POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

IOT BASED SMART SAFETY SOCKET

NAME: MOHAMAD ZAIMIRUL HAIKAL BIN ZAMRIZAL

REGISTRATION NO: 08DEP20F2030

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2021/2022

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This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma Engineering electronic computer communication.

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2021/2022

CONFIRMATION OF THE PROJECT

The project report titled "IOT based smart safety socket " has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

Checked by:

Supervisor’s name: NUR SURIYA BINTI MOHAMAD

Supervisor’s signature:

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date :

"I acknowledge this work is my own work except the excerpts I have already explained to our source"

1. Signature :

Name : **MOHAMAD ZAIMIRUL HAIKAL BIN ZAAMRIZAL**

Registration Number : **08DEP20F2030**

Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : IOT BASED SMART SAFETY SOCKET

SESSION: DECEMBER 2017

1. I, **1. MOHAMAD ZAIMIRUL HAIKAL BIN ZAMRIZAL020612-10-0693**

is a final year student of **Diploma in Engineering Electronics Computer Communication, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan,40140 Shah Alam Selangor Darul Ehsan**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Engineering Electronics Computer Communication** to me.

Made and in truth that is recognized by;

a) **MOHAMAD ZAIMIRUL HAIKAL BIN ZAMRIZAL**)
(Identification card No: - 020612-10-0693)

....…………………………
) **MOHAMAD ZAIMIRUL HAIKAL BIN ZAMRIZAL**

In front of me, **NUR SURIYA BINTI MOHAMAD** (Click here to enter text.)
As a project supervisor, on the date:

) ....………………
) **NUR SURIYA BIN MOHAMAD**

ACKNOWLEDGEMENTS

I have taken efforts in this Project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to Mrs. Nur Suriya Binti Mohamad for their guidance and constant supervision as well as for providing necessary information regarding the Project & also for their support in completing the Project.

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My thanks and appreciations also go to my colleague in developing the Project and people who have willingly helped me out with their abilities.

ABSTRACT

The Internet of Things (IoT) describes the network of physical objects things that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools. With more than 7 billion connected IoT devices today, experts are expecting this number to grow to 10 billion by 2020 and 22 billion by 2025. IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors, and communication hardware, to collect, send and act on data they acquire from their environments. IOT device share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. The internet of things helps people live and work smarter, as well as gain complete control over their lives. In addition to offering smart devices to automate homes. Electric current refers to the flow of electricity in an electronic circuit, and to the amount of electricity flowing through a circuit. It is measured in amperes (A). The larger the value in amperes, the more electricity is flowing in the circuit. Energy current is a somewhat informal term that is used, on occasion, to describe the process of energy transfer in situations where the transfer can usefully be viewed in terms of a flow. It is particularly used when the transfer of energy is more significant to the discussion than the process by which the energy is transferred. For instance, the flow of fuel oil in a pipeline could be considered as an energy current, although this would not be a convenient way of visualising the fullness of the storage tanks.

ABSTRAK

Internet of Things (IoT) menerangkan rangkaian objek fizikal yang dibenamkan dengan penderia, perisian dan teknologi lain untuk tujuan menyambung dan bertukar data dengan peranti dan sistem lain melalui Internet. Peranti ini terdiri daripada objek rumah biasa kepada alat industri yang canggih. Dengan lebih 7 bilion peranti IoT yang disambungkan hari ini, pakar menjangkakan jumlah ini meningkat kepada 10 bilion menjelang 2020 dan 22 bilion menjelang 2025. Ekosistem IoT terdiri daripada peranti pintar didayakan web yang menggunakan sistem terbenam, seperti pemproses, penderia dan komunikasi perkakasan, untuk mengumpul, menghantar dan bertindak ke atas data yang mereka peroleh daripada persekitaran mereka. Peranti IOT berkongsi data penderia yang mereka kumpulkan dengan menyambung ke get laluan IoT atau peranti tepi lain yang mana data dihantar sama ada ke awan untuk dianalisis atau dianalisis secara setempat. Internet of things membantu orang ramai hidup dan bekerja dengan lebih bijak, serta memperoleh kawalan sepenuhnya ke atas kehidupan mereka. Selain menawarkan peranti pintar untuk mengautomasikan rumah. Arus elektrik merujuk kepada aliran elektrik dalam litar elektronik, dan kepada jumlah elektrik yang mengalir melalui litar. Ia diukur dalam ampere (A). Lebih besar nilai dalam ampere, lebih banyak elektrik mengalir dalam litar. Arus tenaga ialah istilah yang agak tidak formal yang digunakan, kadangkala, untuk menerangkan proses pemindahan tenaga dalam situasi di mana pemindahan boleh

dilihat secara berguna dari segi aliran. Ia digunakan terutamanya apabila pemindahan tenaga adalah lebih penting kepada perbincangan daripada proses pemindahan tenaga. Sebagai contoh, aliran minyak bahan api dalam saluran paip boleh dianggap sebagai arus tenaga, walaupun ini bukan cara yang mudah untuk menggambarkan kepenuhan tangki simpanan.

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

This project means to set the voltage or electric current that flows until it stops at a set point. For example, we set the value of the electric current to be 2.1A and the electric current will flow up to that point. The purpose of this project is to avoid fire and short circuit. The system uses current sensor and Arduino nodeMCU. The Internet of Things (IoT) describes the network of physical objects“things” that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. then, this project is very suitable to be at home or at work to use current perfectly. In this project, the results will also be shown on an LCD[1]. Electrical energy as the energy generated by the movement of electrons from one point to another. Three-conductor wire has two hots black and red and a white neutral. Though normally used for three-way switching, three-conductor wire is commonly used for duplex receptacle wiring as well.[2]

1.2 Background Research

Current voltage is the difference in electric potential between two points. Current is just the rate of flow of electric charge. Next, A Volt is the potential difference which moves one joule of energy per coulomb charge between two points. One volt is the difference of electric positional equal to one ampere of current dissipates one watt of power between two conducting points. Energy current is a flow of energy defined by the Poynting vector, as opposed to normal current. It was originally postulated by Oliver Heaviside. It is also an informal name for Energy flux. At its most basic, current = flow. An ampere (AM-pir), or amp, is the international unit used for measuring current. In 2021, the average annual electricity consumption for a U.S. residential utility customer was 10,632 kilowatthours (kWh), an average of about 886 kWh per month.

1.3 Problem Statement

This project has problems, especially at home or in the office, it is very dangerous if you are not careful. The electric fire will exceed the limit set and can involve a short circuit because we don't even know how much voltage goes into the socket. Next, it can cause fire. This fire has many categories including short circuit and forgetting to turn off the plug switch when charging the phone is also one of the fires.Then, it can also cause a fire due to old house wires and that is another cause that can cause a short circuit. Wires are divided into three, namely earth, neutral and life wires. A person's carelessness can cause many unexpected accidents, so just be careful and remember to remember each other.

1.4 Research Objectives

The main objective of this Project is the main goal of this project to save energy electricity and avoid fire. More specifically the principal objective of this research are:

- To design a safety socket system with a current sensor
- to detect an overloading current. 2. To alert user through a mobile application.

1.4 Scope of Research

Project will be completed within 14 weeks, cost of developing project is RM250.00, hardware resources are available for two months. Average Home Energy Consumption. According to data from 2020, the average amount of electricity an American home uses is **10,715 kilowatt-hours** (kWh). If you divide this number by 12 (months in a year), the average residential utilities customer uses 893 kWh per month. project is suitable for home and office because it can make our daily life easier. The size of your home will have an impact on your average home power usage. For example, larger homes tend to consume more energy than smaller homes because it takes more energy to heat and cool a bigger space.

1.5 Project Significance

The applicability of this project can help with problems at home, and it can also help in the office. Therefore, how this project can prevent short circuits from happening and fires due to excessive electric current.

1.6 Chapter Summary

In this chapter, I have given an overview of the upcoming and detailed project background of the original concept for the start of this project as well as an ongoing challenge, such as forgetting to turn off the plug switch in addition, I presented the project objectives. The main goal this project is to help simplify our daily work in saving time, money, and manpower, and I also remember that project importance based on the objective of the study. I hope this project will be useful many people.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

A literature review serves as the foundation for high-quality medical education research, assisting in the maximization of relevance, originality, generalizability, and impact. A literature review provides context, informs methodology, maximizes innovation, minimizes duplicative research, and guarantees compliance with professional norms. Iterative literature reviews take time and should be conducted throughout the study process. Researchers should make the best use of available resources, such as human resources, search tools, and current literature,

Originally this project was specially built for homes or offices, so if a short circuit occurs in a house due to excessive current voltage. Therefore, I found that there is a lot of carelessness on the part of teenagers because they forget to turn off the switch plug when charging the phone. Then, this project can help lighten our burden. Therefore, I decided to create a project based on a IOT smart safety socket that can make it easier for people in the youth as well as families. This project also does not require such expensive costs and it is easy to charge phones or the like. in office there are workers who are very busy due to a lot of work, maybe here we can conclude that they are very careless to turn off the switch plug while working. both the youth and the workers can be used as best as possible.

2.1.0 Fault detection challenges in voltage current

An electrical fault detector system detects electrical faults in an electrical distribution system by monitoring one or more conductors and producing an input signal representing one or more electrical signal conditions in the circuit to be monitored. The factors that should be considered in developing a PMFD strategy are ease in development, diagnostic ability, fault detection speed, robustness to noise, generalization capability, and handling of nonlinearity. Fault detection is the process of discovering the presence of a fault in any equipment before it manifests itself in the form of a breakdown. It is the most important stage of FDD as all the downstream processes depend on its accuracy.

2.1.1 Previous Research

NO	TITLE/AUTHOR	OBJECTIVE	METHOD	RESULT
1.	➢ MorSocket: An Expandable IoT-Based Smart Socket System ➢ Yi-Bing Lin, Chun-Ming Huang ,Li-Kuan Chen, Gang-Neng Sung , Chih-Chyau Yang. ➢ 2018	• MorSocket can be controlled by smartphones through either Wi-Fi or Bluetooth. • MorSocket allows control of multiple sockets (in the current implementation, the maximum number is 30) with only one wireless module that supports both Wi-Fi and Bluetooth. • Through the light sensor, MorSocket is automatically turned on or off according to the light	1. A dropdown menu for the user to select a MorSocket device through its MAC address (or an alias). In our example, the selected MAC address is F728DC9DD4FA. 2. A button for the user to disable/enable a slave socket in the MorSocket device 3. A label shows the index of the slave socket 4. A switch button icon for the user to	• smart socket system called MorSocket that allows the user to arbitrarily expand the sockets in the system, and control multiple sockets within a control webpage. These sockets share the same wireless communication module and therefore the hardware cost of MorSocket is lower than the single-socket solutions.By integrating MorSensor with an IoT management platform called IoTtalk, MorSocket is automatically controlled by arbitrary

		intensity of the room.	turn on/off the socket 5. A dropdown list for the user to specify the socket alias. Several popular home appliances are listed for selection. The user can also add new names to the list. This dropdown list provides the mapping between the sockets and the connected home appliances, so that the user will not accidentally presses the wrong buttons.	sensors for temperature, humidity, UV, CO2 and so on
2	➢ Residence Energy Control System Based on Wireless Smart Socket and IoT ➢ Kun-Lin Tsai, Fang-Yie Leu, Ilsun You ➢ 2016	• The main goal is raising consumers' energy consumption awareness, potentially inspiring them to be more energy efficient. • To automatically control those	• many energy control methods have been proposed. • IoT is a network system consisting of electronic devices, software, sensors and networks.	• One of the main purposes of constructing a smart house is to automatically control those appliances in the house to achieve the goals of energy saving and smart

		appliances in the house to achieve the goals of energy saving and smart living.		living. In this paper, the RECoS controls the energy consumption in a residence through IoT and smart sockets. The RECoS provides four control modes to control the on/off state of home appliances connected to smart sockets
3	➢ Smart Socket for Electricity Control in Home Environment ➢ Lukius Natanael Phangberthaa, Anindya Fitria, Intan Purnamasaria, Yohan Mulionob, ➢ 2019	• communication through middleware and sensors, creates many possibilities of variety creative applications2 . Where leading to technology of computing to be exist everywhere and anywhere, which the device be able to communicate between itself through wireless technology and internet3 .	• The smart socket server functions as a provider for smart socket device and smart socket application. The server provides services in the form of a web service that uses the PHP programming language.	Terminal of full control of each socket were designed and made, using an android-based mobile application as its controller. Simple commands and features have been implemented such as turning on and off, electricity monitoring per socket, timer, renaming each socket as user preferred. The tool has been tested for its endurance with high voltage. Electricity saving has been proven with a daily yet often forgotten, lamp. Cost and importantly, energy efficiency could have been implemented better if a simplicity of controlling it has been reached.

4	➢ Sensor technology for smart home ➢ DanDing[ab] Rory A.Cooper[ab] Paul F.Pasquina[c] LaviniaFici-Pasquina[d]	• A smart home refers to a residence augmented with sensors to observe the environment and devices/actuators to provide proactive services with the goal to improve the occupant's experience.	• Three types of sensor technologies have demonstrated ability to address the challenges of sensing human activity in a smart home, including wearable devices where sensors are worn by the residents, direct environment components where sensors are distributed in the environment, and infrastructure mediated systems where sensors are installed on an existing home infrastructure.	• In spite of the growing number of initiatives in smart home area, challenges still exist in clinical, technical, and ethical aspects of sensor technology for smart homes.
5	➢ Smart plugs perceived usefulness and satisfaction. ➢ MohammedGhazal[a]MuhammadAkmal[a]Shilpalyanna[b]KilaniGhoudi[c]	• system consists of multiple smart plugs connected in a wireless sensor network	• The smart plugs use the ZigBee protocol in a mesh network to extend their range and communicate	• Slave plugs for higher ratings can be designed by changing the choice of electronics. The overall cost of making the

		• The network consists of two unit types:(1)a slave unit type with power measuring and control electronics (the smart plug itself); and (2) a master unit type that coordinates the network activities and provides access to its collected data.	with a master unit. • The master unit uses the home’s existing Wifi network to serve the user information and control capabilities.	master and slave unit is 180 dirhams and 400 dirhams for the master unit. The costs are based on prototype costs and while low can be significantly reduced at production time.

2.2 Control System

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added. NodeMCU is an open-source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. NODEMCU is a development board with ESP8266 and a firmware with the same name. Similarly the Arduino Uno is a microcontroller board based on 8 bit ATmega328P microcontroller. NodeMCU is an open source development board and firmware based in the widely used ESP8266 12E Wi-Fi module. It allows you to program the ESP8266 Wi-Fi module with the simple and powerful LUA programming language or Arduino IDE

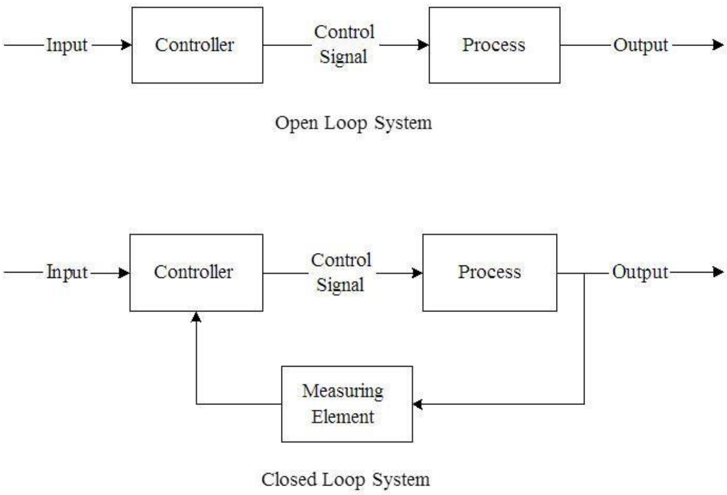


Figure 2.1: Block diagram of open loop and closed loop system

2.2.0 Current sensor

A current sensor is a device that detects and converts current to an easily measurable output voltage, which is proportional to the current through the measured path. Current is the rate at which electrons flow past a point in a complete electrical circuit.[3]

2.2.1 Liquid crystal display (LCD)

A liquid-crystal display is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly but instead use a backlight or reflector to produce images in color or monochrome.[4]

2.2.2 Arduino

Arduino consists of both a physical programmable circuit board often referred to as a microcontroller and a piece of software. Next, this project uses Arduino nodeMCU, well NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.

2.2.3 Chapter Summary

In this chapter ,have told how the smart safety socket project happened and also research related to the project. Therefore, there are methods, sensors, and results for each project that they have prepared. then, the most important control system is Arduino nodeMCU

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

The practical "how" of any given piece of research is simply referred to as research methodology. It is primarily about how a researcher designs a study in a systematic manner to produce accurate and trustworthy results that address the research aims and objectives. A very complete approach is being undertaken to actualize this project as a ready to-use product with safety characteristics. A step-by-step method is followed to ensure that the Project is completed on schedule. This includes the system current sensor to calculate how much voltage comes out to be set through the phone. Therefore, the LCD and buzzer will light up immediately if the current voltage that comes out is excessive according to what is set.

3.2 Project Design and Overview.

As discussed in the previous chapter, Arduino as the main controller. The Arduino controller circuit is designed using Proteus software and then converted to a PCB circuit**.** The current sensor result will be connected to the phone to set how much current voltage comes out through the LCD.

3.2.0 Block Diagram of the Project

This block diagram shows how the smart safety socket works. Therefore, the input is the current sensor, and the process will go through the Arduino node MCU. Next, the output will come out through the phone, LCD, led (green, yellow, and red) and buzzer.

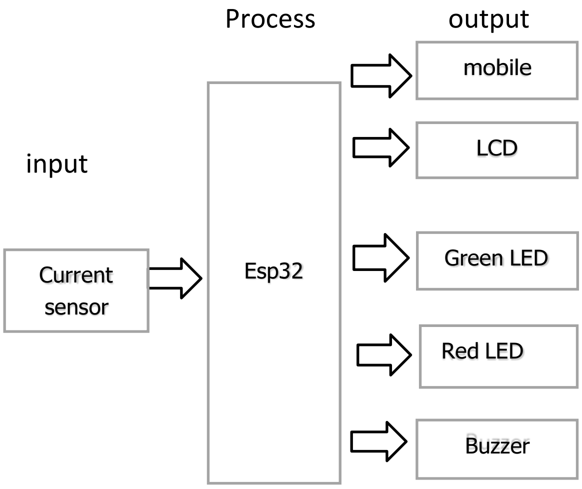


Figure 3.2.0: Block diagram of IOT smart safety socket

3.2.1 Flowchart of the Project 2

shows the circuit diagram of the whole system. It is show how to IOT based safety socket work.

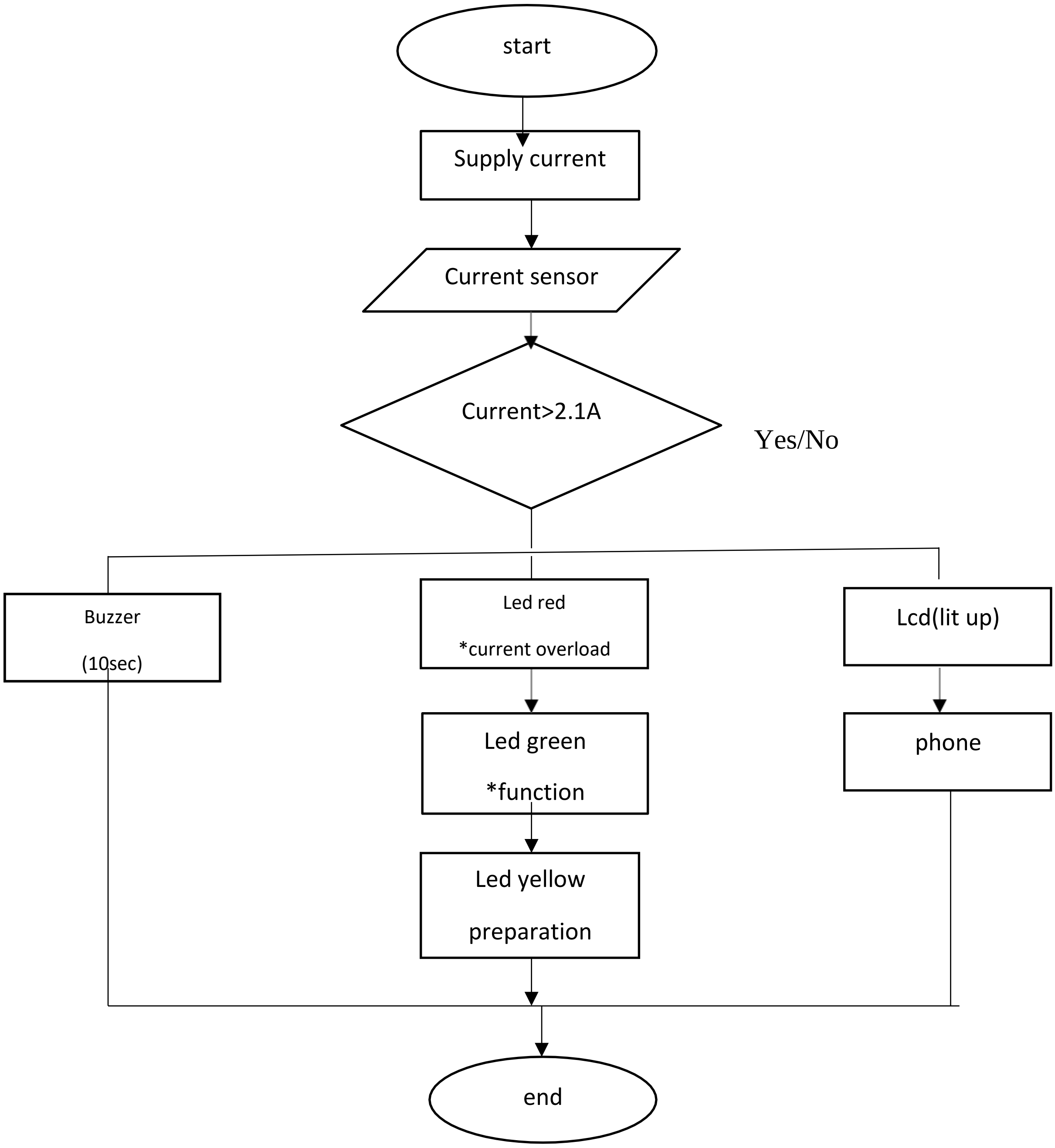


Figure 3.1: Flow chart of operation of the system

3.2.2 Project Description

As mentioned in section 3.2.0 and 3.2.2, this project tells how the smart socket works, so first there must be a supply current connected to the current sensor that has been set to 2.1A only. Next, it will be connected to 3 LEDs which are red (the circuit is not working) while the green led (the circuit is working perfectly) so this means that if the voltage current that comes out will light up red and if it lights up green, it means that the set voltage current is correct. Then it will connect to the buzzer, this component will sound if the current voltage is excessive. Next, for knowledge to set the current sensor, it is connected to the phone and output to the LCD.

3.3 Project Hardware

The main controller, as mentioned in the previous chapter, is Arduino.. The receiving voltage current end will be detected by the current Sensor. The received voltage current is then connected to a current sensor. The Arduino processes the data from the sensor, and the data is then sent via Wi-Fi and the phone. it is a phone that can connect Wi-Fi for data and output on the lcd

3.3.0 Schematic Circuit

This circuit shows that the smart safety socket works by using AutoCAD.

Figure 3.2 shows the overall circuit diagram of this Project.

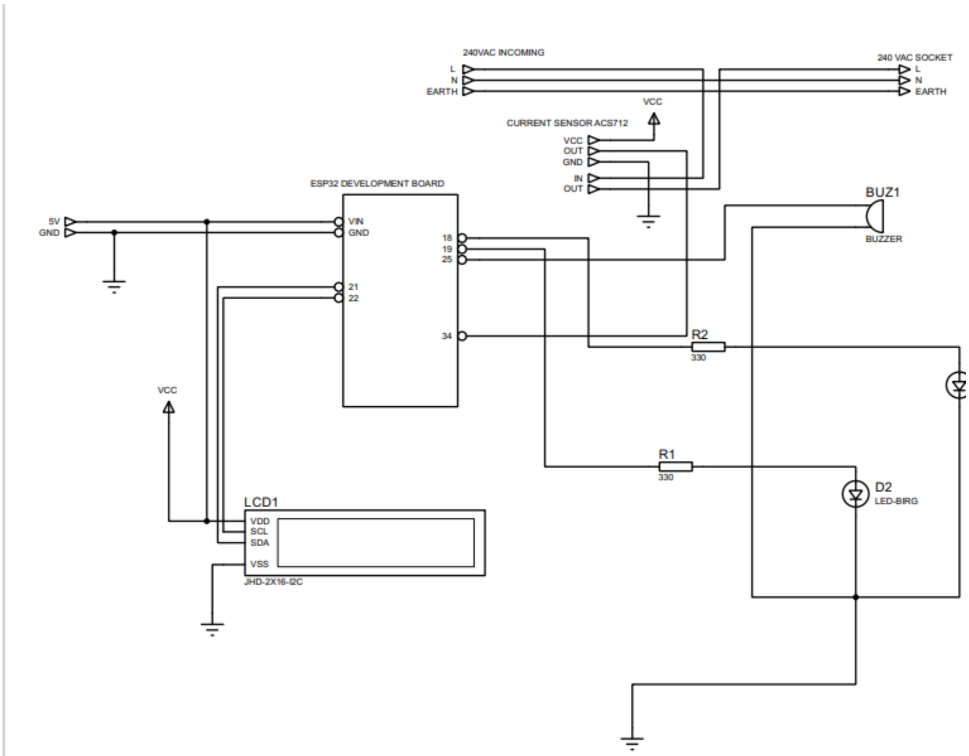


Figure 3.2: Circuit Diagram

*Images may be subject to copyright

3.3.1 Description of Main Component

The main component in this project is the Arduino node MCU as a project. heart, current This sensor functions to measure the current voltage from the current supplier and LCD to display the data obtained during the test.

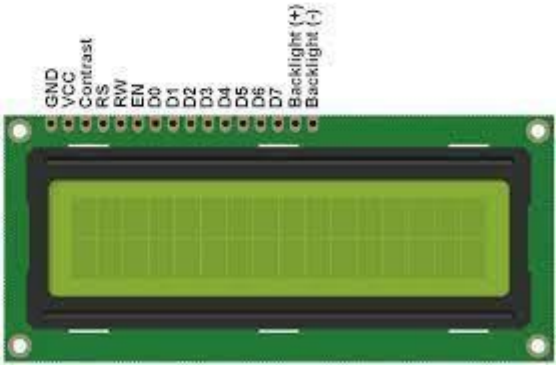
3.3.1.1 ESP32

ESP32 is a series of low-cost, low-power systems on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth[5]. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces [6].

3.3.1.2 Current sensor

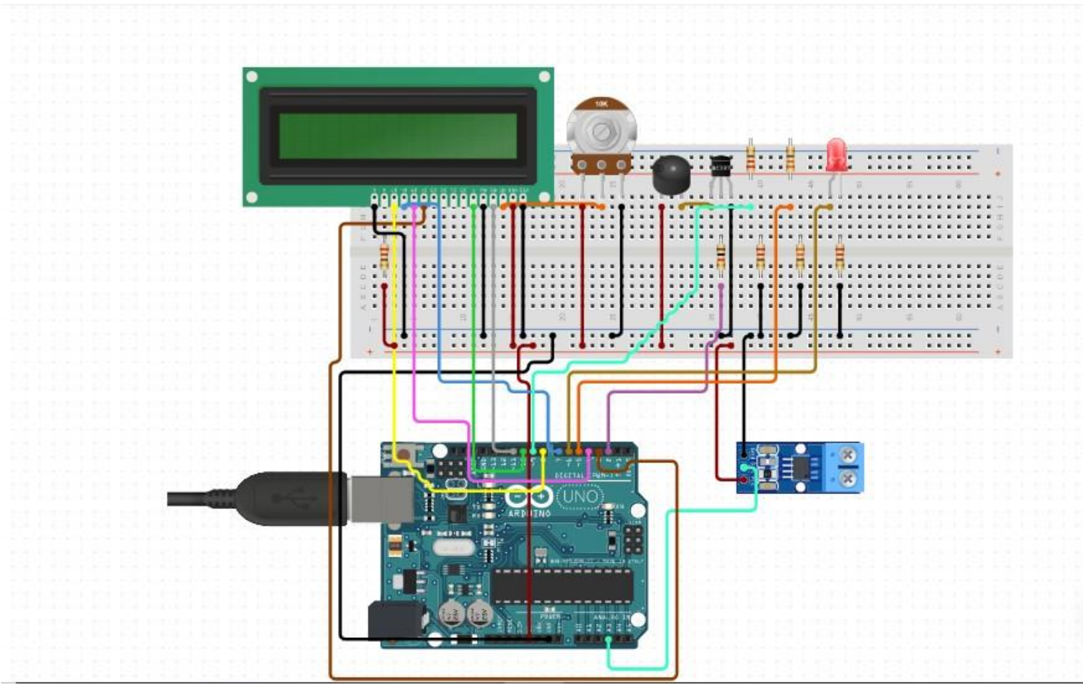
A current sensor is a device that detects and converts current to an easily measurable output voltage, which is proportional to the current through the measured path. There are a wide variety of sensors, and each sensor is suitable for a specific current range and environmental condition. Next, current sensors are either open- or closed-loop. Open-loop current sensors measure AC and DC currents and provide electrical isolation between the circuit being measured and the output of the sensor (the primary current is measured without electrical contact with the primary circuit, providing galvanic isolation).Then, The most common way to measure current in a circuit is to break the circuit open and insert an “ammeter” in series (in-line) with the circuit so that all electrons flowing through the circuit also have to go through the meter.

3.3.1.3 LCD



A liquid-crystal display (LCD) is a flat-panel display or other electronically controlled optical device that uses liquid crystals' light-modulating characteristics in conjunction with polarizers. Liquid crystals do not emit light directly, but rather need a backlight or reflector to generate color or monochrome images. LCDs can display arbitrary or fixed images with low information content that can be displayed or hidden. Preset words, numerals, and seven-segment displays, such as those seen in digital clocks, are all examples of devices having these displays. They both use the same basic technology, with the exception that arbitrary images are created using a matrix of small pixels, whilst other displays use larger elements.

3.3.2 Circuit Operation



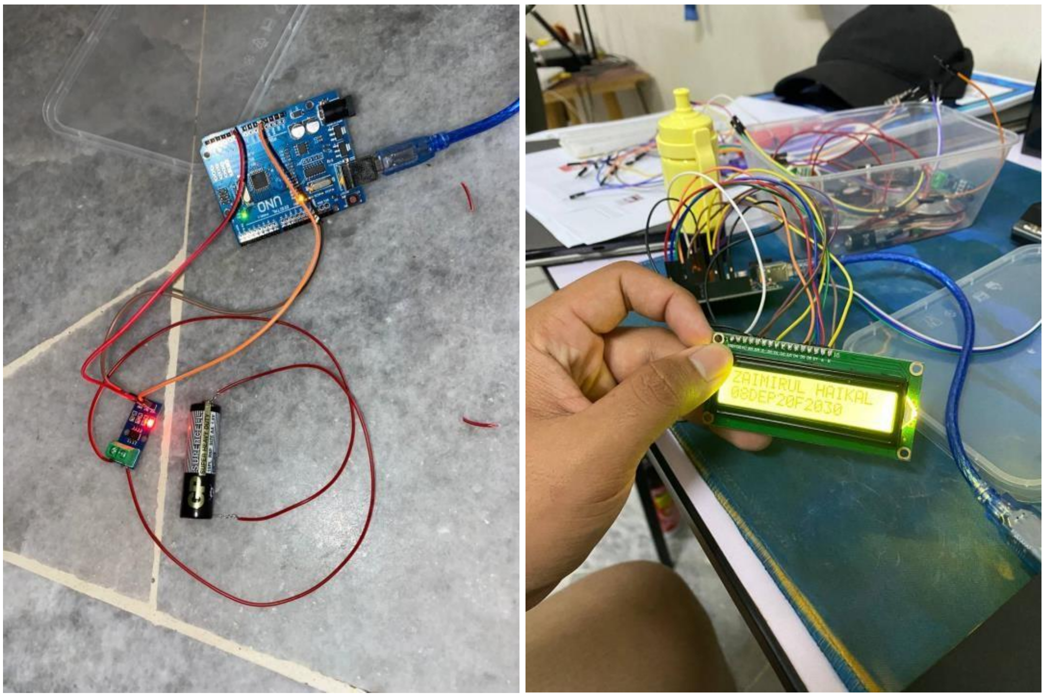
3.4 Project Software

The software that has been used in this project is Blynk and Arduino IDE. This software is used to give instruction or to control the circuit and to get the reading while to display the output.

3.4.0 Description of simulation

The simulation result using the circuit design employing Arduino Uno, LCD, current sensor, and led is shown in Diagram 3.3.2. when the system on LCD will light up according to the set voltage current such as (2.1A), and the green led will light up and if the voltage current is excessive the buzzer will sound along with the red led.

3.5 Prototype Development



Connect current sensor　　　　　　　　Connect LCD (successful)

Figure 3.5

3.6 Chapter Summary

This chapter details the design and overview of the project, including a flowchart for the project and project block diagram. Other than that, this chapter discuss the components used in this project. The system will have a transmitter and We will integrate all components from the previous circuit into one circuit. The heart of this project will be ESP 32.

CHAPTER 4

4 RESULTS AND DISCUSSION

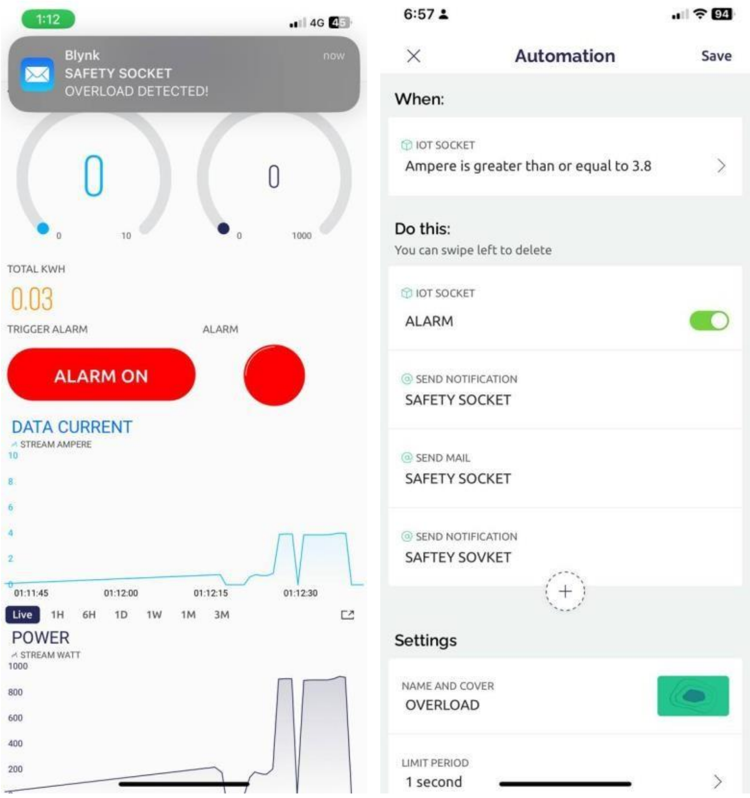
4.1 Introduction

In this chapter, the matters about the technical information of the project and the results will be discussed. As an illustration, I set a limit of 3.8A, so if the current surpasses that, a notification will be issued, and a buzzer will sound. A current sensor is a device that detects and converts current to an easily measurable output voltage, which is proportional to the current through the measured path. There are a wide variety of sensors, and each sensor is suitable for a specific current range and environmental condition. ESP32 is a low-cost, low-power Microcontroller with integrated Wi-Fi and Bluetooth. It is the successor to the ESP8266 which is also a low-cost Wi-Fi microchip albeit with limited vastly limited functionality. Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi, and NodeMCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets.

4.2 Results and Analysis

1. Socket active when you on switch

2.example aps blynk



3.When current overload then 4. you can set current (A) at this aps blynk

Notifications will come out.

Figure 4.2 result

4.3 Discussion

In recent years, the Internet of Things (IoT) has revolutionized various aspects of our lives, including the way we interact with everyday objects. One such area of application is the realm of home automation. This project aims to explore the concept of an IoT-based smart socket, which enhances power management and control capabilities within a smart home environment. By integrating IoT technologies with traditional electrical sockets, this project aims to provide users with advanced functionalities, convenience, and improved energy efficiency. In this project, we can find out that if someone uses a plug switch but forgets to turn it off, a notification will be sent, and a buzzer sound will be made. Since older homes typically do not provide stable current, this project is ideal for usage in such homes or in older homes found in rural areas.

According to the Energy Information Administration (EIA), the average American home uses an average of 10,632 kilowatt-hours (kWh) of electricity per year. That's 29,130 watts (W) per day, which can be divided by 24 hours to get an average of 1,214 W to power a home throughout the day. Next, Energy Monitoring and Analytics: The smart socket will monitor energy consumption of connected devices and provide real-time data on energy usage. It will also offer insights and analytics to help users identify power-hungry devices and optimize energy consumption.

4.4 Chapter Summary

This Tutorial/Project will show the simplest First IOT project with ESP 32, how to light a Physical-LED connected to any ESP 32 Digital pin by using the button/button in the Blynk App and the simplest sketch. LED is the simplest example to see the communication on the App Blynk works fine. After successfully turning on the plug socket can be seen on the LCD output kw and Ampere by changing the coding. Using the Blynk App with the ESP 32 is very easy, but the ESP 32 needs to be connected to a Wi-Fi source that has a phone hotspot Internet.

CHAPTER 5

5 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter the project "IoT-Based Smart Safety Socket" has successfully achieved its objectives of enhancing power management and ensuring user safety within smart homes. Through the integration of advanced safety features, including overload protection, fire and hazard detection, and improved electrical fault diagnosis, the smart socket provides users with a reliable and secure power management solution. The development process followed a well-defined project management approach, including effective planning, execution, and control measures, which contributed to the successful implementation of the smart safety socket.

During the evaluation phase, the smart safety socket demonstrated its efficiency in detecting and preventing electrical hazards. The overload protection mechanism effectively monitors power consumption and automatically cut off the power supply when necessary, mitigating the risk of overloads and electrical accidents. The integration of fire and hazard detection systems enabled prompt detection of anomalies, triggering timely alerts and emergency shutdowns. Additionally, the enhanced electrical fault diagnosis capabilities facilitated quick identification and resolution of device malfunctions and safety concerns.

Furthermore, the smart safety socket showcased seamless integration with home security systems, allowing for automatic device control based on security events. The utilization of energy harvesting techniques and advanced data analytics provided users with insights into energy consumption patterns, device behavior, and safety-related events, empowering them to make informed decisions regarding power usage and safety measures.

5.2 Conclusion

In conclusion, the project "Intelligent Power Management: Design and Implementation of an IoT-Based Smart Socket" is a significant endeavor that harnesses the power of IoT to revolutionize power management in smart homes. By developing an innovative smart socket that seamlessly connects with electrical devices, this project aims to provide users with enhanced control, convenience, and energy efficiency. The primary objective of the project is to design and implement an IoT-based smart socket that enables remote monitoring and control of connected devices. By combining hardware and software components, the smart socket offers advanced functionalities such as remote device control, energy monitoring and analytics, scheduling and automation, and voice control integration.

By empowering users to remotely control devices, monitor energy consumption in real-time, and schedule operations, the smart socket enables them to optimize their power usage and promote energy conservation. These features not only enhance convenience but also contribute to cost savings and environmental sustainability. The integration of voice control further elevates the user experience by allowing hands-free device management through popular voice assistants. Throughout the project, a comprehensive methodology was followed, including the design and development of the hardware, implementation of the software, integration of components, and thorough testing. The project's evaluation and performance analysis validate its success in achieving the desired objectives of efficient power management and user convenience.

In conclusion, the IoT-based smart socket project presents a promising solution for transforming conventional electrical sockets into intelligent devices that seamlessly integrate with the IoT ecosystem. It holds immense potential for improving energy efficiency, reducing wastage, and creating a more sustainable future for smart homes. By providing users with advanced control and energy monitoring capabilities, the smart socket paves the way for a more connected and efficient lifestyle.

5.3 Suggestion for Future Work

Overload Protection: Enhance the smart socket with the ability to detect and prevent overload situations. Implement algorithms that monitor the power consumption of connected devices and automatically cut off the power supply if it exceeds safe limits. This feature can help prevent electrical hazards and equipment damage. Next, Fire and Hazard Detection: Integrate sensors within the smart socket to detect anomalies such as overheating, power surges, or abnormal voltage fluctuations. By leveraging machine learning algorithms, the system can identify potential fire or hazard risks and trigger appropriate actions, such as sending alerts to users or automatically shutting off power.

Electrical Fault Diagnosis: Develop diagnostic capabilities within the smart socket to detect and diagnose electrical faults within the connected devices. By analyzing voltage, current, and other electrical parameters, the system can identify issues like short circuits, ground faults, or insulation problems. This information can help users troubleshoot and rectify electrical issues promptly. Then, User Safety Notifications: Implement a notification system that alerts users about safety-related events or potential risks. This could include notifications for device malfunctions, abnormal power consumption patterns, or the detection of hazardous conditions. Users can receive real-time alerts through the mobile application or web interface, enabling them to take appropriate actions to ensure safety.

Integration with Home Security Systems: Explore integration possibilities with existing home security systems. By linking the smart socket to door/window sensors, motion detectors, or surveillance cameras, the system can automatically adjust device operations based on security events. For example, it can turn on specific lights or activate appliances to simulate occupancy and enhance home security when users are away. Energy Harvesting: Investigate energy harvesting techniques to power the smart socket. By utilizing renewable energy sources such as solar or kinetic energy, the smart socket can operate independently without relying solely on a traditional power supply. This approach enhances sustainability and reduces dependence on external power sources.

5.4 Chapter Summary

This chapter, Chapter 5, discusses future enhancements and advancements for the IoT-based smart safety socket, focusing on integrating advanced safety features into the existing intelligent power management system. This chapter presents a comprehensive roadmap for further development and improvement of the smart socket, emphasizing user safety and the prevention of electrical hazards. The discussion in this chapter covers several key areas of enhancement. First, it explores the implementation of sophisticated overload protection mechanisms, including algorithms for real-time power consumption monitoring and automatic cutoff to prevent hazards. The integration of fire and hazard detection systems is also explored, utilizing sensors and machine learning algorithms to identify anomalies and trigger alerts or emergency shutdowns.

Furthermore, the chapter investigates advanced electrical fault diagnosis capabilities, utilizing monitoring techniques and algorithms to detect and diagnose issues within connected devices. The integration of a user safety notification system is discussed, enabling real-time alerts to users about device malfunctions, abnormal power consumption, or hazardous conditions. The chapter also explores the integration of the smart safety socket with home security systems, allowing for automatic device control based on security events and enhancing overall home security measures. The utilization of energy harvesting techniques, such as solar or kinetic energy, to power the smart socket is investigated, promoting sustainability, and reducing dependence on external power sources.

CHAPTER 6

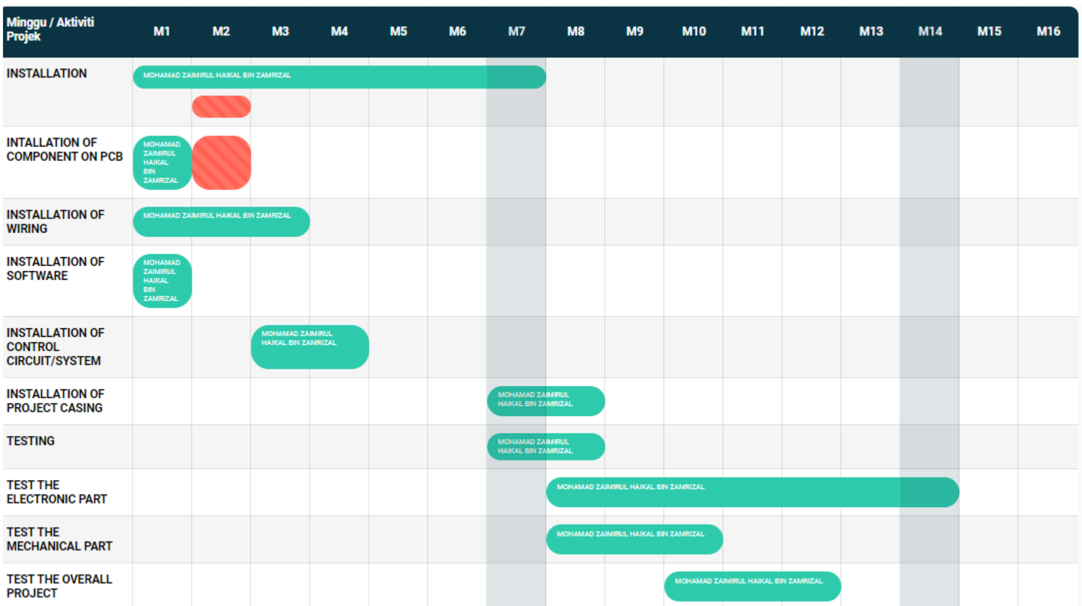
6 PROJECT MANAGEMENT AND COSTING

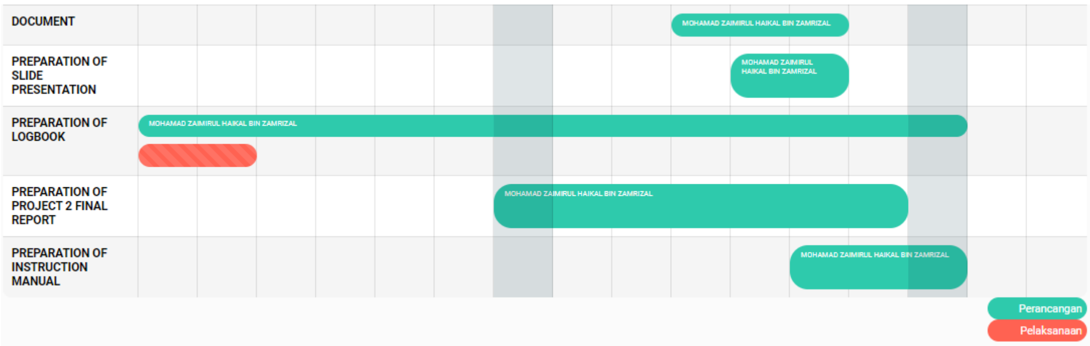
6.1 Introduction

This project involves the cost of purchasing components and materials throughout its implementation. components involving cost are hardware ESP 32, current sensor, casing socket, lcd 16x2, buzzer, preset 10kohm, led red, yellow, green, resistor 470ohm, power supply, 3 pin plug, 3pin socket. All these components are purchased through online purchase methods to make it easier as well as save on costs.

The overall gross budget estimate in the implementation of this project is RM 179.50 and other expenses is coding (wages)at RM250.00 as shown in Table 6.4 According to this budget cost, this project can be considered as a less costly project compared to other projects that can cost over a thousand ringgit and then total overall cost this project is RM429.50. The cost of the project is also in line with one of the key features of a good project developer that is low cost but have a high-quality project.

6.2 Gant Chart and Activities of the Project





6.3 Milestone

6.4 Cost and Budgeting

No.	Component and materials	The unit price	Quantity	Total
1	ESP 32	RM 38.00	1	RM 38.00
2	Current sensor	RM 28.00	1	RM 28.00
3	Power supply	RM 50.00	1	RM 50.00
4	Casing socket	RM 5.00	1	RM 5.00
5	Lcd 16x2	RM 20.00	1	RM 20.00
6	Buzzer	RM 3.50	1	RM 3.50
7	Resistor 470ohm	RM 0.60	6	RM 3.60
8	Lcd red, lcd yellow, lcd green	RM 0.40	6	RM 2.40
9	3 pin plugs	RM 5.00	1	RM 5.00
10	3 pin sockets	RM 3.00	3	RM 9.00
11	Jumper cable x3	RM 15.00	20cm/20pcs	RM 15.00
	Total :			**RM 179.50**
	List of other costing			
1	Coding(wages)			RM 250.00
	Total:			**RM 250.00**
			Overall total	**RM 429.50**

6.5 Chapter Summary

Chapter 6 focuses on project management and costing aspects related to the implementation of the IoT-based smart safety socket. It provides a comprehensive summary of the project's management approach, including planning, execution, and control, as well as an overview of the project's financial aspects. The chapter begins by discussing the project management methodology employed throughout the development of the smart safety socket. It outlines the planning phase, which involved defining project objectives, establishing timelines, and identifying necessary resources. The execution phase is described, highlighting the various tasks involved in hardware and software development, integration, and testing. The control phase is emphasized, discussing the measures taken to monitor progress, track milestones, and manage potential risks.

In terms of project costing, the chapter provides an overview of the financial aspects associated with the development and implementation of the smart safety socket. It discusses the initial investment required for hardware components, connectivity modules, safety features, and software development. The ongoing costs, including maintenance, support, and potential updates, are also considered. The chapter highlights the importance of conducting a cost-benefit analysis to assess the project's viability and determine its long-term sustainability. Furthermore, the chapter addresses the allocation of resources, including human resources, equipment, and budget, to ensure efficient project management. It emphasizes the need for effective communication and collaboration among team members and stakeholders throughout the project's lifecycle.

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7 APPENDICES


KEMENTERIAN PENDIDIKAN TINGGI

POLITEKNIK MALAYSIA

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SIJIL PENYERTAAN

Dengan ini disahkan bahawa

MOHAMAD ZAIMIRUL HAIKAL BIN ZAMRIZAL

020612100693

telah mengikuti

BENGKEL HARTA INTELEK 2023

Pada

17 MEI 2023

Bertempat di

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

DR. NORHAYATI BINTI ZAKARIA

Pengarah

Politeknik Sultan Salahuddin Abdul Aziz Shah

CETAKAN BERKOMPUTER INI TIDAK MEMERLUKAN TANDATANGAN

MALAYSIA MADANI

POLYCC POLITEKNIK KOLEJ KOMUNITI

8 APPENDIX A- PROGRAMMING

```

#include <LiquidCrystal_I2C.h>
#include <Wire.h>
#include "EmonLib.h"
EnergyMonitor emon1;




// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID           "TMPL6eX2fXvly"
#define BLYNK_TEMPLATE_NAME         "Quickstart Template"
#define BLYNK_AUTH_TOKEN            "y8JvGLUGBJKmSYep_MLUKc-5ENg60yQ0"


// Comment this out to disable prints and save space
#define BLYNK_PRINT Serial


#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);


#define LedG 18
#define LedR 19
#define Buzz 25




#define vCalibration 83.3
#define currCalibration 0.50
```

```

#define ADC_BITS    10
#define ADC_COUNTS  (1<<ADC_BITS)

int mode=0;
int SECURITY=0;
int MOTSTAT=0;

// Potentiometer is connected to GPIO 34 (Analog ADC1_CH6)
const int potPin = 34;
const int potPin2 = 35;
const int potPin3 = 32;
const int potPin4 = 33;
const int potPin5 = 25;


int TW=0;
int Load=0;
float Power;
float KWH;
float KWHbySec=0;
float KWHbyminute;
float TotalKWH;
float KWM;
float TotalUseRM;
int cnter=0;
float ACS;
float WATT;

float Amp;
float Ampx=0;
float REF = 2.55;
float RAWMax = 2.50;
float RAW[200];
float AVMin1=0;
float AVMax1=0;
float TAV1=0;
```

```
int SensorPin = 0;

long duration1x, duration2x, distance2, duration3x, distance3, duration4x, distance4, duration5x, distance5;
float inch,distance1;
float ADC1,ADC2,ADC3,ADC4;
float temperature = 25;
float h=0,t=0;
float hx=0,tx=0;
// variable for storing the potentiometer value
int potValue = 0;
  long irValue = 0;
int DSP=0;
  int LSTAT=0;
  int SOCKSTAT=0;

int PIRSTAT=0;
int BIT=0;
int ALM1=0,ALM2=0,ALM3=0,ALM4=0;
int Ready=0;
int M1=0;
String MinS="00";
String HourS="00";
String SecS="00";
int DataIn=0;
String DATA="";
String Temp1x="";
String PHx="";
String Temp2x="";
String Temp1y="";
String PHy="";
String Temp2y="";
String Temp3y="";
String Temp3x="";
String Temp4y="";
String Temp4x="";
String currentTime;
```

```
String currentDate;
String TimerGet="00:00:00";
int MODE=0;
int Hour=0;
int Min=0;
float Tempx=0;
int Spo2=0;
int Sec=0;
float SOIL;
float LEVEL=0;
int ALM=0;
int Val=100;
int Index=0;
float CV=0;
int CKN=0;
//-----------------------------------------------------------------
int TDIS=0;
int Rly1=0;
int wait=0;
int Rly2=0;
int Rly3=0;
int Rly4=0;
int Rly5=0;



float SBP,DBP;
float TD=0;
float TDm=0;
int STEP=0;
float StepCount=0;
float OldIrValue=0;
int Beat=0;
int BeatCount=0;
float PPg=0;

```

```
int Tcount=0;



long previousMillis = 0;
long interval = 3000;
long previousMillis1 = 0;
long interval1 = 10000;
//-----------------------------------------------
  long UpperThreshold = 518;
    long LowerThreshold = 490;
    long reading = 0;
    float Pulse = 0.0;
    bool IgnoreReading = false;
    bool FirstPulseDetected = false;
    unsigned long FirstPulseTime = 0;
    unsigned long SecondPulseTime = 0;
    unsigned long PulseInterval = 0;
    int MyTimer=0;
//-------------------------------------------------

//-------------------------------------------------------------

char auth[] = BLYNK_AUTH_TOKEN;

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "SOCKET";
char pass[] = "12345678";

BlynkTimer timer;

// This function is called every time the Virtual Pin 0 state changes

BLYNK_WRITE(V10)
{
  int pinValue = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly1=pinValue;
   if (pinValue==1){
ALM=1;

  }
   if (pinValue==0){
 ALM=0;

  }

  }

BLYNK_WRITE(V11)
{
  int pin2Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly2=pin2Value;
   if (pin2Value==1){
/*
  lcd.clear();
  lcd.setCursor(0, 1);
  lcd.print("SOCKET ON");
  digitalWrite(SOCKET,HIGH);
  SOCKSTAT=1;
  */

  }
   if (pin2Value==0){
    /*
 lcd.clear();
  lcd.setCursor(0, 1);
  lcd.print("SOCKET OFF");
  digitalWrite(SOCKET,LOW);
  SOCKSTAT=0;
  */

```

```
  }

  // process received value
}
BLYNK_WRITE(V12)
{
  int pin3Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly3=pin3Value;

}

BLYNK_WRITE(V13)
{
  int pin4Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly4=pin4Value;


}

BLYNK_WRITE(V14)
{
  int pin5Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly5=pin5Value;

  // process received value
}
//-----------------------------------------------------------------------------

// This function is called every time the device is connected to the Blynk.Cloud
BLYNK_CONNECTED()
{

}


void myTimerEvent()
```

```
{
  //--------------------------------------------------------------------
static unsigned long timepoint = millis();


  if (millis() - timepoint > 1000U) //time interval: 1s
  {



    double Irms = (emon1.calcIrms(1480))/2;

   Irms=Irms*0.06667;

  if (Irms<0.06){
    Irms=0.00;
    digitalWrite(LedG,LOW);
   }
   if (Irms>=0.06){
    Irms=Irms*10;
    digitalWrite(LedG,HIGH);
   }
    WATT=(Irms*230.0);


    Serial.print(Irms);
    Serial.print("\t");
    Serial.print(WATT);
    Serial.print("\t");
    Serial.println(TotalKWH);
    //--------------------------------------------------------------
 if (Irms>0){


      KWH = WATT * 1/ 1000;
      KWHbyminute = KWH/60;
      KWHbySec = KWHbyminute/60;
```

```
//--------------------------------------------------------------CALCULATE BY HOUR USAGE

      TotalKWH = TotalKWH+KWHbySec;



       if (TotalKWH < 201){
       TotalUseRM = TotalKWH*0.218;
       }
       if (TotalKWH > 200 && TotalKWH < 301){
       TotalUseRM = (200*0.218) + ((TotalKWH - 200)*0.334);
       }
       if (TotalKWH > 300 && TotalKWH < 401){
       TotalUseRM = (200*0.218) + (100*0.334) + ((TotalKWH - 300)*0.404);
       }


       //-------------------------------------------------------------------







    }
    //*****************************************************






  //    lcd.begin();
DSP++;
if (DSP>4){
```

```
if (DSP>4){
  DSP=0;
}
if (DSP<=2){

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("I(A):");
  lcd.print(Irms,5);
  lcd.setCursor(0, 1);
  lcd.print("P(W):");
  lcd.print(WATT,4);

}
if (DSP>2 && DSP<=4){
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("I(A):");
  lcd.print(Irms,5);
  lcd.setCursor(0, 1);

  lcd.print(" KWH:");
  lcd.print(TotalKWH,6);
}
```

```
  //-------------------------------------------------------------

     //  Serial.print(beatAvg);
     // Serial.print("\t");
     //Serial.print(tx);
     // Serial.print("\t");
     //  Serial.println(hx);
if (ALM==1){
  digitalWrite(LedR,HIGH);
   digitalWrite(Buzz,HIGH);
   delay(30);
    digitalWrite(LedR,LOW);
   digitalWrite(Buzz,LOW);
   delay(30);
    digitalWrite(LedR,HIGH);
   digitalWrite(Buzz,HIGH);
   delay(30);
    digitalWrite(LedR,LOW);
   digitalWrite(Buzz,LOW);
   delay(30);
}
delay(100);

Blynk.virtualWrite(V0,Irms);
Blynk.virtualWrite(V1,WATT);
Blynk.virtualWrite(V2,TotalKWH);





  }


  //-------------------------------------------------------------
```

```
}

void setup()
{
//  adc1_config_channel_atten(ADC1_CHANNEL_6, ADC_ATTEN_DB_11);
  analogReadResolution(10);

 emon1.current(potPin, 34);
  int i,k;
pinMode(LedG, OUTPUT);
  pinMode(LedR, OUTPUT);
    pinMode(Buzz, OUTPUT);


lcd.begin();
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Initializing..");
  lcd.setCursor(0, 1);
  lcd.print("pls wait");




  delay(3000);




    lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Searching WIFI");
  lcd.setCursor(0, 1);
  lcd.print("pls wait...");
delay(1500);
  Serial.begin(9600);
```

```
 digitalWrite(LedG,HIGH);
  digitalWrite(LedR,HIGH);


  Blynk.begin(auth, ssid, pass);
  // You can also specify server:
  //Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);

  // Setup a function to be called every second
  timer.setInterval(1000L, myTimerEvent);


   lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("  CONNECTED!");

  delay(2000);
  digitalWrite(LedG,LOW);
  digitalWrite(LedR,LOW);


}

void loop()
{





  Blynk.run();
  timer.run();

}
```

APPENDIX B- PROJECT MANUAL/PRODUCT CATALOGUE