

Naveed Ahmed

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Education

PhD in Computer Science

Max-Planck-Institut Informatik
Saarbrücken, Germany
Advisor: Prof. Dr. Hans-Peter Seidel
Magna Cum Laude

Sep 2004 – Sep 2008
Thesis Defense: July 2009

MSc. Computer Science

University of Saarland
Saarbrücken, Germany
GPA = 3.5 / 4.00 *Major: Computer Graphics*

Apr 2003 – Aug 2004
Degree Received: August 2005

BS Computer Science

University of Karachi
Karachi, Pakistan
GPA = 3.5 / 4.00

Jan 1998 – Dec 2001

Coursework

Computer Graphics I
Computer Graphics II (Realistic Image Synthesis)
3D Image Analysis and Synthesis
Human Computer Interaction
C++ and Object Oriented Programming

Algorithm Library Design
Advanced Software Engineering
Database Design
Game Design and Programming
Compiler Construction

Technical Skill

- **Languages:** C/C++, C#, FORTRAN, Shell Scripting, UML, HTML/DHTML, Assembly, Prolog, Objective C.
- **Application Libraries:** STL, QT, GLUI, .Net Framework, .Net CF.
- **Graphics:** OpenGL, DirectX, Cg, GLSL, 3D Studio, Character Studio, Cal3D, Photoshop.
- **Operating Systems:** Linux, Microsoft Windows, WinCE, OSX, iOS.
- **Databases:** MS SQL Server, MS Access.
- **Software Tools:** Microsoft Visual Studio, gcc, gdb, CVS, SVN, Matlab.

Work Experience

University of Sharjah
Assistant Professor

Sep 2010 –

Working as an Assistant Professor in Computer Graphics, Multimedia and Animation at the Department of Computer Science, University of Sharjah. Taught the following undergraduate and graduate courses:

- 1) Introduction to Computer Graphics
- 2) Advanced Computer Graphics (Graduate course)
- 3) Topics in Graphics & HCI (Graduate course)
- 4) Human Computer Interaction
- 5) Multimedia Programming and Design
- 6) 2D/3D Computer Animation
- 7) Multimedia Junior Project
- 8) Programming I
- 9) Programming II
- 10) Mobile Application & Design
- 11) Game Design & Development
- 12) Special Topics in IT
- 13) Topics in Computer Science I

I have supervised one graduate thesis, and more than twenty senior projects. My supervised projects have won numerous awards, e.g., 2nd position at the Think Science, Top 4 projects for the UAE mGovernment Award, 1st position at UoS Research Forum, 1st position UoS Entrepreneurship, and innovation week, also the 2nd position at University of Wollongong Dubai Software Trade Show.

My current research area is the modelling and simulation of dynamic real world objects using RGB-D cameras, and new user interface design for 3D content manipulation. I have published papers in highly reputed conferences and journals. In recent years, my publications are in Eurographics, Signal Image and Video Processing (Springer), Computer Animation and Social Agents.

Additional responsibilities include:

- 1) BS IT Multimedia Program Coordinator (2010-)
- 2) Curriculum and Accreditation committee member (2010-)
- 3) Seminar Organization Committee Chair (2010-2011)
- 4) College of Sciences Website Committee Chair (2011-2013)
- 5) Chair Timetable Committee (2014-2015)

I have consistently received very high student faculty and course evaluations. The average score for all the major courses has been higher than department, college, and university average.

Since joining the Department of Computer Science in 09/2010, I have been a member of Curriculum and Accreditation committee and the Program Coordinator of BS in IT Multimedia. I worked on the BS IT Multimedia accreditation document, answering a number of queries raised by the accreditation committee. BS IT Multimedia program received accreditation within one year of the accreditation process. I also worked on the committee for the re-accreditation of the MSc. in Computer Science program.

In addition, I worked as the team lead for the IT Multimedia Program ABET accreditation committee in 2015/2016. The ITMM program received the ABET accreditation for six years in July 2016. Currently, I am working as the team lead for preparing the re-accreditation document for the UAE Ministry of Education.

I have been involved in the design and development of a number of courses in the BS IT Multimedia program and in addition to the accreditation process of the BS-IT Multimedia Program. As the Program Coordinator, I have overseen the growth of the BS IT Multimedia program, working closely with the other faculty members. At the start, the program only had five enrolled students, whereas as of now the number of currently enrolled students is more than 50.

Autodesk UK

Sep 2008 – Aug 2010

Software Research & Development Engineer

Worked in the Research & Development group at Autodesk Cambridge, UK. Worked on a number of Autodesk products, e.g. Autodesk Inventor, 3D Studio Max, AutoCad, Revit etc. Work involved enhancing these products on three levels:

- 1) Research and implement new methods in the Autodesk Shape Manager, which is the core geometric modeling kernel that runs under a number of product software. Main responsibilities are supporting the geometry team on implementing new algorithms and enhancing existing functionality. Work is applied research and development arising from finding solutions of problems in the domain of geometry, e.g. Geometry deformation to get free-form animated models, and finding analytic equivalents of deformed parametric geometry.
- 2) Optimizing existing algorithms and code for multi-core system architecture. Each algorithm had to be revisited and revised to support parallelization. Additionally, code was modified to make it thread safe and scalable with increasing number of processing cores.

Max-Planck-Institut Informatik
Researcher

Sep 2004 – Sep 2008

- Worked on the Relightable Free-viewpoint Video project as the lead developer. Developed the software to estimate surface reflectance properties and time-varying normal field from synchronized multi-view video streams. Relightable 3D videos can be rendered under either real-world lighting (using HDR environment maps) or artificial lighting conditions. The rendering engine makes use of programmable GPU for real-time rendering, it also supports shadow-mapping from multiple light sources sampled from the environment map. Cal3D is used for the character animation. All tools are written in C++ with OpenGL, making use of Cg and GLSL for shaders.
- Developed a complete 3D game engine that supported state of the art techniques in the game design and 3D graphics.
- Developed a number of mesh processing utilities using geometric modeling libraries (GMU) in C++. Tools include: Subdivision, decimation, deformation, skeletal animation, loading and conversion between file formats, and establishing correspondences between meshes.
- Developed the tool for automatic generation of personalized human avatars from few frames of multi-view video streams. An adaptable generic human body model is scaled and deformed until its shape and skeletal dimensions match the real human shown in the video footage. A consistent surface texture for the model is generated using multi-view video frames from different camera views and different body poses. The tool is written in C++.
- Developed a Ray-Tracer for the rendering competition. Main features are: photon mapping, Cook-Torrance shading model, area light sources and the depth of field effect. The ray-tracer is written in C++.

Air Products and Chemicals Inc.
Software Development Engineer

Aug 2001 – Oct 2003

- Conversion of Air Products in house developed Advanced Controls and Plant Data Management system from Digital VAX platform (Open VMS-32 bit architecture) to Hewlett Packard ALPHA /ITANIUM platform (Open VMS/AXP — 64 bit architecture). Original system was programmed majorly in FORTRAN, some parts in C and device drivers were written in Assembly language. Conversion required straight porting and in case of some low level tools, a complete rewrite. Programmed real-time monitoring tools in C and C++ for converted routines to facilitate automated debugging.
- Developed a number of interface applications in Visual Basic and other Microsoft tools for the end users in Air Products head office and remote users at other production facilities. This include generic production reporting system, long term data historian and data transfer routines between VMS operation system and Microsoft Windows.

- Specifications and development of a data logger system using Microsoft/windows PDA to replace manual paper logs at the plants. This software is running on 75 systems worldwide operating on production facilities. The data logger system is running on Windows Mobile platform. It was programmed using .Net Compact Framework.

Research

My main research interest is in the fields of computer graphics and computer vision. I am particularly interested in the areas of Reconstruction and Rendering of 3D animation from 2D video. Realistic image synthesis from the real world data is the area, which I find very interesting. In particular, I am more interested in capturing and rendering of humans from video data. This area alone poses many questions that are being explored right now. It encompasses subjects from the reconstruction of animated geometry to the real-time photo realistic representation. In some capacities, I have contributed to all the steps in the pipeline. My interest in programmable GPUs has resulted in their extensive usage in almost all of the solutions that I have developed. In my master thesis, I worked on the idea of reconstructing geometric, lighting and surface properties of a dynamic scene. In my doctorate research, I investigated each problem separately and published results in reputed journals and conferences.

Since moving to University of Sharjah in 2010, my main area of interest is to use RGB-D sensors for the modelling and simulation of dynamic real world objects. I started working with creating novel system for acquiring data from one or more RGB-D sensors with software-only synchronization and their time-coherent reconstruction. The acquisition system algorithm was published in one the biggest conferences in the area of Computer Animation: Computer Animation and Social Agents, 2012.

I have used the acquired data from the multi-view RGB acquisition setup, and used it in a number of research projects that I have worked either individually, or in collaboration with co-researcher and graduate students. I have published a number of publications in the area of time-coherent 3D animation reconstruction in conferences and journals. The most recent publication is in the journal Signal, Image and Video Processing by Springer. Additionally, I have used the motion data from multiple Kinects and worked in the area of seamless 3D motion capture and published a novel method in one of the top conferences in Computer Graphics: Eurographics 2014.

Recently, I have been working in the areas of dynamic foreground segmentation from moving RGB-D cameras, along with integrating Virtual and Augmented Reality with my current research interests. I am also working on designing novel user interfaces using RGB-D cameras and other sensors for desktop environment, and also for Augmented and Virtual Reality. In addition, I have involved in multiple research groups and research projects involving Scene Understanding, Visualization, and Autonomous Robotics. I have

worked on the funding requests for these projects and groups and have successfully secured the funds for all my research. My current and future research is partially supported by these research projects. Below is the detail of the approved research projects and groups that I have been a part of since 2010:

- 1) **Research Project:** 3D Digital Reality Generation Using Off-The-Shelf Time-of-Flight Depth Sensors. Funding: AED 20,000.
- 2) **Research Project:** Scene Understanding and Visualization. Funding: AED 60, 000.
- 3) **Research Project:** 3D Digitization and Recognition of Real-world Actors using off-the-shelf RGB-D Sensors. Funding: AED 80,000.
- 4) **Research Group:** Big Data and Multimedia. Funding: AED 100,000+.

Publications

1. Naveed Ahmed, **Gesture-based User Interface Design for Static 3D Content Manipulation Using Leap Motion Controller**, ACHI 2017, Nice, France, 2017.
2. Naveed Ahmed, **Multi-view RGB-D synchronized video acquisition and temporally coherent 3D animation reconstruction using multiple kinects**, Feature Detectors and Motion Detection in Video Processing, 2016.
3. Imran Junejo and Naveed Ahmed, **Foreground extraction for moving RGBD cameras**, Eighth International Conference on Graphic and Image Processing, Kyoto, Japan, 2016.
4. Naveed Ahmed, **Dynamic 3D Bounding Box Estimation for Video Segmentation from a Non-Stationary RGB-D Camera**, Content 2016, Rome, 2016.
5. Naveed Ahmed and Salam Khalifa, **Time-coherent 3D animation reconstruction from RGB-D video**, Signal Image and Video Processing, Springer, 2015.
6. Naveed Ahmed and Salam Khalifa, **Time Coherent Animation of Dynamic 3D Objects from Kinect Camera using 3D Features**, Content 2015, Nice, France, 2015.
7. Naveed Ahmed, **Unified Skeletal Animation Reconstruction with Multiple Kinects**, 35th Annual Conference of the European Association for Computer Graphics (Eurographics), Strasbourg, France, 2014.
8. Naveed Ahmed and Imran Junejo, **Using Multiple RGB-D Cameras for 3D Video Acquisition and Spatio-Temporally Coherent 3D Animation Reconstruction**, International Journal of Computer Theory and Engineering, 2014.
9. Naveed Ahmed and Imran N. Junejo, **A System for 3D Video Acquisition and Spatio-Temporally Coherent 3D Animation Reconstruction using Multiple RGB-D Cameras**, International Journal of Signal Processing, Image Processing and Pattern Recognition, 2013.
10. Naveed Ahmed, **Spatio-Temporally Coherent 3D Animation Reconstruction from Multi-view RGB-D Images using Landmark Sampling**, International Conference on Imaging Engineering (ICIE), Hong Kong, 2013.
11. Naveed Ahmed, **A System for 360 degree Acquisition and 3D Animation Reconstruction using Multiple RGB-D Cameras**, Computer Animation and Social Agents (CASA), Singapore, 2012.

12. Naveed Ahmed, **Visualizing Time Coherent Three-Dimensional Content Using One or More Microsoft Kinect cameras**, International Conference on Communication, Media, Technology and Design (ICCMTD), Istanbul, 2012.
13. Naveed Ahmed, **High Quality Dynamic Reflectance and Surface Reconstruction from Video**, PhD Thesis, Max-Planck-Institut Informatik, 2009.
14. Naveed Ahmed, Christian Theobalt, Petar Dobrev, Hans-Peter Seidel, Sebastian Thrun, **Robust Fusion of Dynamic Shape and Normal Capture for High-quality Reconstruction of Time-varying Geometry**, in CVPR 2008.
15. Naveed Ahmed, Christian Theobalt, Christian Roessl, Sebastian Thrun, Hans-Peter Seidel, **Dense Correspondence Finding for Parametrization-free Animation Reconstruction from Video**, in CVPR 2008. (*Oral Presentation*)
16. Edilson de Aguiar, Carsten Stoll, Christian Theobalt, Naveed Ahmed, Hans-Peter Seidel, Sebastian Thrun, **Performance Capture from Sparse Multi-view Video**, in SIGGRAPH 2008.
17. Naveed Ahmed, Christian Theobalt, Marcus Magnor, Hans-Peter Seidel, **Spatio-Temporal Registration Techniques for Relightable 3D Video**, in Proc. of ICIP 2007.
18. Christian Theobalt, Naveed Ahmed, Gernot Ziegler, Hans-Peter Seidel, **High-quality Reconstruction of Virtual Actors from Multi-view Video Streams**, in IEEE Signal Processing Magazine, 2007.
19. Naveed Ahmed, Christian Theobalt, Hans-Peter Seidel, **Spatio-temporal Reflectance Sharing for Relightable 3D Video**, in Proc. of Mirage 2007.
20. Christian Theobalt, Naveed Ahmed, Hendrik Lensch, Marcus Magnor, Hans-Peter Seidel, **Seeing People in Different Light: Joint Shape, Motion, and Reflectance Capture**, in IEEE Transactions on Visualization and Computer Graphics, 2007.
21. Naveed Ahmed, Edilson de Aguiar, Christian Theobalt, Marcus Magnor, Hans-Peter Seidel, **Automatic Generation of Personalized Human Avatars from Multi-view Video**, in Proc. of VRST 2005.
22. Christian Theobalt, Naveed Ahmed, Edilson de Aguiar, Gernot Ziegler, Hendrik P.A. Lensch, Marcus Magnor, Hans-Peter Seidel, **Joint Motion and Reflectance Capture for Relightable 3D Video**, Technical Sketch, SIGGRAPH 2005.
23. Naveed Ahmed, **BRDF Reconstruction from Video Streams of Multi-View Recordings**, Master Thesis, University of Saarland, 2004.

Language Skills

Language	Reading	Writing	Speaking
English	Fluent	Fluent	Fluent
German	Basic	Basic	Basic
Urdu	Fluent	Fluent	Fluent

Learning & Teaching Methods

I have adopted a very hands-on policy in teaching all my courses that make extensive use of available computing resources. I have been teaching mostly applied courses, and in order to engage students in the underlying theoretical concepts, I demonstrate and encourage students to immediately test a theoretical concept which not only results in better understanding but also a higher level of engagement.

Since, I am the coordinator of the BS in IT Multimedia Program and has been involved in the development of the program since its inception; I designed and taught a number of courses that were offered for the first time at the University of Sharjah. These courses include:

- 1) Game Design and Development
- 2) Human Computer Interaction
- 3) Multimedia Programming & Design
- 4) 2D/3D Computer Animation
- 5) Mobile Application & Design
- 6) Special Topics in IT, Topics in CS I (Character Animation)
- 7) Topics in Graphics & HCI (Graduate Course)

I designed and taught the Mobile Application & Design course and taught development for iPhone and iPad for Apple's iOS platform. The course made use of the department's Macintosh lab and students created a number of interesting projects and for the first time we participated in the National Mobile Application Contest organized by KUSTAR.

I have taught a number of courses related to Computer Science and Programming. Since I have more than 15 years of experience as a programmer, I am also well suited to teach courses related to software design and development, and object oriented programming.

Extra-Curricular Activities

I have been involved with the students in a number of ways outside the academia. I have accompanied students on a number of trips:

- 1) Visit to twoFour54 Abu Dhabi (2010, 2012)
- 2) Visit to Mobile Application Contest Abu Dhabi (2012, 2014, 2015)
- 3) Visit to Gitex (2012, 2013)
- 4) Visit and Support the Think Science Festival
- 5) Visit to the Software Tradeshow (2013, 2014)

In addition, I have organized sessions for the students on career advising and writing CVs. Being the IT Multimedia Program Coordinator, I interact with the students of the program frequently to inform them about any relevant updates. Currently I am directly advising 16 BS IT Multimedia students and Computer Science students.

I have also conducted a workshop on Adobe Photoshop for the students, presented my research work at UoS and the Community College. I have also conducted two courses, Mac OSX Lion Training, and iPhone Application Development with the Center for Continuing Education and Professional Learning. In Spring 2014, I organized a workshop on Advanced iOS 7 development.

Award and Honors

- 1) Excellence in Teaching Award – College of Sciences, University of Sharjah, May 2013.
- 2) Won 2nd prize in All Pakistan Software Competition, ProCom 2000, held at FAST NU Karachi, for Dream 3D Engine, Sep 2000.
- 3) Certificate of recognition awarded by Association for Computing Machinery (ACM), world's largest and most prestigious society of CS/IT professionals, for serving as the treasurer of the ACM Chapter at University of Karachi.
- 4) Led ACM Student Chapter, University of Karachi on winning the ACM Chapters Excellence Award for "Best Community Service" 2001-02 selected among 600 ACM chapters worldwide.
- 5) Received "Honorable Mention" certificate in ACM Inter Collegiate Programming Competition, held in Singapore, December 2000.
- 6) Received President Talent Scholarship award 1994, selected among Top 50 students of Pakistan.

References

Available on request.