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
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Jun 2012
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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

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.
TABLE OF CONTENTS

Abstract........................................................................................................i
Abstrak........................................................................................................ii
Dedication....................................................................................................iii
Acknowledgement.......................................................................................iv
Table of Contents........................................................................................v
List of Figures...............................................................................................x
List of Abbreviation.....................................................................................xiii
List of Table................................................................................................xiv

CHAPTER 1: Introduction

1.1 Background...........................................................................................1
1.2 Aim of the project..................................................................................2
1.3 Scope.....................................................................................................3
1.4 Significant of the work.........................................................................3
1.5 Problem statement................................................................................4
1.6 Objectives.............................................................................................5
1.7 Methodology.........................................................................................6

CHAPTER 2: Literature Review

2.1 Introduction..........................................................................................7
2.2 Fact and Finding....................................................................................8
  2.2.1 about final year project.................................................................8
2.3 Background project..............................................................................9
2.4 Design of Project................................................................................10
2.5 Design of Circuit................................................................................13
2.5.1 Selection of hardware component ........................................... 14
  2.5.1.1 Introduction .................................................................. 14
  2.5.2 Selection of PIC 16F84A ....................................................... 15
    2.5.2.1 Memory organization in PIC 16F84A ............................. 19
    2.5.2.2 Program memory organization .................................... 20
    2.5.2.3 Data memory organization ......................................... 20
    2.5.2.4 Status Register .......................................................... 21
    2.5.2.5 Option Register ......................................................... 23
    2.5.2.6 Basic different between microcontrollers .......................... 24
      and microprocessor

  2.6 Selection of ULN 2803 (Octal Peripheral Driver Arrays) ........... 25
  2.7 Selection of Relay ............................................................... 27
    2.7.1 Relay Construction ....................................................... 30
  2.8 Selection of DC Motor .......................................................... 32
  2.9 Selection of Voltage Regulator .............................................. 35
  2.10 Selection of PT 2262 ............................................................ 38
  2.11 Selection of PT 2272 ............................................................ 40
  2.12 Selection of Capacitor ......................................................... 42
  2.13 Selection of Diode ............................................................... 44
  2.14 Crystal .............................................................................. 45
    2.14.1 Crystal/ceramic resonator ............................................. 45
  2.15 Selection of webcam ............................................................. 46
  2.16 Designing of circuit ............................................................. 47
    2.16.1 Designing circuit of power supply .................................. 47
    2.16.2 Designing circuit of relay .............................................. 48
    2.16.3 Designing circuit of motor ............................................. 48
    2.16.4 Designing circuit of ULN2803 ........................................ 50
    2.16.5 Designing circuit of PIC ................................................. 50

vi
CHAPTER 3: Methodology

3.1 Introduction .............................................................. 51
3.2 Phase 1: Project planning .............................................. 54
   3.2.1 Requirements Elicitation ........................................ 55
   3.2.2 Data collection methods ........................................ 55
   3.2.3 Data interpretation and analysis .............................. 55

3.3 Phase 2: Project Development ........................................ 56
3.4 Phase 3: System design and process ............................... 58

CHAPTER 4: Result & Discussion

4.1 Analysis of Programming software ................................. 63
   4.1.1 The Compiler .................................................. 63
   4.1.2 PIC Basic & PIC Basic Pro Compiler ........................ 64
   4.1.3 Epic Programmer .............................................. 65
   4.1.4 16F84 PIC Microcontroller .................................. 65

4.2 Installing the Compiler ............................................... 68
4.3 Installing PIC Basic Pro Compiler .................................. 69
4.4 Installing the EPIC software ....................................... 75
   4.4.1 Installing the PIC software in windows .................... 75

4.5 Expected Result ...................................................... 81
4.6 Result project ........................................................ 82
4.7 Speed Tests ............................................................ 85
4.8 Override Relay Tests ............................................... 87
4.9 Floor Movement tests with webcam ............................... 88
4.10 Tests the circuit boards ............................................ 88
4.11 Discussion ............................................................ 90
CHAPTER 5: Conclusion & Recommendation

5.1 Conclusion ........................................................................................................ 92
5.2 Recommendation ................................................................................................ 93

REFERENCES

APPENDICES
# TABLE OF FIGURES

<table>
<thead>
<tr>
<th>NO</th>
<th>FIGURE</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>3 stage of circuit development</td>
<td>9</td>
</tr>
<tr>
<td>2.2</td>
<td>Design of project</td>
<td>10</td>
</tr>
<tr>
<td>2.3</td>
<td>Side view of project</td>
<td>11</td>
</tr>
<tr>
<td>2.4</td>
<td>Design of circuit</td>
<td>13</td>
</tr>
<tr>
<td>2.5</td>
<td>Pin 8 diagrams for PDIP and SOIC</td>
<td>15</td>
</tr>
<tr>
<td>2.6</td>
<td>Pin 8 diagrams for SOIC</td>
<td>15</td>
</tr>
<tr>
<td>2.7</td>
<td>PIC 16F84A</td>
<td>17</td>
</tr>
<tr>
<td>2.8</td>
<td>Details the pin out of the device with descriptions and details for each pin</td>
<td>17</td>
</tr>
<tr>
<td>2.9</td>
<td>Program memory map and stack-PIC 16F84A</td>
<td>19</td>
</tr>
<tr>
<td>2.10</td>
<td>Register file map-PIC 16F84A</td>
<td>20</td>
</tr>
<tr>
<td>2.11</td>
<td>Status registers (Address 03h, 83h)</td>
<td>21</td>
</tr>
<tr>
<td>2.12</td>
<td>Option Register (Address 81h)</td>
<td>23</td>
</tr>
<tr>
<td>2.13</td>
<td>ULN 2803 Pin connections</td>
<td>25</td>
</tr>
<tr>
<td>2.14</td>
<td>ULN pin connection and blog diagram</td>
<td>26</td>
</tr>
<tr>
<td>2.15</td>
<td>Relay</td>
<td>27</td>
</tr>
<tr>
<td>2.16</td>
<td>Relay diagram</td>
<td>28</td>
</tr>
<tr>
<td>2.17</td>
<td>SPDT Relay</td>
<td>29</td>
</tr>
<tr>
<td>2.18</td>
<td>DPDT Relay</td>
<td>29</td>
</tr>
<tr>
<td>2.19</td>
<td>Structure of DC Motor</td>
<td>32</td>
</tr>
<tr>
<td>2.20</td>
<td>DC Motor</td>
<td>33</td>
</tr>
<tr>
<td>2.21</td>
<td>Working of DC motor</td>
<td>34</td>
</tr>
<tr>
<td>2.22</td>
<td>Conceptual 3-pole dc motor</td>
<td>34</td>
</tr>
<tr>
<td>2.23</td>
<td>Working of 3-pole DC motor</td>
<td>35</td>
</tr>
<tr>
<td>2.24</td>
<td>Pin diagram of regulator</td>
<td>36</td>
</tr>
<tr>
<td>2.25</td>
<td>Pin connection of IC regulator</td>
<td>37</td>
</tr>
</tbody>
</table>
2.26 PT 2262.................................................................................................38
2.27 Pin configuration of PT 2262..................................................................40
2.28 PT 2272..................................................................................................40
2.29 Pin configuration of PT 2272..................................................................42
2.30 Capacitor...............................................................................................42
2.31 Block diagram capacitor.........................................................................43
2.32 Schematic symbol..................................................................................44
2.33 Crystal/ ceramic resonator operation (HS, XT OR LP OSC configuration).................................................................................................45
2.34 Webcam..................................................................................................46
2.35 Circuit of power supply...........................................................................47
2.36 Circuit of Relay.......................................................................................48
2.37 Circuit of Motor (Normally Open)..............................................................48
2.38 Circuit of Motor (Normally Close).............................................................49
2.39 Circuit of ULN2803..................................................................................50
2.40 Circuit of PIC............................................................................................50
3.1 Method project...........................................................................................51
3.2 Steps of methodology...............................................................................52
3.3 Flowchart of design Process......................................................................53
3.4 Flowchart of overall design process............................................................54
3.5 Design of PCB; Microcontroller circuit (receiver).........................................56
3.6 Design of PCB; Transmitter circuit..............................................................57
3.7 Scrub the copper clad...............................................................................58
3.8 clean the board with the acetone...............................................................58
3.9 Iron on the circuit pattern..........................................................................59
3.10 Remove the photo paper...........................................................................59
3.11 Brush the board.......................................................................................60
3.12 Etch the board.........................................................................................60
3.13 Rinsing the board....................................................................................61
3.14 Remove the resist.....................................................................................61
3.15 Drilling......................................................................................................62
4.1 Closed up of EPIC programming carrier board..........................................65
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2</td>
<td>PIC Microcontroller</td>
<td>66</td>
</tr>
<tr>
<td>4.3</td>
<td>Windows version of EPIC Software</td>
<td>68</td>
</tr>
<tr>
<td>4.4</td>
<td>Finding Windows explorer in windows 2000 and XP</td>
<td>70</td>
</tr>
<tr>
<td>4.5</td>
<td>Creating a new folder (subdirectory) on computer’s hard drive C</td>
<td>70</td>
</tr>
<tr>
<td>4.6</td>
<td>Type subdirectory’s name in the New Folder icon</td>
<td>71</td>
</tr>
<tr>
<td>4.7</td>
<td>Selecting the A drive containing the PICBasic program diskette</td>
<td>71</td>
</tr>
<tr>
<td>4.8</td>
<td>Selecting and copying all files and subdirectories on the</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>PICBasic Program diskette</td>
<td></td>
</tr>
<tr>
<td>4.9</td>
<td>Using mouse to copy all selected files on the PICBasic program diskette in</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>the A drive to the PBC directory on the hard drive</td>
<td></td>
</tr>
<tr>
<td>4.10</td>
<td>Starting MS-DOS command Prompt window 2000 and XP</td>
<td>73</td>
</tr>
<tr>
<td>4.11</td>
<td>Using Dos Commands in DOS Prompt window to execute</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>PICBasic Pro Installation Program</td>
<td></td>
</tr>
<tr>
<td>4.12</td>
<td>Selecting Run option on Windows start menu</td>
<td>76</td>
</tr>
<tr>
<td>4.13</td>
<td>Selecting install.bat file on EPIC diskette</td>
<td>76</td>
</tr>
<tr>
<td>4.14</td>
<td>Hitting OK on install.bat to begin execution</td>
<td>77</td>
</tr>
<tr>
<td>4.15</td>
<td>Self extracting EPIC program running in MS-DOS window</td>
<td>77</td>
</tr>
<tr>
<td>4.16</td>
<td>Part of receiver</td>
<td>83</td>
</tr>
<tr>
<td>4.17</td>
<td>After implementation of body car controlled</td>
<td>84</td>
</tr>
<tr>
<td>4.18</td>
<td>Final result and Testing</td>
<td>85</td>
</tr>
<tr>
<td>4.19</td>
<td>Graph showing approximate speed values (averaged over three readings)</td>
<td>86</td>
</tr>
</tbody>
</table>
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIC</td>
<td>Programmable Interface controller</td>
</tr>
<tr>
<td>ULN</td>
<td>Octal Peripheral Driver Arrays</td>
</tr>
<tr>
<td>SPDT</td>
<td>Single Pole Double Throw</td>
</tr>
<tr>
<td>DPDT</td>
<td>Double Pole Double Throw</td>
</tr>
<tr>
<td>DC</td>
<td>Direct current</td>
</tr>
<tr>
<td>AC</td>
<td>Alternating current</td>
</tr>
<tr>
<td>PCB</td>
<td>Printed circuit board</td>
</tr>
<tr>
<td>RF</td>
<td>Radio frequency</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>Omnidirectional</td>
<td>Multifunction</td>
</tr>
<tr>
<td>CMOS</td>
<td>Complementary metal oxide semiconductor</td>
</tr>
<tr>
<td>IR</td>
<td>Infrared remote</td>
</tr>
<tr>
<td>SSOP</td>
<td>Shrink small-outline package</td>
</tr>
<tr>
<td>SOIC</td>
<td>Small Outline integrated circuit</td>
</tr>
<tr>
<td>PDIP</td>
<td>Plastic package integrated circuit</td>
</tr>
</tbody>
</table>
# LIST OF TABLE

<table>
<thead>
<tr>
<th>No</th>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>PIC 16F84A Pin out description</td>
<td>18</td>
</tr>
<tr>
<td>2.2</td>
<td>Positive voltage regulators in 7800 series</td>
<td>38</td>
</tr>
<tr>
<td>4.1</td>
<td>Average speeds for speed settings 6 to 18</td>
<td>86</td>
</tr>
</tbody>
</table>
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