### Electrical and Computer Engineering Laboratories

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<tr>
<th>Lab Name</th>
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<th>Person in Charge</th>
<th>Programs Served</th>
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<tr>
<td>Circuit Analysis Laboratory</td>
<td>M12-107</td>
<td>Sol Andrew Domingo</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Sustainable &amp; Renewable Energy Engineering&lt;br&gt;• Industrial Engineering &amp; Management&lt;br&gt;• Mechanical Engineering</td>
<td>• Circuit Analysis I&lt;br&gt;• Circuit Analysis II&lt;br&gt;• Applied Electronics Circuits&lt;br&gt;• Applied Electronics Lab for SREE</td>
</tr>
<tr>
<td>Power Electronics Lab</td>
<td>M12-108</td>
<td>Mohammad Saad</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Computer Engineering&lt;br&gt;• Industrial Engineering &amp; Management&lt;br&gt;• Sustainable &amp; Renewable Energy Engineering&lt;br&gt;• Mechanical Engineering</td>
<td>• Circuit Analysis I&lt;br&gt;• Circuit Analysis II&lt;br&gt;• Applied Electronics Circuits&lt;br&gt;• Applied Electronics Lab for SREE&lt;br&gt;• Power Electronics</td>
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<tr>
<td>High Performance Cloud Computing</td>
<td>M12-108</td>
<td>Maha Alaa Eddin</td>
<td>• Electrical &amp; Computer Engineering Program</td>
<td>• Parallel and Distributed Processing</td>
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<tr>
<td>Electromechanical Systems Laboratory</td>
<td>M12-113</td>
<td>Ahmad Abdul Hadi</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Sustainable &amp; Renewable Energy Engineering</td>
<td>• Electromechanical System&lt;br&gt;• Electric Power Engineering Lab&lt;br&gt;• Circuit Analysis II&lt;br&gt;• Power Systems</td>
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<tr>
<td>Electronic Circuits Laboratory</td>
<td>W12-123</td>
<td>Imtinan Attili</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Sustainable &amp; Renewable Energy Engineering</td>
<td>• Electronic Circuits&lt;br&gt;• Applied Electronics Circuits&lt;br&gt;• Applied Electronics Lab for SREE&lt;br&gt;• Fundamentals of Electronics&lt;br&gt;• Circuit Analysis I</td>
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<tr>
<td>Feedback Control Systems Laboratory</td>
<td>M12-115</td>
<td>Obaida Abu Bader</td>
<td>• Electrical &amp; Electronics Engineering</td>
<td>• Feedback Control Systems&lt;br&gt;• Instrumentation and Measurement</td>
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<tr>
<td>Printed Circuit Board Workshop (PCB)</td>
<td>M12-116</td>
<td>Sol Andrew Domingo</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Computer Engineering</td>
<td>• General</td>
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<tr>
<td>Programmable Logic Controller (PLC) Laboratory</td>
<td>M12-118</td>
<td>Obaida Abu Bader</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Computer Engineering&lt;br&gt;• Industrial &amp; Management Engineering</td>
<td>• Programmable Logic Design&lt;br&gt;• Multimedia Technology Lab&lt;br&gt;• Introduction to ECE Lab&lt;br&gt;• Industrial Automation</td>
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<tr>
<td>Telecommunication Systems I Laboratory</td>
<td>W12-122</td>
<td>Obaida Abu Bader</td>
<td>• Electrical &amp; Electronics Engineering&lt;br&gt;• Computer Engineering</td>
<td>• Telecommunication Systems I</td>
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<tr>
<td>Course</td>
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<td>Laboratories</td>
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<tr>
<td>Digital Logic Design Laboratory</td>
<td>W12-104</td>
<td>Maha Alaa Eddin</td>
<td>• Electrical &amp; Electronics Engineering • Computer Engineering • Computer Science</td>
<td>• Digital Logic Design</td>
</tr>
<tr>
<td>Computer Communications and Networks</td>
<td>W12-116</td>
<td>Maha Alaa Eddin</td>
<td>• Electrical &amp; Electronics Engineering • Computer Engineering</td>
<td>• Computer Communication and Networks</td>
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<tr>
<td>Laboratory</td>
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<tr>
<td>Microprocessors and Assembly Language</td>
<td>W12-105</td>
<td>Maha Alaa Eddin</td>
<td>• Computer Engineering</td>
<td>• Embedded system Design • Microprocessor and Assembly Language • Microcontroller based design lab • Robotics and Computer Vision Lab</td>
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<tr>
<td>Laboratory</td>
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<tr>
<td>Senior Design Project I &amp; II</td>
<td>W12-115</td>
<td>Imtinan Attili</td>
<td>• Electrical &amp; Electronics Engineering • Computer Engineering</td>
<td>• Senior Design Project I &amp; II</td>
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<tr>
<td>Laboratory (Female)</td>
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<tr>
<td>Senior Design Project I &amp; II Laboratory(</td>
<td>M12-126</td>
<td>Sol Andrew Domingo</td>
<td>• Electrical &amp; Electronics Engineering • Computer Engineering</td>
<td>• Senior Design Project I &amp; II</td>
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<td>Male)</td>
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<tr>
<td>Information Security Lab</td>
<td>W12-120</td>
<td>Prof. Ibrahim Kamel</td>
<td>• Computer Engineering</td>
<td>• Information Security System</td>
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</table>
CIRCUIT ANALYSIS I LABORATORY

INTRODUCTION
Electrical Circuit Analysis I Laboratory is the most important lab in the Electrical and Computer Engineering Department. This laboratory provides students with an understanding of the basic principles of Electrical Engineering. In addition, it enables students to use testing and measuring instruments such as function generators, oscilloscope, and digital multimeters to analyze DC and AC circuits by using different analysis techniques. These include Ohm’s Law, KCL, KVL, nodal analysis, mesh analysis, Thevenin’s and Norton’s theorems as well as the transient analysis of RL and RC circuits. P-SPICE software is also introduced for DC and AC circuits and transient analysis.

EQUIPMENT AND INSTRUMENTS
• Pro’s KitMT-1820 Digital Multimeter
• ETS-7000 Digital Analog Training System
• ESCORT EDM-1635 Digital Multimeter
• PEAK ATLAS DCA Model DCA55 Component Analyzer
• TINSLEY LCR Data Bridge
• TTi LCR400 Precision Bridge
• Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
• Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
• Simulators: Microsim, ORCAD Cadence PSpice Circuit Simulator
• TTi 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
• Desktop Computer Core i5
• Analogue Multi-Tester
• Wire Strippers and Pliers

EXPERIMENTS
• Introduction to Circuit I Lab
• Introduction to ORCAD Cadence PSpICE – Part I (DC Analysis)
• Voltage Division Rule (VDR) and Current Division Rule (CDR)
• Kirchhoff’s Laws and Nodal Analysis
• Superposition for DC Circuits
• Thevenin’s and Norton’s Equivalents of DC Circuits
• The Function Generator and Oscilloscope
• Introduction to ORCAD Cadence PSPICE – Part II (Transient Analysis)
• Transients in RC Circuits
• Phasor Domain Measurements for AC Circuits
• Introduction to ORCAD Cadence PSPICE – Part III (AC Analysis)
CIRCUIT ANALYSIS II LABORATORY

INTRODUCTION
Electrical Circuit Analysis II Laboratory helps students to understand AC circuits analysis studied in the corresponding theoretical course. Through this laboratory, students become familiar with AC measurements, and are able to measure voltages, phase angles, resonance frequencies and bandwidth for circuits that consist of resistors, capacitors and inductors. They also investigate the frequency response of low pass, high pass, band pass and band stop filters. In addition, they investigate the «Three-phase» circuits and applications of transformers and its characteristics.

EQUIPMENT AND INSTRUMENTS
- Pro’s KitMT-1820 Digital Multimeter
- ETS-7000 Digital Analog Training System
- ESCORT EDM-1635 Digital Multimeter
- PEAK ATLAS DCA Model DCA55 Component Analyzer
- TINSLEY LCR Data Bridge
- TTI LCR400 Precision Bridge
- Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
- Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
- Simulators: Microsim, ORCAD Cadence PSpice Circuit Simulator
- TTI 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
- Desktop Computer Core i5
- Analogue Multi-Tester
- Wire Strippers and Pliers

EXPERIMENTS
- Spice AC Circuit Analysis
- Power in AC Circuits
- Three-Phase Y- Δ Connection Circuit
- Three-Phase Δ-Connection Circuit
- Two-Port Network
- Two-Port Networks (Orcad Cadence Spice)
- Single Phase Transformer
- Parallel and Series Resonance
- Low-Pass and High-Pass Filter Design
- Band-Pass and Band-Stop Filters (Spice)
APPLIED ELECTRONICS CIRCUITS LABORATORY
(INDUSTRIAL ENGINEERING)

INTRODUCTION
This Laboratory applies the theoretical principles of the applied electronics circuits course. In addition, it enables students to use testing and measuring instruments such as function generators, oscilloscopes and digital multimeters to analyze DC and AC circuits by using different analysis techniques. These include basic DC Circuits, General DC circuit analysis, Transient Circuits, Basic AC Circuits, Diodes and their applications, Operational Amplifiers, Basic Combinational Circuits, Decoders and Multiplexers.

EQUIPMENT AND INSTRUMENTS
• Pro’s KitMT-1820 Digital Multimeter
• ETS-7000 Digital Analog Training System
• ESCORT EDM-1635 Digital Multimeter
• PEAK ATLAS DCA Model DCA55 Component Analyzer
• TINSLEY LCR Data Bridge
• Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
• Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
• TTi 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
• Analogue Multi-Tester
• Wire Strippers and Pliers

EXPERIMENTS
• Simple DC Measurements and Analysis
• Using Function Generator & Oscilloscope and Study of Charging/Discharging of a Capacitor
• Diode Circuits
• Operational Amplifiers
• Digital Logic Circuits
INTRODUCTION
The Applied Electronics circuits Laboratory is designed to introduce and enable SREE and nuclear engineering students to comprehend the main characteristics of electronic devices such as diodes and transistors. It also introduces the circuit simulator SPICE and its usage to carry out DC, AC & transient analysis. Practical circuits are built to test bipolar transistor, MOSFET transistors and operational amplifier circuits under DC and AC conditions as well as small signal amplifiers.

EQUIPMENT AND INSTRUMENTS
- Pro’s KitMT-1820 Multimeter
- ETS-7000 Digital Analog Training System
- ESCORT EDM-1635 Multimeter
- PEAK ATLAS DCA Model DCA55 Component Analyzer
- TINSLEY LCR Data Bridge
- TTI LCR400 Precision Bridge
- Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
- Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
- Simulators: Microsim, ORCAD Cadence PSpice Circuit Simulator
- TTI 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
- Desktop Computer Core i5
- CAUVIN ARNOUX C.A. 5000 Analogue Multi-Tester
- Wire Strippers and Pliers

EXPERIMENTS
- Introduction to Applied Electronics Lab
- Introduction to Spice: DC and AC Analysis
- Function Generator and Oscilloscope
- Diode Characteristics Measurements and Applications
- BJT Characteristics and Biasing
- MOSFET Characteristics, Biasing and Applications
• Single Stage BJT Amplifier
• Single Stage MOSFET Amplifier
• PSPICE Simulation of BJT Amplifier Frequency Response
• BJT Amplifier Frequency Response
• Linear Operational Amplifier Circuits
• Pspice Simulation of a DC to DC converter
INTRODUCTION
This Laboratory is versatile and its flexible training system covers many topics in power electronics application. The equipment support power electronics measurement program for multiple student and small research projects. The program converters are divided into two main sections: line-commutated - Thyristors based converters and self-commutated IGBTs or MOSFETs based converters.

EQUIPMENT AND INSTRUMENTS
- Line-Commutated Power Converter Circuits
- Three-Phase Isolating Transformers
- Power Electronics Load Set, 300 W
- Self-Commutated Converter Circuits 300W
- Convertor Drive with DC Motor 300W
- Servo Machine Test System
- Variable ISOL. Transformer Exciter
- Three-Phase Synchronous Motor
- Analogue/Digital Multimeter
- Tacho Generator

EXPERIMENTS
- Fundamentals of the Power Electronics Switching Elements (DIODE, SCR, TRIAC, IGBT, MOSFET)
- Diode Rectification
- Controlled Rectification: Single Phase-Control, Full-Wave Control, Burst Firing Control, Pulse Pattern Control
- Principles of Inverter Operation
- Control Principles: Pulse-Width Modulation
- Modulation of Low-Frequency AC Voltage with Pulse-Width Modulation
- Control Characteristics and Operating Graphs
• Frequency Analysis and Examination of Harmonics
• DC Chopper Controllers in 1-, 2- and 4-Quadrant Operation
• Torque-Speed Characteristics of IM
• Induction Motor V/F Control
• Induction Motor Slip Compensation Control
• Induction Motor Vector Control
• DC Motor Speed Control
• DC Motor Braking
ELECTROMECHANICAL SYSTEMS LABORATORY

INTRODUCTION
The Electromechanical Systems Laboratory offers hands-on experience with relevant aspects of single and three phase transformers, DC motors and generators, single phase and three phase AC motors.

EQUIPMENT AND INSTRUMENTS
The Lab Volt computer-based electromechanical system runs in conjunction with an IBM-compatible computer consisting of different modules connected to the computer through Data Acquisition Interface with full virtual instruments (voltmeters, ammeters, power meters, an oscilloscope and a phasor analyzer); the system has data storage and graphical presentation facilities. The modules included in the system are:

- Single-Phase Transformer Modules
- Three-Phase Transformer Modules
- Resistive, Inductive and Capacitive Power Load Modules
- Prime Mover/ Dynamometer Modules
- Separately-Excited, Series Shunt and Compound DC Motors Module
- Single-Phase Induction Motor Modules
- Three-Phase Squirrel-Cage Induction Motor Module
- Three Phase Wound Rotor Induction Motor Three-Phase Synchronous Motor
- Three-Phase Synchronous Generator Module
- Synchronous Motor Starter Module
- Wattmeter/VAR Meter Module

EXPERIMENTS
- Autotransformer
- Transformer Regulation
- Open Circuit and Short Circuit Tests
- Three-phase Transformer
- Prime Mover Characteristics
- Dynamometer Characteristics
- Separately Excited, Series Shunt and Compound DC Motors
- Three-Phase Squirrel-Cage Induction Motor
- Single-Phase Induction Motor
- Three-Phase Synchronous Motor
- Three-Phase Synchronous Generator
ELECTRIC POWER ENGINEERING LABORATORY

INTRODUCTION
The Electric Power Engineering Laboratory offers hands-on experience with relevant aspects of single and three phase transformers, DC motors and generators, single phase and three phase AC motors.

EQUIPMENT AND INSTRUMENTS
The Lab Volt computer-based electromechanical system runs in conjunction with an IBM-compatible computer consisting of different modules connected to the computer through Data Acquisition Interface with full virtual instruments (voltmeters, ammeters, power meters, an oscilloscope and a phasor analyzer); the system has data storage and graphical presentation facilities. The modules included in the system are:

- Single-Phase Transformer
- Resistive, Inductive and Capacitive Power Loads
- Prime Mover
- Dynamometer
- Separately-Excited, Series Shunt and Compound DC Motors
- Three Phase Wound Rotor Induction Motor
- Wattmeter/VAR Meter
- Three-Phase Squirrel-Cage Induction Motor
- Three-Phase Synchronous Generator
- Voltmeter/Ammeter
- DC Motors

EXPERIMENTS
- AC Voltage and Current-Part I
- AC Voltage and Current-Part II
- Watt VAR Volt-Ampere and Power Factor
- Three-Phase Star-Star Circuit
- Three-Phase Star-Delta Circuit
• Three-Phase Power Measurements
• Transformer Regulation
• Prime Mover
• Dynamometer
• Three-Phase Squirrel Cage Induction Motor
• Separately Excited DC Motor
• Three-Phase Synchronous Generator
INTRODUCTION

The Electronic Circuits Laboratory is designed to enable students to comprehend the main characteristics of electronic devices such as BJT and FET transistors as well as composite devices such as Op Amps. Practical circuits are built to investigate BJT and FET transistor circuits under DC and AC conditions as well as small signal amplifiers. Filters and oscillators (relaxation and sinusoidal) using op amps are investigated.

EQUIPMENT AND INSTRUMENTS

- ETS-7000 Digital Analog Training System
- Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
- Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
- SONY/ Tektronix 370A Programmable Curve Tracer
- Desktop Computers Core i5
- LCR Data Bridge
- Pro’s KitMT-1820 Multimeter
- ESCORT EDM-1635 Multimeter
- TTi EX354T Triple Power Supply Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
- Simulators: MicrosimPSpice Circuit Simulator - ORCAD Simulator
- BK Precision Spectrum Analyzer 2652 3.3GHz
- PEAK ATLAS DCA Model DCA55 Component Analyzer

EXPERIMENTS

- Multi-Stage BJT Amplifiers
- Frequency Response of Multi-Stages Amplifiers
- Multi-Stage MOSFET Amplifiers
- Linear Op Amp Circuits
- Wave Generators using Op Amps
- Sinusoidal Oscillators using Op Amps
- Op-Amp Filters (Low Pass-Band Pass)
- D/A and A/D Converters
- Analogue to Digital Converter
INTRODUCTION
The Feedback Control Systems Laboratory covers the practical aspects of control systems analysis and design through the lab experiments. Topics vary and include modeling of Servo System, Inverted Pendulum, Magnetic Levitation System and use of MATLAB and SIMULINK for analysis and design of control systems. The lab also has process control module where all well-known controllers (P, PI, and PID) can be implemented with the help of computer interfaced with it.

EQUIPMENT AND INSTRUMENTS
- Personal Computers with MATLAB\ SIMULINK Package
- Modular DC Servo System (FEEDBACK MS150)
- Inverted Pendulum System (PYTRONIC Pendulum Control System)
- Magnetic Levitation System (FEEDBACK 33-210)
- Process Control Module (PYTRONIC PCT-100)

EXPERIMENTS
- MATLAB and SIMULINK for Control Systems
- DC Motor Characteristics
- Speed Control System of DC Motor
- Position Control System of DC Motor
- Frequency Response Analysis using MATLAB
- Root Locus Design GUI and SISO DESIGN TOOL
- Control of Magnetic Levitation System
- Control of Inverted Pendulum System
- Process Control Application (Flow Control, Level Control, Pressure Control, and Temperature Control)
INTRODUCTION
The Instrumentation and Measurements Laboratory covers the practical aspect of engineering instrumentation through lab experiments. Topics vary and include LabVIEW programming, data acquisition interfacing, determination of dynamic behavior of typical sensors, signal conditioning circuits, instrumentation amplifiers, experiments on temperature, position and force measurements.

EQUIPMENT AND INSTRUMENTS
- Personal Computers with Data Acquisition Card and LabVIEW 16 Package
- Different Types of Sensors: Thermocouples, Thermistors, etc.
- LabVolt Transducer Fundamental Board
- DIGIAC 1750 Transducer and Instrumentation Trainer

EXPERIMENTS
- Introduction to LabVIEW
- Modular Programming
- Structures
- Arrays
- Charts and Graphs
- Data Acquisition in LabVIEW
- Opamps DC Characteristics
- Temperature Sensors
- Variable Capacitor and Strain Gauge
- Light Sensors
- Linear Variable Differential Transformer
INTRODUCTION

In this workshop, the students are able to learn the procedure of making both single-sided and double-sided PCBs. Students start by drawing circuit diagrams using any suitable PCB layout software. Then they produce a drawing which is later on printed and transferred onto a photo-resistant layer after exposure to UV light for a few minutes. The subject PCB is etched in a container pan with etching chemical solutions. Finally, holes are drilled for provisions on fixing and soldering the components.

The PCB workshop is of great importance to students for their senior design projects. It is also useful for students who are working on projects related to certain courses.

EQUIPMENT AND INSTRUMENTS

- Computer Set
- Layout Software
- PCB Board
- Etching Chemicals
- Etching Tank
- PCB Cutter
- Drilling Machine and Drill Bits
- Etching Pan
- Acetate Printing Material or Equivalent
- Laser Printer
- UV Exposure Machine
- Soldering Machine
- Wire Strippers and Pliers
INTRODUCTION

PLC Laboratory based on Siemens SIMATIC S7-200 is designed to reinforce the theoretical components covered in the course. This laboratory provides students with an understanding of the basic principles of Relay Logic and PLC (Programmable Logic Controllers) control; ladder programming and input/output operations; manipulate data using PLC instruction sets. Students will have the opportunity to apply their knowledge of programmable logic controller hardware and ladder logic to solve the system problems.

EQUIPMENT AND INSTRUMENTS

- PLC-200 PLC Trainer

EXPERIMENTS

- Introduction to SIMATIC S7-200 Development
- Basic PLC Ladder Programming
- Basic Control Circuits (Light Control, DC Motor Control)
- Programming a Counter (Car Parking System)
- Programming a Timer (Traffic Light Control, Tank Filling Control)
- Drive and Interface Multiplexing 7-Segment Display
- Various Industrial Controller Based on S7-200
MULTIMEDIA TECHNOLOGY LABORATORY

INTRODUCTION
This Laboratory provides a hands-on experience with MATLAB in audio and image signals. Topics include sampling, quantization, sampling rate conversion, compression, basic techniques in audio and image processing.

EQUIPMENT AND INSTRUMENTS
  • Personal Computers with MATLAB Package

EXPERIMENTS
  • Generate and Plot Different Types of Discrete-Time Signals in Time Domain
  • Perform Elementary Operations (Add, Shift, Compress, and Flip) on Discrete-Time Signals
  • Computation of DFT (Discrete Fourier Transform) using FFT Algorithms
  • Design of Butter Worth and Elliptic (LPF, HPF, BPF, and BSF) Digital IIR Filter
  • Read, Play, and Write Sound Signals (Audio Files) using MATLAB
  • Perform Elementary Operations (Shift, Compress and Concatenate) on Sound Signals
  • Familiarization with Image›s Operations and Tools in MATLAB
  • Using MATLAB to Perform Certain Geometric Operations like Resizing, Rotation, Shifting, Concatenating and Cropping
TELECOMMUNICATION SYSTEMS I LABORATORY

INTRODUCTION
This Laboratory’s experiments are designed to cover the Analogue and Digital telecommunications principles explained in the lectures in the telecommunication systems courses. The experiments deal with the analogue communication basics such as filtering, amplitude modulation, frequency division multiplexing, frequency modulation, pulse amplitude modulation, pulse code modulation and digital signal modulation techniques such as: PSK, FSK, DPSK, QPSK, and QAM. The lab is equipped for experiments in telecommunication such as filters, multipliers, discriminators and the phase locked loop (PLL). MATLAB and Simulink are also used to simulate different telecommunication systems. Our main goal in the Telecommunication Laboratory is to bridge the gap between the theoretical concepts of telecommunication subjects and the practical experience required in the telecommunication industry.

EQUIPMENT AND INSTRUMENTS
• Personal Computers with MATLAB Package
• EMONA TIMS Telecommunication-Signal & System Module
• Computer Interface Base Unit All Modules Supplied by Lab-Volt Systems
• Lab-Volt Analogue Communication Board
• Lab-Volt Digital Communication (1) Board
• Lab-Volt Digital Communication (2) Board
• Spectrum Analyzer 1.8 GHz, Tektronix 2711, 1 GHz, Instek GSP-810
• Dual trace Digital Real Time Oscilloscope 100 MHz Tektronix TDS 3012
• Function Generator 11 MHz, Tektronix CFG280
• Function Generator 3 MHz, Tektronix CFG 253
• Dual Power Supply 0-30 V, 0-2.5 A, Metrix AX502
• High Frequency Multimeter, Metrix 553
• TV Color Trainer, PUDAK Scientific PT93201
• Pattern Generator, Promax GV-698
EXPERIMENTS

- Amplitude Modulation\Demodulation (DSBSC)
- Amplitude Modulation\Demodulation (DSB-LC)
- ASK - Modulation\Demodulation
- FSK - Modulation\Demodulation
- PSK - Modulation\Demodulation
- QPSK – Modulation\Demodulation
- Envelope Detection
- FM Modulation\Demodulation
- Line-Coding Encoding
- Signal Sampling & Reconstruction
- PCM Encoding - Decoding
- PAM & TDM - Modulation & Demodulation
- PCM TDM
- PWM - Pulse Width Modulation
INTRODUCTION
The Digital Logic Design Laboratory is divided into two parts. The first part teaches the students how to write Verilog programs to implement and design simple combinational circuits. Students write programs to describe logic gates and simple sequential circuits like adders, sub tractors, encoders, decoders, multiplexers, comparators, flip-flops, counters and shift registers. In the second part of the lab, students get a hands on experience to build a real circuits on the breadboard. The students start from the Boolean expressions, going through building the logic circuit and testing it. During the lab, the students will gain a good understanding of the different tools and simulation software used in designing logic circuits. The students also have to do a project of their choice.

EQUIPMENT AND INSTRUMENTS
• ETS-7000 Digital Analog Training System
• Personal Computers Loaded with QuartusII Software
• ALTERA DE2 Boards
• Logic Pulser
• Logic Probe
• Digital IC Tester
• Simulator: Circuit Maker Simulator
• Wire Strippers and Pliers

EXPERIMENTS
• Introduction to Hardware Description Language and Synthesis
• Basic Gates Implementation in Verilog and Configuration
• Implementation in Verilog
• Introduction to Digital Logic Design Lab Using Basic Logic Gates
• Combinational Circuits Design Using Basic TTL Gates
• Arithmetic Logic Unit and Data path Utilizing Decoders and Encoders
• Sequential Circuits Design
• Registers and Counters with Design Applications
• Group Project to Build Real Life Application
COMPUTER COMMUNICATIONS AND NETWORKS LABORATORY

INTRODUCTION
This Laboratory provides hands-on experience essentials to the real understanding of computer networking and the devices used in building these networks. The goal is to teach students practical aspects of network topologies and network operating systems, including the setup of network services, DHCP, DNS, peer to peer and server based networking, switch setup and VLANs and the basics of IP addressing, sub netting and router configuration. In addition, students use the network monitor to capture and analyze data packets.

EQUIPMENT AND INSTRUMENTS
- The lab consists of the following hardware and software required to meet the above objectives:
  1. Hardware
     a. Networking Devices:
        • Cables and RJ-45 Connectors
        • Repeater Hubs
        • Nortel Switches (Bay Stack 450 Series)
        • Nortel and Cisco Routers
        • D-link Access Points
        • JUNOS Switches 2400 series
        • JUNOS Routers 240 series
        • Cisco Switches 2960
        • Cisco Routers 892
        • Wireless NIC Cards
     b. Personal Computers:
        • 24 DELL PC with Dual-Boot System
  2. Software
     a. Device Manager: used to configure switches over IP networks
     b. Site Manager: used to Configure Routes Over IP Networks
c. Sniffer Pro: used for Explaining the Packet Structure (Microsoft Network Monitor 3.2)
d. Windows 7/Advanced Server 2012: as Network Operating Systems

EXPERIMENTS
- Peer-to-Peer Local Area Network
- Network Applications
- Wired and Wireless LANs Network Topologies
- Layer II Switching - Part I
- Layer II Switching - Part II VLANs
- Network Services: DNS Service
- Network Services: DHCP Service
- Routing Basics
- Packet Format & Network Monitoring
EMBEDDED SYSTEMS DESIGN LABORATORY

INTRODUCTION
This Laboratory applies the theoretical principles of the Embedded System course. It gives hands-on experience with microcontroller applications and interfacing with basic solid state input/output devices, A/D and D/A converters, LCD displays and Multiplexing seven segment LED displays.

EQUIPMENT AND INSTRUMENTS
- Personal Computers with MikroCPro for PIC Compiler
- Multifunctional PIC Microcontroller Development Board (QL200 DEVELOPMENT BOARD)

EXPERIMENTS
- Introduction to the QL200 DEVELOPMENT BOARD and Software Development System
- Basic Digital Input and Output Programming
- LCD Display Interfacing
- Matrix Keypad Interfacing
- Analog to Digital Converter
- Hardware Delay using Timer
- Multiplexing Seven Segments LED Displays
INTRODUCTION
The Microprocessor and Assembly Language Laboratory provides students with practical experience in programming while using the Assembly Language on x86 architecture microprocessors. The lab utilizes the latest personal model computers where the students practice the skills they have learned in the classroom and explore the backward compatibility of modern microprocessors all the way back to their x86 ancestor.

EQUIPMENT AND INSTRUMENTS
- Personal Computers
- Visual Studio 2012

EXPERIMENTS
- Visual Studio and MASM
- Writing an Assembly Language Program
- Addressing Modes
- Working with Arithmetic Instructions
- Working with Logic, Shift, and Rotate Instructions
- Loops
- 8087 Floating Point Unit
- Floating Point Instructions
- Working with Procedures and MACROS
INTRODUCTION
Robotics is generating significant interest among the leading Entrepreneurs and Governments across the globe. Companies are constantly innovating and patenting designs to create the world’s first fully autonomous machine with capabilities that will forever transform the way we do business and how we manufacture goods. It is therefore essential that the UAE, the most technologically forward country in the Middle East & North Africa region, uses the opportunities that robotics advancements can present, to remain competitive and a front runner in the technological field. Analysts predict that the early adoption of robotics technology in the UAE would significantly increase the GDP of the country and create a more knowledge-based economy thus propelling UAE as the premier destination for leading companies worldwide. The Robotics and Computer Vision Lab at the University of Sharjah aims to empower students and researchers to work in a harmonious environment for research to develop the next generation of computer vision algorithms coupled with realistic articulated physics-based kinematics paradigms for the implementation and integration of autonomous robots for the purpose of interacting naturally with people and with each other by adapting their behavior to the requirements of the task they are given within the dynamic environment they are situated in.

EQUIPMENT AND INSTRUMENTS

- Mobile Robot Pioneer P3DX
- Robai Cyton Gamma 1500, 7 dof Manipulator
- Qbot2 Mobile Robot
- RGB-Depth Kinect Sensor
- Humanoid Nao Robot
- Qbo Robot
- ASUS RGB- Depth Sensor
- Robotis OP-2
EXPERIMENTS

- A Vision-Based Kinematic Tracking Control System Using Enhanced-PRM for Differential Wheeled Mobile Robot
- Vision-Based Robotic Velocity Tracking Control System using Reduced-PRM
- Progressively Trainable and Adaptable Intelligent Humanoid Robots for Autism Spectrum Disorders (Completed May 2016)
- Investigating Different Vision Techniques for Parasite Auto-Detection
- Real-time Object Recognition using Improved Color Histogram Techniques
- Self-Learning Robot Senior Student Project
- Autonomous Adaptive Highway-Lanes Distribution to Solve Traffic Congestions using Vision Techniques
- A Technical Solution to Enhance the Visual Perception for Color-Blind Disorders
INTRODUCTION
The Fundamental of Digital Electronics Laboratory is designed to enable students to comprehend main characteristics of electronic devices such as diodes and transistors. It introduces the circuit simulator SPICE and its usage to carry out DC, AC & transient analysis. Practical circuits are built to investigate Zener diode circuits, bipolar transistor and MOSFET transistors circuits under DC and AC conditions as well as small signal amplifiers.

EQUIPMENT AND INSTRUMENTS
- Pro’s KitMT-1820 Multimeter
- ETS-7000 Digital Analog Training System
- ESCORT EDM-1635 Multimeter
- PEAK ATLAS DCA Model DCA55 Component Analyzer
- TINSLEY LCR Data Bridge
- TTI LCR400 Precision Bridge
- Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
- Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
- Simulators: Microsim, ORCAD Cadence PSpice Circuit Simulator
- TTI 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
- Desktop Computer Core i5
- CAUVIN ARNOUX C.A. 5000 Analogue Multi-Tester
- Wire Strippers and Pliers

EXPERIMENTS
- Diode Characteristic
- Full Wave Rectification
- MOS Transistor Characteristic and Biasing
- BJT Transistor Characteristic
- Single Stage BJT Amplifier
- PSPICE Simulation of BJT Amplifier
- Bipolar Transistor as Switching Elements
- CMOS Logic Gates
INTRODUCTION
The High Performance Cloud Computing Laboratory provides students with practical experience in both the hardware and the software of the massively parallel processing platforms as well as the basic concepts of cloud computing. In terms of hardware, the lab utilizes a computer cluster consist of one main server and a group of processing nodes connected to build a computing farm. In terms of software, the cluster has the Message Passing Interface (MPI) parallel programming standard library as well as the multi-threaded programming POSIX thread library. Students can explore how to build a computing farm as well as get a practical programming experience with the parallel and distributed processing environment. Programming with shared-address space parallel paradigm is explored through the multi-core/multi-threaded computing nodes in the lab using the POSIX thread library. The system is built on top of an OpenStack Cloud Computing environment which allows the students to get their hands on the latest technologies in the HPC.

EQUIPMENT AND INSTRUMENTS
- Couple of Server Machines
- Group of Computing Node PCs
- High-Speed Switch and Ethernet to Connect the Machines
- File Server, DNS Server and Job Scheduler
- MPI Standard Library for Distributed System Programming
- POSIX Thread Library for Shared-Address Space Programming
- OpenStack Cloud Computing OS

EXPERIMENTS
- How to Configure PC Cluster
- Basic MPI Program Structure (Parallel Hello World Program)
- Blocking and Non-Blocking Point-to-Point Communication Functions and their Prototype
- Develop Parallel Program for Matrix Multiplication using MPI
- Collective Communication Functions and their Prototype
- Develop MPI Program using Collective Communication Functions
- Develop the First Multithreaded Program
- Using the Open MP Library
- Using Cloud Computing Environment
INTRODUCTION
The Department of Electrical and Computer Engineering offers a project room reserved for senior and junior students for their projects. This room may also be used by students for their course projects. The department provides the needed equipment for various projects and meets student requests for any additional equipment as needed. Subjects of students’ projects are usually linked to research interests in the department or technical problems offered by local industries. In both cases, small groups of students work together to design, build, refine and test complete hardware and/or software systems.

EQUIPMENT AND INSTRUMENTS
- Digital Multimeters
- ETS-7000 Digital Analog Training System
- Rigol DG1032Z Arbitrary Function Generator 2 Channel /30MHz / 200MSa/s
- Rigol DS4012 Digital Oscilloscope 2 Channel / 100MHz / 4GSa/s
- Simulators: Microsim, ORCAD Cadence PSpice Circuit Simulator
- TTi 354T Triple Power Supply 2 x 0-35VDC / 3.3-5.5 VDC 4A
- ESCORT Dual Display LCR Meter
- Soldering Machine
- Hardware Tools
INTRODUCTION
This Laboratory applies the theoretical principles of the microcontroller based design course. It gives hands-on experience with microcontroller applications and interfacing with basic solid state input/output devices, A/D and D/A converters, LCD displays and Multiplexing seven segment LED displays.

EQUIPMENT AND INSTRUMENTS
• Personal Computers with MikroCPro for PIC Compiler
• Multifunctional PIC Microcontroller Development Board (QL200 DEVELOPMENT BOARD)

EXPERIMENTS
• Introduction to the QL200 DEVELOPMENT BOARD and Software Development System
• Basic Digital Input and Output Programming
• LCD Display Interfacing
• Matrix Keypad Interfacing
• Analog to Digital Converter
• Hardware Delay using Timer
• Multiplexing Seven Segments LED Displays
INFORMATION SECURITY LABORATORY

INTRODUCTION
The Information Security Laboratory is a part of the Electrical and Computer Engineering Department at the University of Sharjah. This laboratory is designed to give students hands-on experience on security measures on the detection and mitigation of computer security breaches. The Lab houses dedicated clients and servers are connected with isolated network and multiple operating systems. Students can practice both software and hardware security tools to counter various cyberattacks. The information Security Lab gives students the opportunity to learn how information can be compromised. Students also learn techniques to protect information from cyberattacks and perform forensic examinations to capture digital evidence. The lab is also used to carry research by undergraduate and postgraduate students on protecting cloud security and data privacy and integrity.