POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

IOT ELECTRICAL APPLIANCES CONTROLLER AND VENTILATION SYSTEM

NAME	REGISTRATION NO
EMYLIA BALQIS BINTI ELLY SHAHRULNIZAM	08DEP20F2003

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

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This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "IoT Electrical Appliances Controller and Ventilation System" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

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Date : 20 JUNE 2023

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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 : **EMYLIA BALQIS BINTI ELLY SHAHRULNIZAM**

Registration Number **: 08DEP20F2003**

Date : 20 JUNE 2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : IOT ELECTRICAL APPLIANCES CONTROLLER AND VENTILATION SYSTEM

SESSION: SESI 2 2022/2023

1. I, **Emylia Balqis Binti Elly Shahrulnizam**

   is a final year student of **Diploma in Electrical Engineering, 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 Electrical Engineering** to me.

Made and in truth that is recognized by;

a) **EMYLIA BALQIS BINTI ELLY SHAHRULNIZAM** (Identification card No: - 020322140400)) …….) **EMYLIA BALQIS BINTI ELLY SHAHRULNIZAM**

In front of me, **ZABIDAH BINTI HARON** (Identification card No: - 780613015804) As a project supervisor, on the date) ……) **ZABIDAH BINTI HARON**

ACKNOWLEDGEMENTS

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ABSTRACT

Due to the rapid development in the field of the Automation industry, human life is becoming more advanced and better in all aspects. In the present scenario, automated systems are being preferred over the non-automated system. With the rapid growth in the number of consumers using the internet over the past years, the Internet has become an important part of life, and IoT is the newest and emerging internet technology. Internet of things plays an important role in human life as well as in the educational field because they can provide information and complete the given tasks while we are busy doing some other work. The proposed system consists of a hardware interface and software interface. In the hardware interface, the integration of ESP8266 Wi-Fi technology for controlling electrical appliances, and an application is provided for controlling to multiple users of home, with smart phones. This system is one of the best methods for controlling electrical appliance with ease with multiple users. This system is also expandable for controlling various appliances used at Musalla as long as it exists on Wi-Fi network coverage.

ABSTRAK

Dunia hari ini ramai orang mengalami kecacatan fizikal dan kebanyakan pesakit kurang upaya fizikal bergantung kepada penjaga. Dalam kes yang melampau, pesakit mungkin mengalami masalah pertuturan yang menyukarkan dia untuk berkomunikasi dengan orang lain dan menyatakan keperluannya. Menyediakan penyelesaian kepada ketidakupayaan ini adalah motif utama kerja yang dicadangkan ini. Orang kurang upaya fizikal memerlukan bantuan khas daripada penjaga atau orang lain untuk menjalani kehidupan normal mereka dan walaupun di rumah adalah tidak mudah untuk mereka mengawal peralatan rumah mengikut kehendak mereka. Dalam kehidupan moden, mereka biasanya terlupa untuk menutup lampu selepas menggunakannya boleh menyebabkan pembaziran elektrik. Ini adalah salah satu masalah utama yang dihadapi oleh bandar-bandar di dunia. Kerana kesibukan kita adalah perkara biasa yang akan berlaku membazirkan elektrik kita. Masalah asas yang dihadapi oleh orang kurang upaya dalam kehidupan seharian di rumah mereka sendiri untuk menghidupkan atau mematikan peralatan seperti lampu, kipas dan kesukaran menganalisis suis diperhatikan berkali-kali. Dan isu sampingan yang dihadapi ialah penggunaan elektrik yang membazir. Matlamat dalam projek kami adalah untuk mereka bentuk suis pintar menggunakan pengesan isyarat tangan untuk orang kurang upaya.

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Smart houses are truly dwellings that are heavily reliant on technology. Where embedded technology is used to automatically set up and control a house from anywhere and at any time. Setting is done, of course, with the mobile device (smartphone) as the medium/remote and an internet connection.

As a result, the smart home system links all the equipment in the house, allowing the residents to handle tasks such as security access, room temperature, lighting, turning on the air conditioner, turning off the TV, and even controlling the home theatre from afar. A house with a smart home system does not appear to be any different from a regular house in terms of appearance. I adopted the same principle as the recently constructed smart house in Musalla in my project. Lighting is one of the major automation applications accessible in our project. Not only can you customize the lighting control and output to meet your specific demands, but you can also save money and energy by utilizing lights more efficiently.

While ventilation is a mechanical system in a structure that allows "fresh" external air to enter while removing "polluted" internal air.

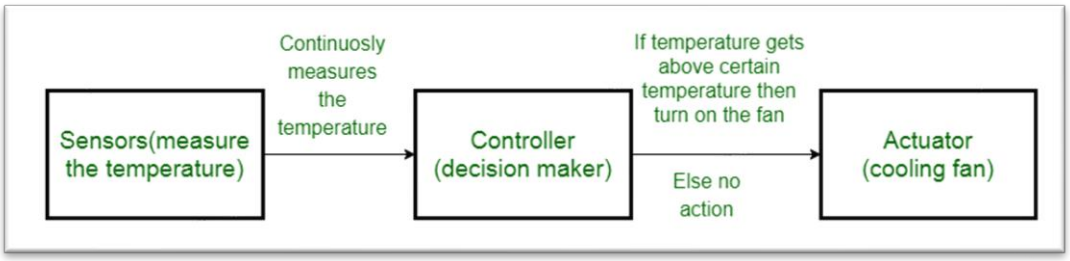


Figure 1.1: Actuators in IoT based on the sensor data

1.2 Background Research

IoT technology provides owners with security, comfort, energy efficiency and convenience. The term “control system” is used to describe a building that has lighting, appliances, air conditioning, audio systems, computers, cameras, and security systems that can communicate with one another and be remotely controlled from any room in the home, as well as remotely from any location via a smartphone or the internet. An important feature of IoT technology is that it helps to conserve the earth’s limited resources. With time, people are becoming more aware of the capability of these technologies, as they make their building smart and green using controllers that are integrated with the application. IoT technology also enables users to save energy by controlling lighting, air-cond. Users can access the systems with the help of the internet from any corner of the world at any time.

1.3 Problem Statement

IoT technology provides owners with security, comfort, energy efficiency and convenience. The term “control system” is used to describe a building that has lighting, appliances, air conditioning, audio systems, computers, cameras, and security systems that can communicate with one another and be remotely controlled from any room in the home, as well as remotely from any location via a smartphone or the internet. An important feature of IOT technology is that it helps to conserve the earth’s limited resources. With time, people are becoming more aware of the capability of this technologies, as they make their building smart and green using controllers that are integrated with the application. IOT technology also enables users to save energy by controlling lighting, air-cond. User can access the systems with the help of the internet from any corner of the world at any time. While people are pursuing ever-growing high quality of their live today. This leads to more and more facilities and electrical appliances poured into their buildings.

How to control and manage these versatile facilities and appliances in a building? Usually, conventional wall switches are located in different corners of a house and, thus necessitate the need of manual operations like pressing to turn the loads on or off. It becomes very difficult for the elderly or physically handicaps people to operate them. How to help them?

1.4 Research Objectives

The main goal/aim of this project is to design a control system for Musalla with an application that can be controlled remotely. The are some objectives that need to achieve before complete for project:

i. To control the use of electrical appliances through wifi.
ii. To manage various electrical appliances using apps.
iii. Create a monitor level for the electrical value in Musalla

1.5 Scope of Research

Musalla Integrated Electrical Controller and Ventilation System project is the basic automatic solution for daily tasks such as turn on/off light, fan other similar functions. The project is the combination of electronics and information technology and their application for controlling different tasks in the building. Our project will enable the user to use a Musalla based on Internet of Things (IoT). The modern Musalla are automated through the internet and the home appliances are controlled. The user commands over the internet will be obtained by the Wi-Fi modems.

The creation of the project has some limitations. It can still be upgraded to become an efficient and better product based on user demand. The limitation is, this project works is complete its own remotely and switching on and off any electrical appliances. It does not implement control of multiple appliances or automatic detection of faults in the controlled appliances.

The second limitations are data transmission speed. Depending on the number of systems that are connected, when transferring a large amount of data, the network can become congested and decrease the transmission speed, causing the functions to slow down.

The last limitations are ring connection. When the information is connected in the form of a ring, there may be some delay that will also depend on the number of points that are connected to the network, which gives little reliability to the system

1.6 Project Significance

This project highlights those electrical appliances controller and ventilation system is an essential work for improving the efficiency of electrical energy. Other than that, most companies are assessing how internal knowledge and skill sets match the new technology that needs to be stated by the developing digital environment by implementing the IoT idea. They progress by conducting internal research and learning more about IoT and connected products. The inability of open protocols to link all products independent of provider is one of the current significant issues. Furthermore, an important property of the system is that the control of all home appliances is done by means of the ubiquitous Infrared and Wi-Fi wireless technologies. This way, the co-operation between manufacturers is not a necessity in order to connect devices to the home automation network

1.7 Chapter Summary

In this chapter, I have provided an overview of the upcoming project and detailed the background of the original concept for the beginning of this project, as well as the challenges that are occurring, such as the repairman's difficulty identifying the sensor fault. In addition, I presented the project's objectives. The main goal of this project is to assist the repairman in identifying the sensor defect at the same time to save time, money, and manpower, and I also remember the project's significance based on the study's objectives. I hope that this project will benefit many people. I have described about the background research of the original idea for the beginning of this project. Then, I have identified the problems that are happening nowadays. In addition, I have demonstrated the objectives in this project and the objective study.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

A literature review is a piece of academic writing demonstrating knowledge and understanding of the academic literature on a specific topic placed in context. A literature review also includes a critical evaluation of the material. Therefore, it is called a literature review rather than a literature report. It is a process of reviewing the literature, as well as a form of writing. Also, 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.

Musalla Integrated Electrical Appliance Controller and Ventilation System is a project that is re - applied from home automation. As we know home automation has been made by many people. So, we took the idea from home automation and applied it in our project.

2.2 Electrical Appliances Controller and Ventilation Application

Since the beginning of electrification, switching electrical devices has been done by means of connecting or disconnecting them to the power grid. In recent years, physically disconnecting a device from its energy source has become less popular. Instead, switching is done electronically (automatically). This means that the inner device is separated from the switching circuit. Consequently, the device can be powered on or off by a remote control or in the case of this research work by an automated switching panel based on the number of persons occupying a room. Some computer main boards even allow reaction to power network events. However, the downside is that the switching unit keeps consuming energy if it stays on.

2.3 Previous Research

Electrical appliances have become a part of every human's daily life. Certain electrical appliances like water heater, induction stove consumes more amount of electrical energy for its operation. Hence it is always must to monitor the running condition of certain applications. People may forget to switch off the appliances when they go out for longer hours. This may result in severe damage to the appliances as well as it increases the energy consumption costs. In order to avoid such conditions an IoT based monitoring and control system is introduced in the proposed work.

The system is made to compatible with any number of appliances in the home and industry. The industrial applications are larger in their rating and consumes very high energy for its production and running purpose. During emergency time and maintenance time, the proposed system will be useful for the technician to control and verify a device by his own hand. This improves the reliability of maintenance operation and saves life of technician. The application also be useful for several remote monitoring applications.

The IoT control application needs a smart phone to act as an input/output device for reading the status of the connected electrical appliance or device. The smart phone is connected to the IoT hardware through wireless connection. The wireless connections are can be Wi-Fi, Ethernet, Bluetooth, or internet. The smartphone must contain a compatible operating system for communicating with the IoT hardware. Android OS is a most compatible OS for several IoT hardware's. There are several number of IoT hardware's are available in the market with several features. One can choose a better hardware for their specific application. The most popular IoT hardware's are Arduino, NodeMCU, or ESP32 and the sensors.

Articles/ Journals	Smart Home Design for Disabled People based on Neural Networks	Automatic Electrical Appliances Control Panel Based on Infrared and Wi-Fi	Development of a GSM based Control System for Electrical Appliances	A Sensor based IoT Monitoring System for Electrical Devices using Blynk framework	Home automation using general purpose household electric appliances with Raspberry Pi and commercial smartphone
Author	Ali Hussein, Mehdi Adda, Mirna Atieh, Walid Fahs	Emma ADETIBA, Victor O. MATTHEWS, Ayokunie A. AWELEWA, Isaac A. SAMUEL, Joke A. BADEJO	Oz Society	Dr. P. Karuppusamy, Professor, Department of EEE	Imran Ashraf, Muhammad Umer, Rizwan Majeed, Arif Mehmood, Waqar Aslam, Muhammad Naveed Yasir, Gyu Sang Choi
Sensor	Motion sensor	Infrared sensors	-	Ultrasonic	Humidity sensor, Motion sensor, and Temperature sensor.
Objective	Smart Home system design has the characteristic of automatic control of different areas of the house. Pre- defined timers may be set, according to the users need and throughout adaptive learning, to switch ON/OFF lights, AC, coffee machine, music, TV, and all other devices. Also, user defined timers are possible to provide the users with a feeling of control over their house	Our system operates on an in-built electronic processing and data storage system that has the ability to make intelligent decisions on the control and regulation of appliances in a given room or specified area.	Most people nowadays have access to mobile phones and thus the world indeed has become a global village. At any given moment, any particular individual can be contacted with the mobile phone, but the application of mobile phone cannot just be restricted to SMS (Short Message Service) which is a service available on most digital mobile phones that permit the sending of short messages also known as text messaging service.	People may forget to switch off the appliances when they go out for longer hours. This may result in severe damage to the appliances as well as it increases the energy consumption costs. In order to avoid such conditions an IoT based monitoring and control system is introduced in the proposed work.	Home automation (smart homes) is one of the potential application areas of IoT that has got rapid interest and growth recently. Smart devices that can sense events and translate them into meaningful data can serve to substantially maximize safety, and security and greatly improve the comfort and quality of human beings.

Method	For this purpose, the electrical devices are equipped with a control board which is a combination of an Arduino microcontroller. an actuator which will be mainly a relay and a difference amplifier circuit acting as a power measurement module for power monitoring. All control boards have the capability to connect to both our network systems. Control boards are used to switch devices ON/OFF.	The circuitry of the system is divided mainly into two parts which are the sensory system (charging system, infrared sensors, microcontroller 1, seven segment display, digital signal transmitter) and the switching system (charging system, digital signal receiver, microcontroller 2, transistors, relays, appliances, etc.	The relay driver (BUFFER ULN2003) is used to drive the relay circuits which switches the different appliances connected to the interface. The LED is used to indicate the status of the operation performed by the microcontroller and also its inclusion makes the overall system user-friendly	The microcontroller unit of the proposed IoT monitoring system acts as a brain of the whole circuit. An Arduino microcontroller is utilized in the work for connecting several peripheral units. The sensors are able to connect directly to the microcontroller without need of any other special components. The values taken from the sensors are utilized in the program written on the microcontroller to decide the operation status of the connected AC and DC circuits.	This section provides the details of the proposed automation systems, its components that interact to control electrical appliances and their working principles.
Result	A prototype was developed and simulations were run to show the effectiveness of this system. It is noteworthy that the design used for one user may differ from that of another user depending on their situation and disabilities. Thus, it is not required to have the whole system set in the same manner for all the users.	The operation of the circuit is dependent on the time of the day (daylight or night) and on the interruption of the infrared rays by occupants of the room.	The system was designed to receive SMS from user mobile phone to the mobile phone connected to the PIC16F877A circuit that acts as a GSM modem. The system then replies by sending a message to user mobile phone reporting the status of the devices (turned ON or turned OFF).	The hardware unit of the project is connected with a light unit, heater, television and a plug socket. The status of the appliances are verified through the relay units connected between the microcontroller and the appliances	A smartphone app is built to operate all the electrical appliances operating in our home automation system. The smartphone app comprises of two modes of operation: admin mode and user mode.

Table 2.1: Comparison Table of Previous Literature Reviews Research

2.4 Control System

Using control loops, a control system manages, commands, directs, or regulates the behavior of other devices or systems. It can range from a single home heating controller controlled by a thermostat to big industrial control systems used to operate processes or machinery. Control systems are created through the control engineering process. A feedback controller is used to automatically control a process or operation for constantly modulated control. The control system compares the value or status of the process variable being controlled to the desired value or setpoint and uses the difference as a control signal to bring the plant's process variable output to the setpoint. Software logic, such as that found in a programmable logic controller, is utilized for sequential and combinational logic.

Control actions are classified into two types: open loop and closed loop. The controller's control action in an open-loop control system is independent of the process variable. A central heating boiler regulated solely by a timer is an example of this. The control action is the activation or deactivation of the boiler. The temperature of the building is the process variable. This controller keeps the heating system running at a steady rate regardless of the building's temperature. In a closed-loop control system, the controller's control action is determined by the desired and actual process variables. In the boiler analogy, this would involve using a thermostat to monitor the building temperature and feeding back a signal to guarantee that the controller output keeps the building temperature near to the value set on the thermostat.

A feedback loop in a closed-loop controller assures that the controller exerts a control action to control a process variable at the same value as the setpoint. A result, closed-loop controllers are sometimes known as feedback controllers. Diagram above shows the block diagrams of the open loop and closed loop systems.

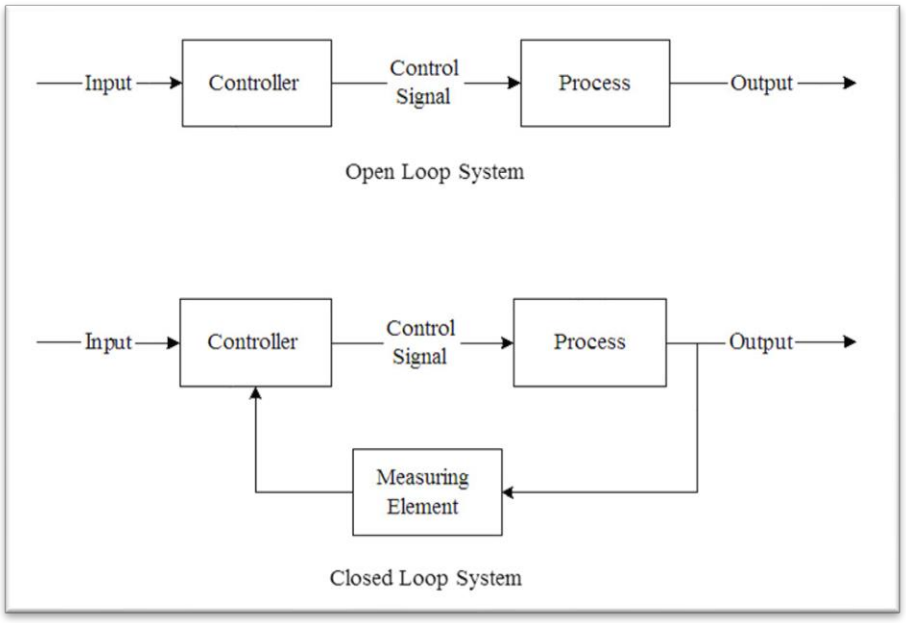


Figure 2.4: Block diagram of open loop and closed loop system

2.5 NodeMCU ESP8266 Wi-Fi Module

The ESP8266 Wi-Fi Module is a self-contained SOC with an inbuilt TCP/IP protocol stack that can provide access to your Wi-Fi network to any microcontroller. The ESP8266 may host applications or offload entire Wi-Fi networking tasks from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, which means we can just connect it to our Arduino device and receive almost the same Wi-Fi-ability as a Wi-Fi Shield right out of the box. The ESP8266 module is a low-cost board with a large and rapidly increasing community.

An ESP8266 Wi-Fi module is a SOC microprocessor that is primarily used to construct endpoint IoT (Internet of things) applications. It is referred to as a standalone wireless transceiver, and it is relatively inexpensive. It is used to connect numerous embedded system applications to the internet. The ESP8266 Wi-Fi module has 64 KB of boot ROM, 80 KB of user data RAM, and 32 KB of instruction RAM. It supports the 802.11 b/g/n Wi-Fi network at 2.4 GHz, as well as I2C, SPI, I2C interfacing with DMA, and a 10-bit ADC. This module can be readily interfaced with the microcontroller via a serial connection. If the operating voltage exceeds 3.6 volts, an external voltage converter is required. Because of its inexpensive cost and small size, it is most commonly utilized in robotics and IoT applications.

2.6 Temperature Sensor (DHT11)

The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It is simple to use, but requires careful timing to grab data. It can get new data from it once every 2 seconds, so when using the library from Adafruit, sensor readings can be up to 2 seconds old.

2.7 Relay Module 1 Chanel

A relay module is an electronic device that allows you to control higher voltage or current loads using a low voltage or current signal. It is commonly used in various applications to switch on or off devices such as lights, motors, appliances, or other electrical components.

The "1 channel" specification indicates that the relay module has one independent relay circuit. This means it can control a single device or load. If you need to control multiple devices simultaneously, you would require a relay module with multiple channels.

2.8 Chapter Summary

The research approach chosen for this project was experimental testing because it is centered on product innovation. When this product is ready to be built, it will be put to the test in order to see how effective it is at solving the problem. Furthermore, this literature review aids in the development of a theoretical framework consisting of research concepts and hypotheses whose success can be evaluated, as well as providing information for research relevance and coherence.

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter will detail the methodology utilized in the project's development and solution. This chapter contains every element of the design, including the creation of project parts, circuit diagrams, schematics, block diagram of the system, flow chart and detail of each mechanism.

This part also covered the problems i had during the project completion process, as well as an explanation of the instructional methods employed. This part should also include a list of experiments that were carried out throughout the course of our study. To keep everyone safe when testing, the safety of the testing and preventative measures must be prioritized.

3.2 Project Design and Overview.

As discussed in the previous chapter, the proposed controller is using a closed-loop system with Arduino as the main controller. The Arduino controller circuit is designed using Proteus software and then converted to a PCB circuit. Also, internet of things provides us with a lot of new technology which would turn the cities into smart cities and all the things can be controlled remotely. These new technologies can decrease the power consumption in home by remotely control the appliances which turns the lighting on or off automatically.

3.2.1 Block Diagram of the Project

Block diagrams are used to break down an entire circuit or project into smaller parts or blocks in order to better comprehend it. It may also be used to create new systems or explain and improve current ones. Each brick has a certain purpose, and a block diagram depicts how they are linked. Figure 3.2.1 depicts a block diagram of our project that might aid others in comprehending it. Based on the block diagram below, it is separated into two parts which are the electrical appliances controller and ventilation system. For the electrical appliances controller, NodeMCU need to initialize to the network and after connected to the network the system needs to initialize to Blynk server after connected to the server, user can control the appliances using the Blynk apps as a mobile interface. Next, ventilation, after the system start data will collect from temperature sensor.

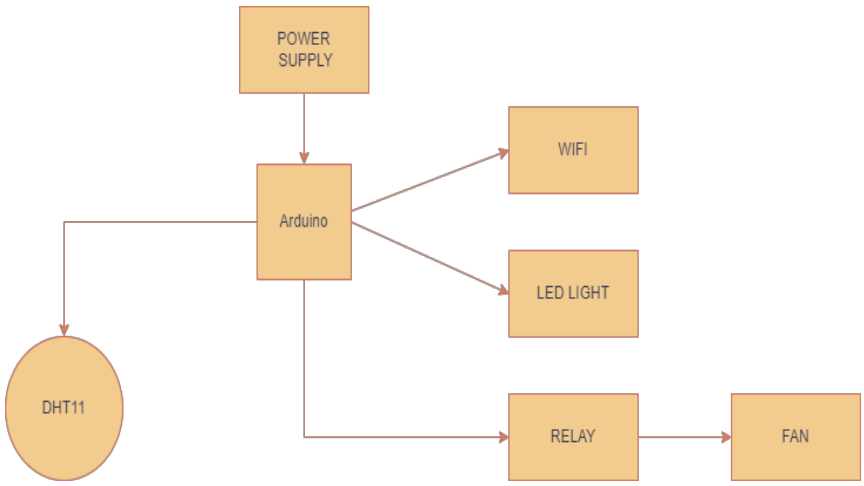


Figure 3.2.1: Block diagram of IOT Electrical Appliances Controller and Ventilation System.

3.2.2 Flowchart of the Project 2

A flowchart is graphical representation of a process, system, or computer algorithm. They are widely used in a variety of fields to document, examine, plan, enhance, and convey frequently complex processes in clear, simple diagrams. Flowcharts, also known as flow charts, use rectangles, ovals, diamonds, and maybe other forms to indicate the type of step, as well as linking arrows to define flow and sequence. They can range from simple hand-drawn charts to detailed computer-drawn diagrams displaying numerous processes and paths. Considering all the different types of flowcharts, they are one of the most ubiquitous diagrams on the globe, used by both technical and non-technical people in a wide range of professions.

IOT ELECTRICAL APPLIANCES CONTROLLER AND VENTILATION SYSTEM

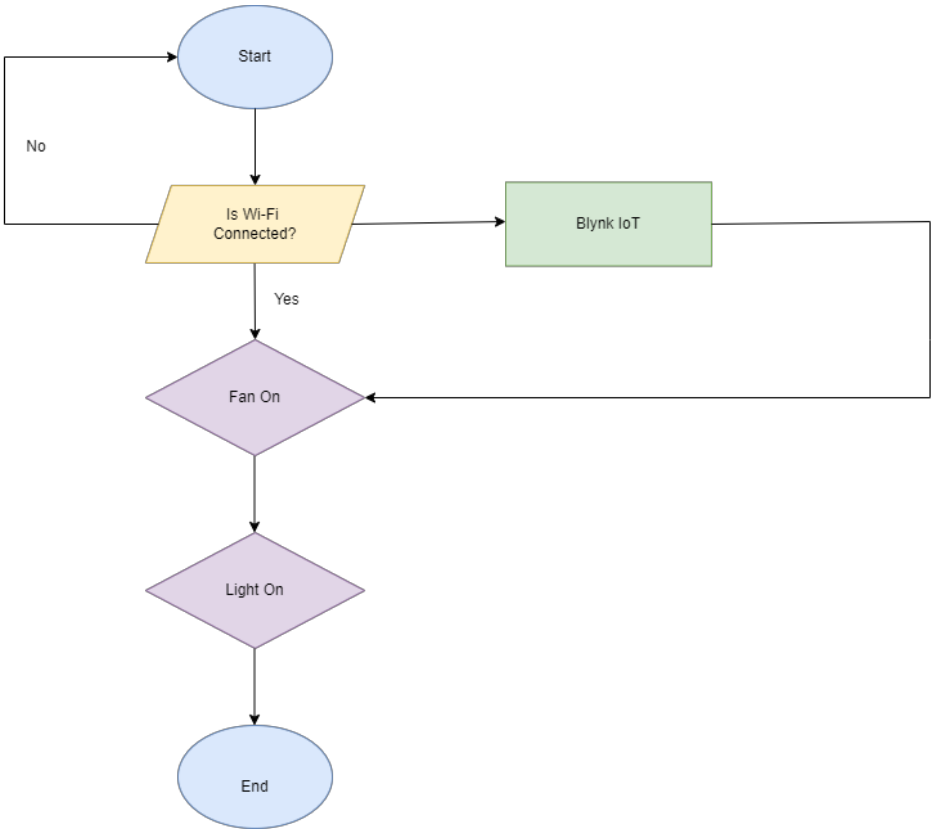


Figure 3.2.2: Flow chart of the system

3.2.3 Project Description

This project refers to a convenient home setup where appliances and devices can be automatically controlled remotely from anywhere with an internet connection using a apps in smartphone or another networked device. Appliances in the Musalla are interconnected through the internet, allowing the user to control functions such light, fan and other task.

3.3 Project Hardware

Hardware assembly mainly includes connecting specific digital pins of NodeMCU to the relays on the relay module, including the connection of supply and ground pins. The main functional assemble in prototype is simple. The further relays are fit to be connected to any appliance desired to be controlled. The vital part in hardware assembly is considering the digital pin that corresponds to which relay. This connection is done as per the setup of Blynk application. The radio buttons on Blynk application are set up to switch a particular digital pin in Node MCU. It is made sure that the relay connection is physically made according to this set up.

3.3.1 Schematic Circuit

The overall circuit design for this project is shown in Figure 3.6.1. The Node MCU ESP 32 is at the heart of this project. The transmitter and receiver are 2 components that were designed for this project. It has a straightforward connection at the transmitter component, which is built using one LEDs and one exhaust fan. The optical source for this project will be made up of LEDs. The main controller, as mentioned in the previous chapter, is Node MCU ESP 32. The Node MCU processes data from the sensor, and the data is then sent to a Wi-Fi module. It is a Wi-Fi module and one of the major platforms for the Internet of Things. It can send data to the IoT cloud. The DHT11 sensor as angular velocity sensors, can detect temperature and humanity of air.

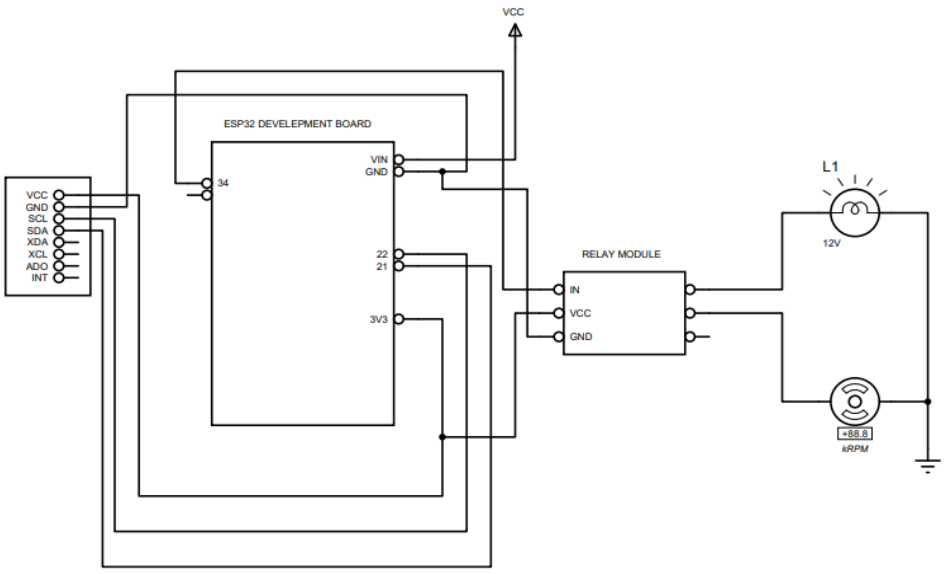


Figure 3.3.1: Circuit Diagram of IoT Electrical Appliances Controller and Ventilation System

3.3.2 Description of Main Component

The key components in this project are to control switch appliances ON or OFF, control lighting, and perform many other tasks and the Nodemcu ESP8266 Wi-Fi Module as the project's heart. Also, the Temperature DHT11 Sensor to operate as environmental temperature control.

3.3.2.1 Nodemcu ESP8266 Wi-Fi Module

NodeMCU is a microcontroller development board with Wi-Fi capability. It uses an ESP8266 microcontroller chip. it is better Processor & Memory. NodeMCu comes with an 80MHz of clock speed and 4MB of flash memory. Built-in TCP/IP Stack - IoT Ready: The NodeMCU contains a Wi-Fi connection and can connect to the internet through Wi-Fi. It is best suited for IoT applications. NodeMCU is an open-source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. In addition, by providing some of the most important features of microcontrollers such as GPIO, PWM, ADC, etc. So, it can solve many of the project's needs alone.

3.3.2.2 Temperature DHT11 Sensor

The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It is simple to use, but requires careful timing to grab data. You can get new data from it once every 2 seconds, so when using the library from Adafruit, sensor readings can be up to 2 seconds old.

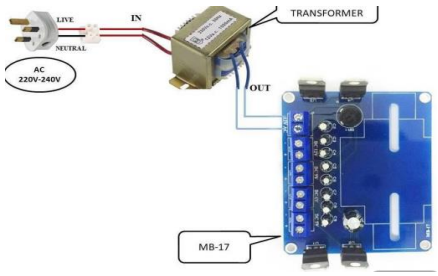
3.3.2.3 Exhaust Fan

5V DC fan is a compact and low-power device that provides cooling and airflow in various electronic applications. Its size, airflow capacity, bearing type, and noise levels can vary, allowing users to select a fan that suits their specific cooling needs while considering factors such as power consumption and space constraints.

3.3.2.4 Light

The choice of bulb depends on factors such as energy efficiency, brightness, color temperature, and the specific requirements of the lighting application. It's worth noting that there is ongoing development in lighting technology, and newer options like LED bulbs are becoming increasingly popular due to their energy efficiency and long lifespan.

3.3.2.5 Power Supply



Power supplies are designed to provide the appropriate voltage and current levels required by the devices they power. They often include protection features like overvoltage protection, overcurrent protection, and short circuit protection to safeguard the connected equipment from damage. When choosing a power supply, it is important to consider factors such as the required voltage and current ratings, the efficiency of the power supply, the type of connectors needed for the devices, and any specific requirements of the application or system being powered.

3.4 Project Software

In this project, we are simulating this circuit with the Proteus application. The following software that we use to design the coding of our project is the Arduino software. Proteus can create a circuit design before we begin prototyping. This software can assist us in simulating the circuit and ensuring that current flows into all the components that we have. This is also to ensure that all the components work as expected. This program can also help us safeguard our component from overvoltage because it allows us to test it in software before testing it on the prototype. After completing the coding, the Arduino program can check the coding for errors before converting it to a hex file for simulation in the Proteus application. This software may examine whether all the components work properly after the coding has been applied to the Arduino in Proteus. This can save time while troubleshooting the problem, whether it is a coding issue or a circuit issue.

In the software, it provides methods such as schematic drawing or schematic construction. The schematic construction can create a complete circuit of our project which is completely connected with all components together in a single circuit. The schematic design and construction also indicate any errors during the connection process.

Furthermore, Proteus 8 Professional contains a lot of components. The components that are present will help assist in construction. However, some components are not be found and must be inserted manually compared to other components that were pre-installed with the software. The numerous amounts of components were all grouped based on the type of components thus making the software user-friendly software

3.5 Prototype Development

A prototype is a look-alike or a copy of a part that illustrates the product features and explores all possibilities before investing in the full creation of the part. A prototype might range from a detailed pen and paper drawing to a fully functional version of the product. As a result, prototype development is just a collection of steps used by the manufacturer to create the prototype.

3.5.1 Mechanical Design/Product Layout

Diagram 3.8.1 depicts the project's top views, as well as its description. The top perspective of the project reveals that it was designed on a board. The transmitter, receiver, and power supply will all be put on the board. As stated, the transmitter part includes a resistor of 330 ohms, a potentiometer of 1k ohms, LEDs, LCD, and ESP 32, where the potentiometer is used to adjust the brightness of the LEDs, ESP 32 as the project's heart. The multi-output power supply is used in this project. The connection between DHT11 Sensor and the ESP 32 is shown in the top image of the project to allow interface between them.

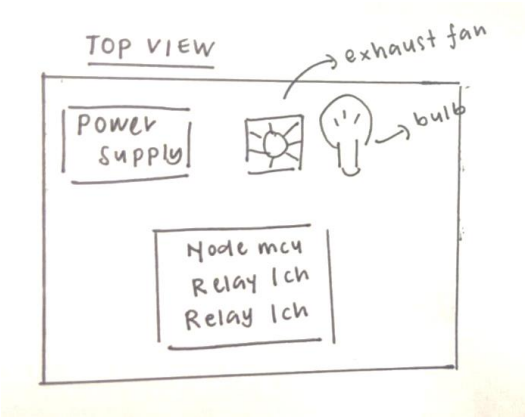


Figure 3.5.1: Top view of IoT Electrical Appliances Controller and Ventilation System

3.6 Sustainability Element in The Design Concept

In this sub-topic student should elaborate on the design criteria of their Project either environmental design criteria, social design criteria use of sustainable design tool or economic design criteria. Also explain contribution to the society of the Project proposed.

This device that allows people with movement-limiting disabilities to use technology and operate electronic devices. Instead of the person performing complex actions such as turning a knob, adaptive switches will offer easier movement solutions, such as pressing a button. For special needs provide an interface between the technology and the person with the disability. They modify the normal switch to give the person access, and they are designed to suit the person's unique ability. When students with disabilities use such switches, they can work more independently and participate actively at home, at school or in their neighborhood.

Electrical Appliances Controller devices can sometimes feel almost magical. They allow you to turn on lights without having to touch a switch, answer the front door from your bedroom or a hotel room, and tweak your thermostat with a simple voice command. For many people, those capabilities are a convenience or a luxury. But for those who live with accessibility challenges, it can be a powerful enabler, one that allows them to live a more independent and empowered life.

3.7 Chapter Summary

This chapter detailed the project design and overview, including a flowchart of the project and a block diagram of the project. Aside from that, this chapter discusses the component used in this project. The system will have a transmitter and receiver component that will be connected end to end of the fiber and will use Temperature Sensor (DHT11). We will integrate all the components from the previous circuit into a single circuit. This project's heart will be the Arduino Uno and the ESP8266 NodeMCU Wi-Fi.

CHAPTER 4

4 RESULTS AND DISCUSSION

4.1 Introduction

Data analysis is the summarization of acquired data. It entails interpreting data acquired using analytical and logical reasoning in order to find patterns, connections, or trends. The outcomes and analysis for this project will be clearly presented and explained in this chapter based on the project's test run progress in 30 minutes. A table detailing the similarities and differences movement to turn lights and fans on and off. I believe that all the results and discussions contained in this part have met the project objectives outlined previously mentioned.

4.2 Results and Analysis

4.2.1 Final Product

Figure 4.2.1(a): Final View Product of the Project

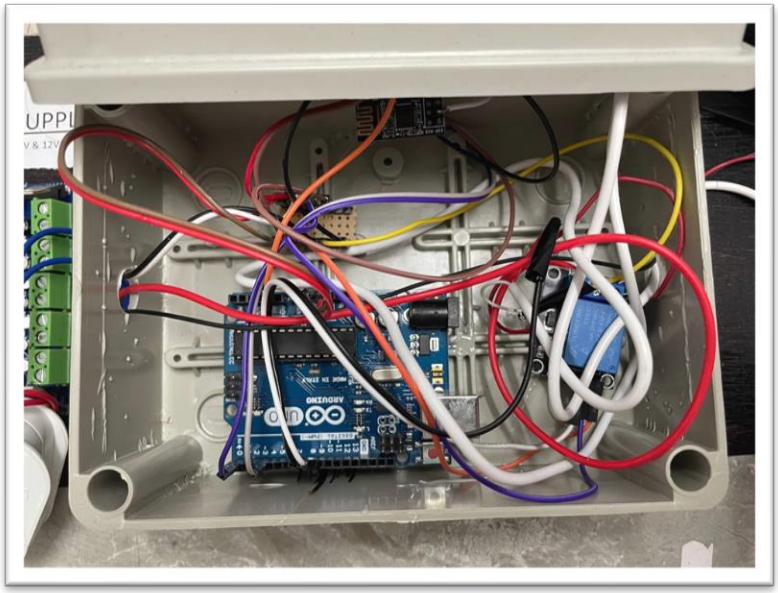


Figure 4.2.1(b): Inside the component box

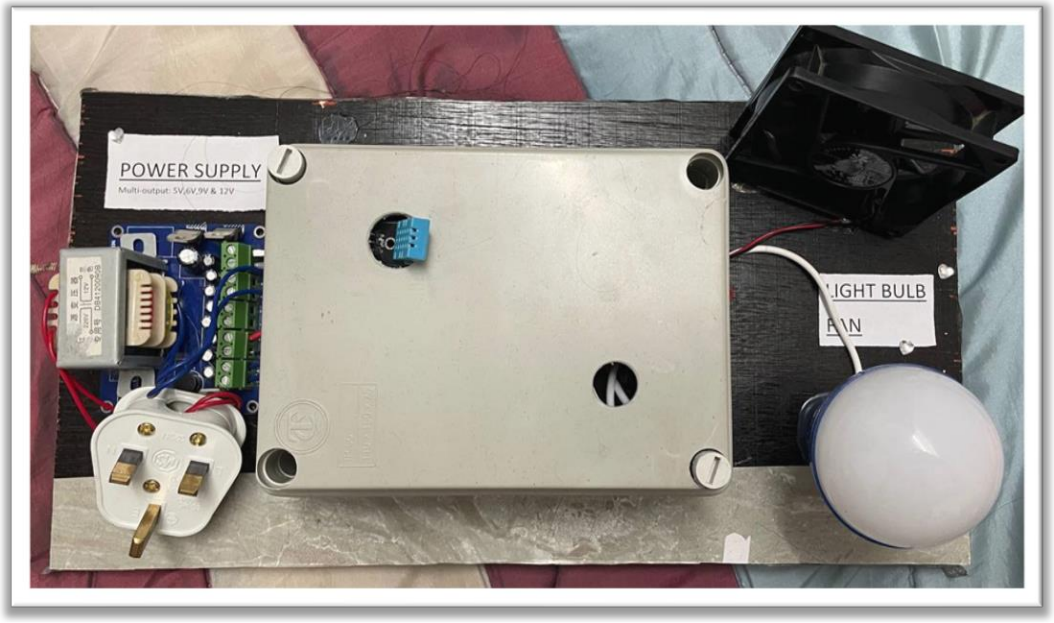


Figure 4.2.1(c): Top View Product of the Project

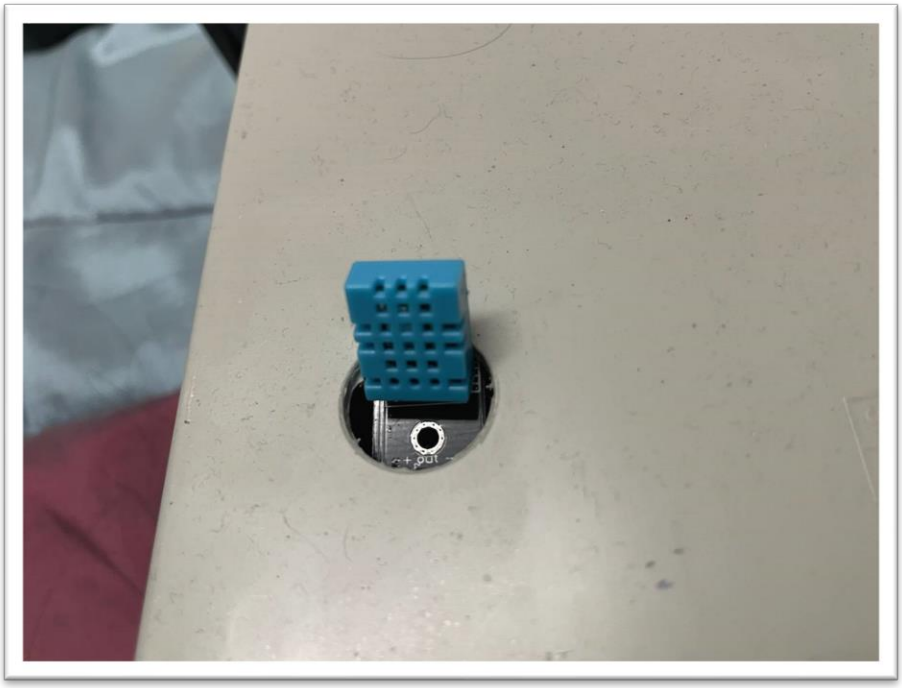


Figure 4.2.1(d): Temperature Sensor DHT11 View in Product

4.2.2 Blynk Apps

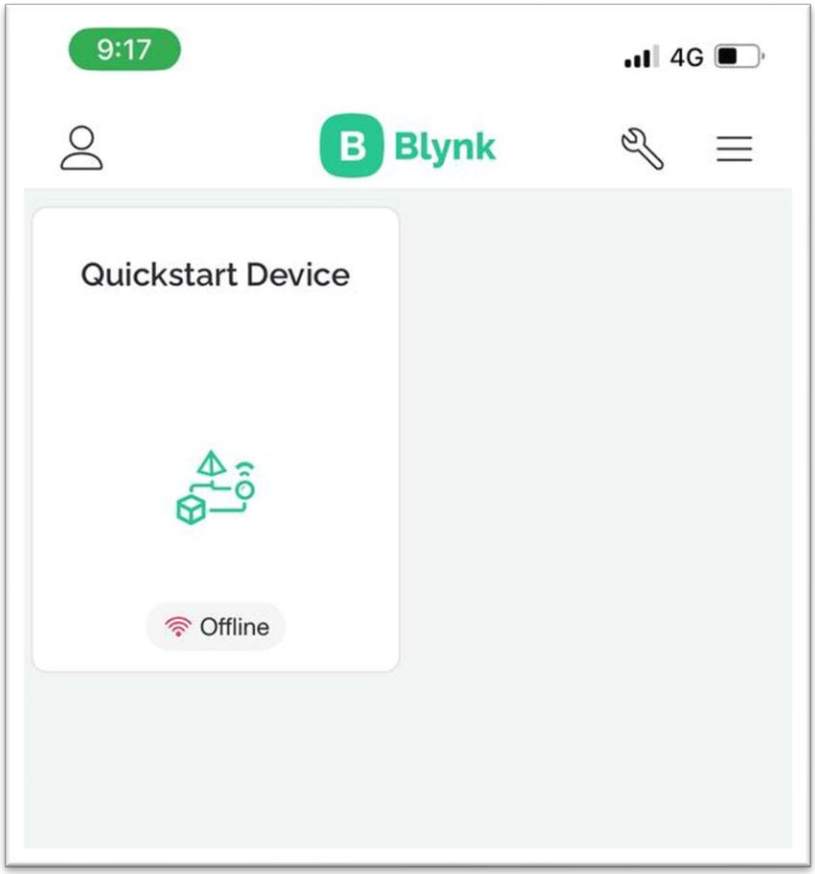


Figure 4.2.2 (a): Main Page Blynk Apps

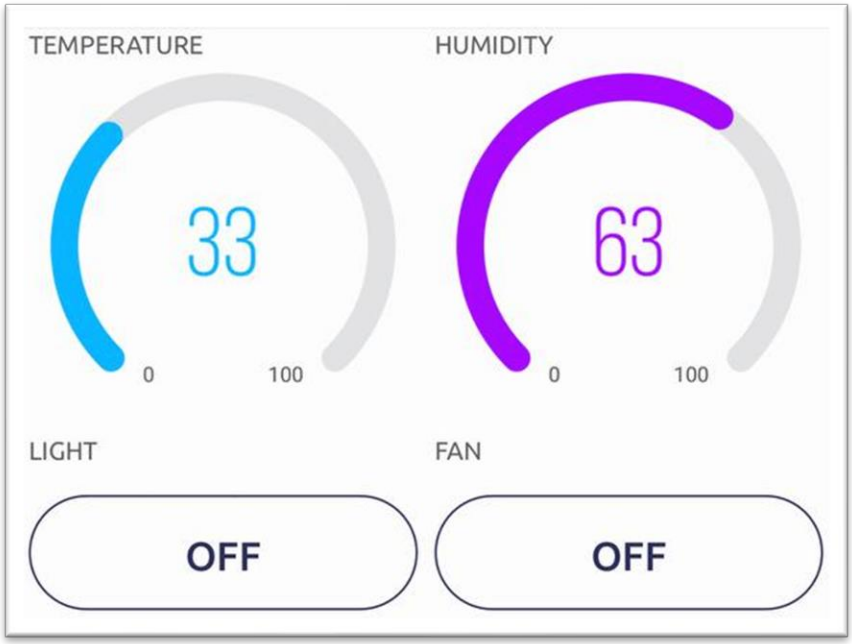


Figure 4.2.2 (b): IOT Electircal Appliances Controller and Ventilation System mode.

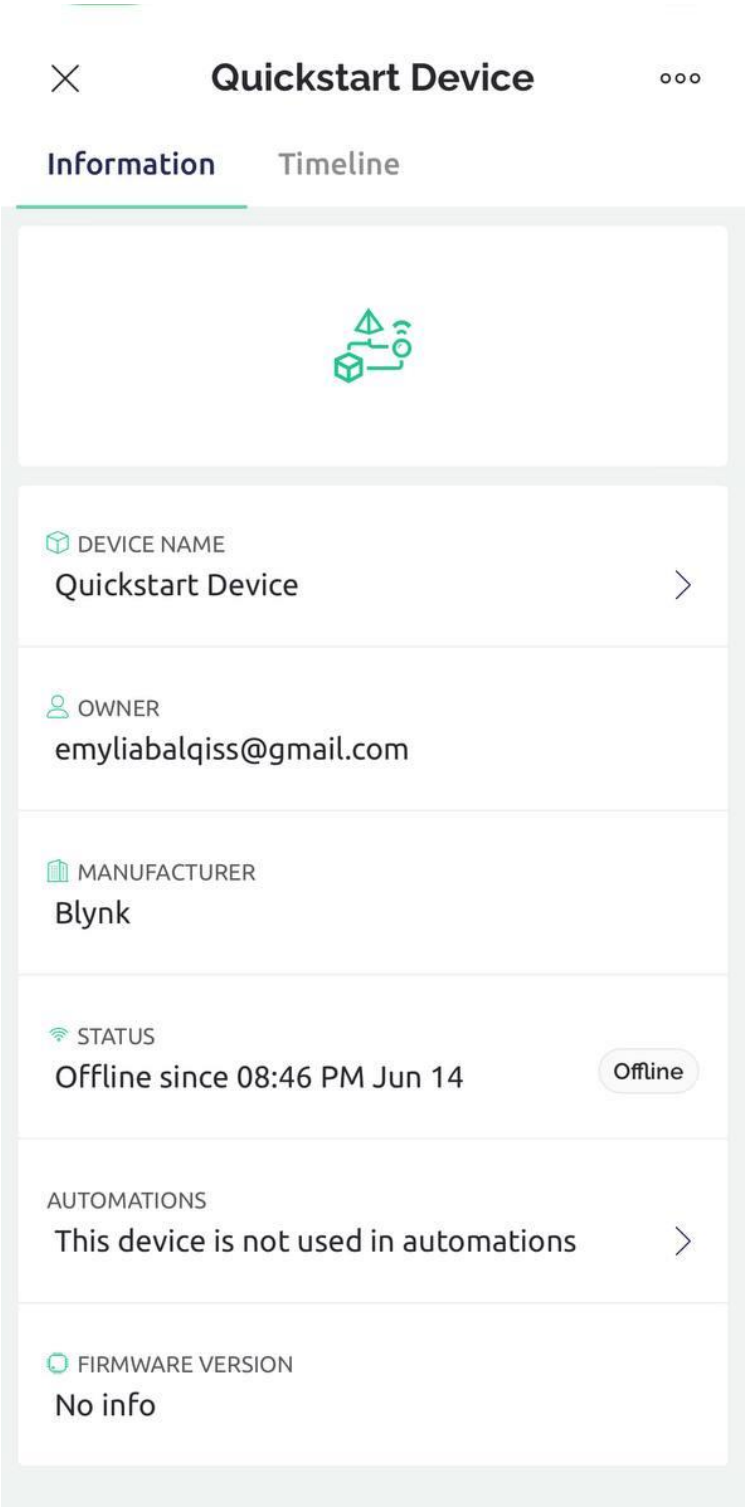


Figure 4.2.2 (c): IOT Electircal Appliances Controller and Ventilation System Developer Mode

4.2.3 Result

4.2.3.1 Collected Data

Time	Temperature (°C)	Humidity(%RH)
12:00	33	63
12:01	32	61
12:02	32	62
12:03	33	63
12:04	32	61
12:05	32	61
12:06	32	63
12:07	33	62
12:08	34	62
12:09	35	62
12:10	33	63
12:11	35	65
12:12	33	65
12:13	33	65
12:14	32	65
12:15	31	65
12:16	31	58
12:17	31	58
12:18	31	58
12:19	32	58
12:20	32	58
12:21	32	58
12:22	32	55
12:23	33	51
12:24	32	51
12:25	33	51
12:26	34	51
12:27	31	40
12:28	32	41
12:29	31	40

Table 4.2.3.1 (a): Data Collected on 27th May 2023 at 12:00 PM

Time	Exhaust Fan	LED
12:00	OFF	OFF
12:01	OFF	OFF
12:02	OFF	OFF
12:03	ON	OFF
12:04	ON	OFF
12:05	OFF	OFF
12:06	OFF	OFF
12:07	ON	ON
12:08	ON	ON
12:09	ON	ON
12:10	ON	OFF
12:11	ON	ON
12:12	OFF	OFF
12:13	OFF	OFF
12:14	OFF	OFF
12:15	OFF	OFF
12:16	OFF	OFF
12:17	OFF	OFF
12:18	OFF	OFF
12:19	OFF	OFF
12:20	OFF	OFF
12:21	OFF	OFF
12:22	OFF	OFF
12:23	OFF	ON
12:24	OFF	OFF
12:25	OFF	OFF
12:26	ON	ON
12:27	OFF	OFF
12:28	OFF	OFF
12:29	OFF	OFF

Table 4.2.3.1 (b): Data Collected on 27th May 2023 at 12:00 PM

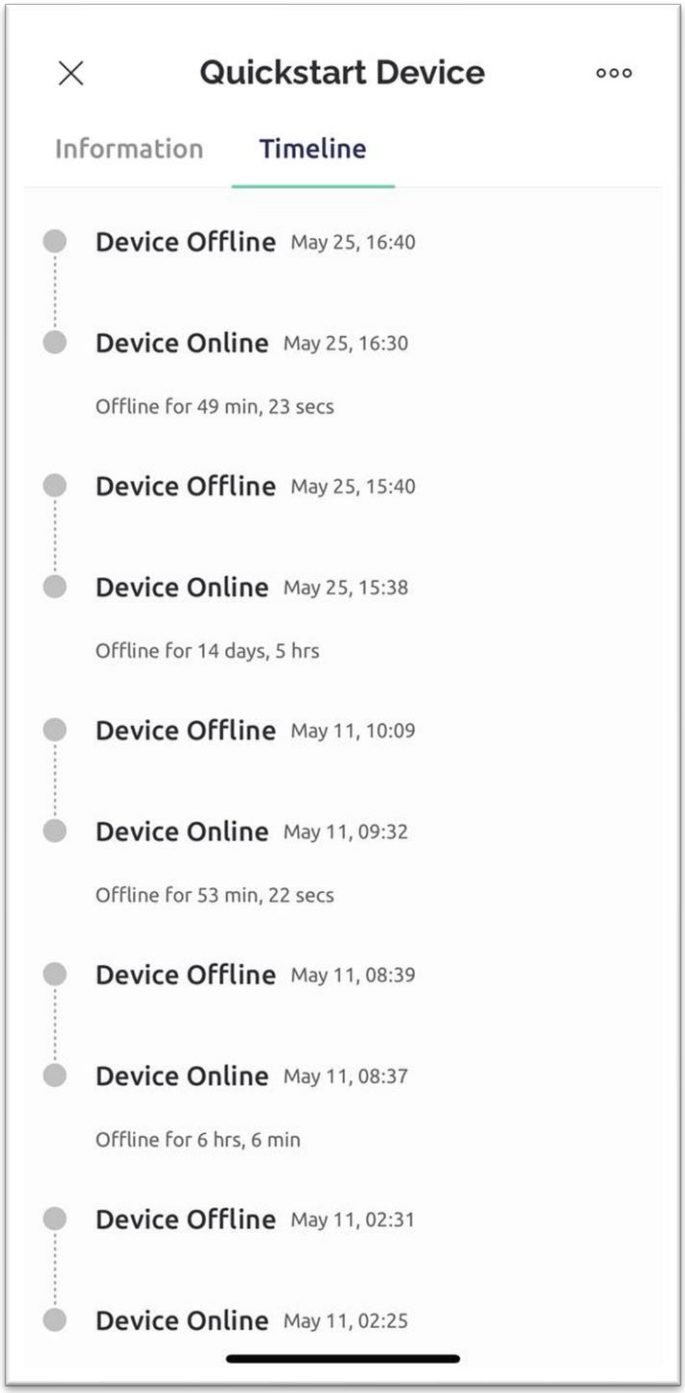


Figure 4.2.3.1: Notification Records

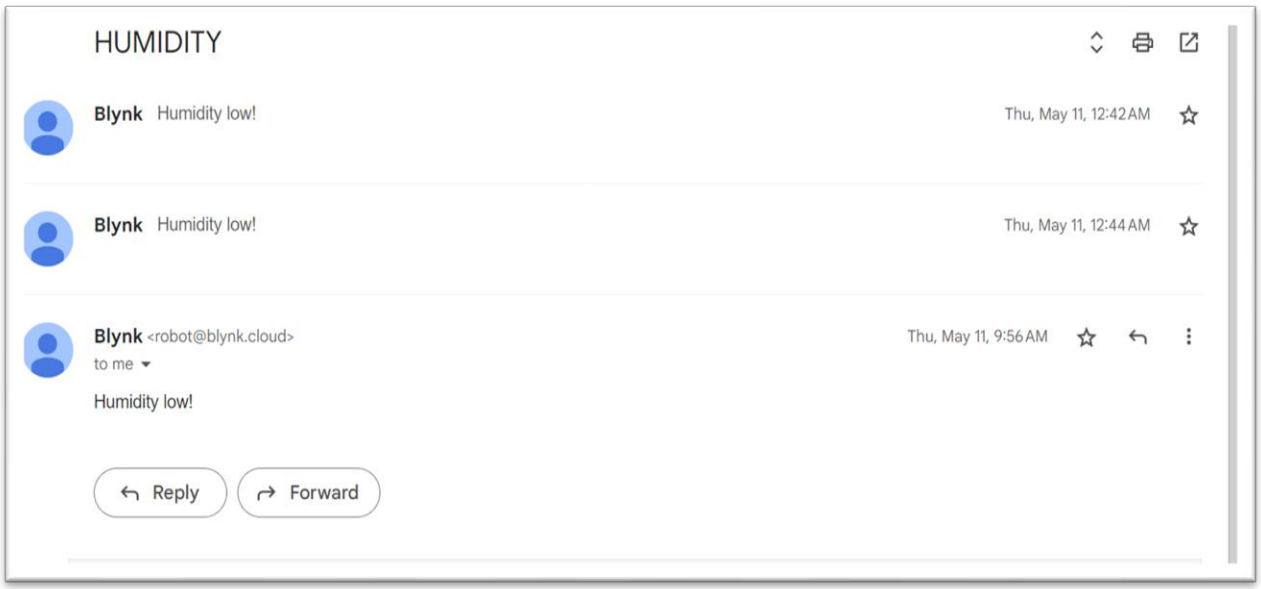


Figure 4.2.3.2 (a): Humidity alert Notification Send through e-mail.

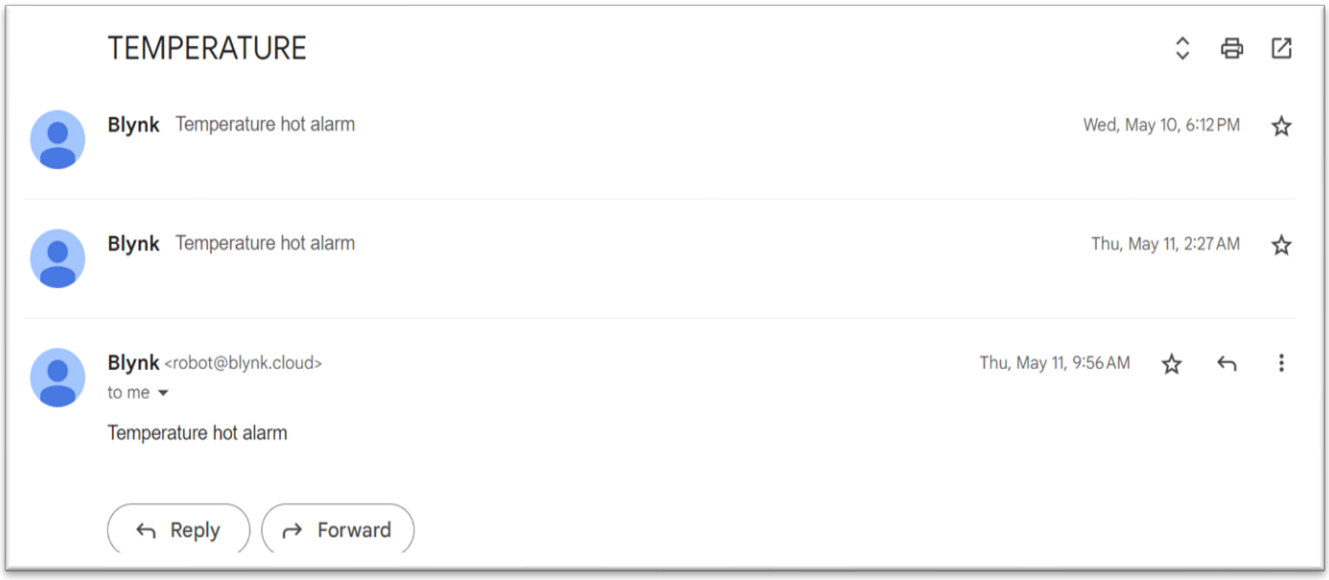


Figure 4.2.3.2 (b): Temperature alert Notification Send through e-mail.

4.3 Discussion

IoT technology has revolutionized the way we interact with and control our electrical appliances. With IoT electrical appliance controllers, users can remotely monitor and control various devices in their homes or workplaces through a connected network. These controllers typically use Wi-Fi or other wireless protocols to communicate with the appliances and enable seamless automation and control.

The benefits of IoT electrical appliance controllers are numerous. Users can remotely turn appliances on or off, adjust settings, and receive real-time data and notifications about energy consumption, operational status, and more. For instance, you can use your smartphone to turn on your air conditioner or start brewing coffee while you're still in bed, or you can check if you left the lights on and turn them off from anywhere. A electrical appliances controller can control system allows people with disabilities to independently operate and adjust the fan without relying on physical switches or remotes. Users can easily control the fan's on/off state by simply making specific gestures, eliminating the need for complex setups or additional accessories. By enabling individuals with disabilities to control the fan using devices, they can maintain autonomy over their environment and adjust according to their comfort without relying on external assistance.

Depending on the chosen approach, appropriate hardware components such as cameras, sensors, or depth-sensing devices may be required for gesture recognition. These components should be selected based on their compatibility, accuracy, and reliability. Overall, it enables users to monitor and control their ventilation systems remotely. Through a smartphone app or web interface, you can adjust ventilation settings, monitor air quality metrics, and receive alerts if any anomalies are detected. However, it requires careful attention to hardware selection, user training, safety measures, and a user-friendly interface to ensure a reliable and inclusive user experience.

The user view of the Blynk application that I am using in this project is depicted in Figure 4, the user can access the data not only by mobile phone, but I have also created a monitoring portal in the Blynk Application website that allows the user to view the data via laptop or PC. The readings displayed on the LCD of this project, as well as their accompanying conditions, will be displayed in the Blynk Application, as seen above. To avoid reading errors, the graph was created every one minute. This demonstrates that the third purpose of this project, which is to allow authorities to monitor and test issues using the Blynk Application and IoT technology, has been met.

4.4 Chapter Summary

The outcomes of this project have been linked to this chapter to illustrate that the aims of the project that were previously set have been effectively attained. The discussion has also been provided based on the project results, such as the description and development of the final project, the specification of the sensor, the results that have been collected and recorded for 30 minutes, the user view of the Blynk Application, and the limitations of this project and its solution. This project's distance between transmitter and receiver has been measured and demonstrated, as indicated in the results section.

CHAPTER 5

5 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The conclusion in this chapter is based on the results and discussion from the previous chapter. To see the benefits of the project and to improve it to its maximum potential, the conclusion must be produced to summarize the overall results. This section will also include and discuss suggestions for future work to improve the project's working and operation for another researcher based on the project that has been created and specific in this report. The conclusion also includes the approaches learned throughout the length to create the final product within the time frame given in the Gantt Chart in Chapter 6.

5.2 Conclusion

In summary, based on the results that were attached in the previous section, I discovered that this project fully achieved the three main goals that were mentioned previously, such as being able to develop a project that saves money, manpower, being able to quickly locate the sensor fault, and only the problematic area needs to be drug up in order to check and repair the fault, and allowing authorities to monitor and test issues via Blynk Application.

Electrical appliance controllers and ventilation systems play crucial roles in enhancing the functionality, convenience, and comfort of our living and working spaces. These technologies have become integral parts of modern homes, offices, and industrial facilities.

On the benefits side, this research can save organizations time, energy, and money. Depending on the chosen approach, appropriate hardware components such as cameras, sensors, or depth-sensing devices may be required for gesture recognition. These components should be selected based on their compatibility, accuracy, and reliability. Developing the gesture recognition algorithms and software interface is a crucial aspect. Machine learning techniques, such as convolutional neural networks, can be employed to train the system to recognize specific hand gestures accurately. Consider providing options for users to customize gestures based on their comfort and capabilities. This allows individuals to define gestures that are most suitable for their unique physical abilities.

A lot of techniques have been learned and practiced in the time frame to complete this project, such as how to draw and design the project's schematic diagram, flowchart, and block diagram by using appropriate application or website, allow to create the source code based on the needs, identify and buy the correct and suitable components and sensor for the project, soldering technique, project testing as well as identifying the damage when the system is not working as expected, documentation, and also the presentation. The presenter certificate for EEEiC for this project is shown in Appendix E and F. A user manual has also been designed.o

Moreover, Electrical appliance controllers, such as smart home automation systems, allow users to monitor and control various devices remotely. This capability provides convenience, energy efficiency, and increased safety. With the

help of controllers, individuals can remotely operate appliances such as lighting, heating, air conditioning, refrigeration, and entertainment systems. These controllers often integrate with voice assistants and mobile applications, making it even easier to manage electrical devices.

Ventilation systems are essential for maintaining indoor air quality, regulating temperature, and ensuring a healthy living or working environment. They help remove pollutants, excess moisture, and odors while supplying fresh air. Proper ventilation is critical in reducing the risk of airborne contaminants, improving respiratory health, and preventing the buildup of harmful gases. Additionally, ventilation systems play a key role in managing humidity levels, preventing mold growth, and enhancing thermal comfort.

By integrating electrical appliance controllers and ventilation systems, individuals can optimize energy consumption and indoor environmental conditions. For instance, smart ventilation systems can adjust airflow rates based on occupancy, air quality sensors, and temperature inputs. They can also be synchronized with heating, cooling, and lighting systems to create a holistic and efficient building management approach.

In conclusion, electrical appliance controllers and ventilation systems are indispensable components of modern living and working spaces. They provide convenience, energy efficiency, and improved indoor air quality, ultimately contributing to enhanced comfort and well-being. As technology continues to advance, we can expect further integration, automation, and intelligence in these systems, enabling even greater control, efficiency, and sustainability in our daily lives.

5.3 Suggestion for Future Work

Future research should focus on electromagnetic interference, bandwidth, and the length of data transmission to temperature sensor, which may help users obtain more accurate data during fault detection testing. Furthermore, the design of the sensor that will be used in the project should be modified in order to collect the motion gesture more easily and accurately. Consider how the different types and modes of sensor may affect the project's data accuracy.

Based on the findings of this project, we observed that the condition exhibited in this Blynk Application corresponds to the readings received and that there is a delay after the initial data displayed, which could be due to the coding settings that I performed. To avoid delays in receiving the most accurate results in the future, the coding settings and parameters should be examined.

Other than that, I need to change the design intuitive and user-friendly interfaces for controlling and monitoring electrical appliances and ventilation systems. This could include touchscreens, mobile apps, or voice-activated interfaces that provide real-time information and control options. The interfaces should be accessible to all users, including those with disabilities, and should provide feedback and suggestions for energy-saving practices.

Last but not least, I can enhance ventilation systems with improved air quality monitoring capabilities. This could involve integrating sensors to measure parameters such as particulate matter, CO2 levels, temperature, and humidity. The system could then automatically adjust ventilation settings based on real-time air quality data, ensuring optimal indoor air quality and user comfort.

5.4 Chapter Summary

The conclusion was reached after considering the prior findings and discussions and reviewing the project's goals, benefits, and lessons discovered while developing its output. The limitations and recommendations for additionalresearch have been given, focusing on integrating it with more significanttechnology-related issues.

CHAPTER 6

6 PROJECT MANAGEMENT AND COSTING

6.1 Introduction

This endeavor includes the cost of sourcing parts and supplies and receiving most of the hardware components through online sources in the implementation of hardware expenses. Before purchasing various elements, some surveys were completed at multiple online shops to evaluate pricing, such as on Shoppe. This method will also make things simpler by saving time and money. The total estimated gross expense for this project's execution is RM290.60.

6.2 Gant Chart and Activities of the Project

The Gantt Chart used in this project to show the start and end dates of a project's terminal items and summary elements. A Gantt Chart also used for project management. It is the most popular and useful methods of displaying activities, task, or events against time. Project plans should include a Gantt Chart, and although complex project planning software is inappropriate to do, where there is only one worker, a Gantt chart is helpful in visualizing project timescales and task dependencies.

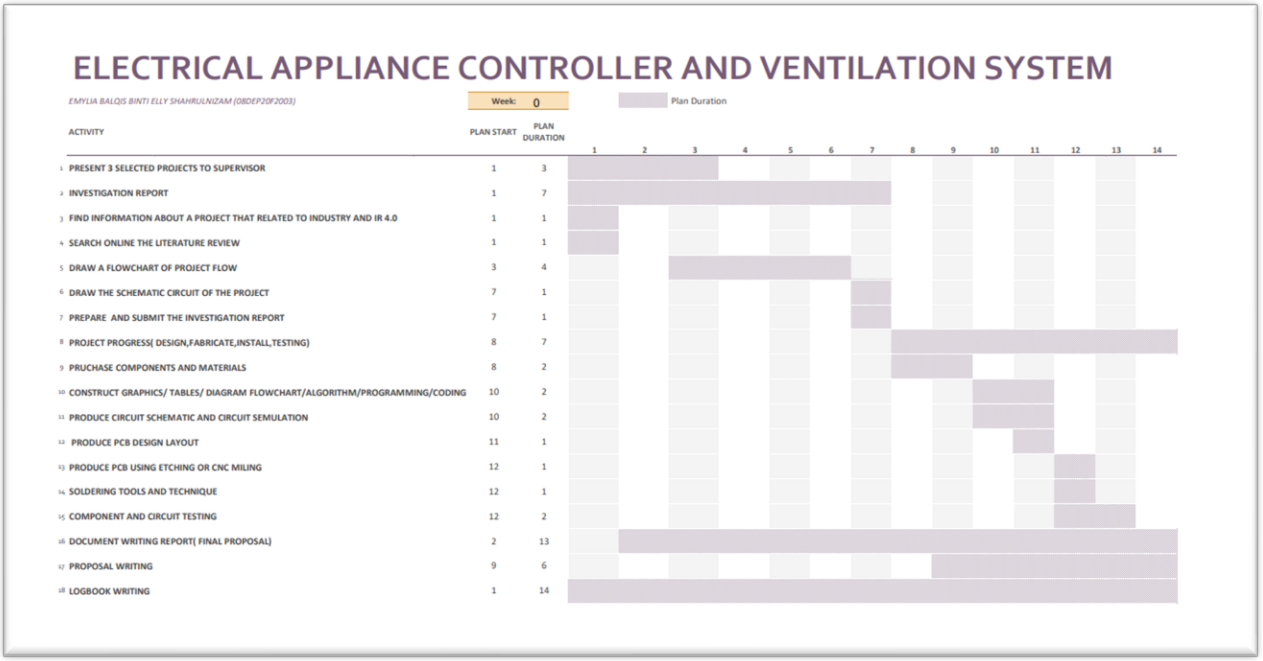


Diagram 6.2.1: Gantt Chart for Project 1

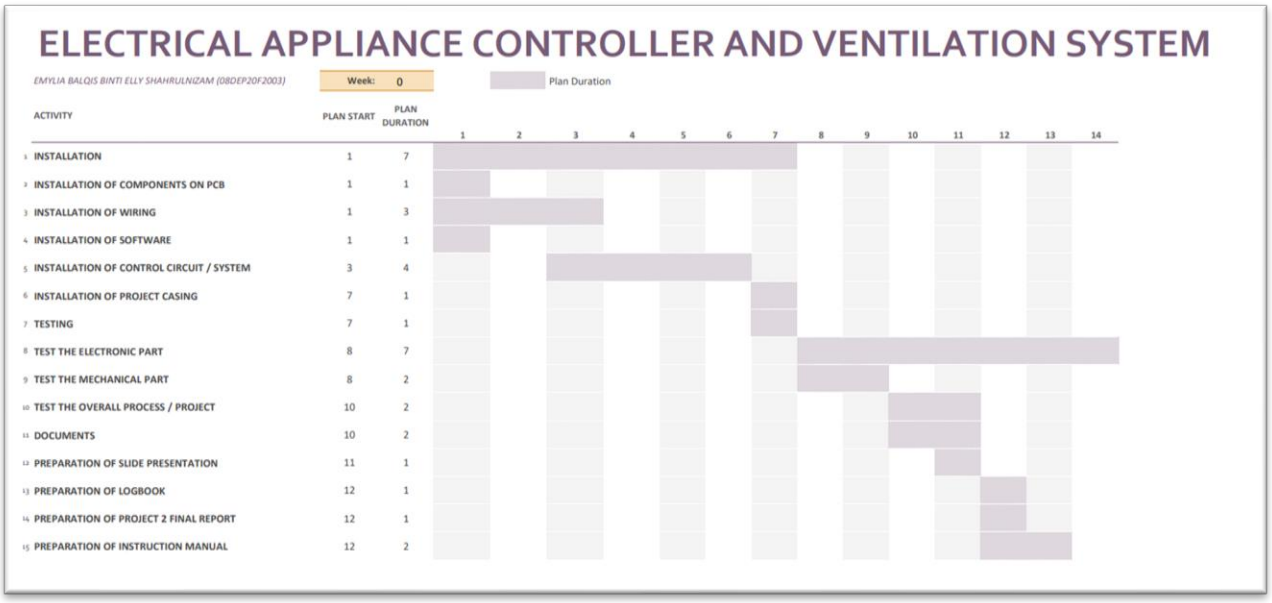


Diagram 6.2.2: Gantt Chart for Project 2

6.3 Milestone

A milestone is a defined moment in a project's life cycle that is used to track progress toward the end goal. Milestones in project management are used to mark the start or end date of a project, external evaluations or input, budget checks, submission of a major deliverable, and so on. A milestone is a reference point inside a project that denotes an important event or a branching decision point. Table 6.3.1 shows the milestone of IoT Electrical Appliances Controller and Ventilation System.

Description	Date	Cumulative project completion percentage
Completion of project planning	08.09.2022	15%
Completion of model system	20.10.2022	20%
Completion of project implementation	03.11.2022	35%
Completion of project management and finance	10.11.2022	40%
Completion final proposal report and mini project presentation	01.12.2022	55%
Completion of project programming design	30.03.2023	80%
Completion of project wiring and casing installation	20.04.2023	90%
Completion final report and project presentation	18.05.2023	100%

Table 6.3.1: Milestone of IoT Electrical Appliances Controller and Ventilation System.

6.4 Cost and Budgeting

Throughout the project's implementation, the cost of procuring components and materials will be incurred. Hardware Nodemcu, Temperature Sensor DHT11, Solid State Relay, Exhaust Fan and Power Supply are among the cost-involved components. These components are obtained through both online and offline ways, depending on which is the most convenient and cost-effective.

So, in Table below, the entire gross costing estimated for the project implementation is RM 220.50, with other expenses RM 69.80. According to this budget cost, this project is less expensive. The project's cost is also consistent with one of the essential features of a good developer, which is having a low cost but high-quality project.

Moreover, the project's financial resources are self-funded, and some of the fundamental components and materials are sourced within the project laboratory. It is anticipated to cost RM 290.30 based on cost projections. The development cost is still manageable over a 7-month period at RM 41.50 per month. Based on the investigation, it is realistic and practicable.

No.	Component and materials	The unit price	Quantity	Total
1	DHT11	RM 20.00	1	RM 20.00
2	ESP32 Node MCU	RM 32.00	1	RM 32.00
3	Exhaust fan	RM 20.00	1	RM 20.00
4	Bulb	RM 13.50	1	RM 13.50
5	Power supply	RM 15.00	1	RM 15.00
6	Relay	RM 20.00	1	RM 20.00
7	Other Materials	RM 100	1	RM 100
			Total:	**RM 220.50**
	List of other costing			
1	Transportation	RM 5.00	7	RM 35.00
2	Postage	RM 4.90	2	RM 9.80
3	Craft Work	RM 0.10	100	RM 10.00
4	Internet	RM 5.00	1	RM 5.00
5	Application	RM 10.00	1	RM 10.00
			Total:	**RM69.80**
			Overall total	**RM290.30**

Table 6.4.1: List of component and materials of IoT Electrical Appliances Controller and Ventilation System.

6.5 Chapter Summary

The table above already shows all detail in this chapter about the cost of creating this product. Nowadays, every client is still concerned with cost when purchasing something, so we must create a comparable table to ensure that each of the costs that must be employed does not overburden the project's development. As a result, the goal of this product is to build a profitable, low-cost, high-quality project. The product is quite affordable, costing less than RM 1,000. Finally, the concept for this product was created using the most recent design.

7 REFERENCES

[1]. [1]. Ashraf, I., Umer, M., Majeed, R., Mehmood, A., Aslam, W., Yasir, M. N., & Choi, G. S. (2020). Home automation using general purpose household electric appliances with Raspberry Pi and commercial smartphone. *PLOS ONE*, *15*(9), e0238480. https://doi.org/10.1371/journal.pone.0238480

[2]. P., K. (2020). A Sensor based IoT Monitoring System for Electrical Devices using Blynk framework. September 2020, 2(3), 182–187. https://doi.org/10.36548/jei.2020.3.005

[3]. Paudyal, P., & Ni, Z. (2019). "Smart home energy optimization with incentives compensation from inconvenience for shifting electric appliances." *International Journal of Electrical Power & Energy Systems*, *109*, 652–660. https://doi.org/10.1016/j.ijepes.2019.02.016

[4]. Sparkfun. "Temperature Sensor"—Waterproof (DS18B20);. https://www.sparkfun.com/products/11050.

[5]. *"Best Smart WiFi Outlets and Plugs" | 2019 Listings and Reviews*. (n.d.). Postscapes. https://www.postscapes.com/smart-outlets/

[6]. Khan, M., Silva, B. N., & Han, K. (2016). "Internet of Things Based Energy Aware Smart Home Control System." *IEEE Access*, *4*, 7556–7566. https://doi.org/10.1109/access.2016.2621752

[7]. Z. Shunyang, et al., "Realization of Home Remote Control Network Based on ZigBee", in the Proceedings of 8th International Conference on Electronic Measurement and Instruments (ICEMI '07), 2007.

[8]. Al-Tabatabaie KF, Hama KD. "Remote Automation System Control Using Arduino Board." International Journal of Latest Trends in Engineering and Technology (IJLTET). 2017;8(3):161–167.

[9]. Hussein, A., Adda, M., Atieh, M., & Fahs, W. (2014). Smart Home Design for Disabled People based on Neural Networks. Procedia Computer Science, 37, 117–126. https://doi.org/10.1016/j.procs.2014.08.020

[10]. Wang, M., Zhang, G., Zhang, C., Zhang, J., & Li, C. (2013). An IoT-based appliance control system for smart homes. 2013 Fourth International Conference on Intelligent Control and Information Processing (ICICIP). https://doi.org/10.1109/icicip.2013.6568171

[11]. Starkova, O., Herasymenko, K., & Babailova, Y. (2017, October 1). Remote control systems of household appliances. IEEE Xplore. https://doi.org/10.1109/INFOCOMMST.2017.8246468

[12]. Nasir, S. Z. (2015, December 14). Arduino UNO Library for Proteus. The Engineering Projects. https://www.theengineeringprojects.com/2015/12/arduino-uno-library-proteus.html

[13]. Gonzalo, P.-J., & Holgado-Terriza Juan, A. (2015, September 1). Control of home devices based on hand gestures. IEEE Xplore. https://doi.org/10.1109/ICCE-Berlin.2015.7391325

[14]. P. Hengjinda, & Zong Chen, Dr. J. I. (2020). An Intelligent Feedback Controller Design for Energy Efficient Air Conditioning System. September 2020, 2(3), 168–174. https://doi.org/10.36548/jei.2020.3.003

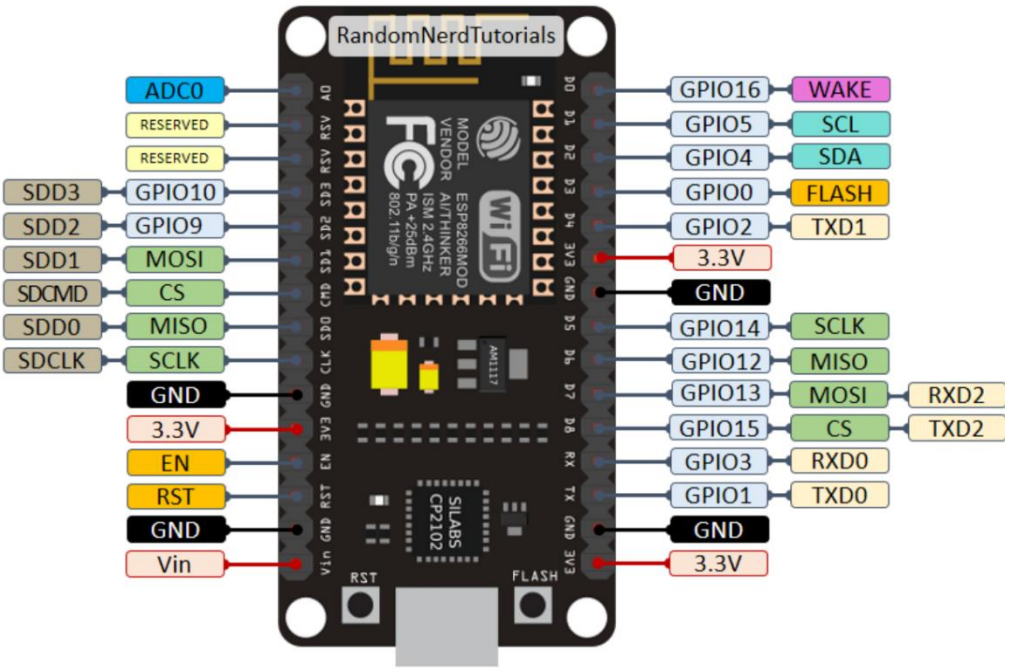
[15]. Coskun, I., & Ardam, H. (1998). A remote controller for home and office appliances by telephone. IEEE Transactions on Consumer Electronics, 44(4), 1291–1297. https://doi.org/10.1109/30.735829

[16]. Wong, E. M. C. (1994). A phone-based remote controller for home and office automation. IEEE Transactions on Consumer Electronics, 40(1), 28–34. https://doi.org/10.1109/30.273654

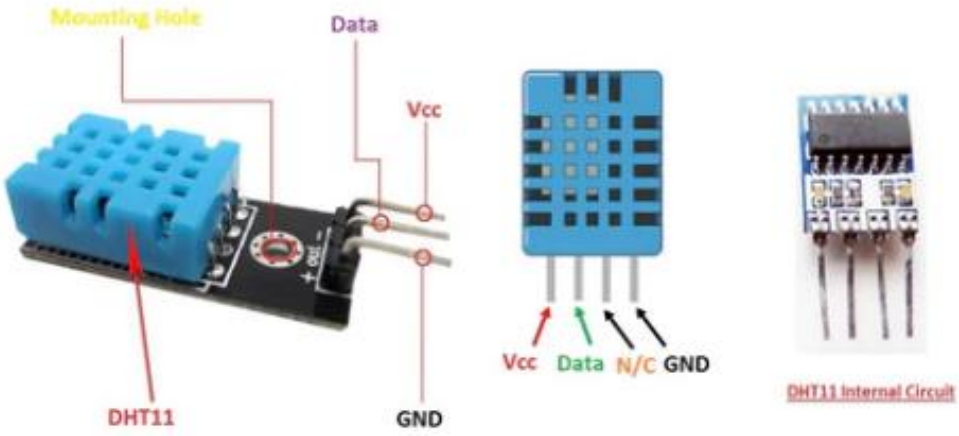
8 APPENDICES

APPENDIX A- DATA SHEET

1. NODE MCU ESP 32



2. DHT11 Temperature Sensor



APPENDIX B- PROGRAMMING

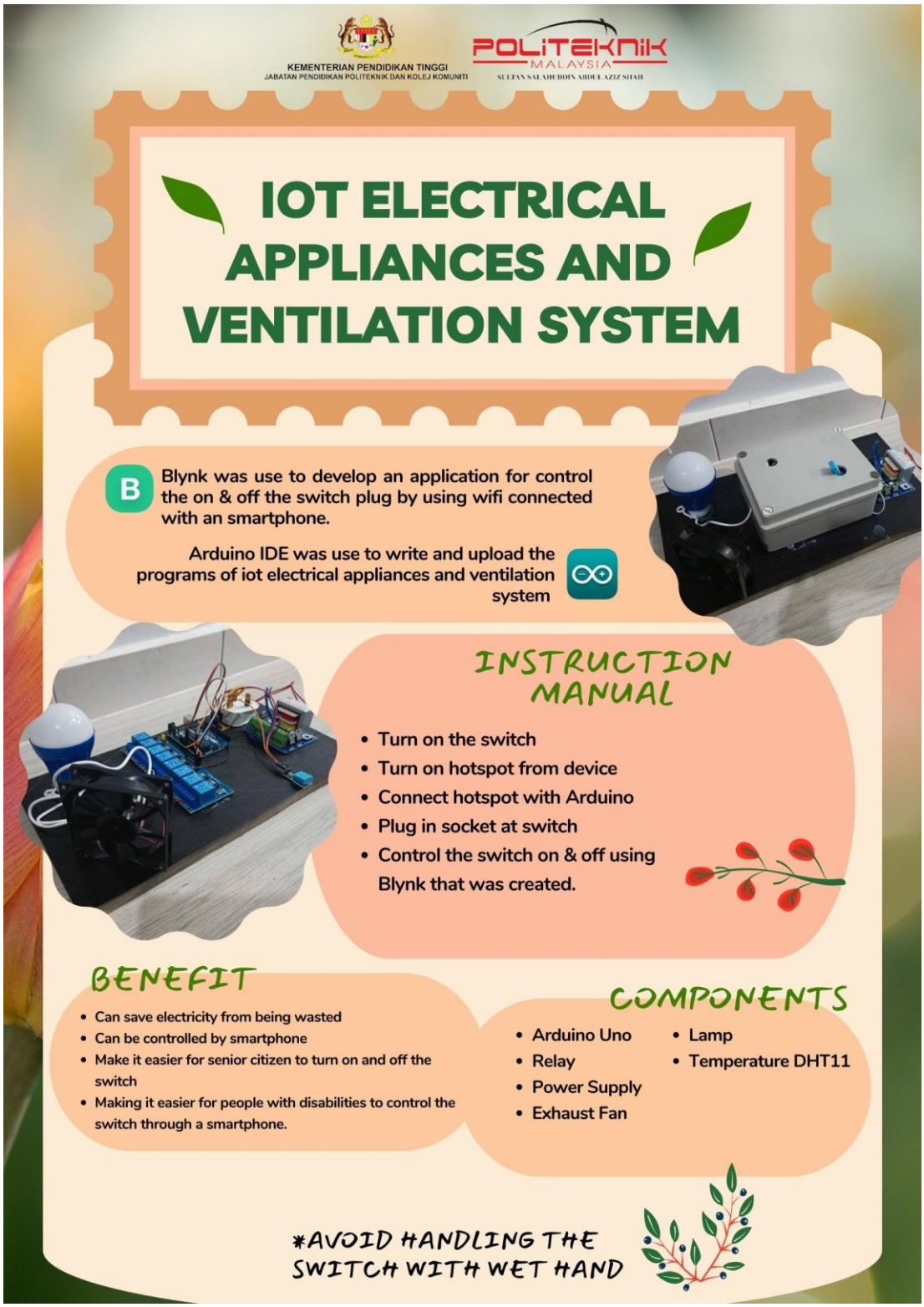
```
#include <Wire.h>
#include <dht.h>
#include <SoftwareSerial.h>


SoftwareSerial ss(2, 3); //(RX,TX)

#define LIGHT 9
#define FAN 8
int Mode=0;


dht DHT;



#define DHT11_PIN A1   //Sambung ke pin A1



int Timerx=0;
String Status="STOP";
float Hum,Temp,Sens1;
float Soil;

void setup(void)
{
  pinMode(FAN,OUTPUT);
  pinMode(LIGHT,OUTPUT);
  digitalWrite(FAN,HIGH);
  digitalWrite(LIGHT,HIGH);

 Serial.begin(9600);
 ss.begin(9600);
```

```
  delay(2500);


}

void loop(void)
{


 int chk = DHT.read11(DHT11_PIN);
 switch (chk)
  {
    case DHTLIB_OK:
    //Serial.print("OK,\t");
    break;
    case DHTLIB_ERROR_CHECKSUM:
    //Serial.print("Checksum error,\t");
    break;
    case DHTLIB_ERROR_TIMEOUT:
    //Serial.print("Time out error,\t");
    break;
    case DHTLIB_ERROR_CONNECT:
        //Serial.print("Connect error,\t");
        break;
    case DHTLIB_ERROR_ACK_L:
        //Serial.print("Ack Low error,\t");
        break;
    case DHTLIB_ERROR_ACK_H:
        //Serial.print("Ack High error,\t");
        break;
    default:
    //Serial.print("Unknown error,\t");
    break;
  }


  Temp=DHT.temperature ;
  Hum=DHT.humidity;
```

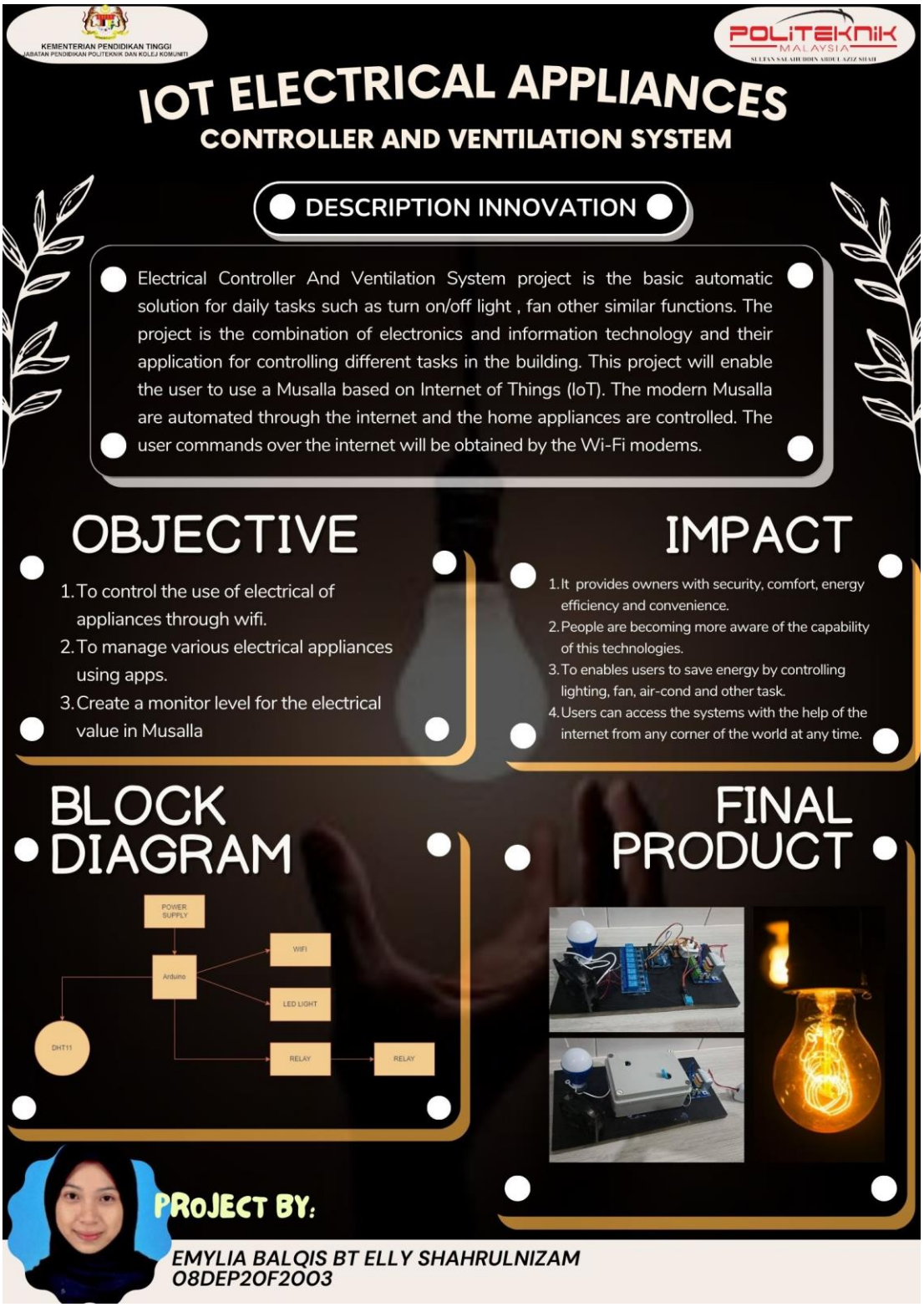
```
Serial.print("TEMP(C):");
Serial.print(Temp);
Serial.print("\t");
Serial.print("HUM(%):");
Serial.print(Hum);
Serial.print("\t");
Serial.println();


delay(300);


}

void serialEvent() {
  while (Serial.available()) {
    // get the new byte:
    char inChar = (char)Serial.read();
    // add it to the inputString:

    // if the incoming character is a newline, set a flag so the
main loop can
    // do something about it:
    if (inChar =='1') {
    digitalWrite(FAN,LOW);
    Serial.print("FAN ON");
    delay(600);


    }
    if (inChar =='2') {
    digitalWrite(FAN,HIGH);
    Serial.print("FAN OFF");
    delay(600);


    }
     if (inChar =='3') {
```

```
      digitalWrite(LIGHT,LOW);
      Serial.print("LIGHT ON");
      delay(600);


     }
     if (inChar =='4') {
      digitalWrite(LIGHT,HIGH);
      Serial.print("LIGHT OFF");
      delay(600);


     }
   }
}
```

APPENDIX C – USER MANUAL



APPENDIX D – EEEiC POSTER AND PARTICIPATION CERTIFICATE



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