POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

IOT-BASED SMART KITCHEN

NAME	REGISTRATION NO
NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN	**08DEP20F2002**

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-Based Smart Kitchen" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated.

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Supervisor's name : Zabidah Binti Haron

Supervisor's signature:

Date : 20 JUNE 2023

Verified by:

Project Coordinator name : Wan Mohd Zamri Bin Wan Ab Rahman

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 : **NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN**

Registration Number : **08DEP20F2002**

Date : **20 JUNE 2023**

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : IOT-BASED SMART KITCHEN

SESSION: 2 2022/2023

1. I, **Nur Hasya Insyirah Binti Ahmad Nor Hishamuddin** 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) **NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN**) ...……………………………

(Identification card No: - 020812-08-1124)) **NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN**

In front of me, **ZABIDAH BINTI HARON**) ……………...………………

(Click here to enter text.)) **ZABIDAH BINTI HARON**

As a project supervisor, on the date:

ACKNOWLEDGEMENTS

I gave this project my all. However, it was only possible with many people and organizations’ kind support and help. I want to say how grateful I am to each one of them. I appreciate Madam Zabidah Binti Haron's guidance, oversight, and the information she provided regarding the Project and helped me complete it.

I want to express my appreciation for my parents' generous assistance and the Polytechnic Sultan Salahuddin Abdul Aziz Shah members, who encouraged me to finish this project. I am expressing my sincere gratitude and appreciation to the professionals in the field for their time and focus.

My gratitude and appreciation also go out to my friend who helped me build the Project and those who volunteered their skills to assist me.

ABSTRACT

In this project, We Implemented an Internet of Things (IoT) based smart kitchen with Automation & Monitoring system using NodeMCU ESP32. The different technologies such as RFID, WSN, Cloud Computing, Networking Technology and Nanotechnology support the IoT and their applications in various fields, i.e., Smart Home, Smart City, Smart Grid, Smart Health, and Smart Farming, have been covered. In addition to this, special coverage has been made concerning Smart Kitchen. The description of various appliances and their application in the bright kitchen has been enumerated. Recently, kitchen-based accidents have increased in both commercial and domestic kitchens.

People regularly go into the kitchen to cook food. But it will become dangerous if there is leakage in the gas cylinder. We aim to reduce the risks in Kitchen using the Internet of Things. These accidents can be avoided using IoT technologies like monitoring the entire kitchen from remote areas. To implement this research, both hardware and software will be utilised. The hardware side gas sensor, temperature sensor, humidity sensor, alarm, Arduino IDE, and load cell NodeMCU ESP32, the heart of this project, have been used. The integrated NodeMCU ESP32 and mobile application have been used from the software side. Our system provides results in various forms. The system enables monitoring of kitchen gas leakages, leading to a faster response time in the event of a leakage condition. During night conditions, if a gas leakage happens suddenly, the person may switch on the light, which may lead to a blast. To avoid that, the main power supply will be automatically off, monitoring the kitchen appliances and notifying the user.

(Keywords: NodeMCU (ESP32), Arduino IDE, MQ135 Gas Sensor, DHT11 Sensor, Load Cell, and Web App (Blynk App)).

ABSTRAK

Dalam projek ini, Kami Melaksanakan dapur pintar berasaskan Internet Perkara (IoT) dengan sistem Automasi & Pemantauan menggunakan NodeMCU ESP32. Teknologi yang berbeza seperti RFID, WSN, Pengkomputeran Awan, Teknologi Rangkaian dan Nanoteknologi menyokong IoT dan aplikasinya dalam pelbagai bidang, iaitu Rumah Pintar, Bandar Pintar, Grid Pintar, Kesihatan Pintar dan Pertanian Pintar, telah dilindungi. Di samping itu, liputan khas telah dibuat mengenai Dapur Pintar. Penerangan mengenai pelbagai peralatan dan penggunaannya di dapur terang telah disenaraikan. Baru-baru ini, kemalangan berasaskan dapur telah meningkat di dapur komersial dan domestik.

Orang ramai kerap pergi ke dapur untuk memasak makanan. Tetapi ia akan menjadi berbahaya jika terdapat kebocoran dalam silinder gas. Kami berhasrat untuk mengurangkan risiko di dapur menggunakan Internet Perkara. Kemalangan ini boleh dielakkan menggunakan teknologi IoT seperti memantau keseluruhan dapur dari kawasan terpencil. Untuk melaksanakan penyelidikan ini, kedua-dua perkakasan dan perisian akan digunakan. Sensor gas sisi perkakasan, sensor suhu, sensor kelembapan, penggera, Arduino IDE, dan sel beban NodeMCU ESP32, nadi projek ini, telah digunakan. NodeMCU ESP32 dan aplikasi mudah alih bersepadu telah digunakan dari sisi perisian. Sistem kami menyediakan hasil dalam pelbagai bentuk. Sistem ini membolehkan pemantauan kebocoran gas dapur, membawa kepada masa tindak balas yang lebih cepat sekiranya berlaku keadaan kebocoran. Semasa keadaan malam, jika kebocoran gas berlaku secara tiba-tiba, orang itu mungkin menghidupkan lampu, yang boleh menyebabkan letupan. Untuk mengelakkannya, bekalan kuasa utama akan dimatikan secara automatik, memantau peralatan dapur dan memberitahu pengguna.

(Kata Kunci: NodeMCU (ESP32), Arduino IDE, MQ135 Gas Sensor, DHT11 Sensor, Sel Kering, and Web App (Blynk App.))

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Human life has transformed because of the Internet of Things (IoT). The massive rise in Internet users and advancements in internetworking technology have made it possible to network everyday objects. Each can be distinguished from the others by the embedded computing system within the internet infrastructure. There are various benefits if the environment's settings adapt to human behavior automatically. Adapting to how residents behave inside the house, ambient intelligence offers them a variety of amenities. The Internet of Things (IoT) is about physical objects communicating with one another; it will expand computer and machine-to-computer connectivity to material objects. The aim is to make the world a better place for people by having the things around us understand what we enjoy, need, and want and behave appropriately without asking us to do so. An energy source utilized in homes for heating and cooking is natural gas. Accidents caused by gas leaks can result in monetary and human injuries. System design aims to find gas leaks and notify subscribers via alerts and status information kept in a database and presented on any device. Technology is intelligent since it warns people instead of continuously sounding alarms and causing a loud nuisance. This technique reduces the risk of explosions caused by gas leaks and enhances the safety of people and property when utilizing domestic cooking gas.

In their daily lives, people engage in a variety of workouts. The kitchen is one of the most common areas people use, especially in the house. People do various things, including cooking, washing dishes, gathering, etc. Hence, countless culinary operations will immediately cause the temperature to shift in space. Regardless of temperature, using gas ovens poses a significant fire risk. The

Internet of Things (IoT) is crucial in the kitchen to keep the kitchen cool and constantly comfortable and reduce the risk of gas explosions. While the average cost of necessities is increasing, there is a cumulative focus on using innovation to reduce those expenses. Considering this, the Smart Home project enables the client to design and maintain a sufficiently energy-efficient home while providing more computerised applications. An intelligent home will take advantage of its existing situation and provide consistent control whether the consumer is there. People can understand that their home is operating at its peak efficiency when it has this benefit. This framework can study numerous design issues, such as programming, PCB layout, Wi-Fi, TCP/IP protocols, Web Server logic, and other points of view. This computerization framework provides valuable information on programming and equipment planning challenges.

An efficient and Fast Working Microcontroller is needed for monitoring and controlling purposes. IN RECENT YEARS, Arduino IDE, a fast-working controller, also has inbuilt Wi-Fi and Bluetooth facilities. Liquified Petroleum Gas (LPG) gas sensor monitors gas leakage; if leakage occurs, it will indicate the controller. The function of the humidity and temperature sensor is to monitor the gas stove status; if moisture is present, the stove knob must close. The buzzer here alerts the user about the kitchen's condition and ensures everything is ideal.

The process taken for the LPG gas detection technique is developed when Science and Technology are growing. The process is developed almost at every peak time. The end user and the system take steps from the survey. But we will design only one end of the system with a tendency to every task. The method we will create is wireless sensor-based technology. The Internet of Things (IoT) is used efficiently in this process. In this system, whatever the data gets is continuously sent to the application. And the user will receive the data via an application in their phone or email. The application frequently updates these sensor data using a Wi-Fi module built into the controller for user interfaces. This system will help users update their safety methods; it is essential for environmental commitments and to prevent natural disasters from protecting our life.

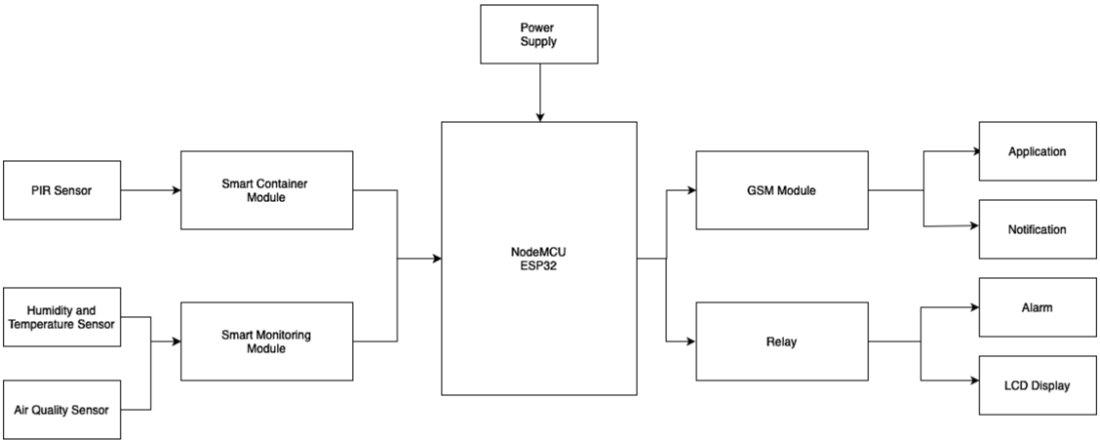


Figure 1: Architecture Diagram of IoT-Based Smart Kitchen

1.1.1 Methodology

The methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of methods and principles associated with a branch of knowledge. Typically, it encompasses paradigms, theoretical models, phases and quantitative or qualitative techniques. The following figure can represent the methodological flow that I used in this project,

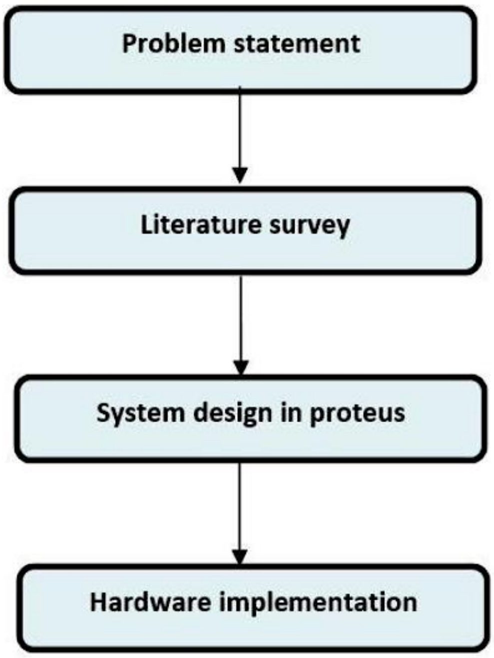


Figure 1.1.1: Methodology Flow

1.2 Background Research

Nowadays, the existence of the Internet of Things (IoT) has constantly changed human life. IoT is a concept that allows objects around us to communicate. This capability will make entities understand what humans need without any command, including providing important information wherever we are.

In everyday life, people do various activities—one of the places where human activity is in the kitchen. Various activities conducted in the kitchen will undoubtedly make the kitchen temperature conditions quickly change. In addition to temperature, using as stoves has a high fire risk. Based on that, IoT in the kitchen is necessary to keep the air condition always comfortable and reduce the risk of using gas stoves.

Much research and projects have been done regarding this smart kitchen. Research by Vu Trieu Minh and Riva Khannadari from Tallinn University of Technology and Mutsalkisana Chaiyoarn from Northeastern University, Boston, USA. Some previous studies mostly only revealed a concept; some research succeeded in making a system that could work but still used ATmega32 as a microcontroller with a limited sensor. In this paper, I'll explain to design an IoT-Based Smart Kitchen with a monitoring system using Arduino IDE and ESP32 as a microcontroller and data communication device using wireless fidelity (Wi-Fi) network.

Based on the background and review from the research that has been described, we need a system that can continuously monitor and send various information about the condition of the kitchen even though we are far from the kitchen.

This project created a system that can detect temperature and fire changes caused by using kitchen gas stoves. In the system. The DHT11 sensor is mounted to detect temperature changes, an MQ135 gas sensor to detect Liquified Petroleum Gas (LPG) lea, an IR Flame sensor to catch fire and Passive Infrared (PIR) sensors to detect human activity in the kitchen. In this system, there is also a relay to control the exhaust fan that controls the temperature and blows out gas in case of a gas leak or smoke from the kitchen in case of fire. This system can be controlled and monitored via the internet directly from laptops or smart devices anytime, anywhere, far from the kitchen. In case of a fire or gas leak, this system will provide a warning form of alarm and information to be sent via the Blynk app or email or notification on intelligent devices.

1.3 Problem Statement

In 2021, approximately 2.7 million metric tons of Liquefied Petroleum Gas (LPG) were produced in Malaysia. The production of LPG in the country has been increasing since 2013, when 2.53 million metric tons were produced. So, it is necessary to use it safely and without any causality; with increased use, there is also an increase in tragedies caused by gas leakage. We need an efficient, reliable, cost-effective system that can be used in hotels and home kitchens. Different LPG-detecting technologies are used in the current procedures. Liquefied petroleum gas is detected via semiconductor devices. Every year, a greater and greater proportion of accidents are caused by LPG leaks. A valve regulator is used to control the LPG cylinder manually. There are two ways in the current system. One is that the alarm will go off when a leak is found, and the owner will have to adjust it manually. The second way involves using the GSM module to send a message to the fire stations when a gas leak heavily causes a fire mishap. The action is performed manually, and the step is generated automatically in the second form. Other advanced methods of gas detection have systems that are so straightforward that when a gas leak is detected, the cylinder valve automatically closes. Some tracks collected real-time data using the Internet of Things for various purposes. However, this method makes efficient use of the Internet of Things. The Alert message is delivered to the user using a mobile application and the Internet of Things.

1.4 Research Objectives

The main goal of this project is to create a system that can enhance human safety in the kitchen. Also, to provide a solution by designing an automatic system to detect liquefied petroleum gas (LPG) leakage at home and control it by turning off the cylinder knob. Gas leakage occurs mainly due to poor equipment maintenance and inadequate awareness of the people. LPG leakage detection is essential to prevent accidents and save human lives. The following are the primary goals of this research.

i. To design a complete kitchen automation system.
ii. Monitor parameters such as LPG gas, smoke, fire, and temperature.
iii. To collect the data through a microcontroller and send it to IoT.
iv. To design an alarming system if conditions become worse.

1.5 Scope of Research

The project's scope focuses on the convenience and safety aspects of the user. Ready to report any hazard simply just by using a mobile application. This project also comprehends the operation of many sensors to make up the ideal IoT-based smart kitchen. Based on the project's timeline, it can be completed in 30 days. However, based on the resources, it will take approximately two months for the component to arrive since it is from outside Malaysia. The project also has the following flaws or limitations:

i. The difficulty in obtaining the most excellent and perfect sensor may cause this project not to work flawlessly.
ii. It is well known that temperature and humidity sensors (DHT11) can only get new data once every 2 seconds.
iii. We need to monitor the sensitivity of all sensors, especially HC-SR501, which can be out of users' ability.

1.6 Project Significance

In today's world, fuel demand is increasing day by day. Liquefied Petroleum Gas (LPG) is the most used fuel in kitchens. This is filled in a cylinder in a liquid state. These cylinders blast sometimes; the main reason for cylinder blasts is gas leakage. So, to avoid this, we need to detect gas leakage. For this, we need an automatic gas leakage detection system that detects gas leakage and gives alerts. This automated security system can save people from dangerous blasts and prevent accidents. IoT is widely used in daily life. There are many home appliances which are based on IoT. Thus, it becomes easier to manipulate them. The kitchen is an essential part of our home, but we also heard about disasters happening in the kitchen for various reasons, and many people lost their lives. There might be multiple reasons behind the cause of these disasters, but the main and most happening is LPG gas leakage from the cylinder. As LPG gas is highly inflammable, small gas leakage can be costly for human life. So, if we can detect these gas leakages before it causes any severe issue, we might save many lives.

This project aims to help people be more careful in internet usage aligned with the enhancement of technology nowadays. Users will receive notifications on their devices if there are, i.e., emergencies. This could help people move freely and not worry much about their house safety and conditions. That is the magic of using multiple sensors. Additionally, a significant injury or risk to the victim's life can eliminate any threat to the user. The website also receives user position data to record and notifies users of emergency alerts.

1.7 Chapter Summary

In this chapter, I have summarized the upcoming project, explained the history of the original idea behind its conception, and discussed the difficulties that are being faced, such as ensuring all the sensors work. I also outlined the goals of the project. I also explained the objectives of the initiative. The primary purpose of this project is to help deliver alerts or emergency alerts to users concurrently to shorten the time it takes to obtain information, save money, safety enhancement and make it user-friendly. Based on the study's objectives, I also remember the project's significance. Our effort will benefit many people. Considering the study's goals, I also recall how important the project was. This endeavor helps many people.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

High-quality medical education research starts with a thorough literature assessment to maximize relevance, creativity, generalizability, and effect. A literature review provides context, guides approach, fosters creativity, reduces duplication of effort, and ensures adherence to standards of the field sets. Iterative literature reviews should be carried out at various stages of the research procedure. Researchers should use resources best. Human resources, search engines, and current publications should use resources best.

Further examination of previous research and associated information will significantly contribute to the field of study. The usage and relevance of IoT-Based Smart Kitchens will be discussed in this chapter. The benefit of using IoT as part of our life is that we can move freely. Besides, it requires less maintenance and is more efficient. There are tons of sources of information regarding IoT-Based Smart kitchens on the internet. The information gathered offers advice on current approaches and samples of perspectives. As a result, much prior research supports and justifies the hypothesis. This literature review also identified and analysed the hardware components employed in the project. This literature review also identifies and examines the hardware used in the project.

2.2 IoT-Based Smart Kitchen

Innovation is developing rapidly and has altered each circle of human life. Specialists have made a massive commitment to changing the substance of the kitchens. Directly from mechanised apparatuses to modified kitchens, everything has been upset. I have checked on and dissected the various plans or techniques proposed by multiple analysts worried about several types of Monitoring to make a redid framework that screens kitchen climate boundaries like light force, room temperature, fire recognition, movement location and LPG gas level. I have attempted to break down just those plans or procedures the scientists have added to ensuing improvement in the current strategies. The survey incorporates research papers, distributions, web sources and other accessible writing to give a complete near the investigation. Advanced individuals consistently anticipate that new devices and technology should improve their everyday lives. The pioneers and analysts continually attempt to discover new things to fulfil individuals, yet the cycle is endless. The kitchen climate observation is one of the significant measures to be progressively checked for individuals' well-being, security, and solace. With the headways in Internet advances and Wireless Sensor Networks (WSN), a recent fad in the period of omnipresence is being figured out. Massive expansion in clients of Internet and changes on the web working advancements empower systems administration of regular items. Web-authorised frameworks have offered an extraordinary guarantee to customers.

Savvy home conditions have developed where everyday items and gadgets at home can be organised to give the occupants new intentions to control them. Advances in computerised hardware have empowered the improvement of a little minor in measure and impart in brief distances sensor hubs. They are minimal expense, low- power and multifunctional. The sensor hubs comprise detecting, information handling, and correspondence parts, which influence the possibility of Wireless Sensor Networks (WSN) given the collective exertion of an enormous number of hubs. The framework has been created primarily to screen kitchen climate boundaries like soft power, room temperature, fire identification, movement discovery and LPG gas level. Users can filter and control transducers on dynamic Web pages upgraded with Embedded C. This framework tracks down a wide application in regions where actual presence is constantly preposterous. The framework offers a total, minimal expense, incredible and easy-to-use method of constant checking and controller the kitchen. A model is created and tried with high exact results.

2.2.1 Previous Research

Most developers focus on the safety of people in the house; hence they use multiple sensors in multiple ways. Since then, the technology has been integrated into one circuit to cut off some maintenance costs. Although the application method differs, it uses the same concept: safety. The critical distinction between the previous literature reviews is that the hardware used is additional. For example, they use a light sensor to detect motion. This system allows communication and sends emergency notifications to the contact person if abnormalities are detected. Since it uses integrated circuits, this system's design is affordable in Malaysia. One limitation of this system is that the difficulty in obtaining the most excellent and perfect sensor may cause this project to work smoothly.

In this project, we can use the Arduino platform, which processes the signal from all the sensors. Based on the research that has been done, Arduino has more significant advantages. Arduino IDE was chosen due to its cost and effectiveness. NodeMCU ESP8266 is used in this system due to its low cost, and to mount it requires WIFI aligned with the technology we are using. This microcontroller is an open-source software and hardware development environment built around it.

This project can use the GSM phone configured to send gas leakage alerts in the form of a short message service (SMS) message, which indicates the exact location of another GSM phone to enable prompt necessary action. This whole system will lead to faster detection when gas leakage occurs. This will create a close relationship between humans and the opportunistic connection of bright things. It deals with information forwarding and dissemination within and among the opportunistic communities formed based on human movement and opportunistic contact nature. This paper suggests a method to create IoT differently so that it can be made whenever needed with the help of radio frequencies.

Finally, the project can be developed by combining a power sensor with an Arduino. If abnormalities are detected, a fault message is displayed on the OLED interfaced with NodeMCU ESP8266, and the fault occurrence is reported to the web server. Table 2.2.1 illustrates the comparison table for the study we conducted to complete our project.

There are many previous research papers on IoT-based smart kitchens. Here are a few examples: A Review of IoT-Based Smart Kitchen Systems by S.M.A.R.T. Research Group, published in "Sustainable Cities and Society" in 2020. This paper provides a comprehensive review of state-of-the-art IoT-based smart kitchen systems. It discusses the different types of sensors and actuators used in smart kitchens and the other applications that can be implemented.

IoT-Based Smart Kitchen: A Review of the Literature and ResearcChallenges by J.P. Singh, published in the journal "IEEE Access" in 2021. This paper reviews the literature on IoT-based smart kitchens and identifies the critical research challenges. The article discusses the challenges of sensor data fusion, security and privacy, and user experience.

IoT-Based Smart Kitchen: A Case Study by A.K. Verma, published in the journal "International Journal of Innovative Research in Engineering and Technology" in 2022. This paper presents a case study of an IoT-based smart kitchen system. The system uses various sensors to monitor the kitchen environment, such as temperature, humidity, and gas levels. The system also includes actuators that can be used to control appliances, such as the oven, stove, and refrigerator.

These are just a few examples of the many research papers published on IoT-based smart kitchens. This area of research is rapidly evolving, and new developments are being made all the time. As IoT technology matures, we expect to see even more innovative and sophisticated IoT-based smart kitchens.

Table 2.1: Comparison Table of Previous Literature Reviews Research

NO	TITLE/AUTHOR	OBJECTIVE	METHOD	RESULT
1	➢ **IOT-BASED SMART KITCHEN** ➢ M. Gopi Perumal, *K. Srivatsan, P. Vijayakumar, R. Krishnaprasanna and R. Rajashree ➢ 2018	They are using the Internet of Things benefits to enhance the kitchen's existing safety standards. Create a system that could help people update safety methods, essential for environmental commitments and preventing natural disasters from protecting life.	Uses multiple sensors to monitor safety aspects, for instance, gas level, gas leakage, the moisture in the kitchen. These sensors will be synced to the programme. Replacing the old sensors with the new one	The Output data of this system is continuously transferred to the User in IoT cloud data Transfer Process. The User can able to modify the system at any time. The Extended Work will be on the software side. Using Visual Studio software, we can create separate websites in which the website Producer and Consumer are connected.
2	➢ **Automation and Monitoring Smart Kitchen Based on Internet of Things (IoT)** ➢ F Nugroho and A B Pantijawati ➢ 2018	The purpose of this project is to create a system that can monitor and send various information about the condition of the kitchen continuously, even though we are in a place far from the kitchen	Designing an IoT-based automation and monitoring system using Arduino UNO and microcontroller and ESP8266-01 as a data communication device using wireless fidelity (Wi-Fi) network	The test results show that the system can cork adequately. Each sensor can work correctly. Arduino can accept all data sent by the sensor to determine an action for the output device. The data received by Cayenne instantly and displayed on the dashboard.
3	➢ **Internet of Things based system for Smart Kitchen** ➢ Jyotir Moy Chatterjee, Raghvendra Kumar, Manju Khari, Dao Thi Hung, Dac-Nhuong le. ➢ 2018	We can get this and much more safety feature that can be integrated with the automation system includes temperature sensor, weight sensor. Continues monitoring of services in kitchen is performed by this system.	MySQL will be used for maintaining a database. In this system, the central concept used is atomisation of home appliances using the domain of the Internet of Things	The results from the tests show that the system can send SMS alerts whenever there is a gas concentration at the inputs of the gas sensors. Hence this system can be used in homes and public buildings such as hotels and restaurants.
4	➢ **IoT based Smart Kithen** ➢ Apsingekar Vrishabh, Anake Prajkta,	Design a complete kitchen automation system. Besides that, to monitor the different parameters	Using Arduino UNO and ESP8266 for monitoring the system Uses the temperature sensor	The system has been tested and succeed. It also can be used in many different places as well, for instance

	Kanhere Adhijeet and Uike Hemant ➢ 2021	such as LPG gas, smokes, fire, and temperature. To collect the data through microcontroller and send it to IoT. To design an alarming system if conditions become worst.	to detect the slight odd different from surrounding temperature. Add the gas leakage sensor to detect a gas leak in the kitchen such as flammable gases. IR flame sensor will be used as a fore sensor based on infrared wave spectrum generated by the fire.	living room, hotels, restaurant, etc.
5	➢ **IoT Based Smart Kitchen System** ➢ Shubham More, Shridhar Shelar, Vaibhav Randhave, Prof. Ashwini Badge ➢ 2021	Detect the gas leakage so that the action can be taken before it causes any hazardous issue. The system consists of a MQ2 gas sensor which will detect the leakage of gas. As soon as it detects the gas an alert message is send to the user, the LED will be on, the warning message is to be displayed on the LCD screen and exhaust fan will be automatically switched on. We have additional sensors which will continuously monitor the oxygen level and the temperature of the room.	Use Arduino UNO, GSM module, LCD, MQ2 gas sensor, Buzzer, LM 35, motor (to simulate fan). Also used a virtual terminal for displaying the message sent by the GSM module. When there is no gas leakage means the toggle flag is “0” LC will display message “Gas Status is ok” .	This project is very useful to prevent accident due to gas leakage. Each flame and gas detection application has its own unique safety hazards. If we implement this on Broadway, it is very successful. The main advantage of this simple gas leak detector is its simplicity and its ability to warn its stakeholders about the leakage of the Gas.

2.3 Control System

A control system uses control loops to govern, command, direct, or regulate other devices' behaviour. It can be as simple as a single thermostat-controlled home heating controller or as complex as large industrial control systems that run processes or machinery. The control engineering process results in the creation of control systems. A feedback controller automatically controls a process or operation for continuously modulated control. The control system uses the difference as a control signal to bring the output of the plant's process variable to the setpoint by comparing the value or status of the process variable being controlled to the desired value or setpoint. Sequential and combinational logic is implemented using software logic, such as that found in a programmable logic controller.

There are two categories of control actions which are open loop and closed loop. The process variable does not affect the controller's control action in an open-loop control system. An illustration of this would be a central heating boiler controlled by a timer. The boiler's activation or deactivation is the control activity. The process variable is the building's temperature. This controller maintains a constant heat flow regardless of the building's temperature. The desired and actual process variables dictate the controller's control action in a closed-loop control system. 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 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. As a result, closed-loop controllers are sometimes known as feedback controllers. Figure 3 shows the block diagrams of the open-loop and closed-loop systems.

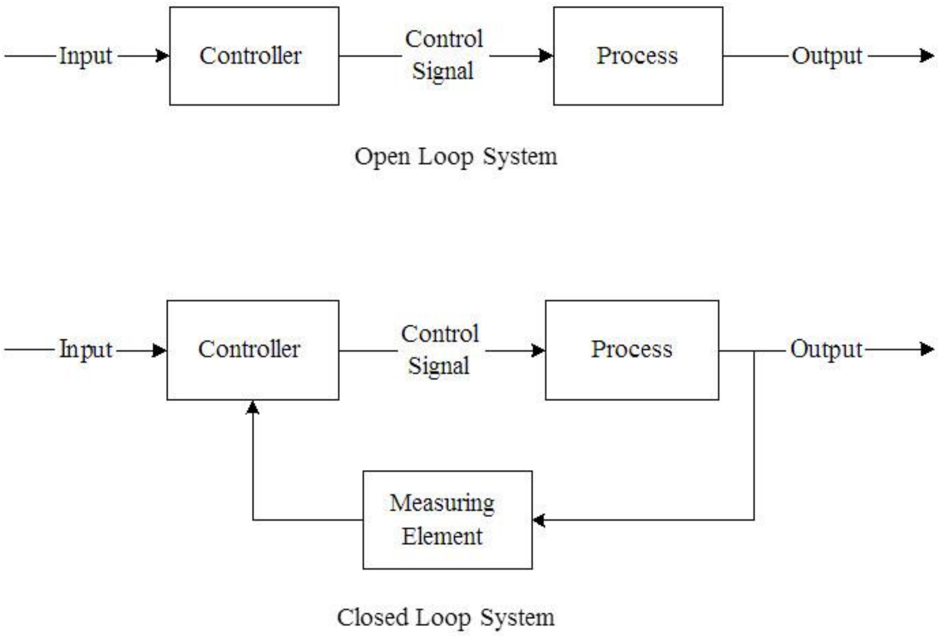


Figure 2.1: Block diagram of open loop and closed loop system

2.3.1 NodeMCU 32

ESP32 is a low-cost System on Chip (SoC) Microcontroller from Espressif Systems, the developers of the famous ESP8266 SoC. It is a successor to ESP8266 SoC and comes in single-core and dual-core variations of the Tensilica's 32-bit Xtensa LX6 Microprocessor with integrated Wi-Fi and Bluetooth. The good thing about ESP32 its integrated Radio Frequency (RF) components like Power Amplifier, Low-Noise Receive Amplifier, Antenna Switch, Filters and RF Balun. This makes designing hardware around ESP32 very easy as per requires very few external components. ESP32 is that it is manufactured using TSMC's ultra-low-power 40 nm technology. Therefore, designing battery-operated applications like wearables, audio equipment, baby monitors, and smartwatches is all suitable. Hence, ESP32 should be very easy.

2.3.2 Temperature Sensor DHT11

An essential, extremely affordable digital temperature and humidity sensor is the DHT11. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and it outputs a digital signal on the data pin (no analogue input pins needed). Although it is easy to operate, data collection requires precise timing. When utilising the Adafruit library, sensor readings may be up to 2 seconds old because it can only get new data once every 2 seconds.

2.3.3 Air Quality Sensor MQ-135

The **MQ-135** are used in air quality control equipment and are suitable for detecting or measuring NH_3, NO_X, Alcohol, Benzene, Smoke, and CO_2. The MQ-135 sensor module comes with a Digital Pin, which makes this sensor operate even without a microcontroller, and that comes in handy.

2.3.4 PIR Sensor HC-SR501

HC-SR501 is an automatic control module based on infrared technology with high sensitivity and security and works under the extra low voltage mode. It is a common sight that the module is applied in a range of automatic sensing electronic equipment, especially in mechanical control products powered by a dry battery.

2.3.5 LCD Display

A flat-panel display or other electronically controlled optical device that uses polarised and light-modulating capabilities of liquid crystal is known as a liquid-crystal display (LCD). Liquid crystal doesn’t directly emit light; they create colour and monochromatic images via a backlight or reflector.

2.3.6 Buzzer

The beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, trains, and confirmation of user input, such as a mouse click or keystroke.

2.4 Chapter Summary

In the first half of this chapter, along with a summary of the research papers used to plan the project, the findings on selecting the kind of sensor or component that would be used for fall detection from wheelchairs are covered. The second section details the technical elements, including the specified controller type. This chapter also summarises the analysis and rationale of prior researchers' technologies or approaches to address the problem statement. The project's central controller will be the NodeMCU ESP32 Wifi Module.

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

The "how" of any specific piece of research is generally referred to as its methodology. It mainly focuses on how a researcher methodically plans a study to obtain accurate and trustworthy results that address the aims and objectives of the investigation.

A thorough methodology materialises this project as a ready-to-use product with safety measures. A step-by-step procedure is implemented to guarantee that the Project is completed on schedule. Each time, collecting and analysing data from numerous sensors is necessary to determine the state. Be sure to test and validate the circuit design.

3.2 Project Design and Overview.

The proposed controller, which uses a closed-loop system with ESP 32 as the primary controller, is described in the previous chapter. Proteus software is used to design the ESP 32controller circuit, which is subsequently translated into a PCB circuit. The sensor data will be recorded and uploaded for analysis to a

3.2.1 Block Diagram of the Project

Block diagrams divide an entire project or circuit into smaller components or blocks for easier understanding. It can also be used to develop new systems and clarify and enhance existing ones. Each brick has a specific function, and a block diagram shows its connection. A block diagram of our project is shown in Figure 3.1 to help others understand it. Based on the block diagram below, it is divided into two elements, the output system, and the monitoring module. The system must initialise to the Blynk server after connecting to the network for the electrical appliance controller, NoodeMCU. After connecting to the server, the user can operate the devices using the Blynk app as a mobile interface. After start-up, the output system will collect data from temperature sensors.

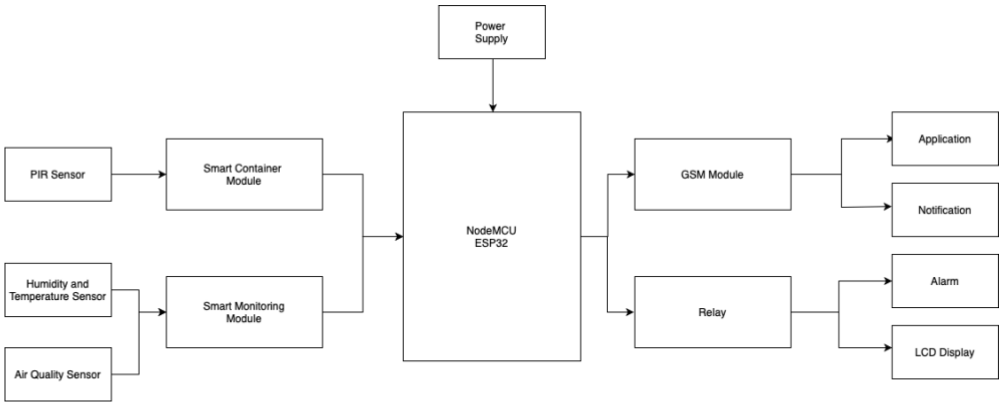


Figure 3.2.1: Block Diagram of IoT-Based Smart Kitchen

3.2.2 Flowchart of the Project 2

A diagram of a procedure, system, or computer algorithm is called a flowchart. They are regularly used to represent complex processes in simple, understandable diagrams and document, analyse, plan, improve, and convey them in several professions. Rectangles, ovals, diamonds, and other shapes are used in flowcharts, also known as flow charts, to represent the type of step, and connecting arrows are used to define flow and sequence. Simple hand-drawn charts and intricate computer-drawn diagrams showcasing various processes and paths are acceptable forms. Given the diversity of flowchart types available, it is no surprise that they are one of the most widely used diagrams on the planet, being utilised by both professional and non-technical persons in various professions.

Figure 3.3.2 depicts the overall system's circuit diagram. It shows the progress of the IOT-Based Smart Kitchen Project. First, the system will turn on and continuously send the sensor data to the application using NodeMCU. Then it will detect the kitchen status. Gas, temperature, and moisture are the elements that will be observed. If those elements exceed the danger level, the alarm will be on, the relay will be activated, the warning will be displayed on the OLED, and the buzzer will sound. The user will get an SMS for them to alert. However, the alarm will not be on if the temperature, gas, and moisture are average.

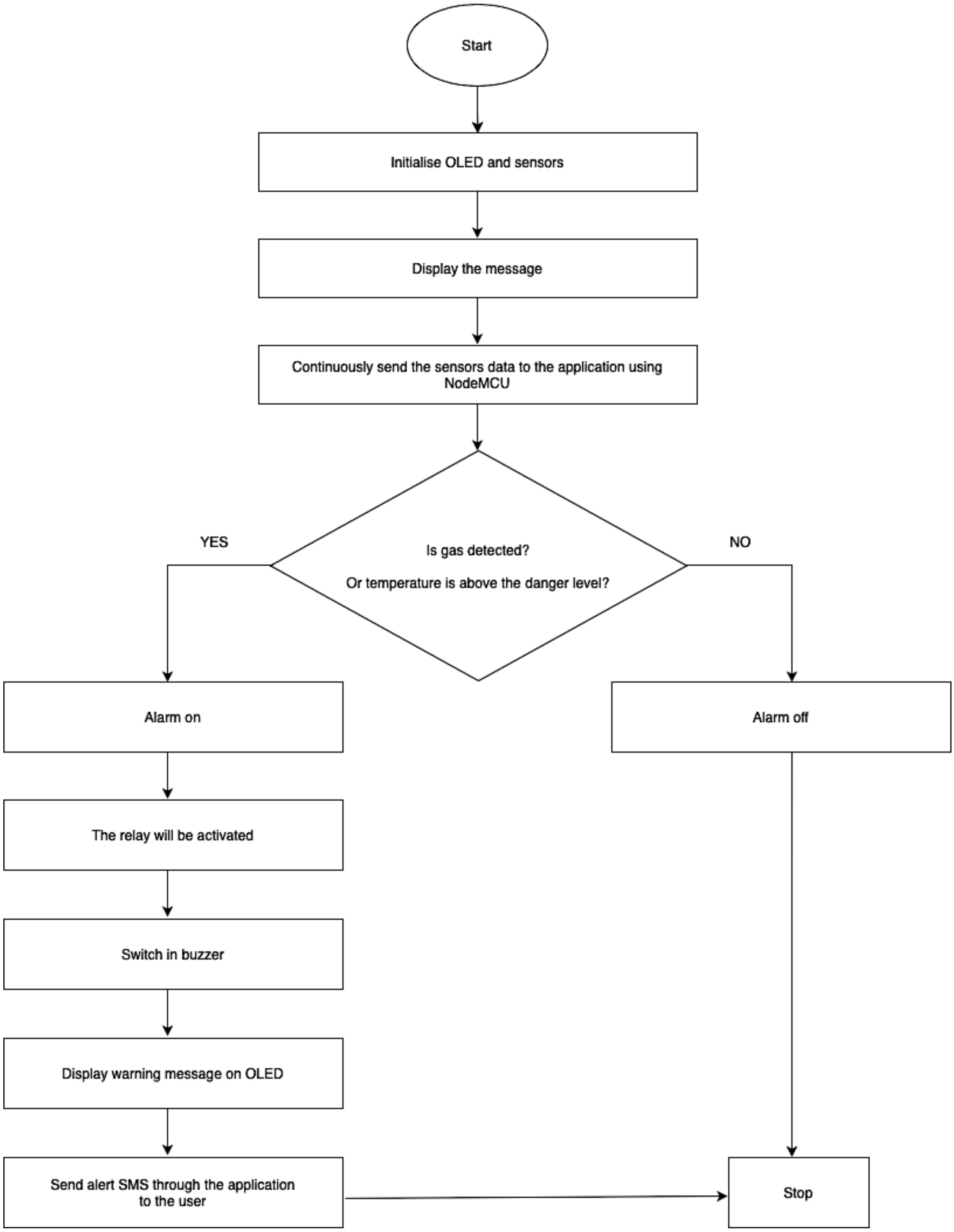


Figure 3.2.2: Flowchart of operation for IoT-Based Smart Kitchen

3.2.3 Project Description

This project highlights the dynamics of IoT's growth in manufacturing kitchens and furniture. 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. However, the deployment of IoT in the kitchen involves more than just technological issues, and businesses must also grapple with the challenge of creating related commercial processes. Early product implementations have already reached the consumer markets up to this stage. The goal is to achieve total integration, which includes connectivity and interaction across all household goods, particularly in the kitchen. Lastly, the users can monitor the situation of their kitchen just simply by watching it through the application and software.

3.3 Project Hardware

As mentioned in the previous chapter, this project's primary controller is Arduino. Hardware assembly mainly entails joining specific NodeMCU digital pins to the relays on the relay module, along with supply and ground pins. Additional sensors are used to keep an eye on the condition of the kitchen. The prototype's primary functional assembly is straightforward. Any appliance that has to be controlled can be connected to the other relays. The crucial step in hardware assembly is determining which digital pin goes with which relay. By the Blynk application's settings, this connection is established. The radio buttons on the Blynk application are programmed to toggle a specific NodeMCU digital pin. It is ensured that the relay connection is formed with this configuration.

Time	Temperature (°C)	Air Quality Index (AQI)	Humidity (%RH)	Motion	Time

Table 3.3**:** Sensors Working Data

3.3.1 Schematic Circuit

The schematic circuit of the project is shown in Figure 3.3.1. The heart of this project is ESP32, which controls and allows each sensor to work through. There are two parts in the schematic. The first part consists of all the indicators, such as a buzzer, exhaust fan, LED and LCD. The second part consists of all the sensors and relays, also known as the worker. And these are the DHT11 temperature and humidity sensor, MQ-135 Air Quality Gas sensor, HC-SR501 motion sensor and 4-channel relay. All the workers, as well as the indicator pins, are connected to the ESP322. The library file must be downloaded because the Proteus software application lacks a microcontroller and some sensors.

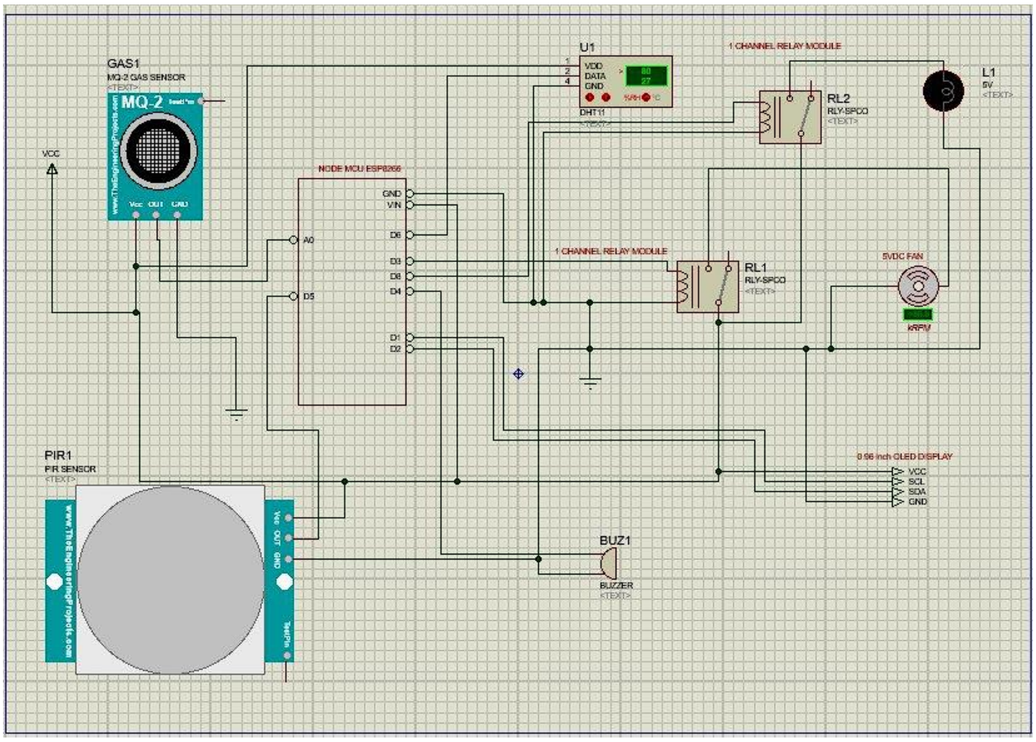


Figure 3.3.1(a): Schematic Diagram

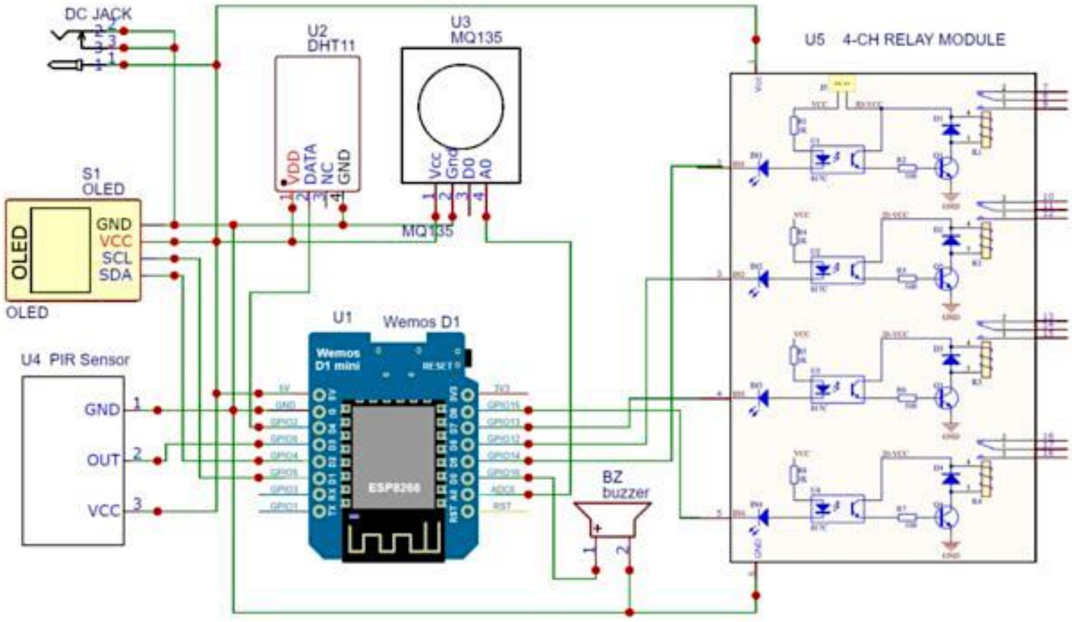


Figure 3.3.1(b): Schematic Diagram Connection

3.3.2 Description of Main Component

The entire prototype is divided into five parts in this project. The sensor, display, alarm, and WIFI module are all found in the first portion. This project is condensed into a tiny container that we call a prototype containing the entire section. This section will be attached to the breadboard using the Arduino IDE to ensure the complete area is connected and performs its function. As an illustration, the Arduino IDE connects the MQ-135 sensor to an LCD. The sensor will display an LCD and emit a buzzer when it notices an abnormal air concentration. Users will be notified via an application or website via a notification. The central element is described in more detail below.

3.3.2.1 NodeMCU ESP32

NodeMCU is a microcontroller development board with wifi capability. It uses an ESP8266 microcontroller chip. It is a 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 Wifi connection and can connect to the internet through Wifi. It is best suited for IoT applications. NodeMCU is an open-source platform based on ESP8266, which can combine objects and let data transfer using the Wi-Fi protocol. In addition, providing some of the essential features of microcontrollers, such as GPIO, PWM, ADC, etc., can solve many of the project's needs alone.

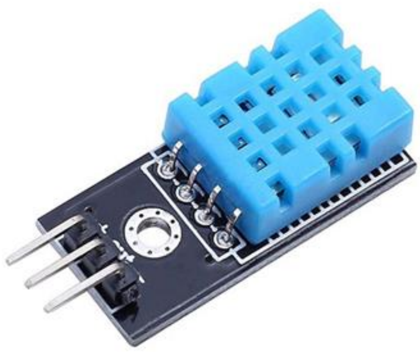
3.3.2.2 Light Emitting Diode (LED)

The electrons and holes are confined inside energy bands inside the semiconductor material of the LED. The energy of the photons (light particles) released by the LED depends on how far apart the bars are, or what is known as the bandgap. The photon energy determines the wavelength of the light emitted and its colour. Various semiconductor materials with different bandgaps produce light of multiple colours. By adjusting the makeup of the light-emitting, or active region, the specific wavelength (colour) can be changed.

3.3.2.3 Buzzer

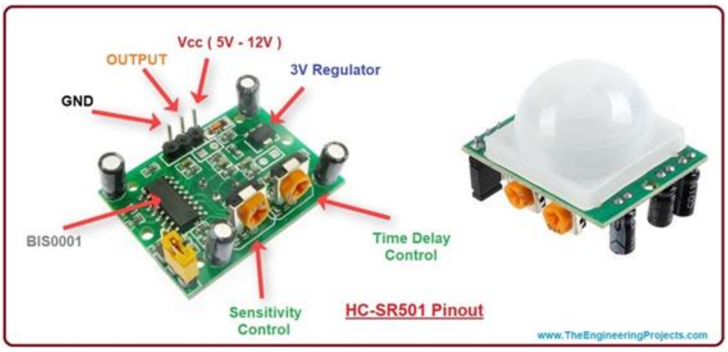
A buzzer is a voice device that converts the audio model into a sound signal. It is mainly used to prompt or alarm. Typical applications include sirens, alarm devices, fire alarms, air defence alarms, burglar alarms, timers, etc. A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, training, and confirmation of user input, such as a mouse click or keystroke.

3.3.2.4 DHT11 Temperature and Humidity Sensor



An essential, extremely affordable digital temperature and humidity sensor is the DHT11. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and it outputs a digital signal on the data pin (no analogue input pins needed). Although it is easy to operate, data collection requires precise timing. When utilising the Adafruit library, sensor readings may be up to 2 seconds old because it can only get new data once every 2 seconds.

3.3.2.5 HC-SR501 Passive Infrared (PIR) Sensor



HC-SR501 is an automatic control module based on infrared technology which has high sensitivity and security and works under the extra low voltage mode. It is a common sight that the module is applied in a range of automatic sensing electronic equipment, especially in mechanical control products powered by a dry battery.

3.3.2.6 MQ-135 Air Quality Gas Sensor

MQ-135 Gas sensors are utilised in air quality control systems and are appropriate for NH3, NOx, Alcohol, Benzene, Smoke, and CO2 detection or measurement. When one must detect one gas, the MQ-135 sensor module's built-in Digital Pin allows it to function without a microcontroller. The analogue pin must measure gases in parts per million (PPM). The analogue pin can be utilised with the most popular microcontrollers because it is TTL driven and operates on 5V.

3.3.2.7 Liquid-Crystal Display (LCD)

A flat-panel display or other electronically controlled optical device that uses polarisers and the light-modulating properties of liquid crystals is known as a liquid-crystal display (LCD). To produce colour or monochromatic images, liquid crystals need a backlight or reflector instead of emitting light directly. A random or fixed image with minimal information content that can be seen or hidden can be presented on an LCD. Examples of devices using these displays include preset text, numbers, and seven-segment displays, such as those seen in digital clocks. They both employ the same fundamental technology, except that some displays use more prominent elements and a matrix of tiny pixels to form random images.

3.3.2.8 Exhaust Fan

Exhaust fans help eliminate excess moisture and unpleasant odours in bedrooms, bathrooms, kitchens, pantries, dining rooms, toilets, and other spaces like the pump house and battery room. They can be found in places where water accumulates quickly. The main priority is to ensure appropriate ventilation. Exhaust fans support ventilation by removing impurities that, if inhaled, could be harmful or irritating. As a result of their ventilation, they help to prevent things like asthma, allergies, and headaches. Additionally, it lessens the possibility of mildew, mould, and damage to walls or furnishings.

3.3.3 Circuit Operation

As stated before, the kitchen is one of the significant spots in a house. Safety is the central aspect that must be considered during kitchen activities. The existence of gas leakage, uncontrolled fire and excessive temperatures must be quickly identified and addressed. The system is designed using four types of sensors and Arduino IDE. DHT11 sensor is used to monitor temperature and humidity, IR Flames sensor is used to detect fire and moisture, MQ-135 sensors are used to detect gas leakage, and PIR sensors are used to detect presence in the kitchen.

We use the DHT11 humidity temperature sensor, MQ-135 gas sensor, and passive infrared sensor to track indoor air quality parameters. Similarly, a short 5V buzzer can serve as an alarm system. When the gas level surpasses the threshold value, a relay attached to an automatic exhaust fan activates automatically. The remaining three relays can be connected to kitchen equipment such as a mixer, refrigerator, oven, water heater, induction range, etc. because we use a four-channel relay.

A straightforward LCD can show real-time room temperature, humidity, and gas value. The project's central processing unit is the NodeMCU ESP32 Board. Any board based on the ESP32-12E can be used. The ESP32 chip creates a connection with the Blynk Application by connecting to the WiFi Network.

3.4 Project Software

It is mainly generating this circuit in this project using the Proteus software. The Arduino software is the next programme I used to design the coding for our project. Proteus can create a circuit before starting a prototype. I use this software to simulate the circuit and ensure that current flows into all my components. This is also to make sure that each element performs as it should. Because it enables us to test the programme in software before trying it on the prototype, it can also assist us in protecting our component from overvoltage. Once finished, the Arduino programme can examine the code for problems before converting it to a hex file for simulation in the Proteus programme. After applying the coding to the Arduino in Proteus, this software may check whether all parts function properly. If the issue is a circuit fault or a code problem, this helps speed up troubleshooting.

The Blynk Application is also used by this project's Internet of Things (IoT) component. Users of these apps may easily keep an eye on the data and analyse it using the produced graph. Users may easily configure and analyse the data using the data, not just when the device is online but even after it has been offline for up to two months and at least 10 minutes afterwards. Users will be notified through email as well as a notification when any anomalies are found. For roughly as long as we desire, the users' apps will remain open while the indications are working up; if the irregularities are identified again after that time, a new notification and email will be issued to the users.

3.4.1 Flowchart of the System

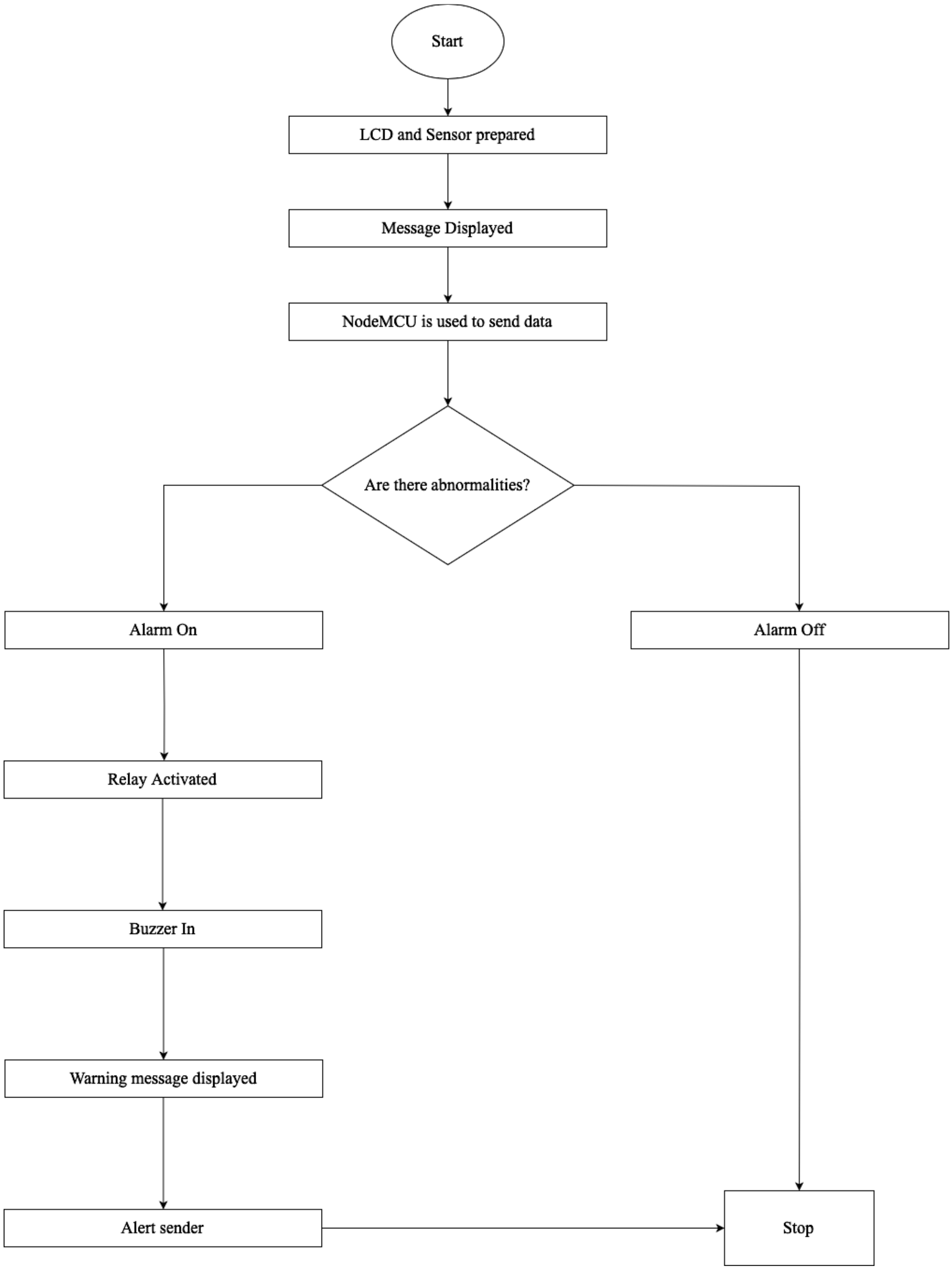


Figure 3.4.1: Flowchart of the System of IoT- Based Smart Kitchen Project**.**

3.4.2 Description of Flowchart

The power supply is connected directly to Arduino. The sensor is powered from pin 5v (VCC) and pin 3.3 V in Arduino. The sensor used in this system is DHT11 to detect temperature change, MQ-135 to detect Liquified Gas Petroleum (LPG) gas leak, an Infrared (IR) flame sensor to catch fire, and a PIR sensor to detect human activity in the kitchen. Data received by the sensor will be sent directly to the Arduino via digital or analogue pins. ESP32 serves as the controlling centre in this system; all data transmitted by the sensor will be processed to become a reference in the following action. Data received by Arduino will also be sent to the server. ESP32 is a Wi-Fi shield connecting the Arduino to the server via Wi-Fi. Fan Relay functions as a fan controller. This relay will work according to the Arduino command. The Arduino will command the Fan to turn on when the DHT11 sensor detects air temperature not more than 35 ° C, the MQ-135 sensor detects LPG gas leakage, the IR flame sensor detects a fire, and when a command from a mobile device passes through the Blynk app.

An alarm works when a gas leak or a fire occurs. The indicator lights indicate motion, and if there is motion, then the light will be on. The Blynk app is a web server that will accommodate various information transmitted by ESP32 via Wi-Fi. Blynk will process the data and display it on the dashboard. The dashboard is a view of the page or application showing the information the Blynk server received. The dashboard also has a section controlling the components connected to the Blynk server. In this system, which the Blynk can govern is a fan relay. Blynk also has a trigger function. The trigger function will send notifications in the form of SMS and Email based on sensor readings that have been determined. The mobile device serves as the receiver and information viewer of the smart kitchen system through the Blynk app.

3.5 Prototype Development

Before investing in the full development of the part, a prototype is a look-alike or a copy of a piece that depicts the product's qualities and investigates all potential outcomes. A prototype could be anything from an intricate drawing done by hand on paper to an actual working product model. Therefore, developing a prototype refers to the manufacturing processes to build the prototype. Prototype production and development are frequently conflated.

3.5.1 Mechanical Design/Product Layout

Figure 3.5.1 shows the product's design and how the circuit and the component will be. All members have been mounted on a PCB board and will be housed in a prototype kitchen kit. This prototype is handy and is suitable to use as a reference. It has high-efficiency sensors that can detect temperature, humidity, motion, and air quality index in a split second. Additionally, since the small prototype is easier to mount with the component box and easy to carry around. If there any abnormalities are detected, the user will be notified not only via the app but also by email.

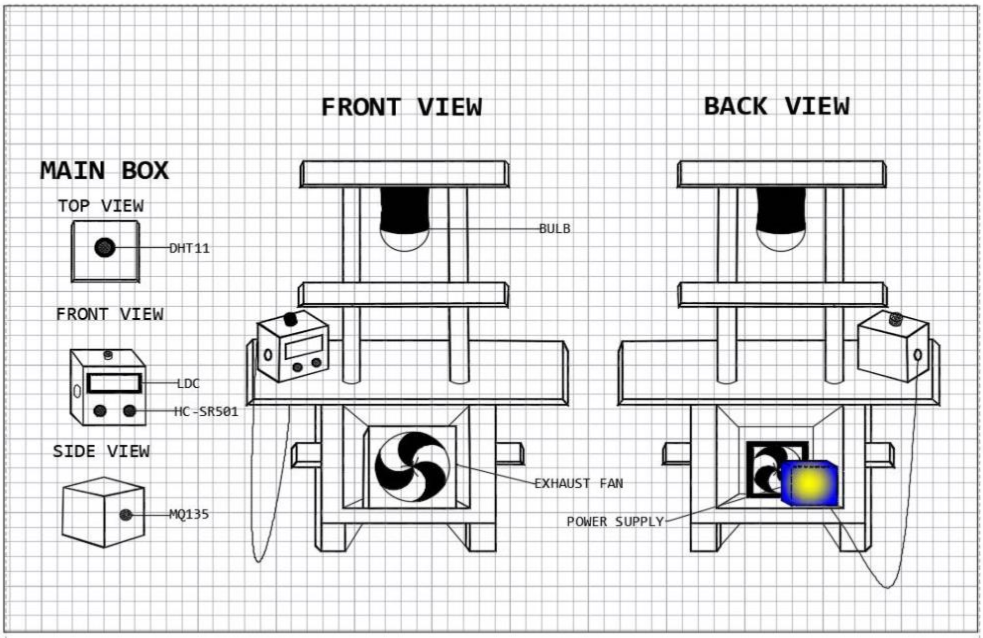


Figure 3.5.1: Front view of the Project

3.6 Sustainability Element in The Design Concept

Sustainability is a broad and ambiguous term. With the current mainstreaming of environmentalism, sustainability and sustainable design becoming hot discussion topics, there needs to be more agreement about the exact definition of these terms. A smart Kitchen using an IoT system with multiregional sensors has been designed, constructed, and tested. This system can be used in homes and public buildings such as hotels and restaurants. The intelligent kitchen provides all the automation features, including safety features over the gas leakage detection system.

For this, the usage of gas sensors, temperature sensors, and weight sensors. Gas sensors are used to detect the leakage of gas in the system. Temperature sensors are used to detect the current room temperature. The server stores information and related data; it also keeps information about the hardware and sensors, maintains the logs and status of the system, and holds the room temperature and information about the users. Threshold values are set in the room; when it crosses those values, it will notify the user about gas leakage. The server can communicate with the user through any device. The application will display a notification to the user on any device. It can prevent accidents and hazards. The only way to access the information is if the user is far from home. It is a cost-effective and time-consuming solution. It can be used in home automation, Hospital management, Military management, and industrial applications.

3.7 Chapter Summary

In this chapter, the project design and overview were covered in detail. A flowchart and a block diagram were also included. The components used in this project is also covered in this chapter. The NodeMCU ESP8266 will connect the system's transmitter and receiver components. All the features from the prior circuit will be combined into a single course and connected to all the sensors. The ESP32 NodeMCU WI-FI will serve as the brains of this project.

CHAPTER 4

4 RESULTS AND DISCUSSION

4.1 Introduction

An analysis of the data is a summary of the information gathered. Data interpretation requires logical and analytical thinking to find patterns, correlations, or trends. This chapter will succinctly present and explain the project's findings and analysis. Tables display how rapidly the system reacts to data being received and sent and to sudden changes in movement. All the data and analyses in this chapter have met the research objectives previously outlined.

4.2 Results and Analysis

4.2.1 Final Product

Figure 4.2.1 (a): Front View

Figure 4.2.1 (b): Inside the kitchen kit

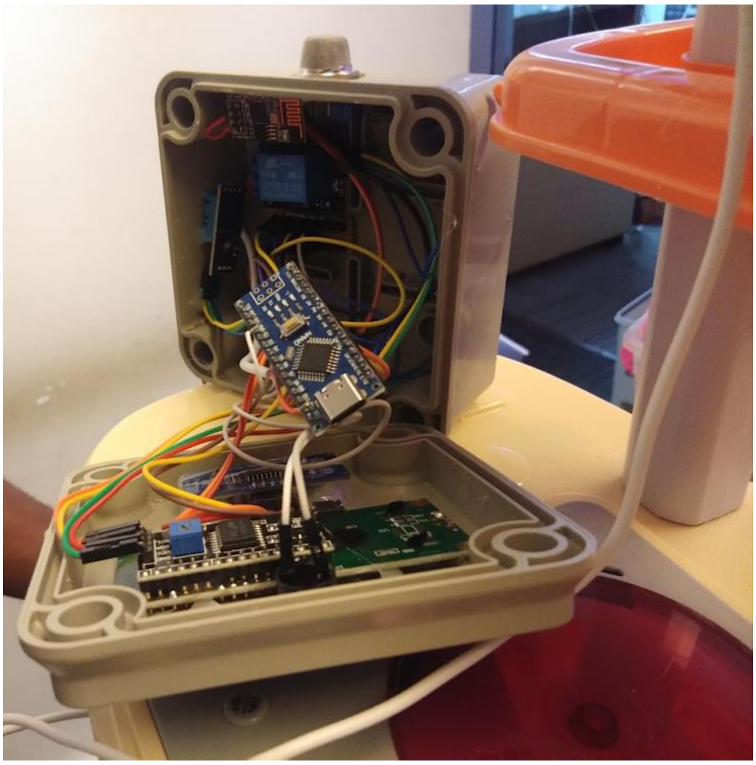


Figure 4.2.1 (c): Inside the component box

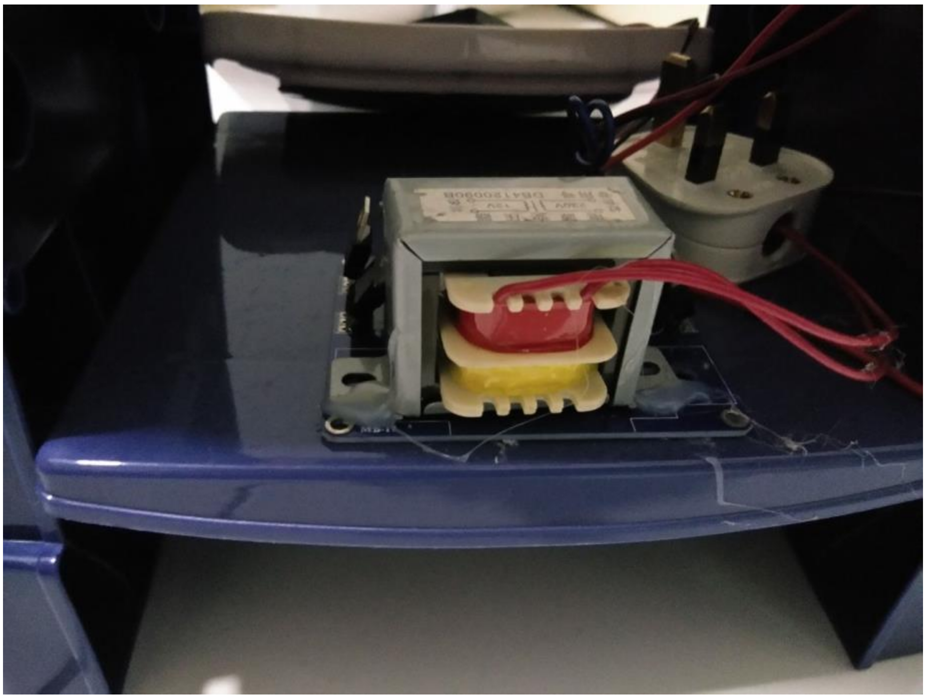


Figure 4.2.1 (d): Back View

4.2.2 Blynk Apps

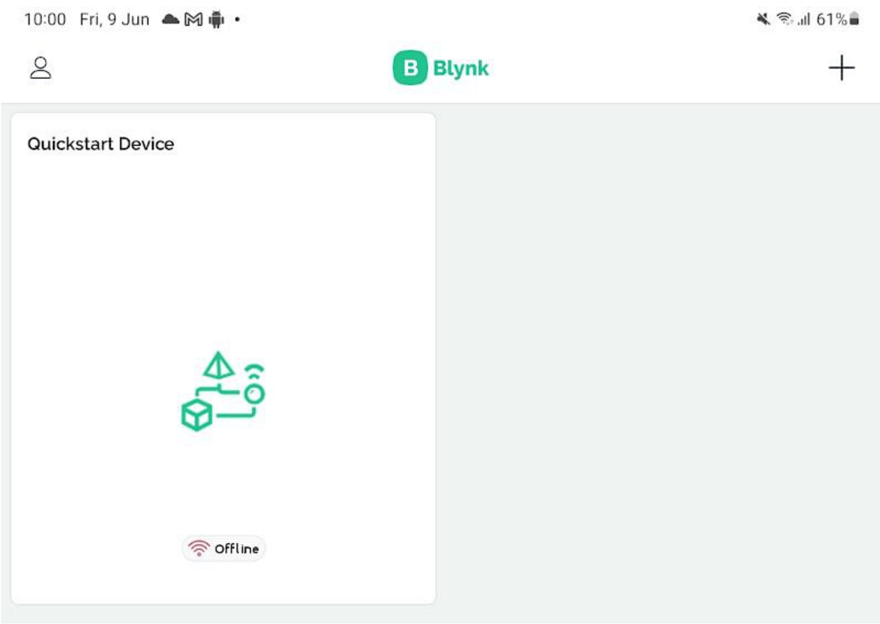


Figure 4.2.2 (a): Main Page Blynk Apps

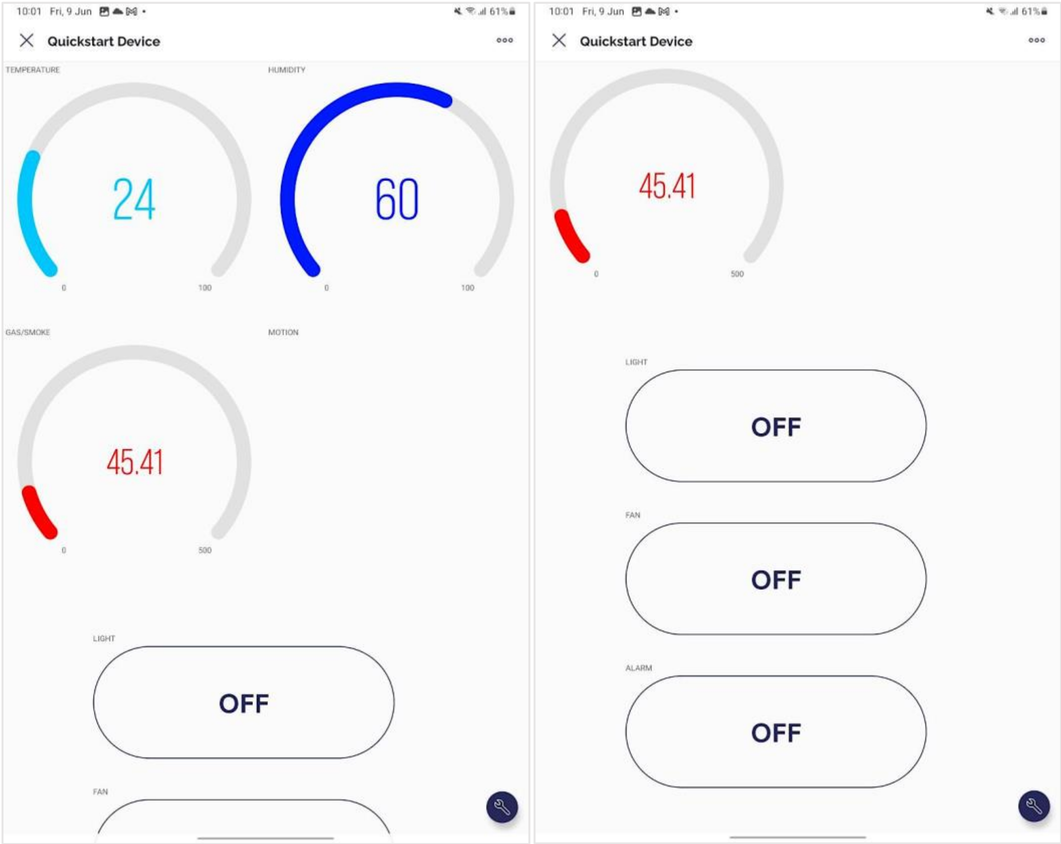


Figure 4.2.2 (b): IOT Based Smart Kitchen mode.

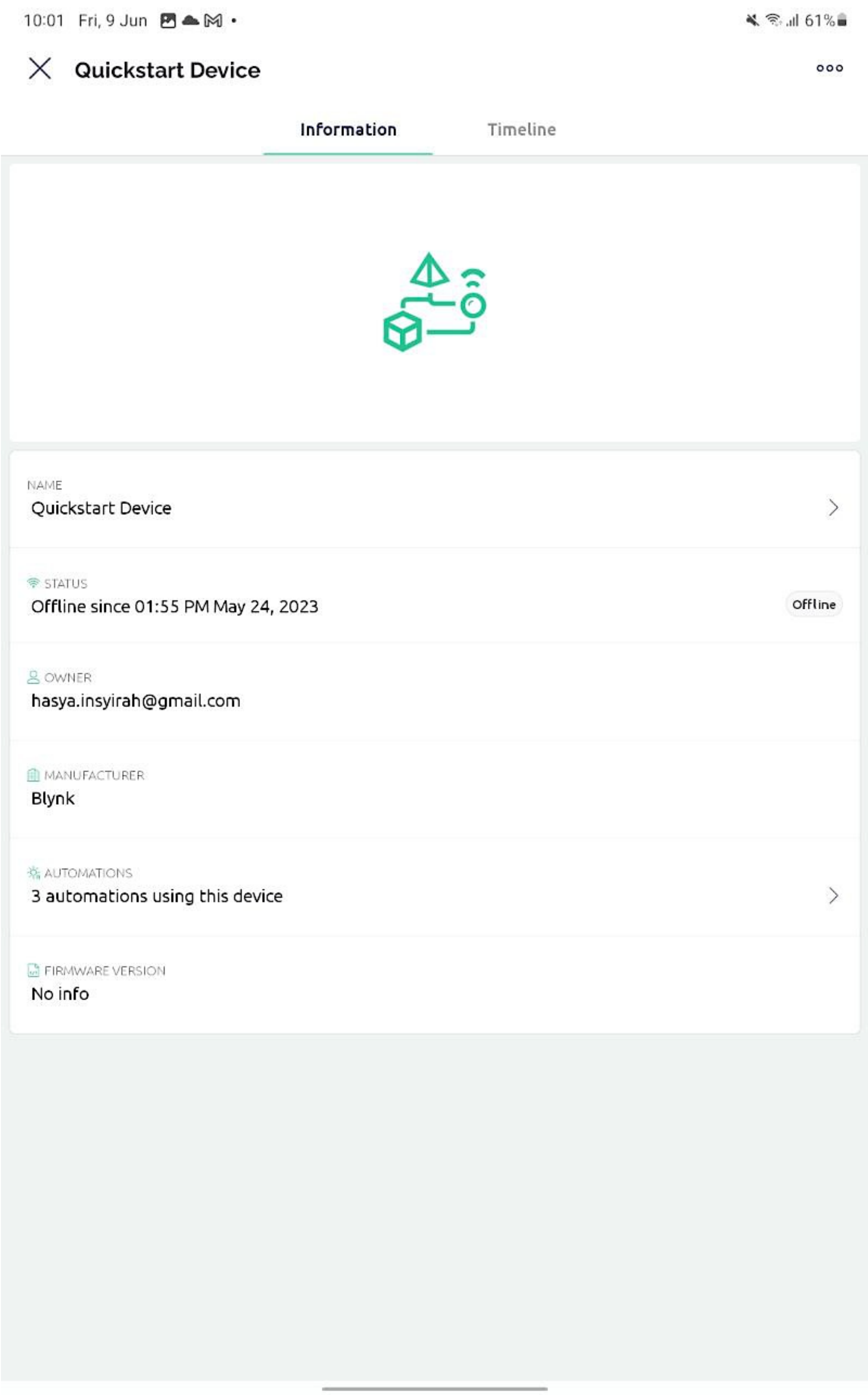


Figure 4.2.2 (c): IoT-Based Smart Kitchen Developer Mode

4.2.3 Result

4.2.3.1 Collected Data

Time	Temperature (°C)	Air Quality Index (AQI)	Humidity (%RH)	Motion
10:00	32	78	61	NOT DETECTED
10:01	32	78	63	NOT DETECTED
10:02	32	78	62	NOT DETECTED
10:03	33	97	61	DETECTED
10:04	32	73	61	NOT DETECTED
10:05	32	73	61	NOT DETECTED
10:06	32	73	63	NOT DETECTED
10:07	33	98	62	DETECTED
10:08	34	100	62	DETECTED
10:09	35	133	62	DETECTED
10:10	33	78	63	NOT DETECTED
10:11	35	99	60	DETECTED
10:12	33	62	60	NOT DETECTED
10:13	33	62	60	NOT DETECTED
10:14	32	58	60	NOT DETECTED
10:15	31	56	60	NOT DETECTED
10:16	31	56	58	NOT DETECTED
10:17	31	56	58	NOT DETECTED
10:18	31	55	58	NOT DETECTED
10:19	32	55	58	NOT DETECTED
10:20	32	55	58	NOT DETECTED
10:21	32	78	58	NOT DETECTED
10:22	32	82	55	NOT DETECTED
10:23	33	101	51	DETECTED
10:24	32	97	51	NOT DETECTED
10:25	33	97	51	NOT DETECTED
10:26	34	101	51	DETECTED
10:27	32	86	48	NOT DETECTED
10:28	32	86	48	NOT DETECTED
10:29	32	82	48	NOT DETECTED

Table 4.2.3.1 (a): Data Collected on 25th May 2023 at 10:00 AM

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

Table 4.2.3.1 (b): Data Collected on 25th May 2023 at 10:00 AM

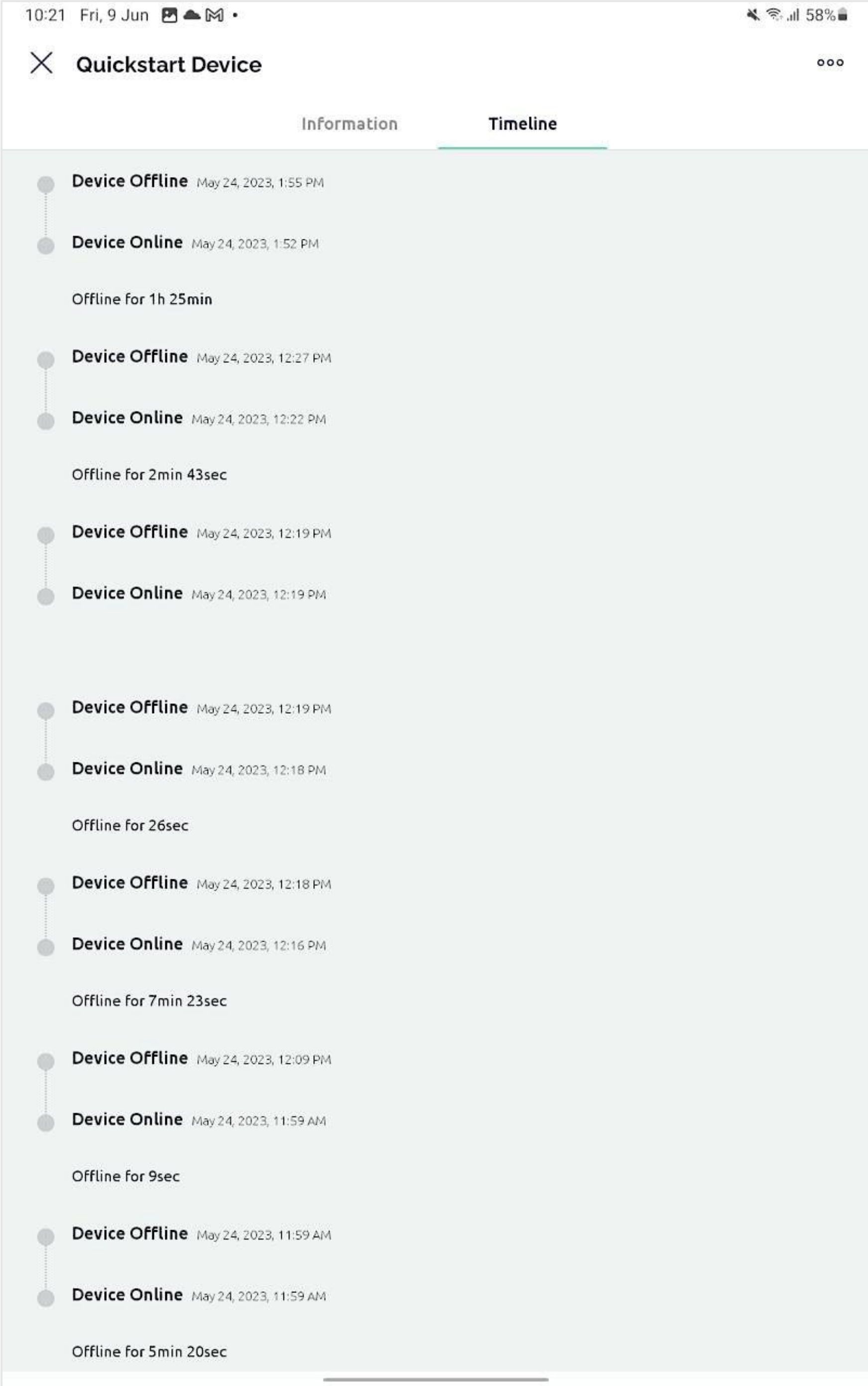


Figure 4.2.3.1: Notification Records

4.2.3.2 Alarm Notification

Time	Alarm Notification		
	The Time Frame for Getting Notice (s)	Blynk Apps	Gmail
10:00	-	-	-
10:01	-	-	-
10:02	-	-	-
10:03	00:01:35	SEND	SEND
10:04	-	-	-
10:05	-	-	-
10:06	-	-	-
10:07	00:01:40	SEND	SEND
10:08	00:01:28	SEND	SEND
10:09	00:01:28	SEND	SEND
10:10	-	SEND	SEND
10:11	00:01:40	SEND	SEND
10:12	-	-	-
10:13	-	-	-
10:14	-	-	-
10:15	-	-	-
10:16	-	-	-
10:17	-	-	-
10:18	-	-	-
10:19	-	-	-
10:20	-	-	-
10:21	-	-	-
10:22	-	-	-
10:23	00:01:38	SEND	SEND
10:24	-	-	-
10:25	-	-	-
10:26	00:01:22	SEND	SEND
10:27	-	-	-
10:28	-	-	-
10:29	-	-	-

Table 4.2.3.2: Status of Received Alert Notifications through Apps and Gmail in 30 minutes.

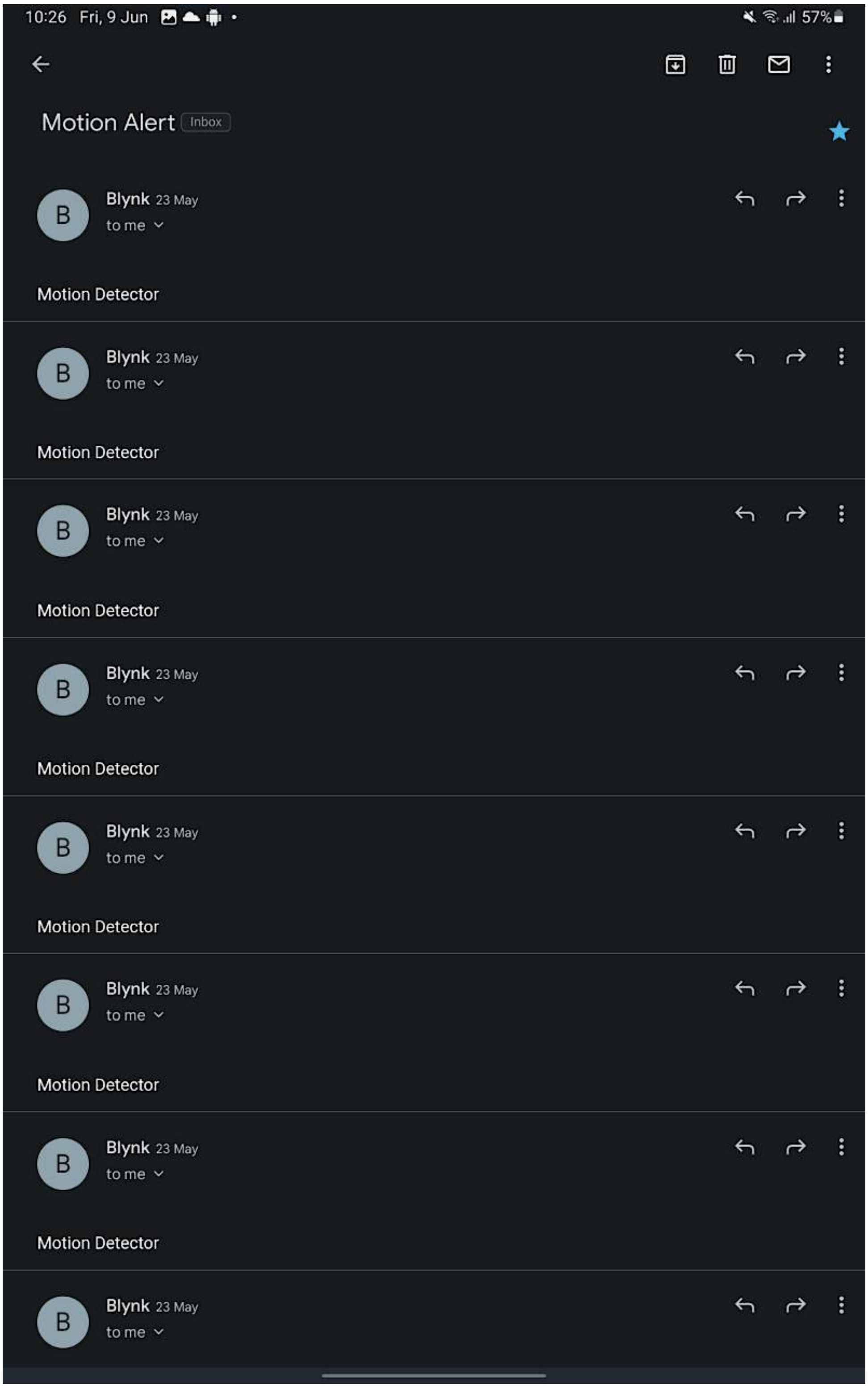


Figure 4.2.3.2 (a): Alert Notification Send through e-mail.

4.2.3.3 The Causes of Fire in Malaysia:

Data Distribution for the Past 5 Years

Cause \ Year	2016	2017	2018	2019	2020
Electric	2005	1737	1563	1234	1239
Cigarette Butt	735	307	322	454	215
Fire Spark	229	171	188	187	138
Fire works	42	18	33	24	7
Kitchen Gas/ Oil	1466	1481	1605	1410	1064

Table 4.2.3.3: The Causes of Fire in Malaysia for the Past 5 Years

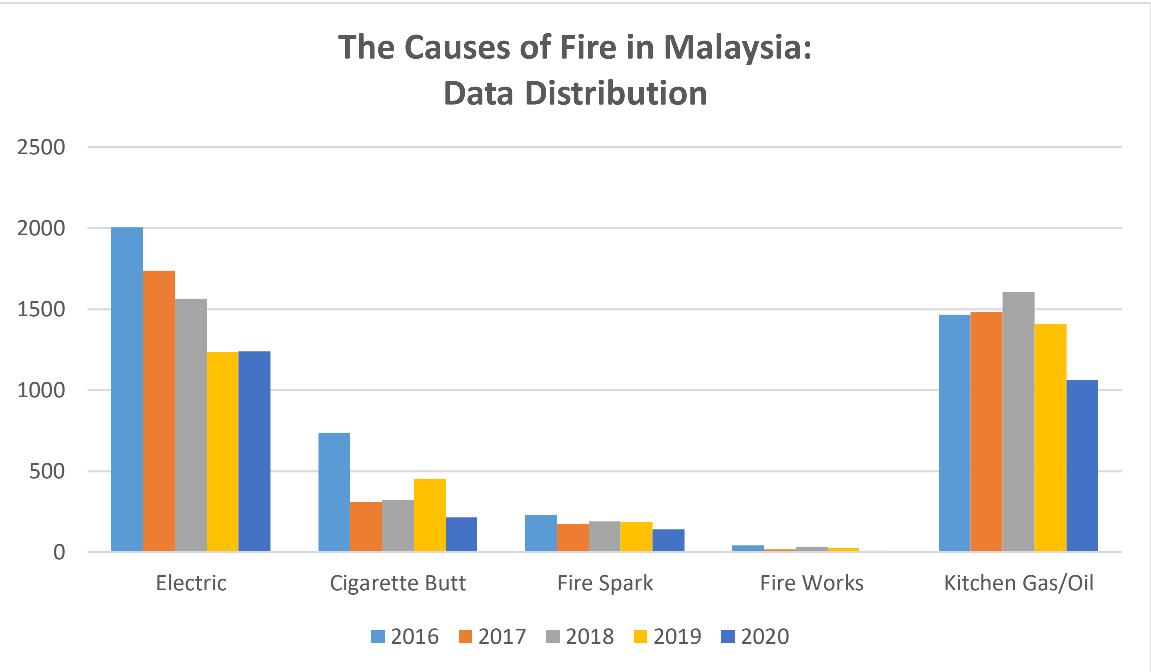


Figure 4.2.3.3: Statistic of The Causes of Fire in Malaysia for the past 5 years

Sources: Punca Kebakaran JBPM 2009 - 2020

4.3 Discussion

Figure 4.2.1 (a), (b), (c) and (d) shows the finished product project, which comprises three of the main system components: The power supply, component box and the prototype itself, as was previously mentioned in the findings section. I faced some issues during the resemblance and integration between the prototype and the component box. Since everything is small, hence it's hard to stick it together. I need to place the exhaust fan in the oven section to maximise the usable space. This kitchen kit requires a power supply to activate the whole process. Working based on the power supply is normal since everything works based on power.

The heart of the project is NodeMCU ESP32 Wi-Fi Module is used to run the device to evaluate and receive input data from sensors. It also helps all the sensors to communicate not only in the programme but as well as with the Blynk app, which the user will handle. The first sensor embedded in the system is a Temperature and Humidity Sensor, DHT11. This sensor detects two factors which are temperature and humidity. The ideal temperature in the kitchen is around 32-35 degrees Celsius max—while humidity needs to stay about 40% RH – 70% RH. Along with completing this project, and based on the data gathered, humidity is easier to maintain than temperature. This is due to lots of kitchen appliances releasing heat while in use.

The second sensor, also crucial in this project, is MQ-135, the Air Quality Index (AQI) sensor. This sensor detects the presence of hazardous gas in human beings. Propane, Butane and Natural Gas, for instance, Carbon dioxide, are usually found in the kitchen stove. Some houses use light to light up the furnace, which is even dangerous to people inside the house. The ideal Air Quality Index (AQI) are 0 to 50 and 50 to 100 is considered excellent and moderate, respectively. However, if it exceeds 100, it can be unhealthy for some sensitive people and cause asthma. The last star in the project is the HC-SR501 sensor that detects the motion of people. This sensor embeds together with light bulb and is programmed with an exhaust fan.

Figure 4.2.2 (a) and (b) depict the Blynk programme, which I use for this project, from the user's point of view. The Blynk programme, which enables users to examine data through their devices wherever they are, is a simple-to-download programme available for all common types of used appliances. Users can access data using this application. As was mentioned earlier, the status is displayed on the LCD by Blynk Apps to avoid issuing alert alerts. We exemplify the third objective of our project, which is to develop a user-friendly alert system that helps give fast assistance.

A system that permits the one-way, real-time transmission of messages to a group or groups of people at a location, facility, or activity is referred to as an emergency communication system. A notification system rapidly delivers essential information to a targeted audience. Although a crisis can occur anytime and anywhere, we never intend to experience one. The most crucial action a group can take in a situation or dangerous circumstance is to warn and inform individuals at risk as soon as possible. Table 4.2.3.2 displays the fall detection status based on a specified time. The Time Frame for Getting Notice outlines how quickly the user should receive the notification to evaluate whether the user's guardian needs to be informed if the victim needs immediate emergency assistance. IoT-based smart kitchens have several advantages that can make cooking simpler, safer, and more practical. As technology progresses, future smart kitchens will likely include even more cutting-edge and valuable features.

4.4 Chapter Summary

To show that the goals of the project that were previously set have been successfully reached, the outcomes of this project have been connected to this chapter. The project results have also been discussed, including the final project's development and description, the data gathered by each sensor that changes frequently, the findings that have been collected and recorded for 30 minutes, the user's perspective of the Blynk Application, and the project's shortcomings and potential solutions. This IoT-based project has proven the change and duration to receive the alarm, as shown in the outcome sections.

CHAPTER 5

5 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The conclusion of this chapter is based on the research and discussion from the preceding chapter. A decision must be written to summarise the overall findings to enjoy the project's benefits and realise its full potential. This section will also look at the project established and notably stated in this report and offer ideas for future work to improve the functionality and operation of the project for a different researcher. The project's techniques for finishing the work by the deadline in the Gantt Chart in Chapter 6 are also covered in the conclusion.

5.2 Conclusion

IoT-based smart kitchens are the latest trend in kitchen technology. These systems use sensors and actuators to connect kitchen appliances, devices, and other equipment to the Internet. This allows users to remotely control and monitor their kitchens and receive alerts about potential problems.

There are many potential benefits to using an IoT-based smart kitchen. These systems can help users significantly if it saves time and energy. This can be seen in IoT-based smart kitchens can automate many tasks, such as turning on and off appliances, adjusting cooking temperatures, and setting timers. This can save users time and energy, which can be used for other activities.

It also Improves safety by detecting potential problems, such as gas leaks or smoke, and alerting users. This can help to prevent accidents and injuries. Apart from increased convenience, IoT-based smart kitchens can be controlled remotely, which can be helpful for people who are busy or have limited mobility. Users can also use these systems to order groceries, get recipes, and learn about cooking techniques.

Besides, users can personalise cooking experiences with IoT-based smart kitchens can learn about users' cooking preferences and habits. This information can generate personalised recipes, cooking instructions, and shopping lists.

Overall, IoT-based smart kitchens offer several potential benefits for users. These systems can help users to save time and energy, improve safety, increase convenience, and personalise cooking experiences.

However, there are also some challenges associated with IoT-based smart kitchens. These systems can be expensive and may only be compatible with some kitchen appliances. Additionally, security and privacy concerns have been raised about these systems.

Despite these challenges, IoT-based smart kitchens are a promising new technology that has the potential to revolutionise the way we cook. As these systems continue to develop, they will become more affordable, compatible, and secure. This will make them a more attractive option for a broader range of users.

There are a few ideas on the potential of IoT-based smart kitchens. For example, as technology develops, we can expect to see more features and capabilities added to IoT-based smart kitchens. We may see systems that can automatically adjust cooking temperatures based on the food type or procedures that provide real-time cooking technique feedback.

We can also expect IoT-based smart kitchens to integrate more with other home automation systems. For example, users may use their smart kitchen system to control their lights, thermostat, and other devices. Ultimately, IoT-based smart kitchens can potentially transform the way we cook entirely. These systems have the potential to make cooking more accessible, more convenient, and more enjoyable.

5.3 Suggestion for Future Work

Some ideas and recommendations could be explored in future work on IoT-based smart kitchens. Firstly, Improved security and privacy as one of the biggest concerns with IoT-based smart kitchens is security and privacy. As these systems become more interconnected, ensuring they are secure from unauthorised access is vital. Additionally, it is essential to ensure that user data is collected and used in a way that respects user privacy.

Secondly, create more affordable and compatible systems because another challenge with IoT-based smart kitchens is that they can be expensive and may only be compatible with some kitchen appliances. It is essential to develop more affordable and compatible systems accessible to a broader range of users.

Thirdly, make personalised experiences as IoT-based smart kitchens have the potential to provide personalised experiences for users. For example, systems could learn about user preferences and habits and use this information to generate personalised recipes, cooking instructions, and shopping lists.

Finally, integration with other home automation systems, the thought that IoT-based smart kitchens could be integrated with other home automation systems, such as lighting and thermostats. This would allow users to control their entire home from a single system.

Overall, IoT-based smart kitchens have the potential to revolutionise the way we cook. As these systems continue to develop, addressing the associated challenges and exploring new ways to improve the user experience is essential.

There are also specific suggestions for future work in each area per mention. Firstly, Improved security and privacy: Researchers could develop new security and privacy protocols for IoT-based smart kitchens. These protocols could be designed to protect user data from unauthorised access and to ensure that user privacy is respected.

Secondly, more affordable and compatible systems: Researchers could develop new methods for manufacturing IoT-based smart kitchen systems that are more affordable. Additionally, researchers could develop new ways to make IoT-based smart kitchen systems compatible with a broader range of kitchen appliances.

Thirdly, more personalised experiences: Researchers could develop new algorithms for learning about user preferences and habits. These algorithms could generate customised recipes, cooking instructions, and shopping lists.

Finally, Integration with other home automation systems: Researchers could develop new methods for integrating IoT-based smart kitchens with other home automation systems. These methods could allow users to control their entire home from a single system.

By addressing the challenges associated with IoT-based smart kitchens and exploring new ways to improve the user experience, researchers can help ensure these systems reach their full potential.

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 additional research have been given, focusing on integrating it with more significant technology-related issues.

CHAPTER 6

6 PROJECT MANAGEMENT AND COSTING

6.1 Introduction

The price of procuring materials and components is accounted for in the hardware implementation expenses, and most of the hardware parts are bought online. Many online shops run surveys so that customers can compare prices before making purchases, such as on Shopee. This method will also simplify things because it will save time and money. This project will cost RM 181.00 in gross expenses, with additional fees of RM 165.00.

6.2 Gant Chart and Activities of the Project

The Gantt Chart in this project shows the start and finish dates of a project's terminal items and summary components. In project management, a Gantt chart is one of the most popular and practical tools for displaying activities, projects, or events with time. This Gantt chart shows the tasks that must be finished by the deadline. Specifying how many weeks it will take to complete each task is necessary. A Gantt chart for projects 1 and 2 is displayed in 6.2(a) and 6.2(b). It includes a list of the chores that must be completed each week. Everyone is reminded to do their work on time by this Gantt chart.

Fig 5: Gantt Chart for Project 1

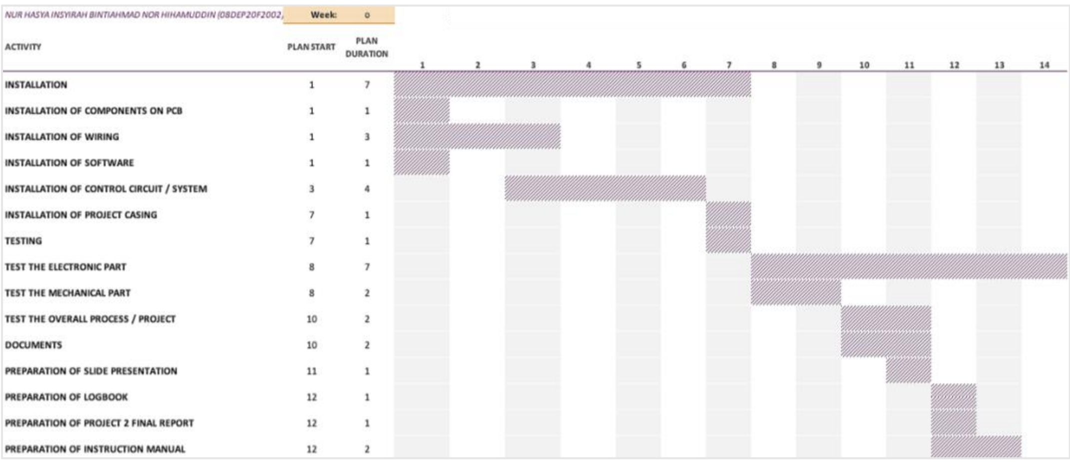


Fig 6: Gantt Chart for Project 2

6.3 Milestone

A milestone is a predetermined point in the life cycle of a project that is used to gauge advancement toward the intended outcome. In project management, milestones indicate a project's start and completion dates, external evaluations or feedback, budget checks, the submission of a significant deliverable, and other events. A milestone is a point of reference within a project that designates a big occasion or a pivotal choice. The milestone for the IoT-Based Smart Kitchen Project is shown in Table 6.3.

Description	Date	Cumulative project completion percentage
Completion Of Project Planning	15.09.2022	10%
Completion Of Model System	28.10.2022	27%
Completion Of Project Implementation	08.11.2022	30%
Completion Of Project Management and Finance	20.11.2022	45%
Completion Final Proposal Report and Mini Project Presentation	01.12.2022	59%
Completion Of Project Programming Design	30.03.2023	76%
Completion Of Project Wiring and Casing Installation	20.04.2023	85%
Completion Final Report and Project Presentation	18.05.2023	100%

Table 6.3: Milestone of IoT-Based Smart Kitchen Project.

6.4 Cost and Budgeting

This project involves the cost of purchasing components and materials throughout its implementation. Components involving the expenditure of NodeMcu ESP8266-12E, DHT11 Humidity and Temperature Sensor, MQ-135 Air Quality or Gas Sensor, HC-Sr501 Passive Infrared (PIR) Sensor, OLED Display, Buzzer, Relay Channel Board, Jumper Wires, Breadboard and USB cable. All these components are purchased online to make it easier and save on costs.

The overall gross budget estimate for the implementation of this project is RM 181.00, and other expenses are RM 165.00, as shown in Table 2. According to this budget cost, this project can be considered less costly than other projects that cost over a thousand ringgit. The project's cost is also in line with one of the critical features of a good project developer: a low-cost but high-quality project.

This project is self-financed, and some materials and components were obtained from the nearby electronic store. According to the cost projection, the price is pegged at RM106.00. The development costs are still manageable over seven months at RM17.30 per month. Based on the research done, it is possible and doable.

No.	Component and materials	The unit price	Quantity	Total
1	NodeMCU ESP32	RM 28	1	RM 2.00
2	DHT11 Humidity and Temperature Sensor	RM 8	1	RM 8.00
3	MQ-135 Air Quality Sensor	RM 10	1	RM 10.00
4	HC-SR501 PIR Sensor	RM 9	1	RM 9.00
5	OLED Display	RM 25	1	RM 25.00
6	5V Buzzer	RM 3	1	RM 3.00
7	4 Channel Relay	RM 30	1	RM 30.00
8	Jumper Wire	RM 0.30	20	RM 6.00
9	Breadboard	RM 8	1	RM 8.00
10	USB Cable	RM 5	1	RM 5.00
11	Other Materials	RM 75	-	RM 75
			Total:	**RM 181.00**
	List of other costing	**The unit price**	**Quantity**	**Total**
1	Transportation	RM 5.00	10	RM 50.00
2	Postage	RM 10	9	RM 90.00
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:	**RM 165.00**
			Overall total:	**RM 346.00**

Table 6.4: List of Components and Materials of IoT-Based Smart Kitchen Project

6.5 Chapter Summary

The table above already has all the information in this chapter regarding how much it costs to make this product. Today, as every consumer is still concerned with cost when purchasing, we must build a similar table to ensure that the expenditures incurred are manageable for the project's progress. As a result, this product aims to develop a high-quality, profitable project. The cost of the item, which is less than RM 500, is fair. Not to mention, the concept for this product was created using the most cutting-edge design.

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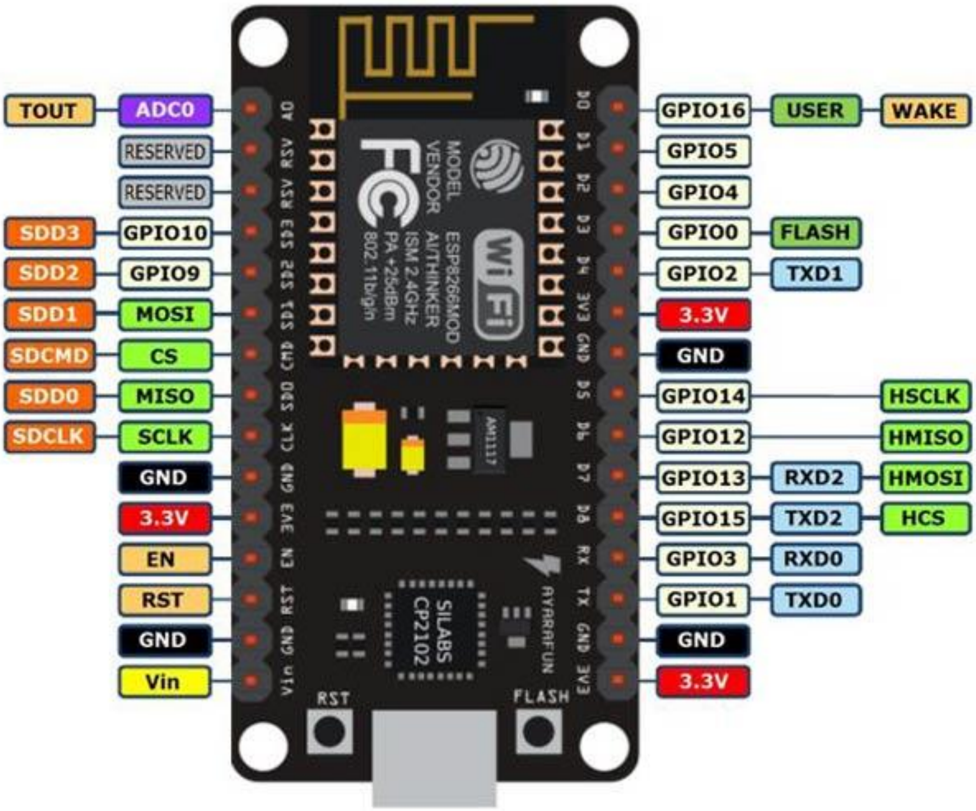
7 APPENDICES

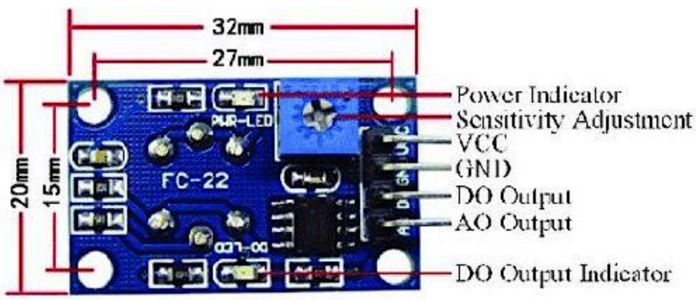
APPENDIX A- DATA SHEET

1. Node MCU ESP32 WIFI module



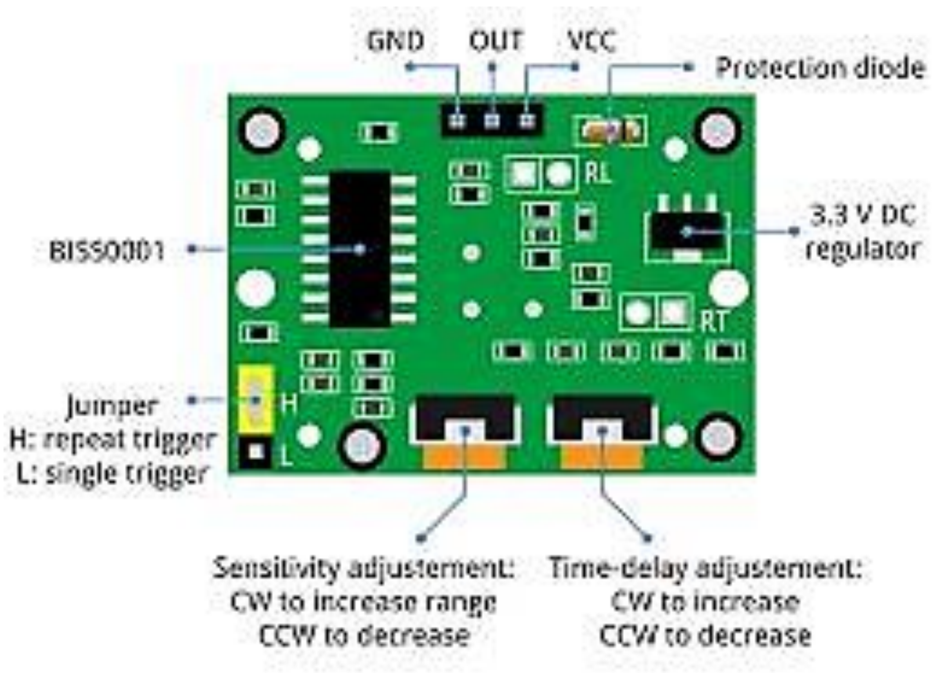
Node MCU ESP8232 Pin Datasheet

2. MQ-135 Gas Sensor



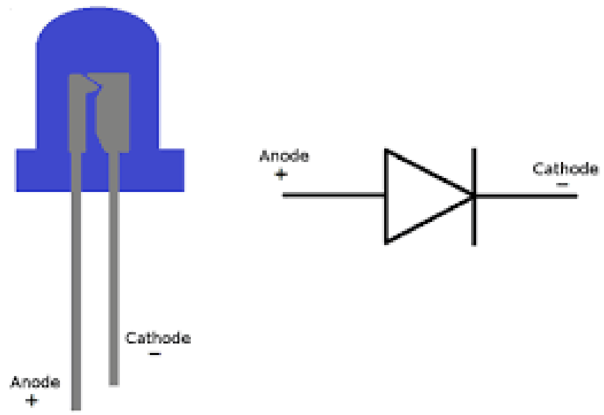
MQ-135 Gas Sensor Datasheet

3. HC-SR501 PIR Motion Sensor

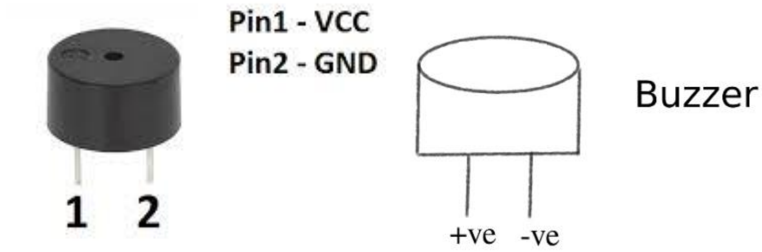


HC-SR501 Sensor Datasheet

4. LED



5. Buzzer



APPENDIX B- PROGRAMMING

```
#define BLYNK_PRINT Serial

#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>

#include <SPI.h>

#include <Wire.h>

#include "MQ135.h"

#include <Adafruit_Sensor.h>

#include <DHT.h>

#include <Adafruit_GFX.h>

#include <Adafruit_SSD1306.h>


char auth[] = "**************************";    // You should
get Auth Token in the Blynk App.

char ssid[] =
"**************************";                          //
Your WiFi credentials.

char pass[] = "**************************";


#define SCREEN_WIDTH 128    // OLED display width, in pixels

#define SCREEN_HEIGHT 64    // OLED display height, in pixels

#define OLED_RESET -1       // Reset pin # (or -1 if sharing
Arduino reset pin)
```

```
#define DHTTYPE DHT11     // DHT 11
#define DHTPIN D4

#define relay_fan D5
#define relay_light D6
#define relay_fridge D7
#define relay_oven D8

#define buzzer_alarm D0
#define pir_human D3


int alarm_status;
int pir_status = 0;

DHT dht(DHTPIN, DHTTYPE);
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire,
OLED_RESET);


void setup()
{
  Serial.begin(115200);
```

```
  dht.begin();
  display.begin(SSD1306_SWITCHCAPVCC, 0x3C); //initialize with the I2C addr 0x3C (128x64)
  Blynk.begin(auth, ssid, pass);

  pinMode(pir_human, INPUT);
  pinMode(buzzer_alarm, OUTPUT);

  pinMode(relay_fan, OUTPUT);
  pinMode(relay_light, OUTPUT);
  pinMode(relay_fridge, OUTPUT);
  pinMode(relay_oven, OUTPUT);

  digitalWrite(buzzer_alarm, LOW);

  digitalWrite(relay_fan, HIGH);
  digitalWrite(relay_light, HIGH);
  digitalWrite(relay_fridge, HIGH);
  digitalWrite(relay_oven, HIGH);
  delay(100);
}


void loop()
```

```
{
  Blynk.run();
  MQ135 gasSensor = MQ135(A0);
  float air_quality = gasSensor.getPPM();

  float t = dht.readTemperature();
  float h = dht.readHumidity();

  pir_status = digitalRead(pir_human);
  alarm_status = digitalRead(buzzer_alarm);



  if (pir_status == 1)
  {
    Serial.println("Person Detected");
  }
  else if (pir_status == 0)
  {
    Serial.println("No One in Room");
  }



  if (air_quality > 150)
  {
```

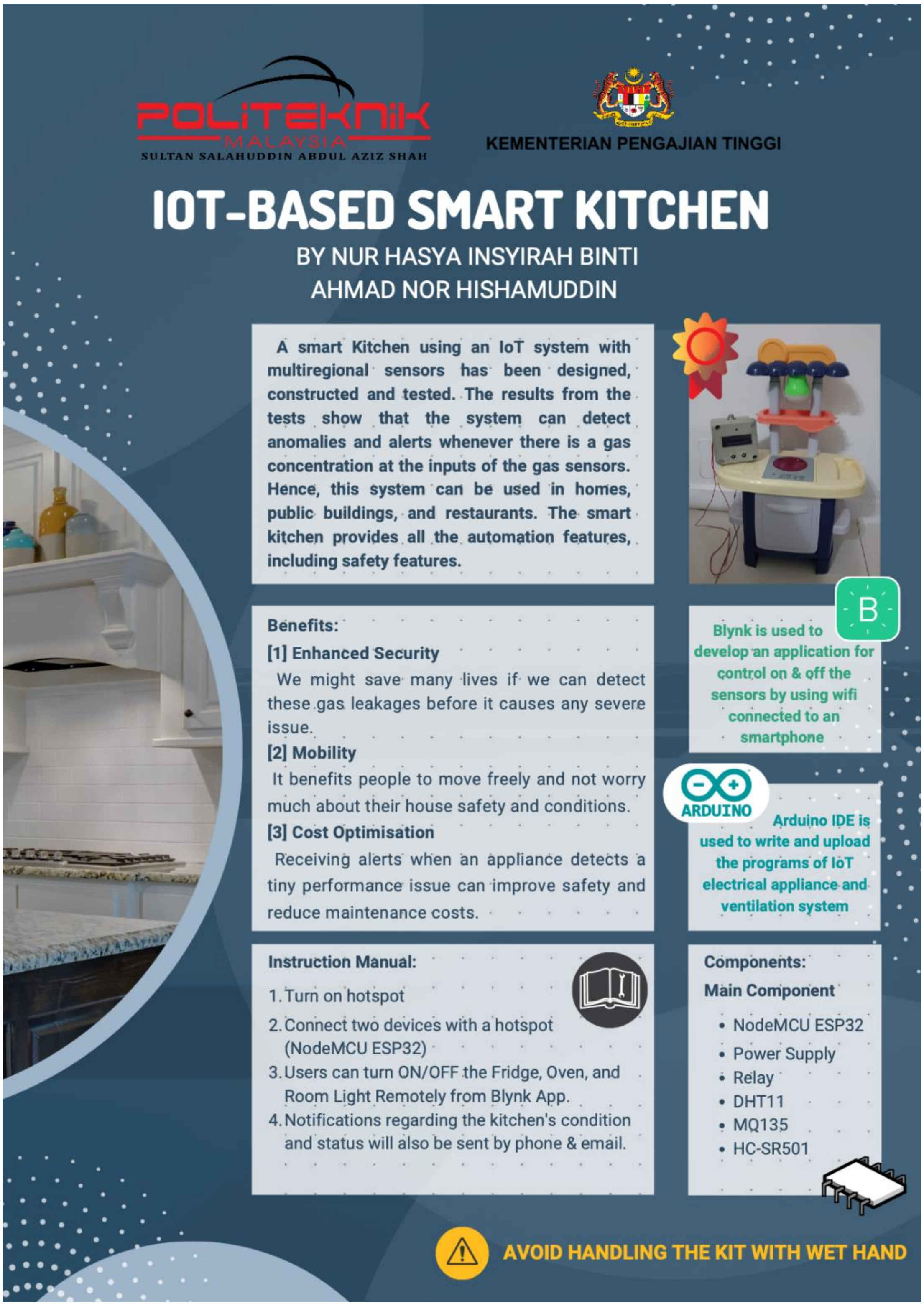
```
  digitalWrite(buzzer_alarm, HIGH);
  digitalWrite(relay_fan, LOW);
  Serial.println("Buzzer Status: ON");
  Serial.println("Exhaust Fan: ON");
}
else
{
  digitalWrite(buzzer_alarm, LOW);
  digitalWrite(relay_fan, HIGH);
  Serial.println("Buzzer Status: OFF");
  Serial.println("Exhaust Fan: OFF");
}

Serial.print("Air Quality: ");
Serial.print(air_quality);
Serial.println(" PPM");

Serial.print("Temperature: ");
Serial.print(t);
Serial.println(" *C");

Serial.print("Humidity: ");
Serial.print(h);
Serial.println(" %");
```

```
  Serial.println();
  Serial.println("***************************");
  Serial.println();

  Blynk.virtualWrite(V1, t);            // For Temperature
  Blynk.virtualWrite(V2, h);            // For Humidity
  Blynk.virtualWrite(V3, air_quality);   // For Gas
  Blynk.virtualWrite(V4, alarm_status);  // For Alarm &
Exhaust Fan
  Blynk.virtualWrite(V5, pir_status);    // For Human
Detection

  display.clearDisplay();
  display.setCursor(0, 0); //oled display
  display.setTextSize(1);
  display.setTextColor(WHITE);
  display.println("Air Quality Index");

  display.setCursor(0, 20); //oled display
  display.setTextSize(2);
  display.setTextColor(WHITE);
  display.print(air_quality);
  display.setTextSize(1);
  display.setTextColor(WHITE);
```

```
display.println(" PPM");
display.display();
delay(1500);

display.clearDisplay();

// display temperature
display.setTextSize(1);
display.setCursor(0, 0);
display.print("Temperature: ");
display.setTextSize(2);
display.setCursor(0, 10);
display.print(t);
display.print(" ");
display.setTextSize(1);
display.cp437(true);
display.write(167);
display.setTextSize(2);
display.print("C");

// display humidity
display.setTextSize(1);
display.setCursor(0, 35);
display.print("Humidity: ");
```

```
  display.setTextSize(2);
  display.setCursor(0, 45);
  display.print(h);
  display.print(" %");

  display.display();
  delay(1500);

}
```

APPENDIX C- PROJECT MANUAL/PRODUCT CATALOGUE



APPENDIX D PROJECT POSTER FOR EEEiC

POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

KEMENTERIAN PENGAJIAN TINGGI

IoT-BASED SMART KITCHEN

STUDENT'S NAME: NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN
MATRIX NUMBER: 08DEP20F2002
SUPERVISOR: MADAM ZABIDAH BINTI HARON

Introduction

People gradually need a kitchen environment closely connected with modern technology. With this demand, new concepts such as kitchen environment monitoring and smart kitchen control have come into our Life.

Therefore, this project proposes a modern intelligent kitchen system based on Internet of Things Technology. The smart kitchen system and current industrial monitoring are based on digitalised information and network, combined with smartphones and various sensors to realise intelligent management of industrial and kitchens.

Objective

The objectives of this project are as follows:

- IoT-based kitchen safety.
- Interfacing of sensors and Blynk App.
- Display of readings from sensors.
- Alarm system for detection of any anomaly.

Impacts of innovation

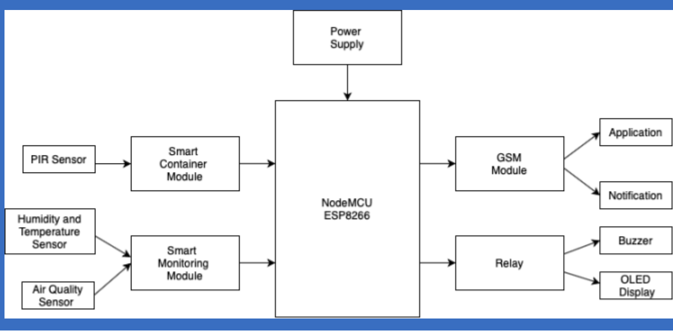
- Enhanced Security

We might save many lives if we can detect these gas leakages before it causes any severe issue.

- Mobility

It benefits people to move freely and not worry much about their house safety and conditions.

Block Diagram and product outcome

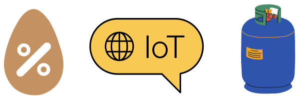


APPENDIX E PROJECT BROCHURE

IOT-BASED SMART KITCHEN

NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN
08DEP20F2002
DEP5A

PRODUCT:



Scope of Research

- Kitchen Air Quality Index
- Hazard in Kitchen
- Liquified Petroleum Gas (LPG)

Air Quality Index

The air quality index (AQI) is a number used to report the quality of the air on any given day

Hazard in Kitchen

Accidents in the kitchen, such as gas explosions, fire, and burn injuries from hot oil or boiling water, are pretty standard these days.

Liquified Petroleum Gas (LPG)

Fuel that contains Butane and Propane, providing energy that can be found in our everyday life as it is used in many household appliances for cooking, heating, and hot water

Objective:

- Design a complete kitchen automation system.
- Monitor parameters such as LPG gas, smoke, fire, and temperature.
- Collect the data through a microcontroller and send it to IoT.
- Design an alarming system if conditions become worst.

Project Description

People gradually need a kitchen environment closely connected with modern technology. With this demand, new concepts such as kitchen environment monitoring and intelligent kitchen control have come into our lives.

Therefore, this project proposes a modern smart kitchen system based on Internet of Things Technology. The smart kitchen system and current industrial monitoring are based on digitalised information and network, combined with smartphones and various sensors to realise intelligent management of industrial and kitchens.

HOW TO USE ?

- DHT11 Sensor will Monitor the Kitchen Temperature & Humidity on Blynk App.
- MQ-135 Gas Sensor will then Monitor the Air Quality Index on Blynk App.
- OLED Display will display the Kitchen Temperature, Humidity & Gas Level.
- The exhaust fan turns ON & the Alarm activates; once the Gas level exceeds.
- PIR motion sensors will detect the presence or absence of a person in the kitchen.
- Alarm Status will be sent, Exhaust Fan Status & Person in **Room Status** to Blynk App.
- Users can turn ON/OFF the Fridge, Oven, and Room Light Remotely from Blynk App.
- Notifications will also be sent to phone & email.

Components

Light Bulb

Buzzer

NodeMCU ESP32

Motion Sensor (HC-SR501)

Air Quality Index (Gas) Sensor (MQ135)

Temperature and Humidity Sensor (DHT11)

APPENDIX F ICOESS PARTICIPATION

KORINT YAYINCILIK IJETS@R IJOEEC

7th INTERNATIONAL CONGRESS OF EURASIAN SOCIAL SCIENCES

ICOESS - 2023

27-30 April 2023 Bodrum / MUGLA / TURKEY

www.icoess.com

LETTER of ACCEPTANCE

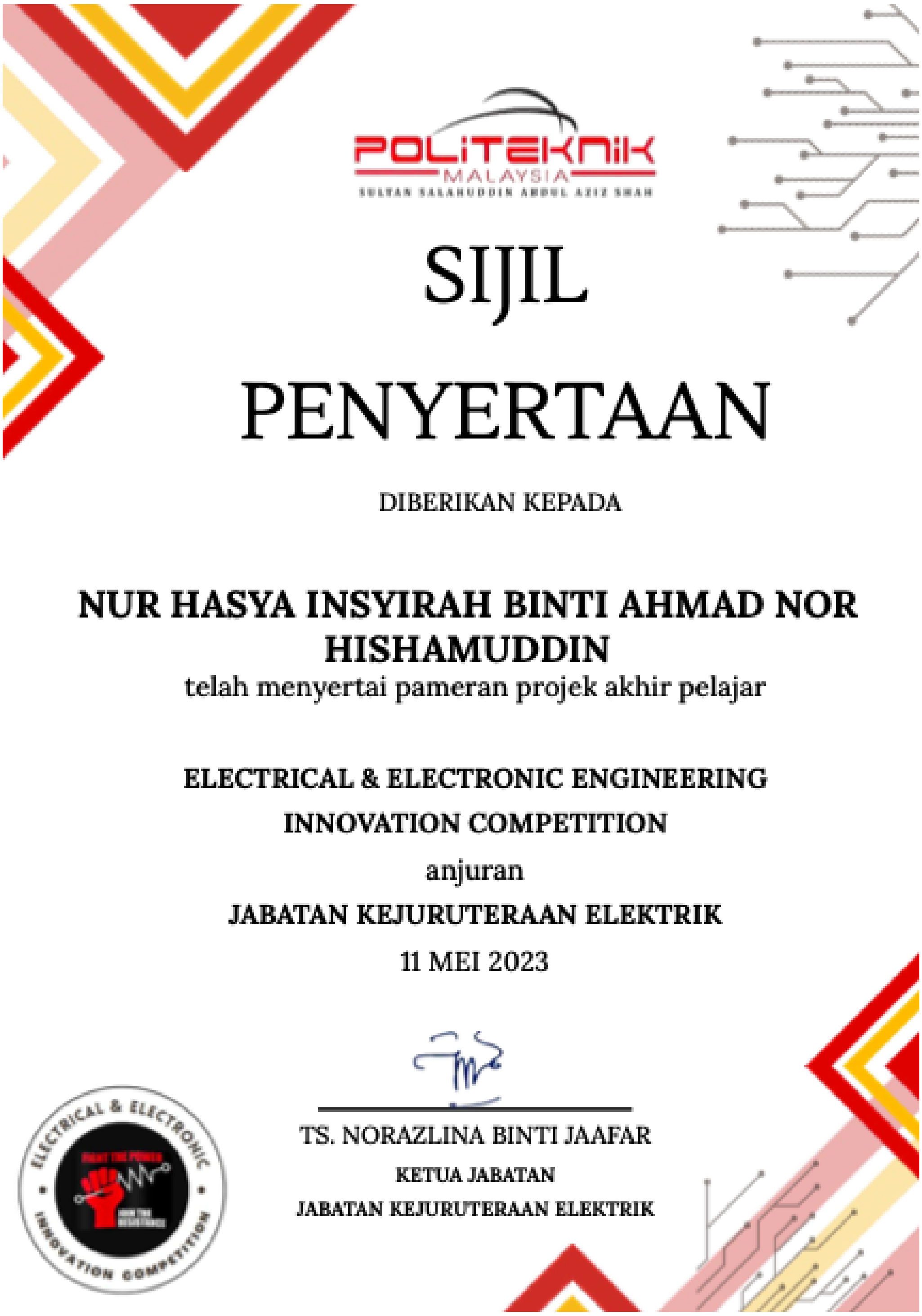
Dear Nur Hasya Insyirah Binti Ahmad Nor Hishamuddin,

"IoT-BASED SMART KITCHEN" was examined by the referee committee and accepted to be presented as an ORAL PRESENTATION at our congress.

We are pleased to invite you to the 7th International Congress of Eurasian Social Sciences, which will be held on 27-30 April 2023.

Prof. Dr. Kubilay YAZICI
Niğde Ömer Halisdemir University
Head of Organizing Committee

APPENDIX G EEEiC PARTICIPATION CERTIFICATE



POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SIJIL

PENYERTAAN

DIBERIKAN KEPADA

NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN

telah menyertai pameran projek akhir pelajar

ELECTRICAL & ELECTRONIC ENGINEERING INNOVATION COMPETITION

anjuran

JABATAN KEJURUTERAAN ELEKTRIK

11 MEI 2023

ELECTRICAL & ELECTRONIC INNOVATION COMPETITION

TS. NORAZLINA BINTI JAAFAR

KETUA JABATAN

JABATAN KEJURUTERAAN ELEKTRIK

APPENDIX H PROJECT POSTER FOR PiTEC

APPENDIX I PROJECT BROCHURE FOR PiTEC

APPENDIX J PROJECT TEST RUN VIDEO QR CODE

APPENDIX K PiTEC CERTIFICATIONS


SIJIL PENGHARGAAN

Setinggi - tinggi penghargaan kepada

NUR HASYA INSYIRAH BINTI AHMAD NOR HISHAMUDDIN
AINA RAIHANA BINTI MOHD TAHZIM

Penyelia

ZABIDAH BINTI HARON

telah berjaya dianugerahkan

PERAK

bagi projek inovasi

IOT-BASED SMART KITCHEN

dalam

PITEC 4

PERTANDINGAN AKHIR PROJEK PELAJAR DAN PAMERAN INOVASI
SESI II 2022 / 2023
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

PENGARAH
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

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