

## Smart Environment for handicapped (Part 1)

### Submitted By

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### Supervisors

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Dr. Amr El-Helw

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### Abstract

We aim to satisfy the handicapped needs at home by replacing the physical labor with technologies like motion sensors, light sensors, cameras, microphones and motors, these equipments will create a smart environment for aiding the user.

For example, knowing the daily habits and his intentions to enable or disable the elements in the house.

The environment include a wheel chair which move the person whatever he wants to go, and the surrounded environment will interact with him even by voice commands or motion sensors like:

- The lights keys.
- The doors.
- The desk light.
- The curtains.

# E-SmartAuto- Advanced Interactive Driver Assistance System (Part 1)

## Submitted By

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## Abstract

The continuous change in young people's behavior requires new mobility concepts in future automotives. New concepts such as advanced driver assistance systems and interactive vehicles need to be integrated with future automotives to fulfill the needs of future generations. All this bears tremendous challenges to automotive design engineers, to ultimately design smart automotives with advanced system integration for pre-crash prediction and driver assistance.

The aim of E-SmartAuto project is to implement an interactive communication module to enable drivers to communicate with surrounding vehicles, and send alerts in case of an emergency to a third-party via means of modern communication technologies.

**Keywords:** *Interactive systems; smart automotive; tele-communications*

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# SmartAuto- Advanced Driver Assistance and Pre-Crash Prediction System (Part 2)

## Submitted By

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## Abstract

According to the British Royal Society for the Prevention of Accidents, each year driver fatigue and/or sleepiness cause approximately 1,550 deaths, 71,000 injuries, and 12.5 billion US dollars of monetary losses. Another independent research conducted by Mercedes-Benz concluded that fatal car crashes in Germany caused by driver fatigue is approximated by 25% of the total number of car accidents. By 2020, the Road Safety Action Plan targets to halve the number of deaths that results from road accidents. Thus, the integration of advanced driver assistance and pre-crash prediction systems with future smart cars is one of the key solutions to achieving this goal.

The aim of SmartAuto project is to implement a prototype of a wireless body area network (WBAN) for real-time driver monitoring and assistance. The prototype will monitor the driver status through car integrated sensors that determine the status of driver in real-time, and ultimately eliminate the possibility of accidents that result from driver fatigue/sleepiness.

**Keywords:** *Body area networks (BANs); sensors; smart automotives.*

# Video Tracking Technique in Controlling Unmanned Ground systems

## Submitted By

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Hasan Mohamed Awad – Allah Aly  
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## Supervisors

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## Abstract

The main goal of this project is to presents different wireless techniques to transmit data for controlling unmanned ground vehicle (UGV). Also Video Tracking Technique will be presented to track multiple targets. This type of robot is generally capable of operating outdoors and over a wide variety of terrain, functioning in place of humans.

Data will be transmitted between *UGV* & Base station (*BS*) using RF signals. *UGV* contains different types of sensors such as: GPS, Temperature & Humidity, Ultrasonic and Wireless Camera to gain more information about the environment then sends it back to *BS*. GPS device has been attached to the *UGV* to get its position where *UGV* was designed to send the position to the Base station to know where the *UGV* is located exactly. Digital image processing techniques will be applied on images and videos captured from *UGV* camera. Using C programming for the *UUV* microcontroller (*AVR*) circuit.

This project facing difficulties in the design due to the limitation of the great size of the data to be sent by the RF modems. Besides Sensors required for such a project are almost not available or they are available over the budget ranged and outside the country.

*UGV* is actively being developed for both civilian { *Deep sea exploration, Exploration of volcanoes, To look for survivors in a disaster struck area* } and military use to perform dull, dirty, and dangerous activities. *UGV* is increasingly becoming the platform of choice in missions that might be dangerous for humans, like inspections in the battlefield and nuclear biologically contaminated regions, or inaccessible areas like wildfires.

**Keywords:** *UGV, Communication Network, Sensors, Microcontroller, Image Processing*

# Free Space Optics

## Submitted By

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Mohamed Ahmed Elsayad  
Omar Abd Elkhaliq Zain

Ahmed Sherif Ezzat  
Moustafa Mohamed Ezz  
Shehab Zakareya Radwan

## Supervisors

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Dr. Heba Ahmed Fayed

Dr. Ahmed Abd Al Aziz

## Abstract

This project presents the practical study and simulation of Free Space Optics (FSO) communication link and analysis of FSO system performance. Free Space Optics (FSO) also called Optical Wireless (OW) is regarded as high speed wireless communication technology due to the security and high data rates. FSO communication system involves the transmission of modulated optical signal through the atmosphere to obtain broadband communications. FSO systems can function over distances of several kilometers. However the performance of a FSO link is primarily dependent upon the atmospheric weather effects such as atmospheric attenuation, window attenuation, alignment or building motion, solar interference and line-of-sight obstruction. OptiSystem and MATLAB are used as simulation tool to simulate the atmospheric weather effects. The result of simulation shows these effects attenuate the FSO signal as it travels through a certain distances.

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## Smart Radar Application

### Submitted By

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Mohamed Nabil Mandour  
Ahmed Saad Ragab

Tareq Mohamed Noman  
Ahmed Abd Elhalim Fayez  
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### Supervisors

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Dr Farouk Abdallah Salem

### Abstract

Study the radar design fundamentals to determine the target position (range, bearing) and the target speed

Apply the communication techniques (SS, UWB, OFDM) updating the traditional system to the smart radar sensor which can be used in space mapping, weather forecasting, auto assembling industry, diagnosis processing and traffic control

# Open Architecture Ship Control, Alarm and Monitoring System

## Submitted By

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Ahmed Tareq Ibrahim  
Yahia Saad Aman

Mahmoud Maher Mohamed Othman  
Mahmoud Ahmed Mahmoud Abd El-Aal

## Supervisors

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## Abstract

This project is practical design and implementation of open architecture control, alarm and monitoring system. Modern ships have an automatic system control which includes control, alarm and monitoring system that have access to all process control station and can monitor them. The control system control several types of self running process control station, each type is dictated to specific task. The alarm system is connected to sensors everywhere in the ship and continuously monitors them, if any sensor reading is outside the preset limits we get an alarm. The monitoring system can record any alarm status and save it in hard disk or printer with time stamp. The alarm system depends mainly on data coming from different sensors connected to corresponding measuring points. In small ship this system can be small LCD and LED panel but in a large ship it can be a computer and many displays. The sensor data can be current loop, voltage contact or open collector digital data. The number of points and scan rate is considered, also an inhibit control can be applied to certain alarm group for disable at certain conditions.

In this project the designed system will include display to monitor all the outputs status, LED display panel for output indication from both digital and analog sensors, main mother board can interface both digital and analog interface PCB and two microcontrollers that will be programmed using basic pro program.

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# Humanoid Robot (Part 1)

## Submitted By

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## Supervisors

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Dr. Amr elhelw

Dr. Mohamed khader

## Abstract

This presentation discusses about our status of humanoid robotics and its application. Our purpose is to create a programmable humanoid robot that has human shape with a trunk, two arms, two legs and a face and head, not only that but to program any tasks a human wants it to do for example human assistance in hospital, reporter, discovering unknown places, home security and driving construction machine, Why should humans waste their time while he/she could program a humanoid to do it for him/her. In order to build a humanoid robot we started with something simple to gain knowledge and experience so we build a programmable car and a robotic arm and finally reading about humanoid applications with the experience and knowledge obtained from our first project we now want to focus our goal on building a humanoid robot as a home security.



## Humanoid Robot (Part 2)

### Submitted By

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Karim El Chiwy  
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### Supervisors

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Dr. Mohamed Habrouk

### Abstract

This presentation discusses about our status of humanoid robotics and its application. Our purpose is to create a programmable humanoid robot that has human shape with a trunk, two arms, two legs and a face and head, not only that but to program any tasks a human wants it to do for example human assistance in hospital, reporter, discovering unknown places, home security and driving construction machine, Why should humans waste their time while he/she could program a humanoid to do it for him/her. In order to build a humanoid robot we started with something simple to gain knowledge and experience so we build a programmable car and a robotic arm and finally reading about humanoid applications with the experience and knowledge obtained from our first project we now want to focus our goal on building a humanoid robot as a home security.



# Smart Home: Remote Control and Security System

## Submitted By

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Abanoub Ayad Fawzy  
Akram Hisahm Mohamed Nabil  
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## Supervisors

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Prof. Dr. Ehab Badran

## Abstract

The aim of the project is to make a person able to interact with his/her home, control electrical devices, see what happens in his/her house and take actions accordingly.

## Requirements:

1. GSM module
2. Microcontroller: Arduino or AVR
3. Sensors
4. Solar Cells
5. Cameras control and Image processing.

# Smart Home: Remote Control and Security System

## Submitted By

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Anas Tareq Mohamed  
Ahmed Nabil Abd Elbary  
Ahmed Adel Ali

Mohamed Elsayed Ahmed

## Supervisors

---

Prof. Dr. Ehab Badran  
Dr. Marwa Elshenawy

## Abstract

The aim of the project is to make a person able to interact with his/her home, control electrical devices, see what happens in his/her house and take actions accordingly.

## Requirements:

6. GSM module
  7. Microcontroller: Arduino or AVR
  8. Sensors
  9. Solar Cells
  10. Cameras control and Image processing.
-

## LTE Scheduling

### Submitted By

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Mai Mohamed Abdelgelil Amin

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Walaa Alaa Eldin Ibrahim

### Supervisors

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Dr. Walid Kamal

Prof. Dr. Saiid Elkhamy

### Abstract

In few words, LTE scheduling is the function of LTE network to assign for users the appropriate modulation and coding types and also assign resource blocks to users as per 2 inputs channel quality of user and type of application user need (voice, browse, download.....).

First we will need to study how LTE applies this function then study all applications and their requirements then start to apply scheduling program to be implemented in LTE.

*“From here Sir, We aspire your approval of our project and we would be honored if you kindly could be our project professional supervisor.”*

# Direction of Arrival Estimation Techniques

## Submitted By

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Mohamed Mahmoud Khalil

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## Supervisors

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Dr. Mohamed M. Omar

## Abstract

Widespread interest in smart antennas has continued for several decades due to their use in numerous applications. The term smart antenna is often used in mobile communications to describe an adaptive process designed to improve the capacity of the base station by focusing the radiated electromagnetic energy on transmit while improving the gain pattern on receive from a mobile system. The enhancement in the capacity of a communication system can be achieved primarily in the implementation of Space Division Multiple Access (SDMA). This is generally carried out using an adaptive process where we have a collection of phased array antennas. To perform adaptive processing in the phased arrays, a priori information about the signals that we are trying to detect is needed; generally the direction of arrival (DOA) of the signal of interest (SOI) is known or assumed. What is unknown is the interference and clutter scenario. Unlike radar, in mobile communications it is difficult to know a priori the DOA of the desired signal. In this case, DOA estimation is exploited before performing adaptive processing to yield the desired information.

The project studies the applications and the theories of the different DOA techniques. MATLAB or other software programs are used for simulating, measuring the performance and comparing between the studied DOA techniques

**Keywords:** *Wireless Communications; Smart Antennas; SDMA; Gain Pattern; DOA estimation Algorithms; correlation matrix; Cramer Rao Bound*

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# Microstrip Antenna and its Application in Wideband and UWB systems

## Submitted By

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## Abstract

In recent years, optimization of the wireless communication system has become critical with the rapid growth of mobile communication services and emerging broadband services. These new wideband services require new antennas that can cover the huge bandwidth with high performance and at the same time fulfill the requirements of low cost, light weight, and compact size equipment. These features can be satisfied by using the microstrip antenna. In this project the students provide a comprehensive introduction to the design parameters of the antenna, the theory of microstrip antenna design, the different configurations of microstrip antenna and its application in the new wideband systems to satisfy the required wide spectrum, using High Frequency Structure Simulator (HFSS) program, manufacturing a new wideband microstrip configuration and measuring the antenna pattern and parameters, and comparing the measured results with the simulated results.

**Keywords:** *Antenna design parameters, Microstrip antenna, wideband communication .*

# Phase Space Based Cardiac Monitor

## Submitted By

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Mohamed Moustafa Ibrahim

Karim Mohamed Nabil

## Supervisors

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Prof. Dr Abdel Moneim Abdel Bary Nasser

## Abstract

The project aims at the design and implementation of a novel cardiac monitor based on the phase space representation of the cardiac vector. The project is an extension to that implemented in the year 2010/2011. It offers the following:

- quality of the diagnosis over that performed in the time domain using the existing monitors.
- reduces the effort of the physician to perform diagnosis (easy diagnosis).
- Increases the diagnosis accuracy.
- Possibility of long term predication.

Tools and skills required:

- Biomedical background.
- Designing digital filters.
- Programming microcontrollers.
- Performing analysis using matlab.
- Image processing.

## Specifications

Number of leads: 3 or 12

Input voltage range: 0.01- 1V

Voltage gain: 1000 V/V

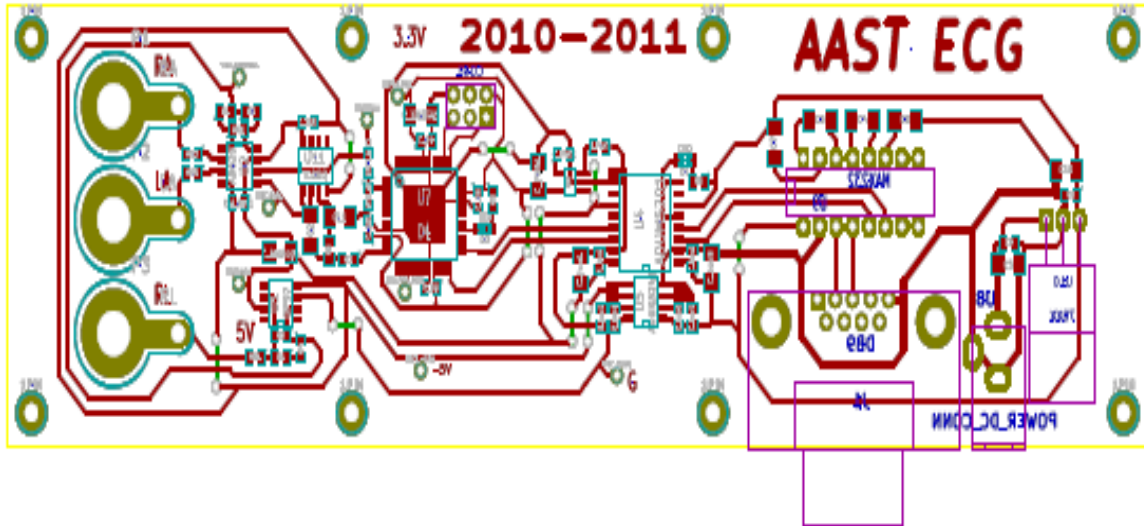
Input Resistance 10G $\Omega$

Input Bias Current: 10nA

Temperature sensitivity 0.6nV/ $^{\circ}$ C

Environmental Constraints: No constraints

## The Implemented Section Circuit Diagram



# Security S-Bots

## Submitted By

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Ingy Yousry Ahmed Hassanin

Mohamed Shaaban Mostafa Abdel-Majed

Mohamed Ghareeb Mohamed El-Taher

Mostafa Hassan Hussien Koth

Noran Attia Abd-Elaziz Ali

## Supervisors

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Dr. Mohamed Essam Khedr

Dr. Moustafa Abd Elgalil

## Abstract

In this project, we will be studying the Swarm behavior according to Swarm intelligence, the Hierarchical Swarm Topology and Swarm Robotics. In addition, we will be talking about the communication system of the swarm using Xbee Technology from the point of view of its architecture and its features and we will be talking about the Ad-hoc network and how to use both communication systems in the swarm robot and how to connect it to the internet.

For the Navigation and Path finding, we will be using GPS and we will study the theory of operation, how to transmit the signal between the robots in the swarm and how to receive it. In addition, we will also use GPS sensors to scan the area. We will be using some other types of sensors such as sharp infrared and ultrasonic sensors for Motion and Obstacles Avoidance. Also we will work on some application as rescue missions, moving obstacles or carrying objects.

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## Security S-Bots

### Submitted By

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Ingy Yousry Ahmed Hassanin

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Mohamed Ghareeb Mohamed El-Taher

Mostafa Hassan Hussien Kotb

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### Supervisors

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### Abstract

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# Data Transfer Device

## Submitted By

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Dr. Ahmed Abou elfrag

## Abstract

DTD (data transfer device): it's a double USB ports device used to select the data needed to be transferred from one memory to another without usage of an external operating system, PC, or Laptop.

The main idea of this project is to ease the data transfer between various forms of memory devices. The device would be simple and small sized. It would consist of two USB ports, a display and a number of buttons to make choices. The device should allow the users to select a specific file or folder to be copied, moved or deleted from storage devices (Flash memory, SD cards, any external HDD, etc.)

The proposed concept, which would be a first, should change the way that we transfer data and make it far easier than ever before.

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# LED life jacket based on wireless communications

## Submitted By

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Mohamed Salah Elmeniawy

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## Abstract

A lifejacket is a type of personal flotation device designed to keep a person's airway clear of the water whether the wearer is conscious or unconscious. They are either made from two layers of bonded polyurethane to be inflated or from foam.

The inflatable lifejacket is probably the most widely used for both leisure and commercial activities, while the foam lifejacket is predominantly designed either for children, or for emergency use (such as on ferries, cruise ships etc.)

### 1.1-TYPES OF INFLATIONS

**Manual:** Manually inflated lifejackets are operated by pulling a string, which pushes a firing pin into the CO<sub>2</sub> canister, inflating the lifejacket. Automatic and hydrostatic lifejackets both have a manual pull string as back up.

**Automatic:** Automatically inflated lifejackets rely on a small pellet or bobbin, which holds back a powerful spring. When the pellet makes contact with water it dissolves very rapidly, releasing the spring, which pushes a firing pin into the gas canister.

## 2-LIFE JACKET CONTROL SYSTEM

The goal is to build a life jacket automatic control system that will be capable of achieving the following objectives.

2.1- a Microcontroller will activate a small valve to push the compressed air from small cylinder the same moment the life jacket touch the water.

3.1-The control system will be capable of locating the place of the user by using GPS system connected to the microcontroller.

4.1-The microcontroller will send the location of the user by using RF module (Xbee).

5.1- the microcontroller will send a light rescue signals (SOS) by using small leds to be seen from a long distance.





# Evolution of Mobile Communications Project

## Submitted By

Ali Sabry Ali Mohamed

Belal Mohamed

Moustafa Mohamed Maged

Mohamed Khamis Saad

Omar Abd Elaziz Shaaban

## Supervisors

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Dr. Shawki Shaaban

Dr Waleed Kamal

## Abstract

The aim of this project is to study the evolution in cellular mobile communication systems. The study starts by the second generation, and ending by the fourth one.

The project has three elements:

- Theoretical review.
- Computer simulation.
- Experimental works

### **Presented systems in details are:**

|       |  |
|-------|--|
| GSM   | Global System for Mobile telecommunication |
| HSCSD | High Speed Circuit Switching Digital NW    |
| GPRS  | General Packet Radio Service               |
| EDGE  | Enhanced Data GPRS Evolution               |
| UMTS  | Universal Mobile Telephone System          |
| HSDPA | High Speed Downlink Packet Access.         |
| HSUPA | High Speed Uplink Packet Access.           |
| LTE   | Long Term Evolution                        |

The project contains many auxiliary systems such as; blue tooth, GPS, Wi-Fi, Wi-Max in order to complete the vision of the integrated systems.

\*In theoretical reviewing, the details of the system structures are presented, and the different signal processing techniques are reviewed.

\* Simulations with the aid of Visual basic program are presented

\* Simulation with the aid of a digital signal processing ( DSP) circuits are given

\* Simulations with the aid of MATLAB program are presented to simulate what is going on the mobile communications.

\*A practical digital transmitter using the A/D converters and coding techniques is presented.

\*Programmed micro-controllers are used to represent the different circuits.

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# Design of Transparent Patch Antennas

## Submitted By

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Ahmed Ismail Ramadan

Mohamed Essam Metwally

## Supervisors

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Dr. Yasser Mahmoud Madany

### Abstract

Transparent patch antennas are microstrip patch antennas that have a certain level of optical transparency. Highly transparent patch antennas are potentially suitable for integration with solar panels of small satellites, which are becoming increasingly important in space exploration.

Traditional patch antennas employed on small satellites compete with solar cells for surface area. However, a transparent patch antenna can be placed directly on top of solar cells and resolve the issue of competing for limited surface real estate. For such an integration, a high optical transparency of the patch antenna is required from the solar cells' point of view. On the other hand, the antenna should possess at least acceptable radiation properties at the same time.

This project focuses on some of the most important concerns from the perspective of small satellite applications. For example, an optimization method to simultaneously improve both optical transparency and radiation efficiency of the antenna is studied. Active integrated antenna design method is extended to meshed patch applications in an attempt to improve the overall power efficiency of the front end communication subsystem. This project also aims to present design methods for circularly

polarized meshed patch antennas. Moreover, a meshed patch antenna capable of supporting a high communication data rate is investigated. Lastly, other types of transparent patch antennas are also analyzed and compared to meshed patches. In summary, many properties of transparent patch antennas simulated and measured results are examined in order to meet different design requirements.

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# Portable Hemodialysis Machine

## Submitted By

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Nehad Mohamed Abou Tabl

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Sherif Sameh Farid

Mosaab Elhady Elmontaser

## Supervisors

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Prof. Dr Abdel-Moneim Abdel-Bary

Prof. Dr Iman Morsy

## Abstract

The project aims at the design and implementation of a portable hemodialysis machine with the ability to control and optimize the operation time for dialysis.

The students should design and implement the following:

- A ratiometric pump that forms the dialysis fluid constituents.
- A membrane filter that filters out the toxic components such as uria, creatinine, and other unwanted components.
- Heparine control system to sustain blood viscosity level.
- Blood leak detector to monitor blood leakage to the dialysis solution if exists.
- Conductivity cell to determine the moment of dialysis termination, and
- A temperature control system to match the dialysis fluid temperature to that of the body.

## Specifications

- Shielded electronic circuits are required (both electrostatic and electromagnetic shielding)
- The conductivity cell should be provided with a buffer stage to prevent a safe interfacing with the body.
- The Heparine level should not go beyond the upper limit.

# Dynamic Spectrum Access for Cognitive Radio

## Submitted By

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Ahmed Nasr Mohamed

Ramy Mohamed Reda  
Ahmed Ehab Abd Elaziz  
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## Supervisors

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## Abstract

The radio frequency spectrum is scarce natural resource and the efficient use of it is an important factor in communication systems. The spectrum bands are usually licensed to certain services, such as mobile phone, Radio system, TV broadcast, and Satellite. The cognitive radio is used to solve the spectrum scarcity problem. This will achieve by using a certain licensed band in certain time when the primary user is not use it. This project aims to study the use dynamic spectrum access which is a new spectrum paradigm that allows the secondary user to access the empty spectrum holes in the licensed spectrum bands, specifically TV band. In this project, the cognitive radio system, and how to make an efficient use of the spectrum bands, licensed to certain services, and the wireless channels will be studied. Moreover, the management of using the licensed bands by the secondary user when these bands are free will is clarified. Then the presenting of the channel model, and defining TV band and the corresponding standard (IEEE 108.16) for cognitive radio will be learned. After that the spectrum sensing techniques will be discovered.

## Objectives

1. Comprehensive study of cognitive radio system, and how to make an efficient use of the spectrum bands, licensed to certain services, and the wireless channels.
2. Clarify the management of using the licensed bands by the secondary user when these bands are free.
3. Learn of the channel model, TV band, and standards for cognitive radio.
4. Find out spectrum sensing techniques.
5. Design system using Dynamic Spectrum Access techniques for TV band( as software using matlab package).

# Automatic parking management system

## Submitted By

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Mohamed Ali Anwar

Ammar Soliman Saber  
Mohamed Moustafa Elsayed

## Supervisors

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Prof. Dr. Maha Sharkas

### Abstract

This project aims to designing an automatic parking system based on vehicle number plate recognition. The aim of this project is to develop and implement an automatic parking system that will increase convenience and security of the public parking. The auto parking system will able to have less interaction of humans and use no magnetic card and its devices.

This system will use image processing to recognize number plates for operation of parking and billing system. Overall, the systems run with pre-programmed controller to make minimum human involvement in parking system and ensure access control in restricted places.

# Smart Environment for handicapped (Part 2)

## Submitted By

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Mohamed Gamal Abd Elhamid  
Elgharabawy

Omar Mohamed Salah Elsamadesy  
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## Supervisors

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Dr. Amr El-Helw

Dr. Ahmed El-shenawy

## Abstract

We aim to satisfy the handicapped needs at home by replacing the physical labor with technologies like motion sensors, light sensors, cameras, microphones and motors, these equipments will create a smart environment for aiding the user.

For example, knowing the daily habits and his intentions to enable or disable the elements in the house.

The environment include a wheel chair which move the person whatever he wants to go, and the surrounded environment will interact with him even by voice commands or motion sensors like:

- The lights keys.
- The doors.
- The desk light.
- The curtains.