

WIRELESS PEDESTRIAN TRAFFIC LIGHT SYSTEM

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**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

Tajuk Projek : WIRELESS PEDESTRIAN TRAFFIC LIGHT SYSTEM

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A special thanks to my family.

To my beloved mother, father and my supervisor.

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ABSTRACT

The pedestrian traffic light is a device to control the pedestrian traffic. The current system of traffic light are using wired for communication purpose. This project developed a Wireless Pedestrian Traffic Light System. This project is developed to reduce the cost of construction and the usage of wire besides reducing the cost of maintenance. This is also same as the current pedestrian traffic light system, where are using wired. Therefore, in this project a wireless communication technique by using Zigbee as communication devices is proposed due to the fact that by using wire as the communication channel, will increase the cost of the construction and increase the usage of wire besides increasing the cost for maintenance. The communication range of this project is limited to 100 meters with the operating frequency of 2.4GHz. The developments of the Wireless Pedestrian Traffic Light System consist of designing a traffic light model, transmitter- receiver circuit, and develop the wireless system. A bidirectional communication concept is applied in transmitting the signal from one traffic light to the other. The develop system is tested on the real environment of a 6m width of road. From the testing it proved that the system works according to the specification where the communication between both traffic light is successfully function.

ABSTRAK

Lampu isyarat pejalan kaki adalah alat untuk mengawal lalulintas pejalan kaki, jika butang ini ditekan; signal trafik menunjukkan merah untuk pejalan kaki menyeberangi jalan. Sistem lampu isyarat berkomunikasi antara satu lampu isyarat yang lain menggunakan pendawaian di bawah jalan. Projek akan dibangunkan adalah pejalan kaki Wireless Trafik Sistem Light. Projek ini mempunyai fungsi untuk mengurangkan kos pembinaan dan penggunaan wayar selain dapat mengurangkan kos penyelenggaraan. Sistem semasa lampu isyarat sekarang adalah masih menggunakan pendawaian di bawah jalan untuk berkomunikasi antara satu lampu isyarat yang lain. Begitu juga dengan sistem lampu isyarat pejalan kaki; ia masih menggunakan pendawaian di bawah jalan. Oleh itu, dalam projek ini teknik tanpa wayar dengan menggunakan ZigBee sebagai alat komunikasi adalah dicadangkan kerana hakikat bahawa dengan menggunakan wayar sebagai saluran komunikasi, ia akan meningkatkan kos pembinaan dan meningkatkan penggunaan wayar selain meningkatkan kos untuk penyelenggaraan. Rangkaian projek ini adalah terhad kepada 100 meter dengan kekerapan operasi 2.4GHz . Pembangunan pejalan kaki Wireless yang dicadangkan terdiri daripada mereka bentuk model lampu isyarat , litar pemancar -penerima , dan sistem model ini menggunakan konsep komunikasi dwiarah yang digunakan dalam menghantar isyarat dari satu lampu isyarat kepada yang lain. Sistem projek diuji pada persekitaran sebenar 6m lebar jalan. Dari keputusan ujian tersebut membuktikan bahawa sistem ini berfungsi mengikut spesifikasi di mana komunikasi antara kedua-dua lampu isyarat adalah berfungsi dengan jayanya.

TABLE OF CONTENT

CHAPTER	CONTENT	PAGE
	PROJECT TITLE	i
	REPORT STATUS VERIFICATION FORM	ii
	DECLARATION	iii
	SUPERVISOR DECLARATION	iv
	DEDICATION	v
	ACKNOWLEDGEMENT	vi
	ABSTRACT	vii
	ABSTRAK	viii
	TABLE OF CONTENT	ix
	LIST OF TABLES	xiii
	LIST OF FIGURES	xiv
	LIST OF APPENDICES	xvi

1	INTRODUCTION	1
1.1	Introduction	1
1.2	Problem Statement	3
1.3	Project Objective	4
1.4	Scope of work	4
1.5	Project Significance	4
1.6	Thesis Outline	6
2	LITERATURE REVIEW	7
2.1	Introduction	7
2.2	Case Study	8
2.2.1	History of Traffic Light	8
2.2.2	A low Cost Pedestrian Driver Safety	10
2.2.3	Dynamic Traffic Control System	11
2.2.4	Infrared Traffic Light System	12
2.2.5	Adaptive Traffic Control with Wireless sensor	12
2.2.6	Zigbee	13

3	METHODOLOGY	14
3.1	Introduction	14
3.2	Flow Chart	15
3.3	Project Overview	16
3.4	Flow Chart of Designing the Prototype	18
3.5	Project Requirement	19
3.6	Software Requirement	20
	3.6.1 MPLAB C Compilers	20
	3.6.2 CCS C Compiler	21
3.7	Hardware Requirement	21
	3.7.1 Xbee	22
	3.7.2 PIC 16F877A	24
	3.7.3 Interfacing PIC to Xbee	26
3.8	Project Development	27
	3.8.1 How Does the System work	28
3.9	Project Schedule	30
3.10	Software Implementation On Microcontroller	31
	3.10.1 Transmit the data	32
	3.10.2 Combining Source Code	34
	3.10.3 Hardware Development	36

4	RESULT	40
	4.1 Introduction	40
	4.2 Testing Result and Analysis	40
	4.3 Flow chart of system develop	43
5	CONCLUSION AND RECOMMENDATION	45
	5.1 Conclusion	45
	5.2 Recommendation	46
	REFERENCES	49
	APPENDIX A	51
	APPENDIX B	59

LIST OF TABLES

NO	TITLE	PAGES
1.1	The Task Planning Phase	17
1.2	Pin assignment for DB9/RS-32	23

LIST OF FIGURES

NO	TITLE	PAGES
1.1	The illustration of The Project	2
2.1	The first three coloured traffic light	9
2.2	Garrett Morgan Patented the design in 1923	9
2.3	PANDA Type A	10
2.4	PANDA Type B	11
3.1	Flow Chart of Project Methodology	15
3.2	Flow Chart of design Prototype Traffic Model	18
3.3	Circuit diagram of the 50 parallel LED	19
3.4	Completed Soldering of 50 LED	19
3.5	MPLAB Software	20
3.6	Circuit Schematic Xbee through TTL/Cmos	24
3.7	PIC 16F877A	26
3.8	Features of PIC 16F877A	26

3.9	PIC and Xbee Interfacing circuit diagram	27
3.10	States of traffic flow diagram	29
3.11	Prototype of pedestrian traffic light	30
3.12	Complete AT command of Xbee to transmit	32
3.13	Part of source code of the program	33
3.14	Sources code of the Initializes the data	34
3.15	The condition of the program when the Interrupt is activated	34
3.16	PIC Burner	35
3.17	Prototype of Pedestrian Traffic with Push Button	36
3.18	Circuit Diagram of 5 output LED	37
3.19	Block Diagram of Traffic Light	38
4.1	Testing of the pedestrian traffic at the zebra crossing	41
4.2	Testing of the pedestrian traffic light system	42
4.3	Flow Chart of system develop	43
4.4	Testing the system at Wide Space	44
5.1	Various Type of Sensor	47
5.2	Pressure Sensor pad visualization	48

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Coding of the system	51
B	Gantt Chart	59

CHAPTER 1

INTRODUCTION

1.1 Introduction

Wireless Pedestrian Traffic light System is a combination of hardware and software project. This system of the project will use a wireless technique such as Zigbee IEEE 802.15.4. A bidirectional communication concept is applied in transmitting the signal from one traffic light to the other. For introduction, traffic light is a device for the control of vehicle and pedestrian traffic. Currently the most common traffic lights consist of a set of three lights: red, yellow and green. When illuminated, the red light indicates for vehicles facing the light to stop; the yellow indicates caution, either because lights are about to turn green or because lights are about to turn red; and the green light to proceed, if it is safe to do so. The pedestrian traffic light is a device to control the pedestrian traffic, if the button is push, the traffic will indicates red for the pedestrian to cross the road. For these system to be able to communicate and transfer the signal among its in any environment they must

be programmed to respond to outside environment. To do this, the traffic light model needs a specific devices to respond to environment such as ultrasonic, ultrasound, light and many more. So, in this project, Zigbee IEEE802.15.4 is use, it will send the signal to the another system of devices so that the system can interfere and communicate between the two traffic light. Then, the traffic light model will operate as the current function of the traffic light but in term of by using wireless technique. The system proposed will remain the current system and functionality of the traffic light but without wire. Software using in this project is MPLAB IDE and this software is use as the compiler for program codes. The range of this project is limited to 100 meters with the operating frequency of 2.4GHz. The development of the proposed Wireless Pedestrian Traffic Light System consists of designing a traffic light model, transmitter- receiver circuit, and the system wireless model uses.

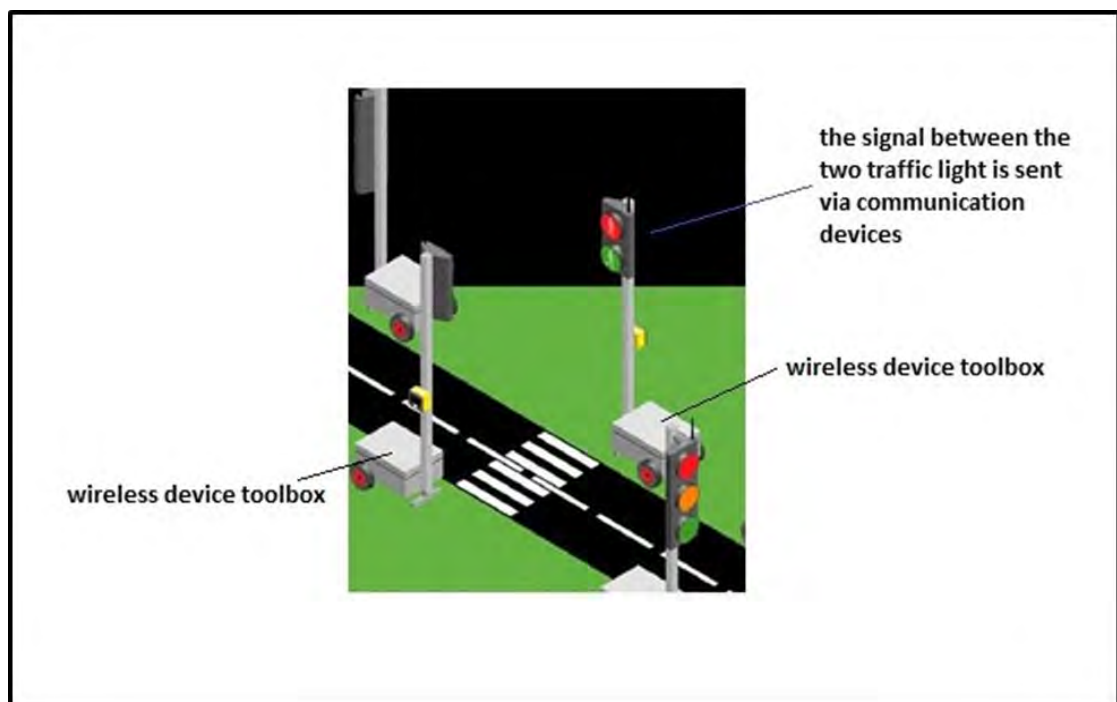


Figure 1.1: Show the illustration of the project [1].

1.2 Problem Statement

A pedestrian traffic light is very useful for people to cross the road, this type traffic light is very useful especially for safety purpose. The pedestrian can control the traffic just by pressing the button and the traffic light will turn for vehicles to stop and pedestrian can cross the road safety. However these current systems of traffic light might also have many problems and disadvantage of it's:

- a. These traffic lights system uses wire to send the signal from one traffic light to the other. Since the communication uses wire as the communication channel, it will increase the cost of the construction and increase the usage of wire besides increasing the cost for maintenance.
- b. The pedestrian push button system is to allow the pedestrian to call up walk signal. However, the way pedestrian signal work is not well understood. People would press the button and interrupt vehicular traffic even if they were not going to cross the road. The cost for maintained the damage or breakdown of the push button also high for the government to bear for the every year.
- c. The conventional traffic light controller system uses the Programmable Logic Controller (PLC). The problem is the cost of the controller set is expensive. Besides, the PLC system needs other component for example, CPU, and I/O card to support the system. PLC also needs the 24VDC to operate and it makes the electricity cost become expensive.

1.3 Project Objective

1. To design a wireless pedestrian traffic light system by using Zigbee for communication between the two traffic lights.
2. To designed the systems by using PIC micro controller.

1.4 Scope of Work

In this project, the communication of two pedestrian traffic lights is via wireless by using Zigbee. This project also focuses on building a model of two pedestrian traffic lights. Besides, the develop system are tested on the real environment. The analyses of reliability of the system are done.

1.5 Project Significance

The idea of traffic light microcontroller design project by using PIC is an adaption from conventional traffic light controller system. Traffic light is an important system to control the traffic flow especially when at the peak hour and at the junction. However, we find some problem with the conventional traffic light in some time. Conventional traffic light can't operate efficiently and need a higher cost for the maintenances. Because of that problem, idea to develop the new system for the traffic light with low cost is taking into consideration.

Idea for develop this project came from observation current pedestrian traffic light operation. Where the current traffic light, user cannot control the traffic light operation although in emergency case. Wireless Pedestrian Traffic Light System have a value market if implement in real environment. This project can use at

a main road where having a high traffic congestion, so that the pedestrian can cross the road although the heavy traffic in the road. Other than that it can use by an attendant (such as school crossing person) is on duty at the crossing zone. This project can be used for locations such as pedestrian crossing, car park exits and other 'black spots'. Its modular architecture is simple to apply, because the systems are wirelessly controlled. It can be installed almost anywhere and for considerably less than hard-wired (externally controlled and powered) traffic systems.

To combine the idea of the software part and the hardware part for a wireless pedestrian traffic light system.

1.6 Thesis Outline

Chapter 1 is about the introduction of the project that consists of project background, problem statement, objective and scope of the project.

Chapter 2 is about the literature review that explains about the background study of the previous project and also all material theory and specification of the current model of traffic light.

Chapter 3 explained about the research methodology where flows process of project, the hardware and software use in this project.

Chapter 4 which is discusses about the result gain from this project and analysis of the project.

Chapter 5 is about the conclusion after completing this project and also recommendation for the future works.

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction

The literature review is a way to get references and information about the projects developed. For this project, there are different types of information, namely the focus more on the topic of designing a wireless signal light system for pedestrian crossings. There are a number of journals in the analysis and reviewed to see a comparison between the systems that have been built or that will be developed this. In peer-reviewed journals have their own systems and ways to overcome the problems for pedestrians crossing the route.

2.2 Case Study

Case study is to investigate alternative ways or other designers or engineers who have the initiative and the purpose of the same title. This study was conducted based on a system that has a direct correlation or similarity with the project to be developed. There are some differences in terms of the developed system or application tools.

2.2.1 History of Traffic Light [2]

On December 10, 1868, the first traffic lights were installed outside the British Houses of Parliament in London, by the railway engineer J. P. Knight. They resembled railway signals of the time, with semaphore arms and red and green gas lamps for night use. The gas lantern was turned with a lever at its base so that the appropriate light faced traffic. Unfortunately, it exploded on 2 January 1869, injuring or killing the policeman who was operating it. The modern electric traffic light is an American invention. As early as 1912 in Salt Lake City, Utah, policeman Lester Wire invented the first red-green electric traffic lights. On 5 August 1914, the American Traffic Signal Company installed a traffic signal system on the corner of East 105th Street and Euclid Avenue in Cleveland, Ohio. It had two colors, red and green, and a buzzer, based on the design of James Hoge, to provide a warning for color changes. The design by James Hoge allowed police and fire stations to control the signals in case of emergency. The first four-way, three-color traffic light was created by police officer William Potts in Detroit, Michigan in 1920. In 1922, T.E. Hayes patented his "Combination traffic guide and traffic regulating signal" (Patent # 1447659). Ashville, Ohio claims to be the location of the oldest working traffic light in the United States, used at an intersection of public roads until 1982 when it was moved to a local museum.