المنتدى الرابع للمرأة في البحث العلمي
The 4th Forum for Women in Research

جامعة الشارقة
UNIVERSITY OF SHARJAH

The 4th Forum for Women in Research

"QUWA: Sustaining Women's Empowerment in Research & Innovation"

2023

صاحب السمو الشيخ الدكتور سلطان بن محمد القاسمي

عضو المجلس الأعلى للاتحاد حاكم الشارقة

His Highness Sheikh Dr. Sultan Bin Mohammed Al Qassimi

Member of Supreme Council Ruler of Sharjah

سمو الشيخ سلطان بن أحمد القاسمي

نائب حاكم الشارقة، رئيس جامعة الشارقة

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مدير جامعة الشارقة
الرئيس الفخري لمنتدى المرأه للبحث العلمي

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Honorary Chair of the Women in Research Forum

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Vice Chancellor for Research and Graduate Studies
Honorary Co-Chair of the Women in Research Forum

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رئيس قسم العلاقات المجتمعية للبحث العلمي
رئيس منتدى المرأة في البحث العلمي

Dr. Manar Abu Talib

Chair of Research Outreach Department
Chair of the Women in Research Forum

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College of Medicine, University of Sharjah
Co-Chair of the Women in Research Forum

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Quwa: Sustaining Women's Empowerment in Research and Innovation

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Di Zhang, Sustainability,
Energy, Engineering, University of Sharjah

Karim Zubi,
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Sponsors

Strategic Partner

نـمـاء لـلارتـقـاء بـالـمـرأة
NAMA WOMEN ADVANCEMENT

Nama Women Advancement Establishment (NAMA) was founded in 2015 by His Highness Sheikh Dr. Sultan bin Mohammad Al Qasimi, Member of the UAE Supreme Council and Ruler of Sharjah, and is chaired by Her Highness Sheikha Jawaher bint Mohammed Al Qasimi, Wife of His Highness the Ruler of Sharjah. At NAMA, we are determined to mobilize the means required to create enabling environments to advance gender equity and inclusive economic and social growth. NAMA's efforts stem from its core philosophy that women advancement is a fundamental requirement for the sustainable development of nations. Through its three affiliates; Sharjah Business Women Council, Irthi Contemporary Crafts Council, and Badiri Education and Development Academy, NAMA designs and implements initiatives that support women across the economic, professional and social sectors.
NAMA also engages with grass-roots and international organizations as part of its comprehensive approach towards developing an ecosystem in which women's full potential is realized.

For more information please visit www.namawomen.ae

Energy Partner

Abu Dhabi National Oil Company (ADNOC) is one of the world's leading energy producers and a primary catalyst for the growth and diversification of the Abu Dhabi economy. With a production capacity of more than 4 million barrels of oil per day and around 11 billion cubic feet of natural gas per day, we operate across the entire hydrocarbon value chain. We have a network of fully-integrated businesses for exploration, production, storage, refining, and trading, as well as the development of a wide range of petrochemical products.

Founded in 1971, ADNOC has been responsible for harnessing the UAE's energy resources by meeting the demands of an ever-changing energy market and ultimately transforming our nation. Since our foundation, we have worked tirelessly to honor the legacy of the UAE's founding father by thinking creatively, challenging convention, and striving for excellence in all that we do.

Our work plays a crucial role in Abu Dhabi's global emergence. We have enabled our people to realize their remarkable potential, helped create thousands of jobs, driven economic growth, and invested in education and research for the future.

Our diverse family comprises more than fifty thousand people who originate from the UAE and beyond, with over 100 different nationalities represented across the company. Backed by their unique perspectives and wide-ranging skillsets, our people share a collective responsibility to accelerate progress, both here in the UAE and across the globe.

With an ambitious outlook for the future, we continue to look for innovative ways to maximize the value of our resources, while applying the latest technology, developing mutually-beneficial partnerships, and driving In-Country Value. Together, we are committed to sustaining our positive impact in the communities where we operate and the Abu Dhabi economy for generations to come.

For more information please visit: www.adnoc.ae

Golden Partner

هيئة كهرباء ومياه وغاز الشارقة

Sharjah Electricity, Water and Gas Authority

Sharjah Electricity Water & Gas Authority has witnessed consecutive huge development since its inception as a private company called Sharjah Electricity & Water Resources Co., then its ownership was transferred to Sharjah Government as (Sharjah Electricity & Water Department). With the tremendous economical, industrial and civilization development boom witnessed in the Emirate of Sharjah, His Highness Sheikh Dr. Sultan Bin Mohammed Al-Qassimi, Member of Supreme Council and Ruler of Sharjah issued his visionary decree on establishment of Sharjah Electricity Water & Gas Authority (SEWA) as financially and administratively independent entity, to distribute and generate electricity, water and (piped natural) gas to the nationals and residents of the Sharjah Emirate.

Our Vision

To be among the best Authentic organizations in the world

Our Motto

Reliable, Efficient, and Sustainable

Our Goal

Meeting customer satisfaction through delivery of reliable services of electricity and water and piped natural gas at an excellent level of safety and quality standards in line with the most advanced technologies and under supervision of qualified and skilled workers.

for more information please visit: www.sewa.gov.ae

Golden Partner

Emirates NBD, the leading Banking Group in the MENAT region, was formed on 19 June 1963, when H.H. Late Sheikh Rashid bin Saeed Al Maktoum signed the Charter of Incorporation of the National Bank of Dubai (NBD) which became the first National Bank established in Dubai and the United Arab Emirates (UAE). With the blessings of H.H. Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, NBD merged with Emirates Bank International (EBI) on 06 March 2007, to form Emirates NBD, the largest banking group in the region by assets.

Emirates NBD, became a regional consolidation blueprint for the banking and finance sector as it combined the second and fourth largest banks in the UAE to form a banking champion capable of delivering enhanced value across Corporate, Retail, Islamic, Investment, and Private Banking, Global Markets & Treasury, Asset Management and Brokerage operations throughout the region.

Emirates NBD is an active participant and supporter of the UAE's main development and community initiatives, in close alignment with the UAE government's strategies, including financial literacy and advocacy for inclusion of People with Disabilities under its #TogetherLimitless platform. The Group is recognised for the pioneering efforts in employee volunteering and corporate social responsibility by IMPACT2030, the corporate volunteering arm of the United Nations. Emirates NBD Group is a Premier Partner and the Official Banking Partner for Expo 2020 Dubai.

Currently, more than 25,000 people, representing more than 70 nationalities, are employed by Emirates NBD, making it one of the largest and most culturally diversified employers in the UAE. As a national banking champion, Emirates NBD is an ambassador of economic and social progress for the entire UAE to the world.

Our Vision

To be the most innovative bank for our customers, people and communities

Our Purpose

Create opportunities to prosper

Our Values

Collaboration - Ownership - Drive - Enterprising

For more information please visit: www.emiratesnbd.com

Golden Partner

The Technology Innovation Institute (TII) is a global research center that focuses on advancing knowledge and developing transformative technologies in various fields such as AI, quantum, renewable energy, and more. TII is part of Abu Dhabi Government's Advanced Technology Research Council which aims to attract the best scientific talent and academic partners to develop innovative solutions to society's greatest challenges. The organization follows a rigorous approach to scientific discovery and inquiry, using state-of-the-art facilities, and collaborates with leading international institutions to create a better world.

PURPOSE

We exist to help create a better world. We develop the most advanced, disruptive technological innovations designed to solve society's greatest challenges.

OBJECTIVES

We attract the best scientific talents by offering world-class facilities and resources. We partner with the best academic, and scientific partners by offering access to knowledge and research collected from a diverse, distinguished talent base. We serve the best clients by offering proprietary knowledge and data, a clear path from research to innovation, and a shared commitment to advancing the long-term public good.

What we do

At TII, we help society overcome its biggest hurdles through a rigorous approach to scientific discovery and inquiry, using state-of-the-art facilities and collaboration with leading international institutions.

Today, we have built a research environment focused on solutions and driven by proprietary and partnership research.

For more information please visit: https://www.tii.ae/

Medical Partner

Our Purpose
We're in relentless pursuit of breakthroughs that change patients' lives. We innovate every day to make the world a healthier place. It was Charles Pfizer's vision at the beginning and it holds true today.
Our Responsibility
Our unique resources allow us to do more for people. Using our global presence and scale, we're able to make a difference in local communities and the world around us.
Health Policies
We advance medical innovation and distribute medicines that might not otherwise be available to undeserved communities.
Company Timeline
We're built on a long history of innovation and a proven dedication to help people live healthier lives. Explore the milestones along our journey by Clicking Here.
Annual Review
Pfizer is committed to providing shareholders, potential investors, and the public with a transparent view of our efforts toward fulfilling our purpose: Breakthroughs that change patients' lives. To that end, our annual reports detail the strategic development, operations, and financial condition of our business.
Our Careers
Incredible things can happen when people come together with one shared goal. The future of medicine is happening here, and we're eager to work alongside inspired and inspirational people who want to improve health around the world.

For more information please visit: www.pfizer.com

Golden Partner

GSK is a global biopharma company with the ambition and purpose to unite science, technology and talent to get ahead of disease together.
We aim to positively impact the health of 2.5 billion people over the next 10 years. Our bold ambitions for patients are reflected in new commitments to growth and a step-change in performance.
We prioritize innovation in vaccines and specialty medicines, maximizing the increasing opportunities to prevent and treat disease. At the heart of this is our R&D focus on the science of the immune system, human genetics, and advanced technologies, and our world-leading capabilities in vaccines and medicines development. We will focus on four therapeutic areas: infectious diseases, HIV, oncology, and immunology.

For more information please visit: https://www.gsk.com/en-gb/

Academic Partner

The University of Khorfakkan (UKF) is a not-for-profit institution for higher education established in 2022 by His Highness Sheikh Dr. Sultan Bin Mohammed Al Qassimi, Member of the Supreme Council, Ruler of Sharjah, and President of the University. The University is an autonomous, academic corporate body enjoying financial and administrative autonomy owned by the government of Sharjah. The University enjoys a State-of-the-Art infrastructure for teaching, research, innovation, and community service.
In addition to the currently offered programs in the branch, the University of Khorfakkan is planning to offer new programs in the marine sciences and ocean engineering fields. In addition, UKF will establish a new college named "College of "Marine Sciences and Aquatic Biology". It is planned that this college will represent a national hub for issues related to marine sciences and Aquatic Biology, such as coastal zone management, marine engineering, fisheries, aquaculture, etc.
The university aspires to be a beacon of knowledge through its various programs and highly qualified and experienced faculty. The university also aims to expand its programs to meet the growing demands of the society in the near future.

For more information: https://www.ukf.ac.ae/en/Pages/default.aspx

Entrepreneurship Partner

SHERAA

مركز الشارقة لريادة الأعمال
Sharjah Entrepreneurship Center

At Sheraa, we believe in human potential.
We have faith in humanity's ability to generate positive change, and we are on a mission to unleash a generation of entrepreneurs who will build a better future for our societies and beyond.
Sharjah has long been known for its enterprising spirit. Over twenty years ago, His Highness Sheikh Dr. Sultan bin Mohamed Al Qasimi, Ruler of Sharjah, envisioned this desert city as a center for education. Today, Sharjah is home to an ocean of young, innovative talent.
Sheraa aims to cultivate this pipeline of future change makers by fostering a culture of experimentation and critical thought. We also engage with others in the entrepreneurship community to build a strong and globally-connected ecosystem, and position Sharjah as a vibrant startup hub.
Our programs are tailored to every stage of the entrepreneurial journey, providing the support necessary to turn ideas into reality, and creating a solid foundation on which sustainable businesses and thriving careers can be built.
We look forward to sharing that journey with you.

For more information please visit: https://sheraa.ae/

Speakers

Opening Ceremony

Professor Hamid M.K. Al Naimiy

Chancellor of the University
Professor of Space Astrophysics, University of Sharjah
Founder and President of the Arab Union for Astronomy and Space Sciences (AUASS), 2004–till present.

Professor Hamid M.K. Al Naimiy is the Chancellor of the University of Sharjah. Prior to his appointment as Chancellor of the University of Sharjah on 20th of January 2014, Prof. Hamid Al-Naimiy served as Vice Chancellor for Academic Affairs and Dean of the College of Sciences, UOS, UAE, (2010-2015). Also Prof. Al-Naimiy served as Acting Dean of the College of Arts, Humanities and Social Sciences and Dean of the College of Sciences, UOS, UAE (2008-2010). and served as Dean of the College of Arts and Sciences , UOS, UAE (2006-2008).

Prior to occupying different positions at the University of Sharjah, Prof. Al-Naimiy worked at different universities in the UAE and the Arab world: UAE University, Al Ain, UAE (2001-2006), Al al-Bayt University, Jordan (1994-2001), University of Baghdad (1990 - 1994), Iraqi Council for Scientific Research(1980 - 1989), The Academic Iraqi Scientific Societies (1982-1988), and the Arab Union for physics and Mathematics (1984-1990).

Prof. Al-Naimiy obtained the Bachelor of Science degree in Physics from The University of Baghdad; 1971. He graduated from Manchester University; UK with the Masters degree in Astronomy and Doctoral Degree in Astrophysics in 1975 and 1978 respectively. Prof. Al-Naimiy is well known internationally for his contributions to teaching and research in the fields of Applied Physics, Astronomy and Space Sciences. He has won several regional and international awards in recognition of original research and for innovations that led to advancements in his field of specialization.

Opening Ceremony

H.E. Dr. Maitha Bint Salem Al Shamsi

Minister of State
Advisor to Her Highness Sheikha Fatima Bint Mubarak

Her Excellency Dr. Maitha bint Salem Al Shamsi has joined the Federal Government in 2008 as Minister of State. She presided over the Marriage Fund until February 2016. Between the 2013-2014, she was entrusted with the presidency of Zayed University. AlShamsi is Advisor to Her Highness Shaikha Fatima bint Mubarak. Previously she held several administrative, academic and research jobs at the United Arab Emirates University.
As an expert, Her Excellency Dr. Maitha has participated in several international conferences and she has represented the UAE in several UN organizations such as ESCWA, UNIFEM and UNESCO.
Shw has a number of contributions through her membership in the international, regional and local committees such as Sorbonne -Abu Dhabi University Board , Abu Dhabi University Board of Trustees, the Consultative Council for Arab Knowledge Report, the UNESCO Science Committee for the Arab Countries concerned with Education and Scientific Research, the GCC Office of Educational Research, the GCC Committee for Scientific and Technical Cooperation and the UAEU Scientific Council for the follow up of Mutual Research with the Japanese Cooperation Center for Oil.
Her Excellency Dr. Maitha Al Shamsi holds a Ph.D. in Sociology and she authored several books, research articles and studies in different fields such as demography, development and women and Education.
She received many awards and certificates of appreciation, including: the Order of the Rising Sun, the Gold and Silver Star from the Government of Japan in November 2018, the Academic Palm Medal and a Certificate of Appreciation from the Ministry of Higher Education and Scientific Research in France in appreciation of the efforts in establishing the Sorbonne University in Abu Dhabi 2008, the H.H. Sheikh Mohammed bin Prize Rashid Al-Maktoum for the Arab Administration for “The Distinguished Arab Administrative Woman in the Arab World” 2003.

Opening Ceremony

Prof. Maamar Bettayeb

Vice Chancellor for Research and Graduate Studies

Professor Maamar Bettayeb received the B.S., M.S., and Ph.D. degrees in Electrical Engineering from University of Southern California, Los Angeles, in 1976, 1978 and 1981, respectively.
He worked as a Research Scientist at the Bellaire Research Center at Shell Oil Development Company, Houston, Texas, USA., in the development of seismic signal processing deconvolution algorithms for the purpose of Gas and Oil exploration during 1981/1982. From 1982 to 1988, He directed the Instrumentation and Control Laboratory of High Commission for Research in Algeria, where He led various research and development projects in the field of modeling, simulation, and control design of large scale energy systems, specifically, model reduction, identification and control of computer-controlled systems with applications to nuclear, solar and electric power systems. In 1988, He joined the Electrical Engineering Department at King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.
He has been Professor at University of Sharjah UAE since August 2000. He also held the position of Advisor to the Chancellor for Graduate Studies and Scientific research for the Years 2004/2006 and Director of Research and Studies Center for the Year 2005/2006 at University of Sharjah. He is the Vice Chancellor for Research and Graduate Studies at University of Sharjah, starting September 2014.

Opening Ceremony

Dr. Manar Abu Talib

Chair of Research Outreach Department

Dr. Manar Abu Talib is Chair of Research Outreach Department, Office of Vice Chancellor Office for Research & Graduate Studies at University of Sharjah, UAE. She is also a faculty member at College of Computing & Informatics. Dr. Abu Talib's research interest includes software engineering with substantial experience and knowledge in conducting research in software measurement, software quality, software testing, ISO 27001 for Information Security and Open Source Software. Manar is also working on ISO standards for measuring the functional size of software, and has been involved in developing the Arabic version of ISO 19761 (COSMIC-FFP measurement method). She published more than 100 refereed conferences, journals, manuals and technical reports, involved in more than 700 professional activities and sponsored research activities and supervised 10 Master thesis, 4 PhD thesis and 35 capstone projects. She received the Best Teacher Award two times, the Exemplary Faculty Award in 2008 and 2010, Google CS4HS Award in 2014, QCRI ArabWIC and Anita Borg Institute Faculty scholarships in 2015, outstanding University & Community Service Award in 2016, Exemplary Leader Award in WiSTEM 2016 and Exemplary Leader Award in ArabWIC 2019. She was the Counselor of IEEE Student Branch at Zayed University, 2012-2013 and founder and former CEO of Emirates Digital Association for Women (EDAW111). She is the ArabWIC VP of Chapters in Arab Women in Computing Association (ArabWIC), Google Women Tech Maker Lead, an executive member in UAE IEEE Section & Women in Engineering (WIE), the Sharjah Google Developer Group Advisor, the UAE representative for the COSMIC-FPP Education Committee, Co-coordinator of OpenUAE Research & Development Group and the International Collaborator to Software Engineering Research Laboratory in Montreal, Canada.

Opening Ceremony

Dr. Bashair Mussa is an associate professor of neurophysiology at the College of Medicine, University of Sharjah (UOS-UAE). She received her undergraduate degree and Ph.D. degree in neurophysiology from the University of Melbourne (Australia). She has extensive experience in research with several publications in international peer-reviewed journals and attracted significant research grant funding of almost 1 million AED. Dr. Mussa presented her research outcomes at national and international conferences. Currently, she is the Co-Chair of the 4th Forum for Women in Research, Head of the Global Engagement Department, and Acting Director of the International Mobility Department at the Office of International Relations (UOS-UAE). In addition, Dr. Mussa is the Deputy Director of the UOS Diabetes Center and Coordinator of the MSc in Diabetes Management.

Dr. Bashair Mohammed Mussa

College of Medicine, University of Sharjah

Keynote Speaker

Samar Al-Hameedi

Consultant at NAMA Women Advancement Establishment

Moza Mohammed Al-Khayyal is an accomplished individual whose journey is defined by her dedication to empowerment and excellence. As an Advisor at NAMA Women Advancement Establishment, she has harnessed her expertise to drive positive change in the lives of women. Moza holds a rich educational background, including a Diploma in Education and a Bachelor of Arts in Modern History from UAEU, in addition to multiple training certificates in the fields of development and strategic management.

With a remarkable career spanning diverse roles, Moza's professional trajectory has been marked by milestones. Her journey culminated in her current role as an Advisor at NAMA Women Advancement Establishment, where through her role, she works to enhance opportunities for women.

Moza's dedication has been recognized with the prestigious Sheikha Jawaher Excellence Performance Medal. Beyond accolades, her greatest source of pride lies in her personal achievements as a mother and as a contributor to her family's growth.

Moza's journey is a testament to her unwavering commitment to elevating women's lives and her tireless pursuit of excellence. Her vision, leadership style, and achievements continue to inspire those around her to strive for greatness and positive transformation.

Keynote Speaker

Aneeza Siddiqui

Vice President, Group Ethics and Compliance,
ADNOC Group

Aneeza has extensive legal, compliance and governance experience with top tier private and public sector companies. She currently heads Ethics and Compliance for ADNOC Group and is a strong believer that ethical and legal conduct is integral to the growth and sustainability of any successful business model.

In her previous role as General Counsel and Company Secretary one of ADNOC's operating companies, she significantly contributed to the leadership team, advising on complex operational matters, business continuity objectives, and corporate strategy.

Prior to this, Aneeza worked for Weatherford International, British Petroleum ambit spanned across 23 countries and their global rigs business. She has also worked with British Petroleum and started her career in private practice with a focus on energy. These roles allowed Aneeza to develop cross-jurisdictional expertise, lead on high profile ethics and trade compliance matters and advise on the entire supply value chain.

She is a firm believer that in house counsel should strive to become a true business partner who is agile and able to preclude risk. Aneeza is passionate about and had led several initiatives promoting diversity, inclusion and social governance matters. She is an advisor to the ADNOC Gender Balance Committee and a regular mentor to young Emiratis.

Keynote Speaker

Dr. Ebtesam Almazrouei

Executive director and acting Chief AI researcher for the AI-Cross Center Unit at the Technology Innovation Institute (TII)

Dr. Ebtesam Almazrouei is the Executive director and acting Chief AI researcher for the AI-Cross Center Unit at the Technology Innovation Institute (TII). She is a renowned leader and visionary in the field of artificial intelligence (AI) and technology. With a wealth of knowledge and experience, she has made significant contributions to AI research, development, and innovation in a short time, earning her a distinguished reputation in the industry.

Dr. Ebtesam Almazrouei leadership and expertise have been vital in the successful development of Falcon LLM models (home-built rival to ChatGPT), which significantly outperforms models like BLOOM-62 and GPT-3. Dr. Almazrouei's commitment to pushing the boundaries of AI innovation and her instrumental role led to the development of Falcon 40B and its release it as an open-source large language model (LLM) for research and commercialization that has garnered global recognition. Falcon 40B's exceptional performance has ranked it the number one LLM globally on Hugging Face's leaderboard in May 2023, surpassing competitors such as Meta's LLaMA and Stability AI's StableLM. Additionally, she led the development of Noor, the world's largest Arabic large language model (LLM) model in 2022.

Dr. Almazrouei is recognized worldwide for her contributions to AI and was featured in Leading AI Women in the World in 2023 list, alongside other distinguished women in the field. She is also an advocate for sustainability and AI for Good initiatives, as well as the general chair of Abu Dhabi AI Connect and TPC chair of many IEEE international conferences.

Her contributions extend beyond her work at TII where she leads the big data expert subcommittee of the UAE Council for AI and Blockchain and is a member of the worldwide steering board of the Wireless World Research Forum (WWRF). She is also a member of the Science and Engineering Advisory Board at Sorbonne University Abu Dhabi (SUAD). She is a scientific author, patent inventor, entrepreneur, and renowned speaker, known for her keynote speeches at prestigious summits such as the AI Summit in London, World AI Cannes Festival, and Tech summits.

Keynote Speaker

Afra Al Owais joined SEWA in 2016, leveraging her academic background in Sustainable & Renewable Energy Engineering from the University of Sharjah and her MBA in sustainability from The British University in Dubai. Her performance on strategic projects earned her the opportunity to assume her current role. Over the years, Afra has made valuable contributions to various initiatives, policies, and best practices in energy efficiency and sustainability. Recently, she has taken the lead in driving the Development of EV Charging Stations Infrastructure Regulatory Framework and Roadmap for the Emirate of Sharjah.

Eng. Afra Al Owais

Electricity Distribution Department, SEWA

Keynote Speaker

Saud Al Dhawyani

Chief Technology Officer IT, Emirates NBD

Saud Al Dhawyani is a seasoned technology professional and a CTO for one of the largest banking groups in the Middle East. He has been leading a major component of one of the biggest digital transformation of its kind in the financial services industry. With responsibility for the end-to-end architectural, development and working model transformation, Saud is focused on pioneering cloud computing and architecture transformation as well as other cutting-edge technology trends like DevOps ecosystem, microservices, and events-driven and APIs-centric architecture.

As a UAE National, Saud has extensive private and public sector experience, spanning multiple leading and technical roles in institutions like Emirates NBD as

well as Dubai Courts, NASDAQ Dubai and Commercial Bank of Dubai. Over the last 18 years, Saud's expertise spans technology infrastructure, Security, software architecture, cloud and data. He also has strong academic credentials with an Executive MBA and a Master's degree in Information Systems Management with distinction with honors.

Keynote Speaker

Nadine Tarcha, MD. MSc, is the Country Medical Director for the Gulf region, Pfizer Inc. She serves as the medical affairs lead for the region, providing medical leadership across all clinical categories.
She is responsible for developing and executing the Medical Affairs strategy and leading the Medical Affairs Team in the Gulf to foster important partnerships with Patient Organization, Medical Societies, and other government Healthcare entities. Nadine has long standing interest in medical writing and outcome research and has co-authored several publications. Nadine holds a Medical Doctor degree from the Balamand University and a Master degree in Molecular Biology from the Lebanese American University in Lebanon.

Nadine Tarcha

MD.MSC, Gulf Medical Director, Pfizer

Keynote Speaker

Miriam Zalzala

Site Relationship & Excellence Lead - Middle East North Africa, Pfizer

Miriam Zalzala is a strategic and accomplished leader with more than 20 years of resounding success in providing Medical and research expertise, including experience in protocol development, support and establishment of interventional studies, study design & efficient conduct across Africa Middle East as well as Asia Pacific(Australia, New Zealand), understanding country and site medical and research need and engagement, drug development process, project management, quality and inspection readiness, statistical analysis and management, publication process on global & local level including the associated regulations and standard operating procedures, supporting all various therapeutic areas and expertise.
Demonstrated strong expertise in the following areas
- Site Start-Up, Activation, Initiation, & Strategies
- Clinical Monitoring & Clinical Trial Applications
- Protocol development, Compliance
- Drug Development and Relationship Building,
- Research Monitoring & Operations
- Medical expertise CRO oversight
- Real World Evidence and non interventional studies design, conduct and oversight
- Data Analysis & Interpretation
- Patient Safety & Quality Improvement
- Country and international research regulations and contacts
- Strategic Planning & Execution
- Risk Assessment & Mitigation
- Operational Delivery
- Statistical software and biostatistical concept
- Training & Development
- Site Audits & Inspections, Medical Quality
- Protocol Development and Oversight
- Strategic Alliances & Partnerships
- Clinical Project Management
- Pharmaceutical Knowledge

Track record of success in providing strategic and insightful support to a broad range of academic & institutional research units, clinical research organizations and pharmaceutical research & development with hands-on experience in accomplishing global assignments as well overseeing Middle East, Africa, Australia and New Zealand.

Keynote Speaker

Boyd Chongphaisal

Vice President & General Manager, GSK

Boyd is a seasoned leader in the pharmaceutical industry, currently serving as the Vice President and General Manager for the Gulf region at GlaxoSmithKline (GSK).

Boyd is entrusted with the critical responsibility of translating GSK's strategic priorities into tangible and impactful actions, driving GSK's vision as a global biopharma company with a purpose to unite science, technology, and talent to get ahead of disease together and positively impact the health of people in the Gulf region.

Boyd's leadership philosophy revolves around putting patients first and ensuring their access to innovative medicines and vaccines. He is dedicated to fostering a culture of collaboration, empowering a diverse team, and encouraging a cross functional partnership to drive transformative change within healthcare and pharmaceutical sector.

Previously, Boyd held the position of General Manager for Thailand and ADC markets (Myanmar, Cambodia, Laos, Papua New Guinea) at GSK for nearly 13 years. During his tenure, he demonstrated exceptional leadership and achieved remarkable success in expanding the company's presence and market share in the region.

In addition to his role at GSK, Boyd actively contributes to the industry through his involvement in pharmaceutical trade associations. He served as the President of the Pharmaceuticals Research and Manufacturing Association, where he played a key role in advancing healthcare standards and promoting collaboration within the industry. Furthermore, Boyd's contribution extended to the British Chamber of Commerce Thailand (BCCT), where he served as a member of the Board of Directors, driving strategic initiatives to enhance business relations and foster international partnerships.

Keynote Speaker

Prof. Ahmed Al-Shammaa

Chancellor, University of Khorfakkan

Since August 2022, Professor Ahmed Al-Shamma'a has been serving as the Chancellor of the University of Khorfakkan. Prior to his current role, Prof. Al-Shamma'a held the prestigious position of Dean at the College of Engineering, University of Sharjah, from November 2019 to August 2022. During his tenure, he played a pivotal role in advancing the college's academic and research initiatives, solidifying its reputation as a hub for engineering innovation. Prior to that he served as the Pro Vice Chancellor and Executive Dean at Liverpool John Moores University in the United Kingdom from 2015 to 2019. Prof. Al-Shamma'a has published an impressive 17 patents and over 350 research papers in Scopus-indexed journals. In addition to his research achievements, Prof. Al-Shamma'a is a dedicated mentor and academic advisor. He has successfully supervised and guided 42 PhD students, nurturing the next generation of scholars and researchers. From 2000 to 2005, he served as the Director of 7 European Regional Development Fund initiatives and Sensor City at Liverpool University. Furthermore, Prof. Al-Shamma'a holds memberships in various international societies and accreditation bodies.

Keynote Speaker

Iman Ben Chaibah

Head of the Community Engagement Department, Sheraa

Iman Ben Chaibah heads the Community Engagement department in the Sharjah Entrepreneurship Center (Sheraa). In that role, she brings together the tech founders and SMB founders and cultivates an ongoing sense of community among them under the wing of Sheraa.
This comes after an experience of about 20 years in private sector specifically in IT, along with an experience in running her own business in Media and publishing as she started Sail Magazine 13 years ago to document the social debates and discussions in the community. She then expanded Sail into a publishing house to grow the local book market. Iman was also the Vice President of the Emiratis Publishers Association Board for the years between 2019-2023.
Iman received the UAE's Young Digital Publisher Entrepreneur Award by The British Council, was chosen as a Delegate to the International Achievement Summit in San Francisco, received the Young Entrepreneur Award from Startup Businesses magazine, and received the Arab Woman Award in Literature. Iman has also completed the Magazine Publishing Course in Yale University. She was a fellow in the Rosalynn Carter Journalism Fellowship in Mental Health to spread the knowledge about the issues in this domain through her magazine's platform. Sail Publishing books also received a number of awards and recognitions in the UAE.
Iman was also part of the UAE official delegations to different book fairs and publishing conferences across the globe such as London, Paris, Sao Paulo, New Delhi, and Casa Blanca.

Panel Speaker

Shaikha Dr. Omaima Abdulaziz Alqassimi

College of Business Administration, University of Sharjah, UAE

Dr. Alqassimi's professional journey commenced at the Ministry of Presidential Affairs, where she held the position of Director of Project Affairs. During her tenure, she played a pivotal role in spearheading the groundbreaking "Absher" initiative, which focused on enhancing Emirati participation in the private sector as part of the Emiratization file. Her unwavering commitment to empowering local talent and promoting inclusive economic growth garnered widespread acclaim.

Driven by her passion for knowledge and a desire to deepen her expertise, she embarked on an enlightening academic pursuit in the United States of America. There, she earned her Ph.D. in Business Administration from the prestigious University of Westcliff Irvine in California. Her doctoral thesis, titled "Factors Affecting Oil Producing Countries: A Study on the United Arab Emirates," extensively examined the critical factors shaping the economic landscape of the UAE, particularly in relation to oil production.

Dr. Omaima Alqassimi serves currently as professor of innovation and entrepreneurship in the Business Administration college at Sharjah University. She is widely recognized for her expertise sustainable development, and her steadfast dedication to fostering stability in the Middle East. With a wealth of experience in academia and practical realms, she has made significant contributions across diverse sectors.

Furthermore, Dr. Alqassimi possesses comprehensive expertise in the field of circular economy and its commercial implications. As an esteemed alumna of the Institute of Circular Economy in the UK, she has gained invaluable insights into sustainable business practices and their profound impact on economic growth and environmental preservation.

With her exceptional knowledge, diverse experience, and unwavering dedication to Gulf unity, Dr. Omaima Alqassimi remains a prominent force in shaping economic strategies and policies that pave the way for a prosperous and harmonious future in the region.

Panel Speaker

Prof. Jackie Yi-Ru Ying

Director, NanoBio Lab, IMRE and Infectious Diseases Labs, A*STAR, Singapore

Jackie Y. Ying received her Ph.D. from Princeton University. She was Professor of Chemical Engineering at MIT (1992-2005), Founding Executive Director of Institute of Bioengineering and Nanotechnology (2003-2018), and Director of NanoBio Lab (2018-2023). She is Advisor of Agency for Science, Technology and Research (A*STAR), Singapore.

For her research on nanostructured materials and bioengineering, Prof. Ying has been recognized with the American Ceramic Society Ross C. Purdy Award, David and Lucile Packard Fellowship, Office of Naval Research Young Investigator Award, National Science Foundation Young Investigator Award, Camille Dreyfus Teacher-Scholar Award, American Chemical Society Faculty Fellowship Award in Solid-State Chemistry, Technology Review's Inaugural TR100 Young Innovator Award, American Institute of Chemical Engineers (AIChE) Allan P. Colburn Award, International Union of Biochemistry and Molecular Biology Jubilee Medal, Academy of Sciences of Iran Medal of Honor, Islamic World Academy of Sciences-COMSTECH Ibrahim Memorial Award, Clarivate Analytics Highly Cited Researcher, Turkish Academy of Sciences (TÜBA) Academy Prize in Science and Engineering Sciences, Journal of Drug Targeting's Lifetime Achievement Award, and King Faisal Prize in Science (Chemistry). Prof. Ying is an elected Member of the German National Academy of Sciences - Leopoldina, TÜBA, and U.S. National Academy of Engineering. She is a Fellow of Materials Research Society, Royal Society of Chemistry, American Institute for Medical and Biological Engineering, American Association for the Advancement of Science, Singapore National Academy of Science, Islamic World Academy of Sciences, and U.S. National Academy of Inventors. Prof. Ying was selected by The Muslim 500 in 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 as one of the world's 500 most influential Muslims.

Prof. Ying was elected a World Economic Forum Young Global Leader. She was named one of the "One Hundred Engineers of the Modern Era" by AIChE in its Centennial Celebration. She was an Inaugural Inductee for the Singapore Women's Hall of Fame. She was the inaugural winner of the Mustafa Prize "Top Scientific Achievement Award" in 2015 for her research in bio-nanotechnology. She was the Founding Editor-in-Chief of Nano Today. She serves on the Board of Trustees of Princeton University, and on the Board of Directors of Saudi Arabia's Research, Development and Innovation Authority.

Prof. Ying has authored 390 articles with more than 47,600 citations (h index: 100). Prof. Ying has 200 primary patents granted or pending, 42 of which have been licensed to multinational and start-up companies. She has served on the Board of Directors and/or Advisory Boards of 10 start-up companies and 2 venture capital funds. One of the spin-off companies that she co-founded, SmartCells, Inc., has developed a technology platform that is capable of auto-regulating the release of insulin therapeutic depending on the blood glucose levels. Merck acquired SmartCells, Inc. in 2010, with milestone-based aggregate payments in excess of US$500 million to further develop this nanomedicine for clinical trials.

Panel Speaker

Prof. Fauzia Jabeen

Professor of Management, Abu Dhabi University, ADU Chapter Advisor-Beta Gamma Sigma Honor Society, UAE

Dr. Fauzia Jabeen is a Professor of Management in the College of Business at Abu Dhabi University and a Visiting Professor at Burgundy School of Business, Dijon, France. In addition, she serves as Chapter Advisor for the Beta Gamma Sigma honor society at Abu Dhabi University. She has more than 20 years of experience in teaching, consulting and research in a wide variety of industries including manufacturing, telecom, education, utilities & healthcare. A prolific writer, Dr. Jabeen has published work on behavior, gender studies, innovation, sustainability, knowledge, and performance in leading journals, including the International Journal of Hospitality Management, Journal of Business Research, Technological Forecasting and Social Change, Business Strategy and the Environment.

Outside of the University, Dr. Jabeen has delivered training to leading Middle East companies, including Sheikh Khalifa Medical City, Abu Dhabi Municipality, Mubadala, and Saudi Telecom Company (STC). She has received literary awards and research grants from various UAE and global funding agencies, such as Al Hosn Gas and the Fulbright Scholarship Program, USA. She was honored to receive the Beta Gamma Sigma Chapter Advisor of the Year Global Award in 2018 and 2020, the ADU Distinguished Faculty Award in 2020 and 2022, the 'Outstanding Paper Award' and 'Highly Commended Paper' in 2018 and 2019 from the Emerald Literati Awards, and the Abu Dhabi University Research Fellow Award in 2018.

Panel Speaker

Prof. Ramla Jarrar is a professor at the Mediterranean School of Business with over 15 years of experience in Marketing Mix Modeling, predictive analytics, budget optimization and marketing strategy consultancy. She is a partner at the international Media Agency MEC UK- WPP group and Ohal UK.

Prof. Ramla Jarrar

Founder and CEO of Mass Analytics, UK

Panel Speaker

Dr. Sarah Quershi

CEO of Aero Engine Craft, Pakistan

Dr. Sarah Qureshi is a jet engine inventor, an Aerospace Engineer and a hobby pilot. She has a PhD degree in Aerospace Propulsion Engineering from Cranfield University, UK. She is the co-founder and CEO of Aero Engine Craft Private Limited, Pakistan's first commercial jet engine R&D Company developing eco-friendly, contrail-free aircraft engines for the global aviation industry. Her company is the first of its kind in the world developing a contrail mitigation hardware technology to bring about a revolution in air travel.
In addition, Sarah holds master's degree in the field of Aerospace Dynamics from Cranfield University, UK, and has worked on autopilot for the mid-air refuelling of drones. Sarah is also the inventor of a supersonic commercial aircraft engine. Sarah holds a Private Pilot License and has also learned acrobatic flying while at Cranfield. She is also an expert and ambassador at the Solar Impulse Foundation where she evaluates green solutions for the world. Sarah is considered to be a trailblazer for women in STEM and an inspiration for women leaders in Aerospace around the globe for her leadership role and dynamic professional contributions to her field. Sarah has been listed among the Top 15 global aerospace professionals to follow on Linked In and is ranked among the top 10 most inspiring women of her country. She has received a total of 22 awards both by national and international organizations for her achievements in the aerospace industry. She is also a prominent voice on sustainable aviation in the media and her work has been featured on several international platforms.

Panel Speaker

Prof. Haifa Takruri

Professor, School of Science, Engineering and Environment,
University of Salford, U.K.

Professor Haifa Takruri received a B.Sc. degree in electrical and electronics engineering from Birzeit University, Palestine in 1984, and the M.Sc. and PhD degrees in fluid flow measurement from the University of Manchester Institute of Science and Technology, U.K., in 1987 and 1990, respectively. She is currently a a full Professor with the School of Science, Engineering and Environment, University of Salford, U.K. She supervises a number of PhD, M.Sc., and U.G. projects. She has extensive experience in successfully managing EU-funded projects. Her technical teaching and research focus on integrating networking technologies and instrumentation, in particular wireless sensor networks and their applications in health applications, smart buildings, networked appliances, and energy saving. Haifa has also been working collaboratively with regional and national organisations and industries to address students' employability and the under-representation of women and minorities in SET studies and careers, leading research in the field of gender in SET, investigating the barriers and good practices to the recruitment, retention and progression of women and minorities in SET

Awards:

- In June 2009 she was awarded MBE for services to Women, Black and Minority Ethnic people in Science, Engineering and Technology Education.
- In November 2009 she was elected as the academic representative member of the University Council in recognition of my long-standing work and contribution to the University.
- In March 2010 she was awarded the Ministry of Defense-sponsored Muslim News award for excellence in science, engineering and technology.

Panel Speaker

Mae Al Mansoori

Senior Mechanical Researcher, Technology Innovation Institute in Abu Dhabi, UAE

Mae Al Mansoori received her M.Sc. degree in 2019 in mechanical engineering from Khalifa University, Abu Dhabi, UAE. From 2017 to 2019 she served as a researcher in Aerospace Research and Innovation Center focusing on structural designing of aerospace structures, such as antennas. Currently, she is working as a senior mechanical researcher at the Directed Energy Research Centre, Technology Innovation Institute, Abu Dhabi, UAE and a second-year PhD student at the Faculty of Electrical Engineering at the Helmut Schmidt University / University of the German Federal Armed Forces; applying state-of-the-art mechanical engineering processes to high power electromagnetic sources.

Mae is currently working on switched oscillators studying its application under different systems and environments. She is also applying her background in composites and additive manufacturing in designing and fabricating a novel non-uniform stackable luneburg lens using 3D printing techniques, as well as manufacturing novel ultra-thin radio absorbing material that is affordable and easily manufactured. Furthermore, she is introducing her knowledge in the current electromagnetic accelerator project at the Directed Energy Research Centre, where she leads the Multiphysics analysis to manage the temperature distribution and final velocity of the designed system.

Mae published three journal papers and participated in more than 15 international conferences. In 2020, She received the "Young Scientist Award" from the International Union of Radio Science (URSI) - German Section. In 2022, she was awarded the IEEE Mojgan Daneshmand Grant by the Antenna and Propagation IEEE Society.

Panel Speaker

Captain Aysha Al Hamili

Assistant Director General-Air Accident Investigations,
UAE General Civil Aviation Authority,
First Emirati female pilot UAE

Captain Aysha Alhameli was appointed ADG-AAIS in April 2021, the sole authority of Air Accident Investigations in the UAE. Since then, she has introduced many strategies to position the AAIS within the top organizations globally .

Alhamelli made history at 16 by becoming the first female pilot in the UAE in 1998. This achievement set the stage for her future success in the aviation industry. Alhameli broke the record for being the youngest Permanent Representative in ICAO Council throughout the organization's history. Her tenure at the ICAO spanned over a decade (2009-2020). She led several panels, committees, task forces, and working groups to establish new ICAO strategies and improve the existing ones.

Before that, Alhameli established the Air Transport Department, where she led more than 80 bilateral and multilateral agreements for three years. Her first post at the GCAA was as Air Accidents and Regulations Senior Officer.

In 2019 She was awarded an Honorary Doctorate Degree from Agean University (Greece) for her contributions to the world air transport, Air and Space law post-graduate certificate from Mcgill (Canada), a Master's in Air Transport Management from City University (London), a Bachelor of Social and Behavioral Sciences from Zayed University (UAE). In addition, she holds CPL and ATPL from the UAE and Jourdan.

Panel Speaker

Aisha Sultan Al Mheiri

Scientific office, Government Affairs & Policy Manager
Johnson and Johnson – Middle East

Aisha is the First Emirati to Join Johnson and Johnson Family of companies Globally in April 2017. She was appointed as UAE Scientific office manager. Later in the same year she expanded her role to Regulatory Affairs GCC leading the Hematology and Oncology Therapy Area for Janssen Pharmaceuticals, where she managed successfully to accelerate the launch of many new products in the GCC. In her commitment to the patients to unlock the challenges and bring the latest innovation in medicine to the region. In September 2019, Aisha moved Johnson and Johnson, Government Affairs and policy Manager for Middle east. Due to her Skill in Insights Generation, experience with laws and regulations, external client facing experience, and Cross-functional team Leadership. Where she led many successful projects, initiatives, and MOUs in UAE.

In 2022, she was appointed to be JNJ-Women in STEM and Emiratization ambassador in the UAE. To encourage females to pursue careers in science & support UAE government in their mission to attract talents to private sectors. In the same year, Ayesha was selected to part of ONE YOUNG WORLD program globally and she was the only emirate from UAE working on specific projects with other talents across the globe related to sustainability development goals (SDGs). Also, she was selected to join UAE MOHAP BE BOLD 2022 PROGRAM – First of its kind with other 25 candidates from healthcare working hand in hand to advance with UAE healthcare ecosystem.

Prior to joining JNJ, Ayesha worked at Ministry of Health and prevention in Dubai for six years, under the Department of Drug as a Unit section head for the import and export. She led MOHAP Electronic transformation Phase one in 2014 which included the Import and export system. Phase two expanding the system in 2016 to include the Drug registration system. She also led MOHAP quality control laboratory ISO accreditation project in 2016.

Aisha holds a BSc degree in Pharmacy from the Higher Colleges of Technology - Dubai Women's College in 2011. In addition, she is the first Emirate to have a master's degree in developing pharmaceutical formulations from Dubai Pharmacy College - Dubai in 2016.

Panel Speaker

Dr. Fatme Al Anouti

Professor of Biochemistry at the Department of Natural Science and Public Health, Abu Dhabi, UAE.

Dr. Fatme Al Anouti is a Professor of Biochemistry at the Department of Natural Science and Public Health, Abu Dhabi, UAE. She served as Assistant Dean of the College of Sustainability Sciences and College of Natural and Health Sciences for 6 years before her current role as the Director of the Biotechnology/Nutrigenomics spoke center at Zayed University (ZU), part of the Precision Medicine Virtual Lab Institute. She received many awards during her career like the Exemplary performance award for outstanding faculty. She was acknowledged by the UNESCO and the UAE Ministry of Education for facilitating experiential learning in Africa and for coordinating study abroad programs for Zayed University students at top ranking universities in the world including McGill and LSE. Professor Al Anouti was the first to promote the research ethos among students through the establishment of Undergraduate Research Scholar Program at ZU and encouraging them to engage in international and national conferences and publish scholarly articles with her as co-authors. She had focused throughout her career at ZU on capacity building mentorship to train Emirati students as research assistants and pursue graduate studies.

Her current research focuses on Nutrition and specifically looks at the biochemical and genetic aspects of vitamin D deficiency and its link with other diseases like type 2 diabetes, hypertension, obesity and osteoporosis among UAE nationals and recently Covid-19. She was awarded in 2013 by H. E. Sheikh Hazaa Bin Zayed Al Nahyan, the Abu Dhabi Medical Distinction award for contributions to Public Health and Promotion in the UAE. Her latest research about Vitamin D and Patterns of Covid-19 infection along with pioneer researchers had been acknowledged by the Department of Health/AD Public Health Center and Dubai Health Authority. She had published over 75 articles in high impact journals and co-edited 3 books about undergraduate research in the UAE and Adolescent Health and Wellbeing in the MENA region. She is the chair of the scientific committee for the Annual International Vitamin D conference in Abu Dhabi which had become a unique global platform to exchange research findings pertaining to Vitamin D.

Panel Speaker

Dr. Narjes Haj-Salem

Assistant professor, College of Business Administration, University of Sharjah

Narjes Haj Salem is currently an assistant professor at the College of Business Administration, University of Sharjah, where she is also director of international relations. Before that, she served as Senior Research Fellow at the University of Neuchatel, Switzerland. She was also a lecturer at HEC Montreal and the University of Quebec at Trois-Rivieres, Canada.
Narjes holds a Ph.D. and MSc. from HEC Montreal, Canada. During her Ph.D., she was awarded the FQRSC Doctoral Fellowship, one of Canada's most prestigious doctoral scholarships. Her research interests include customer experience and relationship management, retail and environmental psychology, social marketing, and cross-cultural studies. Her research in these areas has been published in major academic journals, including the Journal of Business Research, Journal of Retailing and Consumer Services, and Journal of Social Marketing. Her work has also been regularly presented at premier conferences.

Panel Speaker

Eng. Khawla Almazrouei currently works at the autonomous robotics research center in the Technology innovation institute. Khawla does research in Computer Vision, Autonomous Robotics, and path planning .
Khawla holds a BSc in Computer Engineering and Artificial Intelligence minor major from the United Arab Emirates University.
Khawla is doing her master's in computer engineering in university of Sharjah, at same time she is a researcher in system prototyping and integration team focusing on perception and fusion of automatous robots, Besides her role, she is the was a part of inspired women's in Masdar city of #AspiretoInspire series.
Khawla authored research articles, and studies in fields such as machine learning , path planning computer vision.

Khawla Almazrouei

Computer Engineer with AI minor Specialization, Technology Innovation Institute

Panel Speaker

Giulia De Masi is currently Principal Scientist at Autonomous and Robotic Research Center at Technology Innovation Institute in Abu Dhabi, UAE. She got her PhD with a thesis on Complex Networks. She was Post-doctoral Researcher in the Polytechnic University of Marche and Visiting Researcher at Hitachi Research Laboratory, in Nara, Japan. In 2008, she started working in the R&D field for the Private Sector (Snamprogetti Center of Excellence, Italy), joining the Department of Advanced Engineering Services and Technology Innovation Projects. She worked in several academic institutions in UAE, before joining the Technology Innovation Institute in Abu Dhabi as Principal Scientist. She has two patents, more than sixty peer-reviewed publications (including journals and conferences) and more than forty reports for Industry. She is IEEE senior member and she has been recently awarded as Women in Engineering (WIE) Propel laureate by IEEE. Her main fields of expertise are Collective Intelligence, Machine Learning, bio-inspired multi-robot systems.

Dr. Giulia De Masi

Principal Scientist, Autonomous and Robotic Research Center,
Technology Innovation Institute in Abu Dhabi, UAE

Panel Speaker

Jennifer is a Senior Researcher in the Autonomous Robotics Research Center of TII, where she focuses her research on communication and coordination for Nanodrones. She holds a PhD in Computer Engineering from the University of Klagenfurt, Austria, and she gained research experience as Post Doc at the Georgia Institute of Technology in Atlanta, US. Besides working in research, she is co-founder of an innovative AI start-up for image anonymization and editing.

Dr. Jennifer Simonjan

Senior Researcher, Autonomous Robotics Research Center, Technology Innovation Institute in Abu Dhabi, UAE

Panel Speaker

Dr. Roqaya Alamiry

Assistant Professor, College of Marine Science & Aquatic Biology
University of Khorfakkan

Dr. Roqaya Alamiry obtained her Bachelor of Science degree in Biotechnology from Sharjah University, showcasing her early interest in the interdisciplinary nature of science. Eager to delve deeper into their chosen field, she pursued higher education at Masdar Institute of Science and Technology, where she completed both her Master's and Ph.D. degrees in Water and Environmental Engineering.

During her Ph.D., her research focused on the development and fabrication of anti-biofouling membranes for water purification, as well as the socio-political aspects of desalination plants. Her work in this area earned her recognition and acclaim, leading to her Ph.D. work being selected as the best among their peers at the Membrane Society of Australia Early Career Researcher symposium (MSA-ECR).

Currently, Roqaya Alamiry holds the position of Assistant Professor at the University of Khorfakkan in the College of Marine Science & Aquatic Biology. Additionally, Roqaya Alamiry serves as the Director of the Central Labs at Khorfakkan University, overseeing the management and operations of these vital research facilities.

Beyond her academic and research pursuits, Roqaya Alamiry remains passionate about making a positive impact on society. She actively collaborates with industry professionals and governmental organizations to bridge the gap between academia and real-world applications, ultimately working towards a more sustainable future.

In her spare time, Dr. Roqaya enjoys reading & writing to explore new opportunities that promote a healthy work-life balance.

Panel Speaker

Dr. Nada Al Feel

Associate Professor of Commercial Law, College of Sharia and Law - Khorfakkan University

حاصلة على شهادة ماجستير في القانون الخاص من كلية القانون – جامعة بغداد، و شهادة الدكتوراه فلسفة في القانون الخاص – جامعة الموصعملت بالتدريس في كلية الحقوق - جامعة الموصل للفترة 2010 – 2014، وفي كلية القانون –جامعة عجمان 2009-2010، وفي كلية القانون – جامعة الشارقة للفترة من 2015 – 2022

حاليا أستاذ القانون التجاري المشارك في كلية الشريعة والقانون – جامعة خورفكان ساهمت بالتقييم و الإشراف على العديد من رسائل الماجستير والدكتوراهتقدمت ببحوث وأوراق عمل في العديد من المؤتمرات والندوات المحلية والدولية

نُشر لها العديد من البحوث في مجلات علمية محكّمة في مجال التخصصلديها العديد من المقالات الصحفية المنشورة

Session Moderators

Dr. Manar Abu Talib,

Chair of the Research Outreach Department, UoS

Dr. Bashair Mussa,

Associate Professor, College of Medical , UoS

Dr. Amina Al-Marzouqi

Vice Chancellor for Students and Branch Affairs, UoS

Prof. Nadia Alhasani,

Dean of the College of Fine Arts and Design, UoS

Dr. Latifa Yousef

Senior Researcher, Technology Innovation Institute

Sarah Darwish

College of Computing and Informatics, UoS

Prof. Haifa Takruri

Professor, School of Science, Engineering and Environment, University of Salford, U.K

Dr. Iman Akour

Associate Professor, College of Computing and Informatics, UoS

Dr. Amira Traish

Assistant Director, Women's Campus, UoS.

Session Moderators

Prof. Eman Abu Gharbieh

Assist. Dean for Graduate Studies, College of Medicine, UoS

Prof. Fatma Hegazy

Colleges of Health Sciences, UoS

Prof. Wegdan Bani Issa

Colleges of Health Sciences, UoS

Dr. Basharia Yousef

College of Engineering, UoS

Dr. Nadia Rashed Al Mazrouei

College of Pharmacy, UoS

Dr. Nadia Rashed Al Mazrouei

Head of Sociology Department College of Arts, Humanities and Social Sciences, UoS

Dr. Fatima Zohra Aouati

College of Sharia and Islamic Studies, UoS

Dr. Thouraya Snoussi

College of Communication, UoS

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Arts, Humanities and Social Sciences

Driving Sustainable Growth in the GCC: The Power of Diversification and Complexity of Creative Industries

Behnaz Saboori

Sultan Qaboos University

Amani Juma Thuwaini Al-Alawi

Sultan Qaboos University

Abstract

Creative industries are generally characterized by their ability to generate economic growth, create employment opportunities, enhance cultural diversity, and contribute to national human and social capital accumulation. According to the United Nations Conference on Trade and Development (UNCTAD) definition, creative industries are at the core of the creative economy and are defined as cycles of production of goods and services that use creativity and intellectual capital as their main input. The importance of creative industries in the national programs of GCC countries is highlighted more than ever before through support and investment in entrepreneurship, innovation, and creative industries. GCC also emphasizes reducing reliance on traditional exports such as oil and gas and diversifying the export baskets. Due to the increasing recognition of the importance of creative industries in the economic development of GCC countries and the need to diversify their export baskets, this empirical research focuses specifically on the role of creative products in the export basket of GCC countries. The objectives of the research are to analyze the dynamics, diversification level, and complexity level of creative products in the export basket of GCC countries, as well as to examine the effect of diversification of creative product exports on the economic growth of these countries. Additionally, the research aims to discuss the necessity of diversifying the export basket of creative products in GCC countries, with a focus on transforming towards higher complexity products, accumulating production abilities, and identifying potential export markets.

PI email: b.saboori1@squ.edu.om

Influence of Ethical Leadership and Talent Management Practice on Employees Innovative Work Behavior: Does Employees Work Passion Matter in UAE Oil and Gas Industry

Nouf Jalal Awad

Abu Dhabi University

Fauzia Jabeen

Abu Dhabi University

Abstract

The UAE economy is undergoing a fruitful transition that necessitates workers developing innovative workplace behavior. The study will focus on the Oil and Gas industry to investigate the relationship between ethical leadership and talent management practice in the innovative behavior of the employees. The research utilizes social exchange (SET) and ability, motivation, and opportunity (AMO) theories to explain the impact of Harmonious Work passion among the employees. The study will help determine the impact of ethical leadership and talent management practice on the innovative behavior of employees considering the mediating role of Harmonious Work passion. In a cross-sectional study design, data were collected from 154 individuals in the Oil and Gas Industry. The results of the study have theoretical and practical implications to promote innovative behavior among workers in the Oil and Gas industry.

PI email: 1081360@students.adu.ac.ae

Sustainable Inclusive Framework Studio (SIF-Studio) for Nurturing Inclusiveness in Higher Education

Smitha Dev

Abu Dhabi University

Mary Goerge Verghese

Abu Dhabi University

Sidra Rafique

Abu Dhabi University

Asmaa Al Hameli

American University Dubai

Abstract

In recent years, the importance of fostering inclusivity in educational institutions has gained significant recognition. Nevertheless, many private educational institutions still struggle to provide inclusive and sustainable learning environments for all students. Inclusive education aims to provide equitable learning opportunities for students of all abilities, ensuring that no one is left behind. However, numerous challenges persist in implementing sustainable inclusive education. This research proposal outlines a comprehensive plan to develop a sustainable inclusive education model that addresses these challenges, promotes diversity, and empowers learners of all abilities. A mixed methodology approach and 2×2 quasi–Experimental Design will be used to study the variables among 500 participants including parents, teachers, and students of determination in UAE. The outcome of this research will be helpful to create a Sustainable Inclusive Framework Studio (SIF-Studio) to implement in order to give educational institutions the tools and resources they need to foster inclusivity among their students.

PI email: Smitha.Dev@adu.ac.ae

Elaboration, Implementation and Evaluation of the Pioneering Moroccan School-Based Prevention Program Against the use of Psychoactive Substances -"HOPE" Program

Btissame Zarrouq

Sidi Mohamed Ben Abdellah University

Salma Ghofrane Moutawakkil

Sidi Mohamed Ben Abdellah University

Karima El Rhazi

Sidi Mohamed Ben Abdellah University

Abstract

This project aims to develop, implement and evaluate the effectiveness of a school-based substance use prevention program. The program is based on the development of life skills. A quasi-experimental study with before-after-intervention measurement among intervention and control groups was designed setting: middle schools located in Fez city, Morocco. Participants: 800 students 13 to 14 years of age and their parents/ tutors. Measurements : A questionnaire will be self-administered pre-intervention, immediately after the end of the intervention, at 6 months and at 18 months follow-up. The primary outcomes are the prevalence of substance use (lifetime prevalence, last 12 months prevalence and last 30 days prevalence); substance use frequency, and the quantities consumed (among regular consumers); acquisition of life skills promoted by the program. The secondary outcomes are the age-of-onset for substance use; knowledge and opinions about substances; attitudes toward substance use; the psychological and physical symptoms associated to substance use (anxiety, stress, depression, insomnia, and violent behaviors) among consumers. Expected results: Preventing drug use or at least delaying its onset Improving life skills, knowledge and attitudes concerning health behaviors and drug use Reducing the prevalence of substance use among users.

PI email: btissame.zarrouq@usmba.ac.ma

Oral History and Place Identity: Local Narrative of Al Ain Sha'abiat

Sahera Bleibleh

United Arab Emirates University

Boshra Taheri

United Arab Emirates University

Abstract

The prominent reputation of Al Ain city is nurtured by its cultural richness, significance charm and increased systemic delicacies since being recognized as a UNESCO World Heritage Site. However, the rapid growth and development of UAE towards the future may affect the connection between the old and current generations in a way that may jeopardize place authenticity and identity. Therefore, documentation becomes crucial action to preserve the identity of the place legacy as grounded in the old neighborhoods, known as Sha'abiat. The study focuses on collecting the story of Al Ain City as per the oral history of the lived experience of the local generation who witnessed the Sha'abiat era, and its spatial transformation. As such, it aims to bridge the gap between physical and social growth in modern times. A qualitative methodology will be adopted in by applying multiple investigation tools. The primary focus of the study is to provide a revolutionary approach to recognizing the "place" and going beyond focusing only on visual interpretive practice to give a deeper approach to everyday life in old neighborhoods. Considering the increased attention of the UAE government on spatial and in-kind aspects of culture, along with local elements of identity, the findings of this research contribute to the UAE 2071 vision and the 11.4 sustainable development goal in "strengthening efforts to protect and safeguard the world's cultural and natural heritage." The urban tales contribute to recalling sustainable practices within the Sha'abiat. Based on emerging lessons, an action plan will be developed to recognize the spatial identity to be aligned with future development.

PI email: sahera.bleibleh@uaeu.ac.ae

Linguoculturological Gender Representations in the Arabian Peninsula Folktales

Ahlam Alharbi

Imam Abdulrahman Bin Faisal University

Lubna Bahammam

Imam Abdulrahman Bin Faisal University

Abstract

Folktales are ideal sources of information regarding the values, ideas, and representations which reflect a national consciousness inherent in a particular culture. This rich, originally oral, literature is understudied in Arabic linguistics and needs to be deconstructed to provide insight into the representation of critical cultural constructs such as gender. The present study aims to explore the linguistic-cultural construction of gender encoded in the forgotten folktales of the Arabian Peninsula. Accordingly, this study will examine two selected volumes of the first and only five-volume collection of 135 folktales documented by Abdul Kareem A. Aljuhaiman (1987) under the title 'Folktales from the Heart of Arabia.'

PI email: amalharbi@iau.edu.sa

Facebook Social Learning Groups as a LMS ? Students' Perspectives on Facebook as a Learning Platform in Higher Education Institutions

Ilham Mansour

University of Khartoum

Abstract

Higher educational institutions are constantly looking for methods to incorporate new technology, such as social media networks, into university courses to improve students' learning experiences. Recently, social networking sites such as Facebook, Twitter, Instagram, WhatsApp, and YouTube have turned out to be a refuge for academics in higher education. The purpose of this study is to investigate students' perspectives on using Facebook social learning groups as an educational platform in higher education. Moreover, the study aims to identify the factors that might affect students' attitudes towards Facebook use in teaching and learning. To that end, quantitative data from undergraduate students at the University of Khartoum was collected through an online questionnaire. The findings offer evidence of students' positive attitudes and satisfaction with their learning experience using Facebook groups for academic purposes. The study sheds light on the potential opportunities of the use of Facebook in higher educational institutes and the advantages it could bring to the learning process and the quality of the student's learning experience. Based on its findings, the study presents suggestions for Sudanese universities to invest in the application of Facebook social learning groups as a formal academic tool, especially in times of closure.

PI email: emansor@gmail.com

Optimal Management of Pomegranate Butterfly in Oman in the Presence of Agro-Tourism and When Government Bears Treatment Costs

Badriya Al Hinaai

Sultan Qaboos University

Ibtisam Al Abri

Sultan Qaboos University

Abdullah Al Sadi

Sultan Qaboos University

Slim Zekri

Sultan Qaboos University

Kelly Grogan

University of Florida

PI email: ialabri@squ.edu.om

Abstract

Omani pomegranate, which dominantly grows in Al-Jabal Al-Akhdhar, is facing threats from pests that are seriously affecting pomegranate production as well as the livelihood of hundreds of farmers who are dependent on its cultivation. The government of Oman has made great efforts to both improve the productivity of this crop and mitigate the risks associated with cultivating it. The first objective of this study is to develop a stochastic dynamic bioeconomic model to obtain the optimal pest control strategy for pomegranate butterflies and optimal replanting age of pomegranate trees. The second objective is to investigate different scenarios of pest status and agro-tourism value. This study is the first attempt that considers the benefits of agro-tourism in the management of agricultural pests. It is also the first study that drives a stochastic dynamic bioeconomic model to analyze a recourse in Arabian countries. The derived model could be directly utilized for other crops or expanded to account for other natural disasters such as disease, fire, and climate change as well as other economic instruments to mitigate agriculture loss such as insurance. The study aims to inform policymakers of the best strategy to maximize socioeconomic welfare. Considering the literature in this context, the study is a unique case where the government undertakes pest control on behalf of pomegranate growers. Findings imply that government could introduce more effective educational programs to ensure that all pomegranate growers are fully aware of pest-resultant damages in order to align socially and privately optimal decisions, thus minimizing externality costs. The government, biocontrol agents' distributors, and pomegranate growers should realize the importance of well-managed and effective pest control program and the consequences of such a program on increasing the production of pomegranate as well as the tourism-related benefits from pomegranate groves.

Exploring Kumzari Place Names: Unveiling Cultural Identity, Environmental Connections, and Preservation Strategies

Dola Algady

Sohar University

Abstract

This research project focuses on Kumzari, a language that is classified as vulnerable by the Endangered Languages Project and seriously endangered by UNESCO. Kumzari is primarily spoken in the Sultanate of Oman, the United Arab Emirates, and Iran. The objective of this study is to investigate the role of Kumzari place names in shaping the community's identity and their profound connection to the natural surroundings, while proposing strategies for the documentation, conservation, and promotion of these place names as an integral part of the community's intangible cultural heritage.

The research will involve an extensive analysis of 100 Kumzari place names, exploring their geographical distribution, linguistic characteristics, and cultural significance. This analysis will be complemented by the collection of stories and myths associated with these place names, providing valuable contextual insights into their deeper meanings and symbolic representations. To ensure a structured approach to categorizing Kumzari place names, Tent and Blair's (2009, 2011) typology will be utilized.

The findings of this research endeavor aim to raise awareness among the community and stakeholders about the importance of Kumzari place names, fostering a sense of pride and appreciation for their linguistic and cultural significance. By preserving these place names, this project strives to ensure the continuity of Kumzari language and culture for future generations. Ultimately, this research project seeks to contribute to the broader goal of cultural diversity preservation and the recognition of the invaluable heritage embedded within Kumzari place names.

PI email: dfalgady@gmail.com

The Influence of Urban Form on Streets Walkability Conditions- Selected Case Studies from Muscat-Oman

Intissar Bouzekri

Sultan Qboos University

Islam Sallam

Sultan Qboos University

Naima Benkari

Sultan Qboos University

Hanan Khatri

Sultan Qboos University

Abstract

Urban form is the physical characteristic of the built-up area, where the urban areas are performing as climate modifiers. A hot and humid city like Muscat, Sultanate of Oman, is an example of a fast urbanized city. It is facing the challenge of livable and walkable urban development, especially in the newly planned residential areas. Cars are dominating newly planned residential areas, severely compromising pedestrian mobility from the side of safety, connectivity, and comfort. On the other hand, peoples' outdoor activities and the usage of urban areas, especially streets, are directly affected by the microclimate and thus impact walkability.

This research investigates the influence of urban form on streets' walkability conditions. It focuses on studying the street fabric of two different residential development in Muscat (Al Khoudh6 and Al Mouj). The study started with a theoretical review to understand the relation between the urban form, microclimate aspects, and walkability conditions and identify their matrices. The literature concluded by preparing an evaluation list that helps compare and evaluate the research's main factors. All the required data for the study at both sites are collected, analyzed, and evaluated to find the relation between urban form, microclimate aspects, and walkability conditions. The study concluded that microclimate and walkability conditions are better in the carefully designed settlement (Al Mouj), due to the proper urban form planning, that implements the critical urban form indicators positively. In addition, results prove that both microclimate and walkability conditions are significantly influencing pedestrian comfort.

PI email: intissarbouzekri@gmail.com

Chaotically-Disengaged Family Functioning and Depressive Symptoms in Muslim University Students: The Mediating Effect of Psychological Flexibility and Self-Compassion

Sabina Ioana Varga

United Arab Emirates University

Zahir Vally

United Arab Emirates University

Abstract

Depression is one of the most prevalent mental health issues among university students. Growing evidence suggests an association between impaired family functioning and increased depressive symptoms. However, there is a gap in the literature with regards to the factors that mediate this relationship. Psychological flexibility and self-compassion are two factors that have been previously linked to both family functioning and depressive symptoms. Thus, further exploration of the associations between these variables in a cohort of university students is a worthwhile investigation. Objective: The present paper proposes a study that aims to investigate the mediation role of psychological flexibility and self-compassion on the association between chaotically-disengaged family functioning and depressive symptoms in Muslim university students. Whilst previous studies have been conducted in this topic area, the majority of research was based in the US. The results of the present study will apply uniquely to the Middle East context. Study Design: A correlational research design is proposed, whereby Muslim university students complete a set of questionnaires measuring chaotically-disengaged family functioning, depressive symptoms, psychological flexibility and self-compassion. To explore the associations between these variables, data analysis will involve correlations and mediation analyses using the bootstrapping procedure (10,000 samples) with bootstrapped confidence intervals (95% CI).

PI email: 202170061@uaeu.ac.ae

Project [AI]phra: An Interpreting Simulator

Nermin Al Sharman

Middle East University

Sahar Othmani

Queen's University Belfast

Abstract

As the world slowly starts adapting to machine-assisted education, there have been countless contributions that aimed to enrich simulated learning in a manner that fits with learning objectives. Translation and Interpreting (T & I) is an industry that has been at the forefront of innovation and inter-disciplinary research to create a hybrid environment for students to train and grow academically and professionally. Nevertheless, as Dong et al. (2019) point out, T&I has only recently started visiting the potential uses of simulated learning on the market-readiness, and the emotional-readiness of their students. Likewise, utilizing games as a pedagogical instrument may not be a new notion, yet the incorporation of gamification within the strategies of teaching and lesson planning in training interpreting students is a fairly budding endeavor. The gaps in research point toward the need for a practice-based approach that supersedes the use of existing technology with specialist, T&I centred technology. Therefore, this study lays the premise for a simulated learning environment created by industry-specialists for the purpose of training students, and newcomers to the industry. This is done by recreating real-life situations, namely in medical and crisis settings to immerse the trainee in metalinguistic aspects of the interpreting task, thus assisting with assessing and improving the quality of educational and professional outputs.

PI email: Nermeen.jsh@outlook.com

Empowering Women to Preserve Local Environment: Opportunities, Challenges and Future Aspirations

Fatemah Abdel-Razek

Ain Shams University

Abstract

The empowerment of women is vital for addressing environmental challenges and achieving sustainable development. This research project explores the opportunities, challenges, and future aspirations related to empowering Egyptian women in environmental preservation. When women actively participate in environmental preservation, opportunities arise. Their involvement contributes diverse perspectives and innovative solutions, fostering community resilience. Egyptian women's leadership in local initiatives improves resource management, conservation practices, and sustainable livelihoods. Empowering women also enhances social inclusivity and equitable decision-making. However, challenges hinder Egyptian women's empowerment in environmental preservation. Gender inequalities limit access to resources, education, and decision-making platforms. Cultural norms perpetuate gender stereotypes, impeding women's participation. Women also face disproportionate vulnerability to climate change impacts, exacerbating gender disparities. To unlock Egyptian women's full potential in preserving the environment, a multi-faceted approach is needed. Providing education, training, and resources enhances women's knowledge and skills. Inclusive policies and institutional frameworks promoting gender equality and women's representation are crucial. Strengthening women's networks and alliances amplifies their voices and facilitates knowledge exchange. The future aspiration is a society where women's empowerment and environmental preservation are interconnected. This requires transformative change at individual, community, and systemic levels. Empowering women fosters sustainable development, environmental justice, and a more resilient and inclusive future for all.

PI email: fatma_abdelrazek1@women.asu.edu.eg

Understanding the Prevalence and Drivers of Gender-Based Violence (GBV) in the MENA Region

Elena Nikolova

Zayed University

Narmeen Almarzooqi

Zayed University

Abstract

Gender-based violence (GBV) is pervasive in the MENA region, yet comprehensive data and understanding of its causes are lacking. This project aims to fill this knowledge gap with three objectives: conducting a rigorous quantitative and qualitative study on GBV in the MENA region using cross-country data and a new survey at Zayed University, mapping gender-based attitudes to GBV experiences in Jordan and Egypt, and creating community impact through workshops and webinars with international organizations and UAE entities. The research utilizes existing surveys like the Arab Barometer and the Demographic and Health Survey, along with a new survey at Zayed University, to analyze GBV's extent, drivers, and individual and community experiences. Cross-country regression analysis and qualitative analysis of focus groups will be employed. Expected results include estimating GBV experiences in the MENA region and the UAE, identifying drivers, and outlining research priorities and policy solutions. The project's website will showcase infographics and visualizations to communicate the results and policy implications effectively. However, the research does have limitations, including the country coverage of the Demographic and Health Survey and the GBV coverage of the Arab Barometer Survey. Moreover, data collected from the Zayed University community may not fully represent the diversity of the UAE or the entire MENA region. Preliminary findings from the DHS data show negative correlations between economic status and education level and GBV experiences in Jordan and Egypt. In conclusion, this research endeavor contributes valuable insights to combat GBV in the MENA region, while promoting evidence-based policies for prevention and intervention.

PI email: Elena.Nikolova@zu.ac.ae

Digitalization, Virtual Work Adjustment and Task Performance in the UAE Public Sector: The Moderating Role of "Role Clarity"

Abeer Saleh Al Teneiji

Abu Dhabi University

Fauzia Jabeen

Abu Dhabi University

Mariam Albreiki

Abu Dhabi University

Shaikha Al Naqbi

Abu Dhabi University

Khalifa Al Kaabi

Abu Dhabi University

Abstract

The purpose of this paper is to investigate the effect of digitalization and virtual work adjustments on the task performance in the United Arab Emirates Public Sector based on Potential Performance Theory (PPT). The study additionally investigates the moderating role of "role clarity" in the relationship between digitalization, virtual work adjustments and task performance in the United Arab Emirates public sector.

This study employs the quantitative method and data were collected through a questionnaire survey administered to 154 employees from various public sector organizations. The proposed model was analyzed through SPSS 28 and Amos 28. The main findings show that, to achieve high task performance, an organization should have options for workplace flexibility and work time flexibility, supported by digital infrastructure

The practical significance of the study lies in the possibility of applying the developed recommendations for the formation and management of virtual teams both in the public sector and in business organizations in the digital economy. It helps managers understand that significant success in activities in the digital economy is achieved by those organizations that understand the main role in task performance.

The findings in this study offer a number of practical implications by offering a greater understanding of the role of clarity in virtual work through digital channels and how these factors affect the employee's task performance.

PI email: 1078489@students.adu.ac.ae

GVCs and Environmental Sustainability in MENA: Do Digitalization and Institutions Make a Difference?

Suzanna Elmassah

Zayed University

Eslam A. Hassanein

Cairo University

Abstract

Currently, the advent of digitalization has profoundly altered the structure of Global Value Chains (GVCs), with implications for environmental sustainability (ENS). Notwithstanding its importance, the dynamics of participation in GVCs, environmental sustainability, and digitalization has not been thoroughly investigated in empirical literature. As part of the ongoing debate over GVCs environmental ramifications, this study aims to propose a novel perspective on reconciling GVCs participation growth goal with emissions reduction goal through embracing two major policy variables as potentially modulatory variables on the GVCs and environmental sustainability nexus. Precisely, this investigation aims to discern whether participating in GVCs is environmentally friendly in the Middle East and North Africa (MENA) region, followed by an examination of the moderating impacts and the threshold levels of two relevant policy variables: digitalization (DIGI) and institutional quality (IQ) on GVCs and environmental sustainability linkages, to determine whether each of them is complimentaryor substitute to GVCs in enhancing/deteriorating the region's ENS. We employ the system GMM on GVCs database from the United Nations Conference on Trade and Development (UNCTAD-EORA MRIO) for 15 MENA countries from 1996 to 2018. We also consider the environmental consequences of both the backward and forward value chains. This study's findings will be immensely helpful in determining how the MENA region can achieve a "win-win" situation of increased GVCs involvement and environmental sustainability by taking digitalization and IQ levels into account when formulating export policies and strategies.

PI email: Suzanna.elmassah@zu.ac.ae

How do Ethical Leadership and Subordinate Ethical Behaviors Influence the Employee Work Values and Innovative Work Behavior?

Mooza Saeed Alaleeli

Abu Dhabi University

Fauzia Jabeen

Abu Dhabi University

Abstract

This study aimed at identifying the influence of ethical leadership and subordinate ethical behaviors on the employee work values and innovative work behavior. This study relied on the data that were collected from 192 employees of government institutions in the UAE. The hypotheses were tested using structural equation modeling. The study results reported that the diversity of dimensions that affect the employee work values and innovative work behavior to include (Ethical Leadership and Subordinate Influence Ethics (SIE) Behaviors), and then it was necessary to study this impact. The results of the study also proved that there is a low level of satisfaction of the study community with the Ethical Leadership represented in: boss being fair and unbiased, boss acknowledges mistakes and takes responsibility for them, fair and objective when evaluating member performance and providing rewards, boss insists on doing what is fair and ethical even when it is not easy, and boss puts the needs of others above his/her own self-interest.

PI email: 1080739@students.adu.ac.ae

Transformative Effects of Innovation Education: Empowering Women and Enhancing Human Capital in the UAE

Malini Nair

Higher Colleges of Technology

Abdul Ghafar

Higher Colleges of Technology

Abstract

The research will contribute to the Women's Research Forum under the innovation category. This study examines the transformative effects of innovation education on students' minds, with a focus on promoting social innovation, developing human capital, and inspiring women to become entrepreneurs. By applying the Teaching and Learning (T&L) aspects to the innovation course, this paper aims to motivate and empower more women in UAE to pursue entrepreneurial endeavors by examining how they have been positively impacted. The authors analyze how entrepreneurship is cultivated, creative and unconventional thinking is encouraged, problem-solving skills are cultivated, growth-oriented mindsets are nurtured, and self-confidence is boosted through the application of T&L in the innovation course.

Furthermore, it acknowledges the UAE's commendable efforts in providing opportunities for its citizens. It recognizes the challenges faced by marginalized segments of society. A vital role of innovation education in addressing these challenges is explored. This is done by empowering marginalized individuals and creating employment prospects.

The findings of this study will serve as a crucial resource for educational policies. They will guide the development of inclusive innovation courses, and contribute to the existing knowledge base on entrepreneurship education within the Emirati context. The findings will be based on a robust qualitative methodology with a case study approach. This will improve the existing knowledge base on entrepreneurship education. The ultimate focus is to foster social and economic inclusivity while enhancing human capital in the UAE.

PI email: mnair1@hct.ac.ae

Ethical Leadership and Unethical Pro-Organizational Behavior: The Mediating and Moderating Role of Moral Development, Moral Attentiveness, and Identification with Leaders

Grazia Spiga

Abu Dhabi University

Fauzia Jabeen

Abu Dhabi University

Osama Ali Alshehhi

Abu Dhabi University

Abstract

Purpose: The focus of the study is to explain the mechanism of the influence of ethical leadership (EL) on pro-organizational behavior (UPOB). Moral attentiveness (MA) and moral development (MD) have been selected as mediators of the above relationship. In addition, identification with leaders (IL) is introduced as a moderator.
Design: Quantitative methodology was employed to collect data through an online survey approach, targeting employees of organizations in the United Arab Emirates (UAE)'s public sector. The survey scope was to empirically test the proposed relationships using the Smart PLS structural equation modeling.
Finding: This study's results indicate a negative relationship between EL and UPOB, however not significant. It shows a positive association between EL and MA, and MA and UPOB. MA is also found as a partial mediator of the EL-UPOB relationship. MD and IL show a positive relationship with UPOB but are not significant respectively as mediator and moderator of the EL-UPOB correlation.
Significance: This study explores the mechanism of how ethical leadership influences unethical pro-organizational behaviors, which is still unmapped by the literature. It attempts to investigate this relationship's dual path mediation impact of moral component and the moderation effect of identifications with leaders. Therefore, the study constitutes a valid addition to the literature while also providing concrete contributions to ethical leadership and moral behavior themes in the UAE public workplaces.

PI email: 1085499@students.adu.ac.ae

Women Empowerment through Educational leadership: the Community Impact of Female leadership on School Culture in the Middle East.

Shakhnoza Shamsuddinova

Westford Education Group

Noor Un-Nisa Shahani

Westford Education Group

Abstract

Evidence increasingly suggests a link between good female school leaders and positive learning outcomes, yet women remain severely underrepresented in school leadership. The underrepresentation of women in school leadership is a challenge in many contexts. Globally nearly seven in ten primary and five in ten secondary school teachers are female but women remain underrepresented in school leadership (Bergmann et al. 2022). In many contexts entrenched gender stereotypes and normative beliefs undervalue women's capacities and potential contributions and continue to pose significant barriers to women's aspirations and achievements. There is little available research that focuses on the ability of women to lead in the context of education, and existing studies tend to focus on high income countries. In low- and middle-income contexts, more research is needed around gender and school leadership to identify the multiple and intersecting barriers to women's entry into leadership positions and to inform policy in this area. But emerging research suggests a correlation between female school leaders and high performing schools. The main aim of this research is to explore correlation between female school leadership and its impact on school culture and community in the Middle East. The paper will also delve into the challenges and barriers women face in accessing leadership positions and design policy frameworks to make an impact in this field.

PI email: shakhnoza@esbfedu.com

Language Acquisition of Expat Arabic Speaking Bilingual Children in the UAE

Fatma Faisal Saad Said

Zayed University

Nadine Jaafarawi

Zayed University

Abstract

Language, and communication are critical areas of development for children. They play a vital role throughout their lives, helping them to understand what is going on around them, communicate their basic needs and feelings, hold conversations, think and learn, develop relationships, solve problems, and more. They also support many other aspects of development, including cognitive, social, and literacy development. In fact, research proved that early language proficiency is highly predictive of children's academic success and personal well-being. We cannot deny the fact that parents play a significant role in children's language development and outcomes at an early age. From that perspective, and in line with UAE's 2030 vision in preparing students to achieve the highest scientific and professional education standards to serve the UAE's future generations, this 12-month longitudinal study seeks to understand the role, nature and contribution social interaction makes to bilingual language development. It is hoped that the findings of this project will allow researchers to create social impact and equip parents to make better, more informed choices to support their children's language acquisition and early cognitive development. By looking closely at current language acquisition patterns, the project offers recommendations that will assist in language proficiency and offers children in the UAE the best linguistic and academic start to their life. The focus is on Arabic speaking children (3-4 years old) in UAE. The project focuses on the acquisition of Arabic (mainly at home) alongside English (mainly outside the home). It seeks to understand how interaction within the home promotes the learning of language. The findings will offer for the first time empirical based implications for Emirati parents, educators, and policy makers, as to how to support the now- common bilingual development of young children in the Gulf region in UAE.

PI email: fatma.said@zu.ac.ae

United Arab Emirates as a Humanitarian Actor and the Syrian Displacement: Qualitative Study

Ayat Nashwan

University of Sharjah

Wafa Barhoumi

University of Sharjah

Noura Alkarbi

University of Sharjah

Fatima Algharbawi

University of Sharjah

Khadija Albalushi

University of Sharjah

Abstract

United Arab Emirates has developed at least four sets of support mechanisms to get involved in responsibility and burden sharing, namely humanitarian aid, stabilization efforts, facilitation of visas to Syrians and crisis responses. First, Its main contribution has been through humanitarian aid inside to Syria and neighboring refugee-hosting countries like Jordan, Lebanon, Iraq, and even Greece. UAE used to be one of the largest contributors of relief aid, more than USD 1.11 billion in the region since the beginning of Syrian crisis. It generously supported establishing refugee camps (e.g. Emirate-Jordanian camp) and basic service infrastructures such as hospitals, clinics, schools, shelters etc. It also contributed to providing livelihood, protection and social services through financial aid. second, UAE joined in and took active role along with Germany and the United States at international long-term support mechanisms such as the Syria Recovery Trust Fund (2013) which aimed at supporting the stability for internally displaced Syrians. Third, UAE extended the visas and facilitated the process for Syrians who had worked and resided there before the conflict. UAE has welcomed more than 130,000 Syrians since the beginning of the Syrian crisis. The remittances of these Syrians often channeled to the internally and internationally displaced Syrian fellows. Lastly, UAE quickly mobilized its aid support to mitigate the humanitarian impact of unprecedented additional crisis as observed during Covid pandemic and earthquake in Syria and Turkey. It can be concluded that with these several action fields, the UAE takes an active stance in humanitarian crisis at the regional scales as observed in Yemen, Afghanistan, Somali, Palestine, Iraq. Besides its humanitarian purposes, the scale and variations of UAE's support to Syrian refugees align with the country's efforts for branding in humanitarian and development aid, meeting sustainable development goals and pursuing friendly international relations. UAE has turned into a truly a humanitarian actor.

PI email: anashwan@sharjah.ac.ae

Exploring Muslim Matrimonial App Usage in the UAE: Motives, Experiences, and Opportunities

Urwa Tariq

United Arab Emirates University

Abstract

The use of matrimonial/dating apps within Muslim society is on the rise as many seek partners beyond their physical and social locality. This trend, which originally began in Western society, has eventually caught up with the UAE as well. The online platforms for meeting potential partners have opened new avenues for Muslim residents within UAE and widened their social networks. In this context, the present research study aims to understand how UAE residents, involving Emiratis seek kinship through digital platforms as well as their motives, challenges, and experiences through an analysis of gratification theory. The study also compares diminishing traditional kinship methods with digital avenues. Personal interviews will be conducted with UAE residents who are seeking marital spouses. Also, interviews will be conducted with the Muslim app creators who focus on Middle East region and understand the market demand, intentions and user demographics along with the success rate. Using these insights, theoretical and managerial implications of the study are discussed, which will help both government officials and scholars to observe the changing UAE trends, societal norms, and digital preferences in the context of spouse selection among UAE residents.

PI email: 201690065@uaeu.ac.ae

Ullman's Experiential Dreamwork Group Approach Versus Islamic Dream Interpretation: An Ethonographic Approach to Dream Narratives in the UAE

Maria Campo-Redondo

United Arab Emirates University

Mai Nasser Ali Azayez Alsheraifi

United Arab Emirates University

Mariam Awad Mehmas Alshamsi

United Arab Emirates University

Abstract

Using an ethnographic, qualitative approach, the purpose of this project is to demonstrate how a dialogue between the Islamic worldview of dreams could be reconciled with the premises of the Western science on the analysis of dream narratives, especially under Montague Ullman's proposed method of dream appreciation. We are interested in unveiling the application of Ullman's approach to experiential dreamwork to a group of Emirati women psychologists in training, and intertwining it with the Islamic understanding of dreams. To do so, we will build on the premises of the psychodynamic approach to dreams and interweave them with Ullman's method. Second, we will unfold the ideas of dream interpretation in Islam. Third, we will document the mental health of Muslim women in the Middle Eastern culture and the practice of dream sharing. Next, we will conduct an in-depth autoethnographic documentation of the dream of a Muslim woman who is in the final phase of her academic training as a clinical psychologist and who receives intensive training in the Ullman's method. We will show the overlaps and sometimes conflicts of the two epistemologies, Western (Ullman) and Eastern (Islamic), in the understanding and treatment of narratives appearing in dreams. The project will present findings and implications for understanding the dynamics of UAE in terms of dream narratives. Future implications for research and application of dream analysis to the counseling of Muslim Emirati women will be contextualized. In addition, specific therapeutic strategies will be proposed to address dream narratives in clinical (e.g., post-traumatic stress disorder patients) and non-clinical (e.g., therapists-in-training) populations.

PI email: mcampo@uaeu.ac.ae

The Role of the Ministry of Community Development in Empowering Emirati Women to Contribute in Attaining Sustainable Development: An Analytic Field Study

Shaimaa Basha

Helwan University
University of Sciences and Technology of Fujairah

Asmaa Hegazy

University of Sciences and Technology of Fujairah

Amal Alsereidi

Ministry of Community Development

Abstract

This analytic field study aims at identifying the role of the Ministry of Community Development (MCD) in empowering Emirati women and achieving sustainable development goals. The field study population consists of all the Emirati governmental institutions that have a role in empowering Emirati women and achieving sustainable development. The MCD is the governmental institution that works directly with the public, and the public go to MCD to benefit from its projects, support, or services. The study uses a random sample of Emirati women who benefit from MCD's services, support, or projects. The analytic sample population consists of websites of Emirati governmental institutions that have a role in the empowerment of women. Since women benefitting from the MCD have been selected for the field study, the MCD website has also been selected to qualitatively analyze its content. It is expected to reach the following findings: MCD focuses on the economic empowerment of women compared to other domains, followed by educational empowerment; and MCD has a main role in empowering women with disabilities in the various domains. The study presents a proposed model for empowering women and activating women's role in the achievement of sustainable development goals.

PI email: shaimaa_basha@arts.helwan.edu.eg

Communication and Business Administration

Economic Performance and the Demand for Foreign Labor in the Oil-Exporting and Labor-Importing States of the Arab Gulf: Case of Oman

Ibtisam Al Abri

Sultan Qaboos University

Omar Al Hinai

Central Bank of Oman

Sara Al Raisi

Central Bank of Oman

Abdullah Al Harassi

Central Bank of Oman

Zeyana Al Jabri

Central Bank of Oman

Maryam Al Maskari

Central Bank of Oman

Abstract

Despite the generally swift economic growth in the Arab Gulf countries, they still face a national problem with the unemployment of nationals. Given the relatively large inflow of foreign labor across these countries, it is essential to study the association between foreign labor and economic growth in the short and long terms. This paper investigates the relationship between economic growth and demand for labor in Oman, considering separately skilled and unskilled labor as well as hydrocarbon GDP and nonhydrocarbon GDP. Additionally, the study conducts formal tests to determine the direction of short-term and long-term granger causality among all variables, at both aggregated and disaggregated levels. A total of 18 Auto-Regressive Distributed Lag (ARDL) models are applied to examine these relationships. In the long term, results indicate that both skilled and unskilled labor have a positive effect on GDP. However, these relationships are negative in the short term due to adjustment to a new country and productivity reasons. Moreover, it is found that once economic conditions flourish, there is an increased demand for skilled and unskilled expatriate labor. When looking at non-oil activities, there is a positive relationship between nonhydrocarbon GDP and total expatriate labor. Specifically, the relationships between nonhydrocarbon GDP and unskilled expatriate labor are highly significant indicating a bidirectional relationship. To address the issue of increasing dependence on foreign labor, several policy measures can be considered, including the development of a skilled local workforce, the enhancement of women's participation in the labor market, the encouragement of private sector growth, the implementation of labor market reforms, and the promotion of entrepreneurship. Ultimately, these findings provide a guide to policymakers in Oman and the Arab Gulf countries on labor market correlations and dynamics so as to initiate effective labor market reforms and promote jobs for nationals.

PI email: ialabri@squ.edu.om

The Impact of Board Gender Diversity on Financial Performance of Non-Financial Companies of the UAE: The Moderating Role of Economic, Social, and Governance (ESG) Disclosure

Noora Al Hosani

Abu Dhabi University

Haitham Nobanee

Abu Dhabi University

Nejla Ellili

Abu Dhabi University

Abstract

This study examines the impact of Board Gender Diversity (BGD) and Environmental, Social and Governance (ESG) disclosures on Financial Performance (FP). Furthermore, we investigated the moderating role of ESG in the association between BGD and FP. Design/methodology/approach: The sample included data on 60 non-financial companies listed on the Abu Dhabi Securities Exchange (ADX) and the Dubai financial market (DFM) from 2012 to 2021. Data were collected from a Bloomberg Terminal. Dynamic panel data regression was employed to study the impact of BGD and ESG on FP.

During the voluntary ESG reporting period, the impacts of ENV and GOV on FP were significant, whereas that of ESG was not. BGD improves the FP of listed non-financial companies when mandatory ESG disclosure is required. However, this relationship was negatively moderated by ESG during adherence to these requirements.

It is recommended that non-financial companies listed in the United Arab Emirates (UAE) practice a more favorable mechanism to enhance BGD when their ESG scores become weaker. Improving BGD practices for non-finance companies with strong or increasing ESG scores will not be effective as it may reduce the strength of the existing association between BGD and FP.

This is the first study to find a negative moderating role of ESG in the relationship between BGD and FP, particularly during mandatory ESG reporting requirements.

PI email: housani@hotmail.com

Antecedent and Outcome of Career Satisfaction of Females Working in the Aviation Industry of the Kingdom of Saudi Arabia: Underpinning the Role of Glass Ceiling, Career Competencies, and Social Support

Farida Saleem

Prince Sultan University

Sofia Mateou

Prince Sultan University

Abstract

Drawing from gendered organization theory (GOT) and career construction theory (CCT) the current investigation aims at examining the link between the glass ceiling, career satisfaction, and job performance of females working in the aviation industry of the Kingdom of Saudi Arabia. Further, we intend to look at support from friends and family members and career competencies as first and stage boundary conditions. Support from friends and family members is proposed as a moderator that helps to attenuate the negative impact of the glass ceiling on career satisfaction and career competencies as a moderator that enhances the positive impact of career satisfaction on the job performance of females. The collected data from females working in the aviation industry of the Kingdom of Saudi Arabia will be analyzed using SPSS, AMOS, and Hayes PROCESS Macro (2018). The results will provide implications for theory and the rapidly expanding aviation industry of Saudi Arabia.

PI email: fsaleem@psu.edu.sa

Buying Fair Trade Because of the Others or Self? The Role of Attitude, Environmental Consciousness, and Gender on Middle Eastern Fair Trade Consumption

Narjes Haj-Salem

University of Sharjah

Abstract

The present study aims to understand the factors driving fair trade consumption in the Middle East. It empirically tested the combined effect of environmental consciousness, social norms, moral obligation, and attitude on the intention to purchase fair trade products, focusing on the moderating role of gender. The data was collected from 252 consumers in the United Arab Emirates. The results of structural equation analysis showed that attitude towards fair trade products had the highest impact on purchase intention, followed by environmental consciousness, social norms, and moral obligation. Notably, the moderating analysis revealed that whereas attitude and environmental consciousness had comparable effects across genders, the impact of social norms on the intention to purchase fair trade products was larger for females than males. Moral obligation, on the other hand, had a significant effect only on males' intention to purchase fair trade products. The study offers valuable insights for marketers and policymakers seeking to promote fair trade products in the Middle East market and highlights the need for tailored marketing strategies that consider gender differences in fair trade consumption.

PI email: nhajsalem@sharjah.ac.ae

Exploring the Motivations and Strategies of Environmentally Aware Emirati Women Managers in Adopting Eco-Friendly Practices

Eman Alnaqbi

University of Sharjah

Abstract

This study aims to explore the motivations and strategies of environmentally aware women managers in their workplaces. A representative sample of 235 women managers from different industries and sectors will respond to a questionnaire and semi-structured interviews. Quantitatively, PLSpredict will be used to analyze the cause-effect relationship between the frequently reported variables. Qualitatively, a thematic analysis will identify key themes and patterns in the participants' reported eco-friendly practices. The results should reveal female leaders' motivations and environmental strategies to support and sustain natural resources. Environmentally aware female managers are expected to be motivated by personal values, social responsibility, and financial benefits. Whereas scholars may benefit from the findings of this study in considering the gender aspect in environmentally-specific servant leadership, policymakers may use the generated findings to develop policies that promote sustainability and support environmentally friendly practices in the workplace.

PI email: U19106185@sharjah.ac.ae

Channelizing Big Data Analytics Capabilities to Achieve Green Competitive Advantage: A Time-Lagged Investigation of UAE Manufacturing Firms

Fauzia Jabeen

Abu Dhabi University

Khalid Mehmood

Hubei Engineering University

Abstract

The firms' adoption and improvement of big data analytics (BDA) capabilities to gain a green competitive advantage (GCA) in the market have recently increased. This makes it important to discover the underlying mechanism influencing the relationship between BDA and GCA, which is missing in the extant literature. A time-lagged design was employed to collect data from 397 UAE manufacturing firms, and study hypotheses were evaluated using Mplus. This study fills the gap in the literature by channelizing big data analytics capabilities to achieve green competitive advantage with the moderating effect of green organizational identity in manufacturing firm's context. The study outcomes have numerous implications that the policymakers and practitioners of UAE manufacturing industries can use to achieve GCA. The BDA approach encompasses novel resources, tools and operating techniques, and advanced technology, which the UAE business firms adopt to identify novel ideas for effective and efficient big data handling. The approach would help the UAE manufacturing firms improve their performance and sustain them for longer in alignment with the UAE sustainability vision.

PI email: fauzia.jabeen@adu.ac.ae

Feminizing The Entrepreneurial Ecosystem: Narratives of Saudi Women Entrepreneurs

Safiya Mukhtar Alshibani

Princess Nourah Bint Abdul Rahman University

Maram Sabri

Princess Nourah Bint Abdul Rahman University

Abstract

This paper captures the lived and changing realities of the entrepreneurial experience of women operating small businesses in Saudi Arabia over the challenging years of the Covid pandemic. The experience and the perceptions of success in the sampled group offers the opportunity for a qualitative view of the local ecosystem, which is an important and emerging research area. Evidently, a major enabler of success has been the nature and extent of institutional and social change. Another enabling factor is the resident entrepreneurial attributes such as resilience and entrepreneurial perseverance in venture creation and the motivational consequences of facing challenges. Conversely, these are easily achieved changes to facilitate greater uptake and business survival.
A longitudinal analysis using the Entrepreneurial Factor Conditions (EFC) identified by GEM research, shows that the 'lived' experiences of female entrepreneurs and their businesses over five years (2018-2023) markedly differs from an expert review. It would suggest different measures are being used to evaluate effectiveness and that policy coherence and objectivity are lacking. Moreover, the paper suggests key features of a healthy entrepreneurial ecosystem, such as R&D, finance, and entry regulations are significantly under-developed, and in several cases gone backwards – internal market burdens, taxes, and bureaucracy. It could be said, these female entrepreneurs succeed despite the structural challenges and could greatly befit too from antecedent conditions such as mentoring relationships and social ties, that are important particularly for novice entrepreneurs.

PI email: smalshibani@pnu.edu.sa

Moderating the Impact of Product Design on Customer Satisfaction by STEM, Design Complexity, and Cognitive Balance: A Machine Learning Boosted Regression Measurement

Rasha Abousamra

Higher Colleges of Technology

Dana Al Hajjar

Higher Colleges of Technology

Osama Dandash

Higher Colleges of Technology

Osama Hosameldeen

Higher Colleges of Technology

Haris Khalid

Higher Colleges of Technology

Abstract

There are many intervening variables impacting the relationship between the work of the designers and the feelings of the customers when they buy the product. The domain of the current research is focused on finding how to measure the impact of these intervening moderating or mediating variables to be able to control the impact on the end-user of the product. The independent variable of this research is the transformation of the modular design into the integral design, the moderating variables in this research are the use of STEM (Science, technology, Engineering, and Math), the level of product design complexity, and the cognitive balance of the designer during the period of designing the product. The dependent variable in this research is the level of potential end users of the product. The research uses a quasi-experimental research design to investigate the change in the level of customer satisfaction between two groups of young designers. The first group is the controlling group and is given the task of improving the product design of a bottle of water as well as the second group. The second group is the experimental group and is affected by the use of STEM and the differences in cognitive balance and design complexity are measured before and after using STEM. At the end of the experiment, the differences in the level of customer satisfaction for each group are measured. The contribution of the research is expected to find a significant impact of using STEM on three other variables in the experiment and they are the cognitive balance of the designer, the level of the design complexity, and the level of customer satisfaction.

PI email: rabousamra@hct.ac.ae

Other Disciplines with Contributions STEM

Towards Inclusive Education in UAE: Practical Framework for Teaching Robotics to Students of Determination

Muna Darweesh

University of Dubai

Saad Amin

University of Dubai

Amjad Gawanmeh

University of Dubai

Abstract

Robotics, coding, and electronics circuit design are one of the competencies for the current century. It starts to be integrated into almost every field. Computational thinking has recently gained interest in Engineering Education. It is defined as a combination of various forms of solving problems related to engineering, mathematics, and science through real-world application. Integrating computational thinking and programming creates a pathway to share ideas and solve problems. Nowadays, coding is not limited to engineers almost everyone in various fields should have basic skills in programming. In addition, people of determination need to be part of this literacy, however, creating an appealing learning environment for this class of students is a challenging task. In this work, we are proposing a games-based approach to educate the student of determination on robotics and coding. The case study includes normal students with the student of determination, providing equal environmental conditions. The project aims to teach students how to design and construct a robot car using basic electronic components, while providing them with the fundamentals of engineering and electronics, in an easy-to-follow and appealing learning environment. To make the experiment a joyful experience for students, they will use their own built cars to compete on a designated race track. To evaluate the effectiveness of the training, a survey will be provided to students to assess their technical background, the acquired knowledge, and their emotional state, before and after the workshop. The sessions went smoothly and positive feedback from all children.

PI email: midarweesh@ud.ac.ae

Design Protection in the Age of Counterfeiting and Digital Era

Nidhi Goya

Royal University for Women

Raed Alnimer

Royal University for Women

Abstract

As a creative expression, fashion design is recognized for its aesthetic and artistic qualities in clothing for both the consumers as well as for the designers. Digital media in today's age has been a driving force for the movement of trends, designs within regions and across the world. (Saardchom & Business School, 2017). The majority of fashion design companies are challenged by problems with intellectual property rights that lie behind this magnificent and fascinating world. Even the most well-known fashion labels have to cope with the problem of counterfeiting.

The fashion industry is a growing sector in the Gulf region and digital media platforms are characterized as highly profitable domains with low investment, for fashion business promotion, in the present economic phase. The research article inquires whether Intellectual Protection, which is meant for artists and designs, is attainable by fashion designers, in the digital age. In addition, the paper also aims to explore the approaches used by fashion designers to protect themselves from counterfeits. No literature has been found focusing on the brand protection strategies being adopted by fashion designers in different regions as counterfeit culture is available in different countries. In order to fill the literature gap, the study will bring forward the scope of counterfeit activity and the anti-counterfeiting strategies in the Gulf region, including Bahrain, Saudi Arabia and UAE. In addition, the study will focus on the regional law and international conventions. The analysis of both national and international laws, for fashion as design and property will be presented to answer how fashion can be protected.

PI email: ngoyal@ruw.edu.bh

DNA-Based Prediction of Human Eye, Hair and Skin Pigmentation Phenotypes for Forensic Purposes in Egyptians

Ghada Omran

Assiut university

Reham Dawood

National Research Centre

Dina Mourad

Assiut university

Abstract

Human pigmentation is a complex trait, probably involving more than 100 genes. Predicting phenotypes using single nucleotide polymorphisms (SNPs) present in those genes is important for forensic purposes aiming to infer some morphological characteristics of unknown crime perpetrators or missing person investigations from any biological samples. However, the multiplex SNPs panels of pigmentation genes were developed for eye and hair and even skin color prediction, achieving high accuracy among Europeans, the mostly studied populations. Its evaluation in admixed populations is important and very deficient in literature, since they constitute a higher frequency of intermediate phenotypes. The proposed project aims to investigate the genetic background underlying the phenotypic pigmentation characters for eye, hair and skin in Egyptians as valuable intelligence databases serving human identification in forensic practice and mass disasters. The main objectives are to analyze relevant SNP markers located within pigmentation genes responsible for eye, hair & skin color. Collection and analysis of genotypic data from a stratified sample representative of most Egyptian governorates will be undertaken. Additionally, quantitative analysis of pigmentation genes involved in skin, eye and hair intermediate colors for possible improved prediction beside SNPs multiplexes (HirisPlex-S 41 SNPs), is another complementary methodology. Procedures will involve, biological samples collection from Egyptian volunteers, DNA extraction and quantitation, SNPs genotyping post PCR and capillary electrophoresis. Comparison of retrieved genotypes with declared phenotypes for sensitivity testing will be carried out afterwards. Quantitative real time PCR will be implemented for linking gene expression levels of pigmentation genes with colors especially intermediate ones.

PI email: ghada.omran@aun.edu.eg

Analyzing Civil Liability in the United Arab Emirates for Damages Arising from Genetically Modified Foods: A Legal Perspective

Enas Alqodsi

United Arab Emirates University

Iyad Jadalhaq

University of Sharjah

Mohammed Elmaknouzi

University of Sharjah

Abstract

Genetically modified foods, commonly referred to as "modified" or "engineered" foods, have proliferated unnoticed in the market. Nowadays, numerous stores, restaurants, and even natural food outlets offer genetically modified food products. Despite the perceived benefits associated with these foods, they pose significant health risks and contribute to the onset of various chronic diseases. Consequently, many countries have taken measures to prohibit the distribution of genetically modified foods due to their detrimental impact on public health and the environment. These substances have been linked to the development of cancer, particularly colorectal and gastric cancers, as well as neurodegenerative diseases like Alzheimer's. The rise in the prevalence of these diseases in recent times has underscored the need for comprehensive research on the hazards of genetically modified foods and the determination of civil liability for individuals involved in their production or circulation. Such research aims to safeguard consumers from both material and non-material damages caused by these products and to establish the necessary legislative safeguards. This can be achieved through an analysis of relevant legal provisions, scholarly opinions, and judicial precedents in the United Arab Emirates (UAE).

The research findings indicate that the current legislative framework falls short in adequately addressing the compensation for damages caused by defective products, including genetically modified foods. This deficiency leads to ambiguity for judges when quantifying compensation and identifying the specific parties responsible for its payment. Consequently, a cycle of uncertainty ensues, particularly concerning genetically modified products, as their adverse effects manifest in the future rather than immediately. To address these gaps, legislative intervention is imperative to rectify the existing deficiencies. The research identifies numerous reasons supporting this intervention and subsequently provides several recommendations for the UAE legislature. These recommendations aim to strike a balance between the UAE's aspirations to become a global leader in the Food Security Index by 2051 and ensuring consumer safety and protection against the potential hazards associated with genetically modified foods.

PI email: enas.alqodsi@uaeu.ac.ae

Namaq: An OCR System for Printed Historical Arabic Documents

Shahad Al-Khalifa

King Saud University

Noura Alqasim

King Saud University

Reema Aldawood

King Saud University

Sarah Alkhalawi

King Saud University

Atheer Alkhamali

King Saud University

Seetah Alsalamah

King Saud University

Abstract

Nowadays, libraries are filled with historical Arabic books. These books are valuable with various categories of information in different fields. They must be digitized to preserve historical documents and make them available to the public. This prompted many researchers to focus on and investigate this topic. Previous studies have been beneficial to the community, as transactions have been transformed from paper to digital form. This transformation made it much easier for people to work with documents and edit them according to their needs. This research developed an OCR system for the digitalization of Arabic historical books, using Deep Convolutional Neural Network (DCNN) Combined with Bidirectional Long Short-Term Memory (Bi-LSTM) with Connectionist Temporal Classification (CTC) Loss Function. Our data was selected from KITAB Corpus and applied to train the deep learning model. The outcome of this work shows that the proposed system achieved 41.38% WRR and 80.18% CRR on the testing set.

PI email: 441200904@student.ksu.edu.sa

Category 2

Medicine

Health Sciences

Pharmacy

Dentistry

Medicine

A Feasibility Randomized Controlled Superiority Trial of Fluticasone-Vilanterol Once Daily Use for the Treatment of Mild Asthma in Adults

Ghufran Jassim

RCSI Bahrain

Maria Morcos

RCSI Bahrain

Maev O'Connell

Fatima College Abu Dhabi

Wayne Cunningham

RCSI Bahrain

Abstract

Background: Asthma, a chronic condition characterized by episodes of inflammation of the airways causing difficulty breathing and decreased lung function, is a serious burden to global health. Worldwide, asthma affected an estimated 262 million people and caused over 455,000 deaths in 2019 Current asthma management focuses on reducing airway inflammation through the administration of inhaled corticosteroids (ICS) in combination with either short- or long-acting beta-agonists (SABA or LABA, respectively). However, recent international guidelines now recommend LABA+ICS instead for the treatment of mild asthma.
Objective: To explore recruitment, randomization, intervention, retention, and acceptability of this RCT, and to investigate the superiority of effectiveness of fluticasone-vilanterol (LABA+ICS) in the management of mild asthma in adults compared with usual care.
Methods: This trial will be a parallel two-arm randomized open-label controlled study that will be conducted in a primary health care center in Bahrain. We anticipate recruiting 100 currently with mild asthma and assigning them to an intervention group consisting of fluticasone/vilanterol once daily use, or a control group that will receive usual care which is albuterol as needed. We will then follow up and assess the quality of life and asthma control using standardized questionnaires over the duration of 12 months.
Anticipated results:It is anticipated that the interventional treatment will be superior to the usual care in terms of asthma control, exacerbation, and quality of life.
Community, clinical, and research impact: We hope that this study will help support local efforts to update clinical treatment guidelines to be consistent with international recommendations for the treatment of mild asthma. We believe it will lead to better control of mild asthma and reduce the number of asthma exacerbations setting the foundation for further randomized controlled trials in asthma treatment in the Middle East.

PI email: gjassim@rcsi-mub.com

Exploring microRNAs as Potential and Novel Diagnostic Biomarkers for Molecular Apocrine Breast Cancer

Rihab Nasr

American University of Beirut

Ghada Chamandi

American University of Beirut

Abstract

Background: Breast cancer (BC), is a heterogeneous disease. Molecular Apocrine Breast Cancer (MABC) is a poorly diagnosed subtype, characterized by estrogen (ER) and progesterone (PR) receptors negativity, HER-2-amplification in most cases and overexpression of androgen receptor (AR). Unfortunately, MABC does not benefit from existing targeted therapies. Therefore, a sensitive tool like miRNAs, that enables better MABC classification and diagnosis is essential.

Methods: An in silico analysis of miRNA profiling data sets on BC patients in the Cancer Genome Atlas (TCGA)was completed. A validation set of 111 ER- BC samples was used. qRT-PCR was performed to characterize MABC tumors apart of Triple Negative Breast Cancer (TNBC). miRNA profiling, was done for differentially expressed miRNAs using miRCURY LNATM miRNA PCR assay. RT-qPCR to assess target gene expression regulated by miRNAs, and functional assays are in progress on in vitro, MABC and TNBC models.

Results: TCGA data analysis indicated MABC as a separate entity based on gene signature. MiRNA-seq data analysis depicted a set of significantly deregulated miRNA (log2 fold change> 1, $P<0.05$) between MABC and TNBC. We identified 27 MABC HER2-, 51 MABC HER2+, and 53 TNBC samples. miRNA profiling showed significant upregulation in miR-2115-3p and miR-187-3p in MABC compared to TNBC. Overexpression of these miRNAs significantly downregulates in silico predicted target genes (FGF2, HMGCS1, and ADAM12) implicated in carcinogenesis in the models used.

Conclusion: MABC has a unique signature of miRNA as compared to TNBC. These identified miRNAs, can potentially serve as biomarkers to effectively diagnose, prognose and treat MABC.

PI email: rn03@aub.edu.lb

Inhibition of Endoplasmic Reticulum Stress to Mitigate Renal Pathology in a Mouse Model of Hindlimb Unloading

Gopika Menakkath

University of Sharjah

Anu Ranade

University of Sharjah

Rizwan Qaisar

University of Sharjah

Abstract

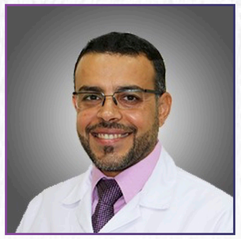
Background: Prolonged bed rest due to various diseases can induce renal damage; however, the associated molecular mechanisms remain poorly known. The potential contribution of chronic protein dysregulation by endoplasmic reticulum (ER), termed ER stress, to acute and chronic renal dysfunction is recognized in several diseases but remains elusive in individuals with prolonged bed rest.
Objectives: We have already established a mouse model of prolonged bedrest (hindlimb unloaded or HU mice). Here, we aim to establish a mechanistic association of ER stress with renal damage in HU mice. We hypothesize that elevated ER stress contributes to renal damage in HU mice. To test this hypothesis, we will pharmacologically block ER stress with 4-phenyl butyrate (4-PBA) in HU mice and dissect its effects on renal microarchitecture and global molecular profile.
Material, Methods & Preliminary results: We will divide male c57B6/j mice into ground-based controls and HU mice treated with vehicle or 4-PBA for three weeks. At the end, mice will be euthanized, and kidney tissues will be investigated for microarchitecture and global molecular profiling, including transcriptomic and proteomic analysis to identify novel genes driving renal damage in HU conditions.
Preliminary Results: Our preliminary data indicate an HU-induced disruption of renal microarchitecture along with elevated ER stress. Specifically, we found an HU-induced hypercellularity and widening of renal glomeruli along with congestion of capillaries and obliteration of Bowman's space. These changes were partly reversed by treatment with 4-PBA.

PI email: pt_gramachandran@sharjah.ac.ae

Understanding the Role of Autoantibodies in Recurrent Pregnancy Loss

Narjes Saheb Sharif-Askari

University of Sharjah



Rabih Halwani

University of Sharjah

Noha Ahmed Mousa

University of Sharjah

Shirin Hafezi

University of Sharjah

Abstract

Recurrent pregnancy loss (RPL) is one of the most challenging areas in reproductive medicine because an estimated 50 percent of cases of recurrent pregnancy loss have no clear etiology, and few treatment strategies are based on evidence. There has been considerable research dedicated to demonstrating the role of antiphospholipid and thyroid autoantibodies in binding to trophoblasts, endometrial endothelial cells, and stromal decidual cells as a cause of placental dysfunction and abnormal implantation in pregnancy. However, less is known about other potential antibodies that could result in RPL. The aim of our project is to identify the autoantibodies of predisposition to repeated pregnancy loss (RPL). We propose to recruit and characterize RPL cases of unknown etiologies. We will test the hypothesis that autoantibody directed against the placenta and decidual tissue causes tissue toxicity and apoptosis, resulting in early pregnancy failure. We propose screening for known autoantibodies, such as antiphospholipid and thyroid antibodies by ELISA, and novel autoantibodies using protein microarray to test this hypothesis. Patients will be recruited, and blood will be collected. Protein microarray screening for more than 1600 targets will be performed and analyzed to detect novel autoantibodies predisposing to the observed recurrent pregnancy loss. Subgroup analyses will be performed to cluster the RPL patients based on the autoantibody panel, which could then identify the underlying pathogenesis and potential treatment.

PI email: nsharifaskari@sharjah.ac.ae

Smoking and Genetic Risk Variation in Saudi Males

Mona Alsheikh

Imam Abdulrahman Bin Faisal University

Seham Alsaif

Imam Abdulrahman Bin Faisal University

Maiadah Alfares

Imam Abdulrahman Bin Faisal University

Abstract

Evidence has shown that smoking behavior and nicotine dependence are affected by genetics. Although the environment may affect smoking initiation, persistence of smoking, heaviness of smoking and dependence on nicotine are hereditary. This is supported by concordance in twins. Variant genes on chromosome 15q25 were shown to be associated with nicotine dependence, lung cancer and smoking-related diseases. Smoking behavior among Saudi Arabians are very high in percentage. The detailed literature survey found no studies on the genetic analysis specific to variants associated with heavy smoking behavior among Saudi males. The gap in the literature was considered and a case–control study is being designed to identify the Genetic predisposition factors or the DNA variants that significantly influence on the heavy smoking behavior among male Saudi Arabians using DNA exome genotyping microarray. Participants will be enrolled, and blood samples will be collected from 100 Saudi males heavy smoking behavior and 100 Saudi males without any smoking behavior (participants with past smoking behavior will be excluded). Genetic zygocity in 250,000 exonic variation sites in gDNA will be screened using iScan. We have recently conducted research on male Saudi smokers and found out that smoking affected cognitive ability on 3 tests out of 8 Cambridge Cognition Ability tests and that it affected nerve BDNF values. We obtained 3 questionnaires from each smoker; health status, socioeconomic status, smoking history, physical activity (IPAQ), and Pittsburgh sleep quality index (PSQI). We are planning to use the same sample to obtain microarray DNA analysis.

P.S.: Our previous research, " The effect of smoking on cognition as measured by Cambridge Neuropsychological Test Automated Battery (CATNAB) and brain-derived neurotrophic factor plasma levels", has shown significant deterioration of performance of smokers in 3 out of 8 cognitive ability tests as compared by nonsmokers. The study was performed on young male adults with short smoking history (Al-Mshari AAS, AlSheikh MH, Latif R, Mumtaz S. The effect of smoking on cognition as measured by Cambridge Neuropsychological Test Automated Battery (CATNAB) and brain-derived neurotrophic factor plasma levels. Saudi medical journal. 2020;41(12):1308-14).

PI email: msheikh@iau.edu.sa

Comparative Histological Study of Mesenchymal Stem Cells Derived Exosomes versus Platelet Rich Plasma Derived Exosomes on Regeneration of Sciatic Nerve Crush Injury in Adult Male Albino Rat

Ayat Abdelnaby

Ain Shams University

Abeer Abdel Mohsen Abdel Samad

Ain Shams University

Ghada Galal Hamam

Ain Shams University

Sarah Abdel Gawad Elsebay

Ain Shams University

Abstract

Mesenchymal stem cells and platelet rich plasma have been widely investigated and exhibited a promising potential for the treatment of various types of tissue injuries. Exosomes are nano-vehicles of intercellular communications and now they represent a promising non-cell-based treatment modality. This study aims at comparing the effect of exosomes derived from either mesenchymal stem cells or platelet rich plasma on the regeneration of sciatic nerve crush injury in rats.

PI email: ayaatabdelnabi@med.asu.edu.eg

Isolation of Bacterial Pathogens from Mobile Phone Surfaces and their Antimicrobial Resistance Profiles

Tasneem Alameri

Higher Colleges of Technology

Asma Al Katheri

Higher Colleges of Technology

Sara Madhi

Higher Colleges of Technology

Fatoon Saleh

Higher Colleges of Technology

Tabarak Alhajeri

Higher Colleges of Technology

Shamshul Ansari

Higher Colleges of Technology

Abstract

It is an undeniable fact that bacterial infections are increasing uncontrollably. Mobile phones can be a means of transmitting diseases, especially for medical field students and healthcare providers. This is because their mobile phones are easily and quickly contaminated due to their constant contact with patients and direct handling of equipment and patient samples. So, medical field students and healthcare providers can contribute to the spread of nosocomial infection to patients, their families, and society. Through this study, bacterial contamination of mobile phones is identified for medical students and health professionals in the field. It will also identify bacterial isolates and their resistance to antibiotics, which will help to educate medical students and health professionals about the appropriate and correct habits of using mobile phones in hospitals and health centers. In this study, we will use a correlational design to examine the association between hospital training and bacterial contamination of mobile phones among medical laboratory and paramedic students. For this purpose, swabs from 517 mobile phones of students will be collected and a series of laboratory tests will be performed in addition to a survey that will study the habitual practices of the research sample to determine the bacterial contamination and the factors influencing it. On the other hand, there are some limitations in this study: The sample may not represent all healthcare workers and the population of medical students, and the sampling method is a non-randomized sample, which gives an unfair advantage to certain members of a community.

PI email: H00414139@hct.ac.ae

Comparison of Exercise Capacity and Hemodynamic Parameters between Different Phases of Menstrual Cycle in Young Saudi Females

Razan Alfakher

Islamic Azad University

Lujeen Alghourab

Islamic Azad University

Batoul Alsaffar

Islamic Azad University

Zahra Al Muailu

Islamic Azad University

Lubna Al Asoom

Islamic Azad University

Seham Alsaif

Islamic Azad University

Abstract

Background: Female sex hormones have a role in regulating menstrual cycle. It is well-established that hormones' fluctuations throughout the month have an effect on body temperature. Yet, the impact of different phases of menstrual cycle on blood pressure and exercise capacity is not well-documented, and previous studies have given conflicting results. Therefore, this study is a cross sectional that aims to elicit the impact of different menstrual cycle phases on hemodynamic and exercise capacity parameters.

Methods: This study was conducted in 21 Saudi, females, aged 18-25 years old, with a normal body mass index, studying in Imam Abdulrahman Bin Faisal University, Dammam, Kingdom of Saudi Arabia. The participants were instructed to perform maximal exercise test using cycle ergometer in each of the three different menstrual phases. During the study, the hemodynamic parameters including systolic and diastolic blood pressure, heart rate, and oxygen saturation were measured before, during, and after the exercise test using vital signs digital monitor and mercury sphygmomanometer. While exercise capacity was expressed in term of time till exhaustion and maximum oxygen consumption (VO2max) which was calculated using Polllock formula.

Results: All-inclusive, the study results showed that there were no significant differences on hemodynamic parameters and exercise capacity during different menstrual phases, using one-way repeated measures ANOVA and Freidman test for normally distributed and skewed variables, respectively.

Conclusion: This study concluded that despite the effect of hormonal fluctuation during different menstrual phases on hemodynamic parameters and exercise capacity, there was no significant difference between the three menstrual phases.

PI email: razan.ali.alfakher@gmail.com

Culture of Human Mesenchymal Stem Cells for Prospective use in Regenerative Medicine

Halima Albalushi

Sultan Qaboos University

Mohadese Boroojerdi

Sultan Qaboos University

Abstract

Mesenchymal stem cells (MSCs) have emerged as a great promise in the field of regenerative medicine. These cells have a stable genome and are able to self-renew and differentiate into multiple lineages of the mesenchyme. Their potential uses as therapeutic agents are based on their role in tissue repair and immunomodulation. These cells have great potential in treating many diseases (Han et al. 2019). However, these cells must be propagated in vitro to be produced in clinical grade as they are present in small numbers in the bone marrow, umbilical cord, adipose tissue and other sources. In vitro culture and expansion of MSCs needs to be done in conditions devoid of any animal or serum products to ensure the safety of the patients after transplantation. Xeno-free culture conditions have been developed as the demand for the clinical application of human MSCs (hMSCs) has increased. We have shown in our work the suitability of xeno-free and serum-free culture conditions in stabilizing and promoting human embryonic stem cells (Albalushi et al. 2018) and human induced pluripotent stem cells (Panula et al. 2019) culture and expansion in vitro. However, in regard to hMSCs, studies are inconsistent about the influence of the xeno-free culture conditions on the hMSCs. Studies demonstrated variation in the influence of xeno-free culture conditions on hMSCs and recommended testing xeno-free conditions prior to use for clinical application (Bui, Nguyen, and Than 2020).

Moreover, extracellular matrix components have been shown to enhance and stabilize the characteristics of stem cells cultured in vitro. Among this component is laminin 521 which we have shown its positive effects on stabilizing and improving pluripotent stem cell culture (Albalushi et al. 2018). In this study we aim to produce, for the first time in Oman, hMSCs from different resources in a condition that permits their future use in the clinic. Furthermore, we aim to investigate the effect of laminin 521 as an initial step prior to shifting to the bioreactor for the expansion of the cells in a GMP (Good Manufacturing Practice) set up in the future.

PI email: halima07@squ.edu.om

IGF-1 as a Biomarker for Type 1 Diabetes-Associated Hypoglycemia Unawareness

Ankita Srivastava

University of Sharjah

Bashair M Mussa

University of Sharjah

Abstract

Hypoglycemia unawareness (HU) is a potentially life-threatening complication of diabetes mellitus (DM) characterized by the inability to perceive and respond to low blood glucose. It is seen more commonly in patients with type 1 DM as a result of failed counter-regulatory responses and less commonly in patients with type 2 DM due to iatrogenic hypoglycemia. Recurring episodes of HU have severe implications on the central nervous system, resulting in hypoglycemia-associated autonomic failure. Together, these complications can impose a heavy burden on the socioeconomic status of a country. In the past decade, the local population of the United Arab Emirates (UAE; Emirati) has shown a drastic increase in the prevalence of DM owing to risk factors such as obesity, a sedentary lifestyle, and consanguineous marriages. This calls for an urgent need for precise interventions enabling early detection, prevention, and successful management of DM and its associated complications. One potential candidate for early identification of HU is the insulin-like growth factor 1 (IGF-1), a hormone primarily involved in growth and development. Interestingly, it shares more than 50% of structural and functional homology with insulin, playing critical roles in glucose metabolism. It has been implicated in various aspects of diabetes pathophysiology; however, its specific role in diabetic complications remains unclear. Therefore, understanding the role of IGF-1 in T1DM-associated complications through genetic and transcriptomic analyses may have important clinical implications that could lead to the development of novel therapeutic approaches targeting the IGF-1 pathway. This could help improve awareness and prevent the potentially life-threatening consequences of hypoglycemia in patients with diabetes.

PI email: asrivastava@sharjah.ac.ae

Innovative Approaches in Targeting Glioblastoma: Exploiting DNA Polymerase Alpha Inhibition and Proteomics

Nadine Darwiche

American University of Beirut

Firas Kobeissy

Morehouse School of Medicine

Berthe Hayar

American University of Beirut

Abstract

Glioblastoma Multiforme (GBM) is the most fatal form of malignant brain tumor. Despite the available GBM therapies, the median survival rate does not exceed two years, pressing the need for novel therapies. The adamantyl synthetic retinoid ST1926 induces apoptosis and growth inhibition in different cancer types. We have shown that ST1926 is an inhibitor of the catalytic subunit of DNA polymerase alpha (POLA1), which is involved in initiating DNA synthesis in eukaryotic cells.

POLA1 levels are elevated in GBM versus normal brain tissues and in GBM cell lines. This suggests POLA1 as a relevant and attractive target for ST1926 in GBM. We studied the antitumor effects and mechanism of action of ST1926 in human GBM cell lines. We further explored the global protein expression profiles in GBM cells using liquid chromatography coupled with tandem mass spectrometry to identify new targets of ST1926. Low sub-micromolar concentrations of ST1926 potently decreased cell viability, induced cell damage and apoptosis, and reduced POLA1 protein levels in GBM cells. The proteomics profiles revealed 197 proteins significantly differentially altered upon ST1926 treatment of GBM cells involved in various cellular processes.

We aim to develop a novel approach to target GBM by exploiting the use of POLA1 inhibitors and proteomics. These identified new targets may become potential biomarkers for novel strategies for treating GBM.

PI email: nd03@aub.edu.lb

Predictive Value of Toll-Like Receptors and Myeloid differentiation factor 88 Signaling Regarding the Response to Bacillus Calmette Guérin Intravesical Therapy in Patients of Non-Muscle Invasive Bladder Cancer

Aya Adel Zahran

Mansoura University

Ahmed Abdulrahman Shokeir

Mansoura University

Mohamed Saad Serria

Mansoura University

Abstract

Background: Bladder cancer is the ninth most prevalent cancer worldwide. About 75% of patients newly diagnosed with bladder cancer suffer from non-muscle-invasive cancers)NMIBC). However, NMIBC is marked by frequent local recurrences and is more likely to progress to muscle-invasive bladder cancer (MIBC), which is more deadly. BCG following transurethral resection of a bladder tumor is considered a part of the standard treatment of NMIBC. Unfortunately, a large fraction of patients display BCG failure and progression to the lethal MIBC that is treated by radical cystectomy. Therefore, there is an urgent need to discover novel immunological markers that predict whether the patients receiving BCG immunotherapy will be responders or not as in case of non-response the treatment will be shifted immediately to chemotherapy before progression to the deadly muscle-invasive bladder cancer.

Objectives: A key objective of this project is to discover molecular signals that drive the immune response following BCG induction in non-muscle-invasive bladder cancers.

Patients and Methods: Patients with NMIBC who were treated by transurethral resection of bladder tumors will be evaluated for study eligibility. Tissue samples from patients will be collected and analyzed for TLR2, TLR4, MYD88, and NFKB using quantitative reverse transcriptase polymerase chain reaction. An analysis of polymorphisms in TLR2 and TLR4 will be conducted using polymerase chain reaction-restriction fragment length polymorphisms (PCR-RFLP). Immunohistochemical analysis of TLR4 and MYD88 tissue proteins will be performed.

Expected goals including clinical impacts: Defining valuable molecular biomarkers underlie the response to intravesical BCG in non-muscle-invasive bladder cancer. If the immunological markers levels increased, this will indicate a good BCG response and the patients will continue receiving BCG immunotherapy and if not increased after BCG, this will indicate non-immune induction with bad BCG response and the patients will receive chemotherapeutic agents immediately. Undoubtedly bladder cancer had a high socioeconomic burden due to the cost of routine surveillance through cystoscopy and radical cystectomy as a treatment of muscle-invasive bladder cancer adversely affects the quality of life so appropriate management of this cancer will have a great impact on our communities.

PI email: ayaadel123@mans.edu.eg

Integrated Machine Learning and Bioinformatic Analyses for Identification and Clinical Validation of a Novel Signature linked Pyroptosis- Hepatocellular Carcinoma

Marwa Matboli

Ain Shams University

Maha Saad

Modern University for Technology and Information

Noha Ezzar

Benha University

Abstract

In Egypt, HCC constitutes a significant public health problem. Due to general resistance to antitumor drugs, only limited therapies are currently available for advanced HCC patients, leading to a poor prognosis. Pyroptosis is a type of inflammation-related programmed cell death and may become a new potential target for cancer therapy. pyroptosis-related genes (PRGs) could be potential innovative biomarkers for prediction and prognosis of HCC patients and targeting pyroptosis is a potential therapeutic alternative in HCC. The existing diagnostic signatures depend mainly on the basis of risk scores taken from signature genes' expression, which are highly sensitive to measurement batch effects and are hardly applied in clinical settings. Scientists aim to invent and develop a machine learning based method to diagnose HCC . Our long term goal is incorporating machine learning into integrated bioinformatics/transcriptome framework to develop sensitive and highly selective pyrotosis linked mRNA/miRNA/ lncRNA signature for accurate HCC diagnosis in Egyptian patients. Thus , it help to to develop an effective novel diagnostic/ prognostic biomarkers as well as preventive and therapeutic strategies for this important, common, and potentially fatal liver disease. Our central hypothesis is that changes in lipid metabolism promote chronic inflammation and progression of chronic liver diseases e.g. NAFLD/NASH into HCC via modulation of inflammosomes and pyroptosis pathway. We will test this hypothesis in three specific Aims.

PI email: marwasayed472@yahoo.com

Utilizing Multi-Omics Tools to Identify Genetic, Cellular and Molecular Markers of Alzheimer's Disease and Depression

Meera Alhussiny

University of Sharjah

Hamid Aldeen Al-Haj

University of Sharjah

Rifat Hamoudi

University of Sharjah

Abstract

Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and behavioral changes. Depression is one of the most common co-morbidities in AD, this study aims to investigate the behavioral and cognitive alterations exhibited in humanized amyloid-beta-knock-in (hAbKI) mice. Its primary objective is to identify novel genetic markers associated with AD pathology and explore their connection to comorbid depression. Additionally, the study aims to validate the findings through comparison with publicly available datasets and the analysis of blood samples obtained from AD patients. A comprehensive methodology is employed to evaluate memory, learning, depression symptoms, and motor function in the mouse model. Genomic analyses encompassing transcriptomics and proteomics are utilized to investigate the underlying genetic mechanisms. Brain tissue samples from the mouse model will be harvested, followed by RNA isolation and sequencing to identify differentially expressed genes (DEGs) associated with AD pathology. Subsequent gene annotation and functional analysis will provide insights into the molecular processes and pathways implicated, particularly those linked to depression and mood disorders. Validation of the genetic markers entails two parallel approaches. Firstly, publicly available datasets derived from AD patients are scrutinized using supervised machine learning and bioinformatics tools. Secondly, the identified genetic markers are applied to blood samples obtained from AD patients, allowing for meticulous assessment of their accuracy, reliability, and reproducibility. The findings of this study hold promise for advancing our understanding of AD pathology, facilitating early diagnosis, and providing valuable insights for the development of targeted therapeutic interventions.

PI email: u22103226@sharjah.ac.ae

Intra-Testicular Transplantation of Mesenchymal Stem Cells as an Intervention to Mitigate Testicular Pathology in Hind-Limb Unloaded Mice

Josemin Jose

University of Sharjah

Anu Ranade

University of Sharjah

Rizwan Qaisar

University of Sharjah

Abstract

Background: Physical inactivity linked to bed rest as well as cephalic shift in body fluids in spaceflight exacerbates testicular dysfunction and prolonged hind-limbs-unloading (HU) in rodents, recapitulates these conditions. In order to salvage testicular dysfunction, and possibly preserve fertility in these HU animals, therapeutic interventions such as Mesenchymal stem cell (MSC) transplantations may be administered.

Objectives: We have established a mouse model of hind-limbs unloading (HU) at the University of Sharjah, which mimics several features of testicular disorders in bed rest. Our preliminary data shows that the HU is associated with disruption of normal testicular histology in a time-dependent manner. Two weeks of HU results in thinning of tubular epithelium and walls, while the luminal diameter of seminiferous tubules further worsens with 4 weeks of HU. Here we aim to treat the testicular injury in HU mice by locally transplanting the self-renewing MSCs, that can differentiate into a variety of lineages including male germ cells.

We hypothesize that administration of MSC's will reduce the testicular injury by differentiating into morphologically and genetically normal and functional spermatozoa thus preserving testicular function.

PI email: josemin.jo@gmail.com

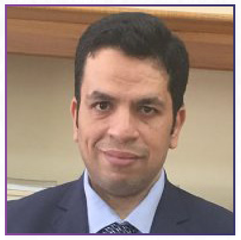
Identification of Microplastics in Human Placental Tissue and its Contribution to Pathological Placental Diseases

Dina Saleh

Assiut University

Marium El Khayat

Assiut University



Essam Othman

Assiut University

Alaa El Din Hamed

Assiut University

Abstract

Microplastics are particles smaller than five millimeters deriving from the degradation of plastic objects present in the environment. Microplastics can move from the environment to living organisms, including humans. In this study, 30 human placentas, collected from consenting women, 10 with physiological pregnancies, and 20 with pathological placental diseases will be analyzed by FT-IR-ALPHBROKER-Platinum-ATR spectrometer and Raman spectrometer, to evaluate the presence of microplastics & comparing these with maternal exposure risk factors & fetal outcome. The present study will be the first to detect the presence of microplastic ruminants in human placental tissue in Africa and the middle east and is the first in the world to identify if the presence of these particles is contributed to the pathogenesis of pathological placental diseases like preeclampsia, abnormal placental implantation and low birth weight of the newborn. Despite the huge exposure of the population especially in the middle east, data on human health risk assessment of MPs is still very limited.

PI email: drdina@aun.edu.eg

Adipocyte-Fibroblast Bidirectional Crosstalk Promotes Features of Fibrosis in Asthma

Nour Jalaleddine

Mohammed Bin Rashid University of Medicine and Health Sciences

Mellissa Gaudet

McGill University Healthy Center

Saba Al Heialy

Mohammed Bin Rashid University of Medicine and Health Sciences

Abstract

Obesity, a global epidemic with rising incidence, is the most coupled co-morbidity and a risk factor to severe asthma development. Recently, adipocytes were detected in the airway walls, positively correlating with patients' body mass index. However, their role in the airway remains unknown. This raises the question about their contribution to asthma airway remodeling, a major pathological feature constituting extracellular matrix changes in the airways, including fibrosis, which plays a major role in driving the disease into a severe form. Therefore, we hypothesize that adipocytes derived from obese subjects drive the induction of airway fibrosis when compared to their lean counterparts. To our knowledge, this is the first study that aims to evaluate the influence of obesity on asthma remodeling via adipocyte-fibroblast bidirectional crosstalk. Our histological findings displayed the presence of adipocytes in the trachea, extra- and intra-pulmonary bronchus of non-asthmatic and asthmatic patients, where obese-adipocytes showed to have a larger size than that of lean counterparts. Employing an in vitro co-culture model of fibroblasts (normal and asthmatic) and adipocytes (lean and obese), our preliminary data displayed a significant increase in fibrogenic markers in fibroblasts co-cultured with obese-adipocytes. On the other hand, a notable increase in α-SMA and fibronectin mRNA expression was detected in adipocytes from obese subjects upon co-culturing with asthmatic fibroblasts. This was accompanied with a significant reduction in the expression of adipogenic markers (PPAR, leptin, and adiponectin,) thus proposing the loss of their adipogenicity. Taken together, this study will provide insights into the role of obesity in the development of fibrosis and help identify novel therapeutic markers for obese-asthmatic patients' treatment.

PI email: nour.jalaleddine@mbru.ac.ae

In Vitro Inhibitory Effect of Nigella Sativa Extracts on SARS-COV-2 Spike Protein-ACE2 Interaction

Najma Mohamed Ali

Mohamed bin Rashid University of Medicine and Health Sciences

Anagha Np

Mohamed bin Rashid University of Medicine and Health Sciences

Rajan Radhakrishnan

Mohamed bin Rashid University of Medicine and Health Sciences

Haneen Aburamadan

Mohamed bin Rashid University of Medicine and Health Sciences

Reem Jan

Mohamed bin Rashid University of Medicine and Health Sciences

Yosra Lozon

Dubai Pharmacy College

Asha Caroline Cyril

Mohamed bin Rashid University of Medicine and Health Sciences

PI email: najm.7869@gmail.com

Abstract

In December 2019, there was an emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), that caused coronavirus disease 2019 (COVID-19), restating the risk that coronaviruses pose to public health. SARS-CoV-2 has notable genomic sequence similarity to SARS-Co, the causative agent of SARS. As always, natural products could be a source for potential compounds that can be used in the treatment of COVID-19. Many experimental and clinical studies have focused on the effectiveness of natural compounds in combating SARS CoV-2. One such significant herb is Nigella sativa (NS), the seeds of which are also known as 'black seeds', 'black cumin seeds' or Habbatus sauda. NS has been used worldwide in folk medicine for centuries as a cure for various illnesses. In silico molecular docking studies have shown that the NS phytochemicals such as nigellidine, -hederin and dithymoquinone, and quercetin have high affinity at SARS-CoV-2: ACE2 interface. However there is a lack of in vitro studies regarding their inhibitory effect on SARS-CoV-2 spike protein: ACE2 interaction, which could be beneficial in COVID-19 drug discovery, if proven effective. Therefore, the current study aims to determine whether NS extract and its biologically active compounds have an inhibitory effect on SARS-CoV-2 spike protein: ACE2 interaction and to analyze whether NS seed extracts may downregulate the ACE2 over-expression in HT29 cell lines. If any of the extracts or compounds show inhibitory effects on the interaction between the spike protein of SARS-CoV-2 and the host cell membrane protein ACE2 or downregulate ACE2 expression, it could prove their potential in preventing viral entry into the host cell and will warrant further studies.

Vitamin D Deficiency in Neonates: Estimating the Burden in the UAE

Azmat Riaz

Ajman University

Maryam Ammirad

Ajman University

Abstract

The role of vitamin D in maintaining physical and mental health is well established. Studies in the UAE have found that up to 75% of the population may have vitamin D deficiency (VDD). The at-risk groups for VDD include pregnant and breastfeeding women, infants, and children under five years. The prevalence of rickets in children in the Middle East is one hundred times greater than in the West. A UAE-based study has shown that most pregnant women (69%) are deficient in vitamin D, while almost 19% of infants in the UAE have VDD. No studies in the UAE have yet analyzed vitamin D levels in newborn babies. Since most pregnant women in the UAE are VDD, most of the babies in the UAE are likely to be born with deficiency or insufficiency of this vitamin. Vitamin D deficiency or lack in early life may lay a poor foundation with long-term threats to human health later in life. Dubai Health Authority (DHA) recommends supplementing all young children aged six months to 5 years with vitamin D. However, DHA does not recommend routine vitamin D supplementation for babies under six months. This may be due to a lack of evidence as no studies have been done on newborn babies locally yet. As a result, the diagnosis of VDD in infants and children may be delayed for many years until the clinical symptoms and signs appear. If our study shows that most neonates in the UAE are born with VDD, the current clinical practice in UAE may be changed by routine testing and vitamin D supplementation for newborns, thus preventing major health problems later in life.

PI email: a.riaz@ajman.ac.ae

Automated Mitotic Cell Detection System for Diagnosis of Breast Cancer from Histopathology Images

Anusree Kanadath

BITS Pilani, Dubai

Angel Arul Jothi

BITS Pilani, Dubai

Abstract

Mitotic cell detection plays a crucial role in breast cancer diagnosis, but the current manual process performed by pathologists is time-consuming and subjective. Artificial intelligence (AI) and computer-aided diagnosis (CAD) have the potential to enhance the accuracy and efficiency of mitotic cell detection. However, existing methods still face challenges related to production factors, cell complexity, similarity between cells, unbalanced samples, and limited datasets. In this proposal, we aim to investigate the application of vision transformers (ViT), a recent development in deep learning, to improve mitotic cell detection. Our approach focuses on constructing a robust recognition model capable of accurately identifying mitotic and non-mitotic cells in unlabeled pathological slices using a large annotated image dataset. By leveraging vision transformers, we anticipate improved diagnostic accuracy and quantitative analysis of diseases. In addition, we plan to develop a user-friendly application that allows doctors and pathologists to easily upload histopathological images for testing and analysis, making it more accessible and efficient for healthcare professionals. Ultimately, this research aims to enhance patient outcomes by enabling pathologists to focus on key regions and benefit from the advantages offered by AI and CAD systems.

PI email: anusreek25anu@gmail.com

Exploring LRRK2 Mutation Frequency and Parkinson's Disease in the Emirati Population: A Clinicogenetic Study

Anjana Soorajkumar

Mohammed Bin Rashid University of Medicine and Health Sciences

Dharana Satsangi

Mohammed Bin Rashid University of Medicine and Health Sciences

Rihana Kamarudheen

Mohammed Bin Rashid University of Medicine and Health Sciences

Mohammed Jashim Uddin

Mohammed Bin Rashid University of Medicine and Health Sciences

Hani Ben Amer

Mohammed Bin Rashid University of Medicine and Health Sciences

Abstract

Parkinson's disease (PD) is a pervasive neurodegenerative disorder and a significant cause of global disability, with its incidence escalating with age. Despite extensive research, the etiology of PD remains unknown. It is presumed to arise from interactions between environmental and genetic factors. Leucine-rich repeat kinase 2 (LRRK2) is the most common known genetic cause of PD, contributing significantly to both autosomal dominant and sporadic disease. Although the prevalence of LRRK2 disease associated variants is particularly high in North African populations, there is currently no data on PD in the United Arab Emirates (UAE). In this study, we aimed to investigate the frequency of LRRK2 mutations in Emirati PD patients and explore clinicogenetic correlations, given the growing importance of LRRK2-PD research. Whole-exome sequencing (WES) was used to identify the frequency of mutations, and to our knowledge, this is the first UAE-based study reporting the use of next-generation genome sequencing to detect LRRK2 gene mutations in the cohort. Using CRISPR genome editing technology on iPSCs we investigated the functional consequences of the Emirati LRRK2 gene and its link to PD. Our study underscores the significance of merging genetic analysis with clinical observation to diagnose PD accurately and develop targeted interventions. We furnish crucial information on LRRK2 mutations in the UAE population, which could facilitate the understanding of PD pathophysiology and developing targeted therapies. LRRK2 has emerged as a promising therapeutic target, with two inhibitors in clinical trials. This research has significant implications for improving treatments and patient outcomes in the field of neurodegenerative disorders.

PI email: anjana.soorajkumar@mbru.ac.ae

Therapeutic Targeting of Cancer Metabolism in Colorectal Cancer

Israa Cheikh

American University of Beirut

Berthe Hayar

American University of Beirut

Nadine Darwiche

American University of Beirut

Abstract

Colorectal cancer (CRC) is a significant global public health that exhibits a substantial increase in incidence and mortality rates worldwide including the Arabic countries. Consequently, it is imperative to enhance our understanding of the disease and improve treatment options to combat CRC. The standard treatment, 5-fluorouracil (5-FU), frequently encounters resistance and toxicity, requiring the development of innovative therapies.

Cancer metabolism, particularly the pentose phosphate pathway (PPP), plays a pivotal role in tumor growth and survival. The PPP, catalyzed by the rate-limiting glucose-6-phosphate dehydrogenase (G6PD), generates ribose phosphates and NADPH that support nucleotide synthesis and redox balance in proliferating cancer cells. Interestingly, high PPP activity is associated with CRC poor clinical outcomes and chemoresistance. We propose that targeting the PPP as a novel therapeutic approach for CRC. Specifically, we will investigate the impact of 6-aminonicotineamide (6-AN), a competitive inhibitor of G6PD, alone or in combination with 5-FU, in CRC. Our results indicate that 6-AN effectively reduces cell growth and increases cell death in various human CRC cells with different p53 and 5-FU resistance status, which synergizes when combined with 5-FU. Importantly, normal human colon cells are relatively unaffected by the single and combination treatments compared to CRC cells.

We aim to investigate the anti-tumor effects and underlying mechanisms of 6-AN, alone or in combination with 5-FU, in a xenograft CRC mouse model.

This research may uncover novel therapeutic strategies for CRC by targeting cancer metabolism and minimizing drug resistance and toxicity, thereby improving survival and quality of life of CRC patients.

PI email: iac06@mail.aub.edu

Educating Physicians to Provide Holistic End-of-Life Care in the United Arab Emirates: a Qualitative Study of Stakeholder and Community Perspectives

Halah Ibrahim

Khalifa University

Leen Oyoun Alsoud

Khalifa University

Thana Harhara

Sheikh Khalifa Medical City

Abstract

The WHO defines palliative care (PC) as "an approach that improves the quality of life of patients and their families who are facing problems associated with a life-threatening illness." PC is "an ethical responsibility of health systems" and its integration into public healthcare systems is essential for the achievement of the Sustainable Development Goal on universal health coverage. In the UAE, limited awareness of PC by healthcare professionals and the lack of an organized educational system for PC are cited as major barriers for the advancement of PC in the country. The UAE is currently experiencing an aging population and increase in non-communicable diseases and lifestyle-related cancers, resulting in a greater need for PC services. However, there is a dearth of PC trained specialists and PC services are insufficient to meet population needs; most PC is provided in acute hospital settings by general physicians and medical trainees. Significant gaps in the teaching and assessment of PC in medical education have been documented worldwide. Recent studies in the UAE confirm a fragmented and inconsistent approach to PC education, with UAE trainees reporting inexperience and discomfort in end-of-life communication and in providing PC services. The purpose of this longitudinal, mixed methods project is to develop patient-centered, culturally relevant PC curricula and educational resources for UAE medical schools and residency programs and to implement educational interventions to improve medical student, resident and practicing clinician provision of end-of-life care to UAE patients and their families. The study will involve community-based participatory research (CBPR) to help guide patient-centered curricula and training. Currently, there are no known CBPR-based healthcare research projects conducted in the UAE.

PI email: halah.ibrahim@ku.ac.ae

Investigating the Role of RNA-Modifying Enzymes in the Molecular Pathogenesis of Renal Cell Carcinoma in the MENA Region Using Multi-OMICs Approaches

Muna Alhammadi

University of Sharjah

Rifat Hamoudi

University of Sharjah

Iman Talaat

University of Sharjah

Abstract

Kidney cancer is among the most common urological malignancy in the UAE population and the world. Annually, more than 400,000 cases are diagnosed with kidney cancer worldwide. Renal cell carcinoma (RCC) represents the most common type of kidney cancer. In most cases, the disease is asymptomatic and not diagnosed until advanced stages. Another challenge that faces the outcome of RCC is the resistance to systematic therapy and the high rate of treatment failure. Recently, RNA modifications appeared to play a critical role in controlling RNA stability and translation. RNA modifying enzymes change the chemical structure of RNA molecules. Some enzymes, such as FTO, modify RNA without altering RNA sequence. Other enzymes, such as APOBEC, can alter RNA sequence leading to an increased heterogeneity and complexity of the tumor. Additionally, the dysregulation of RNA modifying enzymes has been found to play key roles in tumor progression and metastasis. This project aims to identify the targets and the molecular pathways controlled by RNA modifying enzymes in RCC through the application of integrative analysis of genomics and transcriptomics data from different RCC patients' surgical biopsies by bioinformatics approaches. Integrative analysis of data from different OMICs platforms can provide a more comprehensive picture of RCC molecular pathogenesis. The results will be validated in vitro to identify the cellular pathways involved in RCC. This study can lead to the identification of novel cellular pathways and genes controlled by RNA modifying enzymes in RCC which can improve RCC diagnosis and clinical management.

PI email: m59alhammadi@gmail.com

Inhibition of IGF1R and KLF8 Increases Colorectal Cancer (CRC) Sensitivity to Autophagy Inhibition: A Novel Therapeutic Approach

Eglal Mahgoub

University of Sharjah

Maha Saber

University of Sharjah

Nabil Sulaiman

University of Sharjah

Jalal Taneera

University of Sharjah

Abstract

There is increasing evidence of the unique features of the gut as an organ with its distinctive hormonal response. Colorectal cancer (CRC) is the most common malignancy of the alimentary tract, with poor prognosis, once micro(metastases) occurs. Based on previous transcriptomic analysis of 18 FFPE patients' samples from different CRC stages, autophagy pathways and IGF-1R gene were of the top differentially expressed in advanced stage (III) compared to early CRC stages (I and II). In this study, CRISPR-Cas9 using ribonucleoprotein was performed to knock out the HCT116 CRC cell line for autophagy related gene-5 (ATG5) and ATG7. Our results showed that there was an increase in basal autophagosome formation as well as autophagy flux subsequent to IGF-1 treatment; revealed by ATG5 and ATG7 showing an increased level, whereas suppressed by picropodophyllin (PPP). Moreover, combined IGF-1R and autophagy inhibition reduced CRC cells migration, as well as exerted a potent modulation of the EMT markers in CRC cells. Taken together, these findings highlight a novel potential therapeutic combination of IGF-IGF-1R axis and autophagy suppression in tackling CRC metastasis. Additionally, a limitation of essentially all targeted anticancer therapies is treatment-induced compensatory activities to offset the deleterious consequences of target inhibition. Transcriptomic analysis on HCT116-knockout ATG5 and HCT116-knockout ATG7 revealed differential expression of KLF8 transcriptional factor. Therefore, next, we hypothesized that targeting KLF8-compensatory effect may also contribute to increase sensitization to the autophagy inhibition in CRC cells. Subsequently, dual targeting of KLF8 and IGF1R together with autophagy inhibition may be a more durable therapeutic approach for CRC cells.

PI email: U20105887@sharjah.ac.ae

Role of Glycogen Synthase Kinase-3 in Cardiomyocyte Autophagy Under Hypoxia

Hezlin Marzook Kaidal

University of Sharjah

Mohamed Ahmed Awad Saleh

University of Sharjah

Firdos Ahmad

Abu Dhabi University

Abstract

Prevalence of cardiovascular diseases is increasing world wide. Recent findings in cardiovascular research revealed the role of autophagy as a regulator of cardiac homeostasis. Autophagy is an essential metabolic process that delivers damaged cytoplasmic material to lysosomes for degradation. Autophagic regulation exhibits multi facets of pathophysiology under the conditions of hypoxia and stress, thus limiting damage and ensuring cardioprotection and adaptation to stress. In response to myocardial ischemia, autophagy is activated, which appears to be time-dependent. Information is still lacking to illustrate the major regulatory partners triggering autophagy under hypoxia/reperfusion. It is of great demand to learn the role of autophagy in clearing dysfunctional cardiomyocytes to prevent oxidative stress.

The glycogen synthase kinase-3 (GSK-3) is a serine/threonine kinase that was initially identified as a regulator of glycogen synthase and glycogen metabolism. Recent studies have revealed that Glycogen Synthase Kinase-3, a comparatively less explored GSK-3 isoform, plays a critical role in heart diseases. Studies employing loss-of and gain-of-function in vivo models have shown that GSK-3 plays a unique role in cardiac pathophysiology. Cardiomyocyte-specific conditional double deletion of GSK-3 along with GSK-3 in adult heart leads to cardiac fibrosis and fatal dilated cardiomyopathy (DCM) without any cardiac stress. In this context, we aim to explore the effects of GSK3 on hypoxia induced cardiomyocyte injury and the autophagic regulation during the injury. This study mainly explores whether GSK3 exerts cardioprotective functions during hypoxia and cellular stress in cardiomyocytes through autophagy by regulating autophagic markers like LC3, p62, Beclin and ATG class of proteins.

PI email: hkaidal@sharjah.ac.ae

Inhibiting DNA Sensing Pathway to Control Steroid Hyporesponsive Lung Inflammation

Bushra Mdkhana

University of Sharjah

Rabih Halwani

University of Sharjah

Narjes Sharif-Askar

University of Sharjah

Abstract

The accumulation of double-stranded DNA in the cytosol activates cytosolic DNA-sensing pathways, such as STING, which has been implicated in multiple inflammatory diseases including asthma. However, it is unknown how this pathway contributes to lung inflammation and steroid hyporesponsiveness in patients with severe asthma. Therefore, this study investigated the STING pathway's role in inducing pulmonary inflammation and steroid resistance in severe asthma. Human bronchial fibroblasts and lung homogenates from severe asthmatic mice were assessed for STING mRNA and protein levels at baseline, following stimulation, and upon treatment with dexamethasone and STING inhibitor, H151. The STING/IFN-I pathway exhibited higher baseline levels in severe asthmatic fibroblasts and was further elevated upon stimulation with HDM. In the diseased airways, STING activation was resistant to dexamethasone monotherapy but responsive to STING inhibitor and dexamethasone combination treatment. To enhance STING inhibitor delivery to severe asthmatic airways, nanoparticles containing the STING inhibitor were developed. Intranasal administration of the nanoparticle-encapsulated STING inhibitor was found to be more effective in controlling lung inflammation and restoring steroid sensitivity in the severe asthmatic mouse model than free STING inhibitor. These findings support the concept that the STING pathway plays an important role in severe asthma pathogenesis via the induction of pulmonary inflammation and enhancement of steroid resistance. Further, nanoparticles loaded with STING inhibitor were suggested to increase the delivery, decrease the toxicity, and enhance the effectiveness of STING inhibitor.

PI email: u19106031@sharjah.ac.ae

Community-Acquired Urinary Tract Infections (CA-UTI) in Children: A 2-Year Experience in a Secondary Care Center in United Arab Emirates

Shahd Abbastanira

Ajman University

Ragheb Alahmad

Ajman University

Hussain El Housseini

Ajman University

Maryam Amirrad

Ajman University

Abstract

Urinary tract infections are common in the pediatric age group all over the world, and they play a significant role as a concerning public health problem. Swift diagnosis and early treatment are keys to reducing the morbidity of this disease ranging from septic shock to renal failure. In addition, diagnosing UTIs is difficult in younger children who can only show general signs of discomfort and nonspecific symptoms. Moreover, high recurrence and rising resistance rates further contribute to the danger these pathogens pose. Studies conducted in the MENA region and around the globe show an alarming increase in resistant bacteria that are sometimes difficult to treat.

This retrospective study aims to review the cases of Community-Acquired- Urinary Tract Infection (CA-UTI) among children hospitalized at Sheikh Khalifa Medical City Ajman (SKMCA) over a selected period. We will collect, review, and analyze data of patients to describe their demographic features, clinical presentation, etiology, and management. We will also use this data to identify common risks of complications, common microbial agents, and their antimicrobial sensitivity.

PI email: 201810809@ajmanuni.ac.ae

Health Sciences

The Role of Technology Acceptance, Anxiety, and Demographic Factors in Jordanian Healthcare Decision Makers' Attitudes Toward Artificial Intelligence

Sara Ajlouny

Al Yarmouk University

Hindya Maqableh

Al Yarmouk University

Abstract

The General Attitudes toward Artificial Intelligence Scale (GAAIS), Technology Acceptance Model (TAM), and Artificial Intelligence Anxiety Scale will be used in our future study to investigate the General Attitudes and the impact of technology acceptance, artificial intelligence anxiety, and demographics on Jordanian Healthcare Decision Makers' behavior toward artificial intelligence (AI). Demographics, the TAM, the Artificial Intelligence Anxiety Scale (AIAS), and the GAAIS were all used as measures. We will curate, validate, and administer Arabic versions of GAAIS, TAM, and AIAS. Hierarchical Multiple Linear Regression and Logistic Regression with variable blocking will be performed.
We hypothesize: H.1- that demographic characteristics (age, gender, education level, level of computer usage, level of knowledge about AI) will predict attitudes toward AI, with males, younger, more educated people, more frequent computer users, and people with higher levels of computer knowledge predicted to have more positive attitudes toward positive aspects of AI (positive GAAIS) and more forgiving attitudes toward negative aspects of AI (negative GAAIS).
H.2 -High levels of AI anxiety (AI learning anxiety, job replacement anxiety, sociotechnical blindness, and AI configuration anxiety) to predict more negative attitudes toward AI on both GAAIS subscales, owing to the fact that anxiogenic objects generally predict aversion toward the object.
H.3 -If AI attitudes were driven by technology acceptance, we would expect technology acceptance to be more predictive than AI anxiety; however, if the dispositions that drove AI attitudes were more specifically bound to AI anxiety, we would expect AI anxiety to be more predictive.

PI email: alajlounysara@outlook.com

Early Alzheimer Detection by Human Activities Recognition

Fatma Elzahra Sayadi

Sousse University

Hend Basly

Sousse University

Abstract

Studies estimate that by 2030, 19% of people aged 74 to 84 and almost half of people aged over 84 will have dementia. Dementia is the loss of cognitive functioning—the ability to think, remember, or reason—to such an extent that it interferes with a person's daily life and activities. These functions include memory, language skills, visual perception, problem solving, self-management, and the ability to focus and pay attention. Currently, the diagnosis of Alzheimer's disease is based on a complete assessment of the person's cognitive abilities (MRI, questionnaires, etc.). Unfortunately, this type of test does not detect the disease at an early stage. However, Alzheimer's can be identified by changes in behavior such as difficulty walking, an inability to perform tasks. We therefore propose, in this project, to detect the first signs of cognitive disorders called Mild cognitive impairment (MCI) via the recognition activity based on Deep Learning solutions. We have also thought of using Transformer networks to propose a new pose-guided self-attention mechanism combined to 3D convolutional neural networks (3D CNN) by a Bilinear Pooling Attention module (BPA) which allows the spatial-temporal skeleton features to recalibrate the RGB features for Daily Living Activity (DLA) recognition. The experimental results demonstrate that our proposed approach outperforms state-of-the-art methods in terms of performance.

PI email: sayadi_fatma@yahoo.fr

In-Memory Computing for Medical Imaging at the Edge

Kaoutar El Maghraoui

IBM Research

Hadjer Benmeziane

Université Polytechnique des Hauts

Imane Hamzaoui

Ecole Nationale Supérieure d'Informatique

Abstract

The application of AI has brought about a transformative wave in healthcare systems, revolutionizing patient care, diagnostics, and personalized treatment. This remarkable advancement has reimagined the way healthcare is delivered, leading to unprecedented improvements in various facets of the field. Deep Learning (DL) has been instrumental in Medical Imaging Segmentation. In order to facilitate real-time diagnostics while ensuring patient privacy, the role of edge computing in healthcare systems cannot be overstated. It plays a critical role by enabling faster data processing directly at the point of care while addressing privacy concerns. Nonetheless, the deployment of AI in edge computing environments presents a set of challenges, including real-time processing, energy efficiency, and cost-effectiveness.

Analog in-memory computing (IMC), in conjunction with edge AI, is a promising avenue for addressing energy efficiency challenges in healthcare systems. IMC eliminates the classical Von Neuman bottleneck by bringing compute and storage together, hence, making it possible to perform real-time processing of healthcare data at the edge. This approach does not only enable faster and efficient computations but also opens the door to cheaper platforms for healthcare around North Africa and the world.

The proposed research will focus on designing an advanced deep learning IMC system targeting real-time processing of medical image segmentation at the edge. While IMC presents several advantages, their main issue is their inherent noisy and non-ideal properties which significantly reduce the performance of conventional DL models. Our framework will leverage neural architecture search to design noise-resilient models targeting medical segmentation tasks.

PI email: kelmaghr@us.ibm.com

Nanoparticles and Molecular Farming in Plants to Tackle Infectious Diseases

Nancy Elnaker

Khalifa University

Matteo Chiesa

Khalifa University

Lamia Elsherbiny

Khalifa University

Alia Alaydaroos

Khalifa University

Abstract

New vaccines to fight infectious diseases and therapeutic antibodies to treat cancer are needed worldwide. Vaccines can be made in different ways, but they all use an inactive form of a virus or disease antigen to make the immune system react. Nanoparticles can be functionalized by loading the antigen or therapeutic agent in combination with, e.g., antibodies on the surface for active targeting. We plan to employ live plants as bioreactors to manufacture a viral mimic that can be used to combat the targeted virus by studying the transgenic potential of three plant candidates - date palm (Phoenix dactylifera L.), Nicotiana plumbaginifolia Viviani, and Tetraena qatarensis - using the Agrobacterium tumefaciens vector. The deployment of multistep chromatography techniques to purify the targeted protein to produce virus-like nanoparticles or monoclonal antibodies. The application of nanomaterial research techniques will allow for the modification and functionalization of plant-virus-derived nanoparticles, which can be utilized in developing vaccines, anticancer agents, and targeted bioimaging.

PI email: nance.elnaker@ku.ac.ae

Human Papilloma Virus Infection and Cervical Cancer: A Survey on Knowledge and Acceptance of its National Immunization Program among Female University Students in Makkah Region of Saudi Arabia

Ramya Sindi

Umm Al-Qura University

Abstract

Background: Infection with Human Papilloma Virus (HPV) has been known as one of the causes that lead to cervical cancer. Effective HPV vaccination has been recently approved and included in the national immunization program for girls aged 9 to 26 years old by the Saudi Ministry of Health. However, due to a lack of awareness and several cultural and psychological factors, the acceptance of HPV vaccination remain weak. Objectives: To assess the knowledge gap regarding HPV infection and its vaccination acceptance among female students enrolled in different universities in Makkah region of Saudi Arabia's, as well as to investigate the barriers to accepting the HPV vaccination from the perspectives of this population. Methods: This cross-sectional closed-ended questionnaire included 596 female university students in Makkah region between November 2022 and January 2023. The collected data included demographic information, knowledge of HPV infection and cervical cancer, and acceptance of HPV vaccination. Results: The findings revealed that 58% of the female university students in Makkah region have poor knowledge about HPV, and 61% have poor acceptance of HPV vaccination. There were statistically significant variations in knowledge levels among individuals based on age, marital status, and college), and a statistically significant difference in the acceptance scores by academic year and university. Fear of needle injection and HPV-associated side effects were among the common barriers to vaccination. Conclusions: Effective HPV awareness campaigns and educational programs regarding HPV infection and its vaccination are highly recommended to impact the young community and raise awareness and acceptability.

PI email: rahsindi@uqu.edu.sa

One Health Approach to Investigate Brucellosis in Asyut Governorate using Geographical Information System (GIS) Methods and Development of an Application for Mobile Devices to Track Brucellosis

Amal Sayed

Assiut University

Hassan Hussein

Assiut University

Ahmed Abdel Halim Mohamed

Assiut University

Abstract

Brucellosis continues to be a major problem facing livestock production with a great impact on human health. Despite the national efforts made to control brucellosis, the disease is still endemic in Egypt. The motivation of this study increases to apply a one health approach strategy to improve the action plans involving surveillance, early response, and risk assessment of the occurrence of brucellosis by using geographical information system methods (GIS) in Asyut Governorate. Samples will be collected randomly from humans, cattle, and buffaloes. Climatic and environmental data will be collected from the meteorological station. Serological investigation of animal and human samples will be carried out for brucellosis. Isolation and identification of Brucella species will be carried out by using polymerase chain reaction. We will explore the genetic diversity of animal and human Brucella isolates circulating in Asuyt Governorate by using multilocus variable-number tandem-repeat analysis. We will determine the spatial and temporal variations of brucellosis in cattle, buffaloes, and man in relation to environmental factors and the results will be statistically analyzed. Maps will be designed to illustrate brucellosis distribution in animals and humans. Modules will be designed to predict the occurrence of brucellosis. Brucellosis awareness campaign will be held to enhance the awareness of stakeholders. Furthermore, we will develop an application for mobile devices to track brucellosis in Asyut Governorate and send notification alerts to individuals in hot spot areas. We expect that the research outcome will positively affect the community and will refine the action plans applied to control brucellosis.

PI email: amalsayed73@aun.edu.eg

Efficacy of "Neo Mumma Mhealth APP" on Breastfeeding Skill, Maternal Confidence, Stress and Care Compliance among Postnatal Mothers in a Public University Hospital, Oman

Frincy Francis

Sultan Qaboos University

Rajeswari S

Sultan Qaboos University

Vidya Seshan

Sultan Qaboos University

Iman Hamdoon Hamed Al Hashmi

Sultan Qaboos University

Abstract

Postpartum period is a crucial period in a woman's life. Apart from physical changes there are also emotional changes along with a new maternal role attainment. This transitioning to motherhood has been reported as challenging and stressful by many first time mothers. Postpartum related morbidities and mortalities, postpartum stress leading to depression, lack of knowledge in breastfeeding and newborn care are increasing resulting in low confidence levels and maternal dissatisfaction among women. This affects their quality of life. Health related infodemics and misinformation are on the rise due to easy accessibility of wide knowledge through internet and social media. Providing women with right knowledge built from evidence based guidelines and systematic reviews is the main aim of this study. Reaching out to the perinatal woman through a mobile application "Neo Mumma" not only saves time and effort for both the woman as well as the health care workers but also ensures a relevant culturally tailored scientific health education content being delivered. An experimental study using post test only control group design will be done. 140 participants (first time pregnant women) will be recruited (70 in each group). Mobile application will be accessible from their 32nd week of pregnancy and the outcome variables – breastfeeding, maternal confidence will be measured on their day of discharge while postpartum stress and care compliance will be assessed at 6 weeks. Thus the study aims to help in empowering and building a community of postpartum women whose transition to motherhood will be healthy and satisfactory. One woman empowered and educated is equivalent to having educated a family, a community and eventually the society.

PI email: frincy.s@squ.edu.om

Collaborative and Mobile Autistic Children Monitoring and Behavioral Therapy using Educational Content Recommendation

Nermin Eissa

Abu Dhabi University

Mohammed Ghazal

Abu Dhabi University

Marah Alhalabi

Abu Dhabi University

Maha Yaghi

Abu Dhabi University

Tania Tahtouh

Abu Dhabi University

Tania Tahtouh

Abu Dhabi University

Hamad Odhabi

Abu Dhabi University

Abstract

Early diagnosis and chronic management are major aspects of dealing with individuals with autism spectrum disorder. Critical responsibility is placed on pediatricians, parents, and teachers to collaborate, establish and execute management plans that enhance the child's quality of life. We propose a collaborative mobile application and a companion robot to monitor and promote the children of determination's growth and development. Our solution comprises a role-specific mobile application for guardians, educators, and healthcare experts; a child management portal; and an autonomous AI-based companion robot to accompany the autistic child while at home. To demonstrate its range of expressive facial motions, our proposed companion robot incorporates a touchscreen as its face. A camera records diagnosis cues, as instructed by the guardian and educators, and monitors the child's behavior. Healthcare professionals analyze the acquired data and then provide insights and treatment plans. The companion robot is operated with a user-friendly multiplatform mobile content designer that sends commands, emotions, and media files to the robot via our Content Library Server. This mobile application allows guardians to use it for activities that teach social skills, and educators to plan educational activities. The child management portal then displays progress information for the guardian, educator, and healthcare professional. The recorded videos allow the healthcare professional to locate the precise moment they said a certain term and visualize developmental progress. The data will also help them adjust the child's treatment plan. Multiple users with different roles participated in the application and robot testing process, reporting an overall positive experience.

PI email: nermin.eissa@adu.ac.ae

Considering Personal Freedom for Mental Health in Arab Women

Christin Camia

Zayed University Abu Dhabi

Maitha Al Kaabi

Zayed University Abu Dhabi

Abstract

The UAE is a collectivistic society that follows the rule of Islam. As a consequence, females generally face greater restrictions placed on their freedom of movement and personal choices than males. While this may speak for greater care, concern, and protection of females, reduced personal freedom may also constitute a risk factor for mental health (Cartwright et al., 2018; Dressler et al., 2019). Therefore, the suggested study aims to validate a scale that both conceptualizes and measures the degree of personal freedom in Arab women's lives. In a previous pilot study, we developed a survey that measures the personal freedom and emancipation of Emirati women. We now wish to upscale the data collection, preferably including other GCC states, in order to verify the accuracy and reliability of our scale. For now, we restrict the concept and measurement of personal freedom to the Arab world where high rates of depression and anxiety disorders are especially prevalent in young females (Bener et al., 2012; Camia & Omran Alhallami, under review; Thomas, 2013). We believe that the introduction and evaluation of personal freedom as a psychological concept and measure would be advantageous for evaluating the absence of personal freedom, and this could have positive implications for the mental health situation in the Arab region. Namely, this could aid in making psychological diagnoses more culturally relevant and precise for Islamic societies.

PI email: christin.camia@zu.ac.ae

FAM105A is a Novel Gene Down-Regulated in Diabetic Human Islets and Involved in Pancreatic -Cell Function and Insulin Secretion

Anila Abid

University of Sharjah

Jalal Taneera

University of Sharjah

Abstract

FAM105A (known as OTULINL) is a gene that encodes a protein of unknown function. Very little is known about the cellular and biochemical function of FAM105A. However, the gene has been associated with several diseases, including auto-inflammation and dermatosis syndrome. In addition, several bioinformatics studies have implicated FAM105A with type 2 diabetes mellitus (T2D). However, the physiological role of FAM105A in pancreatic -cells function remains unclear. Thereby, various sets of molecular and functional experiments, including RNA-sequencing (RNA-seq), siRNA silencing of Fam015A, qPCR, Western blot and ELISA, were conducted to investigate the physiological function of FAM105A in pancreatic INS-1 cells.

RNA-seq data revealed that FAM105A expression is lower in diabetic islets than in healthy. FAM105A expression was highly present in pancreatic islets compared to adipose, liver and muscle tissues. FAM105A expression correlated negatively with HbA1c levels and body mass index (BMI). Co-expression analysis showed a positive correlation between FAM105A with INS, PDX1 and GCK, whereas it was negatively correlated with GLUT1. Transient silencing of Fam105A in INS-1 cells diminished insulin release and glucose uptake but did not affect cell viability, reactive oxygen species (ROS) or apoptosis levels. Moreover, silencing of Fam105A down-regulated the expression of Insulin genes, Pdx1, Gck, Glut2, and Insr. Silencing of Pdx1 resulted in a slight downregulation of Fam105A expression in INS-1 cells. RNA-seq analysis in Fam105A-silenced cells identified Itpr2, Jun, Rtp4, Pipprs, Glce and Apmap as the top 5 up-regulated genes, while the top 5 down-regulated genes were A1cf, Otulinl, Adamst16, Efna3 and Pi4k2b. Differentially expressed (DEG) genes share multiple pathways, such as regulating insulin secretion, metabolic processes, and signaling mediators. The effect of antidiabetic medication such as metformin, insulin or Rosiglitazone on the expression of FAM105A. Our data showed that Rosiglitazone influenced FAM105A expression in pancreatic INS-1 cells. PDX1 silencing showed no effect on the FAM105A expression. Agilent Seahorse XFp extracellular flux data indicated that Fam105a-silenced cells exhibited a significant reduction in ATP production and basal OCR as compared to the negative control.

PI email: aabid@sharjah.ac.ae

Perinatal Mental Health Literacy in the United Arab Emirates: Scale Validation Study

Rouwida El Khalil

United Arab Emirates University

Iffat El Barazi

United Arab Emirates University

Abstract

Background: After conducting a systematic review on mental health literacy tools in 2014
O'Conner and Casey created in 2015 a comprehensive mental health literacy scale that was based on the six attributes that were endorsed by Jorm et al.in 1997. Since its inception, this tool has been used in mental health literacy research worldwide.
Aim: This study aims to translate and cross-culturally validate the Mental Health Literacy Scale (MHLS) in perinatal patients enrolled in Mutaba'ah cohort in Al Ain, UAE.
Methodology: The translation phase consisted of forward translation of the MHLS into Arabic language, back-translation to English and cross-validation of a scale or instrument, then pilot testing a translated MHLS among Arabic speaking participants to evaluate the instrument's instructions items and answer format for clarity. In addition two panels (maternal clinical experts and professional research experts) will provide feedback and suggestions on the degree of relevance of each item to the measured domains of the Mental Health Literacy Scale (MHLS). Finally the validation phase will test the psychometric properties(reliability, construct and structural validity) of the translated scale among 527 perinatal patients enrolled in Mutaba'ah (Mother and Child Health AlAin Cohort).
Expected Results: This research will lead to the adaptation and validation of the MHLS by following rigorous methodological techniques to derive a valid and reliable measure of the mental health literacy level in the Emirati perinatal patients.

PI email: 202190192@uaeu.ac.ae

Test-Retest Reliability of a Bilingual Arabic-English Arab Teens Lifestyle Study (Atls-2) Physical Activity Questionnaire Among Adolescents and Young Adults of the United Arab Emirates

Shima Mohammad Zadeh

University of Sharjah

Ashokan Arumugam

University of Sharjah

Abstract

Background: The Arab Teen Lifestyle Study (ATLS) physical activity questionnaire has been recommended for measuring self-reported physical activity of Arab adolescents and young adults (aged 14 years to mid-twenties). The reliability of the first version of the ATLS has been tested with a pedometer ($r \leq 0.30$). While the reliability of the bilingual revised version of the questionnaire (ATLS-2, 2021) has not been studied. The aim of this study was to examine the test-retest reliability of bilingual Arabic and English ATLS-2 (AE-ATLS 2) among healthy adolescents and young adults of the United Arab Emirates (UAE).

Methods: A cross-sectional study was conducted among 50 healthy adolescents and young adults (aged 20.82 ± 2.7 [mean ± SD] years, body mass index of 21.80 ± 5.3 kg/m^2) including 34 females (68%) and 16 males (32%). Participants filled out the AE-ATLS 2 questionnaire, and after seven days they were asked to fill out the same questionnaire again. The internal consistency of the bilingual AE-ATLS 2 version was assessed using Cronbach's alpha and test-retest reliability was assessed using the interclass correlation coefficient (ICC) (3,1).

Results: A Cronbach's alpha score varied between unacceptable for 3 items only, while that of seven items ranged from undesirable to very good. The ICC (3,1) values presented a strong estimate of reliability in 4 items, moderate in 5 items and 1 item only showed poor reliability.

Conclusion: The AE-ATLS 2 is a reliable questionnaire to asses physical activities of adolescents and young adults in UAE.

PI email: u22103961@sharjah.ac.ae

Are Sarcopenia and Dynapenia Prevalent Among Young Adults in the United Arab Emirates?

Sivapriya Ramakrishnan

University of Sharjah

Nada Ahmed

University of Sharjah

Ashokan Arumugam

University of Sharjah

Hoor Ahmed

University of Sharjah

Ala Messoudi

University of Sharjah

Tooba Rahmani

University of Sharjah

Ahmed Eldakhs

University of Sharjah

Yaseen Omran

University of Sharjah

PI email: rsivapriya@outlook.com

Abstract

Background: Sarcopenia and Dynapenia is the age-associated loss of muscle strength that is not caused by neurologic or muscular diseases. The prevalence of sarcopenia among young adults in Thai , Korea and Japan is (35.33%) , (9.9%) and (40.6%) respectively. Data of the prevalence of sarcopenia and Dynapenia are lacking in middle east including UAE. Aim: To investigate the prevalence of sarcopenia and Dynapenia among young adults in the UAE. Methods: An exploratory study with convenience sampling of 500 healthy adults, 255 females (51%) and 245 males (49%) between the ages of 18 and 40. Ethical committee approval was obtained. Participants were examined for sarcopenia according to AWGS 2 and EWGS 2 criteria and for Dynapenia using EWGS 2 criteria that includes Handgrip strength, Gait speed test and Skeletal Muscle Index. Results and Conclusion: The prevalence of sarcopenia and Dynapenia is considerably different according to the criteria used. According to EWGS 2 and AWGS 2 criteria there is no prevalence of sarcopenia. The study found prevalence of Dynapenia (19.76%) among the participants showed that there is reduction in hand grip strength in both males and females. There is significant association between the upper limb muscle mass and hand grip strength (HGS) $p(<0.001)$ for both left and the right hand and also a significant association $p(<0.001)$ between the lower limb muscle mass and gait speed.

MemoryCompanion: A Smart Healthcare Solution to Empower Efficient Alzheimer's Care via Unleashing Generative AI

Jennifer Zheng

New York University Abu Dhabi

Yeonie Heo

New York University Abu Dhabi

Yi Fang

New York University Abu Dhabi

Hao Huang

New York University Abu Dhabi

Abstract

Alzheimer's disease (AD) is the foremost neurodegenerative disorder, impacting 1 in 9 individuals (10.8%) aged 65 or older, with global prevalence projected to increase by 62% by 2030, reaching approximately 47 million patients. Amidst this growing concern, present treatment options are restricted . Given the increased risk of stroke and death associated with antipsychotics in AD patients, non-pharmacological approaches are prioritized to emphasize activities and social interactions for enhancing cognitive function and decelerating memory loss progression. However, the provision of continuous interaction and companionship for AD patients encounters serious hurdles of limited caregiver availability, isolation, and daily socialization challenges.

To address those challenges faced by caregivers of AD patients, we present MemoryCompanion, a novel digital health solution that leverages Generative Pre-trained large-scale Transformer (GPT), the core-enabling technology for ChatGPT. MemoryCompanion combines speech-to-text transcription, voice-cloning, and talking-face technologies to establish an efficient and immediate caregiving system for AD patients. The amalgamation of voice-cloning and talking-face methodologies in GPT responses allows AD patients to experience the sensation of conversing with beloved individuals whenever they desire. As an efficacious and efficient caregiving alternative, MemoryCompanion sustains consistent quality and care for each patient, mitigating the protracted working hours, patient loads, labor intensity, and stress experienced by human caregivers. MemoryCompanion transcends the confines of AD, exhibiting applicability in diverse health domains including language, developmental, and mental health, as well as the educational sector, engendering a broader societal impact.

PI email: lz2278@nyu.edu

Metaverse in Healthcare: Investigating Adoption, Use Cases, and Integration Opportunities in the UAE

Eman Abukhousa

Higher Colleges of Technology

Sonia Abdennadher

Higher Colleges of Technology

Omnia Hamam

United Arab Emirates University

Abstract

The healthcare industry in the UAE is constantly evolving, seeking innovative ways to enhance patient care and outcomes supported by the orientation of the UAE to invest significantly in digital health technologies. The emergence of Metaverse presents a unique opportunity to revolutionize healthcare delivery through immersive and interactive experiences. With the UAE aiming to be at the forefront of Metaverse adoption, it is crucial to explore its potential applications in healthcare and understand the attitudes of healthcare professionals towards its adoption.

This study aims to investigate the inclination of healthcare professionals in the UAE towards adopting Metaverse technologies, identify potential use cases, assess benefits and limitations, analyze implementation challenges and opportunities, and propose an integration framework. By shedding light on these aspects, the research will provide valuable insights to healthcare providers, policymakers, and researchers, guiding the development of future applications and improving healthcare delivery and patient outcomes. By understanding the attitudes of healthcare professionals towards Metaverse adoption, this study will contribute to the ongoing efforts to transform healthcare in the UAE. It will provide valuable insights into the potential benefits and challenges of integrating the Metaverse, enabling informed decision-making, targeted interventions, and tailored strategies to optimize its implementation. Ultimately, this research will play a vital role in shaping the future of healthcare in the UAE, ensuring the effective utilization of Metaverse to enhance patient-centered care and improve healthcare outcomes.

PI email: emanak@uaeu.ac.ae

Preparation of Nanoparticles from Natural Waste Products for the Removal of the Endocrine Disruptor Bisphenol A from Waters

Nagwa Abo El-Maali

Assiut University

Asmaa Wahman

Assiut University

Kawthar Abdel Hameed

Assiut University

Abstract

Bisphenol A (BPA) is a xenoestrogen, exhibiting hormone-like properties that mimic the effects of estrogen in the body. Many BPA-containing materials are non-obvious but commonly encountered including coatings for the inside of food cans, clothing designs, shop receipts and dental fillings. Exposure to BPA is a concern because of the possible health effects on the brain and prostate gland of fetuses, infants and children and also their behavior. There is also a possible link between BPA and increased blood pressure, type 2 diabetes, and cardiovascular disease. In vitro, in vivo, and human studies have shown that BPA can have a wide variety of adverse effects on human health. Among these effects, reproductive and development problems due to estrogenic and anti-androgenic effects of BPA, metabolic diseases such as diabetes and obesity, thyroid hormone disorders, organ damage due to oxidative stress, epigenetic alterations, and direct toxic effect, cancer (breast, prostate, etc.), and neurotoxicity.

BPA could exist in market water bottles, home water supply as a result of using membrane filters made of plastics during water purification and/or as a result of the refuse and waste materials in the surface water.

In this work we will prepare nanoparticles non-toxic (NPs) from natural waste products with high adsorption capacity that can adsorb BPA easily at lower concentrations (ppb) as adsorbents for the efficient removal of BPA from different sources of water. The detection of BPA will be followed using three different methodologies viz. GC/MS, HPLC and Voltametric methods of analysis to validate our results.

PI email: aboel_maali@aun.edu.eg

Specialized AHQF Software Based Three-Dimensional Analysis of Disability-Induced Walking Patterns and Stress: an Effort Towards Precise Diagnosis and Assessment of Therapeutic Efficacy in Clinical Settings

Amany Abd-Eltawab

Cairo University

Aisha Farhan

Jouf University

Abstract

Many physical disabilities and pathological conditions lead to problems and stress associated with walking. Furthermore, this stress is amplified when walking up inclined surfaces. Normal healthy people also face stress while walking up the inclination, which requires combined function of neighboring joints connected to hip joint as compared to level walking. This necessitates the center of gravity (COG) to be adjusted to overcome the external forces and raised further upwards to allow easy forward movement. Assessments of walking patterns up the inclined surfaces help in determining many associated problems within the joints, which may not be identifiable during walking on a level surface. Additionally, assessments of upslope walking are also useful in optimizing mobility in different pathological conditions such as spinal cord disabilities, osteoporosis, arthritis, or dislocation of joints. Currently, hip joint force analysis in three-dimensions requires a highly sophisticated and expensive software requiring patients to go through moderate stressful conditions. We have designed software, AQHF, which collects data from the critical sub-phase of the gait cycle when the weight on the hip joint sustains the maximum body weight. We have previously proven and published the reliability and validity of our results in healthy individuals, both males and females. In the current study, we will carry out the validation and assessment reliability of our software in various pathological conditions in clinical settings. It is worth mentioning that our novel software is possibly useful in the tertiary care hospitals and will open practical channels for its further use in medical and paramedical health settings.

PI email: aeabdullah@ju.edu.sa

Prevalence and Impact of Dysmenorrhea on the Academic Performance of Students, at Medical and Health Sciences University

Rajani Dube

RAK Medical and Health Sciences University

Subhranshu Sekhar Kar

RAK Medical and Health Sciences University

Noopur Ramesh Kedia

RAK Medical and Health Sciences University

Abstract

Introduction: Dysmenorrhea is painful menstruation, and is the most common menstrual symptom affecting adolescents. Evidence suggests that worldwide prevalence can be high. Although it can significantly affect academic performance through its impact on activity, absenteeism, and other aspects of learning, little attention has been given to exploring them. Gaining a better understanding of this important condition will help create awareness and help develop coping strategies.

Materials and methods: This was a cross-sectional survey using a pre-validated questionnaire incorporating demography, menstrual history, severity, and effects on academic performance. Female students selected by non-probability sampling of Ras al Khaimah Medical and Health Sciences University were included(calculated sample size=249). Data was analyzed using SPSS version 25.

Results and discussion: A total of 252 students participated(mean age 20.14 years). The prevalence of dysmenorrhea was 80.5%. The pain was severe for 48.7% (≥7/10 score),14.7% reported severely restricted daily activity, 67% received regular treatment, and 24(11.8%) required hospitalization during last year due to pain. 74.8% had significant trouble concentrating and 21.6% missed assessments. Majority missed >2 days each month. Dysmenorrhea was a significant predictor of academic domains(AD) like reduced concentration, inability to complete assignments, missing lectures and assignments [adjusted OR-2.25, 5.57, 4.32, 3.96] with p< .05 in each. Moderate to severe pain was an independent predictor of all AD compared to mild pain(score<3) (p=.026). Moderate to severe dysmenorrhea had a significant negative impact on academic performance(p=.02).

Conclusion: Dysmenorrhea is a prevalent health problem among university students and has a significant negative impact on education.

PI email: rajani.dube@rakmhsu.ac.ae

The Effects of Exercise and Lycopene on Skeletal Muscles Affection in Type 2 Diabetic Rats Model

Enas Hamed

Assiut University

Hassnaa Mahmoud Abd El Aleem

Assiut University

Rasha Mohamed Ali

Assiut University

Marwa Hassan Bakr

Assiut University

Abstract

Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by insulin resistance and impaired glucose tolerance. Skeletal muscle is critical tissue in glucose homeostasis and insulin sensitivity, and its dysfunction plays a role in T2DM development.
Studies reported skeletal muscle impairments in T2DM, including reduced muscle mass, increased fat infiltration, and decreased oxidative capacity that declines in muscle strength and physical performance. T2DM is associated with advanced glycation end-products (AGEs) accumulation in skeletal muscle that impairs muscle function and contributes to muscle wasting.
Skeletal muscle insulin resistance (IR) is a hallmark of T2DM, and impaired insulin signaling in skeletal muscle contributes to disease development and progression. Insulin stimulates glucose uptake into skeletal muscle through the translocation of glucose transporter type 4 (GLUT4) to the cell surface. In T2DM, insulin-stimulated GLUT4 translocation is impaired so reduced glucose uptake and hyperglycemia.
Exercise improved skeletal muscle function and insulin sensitivity in T2DM. Regular exercise promotes mitochondrial biogenesis, enhances oxidative capacity, and increases muscle mass, improves muscle function and insulin sensitivity. Exercise increases GLUT4 translocation, and glucose uptake, leading to improved glycemic control. Lycopene is a natural pigment and carotenoid found in red fruits and vegetables. Lycopene possesses antioxidant and anti-inflammatory properties and reduced the risk of T2DM.
Autophagy is essential for the maintenance of cellular homeostasis and responsible for the degradation of misfolded or aggregated proteins, and clearance of damaged organelles. Dysfunction of autophagy is linked to T2DM development, which leads to the accumulation of damaged organelles aggregates in cells.
General Objective:The aim of this experimental study is to investigate the potential therapeutic benefits of aerobic exercise and lycopene, as well as their combined effects, on glycemic control and skeletal muscle impairments in the T2DM rat model. The study also seeks to identify the underlying mechanisms by which these interventions may exert their therapeutic effects.

PI email: eah3a2010@yahoo.com

HDL Levels Modulate the Impact of TrD Susceptibility Alleles in Elderly

Cynthia Al Hageh

Khalifa University

Siobhán O Sullivan

Khalifa University

Abstract

The incidence of T2D decreases with age, peaking at 55 years. While the rising incidence of T2D at earlier ages is of concern, the protection of older adults from development of T2D warrants closer attention. This study aimed to investigate the relationship between T2D susceptibility variants, age, and risk factors of T2D, and to identify individuals who may have a lower risk of developing the disease with age. 2,909 patients were enrolled in this study. Genome Wide Association Study (GWAS) with T2D was performed, using non-diabetics aged ≥60, ≥65 or ≥70 as control groups. Binomial regression models were applied to investigate the association of T2D with risk factors such as low HDL and family history of T2D (Fx T2D). In addition, a stepwise logistic regression was performed to investigate how the inclusion of low HDL as a variable influenced the association between the SNPs and T2D. A further validation step using data from the UK Biobank with 53,779 subjects was performed. T2D susceptibility variants were found associated with T2D taking as controls, the three aged-control groups. This association became stronger with the age of the control groups and in the presence of low HDL. The findings suggest that individuals aged over 70 years who have high HDL levels and do not carry T2D susceptibility alleles may be at the lowest risk of developing T2D. These results underscore the potential importance of assessing the interplay between age, genetic predisposition, and HDL levels when evaluating T2D risk in different age groups.

PI email: cynthia.alhageh@ku.ac.ae

Identifying the Neural Markers of Amblyopia to Improve Treatment of Visual Disorders in the UAE

Omnia Hassanin

New York University Abu Dhabi

Osama Abdullah

New York University Abu Dhabi

Luai Eldweik

Cleveland Clinic Abu Dhabi

Bas Rokers

New York University Abu Dhabi

Abstract

Amblyopia (or lazy eye) is a condition of poor, or poorly coordinated, visual input to one eye that leads to an abnormal neurodevelopmental trajectory early in life. When left untreated, the brain will suppress sensory input from the affected eye, leading to clusters of perceptual deficits and an elevated chance of complete blindness later in life. There is a critical gap in our knowledge of the exact neural sites and mechanisms that are impacted in amblyopia. Pinpointing these sites will not only enhance our knowledge of the visual system, but it will also guide additional treatment options later in life to "re-teach" the brain to integrate the inputs from both eyes. For the first time in the UAE, we will systematically investigate amblyopic patients with cutting-edge batteries of behavioral assessment and multimodal MRI imaging techniques. First, we will identify the behavioral signatures of amblyopic subtypes using customized visual perception tests, including acuity, contrast sensitivity, and binocular function. Second, we will characterize impairments in the white matter connections from eyes to visual cortex, building on our prior work on the neural basis of perceptual deficits 1–4. Finally, we will use advanced functional MRI tools to identify the signatures of amblyopia in cortical (primary visual cortex and secondary visual cortex), and subcortical (lateral geniculate nucleus and pulvinar nucleus) structures. This research will contribute to understanding the links between sensory input and visual perception. Such insights constitute a critical first step in treating perceptual disorders, including blindness, through behavioral or computer-brain interface-based interventions.

PI email: omh7815@nyu.edu

Tailoring the Person-Centred Needs and Preferences of People with Dementia Using an Evidence-Based and Culturally-Fitting Framework

Seada Kassie

Middlesex University

Arlene Astell

University of Reading

Abstract

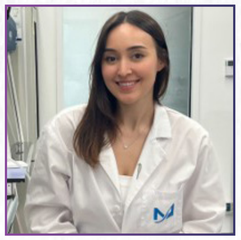
This research aims to contribute towards improved provision of person-centred care (PCC) to people diagnosed with dementia in the United Arab Emirates. Review of the literature has highlighted various individual, contextual, and cultural dimensions that play a significant role in determining the quality of life, life satisfaction, and general well-being of people with dementia. The study's objective is to explore perceptions, knowledge, and understanding of dementia as a neurodegenerative disorder and features of person-centred care amongst people with dementia, their family caregivers, and care staff to help tailor their person-centred dementia care needs and preferences. Having secured ethics approval for scientific research involving humans from the Dubai Health Authority, the study has been granted permission to access research data from the Dubai Seniors' Happiness Centre (DSHC), including patients' medical archives. The study's aim is to evaluate current dementia care services using DSHC as a case study, with the hope of using the initial empirical findings to design, test, and implement an evidence-based and culturally-fitting framework in order to inform/shape dementia care practices in the United Arab Emirates, and possibly in the wider Arab Gulf region.

PI email: s.kassie@mdx.ac.ae

Identifying Therapeutic Targets for Triple-Negative Breast Cancer Regulated by Prognostic Biomarker FOXC1

Revathy Ramachandran

Mohammed Bin Rashid University



Shakhzada Ibragimova

Mohammed Bin Rashid University

Fahad Ali

Mohammed Bin Rashid University

Abstract

Triple-negative breast cancer (TNBC) is an aggressive subtype of breast cancer characterized by a lack of estrogen, progesterone and HER2 receptor expression, and standard receptor/hormone-targeted therapies are ineffective. Attempts to identify crucial transcription factors in TNBC are ongoing and urgently needed to develop targeted therapies. FOXC1 has been recently investigated as a prognostic marker of TNBC; however, its molecular function remains unidentified. Here, we present a large-scale functional genomic analysis of FOXC1 using CRISPR-edited FOXC1 knockout cell lines, which provides insights into the regulatory role of this transcription factor TNBC. Using ChIPseq, we generated FOXC1 binding profiles from four TNBC cell lines to delineate the core conserved and cell-line-specific functions of FOXC1, and show that FOXC1 upregulates expression of oncogenes (CRABP2, IGF2BP3) and downregulates tumor suppressors (THRB, endo180, INPP4B) along with regulating key proteins in various cancer pathways. Further, using gene expression correlation and Kaplan-meier analysis, we identified 8 critical genes whose expression is directly regulated by FOXC1. With this integrative analysis of FOXC1 function, we contribute to the understanding of molecular regulatory mechanisms in TNBC and their impact on cancer hallmarks, providing crucial insights into TNBC-specific pathways that could be targeted for treatment.

PI email: revathy.ramachandran@mbru.ac.ae

The Effectiveness of a Self-Efficacy Enhancing Smart-Phone Application (SEESPA) on Self- Efficacy for Adherence to Healthy Lifestyle Behaviors Among Pregnant Women with Gestational Diabetes Mellitus (GDM)- A Randomized Controlled Trial

Iman Al Hashmi

Sultan Qaboos University

Vidya Seshan

Sultan Qaboos University

Nihal Al Riyam

Sultan Qaboos University

Judie Arulappan

Sultan Qaboos University

Shamsa Al-Awar

United Arab Emirates University

Omar Al Omari Omar

Sultan Qaboos University

Sulaiman Al Sabei

Sultan Qaboos University

Abstract

Although the field of gestational diabetes mellitus (GDM) management is developing, the prevalence rate of GDM related maternal and neonatal-related complications continues to rise, most likely as a result of the obesity epidemic and lack of adherence to healthy lifestyle behaviors. Therefore, the integration of culturally-sensitive, innovative, and effective health innovative interventions for pregnant women with GDM is critical to enhance their adherence to healthy behaviors and decrease the incidence of GDM complications. The purpose of this study is to compare the effectiveness of an innovative self-efficacy enhancing smart-phone application (SEESPA) (Intervention 1) versus the traditional health education (Intervention 2) and the standard prenatal care (control) on the improvement of self-efficacy of adherence to healthy lifestyle behaviors in a population of Omani pregnant women with GDM. A 3 arm-randomized controlled trial (RCT) with pre- and post-test is planned to be conducted among three groups of women with GDM (control vs. two interventions). Total of 270 pregnant women with GDM (90 in each group (smart-phone, traditional health education intervention and control) will be recruited from the antenatal clinics located in three tertiary hospitals in Oman using random selection technique. Study instruments include completion of two self-administered questionnaires that are the Summary of Diabetes Self-Care Activities Measure (SDSCA) and the revised version of Diabetes Management Self-Efficacy Scales (DMSES). Participants' physiological variables will be retrieved from the participants' medical records by trained data collectors. The analytical tools will be ANOVA test and fitting multiple linear regression models for the outcomes improvement in self-efficacy and improvement in mean of adherence.

We hypothesize that providing a self-efficacy enhancing smart-phone application (SEESPA) will enhance women's self-efficacy of adherence, and thus increase their actual adherence to healthy lifestyle behaviors (specifically healthy diet, exercise and self-monitoring of blood glucose [SMBG]). Subsequently, these actions are expected to improve glycemic control, contribute to weight control and ultimately improve obstetrical outcomes of women with GDM.

PI email: eiman@squ.edu.om

Genetic Polymorphisms in NAC1 and Response to Antiepileptic Drugs Among Jordanian Epileptics: Quality of Life: Depression and Anxiety Among Patients with Epilepsy in Jordan

Violet Kasabri

University of Jordan

Rema Alkhateeb

University of Jordan

Reem Abdellatif

University of Jordan

Abstract

Epilepsy is a neurological disease characterized by an enduring predisposition to generate epileptic seizures as a result of abnormal neuronal activity in the brain. Most patients with epilepsy respond to antiepileptic drugs (AEDs). Factors that aggravate, and negatively impact the health condition and quality of life of Patients with Epilepsy include comorbid psychiatric illnesses such as depression and anxiety. About one-third of epileptic patients develop repeated seizures, despite the efficacy of treatment at the optimal dose regimen. They are then, considered resistant to antiepileptic therapy. Despite efforts to predict the AEDs treatment responsiveness and genetic predisposition to epilepsy; the mechanisms underlying the resistance to AEDs in epilepsy treatment are still not well-understood. The nucleus accumbens–associated 1(NAC1) gene, also named voltage-gated sodium channel alpha subunit 1 (SCN1A) gene, is located on chromosome 2q24 and contains 27 exons. The NAC1 encodes the Nav1.1 protein, a molecular target for sodium channel blockers-antiepileptic drugs (SCB-AEDs) that are considered the cornerstone in the treatment of focal and generalized tonic-clonic seizures for more than 70 years. The sodium channels reveal a large pore-forming alpha subunit associated with two smaller beta subunits. Evidence suggests that the channel blocking AEDs do so mainly by binding the alpha subunit. The sodium channel protein undergoes voltage-dependent changes in conformation that regulate conductance through the channel pore. These ion channels are molecular targets for many AED, which block ionic conductance through these channels. Genetic variation at different sites in NAC1 contributes to a wide range of seizure types. Different mutations in the NAC1 gene have been identified that cause monogenic clinical phenotypes of epilepsy in addition to more common nonmonogenic epilepsies. The importance of NAC1 lies not only in its possible causal role in epilepsy but also in its potential influence on the efficacy of AEDs. To clarify the above association, we will perform this study to further explore the relationship between NAC1 polymorphisms and the responsiveness to SCB-AEDs among patients with epilepsy. To better identify the factors that influence Jordanian epilepsy patients, here we will explore the influence of epilepsy on QOL (quality of life) among Jordanian epileptic patients.

PI email: violetk70@gmail.com

Survey of Human Gut Fungi in Health and Disease

Zakeya Alrasbi

United Arab Emirates University

Sumaya Hasan

United Arab Emirates University

Suad Ajab

United Arab Emirates University

Abstract

Introduction: Gut fungi have been associated in several human diseases, including inflammatory bowel disease (3), colorectal cancer (5), and hepatitis B virus infections (6). Unlike bacterial, sequencing studies have brought conflicting results based on the primer used to detect the mycobiome population. Hence, sequencing of fungi came with it is new conundrum, multiple studies have shown different abilities to detect all expected human fungi in the gut based on the primer region used for sequencing. Therefore, to contribute to the existing scarcity knowledge of the human mycobiome, we are planning to investigate the gut mycobiome of pilot cohort by sequencing the Internal Transcribed Spacer 1 (ITS1), ITS2 regions as well as the 18srRNA gene variable region 4 (V4) in cancer and cancer free individuals.

Aim/hypothesis: The hypothesis in this study is to identify gut fungal community patterns in cancer patients and cancer-free participants, comparing the three 18s rRNA regions of gut fungus mentioned above.

Methodology: The study cohort is composed of two groups; cancer patients (n=8) attending

Tawam Hospital, Alain, and Cancer free participants (n=8). Stool samples are collected and delivered to the laboratory. Samples went through macroscopy and microscopy investigations and sequencing. Genomic DNA will be extracted from stool samples using; PowerFecal DNA Isolation Kit, then sent to a commercial company for second-generation sequencing.

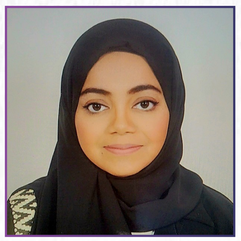
Potential Significance: The main goal of the study is to characterize the current and local human mycobiome pattern in health and disease, and associated it with other microbiome exist in the gut. Since it has been found that fungi population may vary based on geographical region, diet and population.

PI email: rasbi@uaeu.ac.ae

Knowledge, Awareness, and Perception of Artificial Intelligence Among Health Sciences Students at UOS

Al Ounoud Al Marzouqi

University of Sharjah



Al Anoud Salman

University of Sharjah

Shadin Abulabneh

University of Sharjah

Abstract

Purpose: Artificial intelligence (AI) is playing an increasingly important role in education; this study aims to explore and identify gaps in the knowledge that students have regarding artificial intelligence and to understand the Knowledge, awareness, and perception of artificial intelligence among health sciences students at UOS.
Method: A cross-sectional study has been conducted. Using a validated survey that describes the dimension of knowledge, attitudes, and perception of students about Artificial intelligence technology in healthcare.
Result: The survey was conducted online with 142 of 319 students (44.5%) taking an average of 3 minutes to complete. Female students were in the majority, most were sophomores, and most people involved in the research were Health service administration and Medical Laboratory Sciences. Most of the respondents understood AI terms, 41.5% agreed that AI can provide preventative health recommendations and 38.7% agreed that AI can analyze patient information. Around 47% of respondents believe that AI will reduce jobs, 52% will raise new ethical and social challenges, and 41% believe the UAE healthcare system still needs to deal with AI with more maturity. Over 58% believe every medical student/trainee should receive training on AI competencies.
Conclusion: The undergraduate Health Sciences students had a high understanding of AI and its potential implications for healthcare. A perceived willingness among students to learn about AI can be considered a positive sign to harness, and it is imperative to educate future clinical graduates on AI.

PI email: alounoud.salman@sharjah.ac.ae

Development of Bioactive Natural Silk Fabrics via Eco-Printing with Recycled Natural Dyes

Ashgan Mohamed

Assiut University

Amr Nassar

Assiut University

Abstract

The clothing industry considerably benefits from using natural colors rather than risky and carcinogenic synthetic dyes. Natural dyeing and printing are more in demand as a result of increased awareness of the hazards that the production and use of synthetic dyes pose to the environment and human health. This study aims to develop bioactive silk employing plant-based contact printing and organic dyes. Onion skin (quercetin), rose, eucalyptus, lemon, grape, and peach leaves will be utilized in the eco-printing procedure for silk printing. According to AATCC 61-2020, AATCC 15-2013, and AATCC 8-2016, the colorfastness to washing, perspiration, and crocking will be assessed. To investigate the manner of binding between silk and natural dyes, the infrared (IR) spectra of silk will be studied at all stages of dying and printing. In light of its antimicrobial and insecticide properties, the bioactivity of eco-printed silk will be examined.

PI email: ashgan.mohamed@specedu.aun.edu.eg

Investigating the Role the Hijab Plays as a Protective Factors against Eating Pathology in Young Women in the United Arab Emirates

Aisha Alzarooni

Zayed University

Abstract

Previous literature has suggested the hijab acts as a protective factor against eating pathology in women. Other studies have suggested the hijab may no longer be protective if the hijab-wear is compulsory. The aim of the present study is to investigate if the hijab acts as a protective factor against eating pathology in young women in the United Arab Emirates. Additionally, the study aims to investigate if the reasons for hijab-wear and perceived choice in its wear plays a part in the hijab becoming more or less protective. It is hypothesized that young women in the UAE who wear the hijab out of personal choice or to fulfill religious obligations will score lower on eating pathology measures than women who wear the hijab to fulfill family or cultural obligations and women who don't wear the hijab. It is also hypothesized that increased choice in hijab-wear will result in decreased eating pathology. The study will follow a cross-section, comparison and correlation study design of at least 100< female participants living in the UAE and aged between 18-26 years old. Demographic questions will collect information on participants age, nationality, marital status and hijab-usage as well as reason for hijab-wear. A Likert scale will be employed to measure perceived choice while the Eating Disorder Examination Questionnaire (EDE-Q 6.0) will be employed to measure eating pathology. Jamovi will be used to run t-tests to compare the scores of different groups and a correlation test will be used to find correlation between perceived choice and EDE-Q scores. Expected results include: lower scores on the EDE-Q for hijabi participants than non-hijabi participants, lower scores on the EDE-Q for participants who wear the hijab out of personal choice and religiosity than participants who wear the hijab to fulfill family or cultural pressures or obligations and a moderate negative correlation between perceived choice in hijab-wear and EDE-Q scores.

PI email: aalzaaam@gmail.com

The Effects of Aerobic Exercise on Urinary Incontinence and Related Biomarkers in individuals with Multiple Sclerosis: A Pilot Randomized Controlled Trial

Alham Al-Sharman

University of Sharjah

Sivapriya Ramakrishnan

University of Sharjah

Abstract

Background: Multiple sclerosis (MS) is a demyelinating, progressive and neurodegenerative disease affecting mainly young adults. Urinary incontinence (UI) is frequently reported among People with Multiple sclerosis (PwMS). This pilot study aimed at exploring the effects of six weeks of moderate-intensity aerobic exercise on the UI and related biomarkers.

Study design, materials, and methods: A Single Blinded Randomized Controlled Trial was used to examine the effect of six weeks of moderate-intensity aerobic exercise intervention on the UI and related biomarkers in PwMS. Participants were randomly allocated to either a moderate-intensity aerobic exercise program (MAE, n = 20) or a home exercise program (HEP, n = 20). Participants were assessed at baseline and follow-up. Urinary incontinence was assessed using the International Consultation on Incontinence Questionnaire (ICIQ). Blood samples were collected for measurement of cortisol from MS participants in both groups at 8:00 am±1 hour.

Results: Seventeen participants in the MAE and 13 in the HEP group completed the study. Compared to the HEP group PwMS who participated in an MAE experienced significant improvement ($p < 0.05$) on the ICIQ. Furthermore, the cortisol level increased significantly over the six-week period in the MAE group compared to the HEP group. The change score in the cortisol level (from baseline to follow up assessment) was significantly correlated with the change score in ICIQ ($r = -0.56$, $p = 003$) only in the MAE group but not the HEP group.

Interpretation of results: PwMS who took part in the MAE program demonstrated noteworthy enhancement in their ICIQ scores. The scores showed a significant decrease during the follow-up period compared to the baseline.

Concluding message: The results of this study indicated that PwMS who participated in an MAE demonstrated improvements in subjective measure of UI. The improvement in the cortisol level due to aerobic exercise might explain one of the physiologic mechanisms driving these improvements. Exercise may be a non-pharmacological, inexpensive, safe method to improve UI in PwMS.

PI email: aal-sharman@sharjah.ac.ae

Large Language Model Based Digital Therapeutics (DTx) for Diabetes Self Management Education

Lubna Abdel Jawad

Gulf Medical University

Vinaytosh Mishra

Gulf Medical University

Abstract

Diabetes is a growing epidemic worldwide, the United Arab of Emirates being one of the regions with the highest reported cases while the overall prevalence of diabetes in the region is more than 17%. Lifestyle diseases like diabetes are linked to modifiable behaviors such as smoking, unhealthy diet, and physical inactivity, which contribute to chronic conditions like heart disease, stroke, obesity, and more. Effective self-management of diabetes is crucial for delaying its progression and achieving treatment goals. However, existing mobile and web-based applications for self-management lack certain key aspects.

Firstly, these solutions often lack personalized information, which is expensive and not available in real-time. Additionally, they heavily rely on humans for providing information, leading to a lack of patient engagement. The quality of current m-health solutions is also debatable, as many doctors prefer human interaction over these tools. Moreover, these solutions are often difficult to use and require patients to provide prompt and accurate information, which can be challenging for many individuals, particularly in the population where digital literacy levels may be lower.

To address these shortcomings, the researchers of this project propose a digital health product to develop specialized transformers using large language models trained specifically on diabetes. The solution includes two layers: a frontend input and output layer with built-in intelligence to improve usability, and an intermediate interface that interacts with the language model engine to ensure accuracy.

PI email: dr.lubna@gmu.ac.ae

Hepatic Differentiation of Human Amniotic Epithelial Cells on Decellularized Extracellular Matrix-Based Hydrogel

Tayyaba Rasool

Ziauddin University

Shumaila Usman

Ziauddin University

Kanwal Haneef

Ziauddin University

Abstract

Introduction: Liver diseases are affecting millions of people worldwide. Orthotropic liver transplantation is the only current treatment option available for end-stage liver disease. Transplantation of hepatocytes may offer an alternative to liver transplantation. However, there is a dire need for a cost-effective and efficient method that can counteract the disadvantages of cellular transplantation associated with 2D culture. Tissue engineering approaches offer a superior alternative to these limitations with 3D culture, to better mimic in-vivo microenvironment. Although major improvements have been made, there are still no hydrogels available that functionally mimic extracellular liver matrix (ECM), for both in-vitro and in-vivo transplantation models.
Objective: To investigate the potential of Amniotic Epithelial cells for the differentiation of hepatocytes on decellularized ECM hydrogels.
Methodology: Amniotic epithelial cells (AECs) will be isolated and characterized for the presence of their specific markers by Immunocytochemistry and their tri-lineage differentiation potential will be checked. HAM extracellular matrix will be obtained by tissue decellularization process which will then be analyzed for the presence of ECM components and quantification of DNA content. Decellularized ECM hydrogels will be prepared and encapsulated with the AECs for hepatocyte differentiation by using small molecules. The differentiated cells will be analyzed for the presence of hepatic markers by qPCR & Immunocytochemistry.
Expected Results: The differentiation of amniotic epithelial cells into functional hepatocytes and their successful transplantation in vivo for liver degenerative disorders. It can also be used for in vitro cytotoxicity analysis of drugs on hepatocytes.

PI email: tayyabarasool06@gmail.com

Quantification of Trace Metals in Disposable Facemasks Used Widely during the COVID-19 Pandemic

Lucy Semerjian

University of Sharjah

Rand Wardah

University of Sharjah

Kawthar Almatrook

University of Sharjah

Leena Kamali

University of Sharjah

Shahd Al Madhani

University of Sharjah

Abstract

In view of COVID-19 epidemic, the usage of disposable facemasks as a prophylactic measure to address virus transmission has gone widespread and increased exponentially. However, facemasks, when inappropriately discarded, may have major environmental implications as considerable levels of heavy metals, microfibers, and harmful chemicals such as volatile organic compounds may be released into various environmental compartments. In the current study, a total of 68 disposable masks were selected for testing whereby a total of 17 categories of masks were targeted based on their color, brand, and type. Samples were analyzed for eight toxic heavy metals and metalloids (Ni, Cd, As, Sb, Cu, Cr, Tl, and Pb). Recorded results showed that Pb noticeably had the highest concentration among all metals under study with a maximum concentration of 6.57 µg/g. Antimony concentrations varied in different types of masks, and thallium was noted to be present in the range of 0.3618 to 2.6008 µg /g. Chromium was present in specific-colored masks distinctly at levels ranging between 2.3756 and 4.6649 µg/g compared to other samples having ≤1 µg/g Cr. Finally, it was noted that nickel, cadmium, and arsenic showed the lowest concentrations in all tested samples and a similar pattern was observed for copper, excluding black masks. These findings appear to convey that facemasks can be an environmental burden and a source of heavy metals release into the aquatic and terrestrial environments. Therefore, more stringent facemasks manufacturing methods with reduced metal content, and increased public awareness for appropriate facemask disposal are required to lessen their negative impacts on human and ecological health.

PI email: lsemerjian@sharjah.ac.ae

Impacts of Voluntarily Practiced Intermittent Fasting During Ramadan on Non-Metastatic Breast Cancer Patients Under Chemotherapy: A Prospective Cohort Study

Noor Abu Dheir

University of Sharjah

Moezalislam Ezzat Faris

University of Sharjah

Maha Saber Ayad

University of Sharjah

Mohamed Ibrahim Madkour

University of Sharjah

Abstract

Cancer is defined by unregulated abnormal cell division. In more advanced stages, the cells metastasize or spread to other parts of the body locally or via the lymphatic and blood systems. Given the enormous incidence of cancer in the world, primary prevention has been recognized as a major cancer control strategy. Diet and nutrition are significant modifiable factors that can influence the probability of developing cancer. A diet-based therapy called intermittent fasting (IF) alternates between periods of fasting and unrestricted eating. Intermittent fasting (IF) is becoming more and more well-liked across the globe due to its capacity to alter the body's energy metabolic processes, enhance health, and delay the onset of many diseases. Regimens of IF commonly involve short-term IF such as 16 to 18 hours of daily fasting, alternate-day fasting, or 5:2 IF. Interestingly, recent research suggests that IF may be useful in tumor immunotherapy since it can impact tumor cells' energy metabolism, slow down tumor cell development, and enhance immune cell functionality and antitumor immune responses. Moreover, a study conducted by the International Food Information Council Foundation, revealed that IF has become more well-known recently, and cancer patients are now inquiring about the benefits for both cancer prevention and therapy. Therefore, clarifying the role of non-pharmacological, costless dietary modifications such as IF in cancer prevention and therapy is urgently needed to advance cancer care, parallel to innovative therapies. Ramadan model of IF (RIF) is one of the most commonly practiced models with the largest body of evidence elaborating its health effects and metabolic impacts on healthy people. Being practiced by many Muslim patients, even those cancer patients under different cancer therapies, and even without informing their doctors, it becomes legitimate to examine the effect of such ritual practice on cancer markers. This will help oncologists and healthcare providers to develop evidence-based practices and recommendations toward this ritual practice during Ramadan fasting month.

PI email: nour.ad2014@outlook.com

Co-Pharmacist: AI-Powered Medication Regimen Detection, Safety-Review, Tracking, Education, and Management

Tania Tahtouh

Abu Dhabi University

Marah Alhalabi

Abu Dhabi University

Maha Yaghi

Abu Dhabi University

Nermin Eissa

Abu Dhabi University

Mohammed Ghazal

Abu Dhabi University

Abstract

In this research project, we investigate AI-powered patient- and pharmacist-assistance companion apps we call Co-Pharmacist (named after AI assistants commonly referred to in tech as Co-Pilots). Patients receive prescriptions from doctors in a not very accessible format, especially for aging patients. Pharmacists must ensure they have dispensed the right medicine and dosing while ensuring any missed drug-drug or drug-food interaction, or incorrect dosage, is rechecked with the prescribing physicians to avoid risking harm to patients. However, reviewing research and ensuring patient safety is challenging in the short window pharmacists have before moving to the next patient in line and maintaining their patient satisfaction KPIs. The short window does not help pharmacists collect history and provide patients with detailed guidelines on managing their medicine and condition. Patients may even have questions about symptoms and side effects that may go unasked or unanswered. We propose to use Artificial Intelligence (AI) and Computer Vision (CV) to reduce the risk of patient-safety errors and improve patient medication management and information post-subscription collection, a practically non-existing service. Our AI-powered app has two user classes: the patient and the pharmacist. It allows both to scan all medications on a surface quickly, identify them using the visible parts of their name and barcodes, query trusted medical sources for details, detect abnormalities in dosing or interactions that warrant a check, and then display them in accessible formats. It also adds reminders and trackers for symptoms and compounded side effects (from multiple medications). The simplified visual form of their collective medication regimen, symptoms, and side effects, is sharable with doctors and pharmacists to allow them to tune the regimen easily for improved care and quality of life. Moreover, our app uses Large Language Models to answer questions patients typically ask about their medications or conditions that a pharmacist answers and to respond with summarized and helpful details.

PI email: tania.tahtouh@adu.ac.ae

Design and Synthesis of Truncated Antimicrobial Peptides

Emilia Oueis

Khalifa University

Mohammed Aldulaimi

Khalifa University

Ashif Shaikh

Khalifa University

Abstract

Antimicrobial peptides (AMPs), or host defense peptides, are produced by various cells and tissues in all forms of life. They play an important role in the body's response to inflammation and infection. Recently, there has been an increased interest in the development of AMPs as therapeutic drug candidates as antimicrobials, not only because of their innate biological activity, but also their important structural features and immune modulation capabilities. Antimicrobial resistance (AMR) has become a significant threat to health and development, requiring the urgent development of new antibiotics with novel modes of action, making AMPs ideal starting points for their development. Laterosporulin10 (LS10) is a bacterial AMP consisting of 53 amino acids. It is a membrane-permeabilizing peptide with observed bacteriostatic activity against Staphylococcus aureus and Mycobacterium tuberculosis with LD50 values in the low micromolar range while showing no hemolysis effect. In the current project, we aim to synthesize more stable peptidic and peptidomimetic derivatives with better pharmaceutical properties based on short truncated regions of LS10 with drug lead potential. The amino acid composition of LS10 will be analyzed and shorter sequences will be generated based on their cationic content, mean hydrophobicity, predicted stability, and antimicrobial potential using in silico tools. The main lead sequence and its derivatives will be synthesized, purified, and validated by a variety of analytical methods. The physical properties of the molecules will be determined as well as their antibacterial activity and cytotoxicity. Further structural improvements will be guided by structure activity relationship studies in an iterative cycle.

PI email: emilia.oueis@ku.ac.ae

Epigenetic Mechanisms Regulating Iron Metabolism in a Mouse Model of Multiple Sclerosis

Shahad Arikat

University of Sharjah

Mohammad Ghaleb

University of Sharjah

Ameera Abu Qiyas

University of Sharjah

Abstract

Multiple sclerosis (MS) is a chronic autoimmune disease of the central nervous system (CNS) that is characterized by neuroinflammation, demyelination, and axonal degeneration. The dysregulation of iron regulatory proteins(IRPs) has previously been implicated in the pathogenesis of MS, attributing to the neurotoxic effects resulting from iron overload within neuronal tissue. Previous research has already established a link between IRPs , iron overload and neurotoxicity in MS, but little is known with regard to the role of epigenetics control of IRPs-coding genes. Further, the dysregulation of IRPS has been shown to exacerbate neuroinflammatory symptoms in MS and its animal model experimental autoimmune encephalitis (EAE) but the potential epigenetic regulatory mechanisms involved in this dysregulation (during EAE) have not yet been investigated. Epigenetic mechanisms, such as DNA methylation, and posttranslational histone modifications, have emerged as critical regulators of gene expression and have been implicated in the regulation of iron metabolism in MS, further highlighting the relevance and importance of this particular research topic. This proposal will investigate the epigenetic-mediated regulatory mechanisms that may attribute to the regulation of iron metabolism-related proteins during EAE in both in vitro and in vivo experimental setups. Results of this proposed research are expected to help in understanding the epigenetic regulatory mechanism of IRPs and might be therapeutically manipulated to augment neuronal recovery in MS patients.

PI email: U22103814@sharjah.ac.ae

Exploring the Dietary, Lifestyle and Demographic Factors associated with Risk for Colorectal Cancer and Colorectal Abnormalities in a FIT-positive Population. A Cross Sectional Study in the Kingdom of Bahrain

Afnan Freije

University of Bahrain

Simone Perna

Universita Delgi Di Milano

Salwa Al-Thawadi

University of Bahrain

Abstract

In Bahrain, the number of new cases of CRC has increased very rapidly over the last two decades and the age standardized ratio of CRC in Bahrain is between 13.4-18.8 per 100000. The aim of this study was to explore the association between colorectal cancer or colorectal abnormalities in relation with different dietary and demographic factors in Bahrain in collaboration with King Hamad University Hospital. Furthermore, this study aimed to explore the association between f-Hb levels in relation to colonoscopy findings and lifestyle factors in a FIT-positive population in Bahrain. A retrospective cross-sectional study was performed using data extracted from patients who were positive to FIT and who underwent colonoscopy. Data collection included measurements of definitions, age at diagnosis, Body mass index (BMI), Smoke and alcohol consumption, red meat and coffee consumption and levels of fecal immunochemical test.

PI email: afreije@uob.edu.bh

Effect of Different Foot Orthosis Inverted Angles on Walking Kinematics in Females with Flexible Flatfeet

Nour Mustafaalsaafin

University of Sharjah

Abstract

Background: Although the inverted technique was shown to be more effective compared to other orthotic designs for the treatment of flatfeet, the biomechanical mechanisms underlying the therapeutic effect of the inverted angle orthoses is still unclear. Therefore, the aim of this study was to examine the effect of different inverted angles of foot orthoses on walking kinematics in females with flexible flatfeet.
Methods: Thirty-one female adults with flexible flatfeet aged 18-35 years old participated in this study. Kinematic data of the hip, knee, and ankle were collected during walking under three test conditions in random order: with shoes only; with 15° inverted orthoses; and with 25° inverted orthoses.
Results: Significant differences were found between different test conditions for maximum ankle plantarflexion angle during loading response, maximum ankle dorsiflexion angle during mid-stance, maximum ankle plantarflexion angle at toe-off, maximum ankle external rotation angle, maximum ankle internal rotation angle, and maximum hip external rotation angle. No significant changes were shown in the knee kinematic variables, maximum hip extension angle, and maximum hip adduction angle.
Conclusion: Using inverted orthoses at 15 ° and 25 ° inverted angles resulted in significant changes in ankle joint kinematics during walking in female adults with flexible flatfeet. Orthotic insoles with a smaller inverted angle (i.e., 15 °) were shown to be more effective and feasible for female adults with flexible flatfeet.

PI email: u20105881@sharjah.ac.ae

Preconception Health: A Cross-Sectional Study Among UAE Community and Dedicated Internet Platform

Kornelia Zareba

United Arab Emirates University

Shamsa Al Awar

United Arab Emirates University

Abstract

The improvement of maternal health and the reduction of child mortality remain global health objectives that build the Millennium Development Goals. Therefore, the awareness of possible threats among the entire society is so important, with particular focus on men and women of reproductive age. The objectives of this study were to determine if women and men realized the importance of optimizing their health prior to pregnancy; and to evaluate their knowledge level and beliefs about preconception healthcare. Additionally, we sought to understand how and when women wanted to receive information on preconception health and wanted to deliver scientifically proven information in the most accessible way. A prospective cross-sectional survey is planned among the community. The participants will be asked to complete a questionnaire which describes their sociodemographic profile and preconception knowledge. We are planning to set up an online portal developed according to the expectations of the society, administered and consulted by doctors, nurses and dieticians on the subject of preconception healthcare. The internet platform will contribute to the improvement of the health of the United Arab Emirates population with particular focus on fertility and the reduction of pregnancy-related complications. A tailored web intervention may improve general preconception health in women planning a pregnancy. Our long-term goal for preconception care should include a full package of health and social interventions to be delivered to all women and couples of reproductive age everywhere.

PI email: kzareba@uaeu.ac.ae

Pharmacy

Design, Synthesis, and Development of Dual FLT3/HDAC Inhibitors for Combating the Resistant Forms of Acute Myeloid Leukemia (AML)

Heba Hesham

Ain Shams University

Dalal Abou El Ella

Ain Shams University

Deena Lasheen

Ain Shams University

Eman Elrazaz

Ain Shams University

Eman Dokla

Ain Shams University

Abstract

Leukemia (blood cell cancer) is the most frequent cancer in children, accounting for almost 1 out of 3 cancers in children. Acute myeloid leukemia (AML) is the most common and fatal type of leukemia with low five-year survival rate. Disease relapse is the main problem that faces childhood leukemia treatment in Egypt with drug resistance leading to treatment failure. This disease has multiple enzymes abnormalities such as FMS like tyrosine kinase 3 (FLT3) and histone deacetylases (HDACs) and their overexpression and mutations are the most common molecular aberrations associated with poor prognosis of AML. Dual targeting of FLT3 and HDAC enzymes constitute a promising strategy to develop novel and effective anti-leukemic agents against resistant AML.
Recently, our research group developed a benzimidazole-based small molecule; 4ACP, that exhibited nanomolar activity against wild-type FLT3, FLT3-Internal tandem duplications, and FLT3-Tyrosine kinase domain mutations and showed potent antiproliferative activity against AML FLT3-ITD+ cell lines. Based on our lead compound; 4ACP, we aim to design dual FLT3/HDAC inhibitors to target both enzymes which constitute a promising therapeutic approach to reverse the drug resistance of FLT3 mutants and minimize disease relapse. Our workflow will start with rational and computational studies to design dual derivatives. Chemical synthesis and biological evaluation will follow to identify promising hits. Finally, in vivo pharmacokinetics, animal studies, and formulation studies of the most potent derivatives will help establish our compounds as preclinical candidates against resistant types of AML.

PI email: Hebahesham@pharma.asu.edu.eg

Targeting BAFF Signaling as a Potential Therapy for Chronic Rhinosinusitis

Fatemeh Saheb Sharif-Askari

University of Sharjah

Rabih Halwani

University of Sharjah

Abstract

Chronic rhinosinusitis with nasal polyps (CRSwNPs), is a condition associated with high symptom burden, high rates of relapse of nasal polyps after surgery, and reduced quality of life. CRSwNPs predominantly displays type 2-high inflammation involving interleukin (IL)-4, IL-5, and IL-13 cytokines, as well as infiltration of nasal polyps by eosinophils, basophils, and mast cells. The TNF superfamily member, BAFF, has been shown to play an important role in B-cell survival, proliferation, and maturation, and higher levels of BAFF have been found in patients with CRSwNP compared to healthy controls. The project proposes to antagonize BAFF-receptor interactions by administering belimumab locally to sinuses tissue, as well as developing belimumab loaded nanoparticles (NP) to compare the effect on CRS eosinophilic inflammation to free belimumab. Treatment effect will be evaluated ex vivo using polyp tissues collected from CRSwNPs as well as in vivo in our established mice model of eosinophilic nasal polyposis. The project's approach has the potential to provide a promising therapy for CRSwNPs and improve patient quality of life.

PI email: fsharifaskari@sharjah.ac.ae

Delivery of Anti-Diabetic Drug by Novel Polymer-Coated Lipidic Component Glomerulus Targeting Nano-Carrier for Effective Diabetic Nephropathy Treatment

Kawthar Abla

Beirut Arab Univeristy

Mohammed Mehanna

Beirut Arab Univeristy

Abstract

Diabetic nephropathy (DN) is the leading cause of end-stage renal disease worldwide. It is one of the major complications of diabetes that accounts for more than two-thirds of deaths in the diabetic population which is characterized by persistent albumin urea and a decline in the glomerulus filtration rate. Unfortunately, there are no available effective therapeutic strategies to ameliorate and reverse DN progression. However, it is well documented that anti-diabetic drugs attenuate DN by suppressing renal inflammation and oxidative stress and reducing mesangial cell disorder. Herein, we will rationally design a size- and surface charge-dependent glomerulus-targeting polymer-coated lipid (CLS) nano-carrier which will be loaded with anti-diabetic drugs to target mesangial cells and manage DN. Experiments will display that the prepared system has a nanometric size range, positive charge, and spherical morphological structure. In-vivo experiments will include organ biodistribution study in which it is expected that the fabricated nano-system will be distributed significantly in mice kidneys compared to the control group. The induction of the mice diabetic nephropathy model will be performed through high fat-diet and streptozotocin to induce microvascular complications in renal tissues which will result in elevated creatinine, blood urea nitrogen (BUN), and urea levels where CLS will be able to reduce these parameters significantly. Moreover, it is expected that diabetic mice that receive CLS will show significant down-regulation in nestin, vimentin, and Aldo-keto reductase AKr1B1, profibrotic protein transforming growth factor-1. Therefore, CLS ought to be a novel and promising treatment option for DN.

PI email: k.abla@bau.edu.lb

Analysis of Anticholinergic Medications Effect on Cognitive and Functional Decline Among Older Adults

Etwal Bou Raad

American University of Beirut

Khalil El Asmar

American University of Beirut

Monique Chayaa

American University of Beirut

Abstract

The study aims to evaluate the impact of long-term anticholinergic burden on cognitive-functional decline in older adults. In order to do so, the study will validate first a practical assessment approach in quantifying anticholinergic burden.
The analysis will use data from S.AGES sub cohort study that enrolled a total of 983 community older adults from 2009-2013. ACSBC (recently developed anticholinergic catalogue) and ACB (old validated practical scale) will be used to calculate the average daily anticholinergic burden score over the period of follow up. Mini Mental State Examination (MMSE), Instrumental Activity of Daily Living (IADL) and Activity of Daily Living (ADL) measured at time of inclusion and over the period of follow up will be used to evaluate cognitive-functional decline.
The analysis will focus on modeling cognitive-functional decline as a function of the anticholinergic burden with other risk factors over time. The analysis will also validate ACSBC by estimating the level of correlation between average daily ACSBC and ACB scores and determining which score is more positively associated with cognitive-functional decline. In case correlation exists between the two validated scores, the ACB practical scale will be used in further longitudinal analysis.
Results from this study will serve the community and help the geriatricians to improve pharmacotherapy they provide to older persons while lowering the expense of their treatment due to unintended side effects. In addition, the results of this study will provide additional evidence to adjust for anticholinergic burden as a potential covariate when assessing the determinants of cognitive-functional decline.

PI email: epb01@mail.aub.edu

Identification of Potential hENT1 Inhibitors Using a Combined Approach of Ligand-Based and Receptor-Based Virtual Screening: Implications for Cardiac and Neurological Disease Therapy

Sedra Kremesh

Al Ain University

Shaima Hasan

Al Ain University

Azza Ramadan

Al Ain University

Mohammad Ghattas

Al Ain University

Abstract

Human equilibrative nucleoside transporters (hENTs) are a family of integral proteins mostly found primarily on cell plasma membranes. hENTs transports vital nucleosides and nucleobases essential for DNA and RNA synthesis. Pharmacologically, the isoform hENT1 is an important therapeutic target, as inhibitors of hENT1 transport were shown to be cardio- and neuroprotective. However, the current inhibitors are not clinically used due to their poor pharmacological profile. Hence, the overarching aim of this study is to utilize computer-aided drug discovery techniques to search for novel hENT1 inhibitors and confirm these inhibitors' inhibitor activity in vitro.

We have utilized our previously validated computational protocol, a set of pharmacophoric features created based on standard hENT1 inhibitors, to identify novel hENT1 inhibitors using virtual screening. Ten top candidate hENT1 inhibitors were successfully identified in silico. We have also established an in vitro-based model in the H292 cell line to evaluate and confirm the hENT1 inhibitory activity. We will utilize this cell culture model for testing in the upcoming months.

These newly identified compounds can serve as novel therapeutic agents by mediating various protective effects such as cardioprotection, neuroprotection and lung protection.

PI email: Sedra.kremesh@aau.ac.ae

Advancing Community Health and Resilience Post-COVID-19: Integrating Clinical Pharmacy, Nursing, and Health Informatics for Community Impact in the GCC Region

Sahithya Ravali

King Khalid University

Jerlin Priya Lovelin Auguskani

Jazan University

Amutha Chellathurai

King Khalid University

Abstract

The COVID-19 pandemic has significantly impacted healthcare systems worldwide, including the Gulf Cooperation Council (GCC) region. To address the challenges arising from the pandemic and promote community health and resilience, this research proposes the integration of Clinical Pharmacy, Nursing, and Health Informatics. By leveraging the synergies among these disciplines, the research aims to drive community impact, enhance patient care, and foster innovation in the GCC region.

The research objectives include assessing the post-COVID-19 healthcare landscape, exploring the role of interdisciplinary collaboration in addressing community health needs, developing innovative interventions, evaluating their impact, and fostering knowledge exchange and collaboration among healthcare professionals. Through a comprehensive methodology comprising literature reviews, surveys, interviews, data collection, and pilot implementation, the research will investigate the potential of interdisciplinary collaboration in optimizing healthcare outcomes, patient satisfaction, medication safety, and community health.

The expected outcomes include enhanced community health through comprehensive interventions targeting vaccination campaigns, health education programs, and health screenings. Additionally, optimal medication management strategies will be developed, ensuring safe and effective medication use for individuals recovering from COVID-19 and managing chronic conditions. The research will also contribute to strengthening healthcare resilience by leveraging health informatics and data-driven decision-making. By promoting innovation, best practices, and sustainable community impact, this research intends to shape policies, drive collaboration, and empower healthcare professionals to address the post-COVID-19 challenges in the GCC region. Ultimately, it aims to establish a resilient and thriving healthcare system that prioritizes patient-centered care and community wellbeing in the aftermath of the pandemic.

PI email: sahithyamavaluru@gmail.com

Evaluation of the Diabetic Wound Healing Properties of Bio-Nanofiber Incorporating Dragon Blood and Alkanna Tinctoria: In Vivo and in Vitro Experimental Study

Raha Orfali

King Saud University

Rana Almotawa

King Saud University

Mohammed Badran

King Saud University

Ghadeer Alhamid

King Saud University

Abstract

Background: Diabetic patients with foot ulcers have a two-fold higher mortality rate. Studies of Dragon`s Blood (DB) and Alkanna Tinctoria (AT) showed an impact in accelerating wound healing, and using nanofibrous membranes (NFM) as a wound dressing promotes skin tissue regeneration. Thereupon, the aim of this study is to investigate the effect of NFM incorporating DB and AT in treating diabetic foot.

Methods: DB and AT were extracted in ethanol and ethyl acetate. In-vitro antimicrobial activity using agar diffusion method and minimum inhibitory concentration (MIC) of DB and/or AT extract or NFM were tested against S.aureus and P.aeruginosa. For the in-vivo study, Wistar rats were divided into diabetic and non-diabetic groups. Diabetes was induced in rats with STZ 60mg/kg. The wound was prepared with an 8mm biopsy punch and treated with NFM on days 0. 3. 7. 14. Tissue samples were collected for histological examination.

Results: DB and/or AT extract has shown significant antibacterial activity at the concentration of 80mg/ml and 40mg/ml against P.aeruginosa and S.aureus. MIC for DB, AT, and DB+AT was 1.56mg/ml, 12.5mg/ml, and 1.56mg/ml, respectively. The study results revealed that NFM incorporating DB and AT had increased antibacterial activity. NFM showed a higher inhibition zone on agar plates compared to DB and AT extracts. The DB+AT NFM demonstrated the highest percentage of wound closure compared with DB and AT alone, representing the great healing potential of extracts combination-loaded NFM.

Conclusion: The obtained NFM combined with DB+AT extracts have potential antibacterial activity and promising wound healing in diabetic rats.

PI email: ranayalmutawa@gmail.com

Formulation and Optimization of Ivermectin Nanocrystals for Enhanced Topical Delivery and Antiparasitic Activity

Hoda Awad

University of Sharjah

Iman Ahmed

University of Sharjah

Abstract

With the increasing prevalence of antiparasitic-resistant cases and the limited availability of newly discovered antiparasitic agents, it is crucial to focus research efforts on improving efficacy of existing agents. Ivermectin (IVM) is commonly used to treat wide range of parasites in both humans and animals, but its effectiveness is suboptimal, and the emergence of ivermectin-resistant parasites is concerning. In this context, the physico-chemical characteristics of IVM were modified by nanocrystallization to improve saturation water-solubility and skin penetration, which might eventually enhance therapeutic efficacy through the dermal route. IVM-nanocrystals (IVM-NC) were prepared using microfluidization technique. The impact of different process/ formulation variables on IVM-NC characteristics were optimized using D-optimal surface response statistical design. The optimized IVM-NC formulation was further lyophilized and evaluated using in vitro and ex vivo techniques. It produced small monodisperse particles with an average diameter of 186 nm and a polydispersity index of 0.4. The in vitro results indicated a significant enhancement in saturation solubility and dissolution rate, with an impressive 730-fold increase in the former and substantial 24-fold increase in the latter. The ex vivo permeation study conducted on pig's ear skin demonstrated a 1.7-fold increase in the dermal deposition of IVM-NC. In addition, the lyophilized IVM-NC (IVM-NC-L) was integrated into a topical cream preparation at a concentration of 1% w/w, and the drug release profile from IVM-NC cream was superior compared to that of the corresponding marketed product. Overall, the formation of IVM-NC presents a promising approach to improving the effectiveness of topically applied IVM in treating local parasitic infections.

PI email: U19104592@sharjah.ac.ae

Dentistry

Evaluation of the Effect of Electronic-Cigarette Aerosol on Oral Metabolome and Microbiome using a 3D Tissue-Engineered Human Oral Mucosal Model

Meenu Maan

New York University

Keyvan Moharamzadeh

Mohammed Bin Rashid University of Medicine and Health Sciences

Mainak Dutta

BITS Pilani-Dubai

Abstract

Electronic cigarette (EC) usage or vaping has seen a significant rise in recent years across various parts of the world. They have been publicized as a safe alternative to smoking; however, this is not supported strongly by robust research evidence. Toxicological analysis of EC liquid and aerosol has reveale the d presence of several toxicants with known carcinogenicity. Oral cavity is the primary site of exposure of both cigarette smoke and EC aerosol. The role of EC in oral cancer is not as well-researched as that of traditional smoking. Smoking mediated dysregulation of cellular metabolism and the oral microbiome has been extensively reported in oral cancer. However, the effect of EC usage on metabolome and healthy microbiome is not well elucidated. Our study shows that vaping induces de-wiring of the metabolism as well as the microbiome and potentiates the growth of pathogenic bacteria over healthy bacteria. The use of a 3D model makes our study more clinically relevant as compared to the studies using 2D monolayer culture.

PI email: meenu.maan@nyu.edu

Fine Motor Skill Learning in Restorative Dentistry: A Step Forward in Simulated Clinical Activities

Sara Jaser

University of Sharjah

Khaled Khalaf

University of Aberdeen

Mohamed El-Kishawi

University of Sharjah

Constanze Hesse

University of Aberdeen

Abstract

Dental Education has undergone many refinements related to teaching and assessment. Students learn differently and have different learning abilities to develop their fine motor skills required to achieve competent levels within a short period of time. This requires utilization of multiple learning methodologies and diverse teaching methods. There is limited use of contemporary theories for designing motor skill learning activities in dentistry. Recent evidence highlights the negative impact of self-attention and conscious monitoring of movement. Dental training is generally performed conventionally and explicitly on plastic teeth. Recently, there has been an evolution in development and implementation of computerized technologies in dental skills training. Such technologies have started to demonstrate positive and promising results in clinical skill acquisition and development supported by immediate feedback and assessment.

The aim of this project is to evaluate the effectiveness of using the haptic Virtual Reality dental simulator "Simodont®" in relation to fine motor skill learning and assessment in Restorative Dentistry. The enhanced technology will be compared to the conventional method of teaching and assessment. In addition, the effect of reduced focus of attention and its impact on the acquisition and retention of fine motor skills will be investigated. The impact of stress such as the effect of time pressure on student performance and their tendency for reinvestment (self-consciousness) will be measured using subjective and objective assessment tools. Finally, analysis of inter-rater assessments using conventional visual methodology of assessment with results obtained by utilizing an enhanced calibrated assessment device "Simodont®" will be compared.

PI email: sjaser@sharjah.ac.ae

Sustainable Synthesis of Innovative Silver Conjugated Copper Oxide Nanocomposite: Its Biophysical Characterization, Biocompatibility, Antimicrobial and Anti-Inflammatory Activity on Oral Pathogens

Sunaina Shetty Yadadi

University of Sharjah

Priyadarshini Sekar

University of Sharjah

Abstract

The oral cavity has a unique anatomical structure, and most oro-dental infections are treated with antibiotics. However, due to bacterial resistance, the effect of antibiotics is not ideal. Metal and metal oxide nanoparticles have become the recent research limelight due to their innumerable advantages. Silver nanoparticles are widely studied for their antimicrobial and anti-inflammatory activities. Despite clear evidence of the strong antibacterial efficacy of silver nanoparticles, studies have raised concerns over the development of silver-resistant bacteria. Hence, in the present investigation, silver-conjugated copper oxide (Ag-CuO) nanocomposite was synthesized using a sustainable method for improving the yield and stability of the nanoparticle. The synthesized innovative Ag-CuO nanocomposite was characterized using UV-Vis spectrophotometry, Zeta potential, Fourier transform-infrared spectroscopy, thermo-gravimetric analysis, X-ray diffraction, scanning electron microscopy (SEM) to determine the morphological characteristics such as size, shape, stability, and crystalline nature of Ag-CuO nanocomposite. The antimicrobial activity was determined by agar diffusion, broth dilution, and time-kill assays against gram-negative, gram-positive, aerobic, and anaerobic oral pathogens. Similarly, the antibiofilm efficacy will be evaluated by crystal violet staining and then confirmed by viewing under confocal laser scanning microscopy and field emission SEM. The results revealed a potential antimicrobial, anti-biofilm effect and suggested good biocompatibility on dental cell lines. The results further uncovered a potential anti-inflammatory activity on M2 phenotype in the human THP-1 macrophages and showed the expression of CD163 anti-inflammatory marker which states that the silver conjugated copper oxide is a promising nanocomposite in the field of nanomedicine to meet future biomedical and dental demands.

PI email: syadadi@sharjah.ac.ae

Nanofibrous Porous Polycaprolactone Membrane for Guided Tissue Regeneration

Soumya Sheela Aravind

University of Sharjah

Fatma Mousa Alghalban

University of Sharjah

Khalil Abdelrazek Khalil Abdelmawgoud

University of Sharjah

Ensanya Ali Abou Neel

University of Sharjah

Abstract

The periodontium is a unique functional unit that is composed of bone, periodontal ligament (PDL), and cementum. Due to inflammation as in the case of periodontitis, this unique unit is disturbed and if it is not treated it leads to tooth loss. Periodontitis is a major healthcare problem worldwide and in the UAE in particular, the prevalence of periodontal diseases is highly increasing and a variety of risk factors such as diabetes, obesity, smoking, stress, calcium and vitamin D deficiency, are also associated with periodontitis.

To treat periodontitis, controlling the inflammation alone is not enough to restore the diseased periodontium, but regulating the microenvironment and enhancing cellular function is also required. Guided tissue regeneration (GTR) membranes have been attempted for periodontal regeneration and these membranes should be capable of regulating the microenvironment and controlling the cellular functions during different stages of periodontal regeneration. A variety of non-resorbable and resorbable membranes have been used for such purpose and they showed some clinical success but with a high variability in the reported clinical outcomes. Accordingly, getting a real periodontium has not been achieved yet.

This study therefore aims to report the fabrication and characterization of a 3D porous nanofibrous polycaprolactone (PCL) membrane for periodontal tissue regeneration. The porosity within the nanofibrous membrane will assess in regulating the cellular functions (eg, attachment, proliferation, and differentiation) as well as in regulating the microenvironment by providing a better chance for the formation of new vasculature (angiogenesis) that are essential for proper healing and formation of actual periodontium.

PI email: saravind@sharjah.ac.ae

Prospective Evaluation of Salivary FSH Levels as a Non-invasive Diagnostic Marker for Early Detection of Perimenopause

Sarah Jumaah

University of Sharjah

Noura Al Hamwi

University of Sharjah

Ward Al Rubayie

University of Sharjah

Abdulrahman Salmeh

University of Sharjah

Natheer Al-Rawi

University of Sharjah

PI email: u18101606@sharjah.ac.ae

Abstract

Early menopause detection can help to prepare for several possible health complications. Blood tests and symptom evaluation are the two most often utilized techniques for menopause diagnosis, the former of which can be expensive and isn't always reliable (McNamara et al., 2015). Salivary follicle-stimulating hormone (FSH) has just come to light as a novel technique for the early identification of menopause. It is expected that blood FSH levels, which rise during menopause, might correspond to salivary FSH levels. Salivary FSH may be measured in a quick and painless way, making it a desirable choice for menopause screening; Furthermore, it can assist in identifying perimenopausal women who are highly susceptible to osteoporosis, cardiovascular illnesses, and other health issues (Teede et al., 2009). The early detection of menopause could be revolutionized by the use of salivary FSH as a diagnostic tool, which would also have a considerable impact on women's quality of life. To determine the precision and dependability of salivary FSH testing, more research is needed.

Effects of Medwakh Smoking on Salivary Proteome Signatures Related to Oxidative Stress, Inflammation, Cell Adhesion, and Metabolism Among Youth in UAE

Aghila Rani Nair

University of Sharjah

Nelson Soares

University of Sharjah

Betul Rahman

University of Sharjah

Alexander Dyason Gidde

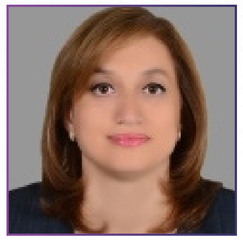
University of Sharjah

Hamza Mohammad Al-Hroub

University of Sharjah

Mohammad Harb Semreen

University of Sharjah



Sausan Al Kawas

University of Sharjah

Abstract

Medwakh smoking has radically expanded among the youth in the Middle East and around the world. The rising popularity of medwakh usage links to the onset of several chronic illnesses including cardiovascular diseases and cancers. The present study aims to elucidate changes in the salivary proteome of medwakh smokers and explore the pathological alterations in comparison to non-smokers. Statistical measurements reveal significant alterations in the abundance of protein identities between medwakh smokers and non-smokers in 74 protein profiles. Medwakh smoking affected proteins with roles in cell anchorage and adhesion (FERMT3, CAPZA2, ACTN1, TLN1), immune responses and inflammation (CFI, PSME2, S100A12, CHI3L1, HRG, RNASE2, ORM2), oxidative and anti-oxidative stress responses (NCF4, ERP 29, AKRA1, NADPH, NCF1B) and various cell metabolic processes (G6PD, HEXB, HK3, EEF1A1, PYGL, UGP2, EEF1A1). The highly significant increase in the abundance of involucrin suggests an alarming squamous cell differentiation among medwakh smokers. In addition, various pathways related to mitochondrial damage, oxidative burst, cell adhesion, migration, differentiation, and proliferation were significantly altered in medwakh smokers. The knowledge gained would help to elucidate the adverse effects of medwakh smoking, especially among adolescents, raise awareness of plausible health hazards, and improve the quality of life.

PI email: anair@sharjah.ac.ae

Beneficial Effects of Hesperidin on Human Periodontal Ligament Fibroblasts in Normal and Diabetic Culture Conditions: Implications for Periodontal Disease Management

Smriti Aryal AC

University of Sharjah

Md Sofiqul Islam

Ras Al Khaimah Medical and Health Science University

Aghila Rani K.G.

University of Sharjah

Abstract

Periodontitis is a chronic inflammatory disease that affects the supporting structures of the teeth. Diabetes is an important risk factor for the development and progression of periodontitis, and diabetic patients have a reduced ability to heal periodontal tissue damage. Periodontitis and diabetes are common and complex chronic diseases with an established bidirectional relationship. Thus, diabetes is associated with increased prevalence and severity of periodontitis, and severe periodontitis is associated with impaired glycemic control. Periodontal treatment is associated with improved glycemic control in a diabetic patient and a decrease in HbA1c after periodontal treatment. For these reasons, treatment of periodontitis in diabetic patients is particularly important. However, high blood sugar levels can impair the healing and normal functioning of periodontal fibroblasts cells. Therefore, it is important to effectively treat periodontitis in diabetic patients. Hesperidin (HPN) is a bio-flavonoid found primarily in citrus fruits known to have beneficial effects on a variety of biological processes, including anti-inflammatory and healing properties. However, its effect on human periodontal ligament fibroblast cells (hPDLCs) in normal and diabetic conditions is unknown. The purpose of this study was to evaluate in vitro the effects of HPN (natural antioxidants) on wound healing, cytotoxicity and hPDLCs function under normal and diabetic culture conditions.

PI email: saryalac@sharjah.ac.ae

A Novel Interactive Digital Case-Based Educational Tool for Self-Directed Learning of Dentist- Patient Interaction for Preclinical Dental Undergraduates

Divya Gopinath

Ajman University

Abstract

Self-directed learning is the process in which a student takes the initiative in establishing their learning needs and set their own goals, with the help of an appropriate plan into practice as well as evaluating the learning outcome. Virtual interactive cases expose students to simulated clinical encounters digitally before they enter the real life scenario and instructors are able to scaffold information collection, clinical reasoning, and decision-making processes in a secure setting. To the best of our knowledge, there are no studies evaluating the effects of self-directed case-based digital interactive tool intervention on preclinical undergraduate dental students in the Middle East and North Africa region. We aim to develop and assess the effectiveness of a self-directed interactive digital case-based educational tool for enhancing student knowledge and learning experience for pre-clinical dental undergraduates. The tool will be developed on Articulate Storyline 360 software based on three instructional design models of ADDIE (Analysis, Design, Development, Implementation, Evaluation) as a framework for designing educational e-learning content. We will also evaluate the student perception and satisfaction after the use of the tool by the students.

PI email: d.gopinath@ajman.ac.ae

Category 3

Computing & Informatics

Bioinformatics

Biomedical Engineering

Engineering

Sciences

Computing & Informatics

Exploring Dimensions of Big Geospatial Data for Enriching Intelligent Transportation Systems

Sarah Al-Shareeda

Istanbul Technical University

Sema Oktug

Istanbul Technical University

Berk Canberk

Edinburgh Napier University, UK

Abstract

The emergence of the area of vehicular networks, intelligent transportation systems, and the so-called internet of vehicles is attributable to the incorporation of GPS devices and communication capabilities into vehicles. Routing protocols for vehicular networks have been a subject of considerable research efforts. However, Geocast routing has been a preferred protocol for vehicle networks and their dynamic nature. Many efforts have been made to enhance the performance of these routing protocols. None of the known efforts have used Points of Interest or driving behavior as a criterion when choosing the next hop to which the source vehicle transmits the intended message. Our proposed research addresses this issue and incorporates machine learning to improve routing decisions. Literature reveals that combining machine learning and routing algorithms for automotive networks is a cutting-edge research path whose hidden benefits demand an investigation. This research topic would stimulate further dimensions of inquiry to be explored.

PI email: alshareeda@itu.edu.tr

Edge-FL-Based intelligent IDS to Safeguard Sustainable HetIoT Applications Against DDoS Cyberthreat

Shalaka Mahadik

BITS Pilani Duabi Campus

Pranav M Pawar

BITS Pilani Duabi Campus

Raja Muthalagu

BITS Pilani Duabi Campus

Abstract

Smart cities, smart agriculture, wearables, self-driving cars, and much more heterogeneous IoT (HetIoT) applications facilitate the globe to accomplish the United Nations' Sustainable Development Goals (SDGs) for environmental protection. In Agriculture 4.0, for example, the smart irrigation system aids in water resource conservation. Smart parking applications use sensors to locate available parking spaces with the consumption of fuel and pollution levels while alleviating traffic congestion. Although this sounds amazing, technological advancements open the door to intruders, rendering security and privacy a significant challenge. Nowadays, distributed denial of service (DDoS) is a major cyber threat, becoming more prevalent as HetIoT devices connectivity increases. The intruder employs this attack to deplete resources by ingesting as much network traffic and disrupting services such as DNS and UDP-lag, to name a few. Embedding Intelligence into security (IS) is drawing much attention to shield HetIoT infrastructure from cyber threats and facilitate the community receiving high-quality service from HetIoT applications. Further, edge computing (EC) contributes by performing computation locally that reduces latency and boosts bandwidth consumption. Federated learning (FL) aids in training the models locally with distributed data instead of centralized global learning of complete data. Therefore, the research is inspired to integrate EC, FL, and IS to strengthen HetIoT security and lead to the development of intelligent intrusion detection systems (IDS) using deep learning (DL)-based approach. The proposed intelligent IDS will aid in the detection and classification of various recent DDoS threats in HetIoT applications while respecting data privacy, efficiency, and security.

PI email: p20200002@dubai.bits-pilani.ac.in

Design of a Lightweight and Secure Remote User Authentication and Key Agreement Protocols for Internet of Drones Environment

Alanoud Faris Aldweesh

Imam Abdulrahman Bin Faisal University

Abdullah Mohammed Almuhaideb

Imam Abdulrahman Bin Faisal University

Abstract

Recently, drones have gained great importance in many fields, such as military fields, health fields, smart agriculture, and traffic monitoring. As the drone is equipped with embedded systems capable of sensing, collecting, and transmitting data in real-time to users via public communication channels, allowing confidential and sensitive data to flow into cyberspace. However, drones may run the risk of attack over data transmitted over an unsecured public channel. Therefore, many mutual authentication schemes have been proposed to mitigate the risk of such an attack. However, existing solutions still have security and performance limitations. Therefore, we will propose to design two lightweight and secure remote user authentication protocols and a key agreement for IoD environment. The first protocol, P-I, allows users and drones to mutually authenticate with each other to provide a secure and reliable connection. The second protocol, P-II, is used to re-authenticate the authorized user to achieve the trade-off between security and performance. We will analyze the proposed protocols and conduct an informal security analysis and performance evaluation in terms of security features, computational, and communication overhead. Thus, we aim to show that the proposed protocols outperform the other existing solutions by meeting all security requirements, achieving re-authentication, resisting active and passive attacks, and having suitable performance for IoD environments.

PI email: Alanoud.fd@outlook.com

Seamless Interoperability in Healthcare Blockchains Federation: A Unified Integrated Approach for Secure and Efficient Sharing of Electronic Health Records

Faiza Hashim

United Arab Emirates University

Khaled Shuaib

United Arab Emirates University

Abstract

Blockchain interoperability refers to the ability of different independent blockchain networks to communicate with one another. This is essential for creating new applications or modules on top of existing network architectures. However, despite the significance of this process, there is no standardized mechanism in the literation for executing inter-blockchain communication. One significant application area that utilizes blockchain technology is he alth care, specifically for sharing EHR among network participants. However, the fragmentation present in the private deployment of various blockchains creates significant obstacles to sharing EHRs beyond the single network boundary. To address this challenge, a blockchain federation is proposed in this paper to facilitate inter-blockchain communication efficiently. The proposed federation employs a unified, integrated approach to register independent networks in the federation and deploy a unified module in each participating network. Our proposed blockchains federation provides a one-to-many connection between the networks, executing query transactions from the source network to trigger the smart contract of the target blockchain to access patient data. To demonstrate the effectiveness of our proposed healthcare blockchains federation with multiple blockchains deployed using various platforms, we conducted several experiments. The experimental results show the functionality and practicality of our proposed solution in enabling efficient inter-blockchain communication and sharing EHR beyond a single network boundary.

PI email: 201890063@uaeu.ac.ae

Enabling Sustainable AI Models with Reduced Carbon Emission: A Novel Energy-Efficient Optimization Algorithm for Complexity Reduction in Computer Vision-Based CNNs

Hanan Hussain

BITS Pilani Dubai Campus

Tamizharasan Ps

BITS Pilani Dubai Campus

Abstract

Our proposed approach aims to enable sustainable AI models by reducing carbon emissions, which involves utilizing a cascaded optimization technique known as pruning and clustering preserving quantization (PCQ) combined with a novel layerwise complexity method (LCRM) optimization. This technique focuses on reducing the complexity of convolutions by decreasing their multiplications, thereby lowering energy consumption per computation. Additionally, we introduce a module for estimating the optimized AI model's carbon emissions based on the reduced energy consumption during training and inference.

Our preliminary experiments separately assessed the effectiveness of ensemble PCQ and LCRM optimization techniques. Our results indicated that PCQ is a highly efficient optimization technique compared to individual optimization methods like clustering, pruning and quantization. LCRM efficacy is tested on four distinct ComputerVision(CV)-based CNNs: AlexNet, U-Net, RetinexNet, and VGG-19. Significant optimization is observed in the targeted performance metrics like energy consumption, hardware utilization, inference latency, and accuracy. By combining PCQ and LCRM optimization techniques, we predict further enhancements to enable sustainable AI models without compromising the benefits of each method.

The outcome of our research will be highly beneficial for the industry as they get access to a sustainable, energy-efficient solution for optimizing AI models, which reduces the energy consumption and overall carbon footprint of the model's operations. Therefore, AI companies operating in the UAE can leverage the benefits of this research as it aligns with the country's vision for sustainable development while promoting the adoption of innovative and eco-friendly technologies.

PI email: p20200005@dubai.bits-pilani.ac.in

A Hybrid Deep Climate Forecasting and Irrigation Activator System for Optimal Irrigation Scheduling

Imen Boukhris

University of Manouba, Tunisia

Haïfa Nakouri

University of Manouba, Tunisia

Abstract

In these challenging times, the world is facing two major crises: climate change and global food insecurities. In 2023, the global water crisis and malnutrition are the two emergencies our world is simultaneously facing. The global economic shocks set in motion by the COVID-19 pandemic and Russia's war against Ukraine, together with weather extremes and armed conflicts, are driving millions of people into acute food insecurity and malnutrition. According to the World Food Programme (WFP), the scale of the current global hunger and malnutrition crisis is enormous, with more than 345 million people facing high levels of food insecurity in 2023. On the other hand, besides inadequate water infrastructure, the current water scarcity is mainly caused by ecological conditions. Accordingly, unless water use is drastically reduced, severe water shortage will affect the entire planet in a few decades. Hence, with demand for food rising, the world must manage its water consumption.

In this context, boosting the adaptation capacity of agriculture system actors is mandatory and Artificial Intelligence has never been more relevant. For many years, Artificial Intelligence (AI) and sustainable agriculture have been a match made in heaven. AI could solve agriculture's water efficiency problems and be used to optimize water usage in irrigation for optimal agriculture crops.

To combine the advantages and convenience of real-time IoT agricultural data and the benefits of an ambient intelligent irrigation system, this proposal aims to investigate automated irrigation scheduling models to develop and validate a new prediction model and make major adaptations to existing ones. The model is then adopted to IoT monitored data from farmlands in Tunisia and the United Arab Emirates. The monitored performance is compared with existing state-of-the-art prediction algorithms focusing on water consumption, energy consumption, and crop yield along with cost analysis.

PI email: imen.boukhris@ensi-uma.tn

Detecting Explicit and Implicit Cyberbullying on Gaming Networks

Heba Ismail

Abu Dhabi University

Mourad Elhadef

Abu Dhabi University

Nada Hussein

Abu Dhabi University

Abstract

Cyberbullying is a prevalent phenomenon on social media and gaming platforms including Twitch, is a popular streaming platform in the gaming community. Cyberbullying impacts people's well-being and result in social isolation and sometimes can lead to suicide among teenagers. As a result, cyberbullying detection has been gaining increasing attention. The deployment of Deep Learning predictive models for cyberbullying detection depends heavily on the accuracy of the training labels and the quality of the extracted features. However, it is extremely hard to find a representative training sample for cyberbullying with complete and accurate labels. This accentuates effective distant supervision methods for cyberbullying labels. To this end, this paper experiments with various combinations of automatic annotation (i.e., distant supervision) and feature extraction methods to improve cyberbullying detection. Furthermore, this work experiments with multiple Deep Learning models and assesses performance improvement. The results of the conducted experiments demonstrate that extending lexicon-based features with valence words' embeddings enhances valence prediction for gaming training samples. Moreover, extending lexicons with emotes improves the representativeness of the content on Twitch. Furthermore, the results demonstrate that the use of word embedding-based annotations with Word2Vec results in an average minimum improvement of 10.13%. Furthermore, the results show that using BERT for both feature representation and classification yields the best average results of 96.5% accuracy with all automatic annotation methods. Compared to the best classification performance of each of the DL models, BERT has an average performance improvement of 47.3%, which is a significant enhancement

PI email: heba.ismail@adu.ac.ae

Parameter Tuning for Nature-Inspired Optimization Algorithms with Applications

Geethu Joy

Middlesex University Dubai

Xin-She Yang

Middlesex University UK

Abstract

Almost all optimization algorithms have algorithm-dependent parameters, and the setting of such parameter values can largely influence the algorithm's behavior under consideration. Thus, proper parameter tuning should be carried out to ensure that the algorithm used for optimization performs well and is sufficiently robust for solving different types of optimization problems. This study uses the firefly algorithm to evaluate the possible influence of its parameter values on its efficiency. Parameter values are randomly initialized using the Monte Carlo method and then used to tune the firefly algorithm. Two benchmark functions and a spring design problem are used to test the robustness of the tuned firefly algorithm. From the preliminary findings, it can be deduced that the Firefly algorithm is not very sensitive to different parameter settings. Experimental trials using the Monte Carlo method on the Rosenbrock function, sphere function, and the spring design problem showed no significant variations in the final fitness values, irrespective of the different sample values selected during simulations. This insensitivity indicates the robustness of the Firefly algorithm. However, this preliminary study consists of only a small number of optimization problems; it may be the case that other issues and other algorithms may not show such robustness. Therefore, further study is required to determine whether the settings of the firefly algorithm may exhibit optimality in addition to the optimality of the optimization problems. Furthermore, some theoretical analysis will be needed to gain insights into the effect of parameter tuning and its potential link to the convergence behavior observed in the numerical experiments.

PI email: GJ219@live.mdx.ac.uk

SmartPosture: Enhancing Health and Wellness with Computer Vision for Real-Time Posture Detection with Historical Tracking and Personalized Insights in a Mobile Application

Tasnim Basmaji

Abu Dhabi University

Huma Zia

Abu Dhabi University

Abstract

Maintaining poor posture due to modern workplaces and daily tasks has significant implications for an individual's health and can contribute to future spinal vertebrae compression. Individuals practicing good posture experience reduced back and neck pain. Existing literature reveals various approaches for posture detection, but mainly rely on hardware-based solutions, requiring the individuals to wear specialized devices. While these hardware-based approaches have demonstrated effectiveness in detecting and tracking posture, they are accompanied by drawbacks such as user discomfort, inconvenience, and the potential disruption of daily activities. Consequently, there is a clear indication from the literature that the advancement of computer vision driven posture detection systems holds tremendous potential for overcoming these limitations. Our proposed low-cost solution utilizes a computer vision-based system with a camera to detect and notify users of incorrect posture. We employ the YOLO object detector, trained on a dataset collected using a posture-correcting belt with an attached IMU sensor for orientation measurement of the thoracic and thoracolumbar angles. Ground truth labeling is facilitated through LED feedback, streamlining the process. Extensive testing and refinement are conducted to ensure the model's accuracy and reliability. The developed model detects true posture with 96% accuracy. By implementing this innovative computer vision solution, our research aims to revolutionize posture correction, providing an accessible method for individuals to improve posture and enhance overall well-being. The developed posture detection model is seamlessly integrated into a mobile application. The mobile application provides comprehensive posture analysis on a daily and weekly basis, enabling users to gain insights into their postural habits and make informed decisions to improve their posture.

PI email: Tasneem.bas@gmail.com

Improving Mispronunciation Detection and Diagnosis for Non-Native Learners of the Arabic Language

Norah Alrashoudi

King Saud University

Hend Al-Khalifa

King Saud University

Yousef Alotaibi

King Saud University

Abstract

Learning new languages is one of the most valuable skills that provide personal and professional benefits, expands cultural horizons, and facilitates communication with people from different backgrounds. Arabic is the world's fifth most spoken language and is the language of the Holy Qur'an. Learning Arabic can provide a deeper understanding of the Arabic culture and Islamic faith, in addition to other skills such as communication and cognitive benefits.

Computer-assisted pronunciation training (CAPT) systems aim to assist second language learners (L2) in learning and practicing pronunciation skills. Mispronunciation detection and diagnosis (MDD) is a core component of CAPT systems that use automatic speech recognition (ASR) techniques to identify and analyze the errors made by non-native speakers. Existing Arabic MDD systems mainly utilize learning-based techniques rather than state-of-the-art deep learning methods. In contrast, end-to-end structures have become increasingly popular in developing MDD models for various languages including, English and Chinese.

This study aims to explore the effectiveness of deep learning techniques in enhancing the performance of Arabic MDD systems. In addition, we developed an Arabic speech dataset collected from native and non-native speakers to support the development and evaluation of these systems. The performance of the developed models will be evaluated based on two tasks: phoneme recognition using the phoneme error rate (PER) metric and MDD tasks to evaluate mispronunciation detection and diagnosis.

PI email: 442203043@student.ksu.edu.sa

Empowering Emotional Intelligence: Bispectrum Analysis and Affect Dynamics for Emotion Recognition in Conversations with Machine Learning and Deep Learning

Ghada Alhussein

Khalifa University

Mohanad Alkhodari

American University of Sharjah

Ahsan Khandokher

Khalifa University

Leontios Hadjileontiadis

Khalifa University

Abstract

Emotion recognition in conversations using artificial intelligence (AI) has recently gained attention as it provides additional emotional cues that can be correlated with human social behavior. This study proposes an extension towards empowering emotional intelligence using an AI-based emotional climate (EC) recognition approach, which involves the recognition of the joint emotional atmosphere dynamically created and perceived by peers throughout a conversation. Two AI-driven approaches, namely DeepBispec and MLBispec, are suggested to achieve this goal.
In MLBispec, the peers' speech signals during their conversation are subjected to time-windowed bispectral analysis to extract features related to dynamic harmonics nonlinear interactions. Additionally, peers' affect dynamics, derived from their emotion labeling within the same time window, are combined to form an extended feature vector inputted into two well-known machine learning (ML) classifiers, namely SVM and kNN.
In DeepBispec, bispectrum images are directly inputted to the DeepBispec, and deep features are extracted from convolutional neural networks (CNN) and combined with affect dynamics (AD). The proposed approaches were evaluated on the IEMOCAP open-access dataset, which contains 2D emotions, namely Arousal (A) and Valence (V), divided into low and high classes. The experimental results demonstrate that both MLBispec and DeepBispec outperform previous state-of-the-art techniques, showing the effectiveness of MLBispec in objectively recognizing peers' EC during their conversation and providing insights into their emotional and social interactions.
The proposed approaches can help improve the development of more advanced emotion recognition systems for better understanding human behavior, communication, and social interactions in various applications such as mental health monitoring and education.

PI email: ghada.alhussein@ku.ac.ae

PolyNet: An Artificial Intelligence (AI) Based Diagnostic and Prognostic Platform for Polycystic Ovary Syndrome (PCOS) in Women in the UAE

Elakkiya Rajasekar

BITS Pilani Dubai Campus

Ange Arul Jothi

BITS Pilani Dubai Campus

Shemy Syed

BITS Pilani Dubai Campus

Abstract

Polycystic Ovary Syndrome (PCOS) is a prevalent hormonal condition that affects women of reproductive age. According to a recent study, around 27% of women population in United Arab Emirates (UAE) got affected with PCOS due to various factors. Early diagnosis of PCOS will help in preventing the serious complications and risks of women life. To provide early diagnosis and prognosis of PCOS in women in the UAE, this proposal aims in introducing PolyNet is a novel AI-based diagnostic and prognostic framework. A common health problem hurting women's quality of life in the area is PCOS. PolyNet analyzes large datasets of PCOS-related health data using cutting-edge AI technologies, such as deep learning and machine learning. PolyNet will reliably identify PCOS, forecast the course of the condition, and offer tailored treatment advice by utilizing AI. To assess medical records, clinical indicators, hormone levels, ultrasound scans, and scleral images, PolyNet uses complicated neural networks. It will offer precise diagnostic outcomes and prognosis skills to pinpoint danger signs and anticipate PCOS-related consequences. The introduction of PolyNet into the UAE healthcare system will empower medical practitioners, facilitate early detection and improve patient management. PolyNet will provide a complete, accessible, and economical solution to the problems encountered by women, such as limited access and high costs. With its AI-driven methodology, PolyNet will mark a huge improvement in healthcare, particularly for PCOS in UAE women. This proposal aims in introducing the PolyNet to advance PCOS diagnosis, prognosis, and treatment in order to benefit UAE women's health and wellbeing.

PI email: elakkiyaceg@gmail.com

Analysis of Covid-19 Pandemic in Saudi Arabia by using Quantitative Approach and SIR Model

Sundus Salem

Arab Open University

Saman Iftikhar

Arab Open University

Abstract

Covid-19 is a disease that affects the whole world. It spreads rapidly all around the world becoming a global pandemic. In this research project, we took a deep look into Covid-19 data in Saudi Arabia by exploring the available collected data from the start of the pandemic, the second day of March. The main objective of this research is to investigate covid-19 data in Saudi Arabia regarding the number of active Cases, Recoveries, and Mortalities. In addition, doing a comparison of the spread of the disease in Saudi Arabia with other world countries. A quantitative descriptive analysis approach is taken in this research. Two datasets were selected, one with Saudi Arabia's data, and the second with other world countries' data. After preparing the data they were analyzed through descriptive statistics, inferential statistics, and the Susceptible-Infectious-Recovered (SIR) model, and the results were presented using visualization tools. We found after the analysis process that Ar Riyadh region is the most affected region by Covid-19 cases number. In addition, Ar Riyadh region has the highest recoveries number out of all the 13 regions, while Makkah Al-Mukarramah region had the highest number of deaths recorded in Saud Arabia. Based on the findings the capital of Saudi Arabia, Ar Riyadh, was the city with the highest number of cases, 199,730 cases, followed by Jeddah then Makkah Al Mukarramah. Moreover, among world countries, Saudi Arabia was the seventy-fifth country in terms of cases, with 752,078 cases, and the sixty-sixth country, in terms of deaths, with 9,060 deaths.

PI email: sunsa.072022@gmail.com

Bioinformatics

Unveiling the Hidden Features and Potential Biotechnological Applications of the Microbial Communities Inhabiting Wadi El-Natrun Hypersaline Lake in Egypt

Elham Badiea

Ain Shams University

Ibrahim Farag

University of Delaware

Abotalib Z Abotalib

National Authority for Remote Sensing and Space Science

Jennifer Biddle

University of Delaware

Abstract

Hypersaline lakes were overlooked for their extreme conditions and have emerged as valuable resources in the realm of biotechnology. These environments harbor unique and extreme microorganisms that have emerged as valuable resources for biotechnological and industrial applications that could offer a wealth of opportunities from the discovery of novel enzymes and biocatalysts to the potential applications in bioremediation, agriculture, and microbial engineering. Al-Hamra lake is a hypersaline lake located in Wadi El-Natrun, a depression in the Sahara Desert that's located in Egypt 80 km northwest of Cairo. Several studies have been reported to identify the microbial communities of several hypersaline lakes in Egypt, but no study shaded the light into the seasonal variations and the functional potential as well as the adaptation strategy of these unique microbes. In this study, to identify the microbial composition as well as the functional potential of these extreme microorganisms, shotgun metagenomics studies were conducted on water and sediment samples collected from the hypersaline, Al-Hamra, lake at different depths along two seasons. Metagenomics DNA extraction was done for all samples followed by assessment of the quality and quantity of the extracted DNA for 16s rRNA gene and shotgun metagenomics sequencing. Bioinformatics analyses are being under study to analyze the big data generated to identify and uncover the hidden features of microbial communities that inhabit this extreme environment and mine for novel enzymes and biocatalysts with extraordinary stability and activity under this harsh conditions which might play a significant role in various industrial and biotechnological applications.

PI email: ebadiea@aucegypt.edu

Advanced Technology for Oil Spill Detection and Classification in Marine Environments

Rama Alkhateeb

Fujairah Research Centre

Abstract

SEANTRY leverages unmanned surface vehicles (USVs) and remotely operated vehicles (ROVs) equipped with advanced sensors to monitor and assess marine environments for oil spills. The integrated sensors are designed to detect hydrocarbons by measuring parameters such as fluorescence, infrared signatures, and spectral characteristics. Real-time data collection from the deployed USVs and ROVs is transmitted to a central control station for analysis using sophisticated algorithms and machine learning techniques.
The key objectives of SEANTRY are to enhance the accuracy and reliability of oil spill detection, enable rapid response and intervention, and minimize the environmental impact of spills. By leveraging advanced sensing technologies, real-time monitoring capabilities, and data analysis algorithms, SEANTRY improves the efficiency of oil spill response operations and reduces risks associated with human involvement in hazardous environments.
The potential impacts of SEANTRY are significant. It will contribute to the protection of marine ecosystems, sustainable economic growth, and improved safety in oil spill response efforts. The project aligns with the objectives of the Conservation and Science Project at the Fujairah Research Center by providing cutting-edge technological solutions for environmental monitoring and supporting the sustainable management of marine resources.
SEANTRY seeks funding from the Conservation and Science Project to accelerate the development and deployment of the technology. The project aims to advance the state-of-the-art in oil spill detection and classification, foster international collaboration, and drive environmental innovation. Through this initiative, SEANTRY aims to significantly contribute to global efforts in combating oil pollution and ensuring the preservation and sustainable use of marine ecosystems for future generations.

PI email: rama.alkhateeb@frc.ae

Intelligent Plant Disease Prediction and Classification System

Diana Susan Joseph

BITS Pilani Dubai Campus

Pranav M Pawar

BITS Pilani Dubai Campus

Abstract

Plant diseases can act as a threat to food security as they can cause damage to the plant, thus reducing the availability of food. It may be difficult for farmers with less experience to access and diagnose the diseases compared to plant pathologists. Experts will not be readily available always and not in all countries. Therefore, automatic identification and classification of plant leaf diseases are crucial in the agricultural field to prevent yield loss and protect crops. Disease identification at the primary stage of infection helps growers or farmers decide on the amount of pesticides to be used, saving time and money. The aim of the research idea presented in the manuscript focuses on the development of a plant disease protection system for plant disease prediction and classifications. Disease prognosis or prediction is based on symptom images of different stages of diseases collected. The dataset developed is trained using the deep learning based Convolutional Neural Network (CNN) models pre-trained on the ImageNet dataset. In the testing stage, the possible outcomes of diseases and their stages are expected to be predicted when an input symptom image is given. The stages of diseases focused on are early, advancing and severe. Based on the diseases predicted suggestions on curable measures and a climate favorable for disease advancement can be given. Finally, an ensemble model can be developed for plant disease prediction and classification.

PI email: p20200010@dubai.bits-pilani.ac.in

Consanguinity and CHD: Evaluation of the Pediatric Cardiac Genomics Consortium Exomes

Richa Tambi

Mohammed Bin Rashid University of Medicine and Health Sciences

Bakhrom Berdiev

Mohammed Bin Rashid University of Medicine and Health Sciences

Mohammed Uddin

Mohammed Bin Rashid University of Medicine and Health Sciences

Abstract

Congenital heart disease (CHD) is a rare structural defect affecting ~1% of live birth and is a major cause of infant morbidity and mortality. Even though CHD is prevalent in children, the genetic factors that contribute to the disease are still unknown. It is known that the risk for congenital heart disease is increased in consanguineous marriages. It has been confirmed that consanguinity is closely linked to increased mortality rates among the offspring, mainly as a consequence of autosomal recessive diseases occurring frequently in the offspring. Despite this, there is considerable debate the way consanguinity likely impacts each type of CHD. In 2009, the National Heart, Lung, and Blood Institute (NIH, USA) started the Pediatric Cardiac Genomics Consortium (PCGC), bringing together hospitals in the U.S. and United Kingdom to study CHD in children. In this work, we will evaluate the exome sequencing data of CHD GENES patient cohort (as a part of PCGC's ancillary study) which will help in defining the association between CHD phenotype from consanguineous parents and specific candidate gene(s) (novel and known) variants, and explore the overall genomics of CHD in consanguineous population outlining the contributions of the known and novel variants. Furthermore, this study will also include single-cell transcriptomic analysis to examine the heterogeneity and specificity of CHD genes.

PI email: richa.naveed@mbru.ac.ae

In-Silico Elucidation of TMEM9 Blockade Mechanism in Suppression of Wnt/b-catenin Signaling as Anti-Cancer Treatment and Associated Anti-Cancer Drug Developmemnt

Shaher Bano

Fujairah Research Centre

Aishah Saeed Sulaiman Al Dhanhani

Fujairah Research Centre

Amal Salem Khamis Hamad Alsamahi

Fujairah Research Centre

Abstract

TMEM9-controlled vesicular acidification hyperactivates the Wnt/-catenin signaling through APC degradation, intrigued by the phenomena, we are planning to identify and design small chemical and peptide inhibitors that will interfere with the Wnt/-catenin pathway and will check if our hypothesis "the blockade of TMEM9-ATP6AP2 interaction with inhibitors (to be proposed) eventually will avert v-ATPase assembly and subsequently leads to suppression of Wnt/-catenin gene activation in Colorectal cancer (CRC)" hold true. We'll further explore crosstalks among different Wnt pathways, to better highlight the molecular targets to antagonize, which may be employed in CRC treatment. We believe that this work can result in good therapeutic agents that can open a new avenue in discovering drugs against various types of cancers and cancer-causing agents.

PI email: shaher.bano@frc.ae

CRC-Detector: A Novel Computer Aided Diagnosis Application for Colorectal Cancer from Multisource Medical Data

Syama K

BITS Pilani Dubai Campus

J Angel Arul Jothi

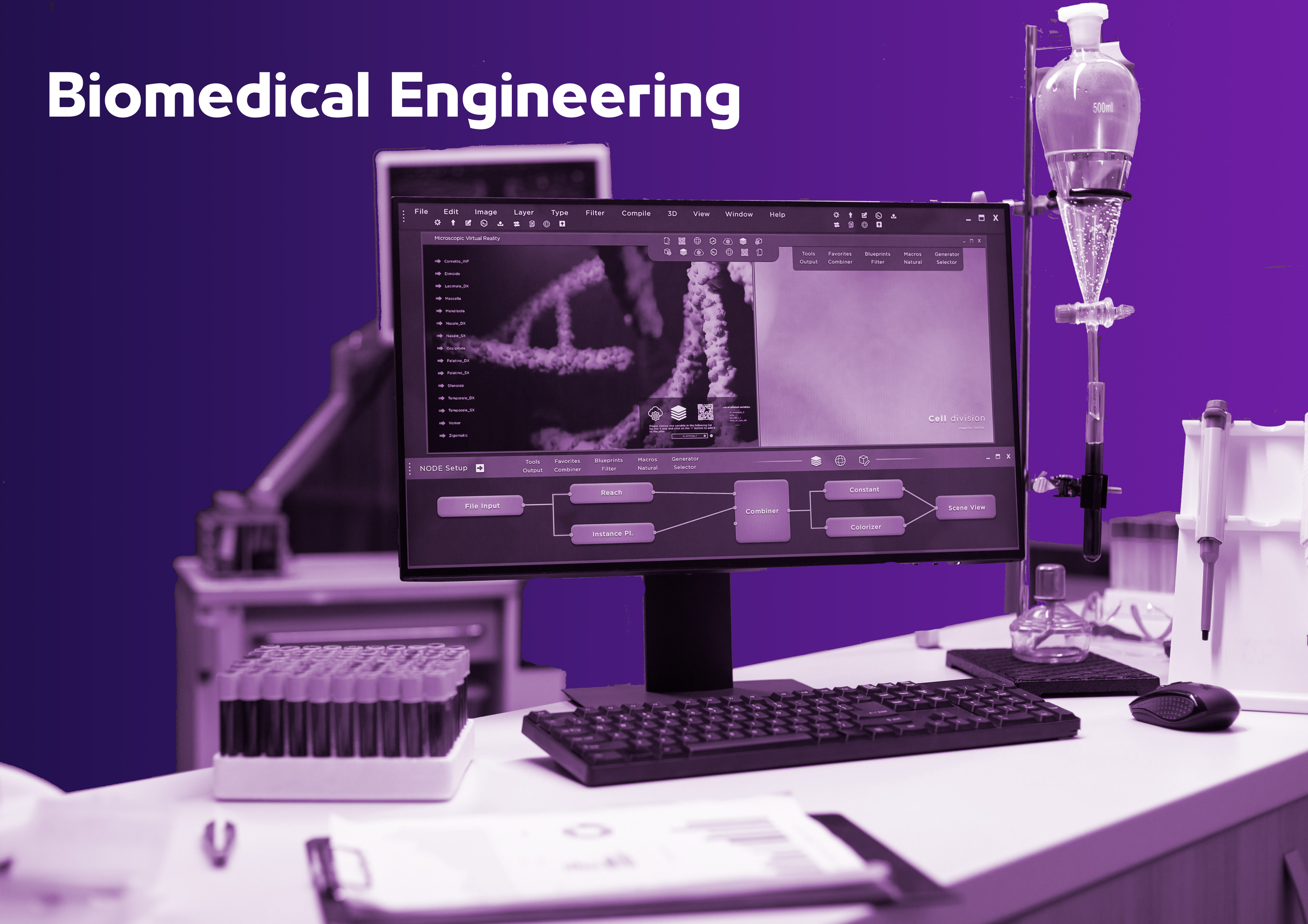
BITS Pilani Dubai Campus

Abstract

Colorectal cancer (CRC) is the world's third most frequently maligned cancer. Early detection of CRC is crucial since it can help reduce fatalities. Hence, finding new diagnostic methods allows for improved therapeutic approaches. Integrating multisource data and multiple prediction modules into the disease prediction task has recently gained more focus. In this work, we propose to develop a framework that can input multisource data and predict the presence of colorectal cancer in the given sample. The proposed framework consists of three modules: 1) Histopathology module 2) Transcriptomics module 3) Metagenomics module. Each module takes different inputs and performs the prediction independently. The histopathology module takes histopathology images and will employ self-supervised deep learning techniques to predict the presence of colorectal cancer. The transcriptomics module takes gene expression profiling data from The Cancer Genome Atlas (TCGA) database and predicts the presence of cancer and its stage along with the potential biomarkers. The metagenomics module takes microbiome abundance data as input and uses a classifier to predict whether the sample is CRC or healthy. The entire framework will be deployed in a web application which can be accessed by medical practitioners and other users to check their medical data and receive accurate assessment of the data.

PI email: p20190011@dubai.bits-pilani.ac.in

Biomedical Engineering



Detecting Mental Stress Using EEG and Deep Learning

Yara Badr

American University of Sharjah

Hasan Al Nashash

American University of Sharjah

Usman Tariq

American University of Sharjah

Fares Al Shargie

Abu Dhabi University

Abstract

Stress profoundly impacts emotional, and physical well-being, often leading to impaired focus and performance. This project aims to present a novel approach for identifying and alleviating stress using electroencephalogram (EEG) signals combined with deep learning (DL) techniques and binaural beats stimulation (BBs). The study involved an experiment with 45 participants exposed to four different mental states: rest, control, stress, and mitigation. Two scenarios were explored, one assuming a consistent baseline stress level among all participants and the other dividing them into low and high-stress baseline levels. During the stress state, participants were subjected to the Stroop Color-Word Task (SCWT) under time pressure, while in the mitigation phase, they performed the SCWT while listening to 16 Hz BBs. EEG, salivary cortisol, behavioral, and subjective measures were utilized to assess stress levels. In addition, a novel approach was proposed, merging Partial Directed Coherence (PDC) with Graph Convolutional Network (GCN). The results indicated that BBs improved target detection accuracy by 27.08% ($p<0.001$), however, no significant changes were observed in the Perceived Stress Scale (PSS-10) and cortisol levels. Nevertheless, utilizing PDC connectivity, a shift in cortical activity back to the temporal region was noticed during mitigation, indicating the recovery of participants' mental focus. Further, in scenario 2, it was observed that high-stress baseline individuals were less influenced by external stressors or mitigation techniques. The DL analysis demonstrated that the GCN-PDC model could discriminate between four mental states with average accuracies of 99.59%, 99.40%, 99.26%, and 99.64% in alpha, beta, delta, and theta bands, respectively.

PI email: g00093100@aus.edu

Ultrasound Mediated Targeted Delivery of Liposomal Curcumin to Herceptin Positive Cell Lines: A Promising Approach for Harnessing the Potency of Herbal Curcumin as an Antibreast Cancer Agent

Remya Radha

American University of Sharjah

Vinod Paul

American University of Sharjah

Shabana Anjum

American University of Sharjah

Ghaleb Husseini

American University of Sharjah

Abstract

Breast cancer is a significant global health concern, affecting millions of women and resulting in high mortality rates. Despite chemotherapy being a primary treatment, its effectiveness is limited by various factors, including low bioavailability, high cytotoxicity, and adverse side effects. By concentrating on herbal remedies like curcumin, which has demonstrated anti-tumor properties, the hurdles can be overcome with the targeted delivery and extended release of therapeutic medications to cancerous cells. However, the clinical efficacy of curcumin is limited due to several factors, including poor oral bioavailability, low water solubility and unsuitable pH stability. To address these limitations, researchers are exploring drug-delivery colloid vehicles such as liposomes or nanoparticles, combined with microbubbles and ultrasound-mediated sustained release. Our proposal aims to optimize the release and uptake of curcumin liposomes through high-frequency Ultrasound in human breast cancer cells. In vitro cell culture studies will examine the potential of Herceptin-targeted and non-targeted curcumin liposomes. Additionally, in vivo studies will be conducted to lay the groundwork for future clinical trials. Our preliminary findings show successful liposomal encapsulation of curcumin, sustained release through Ultrasound, and improved anti-tumor activity when combined with microbubbles. These promising results support the potential success of our proposed study.

In summary, this proposal investigates using curcumin liposomes combined with Ultrasound and microbubbles as a potential targeted and sustained delivery mode for the treatment of breast cancer.

PI email: remya.vava@gmail.com

Design of a Non-Invasive Wearable Device for Brain Hemorrhage Detection

Yasmeen Abu Al-Saud

Imam Abdulrahman Bin Faisal University

Danah Al-Mutawa

Imam Abdulrahman Bin Faisal University

Zynab Khamis

Imam Abdulrahman Bin Faisal University

Abstract

Brain hemorrhage is defined as bleeding within the brain tissue itself, or between the brain tissue and the skull, which can result in brain damage and is characterized as life-threatening if not immediately responded to. In fact, brain internal bleeding is one of the leading causes of trauma-associated mortality worldwide due to the sudden progression of symptoms such as tachycardia and hypotension, where patients might not notice them until losing up to 30% of blood volume. A common detection method uses MRI or CT scans which are relatively expensive and time-consuming. In this research, a non-invasive wearable brain hemorrhage detection device is designed to target people with chronic diseases that are highly prone to developing brain hemorrhages without visible or noticeable symptoms. The device aims to save patients' lives since it provides early detection of their active bleeding, as they are required to wear it at least once a day for a short period of time to ensure that no internal bleeding has taken place. The design is based on the principles of two newly developed technologies, Magnetic Induction Tomography (MIT) and Volumetric Integral Phase Shift (VIPS), to monitor and detect changes in the blood volume by detecting the changes in the dielectric properties of the brain during internal bleeding such as phase and amplitude shifts using a single coil worn around patient's head. Along with these technologies, a specific range of frequencies lying in the range of 400 to 500 MHz should be involved to acquire optimum detection results, which were validated using CST Studio Suite® software. Overall, the design will have a significant impact on society, the environment, the economy, and the global health.

PI email: 2190002321@iau.edu.sa

Crucial Events Identify Emotion Granularity from Long-Term ECG Recordings

Sara Nasrat

Khalifa University

Herbert Jelinek

Khalifa University

Ahsan Khandoker

Khalifa University

Abstract

It is of growing interest locally and internationally to improve the accessibility and implementation of psychiatric solutions in diagnosing and treating mental and neurological disorders through facilitating real-time monitoring of the patient's state to support the conventional methods and increase therapy effectiveness. One promising way to achieve that is through emotion recognition using physiological signal complexity detection. Complexity measures involving crucial events have been used to analyze healthy and pathologic physiological signals, with the assumption that healthy signals exhibit higher levels of complexity and pathologic signals exhibit lower levels of complexity. However, there is limited knowledge regarding the relationship between complexity measures in physiological signals, particularly heart signals, in the context of psychopathological applications. Changes in emotion are reflected in our ECG or heartbeat variations. Valence and arousal are psychological features of emotion that vary from low to high valence and arousal. Crucial events are patterns in the heart rate that identify instances of change that may be used to classify emotions with different levels of valence and arousal in healthy participants. Crucial events can be detected using the novel analysis multiscaled modified diffusion entropy analysis (MSMDEA) developed by our group and proposed in this research. MSMDEA has been shown in another research to have a better ability in distinguishing not only healthy from pathologic cardiac signals but also different types of pathologic signals at high statistical significance ($p < 0.05$) compared to using MDEA on its own. Preliminary results show the same improved performance with more room for optimization when fully implementing this proposal's objectives.

PI email: 100058006@ku.ac.ae

Telemedicine Stethoscope

Noora Alhajeri

Abu Dhabi University

Maha Yaghi

Abu Dhabi University

Marah Alhalabi

Abu Dhabi University

Huda Sliman

Abu Dhabi University

Mohammed Ghazal

Abu Dhabi University

Noran Khaled

Abu Dhabi University

Abdalla Gad

Abu Dhabi University

Abstract

The demand for remote medical care is increasing, particularly in locations where doctors are limited or where physical movement is difficult. Telehealth technologies have emerged as viable alternatives, allowing patients to contact healthcare practitioners without physically being there. This project focuses on the development of a telemedicine stethoscope for patients who require long-term monitoring, those with contagious diseases, those in care facilities, or those who do not have access to in-person medical attention. A real-time patient monitoring camera, a robotic arm, and end-effectors for controlling the stethoscope's movements are included in the proposed telemedicine stethoscope system. Doctors and medical practitioners can remotely listen to the patient's chest and heart sounds using an interactive User Interface (UI). The doctor's commands are received by the robotic arm, which precisely positions the stethoscope and end-effector based on their clicks. A smartphone application for caregivers is supplied in cases where patients do not have access to robotic arms. This application accurately captures the doctor's click, allowing the caregiver to place the stethoscope in the same location while transmitting the audio back to the doctor for analysis. This project aims to meet the increasing demand for distant healthcare by developing an effective telemedicine stethoscope solution. The use of sophisticated technologies allows for accurate and dependable remote monitoring of patient's heart sounds, resulting in lower healthcare expenses and a lower risk of misdiagnosis. The suggested approach has the potential to dramatically increase healthcare access, especially for people living in distant or disadvantaged locations.

PI email: 1074520@students.adu.ac.ae

Reverse Engineering IP Attack on Digital Microfluidic Chips

Marah Alhalabi

Abu Dhabi University

Noora Alhajeri

Abu Dhabi University

Mohammed Ghazal

Abu Dhabi University

Huda Sliman

Abu Dhabi University

Abdalla Gad

Abu Dhabi University

Arwa Sheibani

Abu Dhabi University

Maha Yaghi

Abu Dhabi University

Luay Fraiwan

Abu Dhabi University

Hadeel Salman

Abu Dhabi University

PI email: marah.alhalabi@adu.ac.ae

Abstract

Digital Microfluidic Biochips (DMFBs) are miniaturized chips designed to run affordable, reliable, and speedy biochemical assay procedures bringing us closer to labs-on-a-chip and patient bedside and at-home medical diagnostics. Their potential to improve healthcare has made them the focus of much research lately. Innovative DMFBs promise billions in profit and rapid market share acquisition, making them subject to many security attacks, including denial-of-service, tempering, IP theft, layout modification, and parameter alternation. Defense strategies and quality assurance systems are implemented to facilitate attack prevention and detection. Researchers pursue novel attacks to bring awareness to them and, in the process, propose or help craft effective countermeasures. Some quality assurance measures involve using microscope-equipped cameras to track assay procedures. This research proposes a new type of computer-vision-powered IP theft attack. Our attack uses a segmentation pipeline culminating with applying the Hough transform to detect droplets. Detected droplets are then passed on to multiple Kalman-filter-based trackers using motion and appearance features. Droplets transport, split, mix, merge or remain stored during an assay procedure. Using event recognition, we reverse engineer the assay's directed graph from the hacked camera. To create a testing environment for our proposed IP theft system, we develop scenario-based simulation videos of ground-truth biochemical assays and use them to reverse engineer the assays from the video feeds. Our results show that our IP theft attack is successful in accurately recovering the assay. Our proposed system can also be reliably used in detecting tampering attacks by validating assays at the patient site.

Design of an Automatic Vehicle Acceleration Suppressive System Based on Driver Vigilance Status

Maryam Alkhaldi

Imam Abdulrahman Bin Faisal University

Atheer Alrashed

Imam Abdulrahman Bin Faisal University

Hind Al-Yahya

Imam Abdulrahman Bin Faisal University

Lola El Sahmarany

Imam Abdulrahman Bin Faisal University

Razan Alessa

Imam Abdulrahman Bin Faisal University

Taif Al Omar

Imam Abdulrahman Bin Faisal University

PI email: 2190005348@iau.edu.sa

Abstract

Drowsiness is a natural phenomenon that happens to humans due to a lack of sleep or some illnesses. Being drowsy during driving causes about 43% of vehicle accidents and 27% of near accidents. Many new technologies are being developed to address the issue of drowsy driving. The aim of this research is to design and implement an automatic vehicle acceleration suppressive system based on driver vigilance status. In this research, the FSR and the GSR biosensors are used to detect driver vigilance, as they feature in the force-sensing resistor and the galvanic skin response, respectively. When no pressure is detected from the FSR sensor, alarm one will be activated. Alarm two concerns the GSR signal; it will be active when the error reaches the threshold. If both alarms are activated, the system will release a continuous alarm and flasher lights. The adaptive cruise control (ACC) system is initiated when the system determines that the driver is drowsy. This system will measure the distance between the driver's vehicle and any obstacle ahead. The vehicle will stop gradually if the distance is less than 5 meters. Furthermore, if the distance is longer than 5 meters, the system will control the vehicle's speed. Various approaches are taken to find the optimum system design and the appropriate sensors to meet our real results.

A Novel Diagnostic and Segmentation System for Diabetic Retinopathy

Al Sameera Muhammad Sameera

BITS Pilani Dubai Campus

Vilas H Gaidhane Gaidhane

BITS Pilani Dubai Campus

Abstract

Diabetes mellitus is a debilitating metabolic condition that affects the body's vascular system and results in Diabetes Retinopathy (DR) which causes blindness in the patient. Diabetes can damage the retina and result in lesions on the small retinal arteries. Therefore, it is essential to detect the diabetic retinopathy at an earlier stage. This can be achieved using the concept of automatic segmentation of the affected arteries around the retina. It may help in extracting the information and enable early diagnosis of lesions. In real-time, a fundus camera is used to acquire retinal images. An ophthalmologist uses conventional diagnosis to make the decision which is a time-consuming process. Here, the quality of the acquired image plays an important role and is a crucial element for effective and accurate detection. In this research, an image quality-based segmentation method is proposed. Thus, the proposed method is a hybrid that uses an NR-IQA for image quality analysis and a deep-learning approach for feature extraction and segmentation. The classification efficiency is evaluated with various performance metrics such as the confusion matrix, F-beta, and G-mean. The proposed approach may be tested on publicly available databases such as Detection of Diabetic Retinopathy (DRD), Messidor, APTOS 2019, CHASE_DB1, DRIVE, and HRF. The expected accuracy may be above 97% can be achieved.

PI email: p20210900@dubai.bits-pilani.ac.in

Exploring the Network Physiology Underlying Emotional Responses

Feryal Alskafi

Khalifa University

Ahsan Khandoker

Khalifa University

Faezeh Marzbanrad

Khalifa University

Herbert Jelinek

Khalifa University

Abstract

Emotions play a crucial role in human communication and motivation. In human-computer interaction (HCI) and affective computing, there is growing interest in utilizing physiological signals to quantify and understand emotions. This research proposes a unique approach to comprehending the network physiology underlying emotional responses by examining direct interactions between physiological systems. By analyzing time delay stability between modulations in the output dynamics of one physiological system and corresponding modulations in the signal output of another system, fresh insights can be gained into how the human body's systems coordinate to produce distinct organism-level behaviors. Preliminary results revealed significant findings concerning network interactions among brain rhythms within cortical areas. Notably, alpha brain rhythms were observed to strongly influence theta oscillations during the immersive experience of watching music videos, suggesting potential connections between relaxation and cognitive engagement. Furthermore, theta oscillations regulate gamma oscillations, contributing to coordinating neuronal activity during memory and information-processing tasks. Future work will investigate networks of brain rhythm interactions across cortical locations and study the dynamics of brain-organ interactions. Insights from this research hold implications for affective computing as they inform the development of models and algorithms that incorporate physiological signals from multiple organ systems, thereby enhancing the understanding and recognition of emotional states. By leveraging knowledge about brain oscillations and their interaction with organ systems, computational models can be improved to accurately capture the integration of sensory stimuli and cognitive processes, ultimately advancing emotion recognition in HCI systems.

PI email: 100057997@ku.ac.ae

Design and Prototyping of a Novel Multimodal Sensory and Actuation Foot Insole: Towards the Improvement of Diabetic Foot and Beyond

Kinda Khalaf

Khalifa University

Maria De Fatima Domingues

Khalifa University

Doua Kosaji

Khalifa University

Abstract

Diabetic Foot (DF), one of the most common and debilitating manifestations of Type-2 Diabetes (T2D), is the leading cause of worldwide non-traumatic lower-extremity amputations, with major medical, social, and economic consequences. Despite high clinical relevance and the vast amount of literature available on insole/shoe systems for the management of DFU, there are still no reliable systems which address comprehensive multimodal physiological assessment and provide relevant, real-time intervention to reduce the risk of ulceration. Most existing systems focus on peak vertical plantar pressure and neglect the role of other factors, including shear and the wound healing environment. This work presents a multidisciplinary effort that leverages state-of-the-art wearable technology towards the design and development of a novel comprehensive system for real-time continuous multimodal optic sensor assessment (vertical and shear pressure, temperature, moisture, and blood oxygenation) and mitigation (vibrotactile actuation system to control pressure and ischemia) of DF. The current prototype is expected to provide a proof-of-concept that can be refined and validated in conjunction with our international partner at MIT and clinical partners at CCAD. The project is well aligned with research and innovation strategies in the UAE and addresses one of the most critical health challenges. Innovation will be twofold: 1) through the design/implementation of a novel multimodal sensing platform for synchronously capturing and processing in real-time the main parameters associated with the multifactorial DF pathology/wound healing, and 2) through the design and development of a prototype equipped with a vibrotactile system for multidirectional pressure offloading, as well as, controlling ischemia.

PI email: drkindakhalaf@gmail.com

Novel ST1926 Nanoparticle Drug Formulation and Therapeutic Development in Colorectal Cancer

Sara Assi

American University of Beirut

Nadine Darwiche

American University of Beirut

Berthe Hayar

American University of Beirut

Abstract

Cancer represents a major public health burden, being the second leading cause of death worldwide. Despite recent advances in cancer therapy, anti-cancer drug development remains a challenging field due to several hurdles faced along the process. Combining nanotechnology with medicine enables more efficient drug delivery, increased stability, and reduced drug toxicity. Hence, nanoparticle (NP) formulations in drug delivery have been applied successfully in various cancer models and in the clinic.

We have previously shown that the adamantyl retinoid ST1926 displays potent anti-tumor activities in colorectal cancer models. However, ST1926 is limited by its low bioavailability and increased glucuroconjugation which resulted in it being halted in phase I clinical trials in cancer patients. Therefore, we developed novel ST1926-NPs and assessed their efficacy in colorectal cancer models. ST1926 was formulated into NPs using Flash NanoPrecipitation with a drug to polymer mass ratio of 1:2 providing a stable formulation for one week. Dynamic light scattering has shown that the contin ST1926-NP diameter was 100 nm, with a polydispersity index of 0.245. Using viability, cell cycle, and cell death assays, we showed that ST1926-NP exhibited potent anti-tumor activities in the human colorectal cancer HCT116 cells.

We aim to study the mechanism of action of ST1926-NPs in a colorectal cancer xenograft mouse model and to detect the compound and its glucuroconjugated form in the plasma of mice.

Our research will support the use of ST1926-NP formulations in enhancing the stability and bioavailability of ST1926 in colorectal cancer and its further development in the clinic.

PI email: saa124@mail.aub.edu

Hybrid Techniques for Arrhythmia Prediction Based on Convolution Neural Networks

Ebtesam Alshemmary

University of Kufa

Zahraa Oleiwi

Al-Qadisiyah University

Abstract

There are many methods to diagnose heart disease and the most significant and efficient method is the analysis of electrocardiogram (ECG) signals. Generally, the automatic classification techniques based on ECG analysis, consist of three steps: data preprocessing, feature extraction, and classification. In this work eight hybrid model architectures have been designed using several types of deep neural networks (Convolution Neural Network (CNN), Gated Recurrent Unit (GRU), Bidirectional GRU (Bi-GRU)) four of them without Fast Fourier Transform FFT and the rest using FFT. Firstly, the MIT-BIH arrhythmia database is cleaned using the wavelet thresholding method, and the imbalance problem in this database uses the synthetic minority over-sampling technique (SMOTE). Secondly, hybrid models are constructed using the new proposed architecture consisting of two paths, the first path using ECG in the time domain and the second path using the resultant spectrum of ECG from FFT as input then the features from the two paths are concatenated to produce FFT-CNN, FFT-GRU, FFT-CNN-GRU, and FFT-CNN-Bi-GRU. A comparative study of the performance of all models was produced in terms of accuracy, training time, number of trainable parameters, and robustness against noise. The results show that the proposed FFT-CNN model was the best model with 97% accuracy and less training time and parameters as compared with other models. On the other hand, the use of FFT improved the performance of all models and increased the accuracy and robustness against noise.

PI email: dr.alshemmary@gmail.com

Design of a Portable Non-Radioactive Device for Long Bone Fracture Detection

Reem Alshabanah

Islamic Azad University

Nawal Alhogail

Islamic Azad University

Lola El Sahmarany

Islamic Azad University

Zahra Almaateeq

Islamic Azad University

Mariam Hegazi

Islamic Azad University

Azhar Almashhad

Islamic Azad University

Abstract

The World Health Organization estimates that 66% of the world's population lacks access to basic radiography services. In addition, cost, need of trained personnel, and lack of imaging technologies in many situations or areas, specifically, in rural or remote settings, are all obstacles that may lead many individuals to end up with undiagnosed bone fractures. This project aims to develop a portable, low-cost, non-radioactive device to detect bone fractures using acoustic vibrational signals. However, it is not intended to replace the radiography diagnostic tools, but it can serve the underserved individuals. Preliminary experiments were performed on a developed phantom to validate some concepts needed for the fulfillment of the final prototype. The results of these experiments suggested that the range of the exciting vibration frequency should be between 100 – 300 Hz to avoid resonance. In addition, the amplitude threshold reduction between the fractured and healthy bone was concluded to be 31%. Moreover, the bilateral symmetry, which forms a basis of the working principle of the device, was investigated experimentally and resulted in 82 - 96.6% similarity between the two tested limbs.

PI email: 2190001256@iau.edu.sa

Immunoliposomes with High Frequency Ultrasound and Microbubble-Mediated Triggering for Herceptin-Positive Targeted Breast Cancer Therapy

Waad Abuwatfa

American University of Sharjah

Shaban Anjum

American University of Sharjah

Ghaleb Husseini

American University of Sharjah

Abstract

Functionalization of liposomes with monoclonal antibodies is a potential strategy to increase the specificity of liposomes and reduce the side-effects associated with chemotherapeutics. Active targeting of the Human Epidermal growth factor Receptor 2 (HER2), which is overexpressed in HER2 positive breast cancer, can be achieved by coating liposomes with an anti-HER2 monoclonal antibody. In this study, we aim to synthesize doxorubicin-loaded immunoliposomes functionalized with the monoclonal antibody anti-HER2. Drug release from the immunoliposomes is triggered by high frequency ultrasound co-administered with microbubbles as cavitation-enhancing agents. The platform is to be characterized in terms of size, lipid content, protein concentration and stability. Moreover, comprehensive in vitro profiling will be conducted including the following tests: cell viability by MTT assay, drug uptake by flow cytometry, apoptosis assay and immunofluorescence imaging. Lastly, release kinetics will be studied at different power densities at two frequencies, 1 MHz and 3 MHz, respectively. This work aims to decipher the underlying biological mechanisms of drug delivery and action at the cellular level of the immunoliposomes. Our preliminary results revealed higher uptake and cytotoxicity of DOX-Lip by HER2+ cells as well as controlled drug release profiles, which suggest that combining active targeting with external triggering can yield a synergistic drug delivery platform for breast cancer treatment.

PI email: g00062257@aus.edu

GuardCare: An Advanced Robotic System for Elderly Support, Care, and Assistance

Himanshi Lalwani

New York University

Ajla Šačić

New York University

Nada Elsharkawy

New York University

Yi Fang

New York University

Congcong Wen

New York University

PI email: hl3937@nyu.edu

Abstract

According to the World Bank's development indicators, the United Arab Emirates had a population of nearly 164,678 individuals aged 65 years and above in 2021, comprising approximately 1.76% of the total population. Although this percentage is relatively low, it has been steadily increasing in recent years, indicating a gradual shift towards an aging society. As the proportion of older adults grows, it becomes essential to address their well-being and safety concerns, including the risk of falls and the need for companionship and assistance in daily activities.

To address these challenges, our research proposes the development of GuardCare, a versatile robotic system capable of fall detection, human-robot interaction, navigation and requested object detection. This proposed robotic system provides a comprehensive solution for the aging population. It offers support, companionship, and timely assistance to address the challenges faced by the elderly, including fall incidents, social isolation, and the need for object retrieval. Leveraging advanced technologies, including machine learning algorithms, natural language processing, and advanced object recognition capabilities, GuardCare is an innovative system that represents a significant step forward in utilizing cutting-edge technology to improve the safety, well-being, and quality of life for the aging population in the United Arab Emirates.

iRehab: A Novel AI-Based Multimodal Photonic System for the Diagnostic Assessment and Monitoring of Upper Limb Rehabilitation of Breast Cancer Survivors

Maria de Fatima Domingues

Khalifa University

Kinda Khalaf

Khalifa University

Doua Kosaji

Khalifa University

Abstract

One of the growing burdens in health care systems is directly connected to the rising number of cancer patients. Cancer treatments, including those used for breast cancer (BC), are associated with chronic adverse effects, such as fatigue and pain that affect the quality of life of breast cancer survivors (BCS). Physical exercises (PE) help rehabilitate, not only the physical condition of BCS, but also their psychological health. Interaction, with other BCS, also helps diminish the effects of cancer treatments, both at the psychological and physical levels.

The main goal of iRehab is to design an eHealth solution, starting from the sensing devices and building up to the users' interface, to monitor and evaluate the BCS' performance during rehabilitation exercises. The wearable smart multimodal sensing device, will be custom-designed based on the requirements for lymphedema treatment and patient-specific upper body function rehabilitation.

iRehab will enable BCS to execute a home-based training program, at any time, with continuous connectivity (monitoring) to their medical database, which will be simultaneously accessible by the therapist. The performance of the training program will be backed by smart algorithms associated to the sensors feedback, to evaluate the BCS performance and the lymphedema evolution. iRehab will provide the tools for the medical team to evaluate, in real time, whether BCS are performing the exercises correctly or not, assess how the program is influencing their recovery process, and give instructions/feedback accordingly.

PI email: maria.domingues@ku.ac.ae

Engineering

Efficient Hardware Implementation of AI Algorithms

Meriem Bettayeb

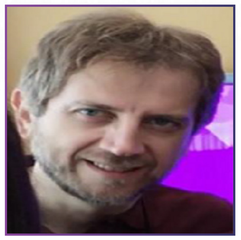
Khalifa University

Baker Mohammad

Khalifa University

Yasmin Halawani

University of Dubai



Leontios Hadjileontiadis

Khalifa University

Hani Saleh

Khalifa University

Abstract

Artificial Intelligence (AI) solutions are driving pioneering research and the development of next-generation technologies, offering improved robustness, reliability, security, logical thinking, and enhanced energy, data, and performance efficiency. However, the adoption of AI applications is hindered by computing and memory limitations, particularly for edge devices. Traditional technologies and architectures, used for the past four decades, struggle to meet the demands of the AI and big data eras. Researchers are now exploring novel technologies and hardware architectures to accelerate AI algorithms.

One promising candidate is memristor-based in-memory computing, which overcomes the traditional von-Neumann bottleneck. Memristors integrate storage and computation into a single physical element, similar to biological systems. Their appealing features include non-volatile analog behavior, nano-scale size, fast read and write times, a high impedance ratio, and potential compatibility with CMOS technology. These characteristics make memristors suitable for common digital processing operations. The crossbar architecture of memristor arrays enables efficient parallel vector-matrix operations, commonly used in AI and signal processing algorithms, leading to potential energy, area, and execution time savings.

This project aims to explore popular AI algorithms like Convolutional Neural Network (CNN), Transformer, and Retinex and map them onto efficient hardware implementations. The investigation will focus on data reuse, data preprocessing, and leveraging the memristor crossbar architecture. The goal is to achieve lower latency and higher efficiency while maintaining comparable accuracy to traditional methods. By unlocking the full potential of AI applications, this project contributes to the advancement of AI technologies in various domains.

PI email: 100057754@ku.ac.ae

Reconfigurable Soft robot Based on Fluidic Elastomer Actuators

Nadin Geies

Assiut University

Omar Nour

Assiut University

Ahmed Abbas

Assiut University

Omar Al Twahy

Assiut University,

Abstract

Soft robotics has become an affluent research topic nowadays with the increased need for robots capable of accomplishing tasks where adaptability, human contact and safe interactions are the most desired characteristics. Fluidic elastomer actuators, composed of embedded chambers in a hyperplastic material with the fluid acting as a resistive variable, are one of the most promising actuators in soft robotics. However, there are still design and modeling challenges that hinder its behavior prediction and wide spread in different applications. For instance, there are few studies that present a numerical investigation taking its different geometric parameters, material properties, and actuation method into account mainly working on one segment with a limited reconfigurability.

In the proposed study we present a modular design approach integrating more than a one segment actuator with different chamber designs that can be reconfigured building different soft robot configurations used in wide applications. Matching between both the numerical model and the produced prototype is predicted through the study with providing a deep understanding of its behavior.

PI email: nadingeies@hotmail.com

Autonomous and Vision-Guided Aeration Basin Cleaning Robot Equipped with Novel Deep Learning AI for Artificial Basin Emptying and Cleaning Efficacy Sensing

Maha Yaghi

Abu Dhabi University

Mohammed Ghazal

Abu Dhabi University

Marah Alhalabi

Abu Dhabi University

Abdalla Gad

Abu Dhabi University

Mohammad Alkhedher

Abu Dhabi University

Abstract

We propose an automated submersible solution for underwater cleaning and efficacy sensing in artificial basins. The need for such a solution arises from the challenge of efficiently emptying and cleaning these basins. Our proposed solution utilizes an autonomous and vision-guided underwater robot with a unique design, AI-optimized boards, and a marine vehicle. The system offers both manual and autonomous modes of operation. In the manual mode, an operator controls the robot using a remote controller, and an onboard camera provides a real-time video feed. A deep learning AI algorithm assists the operator with navigation cues and alerts for track deviation. In the autonomous mode, the robot employs sensor fusion to navigate the basin autonomously. To enhance its capabilities, the system incorporates a floating sonar for underwater scanning, depth, and temperature monitoring and two cameras with infrared lights for pre and post-cleaning views. During cleaning runs, the cameras capture videos that are transmitted, along with monitoring data, to a backend server. We apply a novel deep-learning AI pipeline for underwater image enhancement and segmentation to estimate the sludge percentage and evaluate the cleaning efficacy. The processed results, including estimations of collected silt and mud with sand, are made accessible through a user interface. This interface enables real-time tracking of the robot, monitoring of the cleaning process, and access to analysis results via a cross-platform mobile application. In addition, a geographic heat map visualizes motion paths and coverage areas, facilitating the identification of areas requiring additional cleaning runs. Overall, our proposed solution offers an efficient and effective approach to underwater cleaning and basin emptying, supported by advanced robotics and AI technologies.

PI email: mahayaghi@hotmail.com

Novel 2D Based Nanocomposite Material for Enhancing Lithium Recovery

Nour Abdelrahman

Khalifa University

Faisal Almarzooqi

Khalifa University

Seunghyun Hong

Khalifa University

Abstract

With the increasing demand for lithium in industries such as electric vehicles and renewable energy, concerns have arisen regarding the depletion of global lithium reserves and the environmental impact of mining. This research focuses on the recovery of lithium from diverse water resources, including brine water, wastewater, and seawater to address the need for sustainable lithium production. We aim to synthesize a high-performance adsorbate and apply it in efficient technologies for lithium recovery, thereby contributing to the development of a circular economy for lithium-ion batteries. One promising approach to be explored is the utilization of 2D material-based nanocomposite, which demonstrates remarkable potential in effectively adsorbing and separating lithium from brine water sources. The lithium ion-selective adsorbent has been constructed with rationally-designed nanocomposite consisting of 2D sulfonated graphene oxide/MXene/alginate. This nanocomposite-based adsorbent has proven to be highly effective in adsorbing lithium and exhibiting exceptional performance in removing lithium ions. The synthesized MXene/Algenat-based adsorbent has demonstrated significant efficiency in adsorbing lithium, resulting in the removal of more than 65% of lithium ions from the solution. These promising results indicate that sulfonated graphene oxide/MXene-based nanomaterials can serve as viable and effective solutions for lithium-ion recovery from brine water. By tapping into these advancements, these technologies hold the potential to mitigate the environmental impact associated with lithium extraction while enabling the efficient and cost-effective recovery of lithium from brine water sources. Such developments are critical for ensuring the long-term sustainability of the lithium-ion battery industry.

PI email: 100059675@ku.ac.ae

Advancing Passenger Experience and Reliability of Autonomous Buses through LiFi Technology

Abigail Copiaco

University of Dubai

Diana Dawoud

University of Dubai

Husameldin Mukhtar

University of Dubai

Wathiq Mansoor

University of Dubai

Shadi Atalla

University of Dubai

Abstract

The emerging visible light communication (VLC) or LiFi technology has the potential to revolutionize wireless communication networks through using light bulbs as a backbone for reliable and inexpensive interconnections among streets, buildings, and vehicles. In this context, Global Greenology, a leading environmentally friendly manufacturing company, has partnered with OWNii to launch and install LiFi internet at a large scale in Asian countries. Inspired by this development, we propose the solution of using LiFi for autonomous buses, which integrates LiFi technology with state-of-the-art solutions to enhance the overall experience of passengers in autonomous buses. This solution aims to address the reliability and performance issues of traditional radio frequency (RF) technologies by providing a more reliable and consistent wireless connection for self-driving cars.

To improve passenger experience and confidence in self-driving cars, our solution proposes the integration of a highly reliable LiFi-powered real-time tracking and notification system, on-board LiFi-powered assistance for locating passenger seats, and timely and reliable information gathering on bus seat occupancy. The proposed solution also aims to improve the overall punctuality rate of buses by integrating a LiFi-powered passenger boarding system. We present detailed technical aspects related to LiFi in our proposed solution and provide an overview of the proposed features and services to improve the overall traveler experience in autonomous vehicles. Such features will be combined through the central management system, which is a user-friendly application interface. The proposed solution has the potential to enhance the overall safety, convenience, and reliability of self-driving buses, thereby encouraging the adoption of autonomous vehicles as a reliable mode of transportation.

PI email: acopiaco@ud.ac.ae

Hybrid Hydrogel Water Harvester for Freshwater Capture from Atmosphere

Amira Mohammed Ali

Khalifa University

Fawzi Banat

Khalifa University

Abstract

The increasing demand for freshwater resources has spurred the development of novel approaches for atmospheric water harvesting. Utilizing carbon-based materials as effective water vapor collectors from the atmosphere and solar thermal absorbers has been advocated as a viable solution to the current challenge of water scarcity. The use of carbon nanotubes, graphene, carbon black, and mesoporous carbon as adsorbents has been widely studied in the literature. The hygroscopic properties of these materials make them ideal candidates for the collection of water vapor from the atmosphere; their microstructure is the real reason to form a strong capillary force to adsorb water vapor after being used as a matrix for the salt. Moreover, their ability to absorb solar energy can further enhance their efficiency for this application. This research proposal aims to investigate the potential of polymeric hydrogels containing silica-gel, clays, and carbon materials including carbon nanotubes (CNTs) with the optimized concentration of salt and polymer for harvesting water from the atmosphere, followed by comprehensive characterization to determine their physicochemical properties. Silica-gel is inexpensive, stable, and has been used as a dissident, besides clays which are well known for their water adsorption characteristics. In addition, the CNTs play a vital role in enhancing the desorption process kinetics. Some hydrogels are well known for their water retention and adsorption at high relative humidity but suffer from low water adsorption in low relative humidity. The ultimate goal of this research is to develop highly efficient carbon nanomaterials-based hydrogel for atmospheric water harvesting that can potentially provide a sustainable source of water for various applications. The performance of the hydrogels in water vapor uptake and retention will be evaluated using a humidity chamber that simulates atmospheric conditions, and desorption studies will be carried out under a solar simulator. The effect of various factors, such as humidity, and temperature on the water harvesting efficiency of the hydrogels will be investigated.

PI email: 100058891@ku.ac.ae

Modular Structural Date Palm Rachis Wall Panels for Rural Community Empowerment in Egypt

Eman Atef Abdul-Aziz Darwish

Ain Shams University

Ayman Moustafa

Ain Shams University

Hamed Elmously

Ain Shams University

Abstract

Egypt owns 14million date palms. 810thousand tons are produced annually from their pruning, of which 10% are sold by cultivators to handicraftsmen, crate makers and furniture artisans, whereas 90% are openly burnt on fields. Yet, this sold portion is gradually decreasing as youth are abandoning traditional skills amid the presence of imported plastic alternatives that have more modernistic look than traditional products. However, the most important palm pruning product, rachis, had wider utilization fields. Roofs, huts, and gates depended mainly on rachis with generations of specialized builders inheriting necessary know-how and adapting it to fit available materials and resources in each environment. Nowadays, there is a stigma attached to rachis and other local materials as the obsolete materials of the poor, leading to less utilization of rachis and, consequently, increasing environmental pollution resulting from their open burning and the non-biodegradable construction on the agricultural land. The aim of this project is to revive the architectural and technical heritages of rachis through developing a novel loadbearing wall panel that is based entirely on date palm rachis, depending on latticing and piercing techniques; adopted in traditional rachis handicrafts and furniture. In this project, the community of the Bahareya Oases in west Egypt, as a case study, participates in the practical implantation of the developed walls, by which they can be empowered to build for themselves sustainably using their local materials and skills and by securing their unique cultural heritage. The craftsman who built the first prototypes in the launch of this project will train craftsmen, crate makers and common builders from the Bahareya Oases to build more preliminary prototypes thst are to be tested to determine their compression strength axially and transversely, as well as tensile strength and shear strength. Results will be used to validate a Finite Element Method (FEM) software to optimize design details and obtain the needed structural performance to compete with other modular structural wall panels. New prototypes are built by the trained builders from Step1 according to the validate design. The prototypes are then used to build a sample hut to assess practical details and resume further studies.

PI email: eman.atef@eng.asu.edu.eg

Green Roadway Pavements for Sustainable Infrastructures

Maram Saudy

The American University in Cairo

Mohamed Abou-Zeid

The American University in Cairo

Safwan Khedr

The American University in Cairo

Abstract

Infrastructure is constantly expanding to support the growing population. Cites are constantly paving new roads and resurfacing old roads to accommodate increased vehicle traffic. There are several long-term adverse environmental effects associated with road paving. To mitigate the pavement potential problems, sustainable solutions are pursued. Egypt is undergoing a surge in building roadway construction. The country manages 48,000 km of paved roads, out of which 18,000 are highways. This strategic asset utilizes large quantities of natural resources while producing a significant quantity of harmful emissions. This research proposal details the steps towards facilitating the recycling of pavement materials and incorporating waste materials in asphalt pavements to construct future roads. The combination of pavement recycling and waste materials incorporation is expected to counter the negative effects of this necessary industry on our global climate. The success of this research will be measured through quantitative evaluation of its impact using Life Cycle Assessment (LCA). Building on the promising findings of incorporating waste materials in virgin asphalt binders, this proposal suggests incorporating these waste materials into recycled asphalt. Two green scenarios are proposed; the first is using waste-based Geopolymers as an environmentally friendly additive to the recycled asphalt that can enhance the pavement performance in terms of different pavement distresses and the second is incorporating the waste plastic (Low-density polyethylene, LDPE) into the recycled asphalt showing the benefits and shortcomings of this approach. Then, a detailed approach to recycle the pavement, using the previously produced waste materials modified recycled asphalt, is presented.

PI email: maramsaudy@aucegypt.edu

Thin and Highly Selective Metal-Organic Framework Membranes on Polymer Supports for Propylene/Propane Separation

Taofeeqah Agbaje

Khalifa University

Maryam Khaleel

Khalifa University

Georgios Karanikolos

Khalifa University

Abstract

Light olefins and paraffins, including propylene and propane, are important products of the oil refining industry wherein their energy-efficient separation could provide high economic gains and competitiveness in the emerging energy markets amidst the highly energy-demanding state-of-the-art technology. Widely used polymers such as polypropylene and other chemicals are derived from propylene, mainly processible via naphtha cracking. However, since propylene is usually produced together with propane, separation/refinement is required, and this is commonly achieved through energy-intensive cryogenic distillation due to the similarity in thermophysical properties of the process effluents. Thus, more cost-effective, and energy-efficient processes are required, among which membrane-based separation techniques are particularly promising.

In this work, highly selective and ultrathin membranes for propylene/propane separation based on metal-organic framework (MOF) separating layers on polymeric supports will be prepared through vapor phase synthesis. Vapor phase synthesis offers the potential to lead to industrially competitive materials due to its economic and environmental merits, while polymeric supports are preferred over ceramic ones due to lower cost and easier processability. Therefore, this work seeks to synergize the benefits of a particular MOF type, ZIF-8, polymeric supports, and vapor phase synthesis for propylene/propane separation.

PI email: 100049955@ku.ac.ae

Design and Model Biochar-Adsorber (Bio-sorb) for Direct Air Capture (DAC)

Fatimah Alkhowildi

Imam Abdulrahman Bin Faisal University

Jory Mayoof

Imam Abdulrahman Bin Faisal University

Nouf Aldossary

Imam Abdulrahman Bin Faisal University

Kawther Alhajji

Imam Abdulrahman Bin Faisal University

Abstract

The most widespread human-caused greenhouse gas is carbon dioxide (CO_2). The transport sector significantly contributes to CO_2 emissions in the atmosphere due to the usage of fossil fuels, which is challenging to decarbonize. These emissions result in an increase in the global average temperature. Direct air capture (DAC) technology eliminates CO_2 directly from the atmosphere and is predicted to achieve a net-zero carbon world when used on a wide scale. The sustainable and cost-effective CO_2 collection by DAC has been achieved through the characteristics of the materials, high CO_2 selectivity, regeneration performance, and appropriate design. Biochar is known for its richness in carbon and low-cost material made from various biomass wastes and exhibited favorable surface characteristics (total pore volume, micropore volume, and high surface area) for an effective and sustainable CO_2 adsorbent. In this study, machine learning (ML) was employed to predict the CO_2 capture performance by biochar derived from agricultural wastes. Various prediction ML-based models were applied, and the highest fitting was achieved by the gradient boosting decision tree (GBDT) model with training R2, test R2, and RMSE were 0.986, 0.814, and 0.719, respectively. The maximum CO_2 captured by biochar is found at the surface area (1800 m2/g), total pore volume (0.4 cm3/g), and micropore volume (0.8 cm3/g). The biochar was produced from Saudi Arabia's agricultural waste and their physical properties were analyzed. The biochar-based CO_2 adsorber (bio-sorb) system was designed according to EPA/452/B-02-00 and ISO 27914:2017 standards. The CO_2 adsorber design results demonstrated that in order to achieve maximum CO_2 adsorption the most appropriate design parameter are gas flow rate (100 mL/min) , biochar particle size (0.18 mm), and temperature (25°C). The direct air capture system-design contains three main sections supported with (<0.5 µm mesh, fan, sensor, silica gel, and fabric filter).

PI email: fatimah-2060@hotmail.com

Green Facades as Climate Modifiers for Housing Projects in the Hot Arid Climate of UAE

Muna Salameh

Ajman University

Aida Touqan

Ajman University

Abstract

In the hot arid climate of the United Arab Emirates (UAE), housing projects face unique challenges in maintaining comfortable indoor environments while minimizing energy consumption, beside that improving the outdoor thermal conditions. One effective and sustainable solution that has gained attention in recent years is the implementation of green façades. Green façades are vertical gardens or living walls integrated into the exterior of buildings, comprising various plant species and vegetation. This study aims to highlight the advantages of using green façades in housing projects within the hot arid climate of the UAE. As green façades provide effective thermal insulation for buildings. Additionally, the shade provided by green façades reduces direct solar radiation on building surfaces, further decreasing heat gain. Green façades enhance air quality by acting as natural air purifiers. Plants absorb carbon dioxide and release oxygen through photosynthesis, helping to mitigate the harmful effects of pollutants and improve overall air quality. In a region like the UAE, where air pollution is a concern, green façades can play a crucial role in creating healthier living environments. This research will use a qualitative methodology based on a case study and ENVI-met software to evaluate the effect of green facades on the outdoor thermal conditions and comfort in a housing project in UAE. The results of the research are expected to be with high advantage, because they have the ability to mitigate the urban heat island effects, as green facades help counteract this effect by reducing the ambient air temperature through evapotranspiration and shading, ultimately creating a more pleasant microclimate. Moreover, the use of green façades in housing projects can improve the thermal insulation, enhance the air quality, noise reduction, mitigation of the urban heat island effect, biodiversity promotion, and overall aesthetic enhancement. By incorporating green façades, developers and architects can create sustainable and energy-efficient buildings that prioritize the well-being of occupants and contribute to a greener future in the UAE's challenging climate.

PI email: m.salameh@ajman.ac.ae

A Case Study of the Water Energy Food Nexus in Lebanon

Fatima Mansour

American University of Beirut

Mahmoud Al-Hindi

American University of Beirut

Abstract

Natural resources are facing growing stress due to increasing demands and shrinking supplies. The interwoven nature of water, food, and energy has led to the inception of the water-energy-food nexus (WEFN) concept, which promotes optimum resource allocation balancing demands with supplies and boosting resource efficiencies. The MENA region, framed by the World Bank as a "global hotspot of unsustainable water use", highly dependent on food importation, yet holding 57% and 41% of the world's proven oil and natural gas reserves, respectively, is in dire need for a nexus-optimum management policy to avoid annual economic losses estimated at billions of dollars. To showcase this, this work seeks to provide a case study of the WEFN in Lebanon, applying a multi-objective nexus optimization model. The guiding principle of the model is optimum resource allocation that minimizes water and energy consumption while maximizing food production under conflicting constraints addressing spatiotemporal resource availabilities, healthy and sustainable diets, technological limitations, environmental boundaries, and economic considerations. The case study will build upon data characterizing the country's water and energy resources, to generate an optimal resource allocation scheme that determines which resources are to be produced, using what technology, and for what end-use. Furthermore, it will provide an optimal diet composition that caters to human health while balancing the sustainability of the resources that go into the production of the food. As such, the results of this work are intended to provide the groundwork for prime resource management strategies and to direct related policy.

PI email: fam16@mail.aub.edu

Thermal Performance Analysis on Double-Layered Microchannel Heat Sink (DL-MCHS) for Cooling of Concentrated Photovoltaic Cells

Dinumol Varghese

United Arab Emirates University

Bobb Mathew

United Arab Emirates University

Abstract

The work details the numerical study of a liquid-based double-layered microchannel heat sink (DL-MCHS) of length 25mm in counterflow arrangement for cooling of concentrated photovoltaic (CPV) cells subjected to a heat flux of 100,000 W/m^2 . Three different double-layered configurations have been taken into consideration for comparative study mainly: straight DL-MCHS, wavy DL-MCHS and zig-zag DL—MCHS. The performance metrics of DL-MCHS are evaluated using total thermal resistance, pumping power, maximum temperature and friction factor. The study is conducted over the Reynolds number ranging from 375 to 1500. The results show that straight DL-MCHS exhibit lower thermal resistance compared to straight single-layered microchannel heatsink (SL-MCHS) at the expense of increased pumping power. Over the Reynolds number range, wavy DL-MCHS demonstrated a reduction of 10%-14% in thermal resistance and 350% to 450% increase in pumping power. Also, it has been noted that wavy DL-MCHS has lower maximum substrate temperature compared to zig-zag DL-MCHS which indicates better temperature uniformity along the length of microchannel heat sink. The Poiseuille number associated with the channel configurations is useful for designing various combinations of MCHS using wavy and zig-zag DL-MCHS.

PI email: dinumol@uaeu.ac.ae

Zirconium Silicate/PVDF-ILs Composite Membrane for PEM Fuel Cells Applications

Tallah Magdi Ahmed

American University of Sharjah

Amani Al-Othman

American University of Sharjah

Abdulrahim Shamayleh

American University of Sharjah

Abstract

The combustion of non-renewable resources such as fossil fuels is the primary cause of the increase in greenhouse gases that has resulted in the current global warming. Several renewable energy sources are being explored, but proton exchange membrane fuel cells (PEMFC) have attracted the interest of many due to its advantages of low operating temperature, high conversion efficiency, and minimal or no emissions (when the fuel is hydrogen). PEM fuel cells that use hydrogen as the fuel and therefore, water as the only product are receiving attention. The proton exchange membrane is an important component in PEM fuel cells. However, with the current temperature operation, water management concerns, such as flooding, are a serious obstacle in the PEM fuel cell's performance. The simplest method for removing the excess collected water is to operate at high temperatures because water is produced in the vapor phase. Nafion, the most often used membrane in PEMFCs, has a proton conductivity of 0.1 S/cm and cannot operate at high temperatures (over 80 °C) because it dehydrates, thus, lowering its proton conductivity and eventually the fuel cell efficiency. To overcome this issue, high temperature operation is required. In this work, novel high temperature composite membranes are being researched. A zirconium silicate, $ZrSiO_4$/ Polyvinylidene fluoride (PVDF) membranes with concentrations of 2%wt and 8%wt were synthesized through solution casting method and evaluated for their proton conductivity. The values obtained were 2.85×10-4 S/cm and 4.51×10-4 S/cm respectively. The membranes exhibit encouraging results and has the potential to replace Nafion in high-temperature operation of proton exchange membranes.

PI email: g00098305@aus.edu

Affordable Natural Clay-Based Ni-Supported Halloysites for CO_2 Methanation Reactions

Ayesha Alkhoori

Khalifa University

Kyriaki Polchronopoulou

Khalifa University

Aasif Dabbawala

Khalifa University

Abstract

CO_2 mitigation and utilization are of paramount importance in addressing the global challenge of climate change. As the concentration of CO_2 in the atmosphere continues to rise, it is crucial to develop effective strategies for reducing CO_2 emissions and finding sustainable ways to utilize this greenhouse gas. The conversion of CO_2 into valuable products, such as methane (CH_4), holds great potential for mitigating CO_2 emissions and achieving a low-carbon future. This work focuses on the utilization of affordable natural materials as catalysts for CO_2 conversion. By harnessing the properties of Ni-supported Halloysite nanotubes, the study aims to enhance the efficiency of CO_2 conversion into methane, a valuable energy source. The modification of the catalysts with transition and rare-earth metals further enhances their performance, promoting CO_2 adsorption, activation, and conversion. The successful development of cost-effective catalysts for CO_2 conversion not only contributes to the mitigation of greenhouse gas emissions but also aligns with the zero-emissions vision by 2050. By utilizing abundant and affordable clay materials, this research offers a sustainable and economically viable approach to CO_2 utilization. The findings pave the way for scalable CO_2 conversion technologies, enabling the decarbonization of industries and fostering a cleaner and greener future. Through the utilization of natural materials as catalyst supports, this study highlights the importance of developing innovative solutions to tackle the challenges posed by CO_2 emissions. It underscores the significance of CO mitigation and utilization in achieving a more sustainable and environmentally friendly society.

PI email: ayesha.alkhoori@ku.ac.ae

Fabrication of TiO_2-Based Thin Films for Photoelectrochemical Degradation of Organic Compounds

Alia Alaydaroos

Khalifa University

Matteo Chiesa

Khalifa University

Selvakumar Palanisamy

Khalifa University

Abstract

The increasing levels of pollution and the need to find sustainable solutions to environmental issues have led to the development of various technologies. One such technology is photoelectrochemical degradation, which involves the use of photocatalysts to degrade organic pollutants. TiO_2 has emerged as a promising candidate among the various photocatalysts due to its excellent photoelectrochemical properties. However, it cannot be used for practical applications in water samples because of separation difficulties arising from powder photocatalysts being separated from treated water. Hence, the immobilization of photocatalysts on substrates in thin films could simplify separation procedures and increase catalyst reusability. This research focuses on fabricating efficient TiO_2 photoanode thin films and investigating the photoelectrochemical degradation of organic compounds for reducing water pollution. The TiO_2 anodes on fluorine-doped tin oxide (FTO) were prepared using a chemical spray pyrolysis process with various titanium isopropoxides acetylacetone molar ratios (1:3 to 1:20). The preliminary results showed that the films consisted of the anatase crystalline phase of TiO_2, therefore, it could potentially elevate the maximum level of energy in the valence band in relation to the redox potential of the molecules being adsorbed. Moreover, LSV analysis proved that the 1:8 (TTIP:AcacH) molar ratio film had the highest photocatalytic activity compared to other films.

PI email: 100061893@ku.ac.ae

Date-Palm Bio-Oil modified Phenolic Foam: Preparation and Characterisation

Sarika Reghunadh

American University of Sharjah

Paul Nancarrow

American University of Sharjah

Yassir Makkawi

American University of Sharjah

Abstract

This research addresses two critical drawbacks of the phenolic insulation foam- the environmental impact and low mechanical strength. Phenolic foams are usually produced from nonrenewable resources such as phenol and formaldehyde. Natural petroleum resource depletion, oil price fluctuations, and environmental concerns forced researchers and manufacturers to shift their focus toward facile and environment-friendly reagents and green synthetic routes towards the production of phenolic resin and foam. Materials derived from biomass are abundantly used for phenol substitution and some of them are cardanol, lignin, tannin, and bio-oils from various plants. The main advantages of these substitutes are their abundance, renewability, and free availability as a waste product from biomass. This invention uses bio-oils derived from date palm tree waste for the partial substitution of phenol which can ease the dependence on non-renewable petroleum resources. In this work, phenolic resins were prepared by replacing 10, 15 and 20% phenol with date palm bio-oil. Viscosity of the substituted resin initially decreases and then shows a gradual increase. Foams prepared from the bio-oil substituted resin have high density and mechanical strength with similar thermal conductivity compared with traditional phenolic foams. Hence, the mechanical properties of the resulting foams were improved without the need for any additional toughening agents. The use of material from date palm waste can help to reduce the amount of waste going to landfills. Therefore, the date palm oil substituted phenolic foams are more environmentally friendly and have superior mechanical properties compared with traditional phenolic foams.

PI email: sreghunadh@aus.edu

Exploring the Feasibility of Energy Recovery from Oilfield-Produced Water (PW) through Reverse Electrodialysis (RED) Toward Lowering the Cost of PW Treatment

Randa Gaber

Khalifa University

Emad Alhseinat

Khalifa University

Abstract

This research investigates the potential use of salinity gradient power (SGP) as an energy source through reverse electrodialysis (RED) technology for harvesting produced water (PW) generated from oil and gas exploration and processing. The study evaluates the efficiency of RED technology, including its dependence on various parameters such as feed concentration gradients, compositions, temperature, flow rate, as well as the presence of heavy metals and dissolved organic matter. Additionally, fourier transform infrared spectroscopy (FTIR) was utilized to investigate the interaction of phenol, nickel, and zinc with the RED ion exchange membranes and their impact on power production. Furthermore, the study explores the feasibility of utilizing the SGP of mixed PW streams for operating treatment processes such as nanofiltration (NF) and reverse osmosis (RO). Results indicate that mixing two PW streams with salinities of 150 g L^{-1} and 1 g L^{-1} can lead to a maximum power output of approximately 8 W bbl^{-1} of PW with 1000 cells and an active membrane area of 0.25 m^2. Ultimately, this research provides meaningful information for the development of RED technology to support sustainable energy generation and the management of PW by-products to minimize its treatment cost and facilitate potential use in sustainable farming and landscaping needs.

PI email: 100058652@ku.ac.ae

Improving Emergency Department Resilience to Demand Surge: A Discrete-Event Simulation and Optimisation Framework

Eman Ouda

Khalifa University

Andrei Sleptchenko

Khalifa University

Abstract

This study seeks to enhance the resilience of the emergency department in coping with demand surges by employing a combination of discrete-event simulation, an optimization framework, and reinforcement learning techniques. The resilience of the emergency department, patient flow, and necessary resources are analyzed by assessing the resistance and recoverability components. A simulation model of an emergency department in the UAE will be developed and validated using timestamps. The outcomes aim to uncover the resilience, recoverability, and resistance of the department in normal circumstances, as well as its performance during demand surges. The study examines the impact of additional resources on emergency department resilience using the resilience triangle and optimizes resource allocation policies through the integration of a Markov Decision Process (MDP) model with reinforcement learning algorithms. The methodology and simulation model provide emergency department managers with valuable insights to evaluate and enhance their department's resilience in emergency situations. This research contributes to a deeper understanding of emergency department resilience and establishes a foundation for further investigations into improving performance during demand spikes.

PI email: 100052950@ku.ac.ae

Revealing Community Structure in Complex Networks

Esraa Al-Sharoa

Jordan University of Science and Technology

Ahmad Abu Saleh

Jordan University of Science and Technology

Abstract

Networks play a crucial role across various domains, offering a concise and powerful representation of intricate systems involving interacting agents. Examples of such systems span from social networks to biological networks encompassing neurons, cells, or entire species. Different representations have emerged over the years to capture the nature of these systems, including monoplex, temporal, multiplex, and multi-layer networks. Monoplex networks consist of nodes connected by static edges, whereas temporal networks exhibit time-varying interactions among nodes. On the other hand, multiplex and multi-layer networks involve nodes interacting through multiple types of connections.

One of the fundamental tasks in network analysis involves uncovering the community structure within the network, accomplished through various community detection techniques. Additionally, graph learning has emerged as a valuable approach for comprehending networks, enabling tasks like classification and link prediction. However, existing methods often require enhancements to effectively address the challenges posed by the era of big data. These challenges encompass accurately modeling complex systems, reducing dimensionality, and extracting meaningful information from the system.

This proposal aims to apply network analysis techniques to gain insights into network functionality by learning the underlying graph structure or revealing hidden patterns of connectivity.

PI email: emalsharoa@just.edu.jo

Non-Beam Additive Manufacturing of Architected Cellular Shape Memory Materials

Pooja Srinivas

Khalifa University

Wael Zaki

Khalifa University

Rashid K. Abu Al-Rub

Khalifa University

Imad Barsoum

Khalifa University

Abstract

The aim is the fabrication, modelling and characterization of periodic superelastic architected nitinol foams using non-beam additive manufacturing (AM) techniques, examples of which include binder jetting (BJT), digital light processing (DLP) and fused deposition modeling (FDM). While non-beam AM has been successfully used for the fabrication of other shape memory alloys, such as NiMnGa, their use for additive manufacturing (AM) of nitinol does not seem to have been reported yet. Compared to beam-based AM methods, for which the determination of workable process parameters for AM nitinol remains an open challenge, non-beam AM may be simpler to implement while potentially allowing higher throughput or larger parts. Moreover, its additive nature allows the fabrication of nitinol specimens of complex geometries, which are difficult to achieve otherwise because of the extremely poor workability of the material. Applications for such geometries may include biomedical prosthetics and grafts, as well as impact shielding solutions in the civil engineering and military fields.

PI email: 100060504@ku.ac.ae

Development of Highly Durable Superhydrophobic LTA-Zeolite Coatings with Excellent Self-Cleaning Property

Nahla Alamoodi

Khalifa University

Maryam Alhashemi

Khalifa University

Deepa Dumbre

Khalifa University

Abstract

Self-cleaning surfaces are necessary for wide range of applications spanning from preserving surveillance cameras field of vision to having a lovely street view of skyscrapers with shiny windows. Superhydrophobicity is one of the key components that defines self-cleaning surfaces. In this study, we propose the development of a superhydrophobic surface coating on polydimethylsiloxane surface using the inherently hydrophilic LTA-zeolite (Linde Type A) crystals with a two-silane coupling strategy. The LTA-zeolite coated PDMS substrates are characterized by various techniques such as XRD, SEM, EDX, FTIR, AFM, XPS and contact angle measurements. The resulting superhydrophobic surface exhibited higher surface roughness with a contact angle higher than 150° and a sliding angle of less than 10° using de-ionized water. This highly robust superhydrophobic surface coating strongly repelled muddy water, which confirmed its excellent self-cleaning property. We also evaluated the significance of its mechanical stability by exposing it to kapton adhesive tape peeling, water-jet, and ultraviolet resistance tests, which proved its strong adhesion.

PI email: nahla.alamoodi@ku.ac.ae

Integrating Machine Learning (ML) with a Multi-Metaheuristic Approach for Efficient Optimization of Complex Bulk Port Routing Operations

Sara Mallah

Essaadi University

Oulaid Kamach

Essaadi University

Ahmed Chebak

University Mohammed VI Polytechnic

Abstract

Maritime transport is a vital and indispensable sector for the continued distribution of critical supplies and international trade. Its importance was underscored in times of crisis, with the benefit accruing solely to more resilient markets which commit to increase the value of delivering customer-specific products on time. However, in today's world, the links between suppliers and customers are neither simple nor direct due to the expanded infrastructure of real supply chains, such as bulk port supply chains. In the latter, delivering the right product in good quality, to the right customer, in the right place, and at the right time by choosing the best transportation routes among a complex real-world routes network is more and more challenging, making thereby the bulk port routing problem a strongly demanded optimization issue to solve due to its crucial role in reducing charges related to waiting and tardiness in loading and stocking operations. To solve the routing problem, we proposed, in two former works, respectively, (i) a detailed integration approach of the routing problem with other bulk port problems to avoid sacrificing their economic objective in the interest of the routing problem (ii) a mathematical model, that considers jointly: routing constraints and interactions with stocking and loading operations. The findings were interesting, but some means should be proposed to address difficult instances. Consequently, the aim of this work is to investigate the best combination of diverse metaheuristics to be hybridized further with ML methods for a better control of computational performance and memory usage. Such performance requirements are imperative so that the optimization tool can fit into industrial settings.

PI email: saramallah.elec@gmail.com

Iron-Carbon Nanocomposite for Mitigation of Heavy Metal Pollution in Complex Aquatic Environments

Wedad Masoud

University of Sharjah

Sourjya Bhattacharjee

University of Sharjah

Abdallah Shanableh

University of Sharjah

Abstract

Contamination of water resources by toxic inorganic pollutants such as heavy metals is a significant environmental challenge. Heavy metals such as copper present in wastewater effluents and those that end up in aquatic ecosystems are typically found associated with dissolved organic matter (DOM). The co-presence of DOM can significantly hinder the ability of conventional treatment methods to efficiently remove metal contaminants through non-specific binding to adsorbent material surfaces or excessive consumption of precipitative agents. This results in high water treatment costs. Treatment techniques that can efficiently target the desired contaminants in such complex matrices are critically needed to achieve both performance and cost efficiency. This project will develop an innovative composite nanomaterial consisting of elemental iron (Fe0) and activated carbon (C) to target and remove a representative heavy metal (copper) in the presence of humic acid (representative DOM). The presence of activated carbon in the composite nanomaterial will act as binding sites for humic acid thereby enabling the Fe0 to specifically target and remove copper thus significantly enhancing the removal capacities.

PI email: U20105978@sharjah.ac.ae

Recycling Paper Waste for the Development of Cellulose-Based Composite Adsorbents for CO_2 Capture

Marcellin Premila Jerome

Khalifa University

Nahla Alamoodi

Khalifa University

Georgios Karanikolos

Khalifa University

Abstract

The increase in carbon dioxide (CO_2) due to anthropogenic activities is a global concern at the moment. On the other hand, the accumulation of paper waste in landfills is a growing issue that needs to be addressed. Several CO_2 reduction technologies are currently being investigated to offset the negative impact caused. Among them, the most prominent technology has been Carbon Capture, Utilization, and Storage (CCUS). Currently, absorption is the most common method used to capture CO_2 but it has various limitations as a result this research aims at exploring the use of solid adsorbents in capturing CO_2. Office paper comprises 85% cellulose which is extracted using simple chemicals and is studied in this work. Cellulose is the most abundant biopolymer in the world which is inexpensive, non-toxic, and can be easily functionalized with CO_2-philic functionalities due to the presence of abundant hydroxyl groups. To enhance the CO_2 uptake, and to increase the thermal and mechanical stability of cellulose-based materials, a composite using graphene oxide (GO) is synthesized. Furthermore, the cellulose-GO aerogel is functionalized with an amino silane called 3-aminopropyltriethoxysilane (APTES) to increase the CO_2 adsorption at low pressure and with high selectivity. The prepared composites are evaluated for CO_2 adsorption as a function of temperature and relative pressure. Moreover, other crucial parameters such as kinetics, the heat of adsorption, selectivity to N_2, regeneration, and cyclability were analyzed. It was observed that the functionalized cellulose-GO aerogel (cellulose-GO-APTES) had the highest CO_2 capacity of 2.52 mmol/g at 25°C.

PI email: 100061886@ku.ac.ae

Enhancing Stroke Recovery: A Sensor-Enabled Interative Rehabilitaion Glove for Improved Motor Skills and Progress Monitoring

Huma Zia

Abu Dhabi University

Nour Alrifaee

Abu Dhabi University

Abstract

Hand rehabilitation is crucial for individuals with hand injuries, stroke patients, and those with neurological conditions. Motor recovery can be improved through intensive and repetitive rehabilitation, and Outpatient rehabilitation programs are increasingly seen as a viable alternative to costly hospital-based programs. However, these outpatient programs still incur high expenses that often exceed the coverage provided by medical insurance. Recent advancements in virtual and robotic therapy offer more motivating and efficient approaches, but existing devices are costly and require supervision, limiting their home-based usability.

This research aims to develop a cost-effective motion-tracking smart glove that provides feedback to therapists and patients on hand movement repetitions (wrist and finger extensions) during therapy. By utilizing flex and inertial measurement unit (IMU) sensors, our project accurately tracks finger and wrist movements, especially in game-based active rehabilitation. We integrate these sensors with machine learning classifiers to enhance diagnosis accuracy.

Customized games developed in Unity are integrated into the rehabilitation platform, motivating patients during mobility training. Real-time feedback and personalized health systems monitor patient progress. We investigate the effectiveness of this feedback in promoting hand function recovery in neurologically impaired patients. Our goal is to advance arm rehabilitation monitoring devices, making them more accessible and affordable for individuals affected by stroke.

In conclusion, this research project aims to develop a cost-effective smart glove and game-based platform for hand rehabilitation. By integrating sensors, machine learning, and personalized feedback systems, we strive to enhance diagnosis accuracy and promote motor recovery in individuals with hand injuries, stroke, or neurological conditions. Our work contributes to the advancement of innovative arm rehabilitation devices, improving the quality of life for those affected by stroke and related conditions.

PI email: huma.zia@adu.ac.ae

IVY (Intelligent Visionary robot for the visually impaired elderlY)

Oyungerel Amarsanaa

New York University Abu Dhabi

Aigerim Zhusubalieva

New York University Abu Dhabi

Yi Fang

New York University Abu Dhabi

Shuaihang Yuan

New York University Abu Dhabi

Abstract

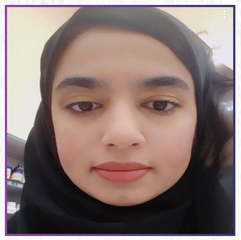
Globally, there are 295 million individuals with visual impairment (VI), and over half of them (52.9%) are above the age of 70, requiring continuous assistance for activities of daily living (ADL) and instrumental activities of daily living (IADL), such as eating, meal preparation, and medication management. VI significantly affects mental and physical well-being, as everyday tasks become more challenging due to difficulties in locating objects and navigating surroundings. Even a basic home environment, like the kitchen, can pose potential safety hazards. While there is assistive technology, the majority only provides passive assistance, in which the assistance is initiated and overlooked by the user.

Motivated by the lack of active assistive technology and immense technological advancement in generative AI like GPT-4, the core technology behind ChatGPT, we propose IVY (Intelligent Visionary robot for the visually impaired elderlY), a homecare assistive system with human-like intelligence and communication. By integrating state-of-the-art components such as a large language model, large vision model, and behavior transformer algorithms, IVY initiates and engages in meaningful conversations, perceives its physical environment, and performs various tasks without step-by-step pre-programming. IVY aims to provide physical active assistance with ADL/IADL, thereby reducing the physical risks associated with hazardous home activities similar to handling hot stoves, sharp knives, and other potentially dangerous tasks, as well as provide mental companionship to the elderly. Our proposed system further displays immense potential for broader application as a general human assistive system, such as in hospital care, toddler care, or comprehensive homecare tasks for physically handicapped people.

PI email: oa853@nyu.edu

Sciences

Utilization of Tephrosia Apollinea UAE Medicinal Pant for the Green Synthesis of Chitosan Silver Nanoparticles and Investigation of their Medical Applications



Shifa Malik

University of Sharjah

Kareem Mosa

University of Sharjah

Abstract

Silver nanoparticles are widely used in various fields such as environment, medicine and agriculture. Over the past decades, various biological systems have been used to synthesize nanoparticles. Nanoparticle synthesis by biological systems is cost-effective, safe and environmentally friendly compared to currently used chemical and physical methods. In this study, chitosan-coated silver nanoparticles (AgNPs) were biosynthesized by Tephrosia apollinea by using two approaches: plant extract and living plants. UV-visible spectrum, energy dispersive X-ray spectroscopy, X-ray diffraction, scanning electron microscope, Fourier transform infrared spectroscopy was used to detect and characterize silver nanoparticles. The research will evaluate the potential anti-microbial and anticancer properties of the green synthesized Tephrosia apollinea Chitosan nanoparticles. The sustainably produced chitosan AgNPs will be evaluated to be used as biocompatible agents in the medical field and confirm prospective antibacterial and anticancer action.

PI email: U21104717@sharjah.ac.ae

Recyclable Gold Nanotubes in Alumina Membranes for Catalytic Reduction of 4-Nitrophenol and Potential Application in the Treatment of Water Contamination

Hafsa Khurshid

University of Sharjah

Rahana Yusoof

University of Sharjah

Abstract

This work proposes the fabrication of gold nanotube membranes for their potential catalytic application in contaminated water treatment. Pollutants such as heavy metals, fertilizers, detergents, and pesticides have seriously affected the quality of pure drinking water and usable water. Nitrophenols are essential ingredients in the production of drugs, fungicides and insecticides, and dye in leather processing increase water pollution by phenol and phenolic compounds. Gold nanoparticles has been proven to be very effective in cost-effective nanotechnology-based water treatment with their unique optical and catalytic properties and chemical stability etc. The gold nanotubes (AuNT) offer much higher surface area than their soild counterparts of nanorod and nanoparticles. A higher surface area contributes to greater catalytic activity than compact solid rods. In this work, we prepared gold nanotubes embedded in porous anodic aluminum oxide (AAO) membranes by electrodeposition. A pilot study of the Au-NTs arrays was carried out by testing catalytic conversion of 4-nitrophenol (4-NP) into 4- aminophenol (4-AP) in the presence of NaBH4 as a reductant. The study verified the catalytic properties of GNT membranes and further research of this work can be used for developing new methodologies to reduce water pollution by phenolic compounds.

PI email: hkhurshid@sharjah.ac.ae

Cellulose Fibers Modifed with Carbon Dots: A Promising Approach for Devlopment of Self-Disinfecting Fabrics

Zinb Makhlouf

American University of Sharjah

Danyah Khan

American University of Sharjah

Tala Terro

American University of Sharjah

Abdelhamid Khodja

American University of Sharjah

Remya Radha

American University of Sharjah

Mohammad Al-Sayah

American University of Sharjah

Abstract

Self-disinfecting materials have gained significant attention due to their utility in personal protective equipment, especially in light of the COVID-19 pandemic. These fabrics have the potential to be applied to various surfaces that can serve as vehicles for microbial transfer, such as seat/table covers, school desks, and hospital beddings. Carbon nanodots (CDs) have been extensively studied for their antibacterial properties and low toxicity to mammalian cells. The primary objective of this project is to modify cellulose-based fibers, including cotton and paper, by incorporating CDs into their matrix. This modification aims to introduce antibacterial properties into the fibers, thereby enhancing their ability to combat bacterial growth. The project envisions the synthesis and characterization of carbon dots derived from natural antibacterial compounds, such as curcumin and piperine. The antibacterial properties of these CDs will be tested against a wide range of gram-positive and gram-negative bacterial strains in solution. Subsequently, the CDs will be attached to cellulose fibers, and the antibacterial activity of the modified fibers will be evaluated. Preliminary results of two CDs have shown notable antibacterial efficacy both in solution and on fibers against representative bacterial strains. Additionally, the project will investigate the bioactivity of all CDs in solution and on cellulose surfaces, while also evaluating their cytotoxicity and the cytotoxicity of CD-modified fibers on human cell lines. The findings of this study hold promise for developing functionalized cellulose-based materials with enhanced antibacterial properties, which could find practical applications in various sectors, including healthcare and textiles.

PI email: g00077088@alumni.aus.edu

Quantum Decoherence in Two Interacting Qubits Coupled to Dephasing Environments

Rahma Abdelmagid

University of Sharjah

Gehad Sadiek

University of Sharjah

Khadija Alshehhi

University of Sharjah

Abstract

One of the main obstacles toward building efficient quantum computing systems is decoherence, where the inevitable interaction between the qubits and the surrounding environment leads to a vanishing entanglement. We consider a system of two interacting asymmetric two-level atoms (qubits) in the presence of pure and correlated dephasing environments. We study the dynamics of entanglement while varying the interaction strength between the two qubits, their relative frequencies, and their coupling strength to the environment starting from different initial states of practical interest. The impact of the asymmetry of the two qubits, reflected in their different frequencies and coupling strengths to the environment, varies significantly depending on the initial state of the system and its degree of anisotropy.

For an initial disentangled, or a Werner state, as the difference between the frequencies increases the entanglement decay rate increases, with more persistence at the higher degrees of anisotropy in the former state. However, for an initial anti-correlated Bell state, the entanglement decays more rapidly in the symmetric case compared with the asymmetric one. The difference in the coupling strengths of the two qubits to the pure dephasing environment leads to higher entanglement decay in the different initial state cases, though the rate varies depending on the degree of anisotropy and the initial state. Interestingly, the correlated dephasing environment, within a certain range, was found to enhance the entanglement dynamics starting from certain states, such as the disentangled, anti-correlated Bell, and Werner, whereas it exhibits a decaying effect when starting from a correlated Bell state.

PI email: u22104927@sharjah.ac.ae

Role of the Hypoxic Secretome in Inducing Stemness and Cell Survival in Normoxic Lung Cancer Cell lines

Rania Zaarour

Gulf Medical University

Salem Chouaib

Gulf Medical University

Maisa Ribeiro

Gulf Medical University

Abstract

Hypoxia, one of the main features of solid tumors induces signaling that promotes tumor cell survival, invasion, and metastasis. The role of hypoxia inducible factor (HIF) signaling in inducing cancer stem cells (CSC) senescence and reawakening and its effects on the secretome of cancer cells is not fully understood. Evidence suggests that one of the major barriers limiting the efficacy of immunotherapy seems to coalesce with the hypoxic tumor microenvironment (TME). Several secreted factors modulate the behavior of the tumor and neighboring cells within the TME, which then determine tumor progression, malignancy, immune and drug resistance. In addition, cancer stem cells could release cellular cargo in the form of extracellular vesicles that can influence neighboring cells, promote cancer survival, and impair natural killer cells mediated cytotoxicity. Finally, senescence and immune escape are emerging features of at least some CSCs, indicating significant overlap between dormant cancer populations and CSCs. Mechanistically, hypoxia influences multiple steps within the metastatic cascade and particularly impacts the interactions between tumor cells and stroma. Here, we will investigate the effects of the hypoxic secretome on the promotion of epithelial-mesenchymal transition (EMT) and cancer stem cells in cells grown under normoxic conditions. Overall, the hypoxia secretome plays a key role in the communication between cancer cells and the tumor stroma, an understanding of these interactions is crucial for developing new strategies to treat cancer.

PI email: dr.rania@gmu.ac.ae

Development of Organic Adsorbent for Environmental Remediation and Detection of Pollutants of Air, Water, and Soil

Rasha Diab

American University of Sharjah

Mohammad Al-Sayah

American University of Sharjah

Oussama El-Kadri

American University of Sharjah

Heba Abed

American University of Sharjah

Raghad Taha

American University of Sharjah

Abstract

Development of multifunctional porous organic polymers is imperative for practical environmental applications including sequestering of greenhouse gasses, radioactive waste, and detecting heavy metals and nitroaromatic compounds which cause major environmental and health risks. Although nuclear energy has emerged as an alternative to fuel-based energy supply, especially in the United Arab Emirates (UAE), it poses risks due to the release of radioactive iodine. To address the aforementioned challenges, a novel type of adsorbents have been introduced recently, called Aminal-Linked Porous Organic Polymers (ALPOP), which have shown high adsorption capacities, thermal stability, and large surface areas. In this work, a triazene aminal-linked anthracene-based POP (TALAPOP) was synthesized through a Schiff-base condensation reaction between melamine and 9,10-di(formylphenyl)anthracene, resulting in a material that exhibits exceptional thermal stability (up to 335°C), a large surface area (558 m^2 g-1), and excellent vapor-phase iodine adsorption capacity (421 wt%). Preliminary studies have also revealed high fluorescence sensitivity to iodine, aluminum (III), and picric acid. This TALAPOP is expected to carry out significant performance in terms of rapid and efficient sorption of iodine from solutions, as well as high chemo-sensitivity to other nitroaromatic compounds (such as 3-nitrophenols and 4-nitrophenols) and metal ions like iron and lead. Furthermore, due to its large surface area and high nitrogen content, TALAPOP is projected to demonstrate considerable capacity for capturing carbon dioxide (CO_2). Consequently, the polymer's three valuable functions make it a highly promising and cost-effective candidate for scaling up to industrial applications.

PI email: g00098576@aus.edu

Accurate Computational Modelling of Water Regeneration Using Adsorbents

Nour Alkhatib

New York Univeristy - Abu Dhabi

Nawavi Naleem

New York Univeristy - Abu Dhabi

Serdal Kirmizialtin

New York Univeristy - Abu Dhabi

Abstract

Water issues have become increasingly significant around the world. With the continuous growth of the global population and the effects of climate change, the availability and quality of freshwater have become critical concerns. Many regions are experiencing droughts, while others face a decline in water quality resulting from water contamination from perfluorooctanoic acid (PFOA) molecules. There have been several proposed methods to address these problems, and one promising approach is water treatment and capture using adsorbents such as Metal-Organic Frameworks (MOFs) and Covalent-Organic Frameworks (COFs). This class of adsorbents can be used for atmospheric water harvesting and the removal of PFOA contaminants in water. While experimental work is underway, there is a lack of understanding at the atomic level regarding the two processes. For such problems, it is important to investigate the adsorption mechanisms and to analyze the structural, thermodynamic, and dynamic properties of the materials. Therefore, in this work, computer simulations were used to address this challenge as it helps in understanding the adsorption behavior, and it works as a tool to complement the understating of the experimental work. This work presents molecular simulations to investigate the dynamic and thermodynamic parameters of the adsorption properties which helps in explaining the physical principles underlying the emerging technology, ultimately aiding in the design of new adsorbents with higher uptake and better stability. Our work aims to determine the driving forces and mechanisms involved in the adsorption process. Results obtained from our simulations provide a comprehensive understanding of the material's behavior and performance and establish a strong correlation between structure and property for these real-world applications.

PI email: na2416@nyu.edu

Development of Mathematical Models in Measuring Risk Contagion and Forecasting

Nida Siddiqui

University of Sharjah

Haslifah Hasim

Heriot-Watt University

Abstract

Forecasting financial risks is one of the most important aspects of world economies. Crude oil is a crucial component of the global economics. The volatility associated with crude oil prices leads to risk contagion across sectors. Hence the interdependence between these prices and the other economic variables needs to be accurately forecasted. To bring more accuracy to the existing forecasting techniques related to financial risk, this study takes an interdisciplinary approach where econometrics modeling is combined with statistics and graph theory to enhance the accuracy of quantitative risk modeling. The Covid-19 pandemic brought unprecedented risks to energy, stocks, and commodities markets which had major implications across industries, particularly in the insurance industry. In this project, we will empirically examine the risk contagion of oil prices to other sectors taking Covid-19 data as a case study. We will incorporate the Markov-switching GARCH framework and the copula-based multivariate BEKK-GARCH models for establishing the relationship between Covid-19 indicators and oil prices. We will then apply graph-theoretic concepts for pair copula parameter estimations. Further, we will use Principal Component Analysis (PCA) to find principal factors explaining the overall variability of the global economic indicators that contribute to the risk. We refine these techniques and back-test the results to ascertain the best-fit models for forecasting with minimum errors. The empirical findings could be used as a starting point for policymakers to ensure financial risk mitigation and by insurers to create innovative insurance products for oil-related risk exposures while also providing added commercial incentives to close the oil-risk protection gap.

PI email: nsiddiqui@sharjah.ac.ae

Ultrasound and Microbubbles (USMB) Potentiate the HSA-Conjugated-DOX- Liposome Uptake and Distribution in 3D Breast Tumour Spheroid Model

Shabana Anjum

American University of Sharjah

Waad Abuwatfa

American University of Sharjah

Remya Radha

American University of Sharjah

Ghaleb Husseini

American University of Sharjah

Abstract

Breast cancer is the most common type of cancer in women worldwide. In the United Arab Emirates, 26% of women have been diagnosed throughout their lifetime with breast cancer. Breast cancer treatment lacks accurate biomarkers to predict the success of chemotherapy. Therefore, new tools are needed to recapitulate the tumor microenvironment by filling the gap between 2D monolayer models and in vivo solid tumors. Multicellular tumors (MCTs) closely resemble in vivo solid tumors in many aspects, such as heterogeneous architecture and growth kinetics. Spheroids' cells mimic the tumors' physical interactions, such as cell-to-cell and cell-to-extracellular matrix interactions. These similarities provide great potential for studying the biological properties of tumors and a promising platform for drug therapeutic efficacy evaluation. Doxorubicin (Dox) is a chemotherapeutic agent usually employed to treat breast cancer. While highly effective, it poses serious side effects such as cardiotoxicity. Therefore, encapsulating Dox in targeted liposomes (human serum albumin (HSA) receptors) has high potential for specific and effective delivery. Herein, we will develop pegylated (stealth) liposomes conjugated to HSA, to investigate the delivery of Dox to breast cancer using MCTs.In this project, our aim is to combine the targeted liposomal formulation with high-frequency ultrasound and micro-bubbles as cavitation-enhancing agents that will promise a safe, effective, and site-specific breast cancer therapy.

PI email: sanjum@aus.edu

Synthesizing Silver Nanomaterials and Formulating Hybrid Silver Nanowires /Conductive Polymer Composite Inks and Electrodes for Printable Healthcare, Food, and Sustainable Energy Applications

Marwa Abd-Ellah

Khalifa University

Abstract

Printed electronics (PE) is a growing technology where electronic devices are fabricated with the simplicity of printing. Since metal interconnects are required in all electronic devices, printable conductive inks are crucial for this technology and in 2019 already have a market size of $3.3 billion worldwide. Conductive ink is typically a liquid solution that contains a conductive filler, solvent and a binder. The most preferred conductive filler is silver as it has the highest conductivity of all metals and it is relatively stable compared to copper and aluminum.Existing methods use silver particles that are micron or nano-sized in the shape of spheres or flakes which allows for printing and low sintering temperatures (~200°C).Conductive inks that are used in flexible electronics need to be stretchable and bendable themselves. Development of a highly flexible and conductive ink is a hot topic because current state-of-the-art silver nanoparticle-based inks undergo cracking under stretching or bending which results in significant losses in conductivity. Silver nanowires are promising material and only very recently have been studied for conductive inks. Nanowires have a cylindrical shape with diameters < 100 nm and lengths of 100 µm or more. However, nanowire inks have drawbacks such as nanowires tend to agglomerate due to the existence of Polyvinylpyrrolidone (PVP) residuals that are commonly used as a capping agent through Ag NWs Polyol Process synthesis, necessitating low fill fractions which in turn lead to lower-than-desired conductivity values. In this project, we will synthesize silver nanowires in the functional conductive polymeric matrix using some conducting (semi)conjugated polymers such as polyaniline (PANI), polypyrrole (PPy), poly(p-phenylene-vinylene) (PPV), polyfuran (PF), and polythiophenes (PTH) and their derivatives with carboxylic acids and amides functional groups as a capping agent instead of PVP which would reduce agglomeration and improve the ink's conductivity and printability.

PI email: marwa.abdellah@ku.ac.ae

Unraveling the Molecular Signature of BCR-ABLP210 And Bcr-BCR-ABLT315I in the Drosophila Melanogaster CML Model

Amro Baassiri

Yale University

Rihab Nasr

American University of Beirut

Margret Shirinian

American University of Beirut

Abstract

Chronic myeloid leukemia (CML) is a clonal hematopoietic stem cell disorder resulting from a balanced translocation namely the Philadelphia chromosome. It produces the BCR-ABL1 oncogene that encodes for the BCR-ABL1 fusion protein that demonstrates increased tyrosine kinase activity. Despite the development of Tyrosine kinase inhibitors (TKI), the notorious T315I (I (BCR-ABL1T315I) gatekeeper point mutation remains elusive as the available TKIs such as ponatinib and asciminib have some serious side effects. We have previously reported in a BCR-ABL Drosophila CML model an increased hemocyte count and disruption in sessile hemocyte banding patterns upon expression of both BCR-ABL1p210 and BCR-ABL1T315I in the hemolymph; these phenotypes were more prominent and exacerbated in BCR-ABL1T315I flies. To understand the mechanism behind these phenotypes and assess whether there exists a gene signature that differentiates BCR-ABL1p210 and BCR-ABL1T315I. We opted to perform RNA sequencing to unravel their transcriptome. Their molecular signatures turned out to be very similar and allowed us to identify 6 upregulated genes that were cross-referenced and validated in adult, pediatric CML patients, and BCR-ABL1T315I mice. We are currently testing potential targets, by knocking them down and screening for phenotype rescue. This study when completed will identify targets that are common to both BCR-ABL1p210 and BCR-ABL1T315I which are worth pursuing since CML patients with and without the T315I mutation can benefit by exploring these targeted treatments for these identified genes from the therapeutic perspective.

PI email: amro.baassiri@yale.edu

Environmental and Chemical Characterization of Hawksbill Sea Turtle Nests in a Hotspot Nesting Area in the Arabian Gulf

Fatin Samara

American University of Sharjah

Ivonn Bejarano Rodriguez

American University of Sharjah

Dana Maalouf

American University of Sharjah

Rama Kaysoon

American University of Sharjah

Abstract

The study aims to assess the factors affecting the hatching success of critically endangered Hawksbill Sea turtles on Sir Abu Nu'ayr island, Sharjah, UAE, a nesting site protected by the Environment and Protected Areas Authority (EPAA). The project was divided into two parts, the first part aimed at exploring the physical and environmental conditions of the beaches on the Island and the second part examined the physicochemical properties, heavy metal concentrations, and organic contamination in turtle nests and surrounding sand. Physical and environmental conditions such as the slope of the beaches, the width, length, exposure, intensity of the wind, as well the tide level of the beach in addition to analysis of sand size, shape and color was performed. For the chemical analysis, physicochemical parameters such as pH, salinity, conductivity, turbidity, and total dissolved solids (TDS) were measured. Followed by the analysis of 21 metals in the nest and neighboring sand samples using an Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Polyaromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), and organochlorine pesticides (OCPs) were measured on all nest sands using a Gas Chromatography - Mass Spectrometer (GC-MS). Correlations between pH, TDS, Temperature, essential metal concentrations vs the hatching success rate were calculated to look for any trends that might have caused the current decrease of the hatching success rate of the Hawksbill sea turtles. The results indicated no evident contamination of the sand, as indicated by the low degree of contamination computed from the contamination factor for all the analyzed metals. Moreover, it allowed us to identify potential threats which could be augmented with climate change.

PI email: fsamara@aus.edu

The Effect of Antioxidants on the Stability of Perovskite Solar Cells

Fatima Alzubaidi

University of Sharjah

Nouar Tabet

University of Sharjah

Abstract

Silicon solar cells are currently the dominant technology in the photovoltaic market, but they require expensive and specialized equipment, including clean rooms and high temperatures for manufacturing. In contrast, perovskite solar cells (PSCs) can be fabricated using low-cost and solution-based methods, which can significantly reduce the production costs. In addition, PSCs have demonstrated high power conversion efficiency. PSCs represent a promising technology that can overcome the challenges associated with traditional silicon solar cells. However, their stability remains a major challenge that needs to be addressed before their commercialization. One possible approach to enhance the stability of PSCs is by incorporating antioxidants into the device architecture. They can help to prevent cell damage caused by harmful molecules. Our results show that Morin and Quercetin antioxidants can significantly improve the device stability against moisture and light exposure. The use of antioxidants to enhance the stability of PSCs is a promising approach that can further promote their commercialization.

PI email: U21103232@sharjah.ac.ae

Debromination of Post-Consumer Plastic E-Waste: A Sustainable Approach Toward Its Mechanical Recycling

Imane Belyamani

Zayed University

Layla Gripon

Arkema

Laurent Cauret

Polyvia Formation

Abstract

Brominated flame retardants (BRFs) are chemicals added to polymers to increase their fire resistance, nevertheless, they also complicate waste management. Indeed, due to their potential environmental risks, several BRFs that were common a decade ago are now banned. Due to the long lifespan (up to 20 years) of electrical and electronic equipment (EEE), polymers with these BRFs are now regularly found in the sorting facilities of waste electrical and electronic equipment (WEEE), also called e-waste. Mechanical recycling of brominated WEEE is restricted by the regulation 2019/1021/EU and the Restriction of Hazardous Substances Directive (RoHS), which requires that brominated WEEE be pre-treated before mechanical recycling to ensure that the concentration of BFRs, recognized as persistent organic pollutants (POPs), are below the regulation limits. On the other hand, the environmental impact of debrominated and recycled material is an important parameter to consider as it indicates whether recycling this material is economically and environmentally viable. Thus, this study aims to evaluate the effectiveness of the dissolution-precipitation technique to extract BFRs recognized as POPs, and conduct a life cycle assessment (LCA) to determine its environmental impact. The environmental impact of the investigated extraction process combined with mechanical recycling will also be compared to that of incineration, which is the current end-of-life of brominated WEEE.

PI email: imane.belyamani@zu.ac.ae

Characteristics of Olive Oil Produced using Home Oil Press Machine and Utilization of the Wastes in Synthesis of Metal Nanoparticles and their Medical Applications

Manal El-Sheikh

Jouf University

Abstract

Olive oil and metal nanoparticles (MNPs) are characterized by their antimicrobial and antiviral efficacy towards many microbial and viral infections. The current work aims at synthesizing novel antibacterial nanocomposites (Olive-M-nanocomposite) based on olive seeds powder obtained as waste from olive oil pressing using home oil pressing machine. Olive seeds powder is used as both reducing agent of metal ions namely, Ag, Cu, Fe, and Cu/Fe ions and stabilizing agent for the synthesized MNPs, silver nitrate, copper sulfate penta hydrate, and Ferric chloride as a precursors, and water as a solvent. Different loads of olive seeds powder, silver nitrate, copper sulfate penta hydrate, and Ferric chloride are applied to optimize the synthesizing conditions of AgNPs, CuNPs, FeNPs, Cu/FeNPs. The parameters to be studied for optimization of the reaction conditions are: concentrations of olive seeds powder, AgNO3, CuSO4.5H2O, FeCl3; Material to liquor ratio; reaction time, and reaction temperature. The nanocomposites obtained namely are evaluated by measuring the absorbance of the MNPs colloidal solution using UV-Visible spectrophotometer. Sample showed highest absorbance of MNPs are further evaluated by FTIR, TEM, SEM, XRD, antimicrobial, and anti-inflammatory efficacy. Oil is pressed at 40$_{o}$C, 100$_{o}$C, and 200$_{o}$C. Produced oils are characterized for their polyphenolic and anti-oxidants contents. This research project is directed to women seeking to reduce living expenses and self-reliance in providing living resources at the lowest costs and highest quality. High priced olive oil, known for its nutritional value and health benefits is the target of this work. Many advanced home oil press machines have recently appeared on the market.

PI email: melsheikh@ju.edu.sa

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