

# COLLEGE OF ENGINEERING & TECHNOLOGY- Cairo

Department: Electronics and Communications Engineering

Feb. 2014-2015 Graduation Projects



Project ID	<b>1</b>
Professors	<b>Dr. Mohamed Ali Abuldahab</b>
Project Title	<b>Hardware Implementation of WiMAX Physical Layer</b>
Abstract	WiMAX is (World Wide Inter operability for Microwave Access), is a wireless telecommunication system that provides transmission of data via various modes, from point to multi point links, to portable and fully mobile internet access. The technology utilized in this system provides higher broadband speeds without the need of cables. The technical requirements of the system are based o IEEE 802.16 standard. WiMAX has two layers, namely the physical layer and the MAC layer. Blocks include QAM mapping and demapping, FFT and IFFT The simulation tools used are Matlab and FPGA Advantage Pro 5.2. Final Hardware using FPGA is required
Required Classes	EC535 – Digital VLSI Design
Links	<a href="http://en.wikipedia.org/wiki/WiMAX">http://en.wikipedia.org/wiki/WiMAX</a> <a href="http://www.wimaxforum.org/">http://www.wimaxforum.org/</a>
Category	VLSI, Communications, DSP

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Project ID	<b>2</b>
Professors	<b>Dr. Khaled Shehata</b>
Project Title	<b>Hardware Implementation of DVB-T2 Building Modules</b>
Abstract	<p>DVB-T2 is an abbreviation for "Digital Video Broadcasting – Second Generation Terrestrial"; it is the extension of the television standard DVB-T, issued by the consortium DVB, devised for the broadcast transmission of digital terrestrial television. DVB has been standardized by ETSI.</p> <p>This system transmits compressed digital audio, video, and other data in "physical layer pipes" (PLPs), using OFDM modulation with concatenated channel coding and interleaving. The higher offered bit rate, with respect to its predecessor DVB-T, makes it a system suited for carrying HDTV signals on the terrestrial TV channel</p> <p>The project is targeted towards implementing some of the building blocks in this system, and benefits from simulations of some building blocks from previous related projects, but focuses on the VLSI implementation using VHDL, and on implementing and testing the final hardware design using FPGA kits.</p>
Required Classes	EC535 – Digital VLSI Design
Links	<a href="http://en.wikipedia.org/wiki/DVB-T2">http://en.wikipedia.org/wiki/DVB-T2</a> <a href="http://www.dvb.org/standards/dvb-t2">http://www.dvb.org/standards/dvb-t2</a>
Category	VLSI, Communications, DSP

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Project ID	<b>3</b>
Professors	<b>Dr. Hazem Hassan</b>
Project Title	<b>Design and Implementation of Wireless remote sensors system for detecting the release of gases and chemicals from plants in water using CMOS technology</b>
Abstract	This project will be a collaborated work with governmental research centers and institutes. It will include the hardware and software implementation, as well as circuit design and VLSI layout using computer-aided design tools. Experience with sensors, instrumentation and CMOS VLSI layout is gained in this project
Required Classes	
Links	<a href="http://www.microwind.net/">http://www.microwind.net/</a>
Category	VLSI, Instrumentation & sensors, Electronics

Project ID	<b>4</b>
Professors	<b>Dr. Hazem Hassan</b>
Project Title	<b>Design and Implementation of a fully automated system for detecting and preventing the growth of unwanted plants in agriculture using CMOS technology</b>
Abstract	The project will include the hardware and software implementation, as well as circuit design and VLSI layout using computer-aided design tools. The project involves the design and implementation of a fully automated system for detecting and preventing the growth of unwanted plants in agriculture using CMOS technology. Experience with sensors, instrumentation and CMOS VLSI layout is gained in this project.
Required Classes	
Links	<a href="http://www.microwind.net/">http://www.microwind.net/</a>
Category	VLSI, Instrumentation & sensors, Electronics

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Project ID	<b>5</b>
Professors	<b>Dr. Mohamed Hassan / Dr. Hussein Ghouz</b>
Project Title	<b>Antenna and Matching Network for Wireless Communication Systems</b>
Abstract	The project is a continuation of previous effort where components for a wireless system are being designed and implemented. In this project, the focus is on the antenna and the matching network which interfaces with the electronics implemented earlier. The system is an example of the design of the analog front ends used in modern wireless data and communications systems working in GHz frequencies. Design using microwave computer aided tools and system prototyping and testing are planned.
Required Classes	
Links	
Category	Antennas & Microwave, Electronics, Communicaton

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Project ID	<b>6</b>
Professors	<b>Dr. Amr Bayoumi</b>
Project Title	<b>Simple SPICE Circuit Simulator</b>
Abstract	<p>Analog circuit simulators such as <a href="#">Orcad</a>, <a href="#">HSPICE</a>, <a href="#">LTSpice</a>, <a href="#">NGSPICE</a> depend solving the circuit matrix of a linear elements R,L,C, plus current and voltage source. This is known as Nodal Analysis. Devices such as transistors or PN junctions are nonlinear elements. They need to be linearized, and a numerical solution is conducted for the whole circuit.</p> <p>In this project, the students will learn how a simulation tool such Orcad or LTSpice works, and will write the code for similar product. The project will be focused on writing an efficient versions of the transient simulation engine of the original Berkeley SPICE (<a href="#">NGSPICE</a>), where circuits with a large number of transistors, R, L, C, I, can be solved, with emphasis on how does the software calculates the voltage at each circuit node, and the current in each circuit branch. The students will write models for transistors as well, and will understand how circuit netlists and technology models are implemented.</p> <p>Students will also learn advanced computer programming in C-language for scientific applications, and numerical methods. They will learn how to develop programs under both Linux and Windows operating systems. Depending on progress, a cloud version can be implemented.</p>
Required Classes	EC560 Modern Electronics Basic background in C programming
Links	<a href="#">Orcad</a> , <a href="#">HSPICE</a> , <a href="#">LTSpice</a> , <a href="#">NGSPICE</a> <a href="http://en.wikipedia.org/wiki/SPICE">http://en.wikipedia.org/wiki/SPICE</a>
Category	Electronics, Software



Project ID	<b>7</b>
Professors	<b>Dr. Hussein El-Attar</b>
Project Title	<b>Simulation and performance analysis of Routing Protocols and security attacks in Mobile Ad hoc Networks (MANETs)</b>
Abstract	Wireless mobile ad-hoc networks are characterized as networks without any physical connections. In these networks there is no fixed topology due to the mobility of nodes, interference, multipath propagation and path loss. Hence a dynamic routing protocol is needed for these networks to function properly. Many Routing protocols have been developed for accomplishing this task. The purpose of this project is to analyze four mobile ad-hoc routing protocols DSR, TORA, OLSR and AODV in terms of routing overhead, Delay, Network load and Throughput for different network sizes and mobility speeds. Black hole attack is one of the security threats in which the traffic is redirected to such a node that actually does not exist in the network. MANETs must have a secure way for transmission and communication which is quite challenging and a vital issue. We shall study and simulate the Black hole attack effect on the network in both AODV and OLSR routing protocols in terms of routing overhead, Delay, Network load and Throughput.
Required Classes	EC521 Communication Networks and/or EC526 Mobile Communications, and/or EC528 Data Communications
Links	<a href="http://en.wikipedia.org/wiki/OPNET">http://en.wikipedia.org/wiki/OPNET</a> <a href="http://www.riverbed.com/products-solutions/products/network-performance-management/network-planning-simulation/Network-Simulation.html#Modeler">http://www.riverbed.com/products-solutions/products/network-performance-management/network-planning-simulation/Network-Simulation.html#Modeler</a> University Program
Category	Communications, Networks

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Project ID	<b>8</b>
Professors	<b>Dr. Hanady Hussein/Dr. Safa Gasser</b>
Project Title	<b>Fingerprint Recognition using Embedded Software/Hardware</b>
Abstract	<p>Fingerprint recognition is a major technique in security applications. It requires image acquisition, image processing (image reconstruction and enhancement), and Digital Signal Processing (DSP) algorithms, as well as database access.</p> <p>In this project, an embedded development kit (Arduino) will be used as the main processing platform. Sensors data will be acquired and processed using software algorithms. The project is focused on actual prototype development and real-life demonstration.</p>
Required Classes	Selected Topics in Communications
Links	<a href="http://www.arduino.cc/">http://www.arduino.cc/</a> <a href="http://www.fut-electronics.com/">http://www.fut-electronics.com/</a>
Category	DSP, Embedded & Software, Instrumentation