

SMART KITCHEN USING IoT

BY

Md. Jasim Uddin

ID: 173-35-272

This Report Presented in partial Fulfillment of the Requirements for the Degree of
Bachelor of Software Engineering.

Supervised By

Ms. Syeda Sumbul Hossain

Former Lecturer

Department of SWE

Email: syeda.swe@diu.edu.bd

Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

OCTOBER 2022

APPROVAL

This project titled “**SMART KITCHEN USING IoT**” submitted by **Md. Jasim Uddin, ID No: 173-35-272** to the Department of Software Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the Degree of Bachelor of Software Engineering and Approved as to its style and contents. The presentation will be performed in October, **2022**.

BOARD OF EXAMINERS



Dr. Imran Mahmud

Head and Associate Professor

Department of Software Engineering

Faculty of Science & Information Technology

Daffodil International University.

Chairman



Kaushik Sarker

Associate Professor

Department of Software Engineering

Faculty of Science & Information Technology

Daffodil International University.

Internal Examiner1



Dr. Md. Fazla Elahe

Assistant Professor

Department of Software Engineering

Daffodil International University.

Internal Examiner2



Mohammad Abu Yousuf, PhD

Institute of Information Technology


Jahangirnagar University

External Examiner

DECLARATION

I hereby announce that I have undertaken this project under the supervision of **Ms. Syeda Sumbul Hossain, Former Lecturer, and Daffodil International University Department of the SWE**. I declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised By:



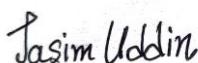
31.10.2022

Ms. Syeda Sumbul Hossain

Lecturer

Department of Software Engineering
Daffodil International University.

Submitted By:



Md. Jasim Uddin

ID: 173-35-272

Department of Software Engineering
Daffodil International University.

ACKNOWLEDGEMENT

First, I express our heartiest thanks to the Almighty Allah for His divine blessing, allowing me to successfully complete the final year project.

I am really grateful and wish my profound indebtedness to **Syeda Sumbul Hossain, Former Lecturer, and Department of Software Engineering Daffodil International University.** Deep Awareness and strong interest in the execution of this project completed by me in the field of “IoT, Embedded System and Android”.

It was possible to Complete this project with relentless my persistence, intellectual encouragement, consistent assistance, persistent and vigorous observation, constructive critique, helpful suggestions, reading many inferior drafts and correcting them at all times.

I would like to express my sincere appreciation to **Dr. Imran Mahmud, Associate Professor and Associate Director, SWE Department,** for his kind assistance in completing my mission as well as to other members of the faculty and staff of **Daffodil International University’s SWE Department.**

I would like to thank both of Daffodil International University’s course mates and older brothers who took part in this conversation when doing the course work.

Finally, my parent’s continuous encouragement and patience must be remembered with proper regard.

ABSTRACT

The use of technology is increasing day by day. IoT is now being used in almost all sectors starting from industries. The Internet of Things (IoT) basically describes a physical object that is connected to sensors, software, processing capabilities and other technologies that connect and exchange data with other devices and systems via the internet or other communication networks.

I have designed an IoT based device that can be controlled using an Android mobile application. I have created a remote button in the Android app through which I can control the power of the device. The device can be redesigned and the tools can be exchanged to deliver multiple applications according to the NodeMCU(ESP8266) chip I use. I have used Android, C++, and Arduino programming language to develop each application and hardware component and electronic chip. The test analysis section below discusses whether the proposed system meets its goals. The potential extensions of the system as well as the performance of the end of the paper are also evaluated.

Keywords: Smart Kitchen, Gas Detection, Fire Detection, IoT, Microcontroller, ESP8266, NodeMCU, Blynk app.

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Chapter 1

Introduction

1.1 Introduction

As technology evolves, we need to move forward with new technologies as soon as possible to keep up with other communities. As citizens of the digital world, we must improve our technology, race and education. Currently, IoT is being used for most of the work in almost all the developed countries of the world. In order to develop the technology, I have decided to create a smart device through Android applications and IoT. The Android application will help to control the device. With the internet, anyone can operate the device in a very easy way through the Android application. This device will help human beings in their daily life in various ways and will make human life easier.

1.2 Motivation

Gas leaks and fire accidents are constantly happening somewhere in the world. As a result, countless people are being seriously injured and even many people are losing their lives in this accident. This device will protect people from these accidents. This device will detect gas and fire and signal people and disconnect all types of gas and electricity to prevent any accidents.

1.3 Objective

The main purpose of my device is to detect gas and fire and signal people and disconnect all types of gas and electricity to prevent any accidents so that people are protected from fatal accidents like gas leaks and fire connections.

1.4 Expected Outcome

The smart kitchen device works in collaboration with the internet via Android application. This device will detect a gas leak and automatically turn on the room's ventilator fan to expel the leaking gas and turn off the main gas connection in the area, as well as send a danger signal to the user. If for any reason a fire connection occurs, it will detect the fire and try to extinguish the fire by automatically turning on the water pump and preventing the accident by turning off the main electrical connection of the place as well as sending a danger signal to the user. Users will also be able to monitor their kitchen situation from anywhere in the world.

1.5 Social Impact

This smart kitchen device will serve the society. We know that gas leakage and fire accidents are now a major problem in our society. For this reason, the people of our society are leading a hazardous life. People will get rid of this problem by using this device. I am going to make my project reality by considering these issues. It will help to overcome disability which is a terrible problem in society.

1.6 Report Layout

Pictorial presentation of the project in a simple way with a figure that describes the whole project, contents and more. The project report contains 5 chapters. The outline of all the chapters including the summary is discussed below by presenting the flow diagram.

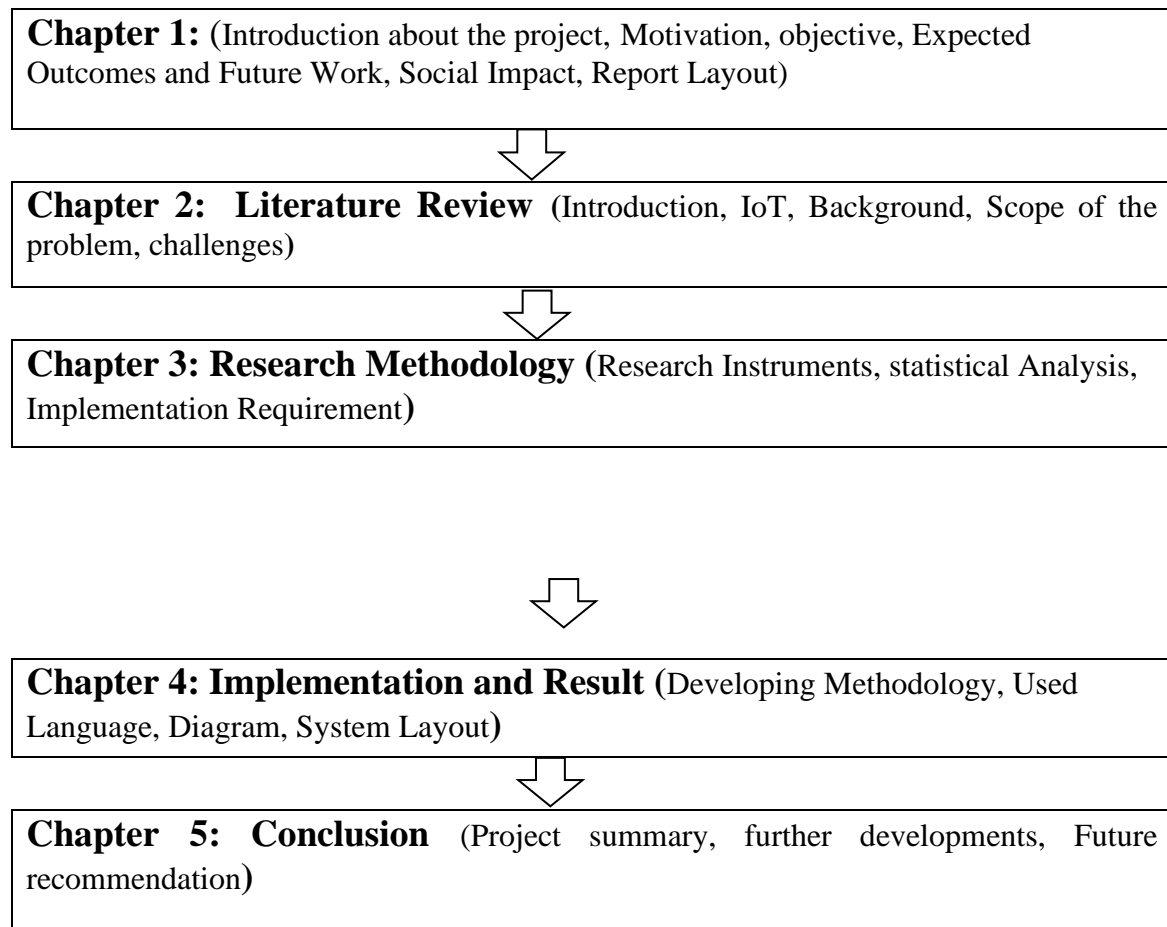


Figure 1.6: Outline of the project

Chapter 2

Literature Review

2.1 Definition of IoT

The Internet of Things (IoT) basically describes a physical object that is connected to sensors, software, processing capabilities and other technologies that connect and exchange data with other devices and systems via the internet or other communication networks.

2.2 Background

IoT is currently an increasing branch. For this reason, many universities around the world, including Bangladesh, have started research on IoT. In addition to electrical engineering, mechanical engineering and computer science, they are providing classes and programs in IoT and robotics science and for students. So that the students can survive in the war of science with the development of technology by doing research on IoT and robotics including making robots and IoT devices. In a few days, IoT will be widely used around the world and will take over a large part of the technology. This branch will be the only tool to survive in the war of technology. So it is time to study, research and acquire detailed knowledge about IoT.

2.3 Scope of the problem

Day by day people have become dependent on technology for their daily work. There are some tasks that people find very annoying to do over and over again and very difficult for people. There are some things that people need a lot in their daily life but they feel bored to do it and ask other people for help but there is not always a working person at hand for this job. IoT and Robotics will play a very important role in helping to overcome all these problems.

2.4 Challenges

I had a lot of big problems early on when I started working to make this device. Surveys on how this device will be controlled, ranging from choosing the type of day-to-day work of age-appropriate people. Sensor selection based on different functions and research on sensor performance. Increasing the time of stored power for the device management was also the hardest task. Choosing the descent stage, relying on apparatus projection is a significant issue. It was very difficult for human beings to do some of their daily tasks with this kind of device. Above all, maintaining the balance of the device by connecting all the sensors to operate the device was a big problem.

CHAPTER 3

REQUIREMENTS SPECIFICATION AND METHODOLOGY

3.1 Introduction

Through this project I have tried to make the life of society people easy and normal. For this purpose, we have created this device. I have assembled some sensors based on different functions. I have tried to manage this device by programming with a microcontroller. A project report or thesis paper, the analysis zone empowers the scrutiny to survey the overall credibility and trustworthiness of an investigation in a general context. Here the part of the methodology:

1. The data collected or generated Procedure
2. Analyzation.

3.2 Requirements Specification

The following components I have been used to implement my project.

There are:

- 1) ESP8266 NodeMCU (Microcontroller).
- 2) MQ-2 (Gas Sensor)
- 3) Flame Sensor
- 4) DHT11 (Temperature and Humidity Sensor)
- 5) Relay Module
- 6) Buzzer
- 7) Water Pump
- 8) Solenoid Valve

- 9) Power Adapter
- 10) Battery
- 11) Exhausting Fan
- 12) Jumper Wire
- 13) Breadboard

3.2.1 ESP8266 NodeMCU

There are many kinds of Microcontroller Board. ESP8266 NodeMCU is one of them. It is a common microcontroller based open-source computing platform. Here the microcontroller is mounted on a board and its various pins are pulled out with the help of a header to easily attach to any external equipment or parts. ESP8266 NodeMCU can be used with many types of switches and sensors. It can be used for a wide variety of tasks, including lighting and motor control. Creating a unique project with this can be done in the same way, or it can be done by communicating with a program on the computer. In this board there is Wi-Fi chip which is used for connecting to internet.



Figure 3.2.1: ESP8266 NodeMCU

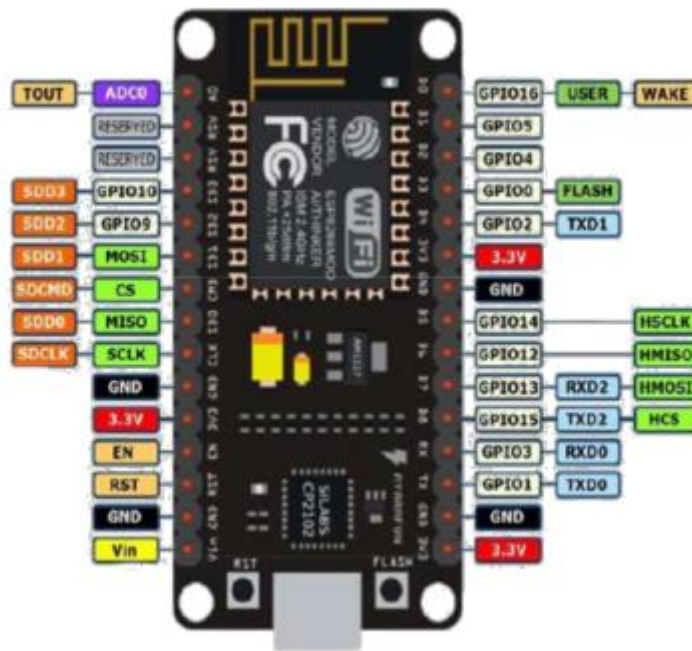


Figure 3.2.1.1 : ESP8266 NodeMCU Pinout Configuration

3.2.2 MQ-2 GAS SENSOR

According to the purpose there are many kinds of sensors. MQ-2 Gas Sensor is one of them. This sensor is used for detecting various kinds of gas from the environment. Not only gas but also smoke from the environment. There are various kinds of gas sensors according to the sensing unit. Like as MQ-2, MQ-3, MQ-4, MQ-5, MQ-6, MQ-7, MQ-8, MQ-9, MQ-131, MQ-135 and so on.

Different types of gas sensors sense different types of gas from the environment. In our device I used the MQ-2 Gas Sensor. It detects Methane, Butane, LPG and Smoke from the environment.



Figure 3.2.2 : MQ-2 Gas Sensor



Figure 3.2.2.1 : MQ-2 Identity

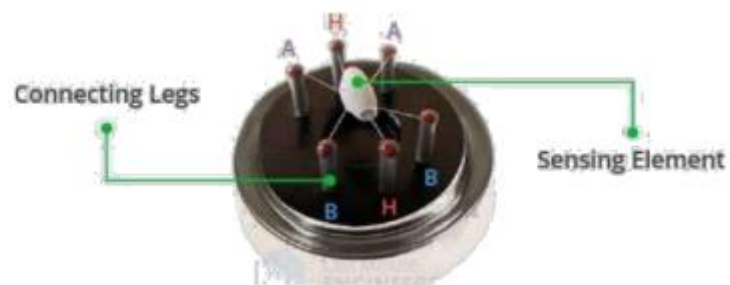


Figure 3.2.2.2 : Internal Structure of MQ-2

3.2.3 FLAME SENSOR

A flame sensor is a sensor which is mainly designed for detecting fire from the sensor. It is able to sense the responding and detecting the occurrence of a fire or flame easily. According to its principle it is known as a flame sensor.

This sensor is classified into four different types. They are:

1. IR Single Frequency
2. IR Multi-Spectrum
3. UV Flame Detectors
4. UV/IR Flame Detectors

I used the IR Single Frequency Flame Sensor in our device. It has a black color Infrared Ray (IR) LED which is used for sensing and detecting the flame or fire from the environment.



Figure 3.2.3 : Flame Sensor



Figure 3.2.3.1 : Flame Sensor Pinout

3.2.4 DHT11 TEMPERATURE AND HUMIDITY SENSOR

This is a digital sensor. The model of this sensor is designed to work with the weather. This sensor can easily measure the amount of water vapor in the air i.e. humidity and temperature of the air. There are two parts of this sensor. Two parts are:

1. Capacitive Humidity Sensor
2. Thermistor

This sensor is divided into several models based on the work. They are :

1. DHT-11
2. DHT-22
3. AM2302 and so on.

I used DHT-11 in my device for measure the temperature and humidity from the environment.

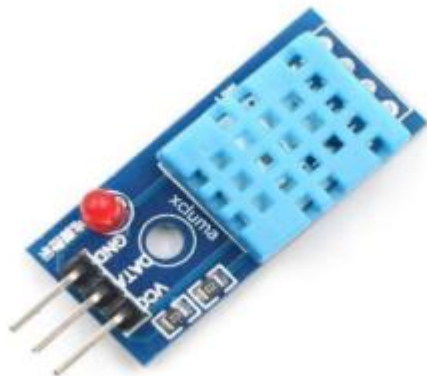


Figure 3.2.4 : DHT-11Sensor



Figure 3.2.4.1 : Internal of DHT-11

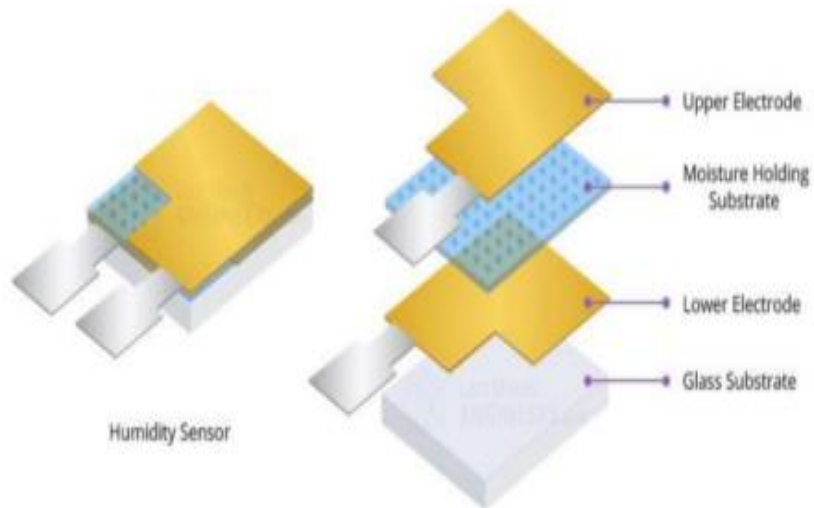


Figure 3.2.4.2: Internal Layer of DHT-11

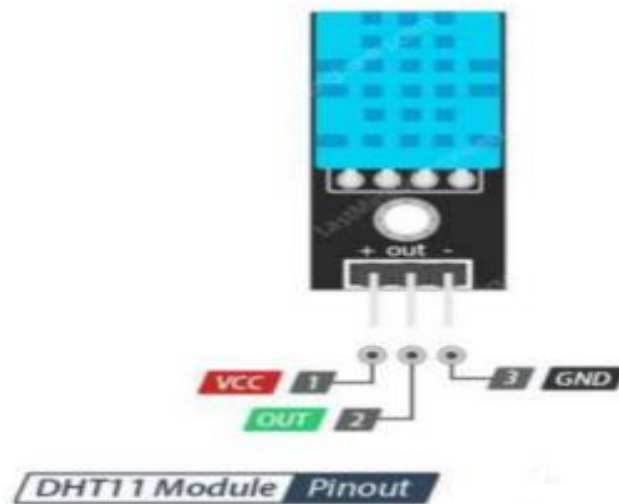


Figure 3.2.4.3: DHT-11 Sensor Pinout

3.2.5 RELAY MODULE

The relay is a kind of switch. Used to work with high voltage in microcontrollers. Inside is an electromagnetic charged coil. When 5 volts are sent to this coil, it turns into a temporary magnet and pulls the small iron handle inside the switch towards itself. This causes the switch circuit to open or close.

Open circuit means switch off and closed circuit means switch on.

There are about 16 types of relays available in the market. Relays vary in volt and shape.



Figure 3.2.5 : Single channel Relay



Figure 3.2.5.1: 4- channel Relay

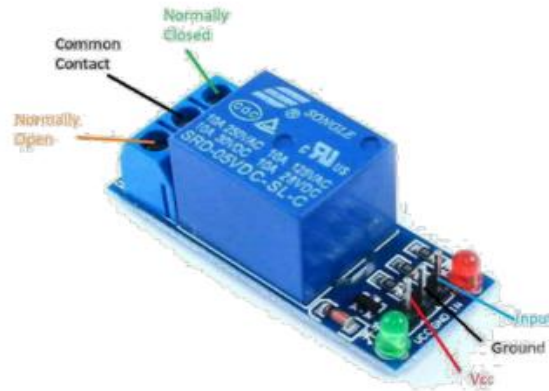


Figure
Relay Pinout

3.2.5.2:

3.2.6 Exhausting Fan

Exhausting fans are a cost-effective way to lower the temperature in our home with zero effort and a smaller investment than an AC unit. Basically, they make high temperatures much more bearable. I've rounded up a number of affordable, high-quality fans on the market to keep my room cool. I have used the Exhausting Fan in my device for passing the leakage gas from the room.



Figure 3.2.6: Exhausting Fan

3.2.7 WATER PUMP

In my device I used a 5V DC mini Water Pump to supply water. It is a low cost pump for designing any kind of embedded or electronics device.



Figure 3.2.7: Water Pump

3.2.8 Buzzer

A buzzer is a gadget that creates a noise that buzzes or beeps. There are many kinds; a piezoelectric buzzer is the most simple, which is just a flat piece of two-electrode piezoelectric material. This type of buzzer needs some kind of oscillator (or something more sophisticated like a microcontroller) to operate it. You can only get a click if you add a DC voltage.

These are found in areas where you need something that emits an audible click, but, like microwave ovens, smoke detectors, and computer gadgets, these don't worry about high-fidelity sound reproduction. Without utilizing too much fuel, they are inexpensive and can be very noisy. They are often very small, so they can be used in flat things such as greeting cards for "singing".



Figure 3.2.8: Buzzer

3.2.9 Solenoid Valve

An electromechanically operated valve is known as a solenoid valve. There are many kinds of characteristics of a solenoid valve: they use the electricity of the current, generate the energy of the magnetic field, mechanism for controlling fluids and the controlled fluid characteristics by them.

The solenoid valve is one of the most controlled components of liquids which is widely used in the world. Mix or distribute liquids, dose, stop, drop and so on. We used the Solenoid valve in my device to stop the gas supply from the main line.



Figure 3.2.9: Solenoid Valve

3.2.10 DC POWER ADAPTER

DC Power Adapter is a one kind of electronic component which is designed for converting the AC power to DC power. By using a voltage regulator, it distributes the required voltage to the other electronics components. It is very easy to use for any kind of purpose. There are various kinds of power adapters according to voltage operating capacity. There are also amp issues in the power adapter. Such as: 5V-1A, 5V-2A, 9V-1A, 9V-2A, 12V-1A, 12V-2A and others.

I used a 5V-2A power adapter to convert the AC voltage to DC voltage to supply the power in my device.



Figure 3.2.10: DC Power Adapter

3.2.11 Battery

The container through which the electrolyte is packaged and placed between the two electrodes is called the battery. Some batteries can be recharged when they run out of charge. These are called rechargeable batteries. I have used rechargeable batteries in this project.



Figure 3.2.11: Battery

CHAPTER 4

SYSTEM DESIGN

4.1 INTRODUCTION

I designed my project by adding various kinds of sensor, electronics components to the microcontroller. Several connections have been needed for the design of the system. After completing all the connections, I uploaded a program to run the device as a complete system.

4.2 BLOCK DIAGRAM

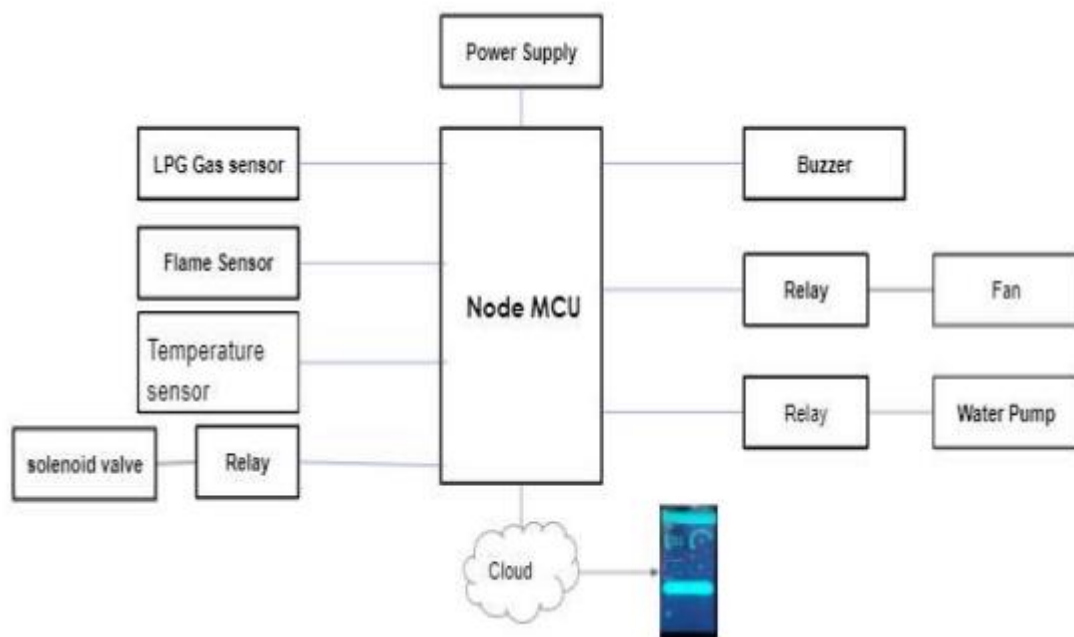


Figure 4.2: Block Diagram

4.3 FLOW CHART DIAGRAM

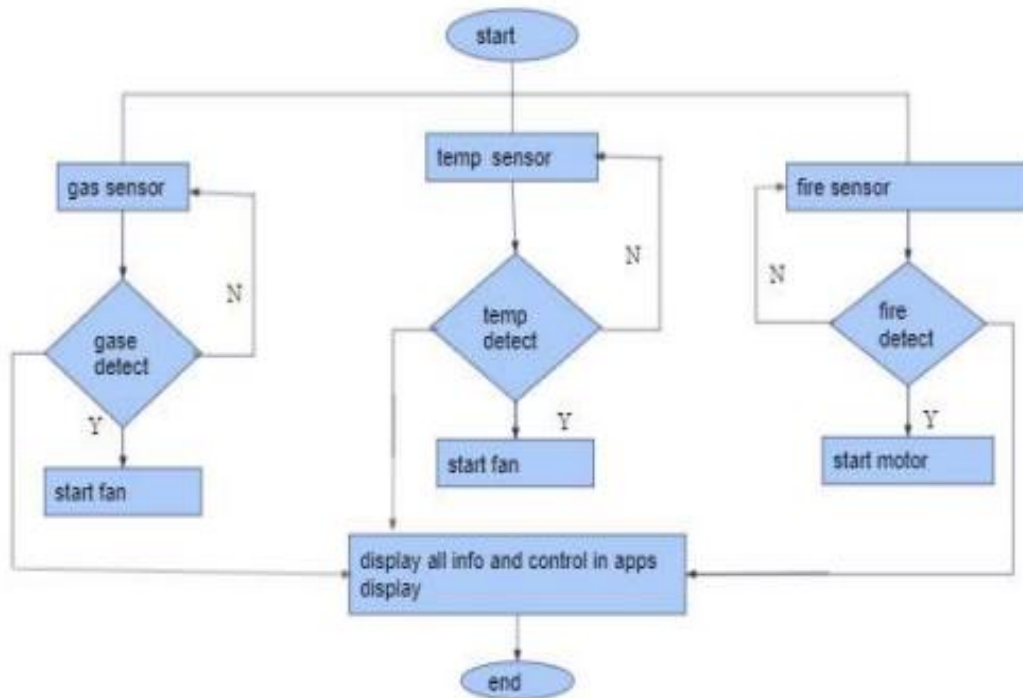


Figure 4.3.: FLOW CHART DIAGRAM

4.4 CIRCUIT DIAGRAM

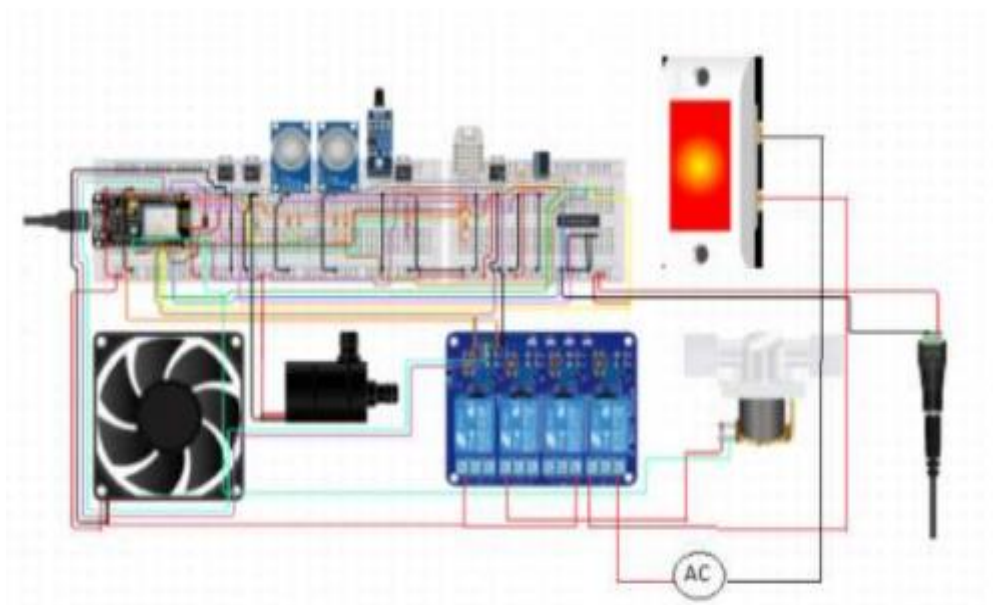


Figure 4.4: CIRCUIT DIAGRAM

4.5 OVERALL PROPOSED SYSTEM

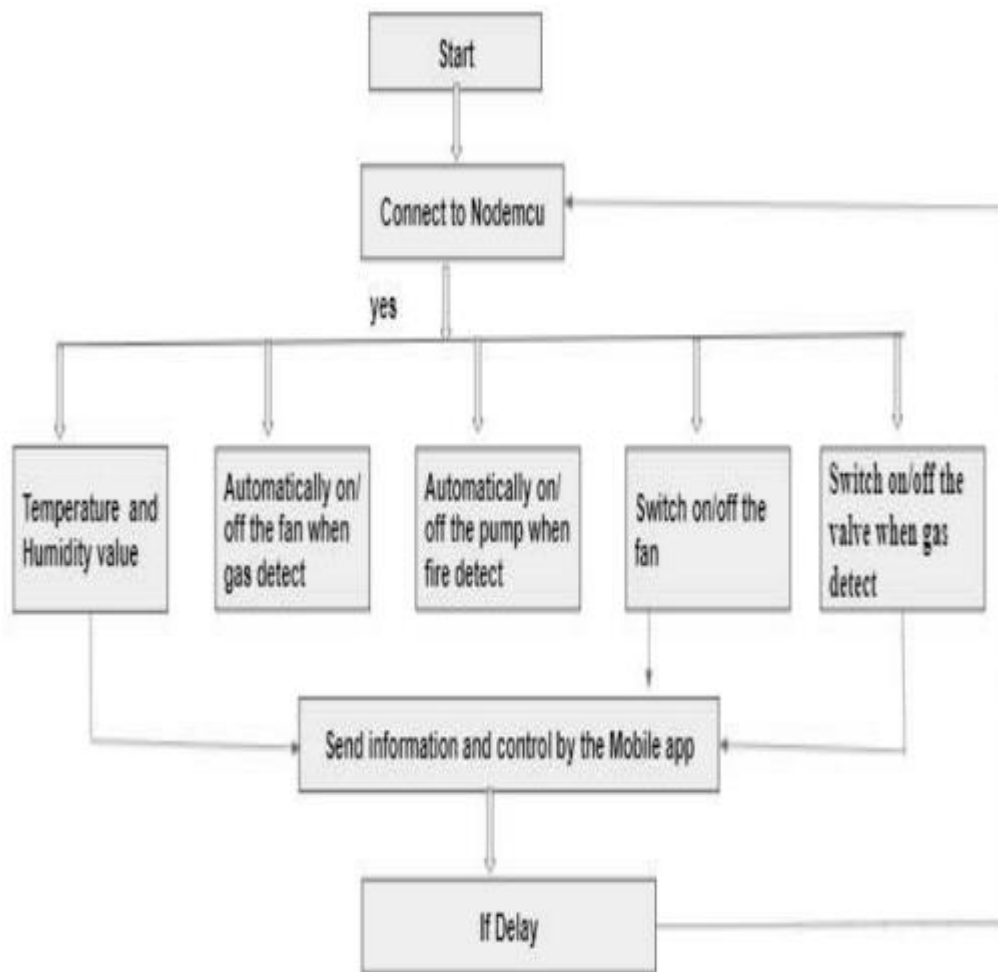


Figure 4.5: OVERALL PROPOSED SYSTEM

Chapter 5

SOFTWARE ANALYSIS

5.1 INTRODUCTION

Embedded device is a combination of software and hardware. Our project is a one kinds of embedded system. I designed our device with the combination of software and hardware part. Without software a design of hardware device is nothing. So, to fulfill my project after design the hardware part I integrated the software part for programming in my device. I used two different software in my project. One is “Arduino IDE” which is an open-source platform for Arduino programming and another is an Android application named “Blynk”.



Figure 5.1: Arduino IDE



Figure 5.1.1: Blynk

5.2 ARDUINO INSTALLATION AND SETUP

For download the Arduino IDE at first we will go to the Arduino official website

<https://www.arduino.cc/>

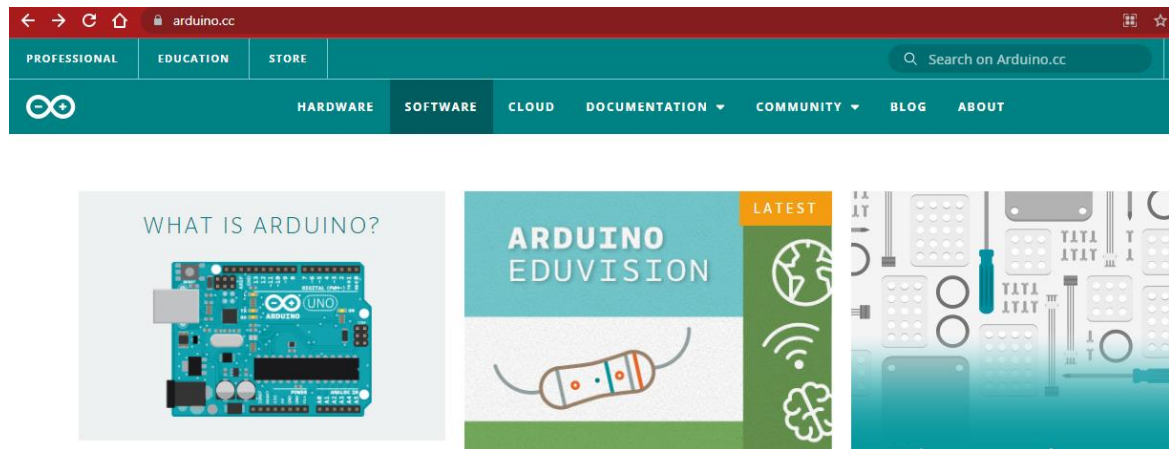


Figure 5.2: Arduino official website

Then Click to Software

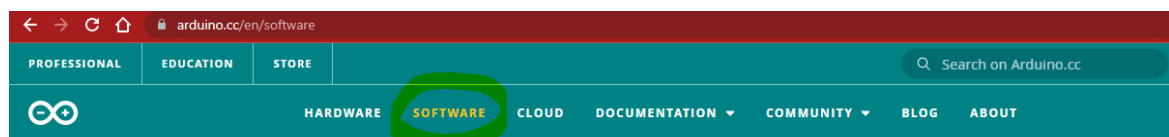


Figure 5.2.1: Arduino Download Section

Finally Download from here and install. It is fully unpaid software.

Downloads

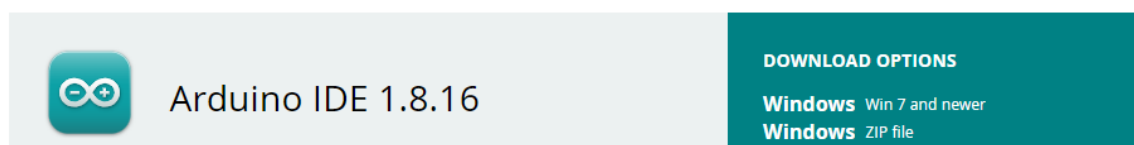


Figure 5.2.2: Arduino Download Path

5.3 PROGRAMMING

After completing the setup process, it will be able to program. So, open the Arduino IDE and start the programming.



Figure 5.3: Programming section of Arduino IDE

After writing the program I will upload the program to the microcontroller of my hardware device. The process to upload the program is divided into four phases.



Figure 5.3.1: Flow chart of uploading code

At first write the code then compile or verify and finally upload the code. Before uploading the code, I should must select the board and port for the microcontroller.



Figure 5.3.2: Arduino IDE's Features

For selecting the Board go to **Tools>Board** and select your microcontroller board.

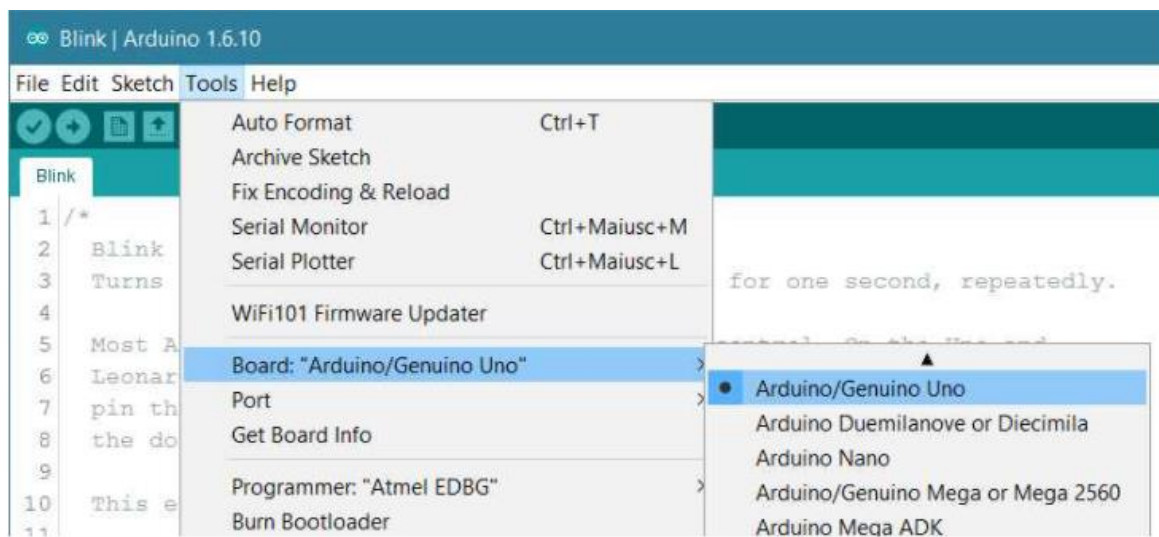


Figure 5.3.3: Board Selection Process

Now select the Port. For selecting the port go to **Tools> Port** and select your port number.

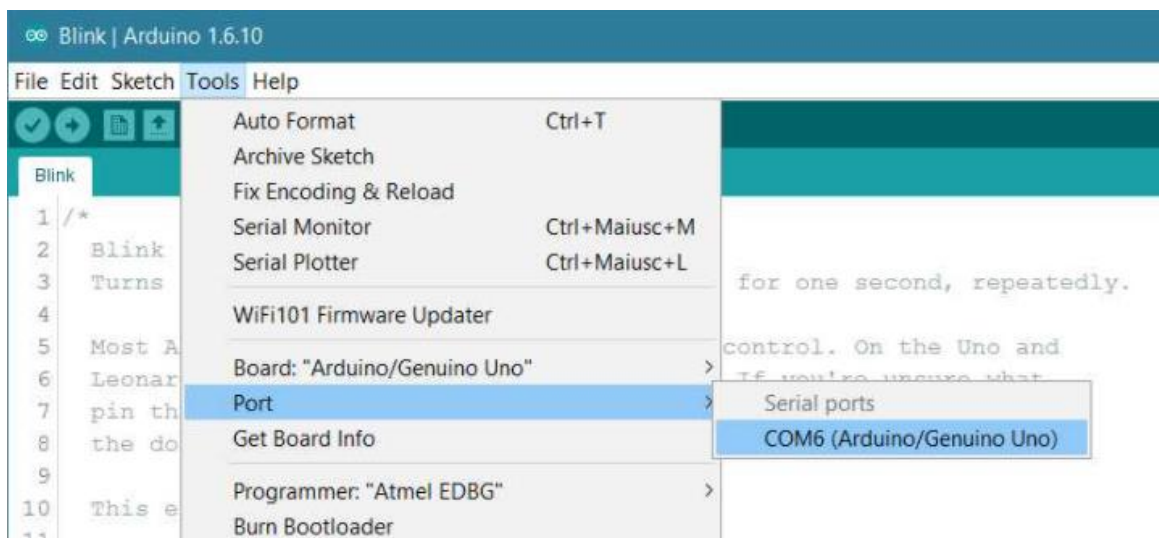


Figure 5.3.4: Port Selection Process

Now Upload the Code.

5.4 BLYNK SETUP

First go to the Play store of your phone then download the “Blynk ” app and install it into the phone. After installation, open the apps and create your project from “New Project ” and design it according to your choice and needed requirements.

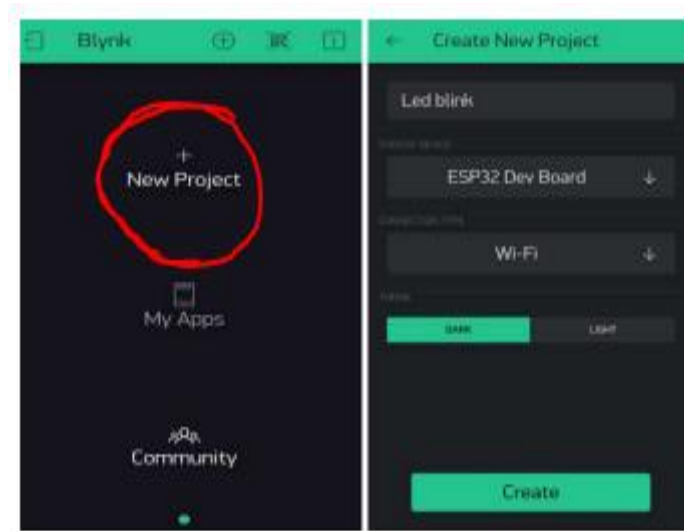


Figure 5.4: Project creation process

After designing the apps, the interface will be like below. It is a sample interface. The interface will be different according to the designer’s choice.



Figure 5.4.1: Blynk Sample Interface

CHAPTER 6

IMPLEMENTATIONAL RESULT AND DISCUSSION

6.1 Implementation

Implementation is complete connection of all necessary sensors and electronic equipment in the correct manner. Before placing the fully connected circuit in the device, we should verify if the circuit performs perfectly perform or not?



Figure 6.1: Final Connection View

6.2 Result Data

After completing connection, programming and other processes I run my project in real life. The project has given me real life data as output results. It has fulfilled our expected outcome.



Figure 6.2: Final Result

6.3 RESULT DISCUSSION

The device gives various kinds of results as output. When the device senses gas then it measures the gas level and processes it according to its instruction. After processing if it is high then automatically the device disconnects the main gas supply by using a solenoid valve, turns ON the Exhausting Fan for passing the gas from the room and sends a notification message to the user.

If the device senses fire, then it measures the fire level and processes it according to its instruction. After processing if it is high then automatically the device turns OFF the main electricity supply, turns ON the water pump to stop the fire, and sends a notification message to the user.

The device also shows the Live temperature and Humidity in Apps screen.

The project gives the update from time to time.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion

This smart kitchen device will serve the society. We know that gas leakage and fire accidents are now a major problem in our society. For this reason, the people of our society are leading a hazardous life. People will get rid of this problem by using this device. I am going to make my project reality by considering these issues. It will help to overcome disability which is a terrible problem in society.

7.2 Future Recommendation

- Add many other sensors
- Send notification with location
- Speaking as output
- Installing the camera as the eyes.

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UNIVERSITY DHAKA, BANGLADESH OCTOBER 2022 © [Daffodil International University](#). [APPROVAL This project titled "SMART KITCHEN USING IoT" submitted by Md. Jasim Uddin, ID No: 173-35-272 to the Department of Software Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the Degree of Bachelor of Software Engineering and Approved as to its style and contents.](#) The presentation will be performed in October, 2022. BOARD OF EXAMINERS -----
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 External Examiner [DECLARATION I hereby announce that I have undertaken this project under the supervision of Ms. Syeda Sumbul Hossain, Former Lecturer, and Daffodil International University Department of the SWE. I declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.](#)
[Supervised By: Ms. Syeda Sumbul Hossain Lecturer Department of Software Engineering Daffodil International University. Submitted By: Md. Jasim Uddin ID: 173-35-272 Department of Software Engineering Daffodil International University. ACKNOWLEDGEMENT First, I express our heartiest thanks to the Almighty Allah for His divine blessing, allowing me to successfully complete the final year project. I am really grateful and wish my profound indebtedness to Syeda Sumbul Hossain, Former Lecturer, Department of Software Engineering Daffodil International University. Deep Awareness and strong interest in the execution of this project completed by me in the field of "IoT, Embedded System and Android". It was possible to Complete this project with relentless my persistence, intellectual encouragement, consistent assistance, persistent and vigorous observation, constructive critique, helpful suggestions, reading many inferior drafts and correcting them at all times. I would like to express my sincere appreciation to Dr. Imran Mahmud, Associate Professor and Associate Director, SWE Department, for his kind assistance in completing my mission as well as to other members of the faculty and staff of Daffodil International University's SWE Department. I would like to thank both of Daffodil International University's course mates and older brothers who took part in this conversation when doing the course work. Finally, my parent's continuous encouragement and patience must be remembered with proper regard.](#)
 ABSTRACT The use of technology is increasing day by day. IoT is now being used in almost all sectors starting from industries. [The Internet of Things \(IoT\)](#) basically describes a physical object that is connected to sensors, software, processing capabilities and other technologies that connect and exchange data with other devices and systems via the internet or other communication networks. I have designed an IoT based device that can be controlled using an Android mobile application. I have created a remote button in the Android app through which I can control the power of the device. The device can be redesigned and the tools can be exchanged to deliver multiple applications according to the NodeMCU(ESP8266) chip I use. I have used Android, C++, and Arduino programming language to develop each application and hardware component and electronic chip. The test analysis section below discusses whether the proposed system meets its goals. The potential extensions of the system as well as the performance of the end of the paper are also evaluated. Keywords: Smart Kitchen, Gas Detection, Fire Detection, IoT, Microcontroller, ESP8266, NodeMCU, Blynk app. [TABLE OF CONTENTS CONTENTS](#) PAGE [Approval](#) ii [Declaration](#) iii [Acknowledgement](#) v [Abstract](#) vi [Table of contents](#) vii [CHAPTER 1: INTRODUCTION](#) 1.1 [Introduction](#) 1.2 [Motivation](#) 1.3 [Objective](#) 1.4 [Expected Outcome](#) 1.5 [Social Impact](#) 1.6 [Report Layout](#) [CHAPTER 2: LITERATURE REVIEW](#) 2.1 [Definition of Robot](#) 2.2 [Background](#) 2.3 [Scope of the Problem](#) 2.4 [Challenges](#) [CHAPTER 3: REQUIREMENTS AND METHODOLOGY](#) 8-10 8 8 8 9 9 10 11-12 11 11 11 12 13-31 3.1 [Introduction](#) 3.2 [Requirements Specification](#) 3.2.1 [Esp8266 NodeMCU](#) 3.2.2 [MQ-2 Gas Sensor](#) 3.2.3 [Flame Sensor](#) 3.2.4 [DHT11 Temperature and Humidity Sensor](#) 3.2.5 [Relay Module](#) 3.2.6 [Exhausting Fan](#) 3.2.7 [Water Pump](#) 3.2.8 [Buzzer](#) 3.2.9 [Solenoid Valve](#) 3.2.10 [DC Power Adapter](#) 3.2.11 [Battery](#) 13 13 14-15 18-19 19 20-21 21-22 23-24 25-26 26-27 28-29 [CHAPTER 4 : SYSTEM DESIGN](#) 32-38 4.1 [Introduction](#) 32 4.2 [Block Diagram](#) 4.3 [Flow Chart Diagram](#) 34-37 4.4 [Circuit Diagram](#) 38 [CHAPTER 5: SOFTWARE ANALYSIS](#) 39 5.1 [Introduction](#) 5.2 [Arduino IDE Installation and setup](#) 5.3 [Programming](#) 5.4 [Blynk Setup](#) 39 39 [CHAPTER 6: IMPLEMENTATION AND RESULT](#) 40 [DISCUSSION](#) 6.1 [Introduction](#) 6.2 [Result Data](#) 6.3 [Result](#) [Discussion](#) [CHAPTER 7: CONCLUSION](#) 7.1 [Conclusion](#) 7.2 [Future Recommendation](#) [REFERENCES](#) [LIST OF FIGURES](#) [Figure 3.2.2: Bluetooth Module](#) 16 [Figure 3.2.3: Motor Driver](#) 18 [Figure 3.2.4: DC Motor](#) 19 [Figure 3.2.5: IR Sensor](#) 20 [Figure 3.2.6: Ultrasonic Sensor](#) 22 [Figure 3.2.7: Voltmeter](#) [Figure 3.2.8: Servo Motor](#) 23 25 [Figure 3.2.9: Buzzer](#) 27 [Figure 3.2.10: Battery](#) 28 [Figure 3.2.11: Cooling Fan](#) 30 [Figure 3.3: System Methodology](#) 31 [Figure 4.1: Connections](#) 32 [Figure 4.2: Architecture Diagram](#) 33 [Figure 4.3.1: Move Materials](#) [Figure 4.3.2: Before Clean Dust](#) 34 35 [Figure 4.3.3: After Clean Dust](#) 36 [Figure 4.3.4: Provide hand](#)

sanitizer 37 Figure 4.4: Final View 38 Chapter 1 Introduction 1.1 Introduction As technology evolves, we need to move forward with new technologies as soon as possible to keep up with other communities. As citizens of the digital world, we must improve our technology, race and education. Currently, IoT is being used for most of the work in almost all the developed countries of the world. In order to develop the technology, I have decided to create a smart device through Android applications and IoT. The Android application will help to control the device. With the internet, anyone can operate the device in a very easy way through the Android application. This device will help human beings in their daily life in various ways and will make human life easier. 1.2 Motivation Gas leaks and fire accidents are constantly happening somewhere in the world. As a result, countless people are being seriously injured and even many people are losing their lives in this accident. This device will protect people from these accidents. This device will detect gas and fire and signal people and disconnect all types of gas and electricity to prevent any accidents. 1.3 Objective The main purpose of my device is to detect gas and fire and signal people and disconnect all types of gas and electricity to prevent any accidents so that people are protected from fatal accidents like gas leaks and fire connections. 1.4 Expected Outcome The smart kitchen device works in collaboration with the internet via Android application. This device will detect a gas leak and automatically turn on the room's ventilator fan to expel the leaking gas and turn off the main gas connection in the area, as well as send a danger signal to the user. If for any reason a fire connection occurs, it will detect the fire and try to extinguish the fire by automatically turning on the water pump and preventing the accident by turning off the main electrical connection of the place as well as sending a danger signal to the user. Users will also be able to monitor their kitchen situation from anywhere in the world. 1.5 Social Impact This smart kitchen device will serve the society. We know that gas leakage and fire accidents are now a major problem in our society. For this reason the people of our society are leading a hazardous life. People will get rid of this problem by using this device. I am going to make my project reality by considering these issues. It will help to overcome disability which is a terrible problem in society. 1.6 Report Layout Pictorial presentation of the project in a simple way with a figure that describes the whole project, contents and more. The project report contains 5 chapters. The outline of all the chapters including the summary is discussed below by presenting the flow diagram. Chapter 1: (Introduction about the project, Motivation, objective, Expected Outcomes and Future Work, Social Impact, Report Layout) Chapter 2: Literature Review (Introduction, IoT, Background, [Scope of the problem, challenges](#)) Chapter 3: [Research Methodology](#) (Research Instruments, statistical Analysis, Implementation Requirement) Chapter 4: Implementation and Result (Developing Methodology, Used Language, Diagram, System Layout) Chapter 5: Conclusion (Project summary, further developments, Future recommendation) Figure [1.6 : Outline of the project Chapter 2 Literature Review 2.1](#) Definition of IoT The [Internet of Things \(IoT\)](#) basically [describes a physical object that is connected to sensors, software, processing capabilities and other technologies that connect and exchange data with other devices and systems via the internet or other communication networks](#). 2.2 Background [IoT](#) is currently an increasing branch. For this reason, many universities around the world, including Bangladesh, have started research on IoT. In addition to electrical engineering, mechanical engineering and computer science, they are providing classes and programs in IoT and robotics science and for students. So that the students can survive in the war of science with the development of technology by doing research on IoT and robotics including making robots and IoT devices. In a few days, IoT will be widely used around the world and will take over a large part of the technology. This branch will be the only tool to survive in the war of technology. So it is time to study, research and acquire detailed knowledge about IoT. 2.3 Scope of the problem Day by day people have become dependent on technology for their daily work. There are some tasks that people find very annoying to do over and over again and very difficult for people. There are some things that people need a lot in their daily life but they feel bored to do it and ask other people for help but there is not always a working person at hand for this job. IoT and Robotics will play a very important role in helping to overcome all these problems. 2.4 Challenges I had a lot of big problems early on when I started working to make this device. Surveys on how this device will be controlled, ranging from choosing the type of day-to-day work of age-appropriate people. Sensor selection based on different functions and research on sensor performance. Increasing the time of stored power for the device management was also the hardest task. Choosing the descent stage, relying on apparatus projection is a significant issue. It was very difficult for human beings to do some of their daily tasks with this kind of device. Above all, maintaining the balance of the device by connecting all the sensors to operate the device was a big problem. CHAPTER 3 REQUIREMENTS SPECIFICATION AND METHODOLOGY 3.1 Introduction Through this project I have tried to make the life of society people easy and normal. For this purpose we have created this device. I have assembled some sensors based on different functions. I have tried to manage this device by programming with a microcontroller. A project report or thesis paper, the analysis zone empowers the scrutiny to survey the overall credibility and trustworthiness of an investigation in a general context. Here the part of the methodology: 1. The data collected or generated Procedure 2. Analyzation. 3.2 Requirements Specification The following components I have been used to implement my

project. There are: 1) ESP8266 NodeMCU (Microcontroller). 2) MQ-2 (Gas Sensor) 3) Flame Sensor 4) DHT11 (Temperature and Humidity Sensor) 5) Relay Module 6) Buzzer 7) Water Pump 8) Solenoid Valve 9) Power Adapter 10) Battery 11) Exhausting Fan 12) Jumper Wire 13) Breadboard

3.2.1 ESP8266 NodeMCU There are many kinds of Microcontroller Board. ESP8266 NodeMCU is one of them. It is a common microcontroller based open-source computing platform. Here the microcontroller is mounted on a board and its various pins are pulled out with the help of a header to easily attach to any external equipment or parts. ESP8266 NodeMCU can be used with many types of switches and sensors. It can be used for a wide variety of tasks, including lighting and motor control. Creating a unique project with this can be done in the same way, or it can be done by communicating with a program on the computer. In this board there is Wi-Fi cheap which is used for connecting to internet. Figure 3.2.1: ESP8266 NodeMCU Figure 3.2.1.1 : ESP8266 NodeMCU Pinout Configuration

3.2.2 MQ-2 GAS SENSOR According to the purpose there are many kinds of sensors. MQ-2 Gas Sensor is one of them. This sensor is used for detecting various kinds of gas from the environment. Not only gas but also smoke from the environment. There are various kinds of gas sensors according to the sensing unit. Like as [MQ-2](#), [MQ-3](#), [MQ-4](#), [MQ-5](#), [MQ-6](#), [MQ-7](#), [MQ-8](#), [MQ-9](#), [MQ-131](#), [MQ-135](#) and so on. Different types of gas sensors sense different types of gas from the environment. In our device I used the MQ-2 Gas Sensor. It detects Methane, Butane, LPG and Smoke from the environment. [Figure 3.2.2 : MQ-2 Gas Sensor](#) Figure 3.2.2.1 : MQ-2 Identity Figure 3.2.2.2 : Internal Structure of MQ-2

3.2.3 FLAME SENSOR [A flame sensor is a sensor which is mainly designed for detecting](#) fire from [the](#) sensor. It is able to sense the responding and [detecting the occurrence of a fire or flame](#) easily. According to its principle it is known as a flame sensor. This sensor is classified into four different types. They are: 1. IR Single Frequency 2. IR Multi-Spectrum 3. UV Flame Detectors 4. UV/IR Flame Detectors I used the IR Single Frequency Flame Sensor in our device. It has a black color Infrared Ray (IR) LED which is used for sensing and detecting the flame or fire from the environment. Figure 3.2.3 : Flame Sensor Figure 3.2.3.1 : Flame Sensor Pinout

3.2.4 DHT11 TEMPERATURE AND HUMIDITY SENSOR This is a digital sensor. The model of this sensor is designed to work with the weather. This sensor can easily measure the amount of water vapor in the air i.e. humidity and temperature of the air. There are two parts of this sensor. Two parts are: 1. Capacitive Humidity Sensor 2. Thermistor This sensor is divided into several models based on the work. They are : 1. DHT-11 2. DHT-22 3. AM2302 and so on. I used DHT-11 in my device for measure the temperature and humidity from the environment. Figure 3.2.4 : DHT-11 Sensor Figure 3.2.4.1 : Internal of DHT-11 Figure 3.2.4.2 : Internal Layer of DHT-11 Figure 3.2.4.3 : DHT-11 Sensor Pinout

3.2.5 RELAY MODULE The relay is a kind of switch. Used to work with high voltage in microcontrollers. Inside is an electromagnetic charged coil. When 5 volts are sent to this coil, it turns into a temporary magnet and pulls the small iron handle inside the switch towards itself. This causes the switch circuit to open or close. Open circuit means switch off and closed circuit means switch on. There are about 16 types of relays available in the market. Relays vary in volt and shape. Figure 3.2.5 : Single channel Relay Figure 3.2.5.1 : 4-channel Relay Figure 3.2.5.2 : Relay Pinout

3.2.6 Exhausting Fan [Exhausting fans are a cost-effective way to lower the temperature in our home with zero effort and a smaller investment than an AC unit. Basically, they make high temperatures much more bearable. I've rounded up a number of affordable, high-quality fans on the market to keep my room cool.](#) I have used the Exhausting Fan in my device for passing the leakage gas from the room. Figure 3.2.6 : Exhausting Fan

3.2.7 WATER PUMP In my device I used a 5V DC mini Water Pump to supply water. It is a low cost pump for designing any kind of embedded or electronics device. Figure 3.2.7 : Water Pump

3.2.8 Buzzer A buzzer is a gadget that creates a noise that buzzes or beeps. There are many kinds; a piezoelectric buzzer is the most simple, which is just a flat piece of two-electrode piezoelectric material. This type of buzzer needs some kind of oscillator (or something more sophisticated like a microcontroller) to operate it. You can only get a click if you add a DC voltage. These are found in areas where you need something that emits an audible click, but, like microwave ovens, smoke detectors, and computer gadgets, these don't worry about high-fidelity sound reproduction. Without utilizing too much fuel, they are inexpensive and can be very noisy. They are often very small, so they can be used in flat things such as greeting cards for "singing". Figure 3.2.8: Buzzer

3.2.9 Solenoid Valve An electromechanically operated valve is known as a solenoid valve. There are many kinds of characteristics of a solenoid valve: they use the electricity of the current, generate the energy of the magnetic field, mechanism for controlling fluids and the controlled fluid characteristics by them. The solenoid valve is one of the most controlled components of liquids which is widely used in the world. Mix or distribute liquids, dose, stop, drop and so on. We used the Solenoid valve in my device to stop the gas supply from the main line. Figure 3.2.9: Solenoid Valve

3.2.10 DC POWER ADAPTER DC Power Adapter is a one kind of electronic component which is designed for converting the AC power to DC power. By using a voltage regulator it distributes the required voltage to the other electronics components. It is very easy to use for any kind of purpose. There are various kinds of power adapters according to voltage operating capacity. There are also amp issues in the power adapter. Such as: [5V-1A](#), [5V-2A](#), [9V-1A](#), [9V-2A](#), [12V-1A](#), [12V-2A](#) and others. I used a 5V-2A power adapter to convert the AC voltage to

DC voltage to supply the power in my device. Figure 3.2.10: DC Power Adapter 3.2.11 Battery The container through which the electrolyte is packaged and placed between the two electrodes is called the battery. Some batteries can be recharged when they run out of charge. These are called rechargeable batteries. I have used rechargeable batteries in this project. Figure 3.2.11: Battery CHAPTER 4 SYSTEM DESIGN 4.1 INTRODUCTION I designed my project by adding various kinds of sensor, electronics components to the microcontroller. Several connections have been needed for the design of the system. After completing all the connections I uploaded a program to run the device as a complete system. [4.2 BLOCK DIAGRAM Figure 4.2: Block Diagram 4.3 FLOW CHART DIAGRAM Figure 4.3.: FLOW CHART DIAGRAM 4.4 CIRCUIT DIAGRAM Figure 4.4: CIRCUIT DIAGRAM 4.5 OVERALL PROPOSED SYSTEM Figure 4.5: OVERALL PROPOSED SYSTEM](#) Chapter 5 SOFTWARE ANALYSIS 5.1 INTRODUCTION Embedded [device is a combination of software and hardware](#). Our project is a one kinds of embedded system. I designed our device with the [combination of software and hardware](#) part. Without software a design of hardware device is nothing. So to fulfill my project after design the hardware part I integrated the software part for programming in my device. I used two different software in my project. One is "Arduino IDE" which is an open source platform for arduino programming and another is an Android application named "Blynk". Figure 5.1: Arduino IDE Figure 5.1.1: Blynk 5.2 ARDUINO INSTALLATION AND SETUP For download the Arduino IDE at first we will go to the Arduino official website <https://www.arduino.cc/> Figure 5.2: Arduino official website Then Click to Software Figure 5.2.1: Arduino Download Section Finally Download from here and install. It is fully unpaid software. Figure 5.2.2: Arduino Download Path 5.3 PROGRAMMING After completing the setup process it will be able to program. So, open the Arduino IDE and start the programming. Figure 5.3: Programming section of Arduino IDE After writing the program I will upload the program to the microcontroller of my hardware device. The process to upload the program is divided into four phases. Figure 5.3.1: Flow chart of uploading code At first write the code then compile or verify and finally upload the code. Before uploading the code I should must select the board and port for the microcontroller. Figure 5.3.2: Arduino IDE's Features For selecting the Board go to Tools>Board and select your microcontroller board. Figure 5.3.3: Board Selection Process Now select the Port . For selecting the port go to Tools> Port and select your port number. Figure 5.3.4: : Port Selection Process Now Upload the Code. 5.4 BLYNK SETUP First go to the Play store of your phone then download the "Blynk " app and install it into the phone. After installation, open the apps and create your project from "New Project " and design it according to your choice and needed requirements. Figure 5.4: Project creation process After designing the apps the interface will be like below. It is a sample interface. The interface will be different according to the designer's choice. Figure 5.4.1: Blynk Sample Interface CHAPTER 6 IMPLEMENTATIONAL RESULT AND DISCUSSION 6.1 Implementation Implementation is complete connection of all necessary sensors and electronic equipment in the correct manner. Before placing the fully connected circuit in the device, we should verify if the circuit performs perfectly perform or not? Figure 6.1: Final Connection View 6.2 Result Data After completing connection, programming and other processes I run my project in real life. The project has given me real life data as output results. It has fulfilled our expected outcome. Figure 6.2: Final Result 6.3 RESULT DISCUSSION The device gives various kinds of results as output. When the device senses gas then it measures the gas level and processes it according to its instruction. After processing if it is high then automatically the device disconnects the main gas supply by using a solenoid valve, turns ON the Exhausting Fan for passing the gas from the room and sends a notification message to the user. If the device senses fire then it measures the fire level and processes it according to its instruction. After processing if it is high then automatically the device turns OFF the main electricity supply, turns ON the water pump to stop the fire, and sends a notification message to the user. The device also shows the Live temperature and Humidity in Apps screen. The project gives the update from time to time. [CHAPTER 7 CONCLUSION AND FUTURE SCOPE 7.1 Conclusion This smart kitchen device will serve the society. We know that gas leakage and fire accidents are now a major problem in our society. For this reason the people of our society are leading a hazardous life. People will get rid of this problem by using this device. I am going to make my project reality by considering these issues. It will help to overcome disability which is a terrible problem in society. . 7.2 Future Recommendation • Add many other sensors • Send notification with location • Speaking as output • Installing the camera as the eyes.](#) REFERENCES [1] <http://energybangla.com/gas-cylinders-blust-deaths-continues/> [2] Ismail, T., Das, D., Saikia, J., Deka, J., & Sarma, R. (2014). GSM based gas leakage warning system. International Journal of Advanced Research in Computer and Communication Engineering (April. 2014). [3] Macker, A., Shukla, A. K., Dey, S., & Agarwal, J. (2018, May). ARDUINO Based LPG Gas Monitoring & Automatic Cylinder Booking with Alert System. In 2018 2nd International Conference on Trends in Electronics and Informatics (ICOEI) (pp. 1209-1212). IEEE. [4] Varma, A., Prabhakar, S., & Jayavel, K. (2017, February). Gas Leakage Detection and Smart Alerting and prediction using IoT. In 2017 2nd International Conference on Computing and Communications Technologies (ICCT) (pp. 327-333). 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Student Portal

Md. Jasim Uddin (173-35-272)Logout

Payment Ledger

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Student Info

Name	Md. Jasim Uddin
ID	173-35-272
Email	jasm35-272@diu.edu.bd

Payment Ledger Summary

Total Payable	789500
Total Paid	789500
Total Due	0
Total Other	8570

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