

SMART STREET LIGHTING ON HIGHWAY

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“I hereby declare that this report is the result of my own work except for summaries and quotations which have been duly acknowledged.”

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Special dedicate to my father Abd Rahman B. Abd Rahim and my mother Hamidah Bt Abd Aziz, my family, supervisor, and all my fellow friends in helping me to accomplish this report.

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ABSTRACT

Street lights are a vital part of every carriageway, providing citizens and road user with safety and security but what if we could use our street lighting in a more intelligent way rather than the normal on-off system that currently exists. In this case, huge amounts of power wasted through the conventional street light which is currently apply on-off system. The consequence is that a large amount of power is wasted meaninglessly. For an example, the street light will still light up although there is no vehicle using the street. On the other topic, the objective of the street light project is to design a street light based on IR sensor circuit to detect the present of the vehicle. Besides that, an Arduino microcontroller will be used to develop a coding for street light. On the other parts, An Arduino will control the street lights, IR sensor and LDR. Meanwhile, IR sensor will be function for detecting the present of the vehicle on the street. Whenever, if there is no present of vehicle on the street, the street light will remains at dim state unless if the sensor detect present of vehicle on the street, the street light will be bright. Apart from that, Light density resistor (LDR) is use in this project for detecting the intensity of light. In addition, an internet of things (IoT) will be implemented in the project that allow the authority to control the system, receive notification and detect faulty of the street light. As expected, I envisage the project will bring a huge impact to the community in reducing fatal accident on the highway. Furthermore, the project will be going for green technology which beneficial the people. In conjunction of that it could reduce money for maintenance.

ABSTRAK

Lampu jalan merupakan salah satu kepentingan di setiap laluan kenderaan, ianya memberi keselamatan kepada para pengguna jalan raya. Bagaimana, sekiranya kita mampu mengubahkan lampu jalan kearah lebih bijak dan bukannya lagi menggunakan sistem yang sedia wujud. Dalam hal ini, sejumlah yang besar pembaziran terhadap tenaga elektrik kerana jalan konvensional yang kini hanya menggunakan sistem buka dan tutup. Disebabkan itu, pembaziran tenaga elektrik yang begitu banyak dibazirkan begitu sia-sia. Sebagai contoh, lampu jalan akan sentiasa menyala walaupun tiada kenderaan yang menggunakan jalan raya. Dalam hal lain, objektif projek lampu jalan adalah untuk mereka bentuk lampu jalan berdasarkan litar sensor infrared dimana ianya akan mengesan kenderaan. Selain itu, mikropengawal Arduino akan digunakan untuk menghasilkan kod untuk lampu jalan. Di samping itu, Arduino akan mengawal lampu jalan, Infrared sensor, dan juga LDR. Sementara itu, Infrared sensor akan berfungsi sebagai mengesan kenderaan di jalan, sekiranya tiada kenderaan lalu lampu jalan akan berada dalam keadaan samar-samar jikalau terdapat kenderaan lalu, lampu jalan akan menyala lebih terang. Selain itu, LDR digunakan untuk mengesan keamatan cahaya. Di samping itu, "Internet of Things (IoT)" akan di implementasi dalam projek ini dimana pihak berkuasa akan mengawal serta menerima notifikasi jalan raya. Di jangka kan, projek ini akan mengurangkan kemalangan maut di jalan raya. Tambahan pula, projek ini amat bermanfaat kepada rakyat jelata. Dengan itu, ianya juga dapat mengurangkan wang untuk penyelenggaraan.

TABLE OF CONTENT

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

1	INTRODUCTION	1
1.0	OVERVIEW	1
1.1	OBJECTIVES	2
1.2	PROBLEM STATEMENT	2
1.3	SCOPES	3
1.4	LIMITATIONS	3
1.5	SIGNIFICANT OF THE PROJECT	4
II.	LITERATURE REVIEW	5
2.0	OVERVIEW	5
2.1	HARDWARE OVERVIEW	5
2.1.1	ARDUINO UNO R3	5
2.1.2	MEMORY	7
2.1.3	DIFFERENT THAN OTHER BOARDS	7
2.1.4	INPUT AND OUTPUT	8
2.2	LIGHT EMITTER DIODE	9
2.2.1	OVERVIEW	9
2.2.2	ENVIROMENT BENEFITS OF LED	10
2.2.3	WORKING PRINCIPLE OF LED	10
2.3	LIGHT DEPENDET RESISTOR	10
2.3.1	OVERVIEW	10
2.3.2	WORKING PRINCIPLE OF LDR	11
2.3.3	CHARACTERISTIC OF LDR	11

2.3.4	CONSTRUCTION OF LDR	14
2.4	INFRARED SENSOR	15
2.4.1	OVERVIEW	15
2.4.2	INFRARED RADIATION THEORY	15
2.4.3	PRINCIPLE OF OPERATION	16
2.4.4	TYPE OF IR SENSORS	17
2.5	COMPARISON THE TECHNOLOGY OF LAMP	19
2.6	TYPE OF LAMP	20
2.7	COMPARISON WITH PREVIOUS JOURNAL	21
2.8	VOLTAGE REGULATOR FOR ESP8266	24
2.9	WIFI MODULE (ESP8266)	25
2.10	INTERNET OF THINGS (BLYNK APP)	26
III	PROJECT METHODOLOGY	27
3.0	OVERVIEW	27
3.1	METHODOLOGY	27
3.2	ROAD LIGHTING TERMINOLOGY	28
3.3	PRELIMANARY RESULT	30
3.3.1	DESIGN CRITERIA	30
3.3.2	FLOWCHART OF THE PROJECT	31

3.4	ESP8266 FLASHING	32
3.4.1	DOWNLOAD LASTEST FIRMAWARE	32
3.4.2	SETTING UP ESP8266 FOR FLASHING	32
3.4.3	UPLOADING LASTEST FIRMAWARE	33
3.5	IoT INTEGRATION WITH ARDUINO	34
3.6	PCB FABRICATION	37
3.6.1	SAFETY PRECAUTION	
3.7	PROJECT MANAGEMENT	41
IV	RESULTS AND DISCUSSION	42
4.1	OVERVIEW	42
4.2	EXPECTED RESULTS	42
4.3	DESIGNING PROTOTYPE	46
4.4	TESTING HARDWARE	49
4.4.1	TESTING HARWARE OVER THE INTERNET OF THINGS (IoT)	51
4.5	DISCUSSION	55
V	CONCLUSSION AND RECOMMENDATION	56
5.1	INTRODUCTION	56
5.2	CONCLUSION	56
5.3	RECOMMENDATION	57
	REFERENCES	58

LIST OF TABLES

NO	TITLE	PAGE
2.1	Arduino Specification	6
2.2	General Overview Of Arduino	7
2.3	Fixture on lamp technologies	19
2.4	Various Type of Lamp	20
2.5	List of Literature Review	21-23
4.1	The value of each watt with different PWM outputs	44
4.2	The graph of power usage	44
4.3	Number of vehicle in 12 hours and 1 hour based on road type	45
4.4	Power Consumption for each hour according to their road type	45

LIST OF FIGURES

NO	TITLES	PAGES
2.1	Arduino Uno R3	6
2.2	Arduino programming	8
2.3	microcontroller	9
2.4	graph shows resistance vs illumination	12
2.5	typical type of LDR	13
2.6	the structure of LDR	14
2.7	IR sensor detecting object	16
2.8	IR Transmitter and IR Receiver	17
2.9	LM1117 voltage regulator	24
2.10	ESP8266 -01	25
2.11	ESP8266-12e	25
2.12	The Blynk app	26
3.1	Block diagram of the project	28

3.2	Road Terminology	29
3.3	Prototype of the Street Light	30
3.4	Flowchart of the prototype	31
3.5	Setting up ESP8266 in flash mode	32
3.6	Writing new firmware	33
3.7	Testing ESP8266 with AT commands	34
3.8	Naming Project and choosing device in Blynk	35
3.9	Choosing Widgets	36
3.10	Final Blynk Interface	36
3.11	Personal Protection Equipment	37
3.12	Simulator layout printed on plastic	38
3.13	Vacuum Exposure Unit Machine	38
3.14	Vacuum Exposure Machine	38
3.15	Developer liquid	39
3.16	Washing the board after developing	39
3.17	Placing the board in conveyor spray processor	40
3.18	Resist stripper	40
3.19	the gantt chart for the project	41
4.1	Setting pulse width modulation at 200	43
4.2	Settings pulse width modulation at 20	43
4.3	IR sensor board	46

4.4	The design of the prototype	47
4.5	From above perspective of model	48
4.6	From above perspective of model	48
4.7	the street light at dimming state	49
4.8	the side view of the prototype	49
4.9	The street light getting brighter	51
4.10	Confirmation from the blynk hardware	52
4.11	slidder to control the brightness of the led light	53
4.12	The notification of the street	54

LIST OF ABBREVIATIONS

IR	-	Infra red
APP	-	Applications
LDR	-	Light Density Resistor
IoT	-	Internet of Things
PWM	-	Pulse Width Modulation
RX	-	Receiver
TX	-	Transmitter

APPENDICES

NO	TITLES	PAGES
A	CODING	61

CHAPTER 1

INTRODUCTION

1.0 OVERVIEW

Due to the increases of environment concerns, energy conservation and reduction of power consumption has become the major hot topic debated in the research of science and technology. Street light system is a very important system and it plays very crucial role on developing country. The principle purpose of main road and motorway lighting is to improve visibility for the driver, in contrast to residential road lighting, which is installed for the benefit of the pedestrian. Main street light system is installed to provide citizen safety and security. Research has shown that nighttime results in large number of accidents than that by day. For fatal accidents the risk at night is by far three times greater than by day. Several studies have shown that the effect of installing good street lighting is could reduce nighttime accident. In fact, the economic justification for installing it rest mainly costing exercises to evaluate the savings from the estimated reduction in accidents.

Energy conservation concept, energy is conserved when technical means are employed to improve efficiency or to reduce energy waste. Today, there are many inventions occur regarding in advancing the effectiveness of current street light. However, the recent increasing pressure regarding the usage of raw material costs and the greater social sensitivity on environmental issue has lead the manufacturers to develop a new technologies and new technique which bring a significant cost savings and solutions for reducing environment effects.

1.1 OBJECTIVES

- To design a street light system circuit based on IR sensor using Proteus.
- To develop a system that will automatically switch on the street light via Arduino.
- To create an application which connecting the street lighting system with authorized people for monitoring purpose

1.2 PROBLEM STATEMENT

Generally, due to the concern of the environment issue many have proposed an idea for green technology products and eco-friendly. Regarding to this, a huge amount of power consumption is wasted through old system implementations on conventional street light which is currently applying on- off system. During the night time the conventional street light remains on even though there is no vehicle present on the street. The amount of power consumption wasted for street light has produces a significant amount financial source. Hence, each year government or private sectors need to overcome the issues regarding to reducing the bills regarding the street lights. Street lighting is installed in the hope that will reduce fatal accidents. The risk

at night is over three times greater than that by day due to the poor visibility or less efficiency of light at night on the road and its immediate surrounds is important for vehicle, motorcyclists, pedal cyclists, pedestrians and other road users. It enables them to proceed with a sense of safety and security.

1.3 SCOPES

In this scope project, the street light will be focusing on the highway that has lamp poles. The project will consists of several sensors include IR sensors, rain sensor and Light density resistor (LDR), the use of these sensors is to provide street light more intelligent and less power wasted. Furthermore, there is new technique been introduced in this project which is dimming techniques which could allow more power to be save by using this technique. IR sensor is introduces in this project since the IR sensors can detect the presents of the vehicle. Its enable to light up the street when there is presents of the car. Rain sensors is use to collect the data of the rain and it an alternative option if the LDR could detect the intensity of sun light. The main focus of this project is on light development.

1.4 LIMITATIONS

The project limitation is only focuses on the urban highway and existing of lamp poles due to the implementation of the sensors. On rural roads and motorway the ratio of benefit to cost may be greater, but because of the great cost of lighting the motorway network, a priority system must be introduced.

1.5 SIGNIFICANT OF THE PROJECT

Due to the new technique and new technologies been introduced in this project, the project is describes about the street light on detecting the present of the vehicle that pass through the sensor and it will remains dimming after few seconds, this will allow the conservation of the power would be less. This system controls the street light using the IR sensor where when there is present of vehicle the light will on bright and remains dimming after few seconds. Furthermore, Street light are also depending on the intensity of the sun light on LDR, which is 0 percent energy consumption on day time. A number of LED street light will bright for a specific distance ahead, if the IR sensing the approaching vehicle and the remains dim once the vehicle passes through. Thus , the dimming technique could save a lot of energy.

CHAPTER 2

LITERATURE REVIEW

2.0 OVERVIEW

In this chapter, some of the hardware components are required in the process to construct the project.

2.1 HARDWARE OVERVIEW

2.1.1 ARDUINO UNO R3

Arduino Uno is a microcontroller board based on the ATmega 328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs) , 6 analog inputs, a 16 MHZ quartz crystal(ceramic resonator), a USB connection, a power jack, an ICSP header, and a reset button. It contains everything expected to support the

microcontroller, basically connect it to a computer with a USB cable or battery to get started.



Figure 2.1: Arduino Uno R3

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

ARDUINO MICROCONTROLLER

Microcontroller	ATmega328
Architecture	AVR
Operating Voltage	5 V
Flash memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
Clock Speed	16 MHz
Analog I/O Pins	6
EEPROM	1 KB
DC Current per I/O Pins	40 mA on I/O Pins; 50 mA on 3,3 V Pin

Table 2.1: Arduino Specification