POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SMART STREET LIGHT DETECTOR

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ELECTRICAL ENGINEERING DEPARTMENT

JUN 2019

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This report is submitted to the Department of Electrical Engineering in fulfillment of the requirements of the Diploma in Electrical Engineering

ELECTRICAL ENGINEERING DEPARTMENT

JUN 2019

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TITLE : SMART STREET LIGHT DETECTOR

SESION : JUNE 2019

1. We,

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is a final year student of **Diploma in Electronics Engineering (Control), Politeknik Sultan Salahuddin Abdul Aziz Shah,** who address at **Persiaran Usahawan, 40150 Shah Alam, Selangor.** (After the content is referred to as 'the Polytechnic')

2. We acknowledge that 'The project above' and its intellectual property are the original work / art of our work without taking or imitating any intellectual property from any other party.

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Made and truly acknowledged by;)	
a) KHAIRUL AIMAN BIN ROSDI)	.....
(IC number:- 990925-10-5919))	KHAIRUL AIMAN BIN ROSDI
b) MOHAMAD IQBAL HUZAIRI BIN)	
MOHAMAD TAIB)	.....
(IC number:- 990819-08-6363))	MOHAMAD IQBAL HUZAIRI
at ....., on .....)	BIN MOHAMAD TAIB
In front of me, MR WAN MOHD ZAMRI BIN)	.....
WAN AB RAHMAN As the project Supervisor)	MR WAN MOHD ZAMRI BIN
on date: .....)	WAN AB RAHMAN

APPRECIATION

Many thanks and a heartfelt thank you to my Project Supervisor, Mr. Wan Mohd Zamri bin Wan Ab Rahman for providing me with the guidance, advice and guidance to complete this project with great patience.

And also to my whole family, especially my parents who provided so much support and encouragement throughout this study. To all partners directly or indirectly in providing ideas, guidance and suggestions for the preparation of this project report. All the instructions, advice and guidance I will never forget.

May this study be blessed by God.

Thank you.

ABSTRACT

The project is derived from the IoT system, its use is now growing worldwide. The objective of this project is to create a tool that can detect damage to street lights to ensure the safety of users especially at night. In addition, there are several studies covered in this project, namely, using LDR sensors to detect street light damage and creating devices that allow the authorities to repair damaged street lights. All of these objectives are intended to address the problems that arise as we undertake research to produce this project. Among the problems we identified during our testing process were the authorities' difficulty in addressing the issue of delay in repairing damaged street lamps due to time constraints in inspecting each street lamp. In addition, the lack of feedback and complaints from users on damaged street lamps. The main ingredient used in the production of this project is the Arduino Atmega which aims to receive, store and transmit data for further action. Whereas for the component construction process, methodological studies are used to design the project production process using flow charts as a guide for project planning and testing. As a result of this process, the whole project was successfully created at the right time. Based on the analysis and discussion that have been conducted, it can be concluded that this Smart Street Light Detector has reached its stated goal. In addition, this tool has also been proven to save time and energy in performing tasks.

ABSTRAK

Projek ini berasal dari sistem IOT, penggunaannya kini berkembang di seluruh dunia. Objektif projek ini adalah untuk mewujudkan alat yang mampu mengesan kerosakan pada lampu jalan untuk memastikan keselamatan pengguna khususnya pada waktu malam. Di samping itu, terdapat beberapa kajian yang diliputi dalam projek ini iaitu, menggunakan sensor LDR untuk mengesan kerosakan cahaya jalan dan mewujudkan peranti yang membolehkan pihak berkuasa membaiki lampu jalan yang rosak. Kesemua objektif ini bertujuan untuk menangani masalah yang timbul semasa kami melakukan kajian untuk menghasilkan projek ini. Antara masalah yang kami kenalpasti sepanjang proses ujikaji kami ialah kesukaran pihak berkuasa dalam menangani masalah kelewatan memperbaiki lampu jalan yang rosak yang disebabkan kekangan waktu dalam memeriksa setiap lampu jalan. Selain itu, kekurangan tindakbalas dan aduan daripada pengguna terhadap lampu jalan yang rosak. Bahan utama yang digunakan dalam penghasilan projek ini ialah Arduino Atmega yang bertujuan untuk menerima, menyimpan dan menghantar data supaya tindakan selanjutnya dapat dilakukan. Manakala untuk proses pembinaan komponen, kajian metodologi digunakan untuk merekabentuk proses pengeluaran projek menggunakan carta aliran sebagai panduan untuk perancangan dan pengujian projek. Hasil daripada proses tersebut, keseluruhan projek berjaya dihasilkan pada masa yang tepat. Berdasarkan hasil analisis dan perbincangan yang telah dilakukan, dapat disimpulkan bahawa Smart Street Light Detector ini telah mencapai tujuan yang dinyatakan. Di samping itu, alat ini juga telah terbukti dapat menjimatkan masa dan tenaga dalam melaksanakan tugas.

LIST OF CONTENTS

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

This project we created is a project based on IOT. With the advent of internet facilities,

IOT devices have been invented. IOT is a device that has the intelligence to connect with other devices and then takes action based on the information it receives. The concept of IOT has long been introduced even though the term IOT has not yet been established, for example in the early 1980s, coca cola machines at Carnegie Melon University has been connected to the internet to check whether the beverage in the machine is sufficient and cool enough. The term IOT existed in 1999 after being introduced by Kevin Ashton.

Now, IOT has evolved into a system that uses various technologies that bring change to various industries, using wireless communication and so on. The use of IOT is so widespread that it contributes to our daily lives. For example, smartphones are connected to weather stations around the world. Information from GPS can determine the location of the phone. With these informations, it can provide weather prediction information on the location of the user's phone. The IOT process requires three things which are unique identities provided through internet protocols, having a way of communication that over the internet and having sensors to collect data that can be shared with other devices.

So, based on these three things, we've created a smart detector for street light damage project. This project consists of a combination of hardware and software. We use Arduino as a 'brain' that controls the inputs, processes and outputs of information in our projects. The main function of this project is to detect street lights damage and to send the data for

processing. We have also created an application as a medium for receiving information. Through the application, we were able to find out which street lights were damaged. So, the completed data are sent to the application, and action can be taken immediately.

1.2 STUDY OF BACKGROUND

The background of the study refers to the latest information related to the current issue that is the focus of the study. The purpose is to provide a comprehensive review of the studies to be conducted. This section also highlights major or current issues related to the focus of the study. These issues are usually summarized briefly in a few paragraphs and are supported by previous research findings such as books, journal articles, reports, newspapers or government policy.

This project was taken because Malaysia is one of the countries with the highest rates of accidents especially at night, so there is a need for a solution to reduce these rates. In this project we have implemented a light detection sensor (LDR sensor) to detect the same there was some damage to the headlights. This project is designed based on a microcontroller that stores data and sends notifications in the event of a malfunction. There is a sensor present on each lamp that only works at night to detect damage. During the day, the street lights will be turned off as sensors detect the sunlight. Even when the light is off, the microcontroller will not send the signal because the situation is normal. At night time, the sensor on the lamp circuit will turn on the light because there is no sunlight while the sensor on the lamp will be activated to detect light from it. This project uses a Microcontroller. It is programmed in such a way that it performs many functions. This system is widely used by the authorities as there are many road lamps that are not repaired and are obstructed. Therefore, the microphone must be encoded to detect the presence of light and transmit the signal.

Street lights are very important for those who drive at night. However, damage to road lights is inevitable for certain reasons but delays in repairing them can be avoided. So to solve this problem, we created this project so that authorities can be aware of it quickly in the event of road light damage. System automation is designed for user safety. We hope that through this project accidents will be avoided especially when it involves street lights.

1.3 PROBLEM STATEMENT

One of the factors that led to the idea of producing this project was the sudden increase in road accidents due to road lights. This may be familiar to some road users who are driving under dark conditions, but this is a major problem for some users who face night blindness due to the lack of choice. Therefore, the user has to drive slowly and carefully to avoid accidents. As a result of this difficulty, this will create resentment by other users behind them who will have to drive slowly as well. Indirectly, this may lead to misunderstandings among road users.

In addition, the problem of shortage of time by the authorities is also one of the factors of this project. This is because the authorities have to check the condition of street lights at each location at all times. The shortage of workers also led to this problem. In the event of a damaged street lamp, the authorities will have to repair it immediately as the street lamp has become a must for all road users. There are also some workers who have to work overtime to repair the damage that is causing them harm. Some have had to repair street lights in rainy and hot conditions to ensure the safety of all users at night.

So, with the production of this project, they can fix it at the right time. The careless attitude of consumers is also one of the triggers of this idea. This is because some users do not care about the condition of the street lights and cause others to fall victim. They mostly just saw the damage and did not report it to the authorities for immediate action.

1.4 RESEARCH OBJECTIVE

The objective of this study is to clearly state how the purpose of the study can be achieved. The number of proposed research proposals is between two and three objectives. The SMART criteria (specific, measurable, achievable, realistic and constrained) are recommended as guidelines for writing the purpose of the investigation.

The main objective of this project is to reduce the rate of accidents that are particularly caused by damage to road lights. The damage caused by certain factors is inevitable but the delay in repairing the street light can be avoided. Through this project, the authorities can repair the street lights immediately without waiting for complaints from users.

1.5 RESEARCH QUESTION

The research question is basically a specific question that researchers want to answer based on the research objective. It needs to be written in the form of a question. If the research question involves hypothesis testing (such as making comparisons, determining the existence of relationships and making predictions), the hypothesis needs to be stated.

a) Can the authorities ensure that street lights are in good condition ?

b) How can the authorities identify damaged street lights without having to wait for complaints from road users or going to each location to check the condition of street lights ?

c) How to reduce accident rates caused by dark road conditions ?

1.6 RESEARCH SCOPE

The scope of the study explains the limitations of the research being carried out. This is to ensure that the research is not carried out of scope or limit.

This project is designed to reduce the rate of road accidents due to road lighting damage. The scope of this project is to use the current sensor on the light to detect if any damage occurs. The signal will be read by Arduino and this data will be stored in the cloud to be sent to the application that has been created.

1.7 IMPORTANCE OF RESEARCH

The importance of this study is also referred to as the importance of the study briefly explaining the importance or value and contribution / implications of the study. This project will ensure that road users can drive safely in the evening, especially at night. Find out which street lights are damaged. To facilitate the authorities in carrying out their duties.

1.8 DEFINITION OF OPERATION

From this project, the expected result was inferred from the fact that street lamps at night were successfully prevented from accidents. The system works on the principle of detecting light by using sensor technology using the Arduino Atmega, ESP8266 Wifi Module, Relay module & LDR sensor. To ensure the safety of road users at night.

1.9 CHAPTER SUMMARY

The Chapter Summary summarizes the main sub-sections that have been presented in Chapter 1 without introducing new material and then proves the continuation of the next chapter.

As such, many improvements can be made based on this initial design. That being said, it is felt that this design represents a small-scale functional model that can be replicated to a larger scale. Suggestions are given as ideas for future expansion of this project. While it may seem more challenging and challenging, there are many other possibilities such as creating an automatic emergency light in the event of a malfunction. In addition, using more than one sensor is another great idea for an experiment, but there are also many other ideas for experiments and challenges such as using solar power to turn on lights when they are out. However, independent of the methods used to build it, there is no doubt that the system can be very helpful in solving many problems, from the seemingly harmless to those on the most important and most dangerous scale to the human population. By using this system, it is possible to reduce the rate of road accidents. While it can be very useful for safety in general, road users, the authorities are the ones who can benefit the most from using this system.

CHAPTER 2
LITERATURE STUDIES

The term "literature" means a research article that is referred to to understand and study the research problem. The literature review is used to provide the context of the study by looking at the research that has been conducted in the field of research and not just summarizing the research conducted by other researchers (Kumar, et al., 2013). The references used should be relevant to the focus of the study. The contents of this chapter may contain a brief introduction to the subject of the study, concept or theory, previous studies related to the field of study and summary of this chapter.

2.1 CHAPTER INTRODUCTION

General topics, issues or areas of focus need to be identified and then provide the appropriate context for the literature review. The overall trend of the topic, suggestions in theory, methodology, evidence and conclusions or new issues / perspectives should be stated.

In this chapter, further discussion of past research and related information will make important contributions to the field of study, light detection systems or closely related systems. There are many sources of information about related areas published on the web about street lighting systems. The information collected provides suggestions on current methods and examples of opinions. The idea is therefore supported and justified by important past research.

2.2 CONCEPTS / THEORIES

Literary materials (research, reviews, theoretical articles, case studies, etc.) based on the same category / theme as the author's summary, purpose or purpose and chronology should be collected. Any relevant research, article or reference material should be summarized. The main ideas are stated at the beginning of the paragraph and elsewhere strategically to help the reader understand the comparisons and analyzes presented.

Complaints from road users can help authorities repair the damage. But this process takes time for the authorities to accept the issue and there are some users who don't care about the problem. To replace manual activity and make the work of the authorities easier, an automated street lighting system was created.

2.3 PREVIOUS STUDIES

The hardware components that involved in this study are; Arduino UNO, ldr sensor and, WiFi Module esp8266. Arduino consists of a physical programmable circuit board and a piece of software that runs in your computer, used to write and upload computer code to the physical. We chose Arduino UNO for this tracking device because it is the best choice for us beginners. It got everything that we need to get started.It has 14 digital input and output pins, 6 analogue inputs, a USB connector, a power a jack, a reset button and more. "This Arduino can be powered from the same USB cable that is used to program it.Because of this it is not necessary to have an external power supply, although one could be used if needed." Startingelectronics.org
(2017, Choosing an Arduino for beginners).

As its name implies, the Light Dependent Resistor (LDR) is made from a piece of exposed semiconductor material such as cadmium sulphide that changes its electrical resistance from several thousand Ohms in the dark to only a few hundred Ohms when light falls upon it by creating hole-electron pairs in the material. The net effect is an improvement in its conductivity with a decrease in resistance for an increase in illumination. Also, photoresistive cells have a long response time requiring many seconds to respond to a change in the light intensity. Materials used as the semiconductor substrate include, lead sulphide (PbS), lead selenide (PbSe), indium antimonide (InSb) which detect light in the infra-red range with the most commonly used of all photoresistive light sensors being Cadmium Sulphide (Cds). Cadmium sulphide is used in the manufacture of photoconductive cells because its spectral response curve closely matches that of the human eye and can even be controlled using a simple torch as a light source. Typically then, it has a peak sensitivity wavelength (λp) of about 560nm to 600nm in the visible spectral range.

WiFi is a popular technology that allows any electronic device to connect with the internet or exchange data wirelessly using RF radio waves. WiFi module is a self-contained, system on chip module that can give any microcontroller acess to your WiFi network. We choose WiFi ESP 8266 because it is the most popular wifi module and it is a low cost WiFi module with full TCP/IP stack and microcontroller produced to support the module. "...provides unsurpassed ability to embedded WiFi capabilities within other systems, at lowest cost with the greatest functionality."Dr Y Ragavhender Rao (2017, Automatic Smart Parking System using Internet of Things (IOT).

2.4 CHAPTER SUMMARY

This session discuss on the overall project theory and concept. The purpose of this is to explain the perspective and method that is used in previous research or project and to classify how much this project related with those research and theory. Moreover, this session will show the theory and concept used to solve problem. Theoretical is very important as a guidelines in doing any kind of research.

Surya Teja *Automatic Street Light Controller*

Ramesh S. Gaonkar. *Microprocessor Architecture, Programming & Applications.*

Shreesh Mishra, Shivakant Gupta, Santosh Singh, Tripuresh Tiwari, Anand Mohan. (April 2016). *Review for Arduino Based Led Street Light Auto Intensity Control System. International Journal of Scientific and Research Engineering*, Volume 3, Issue 4.

CHAPTER 3
METHODOLOGY OF THE STUDY

3.1 CHAPTER INTRODUCTION

Structured planning is required in the execution of a project. Each step is organized and systematically listed to facilitate and accelerate project execution. In order to obtain the working procedure of a project that goes from idea generation to product development stage or better known as methodology, a study to develop the implementation process should be done first. This includes a description of all the methods or methods used to complete the project.

All listed work procedures should be followed to facilitate project execution. The process starts from obtaining the project title to the production of the project from the raw material. After obtaining some of the factors that have been taken into account, only select certain circuits and appropriate components. The project to be implemented is based on references and studies on road lighting systems and IoT. The circuit used for the purpose of producing this project only uses combinations and combinations of some basic electronic components such as LDR, LED, relay, wifi module, arduino and so on.

3.2 STUDY DESIGN

The Design of the Study briefly describes the research design to be used (whether exploratory, descriptive, causal or experimental). This study will be carried out using experimental design. This study will also be made available to the public through experiments conducted.

3.3 METHODS OF DATA COLLECTION

For the success of this project in order to meet the criteria necessary and timely, the frame structure of the project from the beginning until the end of the process has been developed.

The overall description of the project implementation process is:

Start - choosing the title that suits the project

Process / selection:
Process - learn the software used

-Design

-Identify the hardware

-Develop a program

-Connecting circuit

-Combines hardware and software

-Project testing

Selection - project restoration

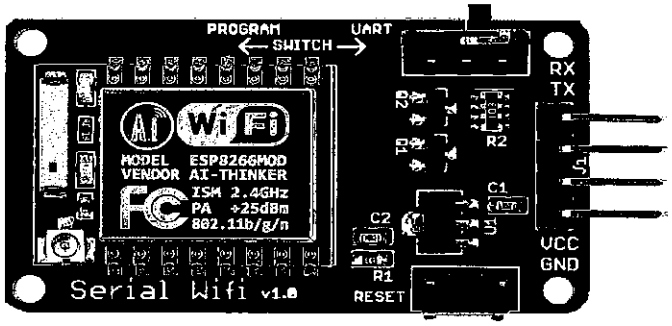
-Improved project

Process - install on prototype

Finish - preparations for project reports and project presentations

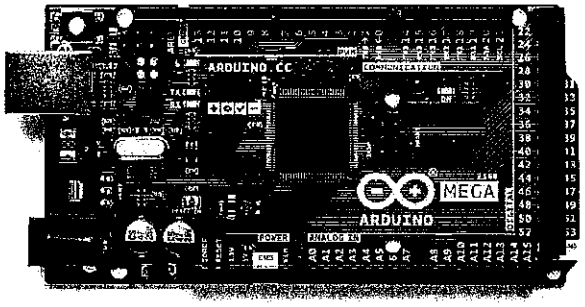
3.4 INSTRUMENT REVIEW

WIFI MODULE ESP8266



The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

ARDUINO ATMEGA 328



The Arduino Atmega 328 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either

from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

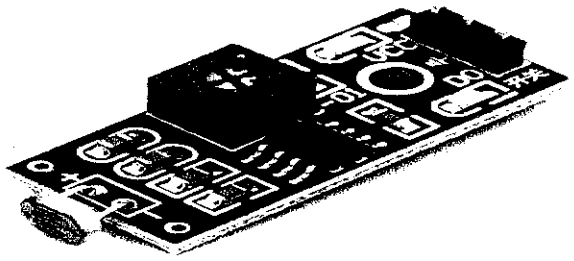
The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

The power pins are as follows:

- **VIN.** The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V.** The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- **3V3.** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND.** Ground pins.

LDR MODULE

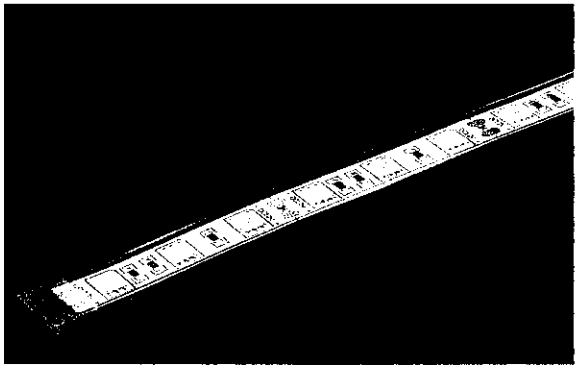


A **light dependent resistor** works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls or when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band.

These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers.

The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased.

LED



A high-power LED light source is a single LED power higher than 0.5W. At present, many manufacturers use low power LED, but it need use a lot of LED, and also lower power LED with higher light decay. So its trend to use high power LED source in commercial lighting.

High power LED is a light emitting diode with high rated current. Low LED power is generally 0.1W, operating current can be range from tens of mA to several hundred mA. Due to the constraints of flux conversion efficiency and cost, it decides high-power mainly used in some special lighting areas in short-term and long-term goal is the general lighting.

High power LED advantages:

High-power LED as the light source with features of low power consumption, less heating, long life, fast response, good direction and so on. Housing is available for PC pipe, able to bear high temperature of 135 degrees, low temperature of -45 degrees.

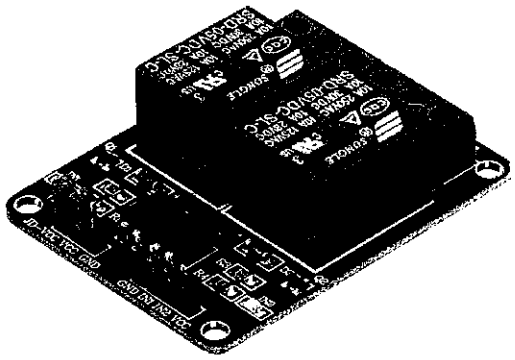
High power LED disadvantages:

Current high-power LED light conversion efficiency is still low, and cost is high. White LED colour is easy to be changed for long time use, cooling.

Applications:

High-power LED mainly used in oilfield, petrochemical, railway, mining, military and other special industries. And most important is high power LED is more and more popular in general lighting.

RELAY MODULE



A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it). You can think of a relay as a kind of electric lever: switch it on with a tiny current and it switches on ("leverages") another appliance using a much bigger current. Why is that useful? As the name suggests, many sensors are incredibly *sensitive* pieces of electronic equipment and produce only small electric currents. But often we need them to drive bigger pieces of apparatus that use bigger currents. Relays bridge the gap, making it possible for small currents to activate larger ones. That means relays can work either as switches (turning things on and off) or as amplifiers (converting small currents into larger ones).

How relays work:

When power flows through the first circuit (1), it activates the electromagnet (brown), generating a magnetic field (blue) that attracts a contact (red) and activates the second circuit(2).When the power is switched off, a spring pulls the contact back up to its original position,switching the second circuit off again.

This is an example of a "normally open" (NO) relay: the contacts in the second circuit are not connected by default, and switch on only when a current flows through the magnet. Other relays are "normally closed" (NC; the contacts are connected so a current flows through them by default) and switch off only when the magnet is activated, pulling or pushing the contacts apart. Normally open relays are the most common.

Here's another animation showing how a relay links two circuits together. It's essentially the same thing drawn in a slightly different way. On the left side, there's an input circuit powered by a switch or a sensor of some kind. When this circuit is activated, it feeds current to an electromagnet that pulls a metal switch closed and activates the second, output circuit (on the right side).

The relatively small current in the input circuit thus activates the larger current in the output circuit:

1) The input circuit (blue loop) is switched off and no current flows through it until something (either a sensor or a switch closing) turns it on. The output circuit (red loop) is also switched off.
2) When a small current flows in the input circuit, it activates the electromagnet (shown here as a dark blue coil), which produces a magnetic field all around it.
3) The energized electromagnet pulls the metal bar in the output circuit toward it, closing the switch and allowing a much bigger current to flow through the output circuit.
4) The output circuit operates a high-current appliance such as a lamp or an electric motor.

3.5 SAMPLING TECHNIQUES

An automatic street lighting system is designed to keep the street lights at night in good condition. The system acts accordingly by detecting damaged street lamps and sending the information to a specific party.

3.6 DATA ANALYSIS METHODS

In this project, we did some research on some of the components to find out how well they fit into our project. We also troubleshoot circuits that have been designed to know the results.

3.7 CHAPTER SUMMARY

This project provides significant improvements in the effectiveness of effective security. The components used are also easy to maintain and easy to maintain. The cost allocated to produce a larger scale is not too costly and costly. Creating coding on Arduino requires "try and error" skills and has to learn more because coding on this project is not an easy task.

CHAPTER 4

RESULTS

4.1 CHAPTER INTRODUCTION

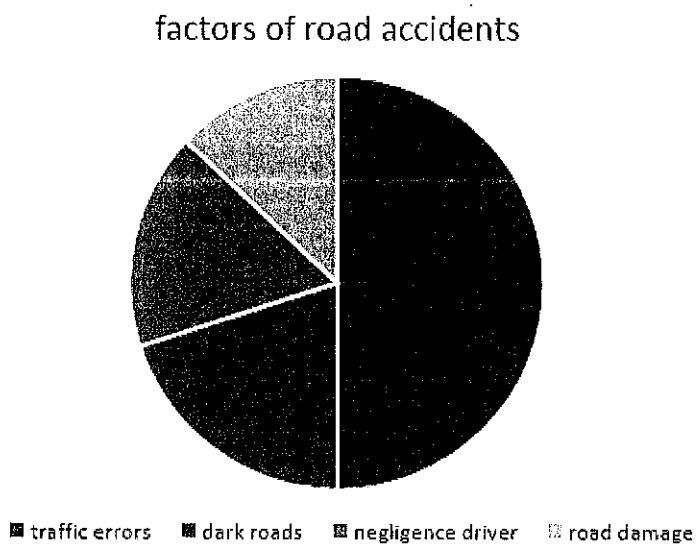
This chapter presents and analyzes the research data. Overall insights and analysis presented in the form of tables, diagrams and statements to enable important findings submitted. This section needs to be organized according to the hierarchy of the research questions to show that all the questions have been answered.

4.2 FEEDBACK RATE

A total of 20 questionnaires were sent to respondents via whatsapp and telegram. Out of the 20 forms, 85% of respondents have responded to the difficulties they have encountered while working on the problem of damaged street lamps. Response rates are considered realistic given the difficulties they face.

4.3 RESEARCH FINDINGS

This pie chart shows the cause of accidents in Malaysia. This pie chart shows some of the major causes that often occur to road users. According to the survey results, 20% were due to dark roads. In addition, 50% represents traffic errors. Furthermore, 17% was due to negligence of the driver himself. Finally, the average rate of road damage is 13%.



4.4 CHAPTER SUMMARY

To ensure that road users drive safely. In addition, to alert the authorities to be constantly alert to the average of accidents that occur lately. With the creation of this project, there are many benefits to the users and even the authorities.

CHAPTER 5
DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 CHAPTER INTRODUCTION

This chapter will describe in detail the research that is intended to be carried out and described in the sub-section of the discussion, conclusions and suggestions. The introduction of this chapter also aims to inform the contents of the chapter as a whole.

5.2 DISCUSSION

The great and expected results of our experiments are inferred from the fact that we have successfully avoided the issue of street lamps and continue to grow without problems and shortcomings, thanks to sensors that can detect the presence of light in street lamps while at the same time benefiting consumers. The system works with the principle of detecting the presence of street light and then sending data to the microcontroller so that the data can be processed to send notifications. This is indirect, we can know the state of the street lights without having to go to that location.

5.3 SUMMARY

From this project, the expected result was inferred from the fact that the project was successfully avoided from the issue of street lamps and this is for sensors connected to street lamps. The system works on the principle of detecting light by using sensor technology and

several components namely the Arduino Atmega, ESP8266 Wifi Module, relay module & led strip. To send a notification when further action is required. This project is generally used by the authorities responsible for resolving the issue.

5.4 RESEARCH IMPLICATION

This Smart Street Light Detector is able to solve many problems involving street lighting. One of the problems that has arisen is the sudden increase in road accidents as a result of road light damage. This may be familiar to some road users who drive under the dark conditions, but this is a major problem for some users who face night blindness due to lack of choice. Therefore, users need to drive slowly and carefully to avoid accidents. As a result of this difficulty, this will cause anger by other users behind them who need to drive slowly as well. Indirectly, this can lead to misunderstandings among road users.

In addition, the problem of lack of time by the authorities. This is because the authorities need to check the condition of street lights at each location at all times. The shortage of workers is also a major factor in this problem. In the event of a bad road light, the authorities will need to repair it immediately as road lighting is of utmost importance to all road users. There are also some workers who have to work overtime to repair the damage so that it is harmful to themselves. There is a need to improve road lighting in rainy and hot conditions to ensure the safety of all users at night.

Therefore, with the release of this project, the authorities can improve it at the right time. Careless consumer behavior is also one of the problems that arise. This is because some users do not care about the condition of the street lights and cause others to fall victim. They mostly just saw the damage and didn't report it to the authorities for further action.

5.5 RECOMMENDATION

There are many other possibilities for future work such as establishing an emergency lighting system that works when the street lamp is switched off while waiting for authorities to fix it. Also, using more than one sensor is another great idea for an experiment, but there are also many other experimental ideas such as using a component that can detect street light damage during the day even if the light has not been activated.

5.6 CHAPTER SUMMARY

This project is derived from the IOT system, its use is now expanding worldwide. The objective of the project was to create a tool capable of detecting damage to street lights to ensure the safety of users at night. In addition, there are several studies covered in this project, namely, detecting the location of street light damage, using current sensors to detect street light damage and creating a device that enables the authorities to repair damaged street lamps. all of these objectives were set out to address the problems that arose during our study to produce this project, the difficulty of the authorities to check the condition of street lights at each location and the increased rate of road accidents caused by damage to road lights. the main ingredient in the project's production is the arduino that aims to receive data and transmit data for action. while for component building processes, methodological studies are used to design the project production process using flow charts as a guide for project planning and testing. the result was that the whole project was successful in a timely manner. Based on this result, the analysis and discussion that have been carried out, it can be concluded that this street light detector has achieved its stated objectives. In addition, this tool has also proven to save time and energy in the execution of tasks.