



<b>Department:</b>	<b>Mechanical Engineering (Mechatronics)</b>	
<b>Project:</b>	<b>Design and Control of Articulated Robotic Manipulators</b>	
<b>Supervisor:</b>	<b>Dr. Khaled Zied</b>	
<b>Students:</b>	Ahmed Mohamed Mohsen	
	Hassan Abo-Aldahab	
	Tarek Hegazy	

**ABSTRACT**

The project is dealing with designing and control of an articulated robotic manipulator for generic industrial application. The aim of the project is to get the student involved in the design process of robotic systems. This include the detailed design of the robot components and control of the system using advanced digital control methodologies.

**Project Methodology:**

Literature review – Studying the similar projects – Design the robot kinematics – Design the mechanical parts and preparing the calculation sheets – Preparing workshop drawings – Design the control strategy – Design the control circuits – Development of software – Manufacturing of mechanical components –Manufacturing of electric and control components – Assembling of the system – Testing the system and assessment its accuracy – Preparing of project documentations – Preparing of final presentation



<b>Department:</b>	Mechanical Engineering	
<b>Project:</b>	Automatic Tube Bending Machine	
<b>Supervisor:</b>	Dr. Mohamed Aly Khamis Elsayed	
<b>Students:</b>	Sherif Hassan Mahmoud Hassan	5103144
	Ahmed Abd El-Rahman Mostafa Radwan	7109456
	Hassan Mohamed Hussein El-Dahan	5209180
	Ahmed Hassan Hamed Awad	5103038
	Kaream Mostafa Hassan Hendawy	6101222

**ABSTRACT**

Tubes are being used in many of the fields, as an example in construction, car production and many others, and most of them are using manual bending machines to shape the tubes.

The Automatic Tube Bending Machine is used to bend tubes automatically, producing more accurate products, faster and with fewer defects than the manual machines.

It is controlled through a computer by using Data acquisition card.

This machine will save time, material and effort, therefore it will be considered an economic device.



<b>Department:</b>	<b>Mechanical Engineering – Mechatronics</b>	
<b>Project:</b>	<b>Design and manufacturing of a rapid prototyping Machine</b>	
<b>Supervisor:</b>	<b>Dr. Mostafa Rostom A. Atia</b>	
<b>Students:</b>	Mohamed Sherif Fathy El-rashidy	6109807
	Mohamed mamdouh Mohamed El-Baz	8109563
	Hisham Ahmed maher mohamed	6109226
	Mostafa Moamdouh Hamed El-Sayed	5204025

### ABSTRACT

Rapid prototyping machine is a modern mean for printing 3D model from the computer to the real world. The generated prototype is used as a demonstration mean, tool for producing other products or product for direct use. A wide variety of materials are used for printing operation. In this project a new material is used, which is the glue tab. blanking of glue tab generate the dots of printing material. The developed machine contains three Cartesian axis and a head for generate the blanked glue dots.

During the project, the students have designed the mechanical part of the CNC system. 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.



<b>Department:</b>	<b>Mechanical Engineering Department</b>	
<b>Project:</b>	<b>Design and manufacturing of musical fountain</b>	
<b>Supervisor:</b>	<b>Dr. Sameh Shaaban</b>	
<b>Students:</b>	Moustafa Khyree Moawaad	Mina Adel Wasfe Pascal
	Abdelrahman Moustafa Mohammed	
	Ayman Magdy Mahmoud	

**ABSTRACT**

Musical fountains are widely used in many locations. They can be located either indoor or outdoor. The design of musical fountain involves the use of high level of control on the mechanical components like pumps and electrical component like light system. The present project concerns with the design and manufacturing of a musical fountain with its control system. The project can be divided into two main categories. The first one includes the selection of pumps and nozzles. It also includes stress analysis of different supporting members. The second category concerns with the design and implementation of the control system. A complete control system of all mechanical component as well as the light and sound systems is developed.



<b>Department:</b>	<b>Mechatronics Engineering</b>	
<b>Project:</b>	<b>AUTOMATED STORAGE and RETRIEVAL SYSTEMS (AS/RS)</b>	
<b>Supervisor:</b>	<b>Dr. Ahmed Helmy</b>	
<b>Students:</b>	<b>Mohamed Sabry Redwan</b>	<b>Samir Khaled Abu-Elnil</b>
	<b>Mina Badie Eskander</b>	<b>Aziz Azem Aziz</b>

### ABSTRACT

Automated storage and retrieval system (AS/RS) is one of the important improvements in now a day's inventory systems, which allows items handling from/to their storage locations and an origin point. The AS/RS's are currently gaining in popularity due to their effectiveness in reducing handling costs; however, this requires an effective design and a reliable control system. This study presents a new developed AS/RS for pharmacies or small inventory locations. The development process included the following tasks:

- 1- The design and production of the mechanical parts.
- 2- The development of the control system sensory- actuation hardware part, including a low cost DAQ PC based system.
- 3- The development of user interactive software using LabVIEW scalable architecture.

The system is tested in the lab and successfully passed the system validation test program, which proved its capability to perform the following:

- 1- The control the operation of the AS/RS system,
- 2- The achievement of storage/retrieval tasks using a barcode device.

The system has been developed for pharmacies and small inventory locations however can be scaled for other applications.



<b>Department:</b>	<b>Mechanical Engineering – Mechatronics</b>	
<b>Project:</b>	<b>Vision-based Obstacle Avoidance System in a Robotic Car</b>	
<b>Supervisor:</b>	<b>Dr. Amgad M. Bayoumy</b>	
<b>Students:</b>	Akram Magdy	4101077
	Yasser Mohsen	6103082
	Kareem Salah amer	6103289
	Hamzah Hassan	6103819

### ABSTRACT

The goal of this project was to build a robotic car with the ability to identify and avoid an object using a vision system. The ability of obstacle detection and avoidance is essential for the safe visual guidance of autonomous vehicles especially in urban environments. The obstacle avoidance problem in robotics has been researched extensively and there are many well established algorithms for this problem. However, most of these algorithms are developed for large robots with expensive, specialized sensors, and powerful computing platforms.

We have developed an algorithm that can be implemented on small robots with low-cost electronics and small computing platforms. We used a webcam to identify obstacles and through Matlab processing a safe path is determined for the robotic car to take.

The main difficulties in this project were being able to isolate the object of interest in the video and then directing the car to avoid it. Once identified, a control scheme allowed the car to keep the object on the screen and works out the safest path around it. The whole system runs onboard the car. Thus, we are limited in processing capability, so our algorithm has to be quick enough to run in real-time, yet robust enough to identify and avoid an object, while itself being on a moving platform.



<b>Department:</b>	<b>Mechanical Engineering (Mechatronics)</b>	
<b>Project:</b>	<b>Interactive Tour Mobile Robot</b>	
<b>Supervisor:</b>	<b>Dr. Khaled Zied</b>	
<b>Students:</b>	Ahmed Mahmoud abdo	
	Ahmed Mohsen	
	Mohamed Fathy	
	Mahmoud Hesham Alarabi	

**ABSTRACT**

The main objectives of the project are to design and control of a mobile robotic device to guide visitors to the AAST in Cairo on the open days for new comers to make an impact to show the technology advances in the academy and to attract students to join the academy. The robot will be used to move in corridors in the academy buildings to show labs and classes with the aid of visual and audible information about the academy places.

**Project Methodology:**

Literature review – Studying the similar projects – Design the robot kinematics – Design the mechanical parts and preparing the calculation sheets – Preparing workshop drawings – Design the control strategy – Design the control circuits – Development of software – Manufacturing of mechanical components –Manufacturing of electric and control components – Assembling of the system – Testing the system and assessment its accuracy – Preparing of project documentations – Preparing of final presentation



<b>Department:</b>	Mechanical Engineering [Mechatronics]	
<b>Project:</b>	A universal Testing Machine	
<b>Supervisor:</b>	Dr. Mohamed Aly Khamis Elsayed	
<b>Students:</b>	Peter Nagy	
	Ramez Saad	

**ABSTRACT**

In this project, a hydraulic testing machine is used in order to test either tension or compression on a specified known material specimen. In this project, we concentrate on the compression test of a readymade concrete, the composition of this concrete will be discussed further. The machine will perform the task by applying a force on the specimen using a hydraulic piston which is motorized; the whole task is explored further in the project.





<b>Department:</b>	<b>Mechanical Engineering – Mechatronics</b>	
<b>Project:</b>	<b>Design and manufacturing of a CNC milling machine</b>	
<b>Supervisor:</b>	<b>Dr. Mostafa Rostom A. Atia</b>	
<b>Students:</b>	Bishoy Moheb Saeed	6103884
	Andro Samir Weliam	6103633
	Mohamed Ahmed Kamal	6103204
	Hasan Mohamed Hasan	6103063

### ABSTRACT

CNC milling machine is one of the bench mark project for Mechatronics student. The project contains mechanical, electronic and software components. The machine control is a contour type base, which needs synchronization between the three axes, which represent real difficulties to be solved. Therefore, the aim of the present project is design and manufacturing a CNC milling machine.

During the project, the students have designed the mechanical part of the CNC system. 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.



<b>Department:</b>	<b>Mechanical Engineering – Mechatronics</b>	
<b>Project:</b>	<b>Design and manufacturing a Concrete Pump Boom</b>	
<b>Supervisor:</b>	<b>Dr. Mostafa Rostom A. Atia</b>	
<b>Students:</b>	Ragy Mousa Ibrahim	6204016
	Abd El-Rahman Ali Hider	6204080
	Ahmed Ismail Arafa	6209122

**ABSTRACT**

The mobile concrete pump is one of the important equipment in the modern civil work. Its boob reaches high and long distances. It contains several arms. The boom is stretched by manual control. This is a time consuming and causes many accidents. The boom can be considered as a serial robot. Thus, the aim of the present project is design and manufacturing a concrete pump boom with automatic control on the stretching and manipulating operations.

During the project, the students have designed the mechanical part of the system. 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.



<b>Department:</b>	<b>Mechatronics Engineering</b>	
<b>Project:</b>	<b>Universal testing machine</b>	
<b>Supervisor:</b>	<b>Dr.Nabil Gadallah</b>	
<b>Students:</b>	Mohamed khamis kassab	Amr Mohamed gameel
	Ahmed ashraf hamed	Mohamed abdelhay ahmed

### ABSTRACT

The Material Testing Machines are ones of the best projects to enable the students to review , apply and illustrate their knowledge of the studied subjects in the undergraduate period in the academy as:

- Machine Drawing, Machine Design and Computer Aided Design
- Hydraulic Systems and Hydraulic System Control
- Measuring Systems and sensors and Monitoring the results using data Acquisition cart and illustrating the results using the advanced Monitoring packages.
- Material Science and Material Testing
- Manufacture of the machine parts, assemble them , checking the performance of operation and testing.

**Student Mohamed abdelhay** has designed the mechanical structure of the machine and made the calculations for the compression and bending testing operations.

**Student Amr Mohamed gameel** has designed the hydraulic circuit of the machine according to the required calculations and the required force for the testing operations.

**Student Mohamed khamis kassab** has designed the electrical circuit required for the machine and choosing the required sensors and its calculations for the testing operations.

**Student Ahmed ashraf hamed** has designed the required program for operating the machine and making the required calculations and results of the testing operations.



<b>Department:</b>	<b>Mechanical Engineering, Mechatronics Department</b>
<b>Project:</b>	<b>Master Slave Robotic Hand</b>
<b>Supervisor:</b>	<b>Dr. Salem A. Haggag</b>
<b>Students:</b>	Ahmed Mohamed Amin Assal
	Ahmed Hossam El-Din Hassan
	Amr Hossam El-Gohary
	George Nabil Fahmy Soliman

**ABSTRACT**

The Master/Slave Robotic Hand graduation project is a multi-purpose high response humanoid hand. The Slave is an aluminum hand that should copy the motion of the fingers of the Master which is a glove fitted with sensors through a programmed controller. The project was designed taking all engineering considerations into account. Flex sensors are used as the feedback sensors in the Master subsystem while servomotors are used as the actuators in the Slave subsystem. The control system (microcontroller based controller) uses the feedback signals of the Master subsystem to mimic its motion profile through parallel activation the actuator in the Slave subsystem.

The prototype -with some optimization and upgrades- should prove very useful in many fields especially in all kinds of tele-operations (medical, space...etc) and working in hazardous environments.



<b>Department:</b>	<b>Mechanical Engineering, Mechatronics Department</b>
<b>Project:</b>	<b>Sideways Tracking Robot</b>
<b>Supervisor:</b>	<b>Dr. Salem A. Haggag</b>
<b>Students:</b>	Amany Khaled Ahmed Sayed
	Mohamed El-Sayed Ahmed El-Sayed El-Shorbagy
	Amr Ashraf Abdelhameed Awad

**ABSTRACT**

This project highlights the study introduced by a team of undergraduate mechatronics students to design and implement a full mechatronic robotic security system. This system is capable of tracking sideways and getting temperature information from the around area. The system is required to get full temperature features of an area away from human reach which is supposed to be totally secured. It was a necessity to follow the certain objectives of any mechatronics system from cost optimization to full efficiency.

The project is set out to design and implement an autonomous security system based upon wall tracking, obstacle avoidance RF communication between an operator available at a PC end and the vehicle. Mechanical design was adopted to be highly efficient to the job and least in cost. Moreover, the control system was chosen to be the easiest approach known around for such a task.

As a result of a number of brainstorming and implementation sessions, an autonomous little vehicle is set to patrol corridors and military areas for security purposes. A temperature system rolls around the vehicle to detect temperature changes and feedback the operator with ultra-average situations.



<b>Department:</b>	<b>Mechanical Engineering Department</b>	
<b>Project:</b>	<b>Design and Manufacturing of Smart Elevators</b>	
<b>Supervisor:</b>	<b>Dr. Sameh Shaaban</b>	
<b>Students:</b>	Kareem Amgad Ahmed	
	Ameer Sarofeem Nageeb	
	Omar Tarek Awad	

**ABSTRACT**

Elevators are very important in the majority of buildings. Elevators of large buildings consume considerable energy during operation. This high energy consumption can be optimized using smart control systems.

The present project concerns with the design and manufacturing of a smart elevators system. The system includes different operating modes like normal operating mode and fire alarm mode. Different actions to minimize energy consumption are implemented.



<b>Department:</b>	<b>Mechanical Engineering Department</b>	
<b>Project:</b>	<b>Monitoring and Control of Refrigeration Cycle</b>	
<b>Supervisor:</b>	<b>Dr. Sameh Shaaban</b>	
<b>Students:</b>	Kareem Ahmed Mohamed	Ahmed Gaber Imam
	Mohamed Fawze Abd Allah	
	Mohamed Mostafa Hussien Salman	

**ABSTRACT**

Modern refrigeration systems involve high level of operation control. The present project aims at designing and manufacturing a simple dual cycle refrigeration system. Analog cycle control is achieved using number of transducers and solenoid valves. Data acquisition card is used in order to collect the data and monitor the cycle performance.

The cycle is manufactured in the form of training module. The module contains both a fridge and a deep freezer. The effect of throttling devices on cycle performance is also investigated.



<b>Department:</b>	<b>Mechatronics Engineering</b>	
<b>Project:</b>	<b>Humanoid Robot</b>	
<b>Supervisor:</b>	<b>Dr. Wessam Hussein</b>	<b>Dr. Mohamed M. Elkhatib</b>
<b>Students:</b>	Khaled Mohamed Gaafar	Mostafa Maher Nofal
	Mohamed Saleh Said	Mostafa Yehia Morsy

## **ABSTRACT**

A humanoid robot is an autonomous robot, because it can adapt to changes in its environment or itself and continue to reach its goal. This is the main difference between humanoid and other kinds of robots.

There are several reasons to build a robot with humanoid form. Humanoid robots are wonderfully complex machines, with the potential to travel through the same formidable terrains that humans can traverse, and to perform the same tasks that humans can perform.

The project object to build a Humanoid Robot that has 19 Degrees Of Freedom (D.O.F) and using microcontroller for controlling the motion of robot body. The Project Consist the following.

### **1- Design Mechanical Body**

The mechanical design includes material selection, motor sizing and the design of the body parts and joints.

### **2- Modeling and Simulation of Body**

This includes convert the mechanical body to mathematical model and solve this equations by simulink Matlab.

### **3- Control Aspects**

Connect the microcontroller with 22 servo motors to control position and speed of each motor.

### **4- Sequence Motion**

Program the microcontroller to control a series of events representing robot walking motion.



