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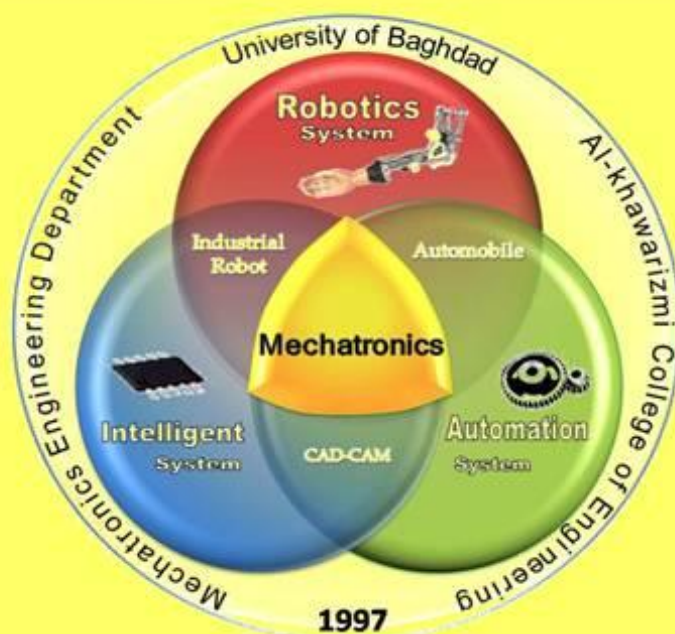
**Graduation Projects' Researches
Of Students In Mechatronics
Engineering Department
2011 - 2012**

Ministry of Higher Education
And Scientific Research
University of Baghdad
AL-Khwarizmi College
Of Engineering

Summaries of Scientific Research Projects for Graduate Students In Mechatronics Engineering Department

2011 - 2012

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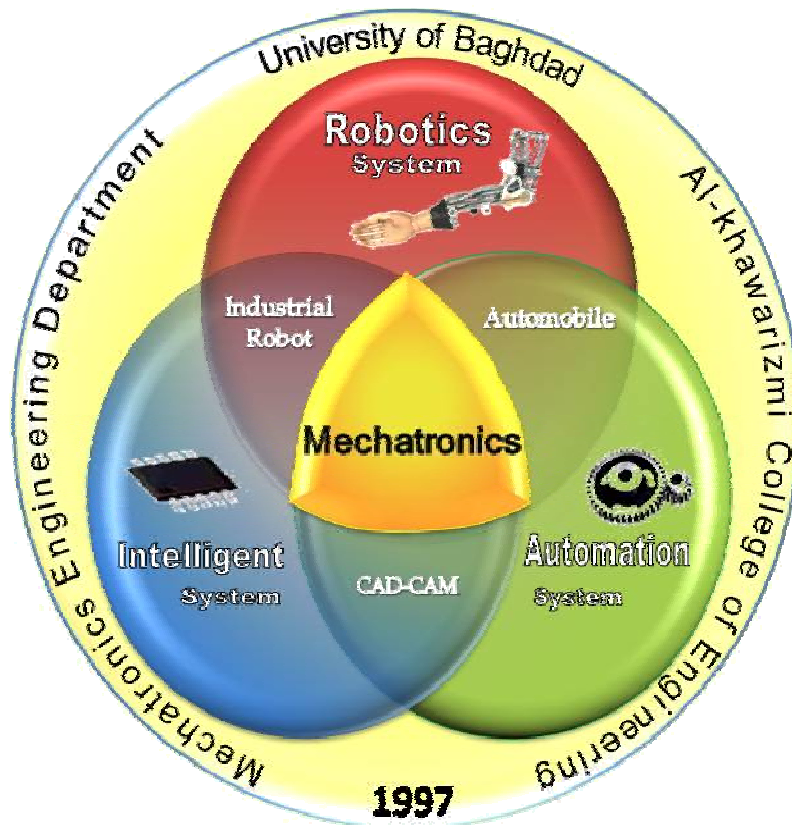
Summaries of Scientific Research Projects for Graduate Students In Mechatronics Engineering Department

2011 – 2012

Student Graduate Projects

Directed by

Prof. Dr. Nabeel K. Abid Al-Sahib
The Dean of Al-Khwarizmi College of Engineering

Supervised by

Dr. Wael Rasheed Abd Majeed
The Head of Mechatronics Engineering Department

Prepared by

Assistant Lecturer Israa R. Shareef

Introduction

Mechatronics Engineering department represents the reference of modern engineering that links the particular specializations of the scientific engineering departments (mechanical , electrical , control and computers) and formulates in a way serving modern development in various engineering devices which is in turn supports the continuity of supplying the educational aspect with scientific and engineering efforts of academic staff , undergraduates and post graduates , a set of projects have been prepared that present the outcome of the department scientific efforts which had the greatest impact with the participation of a whole section of the conferences and gatherings, in order to demonstrate the importance of Mechatronics Engineering in the intellectual disciplines and applied learning , this booklet has been prepared , which includes the final year student projects of the academic year 2011 - 2012 which are completed within the department.

Dr. Wael Rasheed
Head of the Mechatronics
Engineering Department
2011 - 2012

Academic Staff of Mechatronics Engineering Department

**Prof. Dr. Nabeel Kadim
The Dean**

**Prof. Dr. Abdul Salam
Al-Amiri**

**Ass Prof. Dr. Bahaa
Ibrahim**

Dr. Wael Rasheed

Head of the department

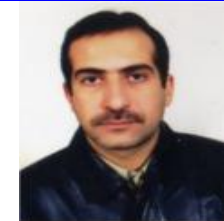**Dr. Laith Abed Sabri**

Dr. Laith Jameel

**Ass Prof. Dr. Ali
Ibrahim Mahdi**

Dr. Laith Awda Kadhim

M.Sc. Ali Hussan

M.Sc. Yarub Omer

M.Sc. Hisham Hassan **Reporter the department**	**M.Sc. Ahmed Rahman**	**M.Sc. Ayad Jasim**
M.Sc. Ra'ad Kadhem	**M.Sc. Aymen Ahmed**	**M.Sc. Furat Ibrahim**
M.Sc. Emman Ahmed	**M.Sc. Aslan Sabah**	**M.Sc. Adnan Jabbar Attiya**
	M.Sc. Israa Rafie	

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Student Graduate Projects 2011-2012

	Project Name	Supervisor Name	Student Name
1	Vibration control of mechanical bodies	Dr. Laith Abd Sabri	Sarah Basim + Mirna Mazin
2	Design intelligent home alarm system based internet	M.Sc. Malik Mouhamed Ali M.Sc. Ali Hussein Meri	Riam Nima + Aya Majeed
3	Robotics arms for explosive disassembling	M.Sc. Yarub Omer Naji	Moustafa Alaa
4	Pneumatic sorting using image recognition	M.Sc. Raad Kadim Mouhamed M.Sc. Ahmed Mahrous Raghib	Khaled Waleed + Ameen Sadiq
5	Automatic irrigation system with humidity sensor	M.Sc. Ali Hussein Meri M.Sc. Hisham Hasan Jasim	Nidaa Abd Al Kareem + Saja Hamed
6	Watering system using solar cell	Dr. Laith Awda Kadim M.Sc. Alaa Abd Ameer Hasan	Shahad Majeed + Mays Mouafaq
7	Obstacle avoidance mobile robot	M.Sc. Yarub Omer Naji M.Sc. Iman Ahmed Zayer	Israa Jawad + Lina Kamran
8	PMDC motor speed control using SMRS	M.Sc. Aslan Sabah aldeen Jalal	Asaad Sabah + Marwan Kais
9	Smart cleaner design	M.Sc. Aymen Ahmed Salih M.Sc. Amna Abd Al Hadi Salih	Safaa Abd Al Kareem + Safa Hussein
10	Simulation of Biomechatronic hand	M.Sc. Saif Ghazi Faisal	Rawaa Saadoon + Hanaa Fadhel
11	Mobile robot path planning	M.Sc. Israa Rafie Shareef M.Sc. Ahmed Rahman Jasim	Iman Hameed + Rajaa Hilo

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 1	Date:20 / 5 / 2012
Project Name	**Vibration control of mechanical bodies**			
Students Names	**Sarah Bassim**		**Merna Mazin**	
Supervisor Name 1	**Dr. Laith Abd Sabri**		**Field: Mechanic Engineering**	
Supervisor Name 2			**Field:**	

Aim of the Project

This project is about vibration controlling of mechanicals bodies.

Project Summery

In this project , the unbalance will be controlled in any system by adding a mass that substitute the missing part of the real mass.

Discussion

It is based on making an unbalance in a system; that will be described below; this unbalance will force the whole system to vibrate then we will try to stop this unbalancing.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 2	Date:20-5-2012
Project Name	**Home Alarm System Based On E-mail**			
Students Names	**Aya majeed mohsen**		**Reyam naima khalil**	
Supervisor Name 1	**Ali hussien miry**		**Field: electric**	
Supervisor Name 2	**Malik mohammed ali**		**Field: mechanic**	

Aim of the Project

The aim of the project is to investigate a cost effective solution that provide controlling of home appliances remotely and will also enable home security against intrusion in the absence of home owner.

Project Summery

In this project we present an operational computer vision system for real-time detection and tracking of human motion.

The system captures a scene and identifies those moving objects which are characteristically human. This serves as both a proof-of concept and a verification of other existing algorithms for human motion detection.

Discussion

In this project we built hardware and software systems based on the techniques of the internet especially email technique. Where a message has been sent via email in the event of any break in the infrared signal indicating the passage of people in that building. This process is done by programming the microcontroller in assembly language.

Suggestions for Future Developments

1. The use of sensors with high specifications for the purpose of detecting infrared signals over long distances.

2. to Increase reliability, we will use other sensors to detect movement such as surveillance cameras.

3. Published several sensors in several places.

4. The use of mobile technologies in addition to Internet services.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 3	Date:20/5/2012
Project Name	**Robotic arms for explosive disassembly**			
Students Names	**Mustafa Alaa Yusuf**			
Supervisor Name 1	**Yuarub omer**		**Field: mechatronics**	

Aim of the Project

The aim of this project is to perform simulation to a human arm and use it for explosive

disassembly .

Project Summery

Create human arms that represent three degree of freedom where this done by using 6 dc motor
and two links and two grippers .

Discussion

The control of robot joints done by electrical cct. Where this cct. Consist from two relays and analog
comparator that compare between the bending sensor voltage on the robot joint and the bending
sensor on the human joint and give the electrical signal to one of the relay to rotate the motor
according to human arm.

Suggestions for Future Developments

1) use camera for imaging the sample .

2) using wireless connection to control the robot from distance.

3) develop the mechanical structure by adding more degree of freedom to increase the flexibility.

4)control the robot hand through electrical brain signal.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 4	Date:20-5-2012
Project Name	**Pneumatic Sorting Using Image Recognition**			
Students Names	**Ameen sadiq**		**Khaled waleed**	
Supervisor Name 1	**Ahmed mahrous**		**Field: electric**	
Supervisor Name 2	**Raad kadem**		**Field: mechanic**	

Aim of the Project

The aim of project is to make production line to sort the parts automatically without handle sorting.

Project Summery

The idea of this project comes to improve the sorting operation, and it is ready to use in any application.

Discussion

The idea of project is pneumatic arm that transfer part which its shape is known by camera(web cam) to the belt that driven by a dc motor have a constant speed , and after few seconds dc motors that placed along the belt which connected to small arm sort the parts according it's shape ,this motors receive it's signal from computer ,and sort any one of these parts. There is a spatial place for any shape. When the part is pass, the small arms will responsible to pass it to the desired place.

Suggestions for Future Developments

The obstacles is dynamic and using fuzzy control.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 5	Date:20-6-2012
Project Name	**Automatic irrigation system with humidity sensors**			
Students Names	**Nidaa Abd Alkareem**	**Saja Hamed**		
Supervisor Name 1	**Husham jasim hasun**	**Field: mechanic**		
Supervisor Name 2	**Ali hussien mery**	**Field: mechanic**		

Aim of the Project

The objective of the project is to control and maintain the amount of water needed by the soil to moisture.

Project Summery

According to the inducted development in various sciences and the development in technology in the world and because lack of water, the idea of controlling and maintaining the amount of water to make the process of irrigation is automatically by sensors, soil moisture, irrigation control by the order come from computer in order to preserve the water from the waste.

Discussion

Was the use of interconnection (parallel port-pc interface) as a means of communication between input, a signal coming from the sensor (sensor soil moisture) and the output is (water pumps) for the purpose of control in operation and firefighters whether soil moisture a few are giving the signal operation of the pumps and send a signal by the computer through the program by (visual basic) this program illustrates the conditions of irrigation according to need soil moisture for irrigation and when the soil is saturated and stop the pump automatically.

Suggestions for Future Developments

The automatic irrigation by use USB or PLC.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 6	Date:20-5-2012
Project Name	**Watering system using solar cell**			
Students Names	**Shahad majeed**		**Mais muafaq**	
Supervisor Name 1	**Dr. Laith Audaa**		**Field: mechanic**	
Supervisor Name 2	**Alaa abd alameer**		**Field: electric**	

Aim of the Project

the aim of project is to use sun energy that is extensively available in Iraq to power the watering system in far away system.

Project Summery

According to the sun energy transformed to electrical energy that will power both the watering pump and the linear motor that is responsible of moving the solar cell forward and reverse ,the motor can be actuated from electrical circuit contain digital comparator for comparing the voltage of two photo resister that is responsible of solar cell movement toward largest sun energy.

Discussion

The comparing process will be continuous that will cause unbalance movement for the solar cell in case we use op-amp because it does not have equilibrium state between the two comparing amount ,where if we use digital comparator which have three states (largest, equal , smallest) that provide the stable movement.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 7	Date:20-5-2012
Project Name	**Obstacle Avoidance Mobile Robot**			
Students Names	**Leena Kamaran Ihssan**		**Israa Jwad Kadem**	
Supervisor Name 1	**Yarub Omer Naji**		**Field: Mechatronics**	

Aim of the Project

The aim of this project is design mobile robot and ability to avoid the obstacles in front of it.

Project Summery

The mobile robot proposed in this project is an obstacle avoidance robot used in wide-range of applications ,as automatic floor cleaner.Infrared sensor used to discover the obstacle and AT89C51 microcontroller to control the whole motion process.

Discussion

After multi test applied to the mobile robot with proposed avoidance strategy, its cleared that the proposed mobile robot is able to avoid static obstacles by using many type of sensor but we found that the IR sensor is suitable because the ratio of noise is minimum ratio when we compare with another sensor.

Suggestions for Future Developments

The obstacles is be dynamic and using fuzzy control

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 8	Date:20/5/2012
Project Name	**PMDC Speed Control Using SMRS**			
Students Names	**Asaad Sabah Asaad**		**Marwan Qais Mohammad**	
Supervisor Name 1	**Aslan Sabah Al deen Jalal**		**Field: electric**	
Supervisor Name 2			**Field:**	

Aim of the Project

The aim of project is to enter 12 volt and out 6 volt to control speed of DC motor.

Project Summery

Depend on enter constant voltage and control speed of DC motor for reduce the power consumption.

Discussion

This project include make electric circuit for reduce input voltage and control speed of DC motor and make simulink to find the result and make comparison with practical values.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 9	Date:20/5/2012
Project Name	**Smart cleaner design**			
Students Names	**Safaa abd al_kareem**		**Safa husien hamoody**	
Supervisor Name 1	**Aymen ahmed salih**		**Field: control**	
Supervisor Name 2	**Amenah abd al_hadi salih**		**Field: mechatronics**	

Aim of the Project

The goals of this project : scan the room. Clean up all the dirt. Return home and stop. Enable two-way communication, direct to send commands to the robot and use the program set up to provide feedback to the PC station. Use the interface as a means of getting visual data from the robot, will help enable to map the path of the robot. Calibration of the robot to move in predetermined time.

Project Summery: This work contains theoretical part and experimental part.

The theoretical part includes building MATLAB program which applied to environment image to recognize the rubbished particle locations in the environment, and according to this wireless signal is sent to the intelligent vacuumed cleaner which made it move towards these particulars and remove it completely from the environment The experimental work, which include the design of wireless vacuumed cleaner and interface circuit to send a signal to the wireless cleaner according to the image obtained from a camera which is fixed above the environment.

Discussion

Set up the camera to the computer using USB port and take a picture and make that picture as an input to the MATLAB program .

Suggestions for Future Developments

1) Instead of the camera it can use a wireless camera that setup on the mobile robot . 2) It can using the sensors such as ultrasonic , IR sensors to detect the obstacles. 3) It can use the mobile sensing robot.

4) make the cleaner more intelligent by using microcontroller that setup on it to take it's orders.

5) Using genetic algorithms in intelligent cleaner device.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 10	Date:20/5/2012
Project Name	**Simulation of a Biomechatronic hand**			
Students Names	**Hanaa Fadhel**		**Rawaa Sadoon**	
Supervisor Name 1	**Saif Ghazy**		**Field: mechatronics**	
Supervisor Name 2			**Field:**	

Aim of the Project

The aim of this project is to perform simulation to a human hand as a biomechatronics hand,

specifically, a hand finger (index).

Project Summery

After doing many searches and studies regarding this major ,a finger is simulated as single robotic arm and its axes coordinates are translated to be fitted on one of human hand fingers (index),then the equations and transformation matrices are created to have the forward kinematic matrix of the finger.

Discussion

A software program is constructed by MATLAB to simulate the finger equation and matrices in the program and then we can get the resulting finger final matrix which represents the rotation around z-axis for(home, grasping and special positions) .

Suggestions for Future Developments

1) Our project can be developed by utilizing mouse hardware circuitry and connect its output to human hand , and thus we can show the movement of the hand when we movie the mouse.

2)The electromyography (EMG) signal can be used to control the biomechatronic hand, so it can be connected to the hand muscles.

3) A biomechatronic hand can be constructed from a certain mechanical structure and design it with a an interface port that can be connected to human nervous system later.

Student Project Paper for Final Class

University of Baghdad	Al-Khawarizmi College of Engineering	Mechatronics Dep.	Project Index: 11	Date:20/5/2012
Project Name	**Mobile robot path planning**			
Students Names	**Iman Hameed**		**Rajaa Helo**	
Supervisor Name 1	**Israa Rafie Shareef**		**Field: Mechatronics Engineering**	
Supervisor Name 2	**Ahmed Rahman Jasim**		**Field: Mechatronics Engineering**	

Aim of the Project

Design of a mobile robot that has the ability to detect the start point , target point , and obstacles .

Project Summery

This project involves creating an integral MATLAB program that inspect and recognize the contents of the mobile robot environment by using a vision sensor and a PC-Interface . The mobile robot will be capable of working autonomously from Start to Goal with avoiding Obstacles .

Discussion

The next figure explains the essential steps of accomplishing this project :

Suggestions for Future Developments

1-Implement a three-dimensional environment for the mobile robot path planning .

2-Make the obstacles subject to a dynamical motion .

3-Provide the mobile robot with the stereo vision .

4-Adding another sensor like ultra sonic sensor to locate more accurately .

5-Implement the path planning algorithm by one of the artificial intelligence methods like fuzzy , neural networks , and genetic .