WIRELESS CONTROLLED OMNIDIRECTIONAL MONITORING ROBOT WITH VIDEO SUPPORT

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This report submitted in partial fulfilment of the requirements for the award of Bachelor of Electronic Engineering (Wireless Communication) With Honours

Faculty of Electronics and Computer Engineering
Universiti Teknikal Malaysia Melaka

Jun 2012

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : WIRELESS CONTROLLED OMNIDIRECTIONAL MONITORING ROBOT WITH VIDEO SUPPORT

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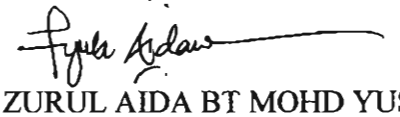
DECLARATION

I hereby, declared this report entitled "WIRELESS CONTROLLED OMNIDIRECTIONAL MONITORING ROBOT WITH VIDEO SUPPORT " is the results of my own work except for quotes as cited in references.

Signature	:	
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ABSTRACT

The Final Year Project (FYP) or Project Sarjana Muda (PSM) is a subject that must be completed by final year students as a requirement to receive the bachelor of engineering degree. In this subject, the students will be given two semesters to work on a task that is related to their field of interest. Students are expected to do their work independently most of the time, but their progress will be monitored closely by their supervisors. At the end of the project, students will have to document their work in a report which must be hard bounded and submitted to the Faculty. PSM for Bachelor in Electronic Engineering (Wireless Communication) is to give students an opportunity to make use of the expertise and knowledge in hardware and software that they have gained in their class. The project that was chosen is Wireless controlled omnidirectional monitoring robot with video support. This project is an elementary that can be controlled with using RF mode and with camera on the robot surface. Generally, the RF has the advantage of adequate range up to 200 meters with proper antennas and the proposed monitoring robot is omnidirectional that it can move in forward and reverse directions, monitoring robot also is able to steer it towards left and right direction. It also have additional webcam/camera that can display on the monitor screen by using the wireless mode, beside that this project also using EPIC software and PIC Microcontroller for controlled the robot. To make sure that the objectives of this project achieved, a systematic method have been applied in order to obtain the future development of the robot especially for the robot motor control circuit and actuator mechanical system.

ABSTRAK

Projek Tahun Akhir (FYP) atau Projek Sarjana Muda (PSM) adalah satu subjek yang perlu diselesaikan oleh pelajar tahun akhir sebagai syarat untuk menerima ijazah sarjana kejuruteraan. Dalam mata pelajaran ini, pelajar akan diberi dua semester untuk membuat kajian dalam bidang yang mereka minat . Pelajar dijangka untuk melakukan tugas mereka secara bebas mengikut masa, tetapi peningkatan projek mereka akan dipantau rapi oleh penyelia mereka. Pada akhir projek, pelajar akan mendokumenkan kerja mereka dalam satu laporan yang mesti dijilid dan diserahkan kepada Fakulti. PSM adalah untuk melengkapkan Ijazah Sarjana Muda dalam bidang Kejuruteraan Elektronik (Komunikasi wayarles) untuk memberi pelajar peluang menggunakan kepakaran dan pengetahuan dalam perkakasan dan perisian yang mereka perolehi dalam kelas. Projek yang telah dipilih adalah Wireless controlled omnidirectional monitoring robot with video support. Projek ini adalah asas yang boleh dikawal dengan menggunakan mod RF dan dengan kamera di permukaan robot. Secara umumnya, RF mempunyai kelebihan sehingga 200 meter dengan menggunakan antena dan robot pemantauan yang dicadangkan adalah omnidirectional bahawa ia boleh bergerak ke hadapan dan berbalik arah, robot pemantau ini juga mampu untuk memandu ke arah kiri dan kanan. Ia juga mempunyai webcam / kamera tambahan yang boleh dipaparkan pada skrin monitor dengan menggunakan mod wayarles. Selain daripada itu projek ini juga menggunakan perisian EPIC dan Mikropengawal PIC bagi robot terkawal. Untuk memastikan bahawa objektif projek ini dicapai, satu kaedah yang sistematik telah digunakan untuk mendapatkan pembangunan masa depan robot terutamanya bagi litar kawalan motor dan sistem penggerak robot mekanikal.

DEDICATION

"In the Name of Allah, the most Beneficent, the Most Merciful"

Special Dedication to my family and especially my parents

To my supervisor Eng. Maizatul Alice Bt Meor Said,

My friends, my fellow bosses and my university

Thank you for all your care, support and believe in me.

ACKNOWLEDGEMENT

In the name of Allah, invocation and greetings to adoration of Nabi Muhammad (S.A.W.), thanks to God because giving me strength and patience in finishing this Final Year Project. Alhamdulillah.

The satisfaction that accompanies the successful completion of task would be but incomplete without mention of the people, who made it possible, whose constant guidance and encouragement crown all efforts with success.

In particular, I wish to express my sincere appreciation to my supervisor, Eng. Maizatul Alice Bt Meor Said, for encouragement, guidance, critics and friendship. My fellow friends under the same supervisor should also be recognized for their support and ideas.

In addition, my sincere appreciation also extends to all my university and others who have provided assistance at various occasions. Their views and tips are useful indeed. I would also like to thank to all UTeM's lecturers and electrical technicians whom had helped directly or indirectly. Unfortunately, it is not possible to list all of them in this limited space. I sincerely appreciated all of the efforts and precious time to be spent together in making this final year project educational, enjoyable and memorable. Not to be forgotten, my deepest thanks to my parents for all the support and blessings.

The great cooperation and kindheartedness to share worth experiences that have been shown by them will be always appreciated and treasured by me, thank you.

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PIC	Programmable Interface controller
ULN	Octal Peripheral Driver Arrays
SPDT	Single Pole Double Throw
DPDT	Double Pole Double Throw
DC	Direct current
AC	Alternating current
PCB	Printed circuit board
RF	Radio frequency
USB	Universal Serial Bus
Omnidirectional	Multifunction
CMOS	Complementary metal oxide semiconductor
IR	Infrared remote
SSOP	Shrink small-outline package
SOIC	Small Outline integrated circuit
PDIP	Plastic package integrated circuit

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CHAPTER 1

INTRODUCTION

1.1 Background

Technology is the making, usage, and knowledge of tools, machines, techniques, systems or methods of organization in order to solve a problem or perform a specific function. It can also refer to the collection of such tools, machinery, and procedures. Technology has affected society and its surroundings in a number of ways. In many societies, technology has helped develop more advanced economies and has allowed the rise of a leisure class.

The implementation of this project is to resolve the problem of replacing a human work with wireless controlled omnidirectional monitoring robot with video support that completely controlled with wireless network. The recent developments in technology which permit the use technology such as wireless, using wireless it have capabilities of communicating with each other. Wireless is a new technology, which has at its center the goal of eliminating wired connections between computers. Instead of connecting with wires, every appliance has small transmitters/receivers.

The project is to detect an object that is located at some distance within the range of RF transmitter with webcam. The webcam that have used is a camera which is feeds its images in real time to a computer or computer network, often via USB. Other than that, with this webcam the project is more better because as a security surveillance and there are also uses on sites like video broadcasting services and for recording social videos.

This project also can move in forward and reverse directions. Beside that it also is able to steer it towards left and right directions where the controller circuit and webcam is put it on the surface of robot (like car controlled). Automation is today's fact, where things are being controlled automatically, usually the basic tasks of movement, either remotely or in close proximity. The concept of wireless controlled omnidirectional monitoring robot devices is using the wireless that is more reliable nowadays; any time in the world today can be a reality. Assume a system where from the processing image (monitor), the user could view the image that appear in monitor screen and decides to take control the movement by using RF transmitter to view the dangerous area.

1.2 Aim of the project

The project is basically used to detect an object by using a wireless robot with webcam and appear in monitor screen. This project uses a RF remote control that has advantages of adequate range (up to 200 meters), which has a wide range of applications such as detecting the object in longer distance. The webcam is mounted on the surface of robot. The robot is controlled through transmitter which is as a remote control. The video sent by the webcam can be viewed on the monitor. The video sent by the webcam is sampled and the sampled image is processed through EPIC software.

1.3 Scope

To achieve this mission, the system was developed into two parts.

- *Part 1 is refer to the hardware*
- *Part 2 is refer to the software*

For the HARDWARE it contains the part of the circuit process and for the SOFTWARE it contains the part of programming process.

The scope of project in PSM 1 is to design and fabricate some part of project. The area of interest is remote control of wireless controlled omnidirectional monitoring robot with video support that using RF transmitter. This project will focus on the remote control of a transmitter and receiver (controlled circuit) which is including PIC16F84A, PT 2272M, PT 2262M and ULN 2803.

- To design and fabricate a controller circuit system with PIC 16F84A
- To design and fabricate a transmitter module using PT 2262M
- To design and fabricate a receiver module using PT 2272M
- To design and do a research about wireless webcam.

1.4 Significance of the work

The word robot can refer to both physical robots and virtual software agents, but the latter are usually referred to as bots. There is no consensus on which machines qualify as robots, but there is general agreement among experts and the public that robots tend to do some or all of the following: move around, operate a mechanical limb, sense and manipulate their environment, and exhibit intelligent behavior, especially behavior which mimics humans or other animals. Controlled by computer, the owner can move the robot to various locations within range of the RF transmitter, take pictures and video, and listen to surroundings with the on-board microphone

1.5 Problem Statement

Design and construction of this project requires a broad range of engineering skills such as electronics design, program design and how to approach complex engineering problems. To build this project;

- Need know how to build the controller circuit, transmit and receive circuit?
  In the construction of circuit, the selected component is very important to ensure that the circuit is function. After the component, the connection of control circuit, transmitter and receiver must be connected properly.

- Which webcam technologies provide the cost effective? And which webcam having a good quality video in real time?
  Having a good quality image is very difficult in real time. The selection type of webcam plays an important role because good quality image is using a good webcam. This will cause the cost of project (cost expensive) and problem in real time.

1.6 Objectives

1.6.1 Main objective

- Main objective is to design Wireless controlled omnidirectional monitoring robot with video support.

1.6.2 Specific objectives

- To implement the large application on wireless webcam with the high quality of video support.

  In this project, the important thing is in a part of webcam which is doing a research about multifunction webcam and want to upgraded the webcam which is the camera can capture the image with move back and forth, up and down, and zoom to improve the viewing area.

- To monitor or detect the image or objects at long distance.

  This project can monitor and detect the image or an object in real time at long distance, the RF remote control has been using which is the advantage of adequate range (up to 200meters).

- To analyze and identify the weaknesses of existing wireless controlled omnidirectional monitoring robot with video support.

  In this part, the wireless is the main factor that image can be sent in a monitor screen which is the laptop or Pc can be used in the control room for image processing. Many factors that can be interference during transmission such as not in real time, therefore the objective of this project is to improve the quality of video that appear in screen.

- To build a wireless controlled omnidirectional monitoring robot with video support and applying PIC microcontroller to control the circuit.

The PIC or circuit is also the main factor that can generate the robot such as to move the robot. The chosen of PIC and connecting of the circuit is the important part to develop this project.

1.7 Methodology

The project begins by programming the microcontroller for serial communication with PIC 16F84A interface. Microcontroller is a single chip containing a microprocessor, memory, input and output ports. Since all four blocks reside on the one chip a microcontroller is much faster than microprocessor system. PIC 16F84A is a main part of controller circuit that connect from receiver to ULN interface, relay and motor.

The receiver receives the data and decodes the information received using PT 2272M decoder. While for PT 2262M is a part of transmitter which is a remote control encoder paired with PT 2272M utilizing CMOS technology. It encodes data and address pins into a serial coded waveform suitable for RF modulation.

The decoded data is sent to the ULN2803 which is a pin chip of eight Darlington arrays which is used to drive the relays. SPDT relays are used to control the DC motor which controls the motion of bot. SPDT relay have four parts in every relays which is electromagnet, armature (can be attracted by the electromagnet) and set of electrical contacts.

Wireless camera used for object detection is mounted on the surface of robot. It is a wireless video webcam RF communication range. Other than that, webcam connected to the monitor screen using RF Module receiver. Special module used to the video stream from a webcam to assist or enhance a user's control of applications.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss about literature review, fact and finding in order to study and understand the current technology of existing system which is the fact later will be use as a guidance to develop the application which is focus to the system that based on monitoring orientation.

Fact-Finding is the formal process to collect information about systems, requirement and preferences. Fact-finding is most crucial to the systems planning and systems analysis phases. It helps to learn about the vocabulary, problems, opportunities, constraints, requirements and a system.

Interview, research and literature study are the fact-finding technique that be used during the early stage of the system planning and system analysis phase in order to collect the related information. Wide ranges of information resources need to consult during research and literature study. The inform sources include contact with peers, colleagues, supervisor and the user of the system; the formal sources including books, journals, research papers, encyclopedias, newspapers, magazines, handbooks, thesis, bibliographies and World Wide Web (WWW). Internet and WWW exploring provides