COLLEGE OF ENGINEERING & TECHNOLOGY- Cairo

Department: Electronics and Communications Engineering

Sep. 2015-2016 Graduation Projects

Project ID#	*1*
Professors	*Prof.Dr. Mohamed Aboul-Dahab*
Project Title	**Millimeter-Wave (MMW) Automotive Radar**
Abstract	Collision Avoidance and the detection of objects in the environment is an important task for an automated mobile vehicle. This could be achieved by using a radar system mounted on the vehicle. This radar operates in the EHF band (30-300 GHz) which is called the millimeter- wave (MMW) range, More specifically the automotive radar operates within the range77-81 GHz . MMW radar systems are divided into pulsed and continuous wave systems, which are in turn subdivided into frequency modulated continuous wave (FM-CW) and spread spectrum systems. The 77 GHz FM-CW radar systems for example, allow objects to be detected within a range of 1 to 150m. At the same time, their distance and speed relative to the host vehicle—and with the right number of antennas, also their angle to the longitudinal axis of the vehicle—are determined . It is worth mentioning that the following automotive manufacturers are known to be including automotive radar devices on vehicles: Daimler-Benz, BMW, Jaguar, Nissan, Toyota, Honda, Volvo and Ford. Fujitsu, an electronic component manufacturer, is known to be producing semiconductor devices specifically for automotive radar systems. The MMW radar can be integrated with other systems in the vehicle to give an “intelligent cruise control system” The objective of this project is to 1. design and simulate MMW automotive radar 2. implement and test some of the basic modules of the radar
Required Classes	**N/A**
Links	**N/A**

COLLEGE OF ENGINEERING & TECHNOLOGY- Cairo

Department: Electronics and Communications Engineering

Sep. 2015-2016 Graduation Projects

Project ID#	*2*
Professors	*Prof.Dr. Mohamed Aboul-Dahab*
Project Title	**WiMAX System**
Abstract	**WiMAX**, means " *Worldwide Interoperability for Microwave Access" . It* is a wireless telecommunication system that provides transmission of data via various modes, from point – to multipoint links, to portable and fully mobile internet access. The technology utilized in this system provides higher broadband speeds without the need for cables. The technical requirements of the system are based upon the IEEE 802.16 standard .The bandwidth and range of WiMAX make it suitable for potential applications such as connecting Wi-Fi hotspots to the Internet, providing a wireless alternative to cable and DSL for "last mile" broadband access and providing portable connectivity.Fom the engineering point of view, WiMAX incorporates two significant layers, namely the Medium Access Control (MAC) layer and the Physical (PHY) layer. The MAC layer is characterized by a scheduling algorithm that allows the subscriber station to have access to the network with more efficient use of the available bandwidth. On the other hand, the physical layer uses a scalable orthogonal frequency division multiplexing (OFDM) and orthogonal frequency division multiple access (OFDMA) techniques, by which a very large number of subcarrires are used to handle the data. In addition, the use of multiple input- multiple output (MIMO) antennas provide more technical support to the system. ***It is worth mentioning that the project mainly deals with the PHY layer.*** The objective of this project is to: 1. Design and simulate the physical layer of the indoors / outdoors unit of the system 2. Implement and test some of the basic modules of the above unit
Required Classes	**N/A**
Links	**N/A**

COLLEGE OF ENGINEERING & TECHNOLOGY- Cairo

Department: Electronics and Communications Engineering

Sep. 2015-2016 Graduation Projects

Project ID#	*3*
Professors	*Prof. Khaled Shehata*
Project Title	**Architecture Design and FPGA Implementation of LDPC for DVB applications**
Abstract	Low Density Parity Check (LDPC) codes are one of the hottest topics in coding theory nowadays. Equipped with very fast encoding and decoding algorithms, LDPC are very attractive both theoretically and practically. In this project, students will get a throughout view of LDPC. Then, they will study the detailed architecture of LDPC's popular decoding algorithms. Matlab (of Labview) design of the proposed LDPC will be performed for verification purposes. VHDL design of the algorithm is the core of this project. Performance of the designed LPDC will be evaluated and compared with the previous work. FPGA implementation of the designed algorithm will also be completed.
Required Classes	Digital VLSI Design course, and Introduction to Digital Communications course
Links	**N/A**

Project ID#	*4*
Professors	*Assoc. Prof. Amr Bayoumi*
Project Title	**VLSI Test Circuits**
Abstract	In this project, several full circuits in nm-scale CMOS technologies (45nm down to 16nm) representing integrated circuits used in communications and power systems are to be designed and published as public domain worldwide as test circuits. Internationally-accepted and established opensource device models, CMOS technologies rules, and CAD design tools will be used, while still matching real life cases reported in the literature. The circuits will include, depending on students progress, one or some of the following: RF LNA+mixer+PLL+IO chip Switching High Voltage regulators Digital-to-Analog converter Simple digital full chip design, with interconnects due to Place & Route prevailing Memory circuits as used on chips (cache, register files, ..) It will start by defining and updating the device models, publishing cross sections and layout rules, and simulating them, followed by standardized "robust" designs reflecting real life ICs. The outcome will also include circuit and layout level designs, as well as numerical circuit matrices for testing each simulation phase. Students will also make basic structures for testing of device models. Students will be qualified to work in companies developing or maintaining simulation EDA/CAD software tools, as well as in companies working in analog, RF and mixed signal VLSI design.
Required Classes	EC560 (strongly recommended)
Links	**N/A**

Project ID#	*5*
Professors	*Dr. Bassem Sheta*
Project Title	**Vision Based Real Time Objects Detection and Tracking**
Abstract	The use of video is becoming prevalent in many applications such as monitoring of traffic, detection of pedestrians, identification of anomalous behavior in a parking lot or near an ATM, etc. While a single image provides a snapshot of a scene, the different frames of a video taken over time represents the dynamics in the scene, making it possible to capture motion in the sequence. Tracking is the problem of generating an inference about the motion of an object given a sequence of images. Good solutions to this problem can be applied to many applications. For example, off speed limit car tracking, aerial targets tracking...etc. In this project, a real–time tracking systems is required to be designed and developed. The developed system will be used detect an object entering the field of view (FOV) of a camera and execute tracking of the detected object. To accomplish this requirement, a real time image processing software such as "OPENCV" is used and interacted with a microprocessor board such as Raspberry Pi that directly/indirectly controls the motion of a camera platform that has two degree of freedom to move it in pan and tilt motions. Successful development of this project will enhance the capabilities of the candidate in many aspects such as image processing, real time programming, and microcontroller based applications. **Tasks:** 1- Image processing theoretical background. 2- Image filtering and tracking techniques. 3- Real time image processing software on Raspberry Pi. 4- Camera interfacing with Raspberry Pi 5- Generating libraries responsible for processing each frame and locating the object in each frame. 6- Design of motors control algorithms. 7- System integration. 8- Project report submission.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*6*
Professors	*Dr. Ahmed Mohsen*
Project Title	**Handheld Navigation System and data logger with GSM**
Abstract	The use of handheld personal navigation devices has been widely used these days in many applications. For example, the workers in the fields need to know their position and send their location to the central monitoring station to be tracked for any emergency cases. In addition, this position information can be augmented into a Geographic Information System (GIS) which can be an added value for positioning and localization of the workers in the field. In this project, a handheld real–time navigation system and data logger with GSM is required to be designed and developed. The developed system will provide real-time positioning data for pedestrian using GPS, IMU, and digital compass sensors. To accomplish this requirement, some sensors will be used such as GPS which will be used for positioning information along with 10 degree of freedom sensors containing IMU, digital compass, and barometric pressure sensor which will be used for attitude, heading, and height information. These sensors will be integrated and interacted with a microcontroller that controls the sensors measurements such that accurate navigation is provided. The position information will be saved and sent via GSM to a central station. Successful development of this project will enhance the capabilities of the candidate in many aspects such as signal processing, real time programming, and microcontroller based applications. **Tasks:** 1- Theoretical background on microcontrollers, GPS, IMU, magnetometer 2- GPS receiver Connection to the appropriate microcontroller and develop the required software to read its data. 3- IMU and magnetometer connection to the appropriate microcontroller and develop the required software to read its data and calculate the vehicle orientation and heading. 4- GSM-GPRS connection to the microcontroller and develop the required software to read its real-time sensor data to process the position information provided by the GPS, IMU, and digital compass. 5- System integration. 6- System testing and error reporting. 7- Project report submission.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*7*
Professors	*Dr. Hussein El Attar*
Project Title	**Design and Simulation of Routing Protocols in Mobile Ad hoc Networks (MANETs)**
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 profect is to analyze four-mobile ad-hoc routing protocols DSR ,TORA,OLSR and AODV in term of routing overhead, Delay ,Network load and Throughput for different network sizes and mobility speeds. Black hole attack is one of the security threat 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 vital issue. We shall study and simulated 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	EC521Communication Networks **and/or** EC526 Mobile Communications, **and/or** EC528 Data Communications
Links	**N/A**

COLLEGE OF ENGINEERING & TECHNOLOGY- Cairo

Department: Electronics and Communications Engineering

Sep. 2015-2016 Graduation Projects

Project ID#	*8*
Professors	*Dr. Hussein El Attar*
Project Title	**Design ,simulation and Performance Analysis of Voice over IP (VoIP) Networks**
Abstract	Voice over IP (VoIP) is a technology that permits communication calls to be made over the internet and it is expected to become the mainstream for communication due to its low cost. However, the quality of VoIP is mainly impaired by jitter, delay, packet loss, distortion and many other parameters. As a case study, we simulate a VoIP network and study its behavior and Quality of Service (QoS) under different scenarios as increasing the traffic load and generating more realistic topologies. Furthermore, we study all the potential parameters that can deteriorate the quality of VoIP and evaluate their impact to the overall QoS through simulations in OPNET.
Required Classes	EC521Communication Networks **and/or** EC526 Mobile Communications, **and/or** EC528 Data Communications
Links	**N/A**

Project ID#	*9*
Professors	*Assoc. Prof. Hanady Hussein Issa,* *Dr. Saleh Eisa*
Project Title	**Design and Implementation of Lightweight Cryptography Algorithm on FPGA**
Abstract	The security to protect data has become critical and of vital importance for many applications. Cryptography is the science of using mathematics to encrypt and decrypt data. It enables the storage and transmission of sensitive information across insecure networks so that it cannot be read by anyone except the intended recipient. One of the state-of-the-art techniques for data protection is Light Weight Cryptography (LWC). It is a cryptographic algorithm or protocol tailored for implementation in constrained environments including RFID tags, sensors, contactless smart cards, health-care devices etc.. The hardware implementation could improve time efficiency and decrease the power consumption. The proposed project presents design and implementation of different LWC encryption algorithms. The algorithms are applied using MATLAB to prove the concept. The encryption and decryption modules are designed and implemented using **V**ery High Speed Integrated Circuits **H**ardware **D**escription **L**anguage (VHDL). The whole design is simulated using FPGA Advantage Pro tools from Mentor graphics.
Required Classes	EC535 Digital VLSI Design (Fall 2015/2016) Good knowledge in MATLAB
Links	**N/A**

Project ID#	*10*
Professors	*Assoc. Prof. Hanady Hussein Issa* *Dr. Saleh Eisa*
Project Title	**FPGA Design and Implementation of DNA-based encryption algorithm**
Abstract	Cryptography is a method of storing and transmitting data in a form that only those it is intended for can read and process. DNA cryptography is a new and promising field in information security. It combines the classical solutions in cryptography with the strength of the genetic material. The digital genomic databases help in the practical implementation of the One Time Key (OTK) encryption system. It is the only unbreakable cipher system, therefore it has absolute security. OTK is a stream cipher system based on mixing the characters of an original message (plaintext) with a truly random generated key stream to get the cipher text. This project presents design and implementation of DNA-based encryption algorithm. The algorithm is applied using MATLAB to prove the concept. The encryption and decryption modules are designed and implemented using **V**ery High Speed Integrated Circuits **H**ardware **D**escription **L**anguage (VHDL). The whole design is simulated using FPGA Advantage Pro tools from Mentor graphics.
Required Classes	EC535 Digital VLSI Design (Fall 2015/2016) Good knowledge in MATLAB
Links	**N/A**

Project ID#	*11*
Professors	*Prof. Hazem H. Ali*
Project Title	**Eye Controlled Wheel chair for Handicapped**
Abstract	Project aims at designing and implementing a wireless communication system that controls the motion of a wheel chair depending on the direction to which the handicapped person's eye looks to.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*12*
Professors	*Prof. Hazem H. Ali*
Project Title	**Wireless Detector for submersed plants**
Abstract	Project aims at designing and implementing a wireless communication system that detects the growth of submersed plants in water and controls the slicing of these plants based on a patent.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*13*
Professors	*Prof. Hesham El Badawy*
Project Title	**Car Anti-Theft System (CATS)**
Abstract	Nowadays, we hear a lot about cars being stolen so we thought about a system to protect cars. Some cars already has an alarm that depends on the pressure of the car which leads to false alarm which we neglect after a while, our goal is to implement an accurate system which sends an alert when it is really needed. The project objective will improve the car security by implementing small module that will be able to perform the following added features: • When someone tries to open the doors of the car or its trunk. The system will inform the microcontroller which will order the GPS/GSM/3G module to send an alert to the owner. • The PIR(peripheral infrared) will detect if anyone is in the car and so the owner will know. • The car will not work as no gasoline will reach it unless the system is deactivated by the owner which will make the person who wants to steal it have no option unless to trail it. • Tin case of the car being trailed, the GPS/GSM/3G module will send an instant alert for the owner showing the coordinates of the car. The project group will implement the CATS module by means of MATLAB files and suitable Graphical user interface (GUI) . Special qualifications: CCNA course, Micro C, Orcad, Matlab, and Proteus Simulator.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*14*
Professors	*Prof. Hesham El Badawy*
Project Title	**Mobile/Vehicle Direction Finder (MDF/VDF)**
Abstract	MDF/VDF units are simple and very useful. These units are so versatile and simple to make. They are so simple; you can build one for each of your vehicles, just to have in case of an emergency transmitter hunted. MDF/VDF units work by exploiting the phase shift that occurs when the path length from the transmitter to the MDF/VDF unit elements are unequal. This phase shift produces an audio tone/or any alert signal. By rotating the MDF unit, you can determine what line the transmitter is on (in front of you, or behind you). Moving of the unit will allow you to triangulate on the transmitter. The following figure illustrates what happens. The Unit in position 1 is not rotated to "face" the transmitter. As a result, the path lengths from the transmitter to each antenna (A and B) are unequal. These results in an alert signal will start. Position 2 and 3 both are rotated until the alert signal is minimized. In position 1, the transmitter is then known to be on line T1. Because the transmitter could be in front of the MDF or behind it, another position is used to get a second bearing. Position 3 gets the bearing T2. At the intersection of the two lines T1 and T2, we can locate the position of the transmitter. This MDF unit sees lots of use in the test Area transmitter hunts. Upon successful completion of this project, the student should be able to: 1- Direction finder techniques for wireless communication systems. 2- Investigate the mobility effects on the detection in wireless mobile communication systems. 3- Understand the concepts of wireless tracking and its different methodologies. 4- Design the basic block scheme and make the required simulation to check the designed schemes and its expected performance. 5- Implement and test the designed system using: discrete components, small vehicles or RF transmitters in order to measure the MDF/VDF performance in different test areas and thus try to change the operating environment as obstacles/reflectors. Then, the students may evaluate these effects on the MDF/VDF performance. The project group will implement all the stagesby means of discrete components.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*15*
Professors	*Prof. Mohamed Hassan, Associate Prof. Dr. Mahmoud A. Abdalla*
Project Title	**A Compact ultra wide band Filter with Notching for Wireless Applications**
Abstract	The project discusses the aspects of UWB technology and the concept on which it is based. The project aims to design, simulate, fabricate and measure a planar ultra wide band (frequency range of 3.1 GHz to 10.6 GHz) filter. The filter should be able to notch undesired frequencies within the filter passband. The designed antenna should be a low profile with small cost, simple in installation as required for many modern applications. **The project is scheduled to the following stages:** 1- Understanding of the different microwave transmission lines and matching techniques. 2- Design of different types of band pass filter. 3- Understanding possible notching techniques. 4- Design verifications using circuit simulator and electromagnetic full wave simulations. 5- Practical realization of the filter in microstrip technology. 6- Filter response measurements.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*16*
Professors	*Assoc. Prof. Mahmoud A. Abdalla*
Project Title	**Planar Multi Band Metamaterial Antennas for WLAN Applications**
Abstract	Antennas play an essential role in various communication services such as (GPS, WiFi, LTE & WiMAX). Such applications demand solutions for low cost and for high-performance, long distance connectivity services. Thus, the need for high gain and multi band antennas that can serve more than one device is urgently required for many modern applications such as GPS, satellite communications, and mobile communications. Also, low profile antennas with small cost, ease of installation are required. The project presents the design, realize, and measurement of microstrip planar multi band metamaterial antenna for WLAN applications. The project is scheduled to the following stages: 1- Theoretical analysis of planar microstrip antennas. 2- Understanding of the different microwave transmission lines and matching techniques. 3- Design of a metamaterial based artificial transmission lines planar antenna. 4- Design verifications using circuit simulator and electromagnetic full wave simulations. 5- Practical realization of the antenna in microstrip technology. 6- Experimental measurements of the antenna properties.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*17*
Professors	*Prof. Mohamed Hassan* *Assoc. Prof. Mahmoud A Abdalla*
Project Title	**Compact Power Splitter/Combiner for Wireless Communications**
Abstract	Microwave power dividers are important microwave components that are commonly used to split an input signal into two or more output signals. The development of microwave engineering requires the power dividers to have a compact size, low insertion loss, high isolation, and wide bandwidth. One of the advantages of utilizing metmaterials transmission lines in designing microwave components is to introduce miniaturization of such microwave components. This project proposed an extra compact and broadband power divider/combiner. The project presents the design, realize, and measurement of microstrip power splitter for different wireless applications. The project is scheduled to the following stages: 1- Understanding of the different microwave transmission lines and matching techniques. 2- Theoretical analysis of planar power divider. 3- Design of a metamaterial based artificial transmission lines planar antenna. 4- Design verifications using circuit simulator and electromagnetic full wave simulations. 5- Practical realization of the power splitter in microstrip technology. 6- Practical measurements.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*18*
Professors	*Prof. Mohamed Hassan Abd El-Azeem*
Project Title	**Design and Measurements of Frequency Selective Surfaces Structures used for Telecommunication Systems**
Abstract	Two dimensional periodic arrays of patch elements can be used as frequency selective surfaces (FSS) owing to the frequency filtering properties of these structures. Depending on their physical construction, material and geometry, they are divided into: Low Pass, High Pass, Band Pass and Band Stop Filters. In this project we will use the microstrip Technique to fabricate the FSS structures, we will also use one of the numerical techniques to simulate these structures. Finally we will measure the fabricated structures and compare the results with the simulated results.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*19*
Professors	*Assoc. Prof. Mohsen M. Tanatwy*
Project Title	**Deployment Scenarios for Cognitive Radio in 5G Networks**
Abstract	In the fifth generation (5G) wireless communications, to meet the challenging requirements of huge capacity, massive connectivity, high reliability and low latency, cognitive radio is expected to play an important role. Since the spectrum band for 5G will be extended to millimeter-wave range, cognitive radio can still be used specially with the development of self organizing network (SON), ultra dense network (UDN), mobile network (MN), and device to device (D2D) communication. Moreover, Cognitive radio can be used in 5G to mitigate the intercell interference between femto-to- femto, and femto-to-macro cells. Cognitive radio also can be used to dynamically and autonomously adjust the operating parameters to satisfy the quality of service (QoS) requirement by offload delay tolerant data traffic to different tiers and radio access technologies. A functional model with different scenarios will be developed, the purpose of which is to show that cognitive radio based 5G systems will give acceptable level of quality of services and energy efficiency.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*20*
Professors	*Prof. Salah Sayed Elagooz*
Project Title	**Code Synchronization in Spread Spectrum Communication Systems**
Abstract	In spread spectrum communication systems (SSCS) the transmitted signal is spreaded over a wide bandwidth by using pseudo-noise (PN) code which is known only by the transmitter and the receiver. The project presents the basic principles and the advantages of spread spectrum communication systems. Also, it presents and discusses in details the most common types of SSCS, namely frequency hopping spread spectrum (FHSS) and direct sequence spread spectrum (DSSS). A technical comparison between the two types of spreading techniques will be made. The generation and properties of PN code, which is used in signal spreading and despreading, will be emphasized and discussed in detail. Since code synchronization is of great importance in spread spectrum communication systems, different code synchronization techniques used in both acquisition and tracking modes of operations are studied and evaluated. As a practical part in this project, a hardware code synchronizer model with recursion aided sequential estimation (RASE) for acquisition mode of operation and full time early late tracking loop with amplitude limiter for tracking mode of operation will be implemented as a part of frequency hopping spread spectrum communication system.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*21*
Professors	*Assoc. Prof. Mohamed El Mahallawy* *Dr. Bassem Sheta*
Project Title	**Waypoint Navigation and Control of an Unmanned Ground Vehicle (UGV) with Obstacle Avoidance Capability**
Abstract	Real-time obstacle avoidance and navigation are key fields of research in the area of autonomous vehicles. The primary requirements of autonomy are to detect or sense changes and react to them without human intervention in a safe and efficient manner. Autonomous vehicles are widely used these days to achieve several tasks in different areas such as fire fighting, mine detection, farming, …etc. The key point to autonomously control any vehicle is to provide its brain/processor with a reliable data of its location. Motion decision is correctly taken when true coordinates are provided. In open areas, global positioning system (GPS) is the perfect solution. The problem of GPS is that it is very hard to rely on it to achieve heading information which is necessary to build the decision on the required direction. This problem is usually solved by integrating the GPS with another heading sensor such as digital compass or magnetometer. The objective of this project is to develop autonomous waypoint navigation and obstacle avoidance capabilities for an unmanned ground vehicle (UGV). A fully autonomous ground vehicle is built with the capability of detecting and localizing potential obstacles using real-time sensor data, navigation and heading sensors are integrated, and the required software that takes the correct decision and controls the vehicle motion is developed. **Tasks:** 1- Theoretical background on microcontrollers, GPS, IMU, magnetometer 2- GPS receiver Connection to the appropriate microcontroller and develop the required software to read its data. 3- IMU and magnetometer connection to the appropriate microcontroller and develop the required software to read its data and calculate the vehicle orientation and heading. 4- Ultrasonic sensor range finder connection to the UGV through the appropriate microcontroller and develop the required software to read its real-time sensor data to detect and localize potential obstacles. 5- Mission planning (motion path determination and time of flight estimation) 6- Mission testing and error reporting. 7- Project report submission.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*22*
Professors	*Assoc. Prof. Mohamed ElMahallawy* *Dr. Mostafa Fedawy*
Project Title	**Smart Home System**
Abstract	With the rising power of technology, we are able to accomplish things at a much quicker rate. By a single touch we have the access to large amount of information by virtue of computers' ability. Smart home is an emerging feature in the modern technology dependent society. Remote control technologies are widely used to control household electrical and electronic appliances without any effort. Mobile phones are a practical solution to interact with an effective automation system. The goal of the project is to implement a smart home by controlling electronic devices at home remotely and to get an alert on intrusion or movement around the restricted premises. The devices are controlled by a mobile phone using either voice control or the SMS service available and also alerts are also received as an SMS.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*23*
Professors	*Dr. Mostafa Fedawy*
Project Title	**Carbon Nanotube Transistors (CNT): Physics, Modeling, and Applications**
Abstract	Aggressive scaling of silicon based transistors has led to higher integration density, higher circuits performance, and low power consumption. However, it is expected to reach to its limit by 2020. Carbon Nanotube Field Effect Transistor (CNTFET) is currently considered as a promising nanoelectronic devices because of their small nanometric size and their ability to carry high current. Moreover, it can avoid most of traditional Metal Oxide Semiconductor Field Effect Transistor (MOSFET) limitations. **In this project,** a simple numerical model for MOSFET-Like Single-Wall Carbon Nanotube Field Effect Transistors (SW-CNTFET) will be introduced. Based on this model, the transfer characteristic curves , the effect of the diameter on the output characteristic curves, the onset-voltage, the On-/Off-current ratio, and the sub-threshold swing of the SW-CNTFETs will be analyzed.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*24*
Professors	*Dr. Safa Gasser*
Project Title	**Crowd sensing for traffic irregularities based on human mobility and social media**
Abstract	In this project we propose a system that detects and describe traffic irregularities, that might be caused by accidents, disasters, celebration, etc,..... These system is based on crowd sensing techniques with two forms of data; human mobility and Social media(Twitter, Facebook,...). This system will benefit both driver as well as transportation authorities, by notifying drivers approaching traffic irregularity and suggesting alternative routes as well as supporting traffic jam analysis and dispersal.
Required Classes	**N/A**
Links	**N/A**

Project ID#	*25*
Professors	*Dr. Safa Gasser*
Project Title	**Simulation and hardware implementation of 5G mobile communication system**
Abstract	In this project we study the different blocks of a 4G mobile communication system (Tx /Rx), then each of the system blocks will be simulated using Lab View/ Matlab. The system will be tested for different types of channel models, and finally the whole system will hardware implemented.
Required Classes	**N/A**
Links	**N/A**
Category	