Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Atmospheric Water Generation**	
Supervisor:	**Dr. Jean Khalil**	
Students:	Hesham Mohammed Taleb	Moataz Magdy Mostafa
	Khalid Magdy Shafik	
	Ahmed Nejm	
	Abdullah Ebrahim El Refai	

ABSTRACT

Lack of potable water is becoming an increasing problem day by day. This project is about a device that extracts the atmospheric humidity and treats it in order to accumulate drinkable water. The device relies on cooling a stream of air and therefore bringing droplets of water that fall under their dew point to a container, whereby it gets filtered and treated in order to be drinkable. The device was completed tested and the results were assessed.

1-Mechanical System Design:
The device consists of an evaporative cooling cycle embedded in an air tunnel in which a constant stream of air is forced by a fan.

2- Electrical and Electronic System Design:
The device automatically functions when the relative humidity exceeds a predetermined threshold and when the level of water within the accumulation tank is below a certain level. These values are gathered through a set of sensors to a microcontroller which activates and de-activates the refrigeration cycle and the air streaming function. The system also displays the values of its functioning parameters.

3- Human Machine Interface:
The user is required to place the device in a high humidity area, facing an opening of atmospheric air, then to connect it to an electrical power sources, therefore to drain the water container before its get filled.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Automatic Forklift With Wireless Communication	
Supervisor:	Dr. Jean Khalil	
Students:	**Hesham Mohammed Taleb**	**Ahmad Abdelfattah Negm**
	Abdullah Ebrahim Al Refai	
	Khaled Magdy Shafik	
	Moatz Magdy Mostafa	

ABSTRACT

Fork Lifts are a necessity in many industrial and corporate organizations. Unmanned fork lifts are expected to be tomorrow's necessities due to the rising rates of production and the stress upon the costs of storage and handling. This project is about the design and manufacture of an unmanned preprogrammed prototype of a forklift. The realized machine is being operated and tested.

1-Mechanical System Design:
The developed forklift is designed to lift a nominal load and to raise that load, then to move backwards and onwards in a specific trajectory. Once arriving at the delivery point, the device unloads automatically and travels back to its original position.

2- Electrical and Electronic System Design:
The forklift operates through an Arduino microcontroller, integrated with displacement and proximity tracking sensors and a set of motors for motion and for loading and unloading.

3- Human Machine Interface (Master):
The user is required to set up the trajectory of the vehicle, place the while lines on the ground and leave it to work until the ned of the production shift when he / she may then disengage it.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Automatic Parking system	
Supervisor:	Dr. El Tantawy M. Farid	
Students:	Ashraf Fouda	Umna Said
	Reem Abdel Moneim	Youssef El Kady
	Shady Maged	
	Mahmoud Mohamed Mahmoud	

ABSTRACT

This project was chosen because Cairo city is becoming more crowded year after another, land spaces are becoming more expensive, high rise buildings are in need of lots of parking spaces. Hence, the project's idea will be the solution for the mentioned issues. The main aim of automated car parking service was to adjust more cars in the same space, thereby reducing the space needed to park the same number of cars. It is a method of automatically parking and retrieving cars.

During the project, we have designed the mechanical part of the machine; this includes the preparation of engineering drawing, workshop drawings and calculation sheets. The mechanical parts have been manufactured and assembled according to the design. We have developed the control strategy and control system. The control system consists of hardware, such as electronic circuits, and software, such as motion control and user interface. The system has been established and tested. The tests prove the system workability and accuracy.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Autonomous Pipeline Inspection Robot**	
Supervisor:	**Prof. Dr. Mohamed Abo El Ella Abdellatif**	
Students:		
	Mohamed Hesham Saad	Ahmed Khaled Atia
	Hazem Mohamed Osman	Ahmed Abd Elmoneam Qasem
	Amr Kamal Ahmed	

ABSTRACT

Water & sewage pipeline is an environment which requires periodical inspection. The inspection should be done due to the problems that may occur in the sewage networks like roots, corrosion and deformation of pipe are some usual problems occur in the network. As a result, monitoring the pipe interior is necessary for managing the sewer system. Sewer inspection robots can be developed as a special to inspect the pipe interior. At first, the robot should move through the pipe and provide pictures and video from pipe interior. In addition, producing sensory data from the pipe interior would be very valuable. In this paper, we developed a new sewer inspection robot that is developed with new concepts in mechanical and electrical systems which keep the control system relatively simple. Sensors and actuators allow the robot to benefit from accuracy, rigidity and the mechanical design aims to provide smooth and reliable motion. The new robot is believed to perform better than state of the art and provide video stream of pipe interior with location stamp. The project covers the following aspects:

1-Mechanical System Design:

Our Robot is designed to withstand bad and dangerous environmental conditions like high pressure, high temperature, and contact obstacles. It is manufactured from Aluminum sheet metal to minimize robot weight, and its steering system depends on tracks to perform its intended function.

2- Electrical and Electronic System Design:

Our low power system (Electronic) is represented in the controller (Raspberry PI - Model B) which is the robot brain that controls the robot's reactions in response to various actions.

Our high power system (Electrical) is represented in actuators (DC motors) to control the robot's speed and direction by a specified driver (H-Bridge).

3- Human Machine Interface:

PC Interfacing using a simple simulation program showing a simulated example for the robot that is used for receiving the feedback signals from the robot containing critical information.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Design and Development of Quadriplegics Electric Wheelchair**	
Supervisor:	**Dr. Mohamed M. Abdelwahid**	
Students:	Nader Esmat Bakry	9104417
	Shawky Hussien Saber	9103309
	Mohamed Emad Mansy	9103470
	Essam Aly Osman	9103632

ABSTRACT

The problem of disability in people is one of the most important problems in our society. Many researches tried to help the disabled through the development of reliable equipment that help them to accomplish the activities in their everyday life. This research aims to implement a (QEWC). A complete design of the chair's mechanical parts is presented. We used (SIP&PUFF) control through;

- Studying and producing a simple physical and mechanical design of the wheelchair
- Synchronizing the Pressure sensors with types of motors used, to control the chair's mechanical parts. (Using ARDUINO)
- Studying all obstacles that can face the user and trying to avoid it.
- Simulation and testing both the design and the control.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Design and Implementation of an Animatronics Hand	
Supervisor:	**Dr. Mohamed Metwally and Dr. Ahmed Salah Abu El Azzm**	
Students:	Ahmed Ammar	01015222802
	Ahmed Beltagy	01147579600
	Amr El Feky	01009492822
	Hesham Moustafa	01115007129
	Rana Hammad	01008553099

ABSTRACT

In order to preserve human life, something needs to be created, to help in dangerous situations. A life-like robot is the perfect substitute. This robot needs to perform under adverse conditions and do more than a human can. The hand is the most complex part of a robot and requires the most control. In designing and building a working hand, the proven idea can be taken to the next level and a full robot can be constructed.
This work discusses efforts to design an animatronics robotic hand, focusing on the detailed design, constructing, and testing of an individual modular finger with considerations into overall hand configuration. This research first aims to define requirements for animatronics and compare the geometry and motion of the design to that of the human hand. The ranges of motion are studied along with coupled joint behavior and grasp types. The second objective is to study the benefits and drawbacks of an active versus passive actuation systems. The control system and control laws are carefully designed. Tradeoffs between controllability and packaging of actuator assemblies are considered. The animatronics hand finger are actuated by a pneumatic system.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Design, implementation and validation of firefighting mobile robot**	
Supervisor:	**Prof.Dr.Magdy M.AbdelHameed**	
Students:	Ahmed Araby Amin	Rami Mohamed Fakhry
	Ahmed Osama Hamroush	
	Mohamed Magdy Abdelmohsen	
	Hossam Mohamed Othman	

ABSTRACT

This project has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software. Before we think about our project, we decided that we want a project that reflects the Mechatronics system which includes some sets of integrated systems; Mechanical, electrical and electronics, and computer software systems. This project main objective is to develop an application that can detect, warn and extinguish fire here our interest of review is to make a fully automated firefighting robot which can help in dealing with many fire problems in households and small scale industries. Autonomous robots must have sensors to gather information about the outside world such as light intensity, obstacles, and temperature, then pass it through the robots brain as Arduino to make decisions then send them to the actuators as signals to execute these orders.

1-Design of Mechanical System

Our Robot is designed to enter small rooms, narrow places and avoid obstacles,. It is manufactured from Stainless Steel to minimize robot weight and withstand high temperature.

2- Electrical and Electronic System Structure:

Our low power system (Electronic) is represented in 2 Arduino Mega. which is the robot brain that controls the robot's reactions in response to various actions.

Our high power system (Electrical) is represented in actuators (DC motors) to control the robot's speed and direction by specified drivers. Servo motors to control Nozzle and camera.

3- Control System Layout:

Our system is divided into :

First: Automatic Control and manual Control.

Second :Control System Analysis which is simulation and Mathematical modeling for DC motors

Third : communication used to control the robot

Forth :Image processing Techniques

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Development of a Rapid Prototyping Machine	
Supervisor:	Dr. Mostafa Rostom	
Students:	Adham ayman zaki	Mohamed refaat
	Ahmed essam mohamed	
	Karim adel halim	
	Mohamed gamal	

ABSTRACT

Rapid prototyping is a group of techniques used to quickly manufacture a model of assembly using three-dimensional techniques. Where successive layers of material are laid down in different shapes.3D printing is also considered distinct from traditional machining techniques. 3D printing theory all about transforming 2D image to (.stl file) image then the printer starts to print layer by layer till the shape is formed. The material used in this application is simply melted plastic (ABS or PLA). All axes are controlled by using stepper motors:

1-Mechanical System Design:
This machine is designed to be able to make any 3D shape in an efficient way compared to the manpower. It is characterized by high efficiency, repeatability & the ability to perform mass production.

2- Electrical and Electronic System Design:
The brain of our machine is RAMBO board. It stands for reprap arduino mega compatible mother board. It controls all the drivers of electrical components (stepper motors, extruder, heated bed, etc…)

3- Human Machine Interface (Master):
PC Interfacing using print-run program. We load the (.stl file) then it converts it to G code which controls the electrical components by sending commands to the RAMBO board.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**DEVELOPMENT OF A VISUALLY GUIDED AUTONOMOUS WAREHOUSE FORKLIFT**	
Supervisor:	**Dr. Mohamed Abdellatif**	
Students:	Elmetwally Zaghlol Shoier	Saleh Ahmed Saleh
	Omar Talaat Abd Elmaguid	
	Mohamed Elhamy Elbably	

ABSTRACT

Material handling is a necessary, but expensive activity in manufacturing. Insufficient material handling causes additional costs in time and cost of labor. Effective material handling solutions can reduce a production or distribution facility's cost by significant. Forklift is an example of material handling machines. In general the forklift can be defined as a tool capable of lifting hundreds of kilograms. The Aim of this project was to design and develop an autonomous warehouse forklift using the vision technique we have used the Kinect in order to map the working environment, so the robot can avoid obstacles. The navigation method on the robot depends on the differential drive model using the wheel encoders. Experiments showed success the robot succeeded in going to its target and move the cargo from it place to another location.

Department:	**Mechanical Engineering – Mechatronics**	
Project:	**Development of an image protruding machine for blind**	
Supervisor:	**Dr. Mostafa Rostom A. Atia**	
Students:	Abd El Rahman Mohmed Adham	
	Islam Mohamed Wahaba	
	Hamzah Mohamed Shadfouh	
	Omar Masoud Hamed	
	Ahmed Mohamed Lotfy	
	Karim Isam abd El Hady	

ABSTRACT

Blind is a real problem in Egypt and world. Protruded symbols on paper are well known method to introduce text to blind persons. Introducing images to blind faces difficulties. Protruded image is a good solution to show the blind some details of images. In this project a device for generating protruded image is developed. The image is formed from a matrix of pins, which protruded in different heights. The heights are controlled using a system of stepper motors. The machine is designed, manufactured and tested in real cases. The control system is based on microcontroller.

During the project, the students have designed the mechanical part of the machine. This includes the preparation of engineering drawing, workshop drawings and calculation sheets. The mechanical parts have been manufactured and assembled according to the design. The control strategy and control system have been developed by the students. The control system consists from hardware, such as electronic circuits, and software, such as motion control and user interface. The system has been established and tested. The tests prove the system workability and accuracy.

The project contains all the mechatronics branches. It contains mechanical system, which is controlled using electronic circuits. The control strategy is contained in software. All the system parts have been developed and executed by the students.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Glass Climbing Cleaning Robot**	
Supervisor:	**Prof. Dr. Ahmed Helmy**	
Students:	Fady Samy	
	Joseph Farid	
	Sherif Shafik	
	Romany Rady	

ABSTRACT

This graduation project report is considered the main source of knowledge to what we did in our graduation project. It will be discussing everything we used in our graduation project from: materials, sensors, sources of power, actuators, motors, gears, controllers, etc. Also, discussing the way we did everything like: making the mechanical body, the way of writing the code, wiring, piping, etc. The report will mention every step in the graduation project in detailed steps to make it easy for anyone to understand the idea of the project, its use, how it is applied, and to be able to develop it in the future. The report will mention how the project operates, what are its advantages and disadvantages, recommended power supplies, etc. We will mention also the budget of the project in which we will see the cost of every single thing used in this project to make it applicable and done. Generally this report will contain detailed information about our graduation project to enable anyone upon reading it to understand it, its concept, the problem it solves, how it is done, how it operates, its advantages and disadvantages, etc. To be able to use it, repeat the project with different idea or even to develop in it.

1-Mechanical System Design:

Our Robot is designed to climb and clean the glass buildings

2- Electrical and Electronic System Design:

Our low power system (Electronic) is represented in microcontroller (Arduino Mega 2560) which is the robot brain that controls the robot's reactions in response to various actions.
Our high power system (Electrical) is represented in actuators (DC motors) (LINEAR ACTUATORS) to control the robot's speed and direction by specified drivers (H-Bridge DRIVERS).

3- Human Machine Interface (Master):

Human can control the robot by switching it ON and OFF manually.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Hybrid Assistive Limb**	
Supervisor:	**Dr. Adham Mohamed AbdElKader**	
Students:	Mohamed Osama Ezzat	Ahmed Mohamed Samir
	Karim Sherif Ahmed	
	Waleed Ashraf Ismael	
	Mahmoud Mohamed Salah	

ABSTRACT

The objective of this report is to deliver the main idea of the assistant disable person robot and how it works through a number of circuits and its history. This project was made in Japan and was named Hal and its main function is to help the disable persons to walk easily and help them. But it only became product to be rented with 3000 $ which make it lose its side of humanity and didn't help all people. So In this report we are going to discuss our project and how it works throughout its history and we are going to demonstrate the steps we had taken until now so we can get closer to useful project that can be manufactured with low price so it may gain again its side of humanity and serve all people that needs it. The number of the steps we have taken until now is making a lot of circuits that is needed in our project like the weight sensor circuit also we made a 1st design which we still are testing and improving in it.

In this report there will be a lot of circuits that we used in our project these circuits is a main part of our project also this report is going to include the types of sensors and components used and its datasheets which contains a lot of information about it. Also we are going to define a lot of acronyms that might be little complicated for normal reader to understand it. And we hope in the future to finish this project so it can regain its side of humanity and help people that are really in need .

And this more details on HAL-5:

We aim to develop the Hybrid Assistive Lims (HAL) in order to enhance and upgrade the human capabilities based on the frontier science Cybernics. Cybernics is a new domain of interdisciplinary research centered on cybernetics, mechatronics, and informatics, and integrates neuroscience, robotics, systems engineering, information technology, "kansei" engineering, ergonomics, physiology, social science, law, ethics, management, economics etc.

Robot Suit HAL is a cyborg type robot that can expand, augment and support physical capability. The robot suit HAL has two types of control systems such as "Cybernic Voluntary Control System" and "Cybernic Autonomous Control System".

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Laminar Jet Fountain**	
Supervisor:	**Dr. Ahmed Salah Abo El-Azm**	
Students:	Ahmed Mohamed Hany	Moustafa Mahmoud Hatem
	Ahmed Hazem Abd El-Rahman	Rana Hesham Ismail
	Ezzat Khaled Ezzat	
	Hesham Ahmed Helaly	

ABSTRACT

The purpose of this project is to produce laminar jet fountain which is to some extent needs accurate calculations, design and manufacturing to keep the flow laminar.

This proposed system has been divided to many subsystems including the piping system, pump selection, the mechanical system design and manufacturing and control system.

The laminar flow is obtained from calculating Reynolds's number less than 2000 in the laminar jet, design manufacturing to keep this is the milestone issue in the project, and designing a specific laminar jet nozzle that produce the laminar flow.

The use of such fountain could be used in entertainment, decorative item and customer holder object. The laminar flow could be colored and light could be applied.

Finally, the design of such fountain shows the ability of the student in designing, calculating and manufacturing a real system.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Mini Formula one Project**	
Supervisor:	**Dr. Essam Morsy**	
Students:	Mostafa Hossam Farag	Ahmed Amr Eltabakh
	Kareem Yassin Elashi	
	Omar ahmed sanad	
	Mohamed osama ali	

ABSTRACT

This project aimed to give birth to a new beginning and start the participation of our university in a worldwide competition, Student Formula FSAE in the coming years. The race car was completely designed and built by a team of five undergraduate Mechatronics Engineers.

Project and design management techniques were investigated and applied to the project team; this empowered the team to work effectively Together. Successful integration of the vehicles' systems was achieved and Checked by a simulation program.

Management of the project team and the design process was found to be Essential to the efficient completion of any complex engineering project.

Performance objectives for Formula Student competition were not only car performance parameters such as acceleration and handling, but also Included objectives such as innovation in design and aesthetic qualities.

The basic performance objectives as given in the Formula SAE rulebook were for the race car to:
• Have very high performance
• Be easy to maintain.
• Be reliable.
• Look appealing.
• Use common components.
• Be comfortable.
• Able to be manufactured on a limited production.

Department:	**Mechatronics Engineering**	
Project:	**Private Car Parking System**	
Supervisor:	**Dr. Ahmed El Sanabary**	
Students:	Ahmed El Samalouty 9104530	Ahmed Ihab 9104537
	Michael Adel 9103104	Mohamed Salah 9103844

ABSTRACT

The main reason behind choosing such project is that we wanted to work on something that would combine between various courses that we have studied throughout the past four years. This project will upgrade our knowledge of stress analysis, machine design, mechatronics systems, and hydraulic systems.

Simply, our project is about consuming the unused underground space to provide two parking spaces. During the project, students have designed the hydraulic parts of the project. This includes the preparation of engineering drawings and calculation sheets. The project have been manufactured and assembled according to the proposed design. In the current project, the limit switches are added for the purpose of controlling the miniature model. The project is designed and manufactured as a demo. We decided to name our project "*MASSParking*".

The control and software of the system have been developed by the students. All the project phases have been developed and executed by the students.

Project Constrains:

1) That the project can't be simulated on its original size because of its high cost, so we implemented it on a smaller scale.

<u>The project covers the following aspects:</u>

1- Mechanical Design
2- Hydraulic System.
3- Electronic System.
4- Programming.
5- Control System.

Mechanical Engineering – Mechatronics

Department:	Mechatronics Engineering	
Project:	**Remotely Operated Vehicles**	
Supervisor:	**Dr. Sameh Shaaban**	
Students:	Omar Hesham Rashed	Ahmed Ali
	Marwan MOhamed Deif	Mahmoud Amr
	Ahmed Gaber	

ABSTRACT

ROV stands for "Remotely Operated Vehicle" It is an underwater robot that allows the vehicle's operator to remain in a comfortable environment while it performs the work underwater .Vehicles are highly nonlinear and complex systems, that makes designing autopilots extremely difficult. Unlike man's vast knowledge of the land, atmosphere, and solar system, humanity knows relatively little about the oceans, especially deep below the surface. With global climate change a growing concern, understanding the dynamics of the oceans is imperative. Sensor networks, similar to underwater weather stations, must be deployed globally to gather the data needed to support ocean research.

Our vehicle is not just a remotely operated submarine it's also a research semi- autonomous vehicle. it consists of eight powerful bilge pumps that can provide motion in four directions with remotely joystick for controlling. The vision system consists of three wide angle cameras which can give a complete view of the environment and processed via vision and motion. Our manipulator is an electrical type with four servo motors and grabber all the electronic components are built in a waterproof isolation box to overcome high depth environment. Our vehicle will be able to complete any specified missions required.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Sea Water Desalination Using Renewable Energy	
Supervisor:	Dr. Sameh shaaban	
Students:	Bahaa El-deen Riyad	Hazem Mohamed Ibrahim
	Islam Khaled	Marwan Ahmed El-Boushi
	Mohamed Alaa	
	Andrew Raaouf	

ABSTRACT

Egypt is currently facing severe problems in terms of water usage due to the huge increase in population which increase the demand for resources of proper water. At the same time that Egypt is rich by sea water which can be used for drinking and agriculture in case of desalination.

This graduation project is submitted with the intention of solving this problem at the same time of relying on renewable energy to generate power to a portable desalination system capable of desalinating water with high level of TDS.
The application implementation desalinate Red Sea water with TDS of 4500 ppm to a proper water compatible for personal use and drinking as well as agriculture with a TDS level of 300 ppm.

System depends on a Piston pump of to feed the pre-treatment system with Sea water passing through our main treatment equipment the reverse osmosis membrane to ensure water is well desalinated.

The system is a mechatronics system controlled via Lab view program to detect the salinity , conductivity and flow rate of delivered desalinated water.
This functioning model is intended to use renewable energy as the source of energy for motor and other system components.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Security Road Blockers	
Supervisor:	Dr. Ahmed F. El Sanabary	
Students:	Ahmed Fouad Abd El Halim	Mohamed Maher Omara
	Ahmed Mohamed Anwar Hegazy	Mohamed Ahmed Abd El Aziz
	Hossam El-Dein Ahmed Naguib	

ABSTRACT

Mechatronics is the combination of Mechanical, Electronic, Computer, Software, Control, and Systems Design engineering in order to design and manufacture useful and intelligent products. The project is an implementation of a mechatronic system used to produce a Security Road Blocker.

The security road blockers are a temporary installation for the purpose of controlling traffic. It has a wide range of applications, securing buildings, road works, temporary road closure during special events, Police chase, Robbery and checkpoints. The current project focuses on the electromechanical mechanism. In the current project, proximity sensors are added and based on its signals the bollard moves. The project is designed and manufactured as a demo.

During the project, the team has designed the mechanical parts of the project. This includes the preparation of engineering drawings and calculation sheets. The project have been manufactured and assembled according to the proposed design.

The control and software of the system have been developed by the team.

Our project covers all the mechatronics system components. It's mainly mechanical system, control system, electronic system, and computer system. All the project phases have been developed and executed by the team.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	Smart Elevator	
Supervisor:	Dr. Sameh shaban	
Students:	Adham ayman zaki	Mohamed refaat
	Ahmed essam mohamed	
	Karim adel halim	
	Mohamed gamal	

ABSTRACT

The smart elevator is industrial elevator with some high technology, it uses for industrial material like transport heavy equipment and other things like this. We made it smart to increase its efficiency and save energy. We used PLC as our main controller as industrial application we used we have many inputs and outputs, the most reliable and stable controller for this application is PLC. We used also drive controller for acceleration and deceleration which saves a lot of power consumption and that is our aim. We use a many relays due to huge number of cases we have. We put many ideas to get out a system industrial with luxury so we put sensors (motion sensor – smoke sensor – weight sensor (FSR)) to save energy and give to the user more safety in the system.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**SPHERICAL FLYING ROBOT**	
Supervisor:	**Prof. Dr. AHMED HELMY**	
Students:	Amr Magdy Abdl Hamed	
	Mohamed Hassan FArag	
	Nadia Ali Yasien	

ABSTRACT

Spherical flying robot is designed to do the tasks of surveillance, search and rescue missions especially in narrow and deep places; its shape gives it the advantage to hit walls and obstacles without causing any damage to the propeller through the spherical cage. This robot has two advantages, the advantage of the helicopter because it can takeoff and land vertically, and the advantage of the fixed wing airplane because it uses control surfaces to do its maneuvers. An auto stabilizing firm ware has been implemented, also the control system allow the user to control it through remote control using RF waves.

1-Mechanical System Design:

The mechanical design spherical shell is made to provide the robot with protection against hitting walls or obstacles, also it allow any sudden or wrong landing to roll on the ground like a ball without damage of propeller or any electrical component .multi prototypes have been implemented to reach the optimum dimensions and shape, also the material used it must withstand this conditions and at the same time provide low density to facilitate the flight process.

The air motion and parameters have been studied well around the robot body and the control surface through simulation and modeling software to reach the optimum dimensions of the control surface to allow good stability and control.

2- Electrical and Electronic System Design:

Our low power system (Electronic) is represented in microcontroller (Arduino mega) which is the robot brain that controls the robot's reactions in response to various actions.

Our high power system (Electrical) is represented in 8 actuators, (8 servo motors) to control the control surface angle depending on the signal that they receive from the controller, and (1 Brushless Dc motor) to control the rpm of the propeller which in turn control the induced lift force.

3- Human Machine Interface (Master):

At the normal conditions the controller are receiving a signals from the IMU sensor and start to send signals to the servo motors to control the control surface to maintain auto stability while, in case of human control the pilot start to send signals from the remote control which will be received through the controller and been translated to send this signals to the servo motors and control the control surfaces

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**UAV(Unmanned Arial vehicle)**	
Supervisor:	**Dr. Amgad M. Bayoumy**	
Students:	Mohamed Mahmoud Abdel Monieum	Mustafa Amin Abdel Salam
	Ahmed Mustafa Elshazly	Ahmed Mohamed Awad allah
	Gehad Mohamed Naguib	

ABSTRACT

An unmanned aerial vehicle (UAV), commonly known as a drone and referred to as a Remotely Piloted Aircraft (RPA) by the International Civil Aviation Organization (ICAO), is an aircraft without a human pilot aboard. Its flight is controlled either autonomously by onboard computers or by the remote control of a pilot on the ground or in another vehicle. Nowadays many countries use the UAVs due to their wide range of uses from military uses to civilian uses (e.g search and rescue).

The purpose of this project is to build a UAV that will fly without a pilot and has a camera that send live feedback and by doing so the UAV will help in surveillance and monitoring. This target will be accomplished by building and transforming an RC airplane to a fully autonomous UAV capable of surveillance using GPS coordinate of the desired location given by the user, It will then orbit the given location and send live video feedback to the ground control station (GCS).

As for the requirements of the airframe design it was decided to be a slow speed, light weighted, and simple construction from cheap materials. As for the propeller behind the wing was formed from foam sheets with an airfoil wing section that produces high lift-to-drag ratio, and larger rudder and elevator for easier control. Regarding the propulsion it was chosen to be electric propulsion because it is light weighted, easier to control and much cleaner (no fuel). On top of all this a servo motors, brushless DC motor, propeller and camera with transmitter are added to complete the UAV.

The control system was chosen to be an open-source autopilot platform, called ArduPilot-Mega (APM). The airplane mechatronics system is divided between two sides: airplane side and GCS side.

In the airplane side, the APM is the heart of the UAV control system; as most of the sensors needed are embedded on it. While in GCS side, a Graphical User Interface (GUI) is used to control the airplane by sending commands like target location and reading its sensors status through telemetry. Since the ArduPilot code is an open-source, it could be modified easily. The control loops of the control system could be altered through changing control gains and parameters. It could be tuned using hardware-in-the-loop simulation rather than actual flight test.

Finally the design and construction of the UAV was finished and it was assembled with motors and wireless control. The UAV as tested in flight and it worked properly as well as the camera had successfully send live feedback.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Updating a mini lathe into a CNC using Reverse Engineering**	
Supervisor:	**Prof. Dr. Nabil Gad ALLAH**	
Students:	Yasmin Ali Ragab	Abd El-rahman Ihab
	Ashraf Al-qosary	
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ABSTRACT

CNC controller is the "brain" of a CNC machine, whereas the physical configuration of the machine tool is the "skeleton". A thorough understanding of the physical configuration of a machine tool is always a priority for a CNC programmer as well as the CNC machine tool manufacturers. This book starts with a historical perspective of CNC machine tools. Two typical types of CNC machine tools (i.e. vertical and horizontal machining centers) are first discussed. Tooling systems for a CNC machine tool are integral part of a CNC system and are therefore elaborated. Also discussed are the four principal elements of a CNC machine tool. They are machine base, machine spindle, spindle drive, and slide drive. What letter should be assigned to a linear or rotary axis and what if a machine tool has two sets of linear axes? These questions are answered later in the chapter. In order for readers to better comprehend the axis and motion designations, a number of machine tool schematics are given.

Department:	**Mechanical Engineering (Mechatronics)**	
Project:	**Vehicle Stability Control System for E-cars**	
Supervisor:	**Dr. Adham Mohamed**	
Students:	Hesham Mohamed Bahyeldin Niazy Hendy	Muhammad Hamdy Ali Abass
	Mahmoud Fawzy Mohamed Fahmy	Mohammed Abdelfattah Abdelfattah

ABSTRACT

The system mainly designed to act fast as much as possible control using NI myRIO as a controller to sense oversteer and understeer during cornering or any kind of manoeuvre, and automatically activates to keep the vehicle on track. Vehicle Stability Control (VSC) works by monitoring steering angle produced by servo motor against the direction in which the vehicle is actually travelling which detected by gyro sensor, and uses the results to sense when the front or rear wheels begin to slip i.e. it detects the difference between the actual steering and input steering then applies electrical brake force to each individual wheel to dampen understeer and oversteer as a result of that it is minimizing skidding and helping to ensure safer cornering. The VSC is system that suppresses skids during emergency steering manoeuvres or driving on slippery roads .VSC system can identify driving situations approaching critical road-holding limits such as evasive, sudden, manoeuvres and helps the driver , that control the vehicle remotely by wireless communication, to stabilise the vehicle by braking individual wheels and adjusting the engine output accordingly.
The project covers the following aspects:

1-Mechanical System Design:
We tried as much as possible to be simple in our design to avoid any mistakes and also due to our little experience in engineering automotive. We designed to be easy to carry and pass through doors as it will work indoor and outdoor.

2- Electrical and Electronic System Design:
The system mainly depends on a microcomputer called "NI myRIO" that enables us to monitor the signals from the Vehicle Stability Control sensors and checks many times at one second and give the control of vehicle to a human to be an automated vehicle. The important thing is to brake the vehicle by electrical means not as usual by mechanical braking so it saves energy. NI myrio is enabled me to control many things and collect data as a master from Arduino controller that work as a slave which collect data and send to the master to process it

3- Human Machine Interface (Master):
The vehicle is controlled wirelessly by human but system is working automatically as its speed is more than 10 double human speeds in avoiding mistaking and controlling a lot of inputs.
Simulation is done by LabView