POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

IOT ACCIDENT DETECTION SYSTEM

MUHAMMAD QAYYUM BIN AHMAD KHALIL

(08DEP20F1018)

JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 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

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SESI 1 2022/2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

INTELLIGENT AUTOMATIC CLOTHES SYSTEM WITH IOT

1. Me , **MUHAMMAD QAYYUM BIN AHAMD KHALIL(IC NUMBER : 020721-05-0453)** is a student of **Diploma Kejuruteraan Elektrik, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor.**

2. I acknowledge that **IOT ACCIDENT DETECTION SYSTEM** and the intellectual property there in 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;
MUHAMMAD QAYYUM BIN AHMAD KHALIL) …….…….

(Identification card No: (020721-05-0453)

MUHAMAD QAYYUM BIN AHMAD KHALIL

In front of me, ANNAFAEDZATUL BINTI MOHAMAD AMIN
(Identification card No : (.....)

As a project supervisor, on the date: ……..….....)

ACKNOWLEDGEMENTS

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

I would like to express my gratitude towards my parents & my supervisor for their kind co-operation and encouragement which help me in completion of this Project. I would like to express my special gratitude and thanks to industry persons for giving me such attention and time.

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

ABSTRACT

With an increase in population, there is an increase in the number of accidents that happen every minute. These road accidents are unpredictable. There are situations where most of the accidents could not be reported properly to nearby ambulances on time. In most of the cases, there is the unavailability of emergency services which lack in providing the first aid and timely service which can lead to loss of life by some minutes. Hence, there is a need to develop a system that caters to all these problems and can effectively function to overcome the delay time caused by the medical vehicles. The purpose of this paper is to introduce a framework using IoT, which helps in detecting car accidents and notifying them immediately. This can be achieved by integrating smart sensors with a microcontroller within the car that can trigger at the time of an accident. The other modules like GPS and GSM are integrated with the system to obtain the location coordinates of the accidents and sending it to registered numbers and nearby ambulance to notify them about the accident to obtain immediate help at the location.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

IOT ACCIDENT DETECTION SYSTEM is a way to help road users. As we already know in 2020 the number of deaths due to vehicle user accidents is 3692. This shows us a significant increase compared to the previous year. as an engineer I have thought of a way to reduce accidents by building a system that can detect accidents.

This system has an accelerometer that will detect vibrations and angle changes. with this system, all impacts with the vehicle will be detected. it only takes 3 seconds to send information to the entire system. This system has also been determined with the angle position with the help of studies that have been done.

with this help, all important user accident information will be sent to a number that has been set to help users get help faster.

1.1 Background Research

This research will look at some angle measurements. To what extent can this system detect impact, and what are the issues that arise, especially affecting the impact received, network and function Is it cost effective, meets the requirements, and works well and determines the extent to which the existence of this market suspension is

effective.

1.2 Problem Statement

problems that we can see especially for land vehicle users. when an accident occurs, emergency assistance is relatively slow to arrive due to the lack of accurate location data.

1.3 Research Objectives

The main objective of this Project is to further develop suspension technology by adding new features to the suspension.

More specifically the principal objective of this research is:

- To designing an automatic clothes hanger product from inside the house to make it easier for users to hang clothes.
- To prevent clothing from being exposed to rain .

1.4 Scope of Research

This Project is focusing a size that is very suitable for users and can also be placed in the area they want.

1.6 Project Significance

This project is important for accident victims who face the problem of slow emergency assistance. They often face situations when there is an accident in an area where there are no civilians, such as they are not aware to act by making an emergency call due to unconsciousness.

1.7 Chapter Summary

In this research in terms of introduction, objectives, problem statement, hypotheses, scope of study and limitations play an important role at the beginning of something studies to be done because this method can ensure all the products that want to be produced is according to one's needs and wants. Besides, it is be able to convince a product produced is effective and accepted on public opinion.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Data collection is the result of previous studies by other researchers obtained from books, magazines, articles and the internet. This past study refers to studies that have been done before and this study was done is to complement the study of the thesis title.

2.2 Previous research

2.2 ACCELEROMETER

There are three different types of accelerometers, and they are each designed to efficiently function in their intended environments. The three types are: piezoelectric, piezoresistance and capacitive.

A piezoelectric accelerometer utilizes the piezoelectric effect (piezoelectric materials produce electricity when put under physical stress) to sense change in acceleration. Piezoelectric accelerometers are most commonly used in vibration and shock measurement.

Piezoresistance accelerometers are much less sensitive than piezoelectric accelerometers, and they are better suited to vehicle crash testing. A piezoresistance accelerometer increases its resistance in proportion to the amount of pressure applied to it.

The third and most commonly used type of accelerometer is the capacitive accelerometer. Capacitive accelerometers use change in electrical capacitance to determine an object's acceleration. When the sensor undergoes acceleration, the distance between its capacitor plates changes as the diaphragm of the sensor moves.

Most accelerometers are miniscule, and they are often referred to as Micro-Electro-Mechanical Systems (MEMS) accelerometers. Because of their size and affordability, they are embedded in a myriad of hand-held electronic devices (such as phones, tablets, and video game controllers). In phones and tablets, the accelerometer is responsible for "flipping" the screen when the device is rotated. Accelerometers are also used by zoologists (to track the movement of animals in the wild), engineers (especially in collision experiments) and factories (to monitor the vibration of machinery)[1].

2.21 WIFI MODULE

WiFi module, also known as serial to WIFI module, which belongs to the transmission layer of IoT. The function is to convert serial port or TTL level into embedded module which can

conforming to WiFi wireless network communication standard, with built-in wireless network protocol IEEE802.11 B.G.N protocol stack and TCP/IP protocol stack.

Traditional hardware devices embedded WIFI modules can use WIFI directly to connect to the Internet, which is an important part of realizing wireless smart home, M2M and other IoT applications.

WIFI modules can be divided into the following three types:

1. Commonly used WIFI module, such as the USB or SDIO interface module of mobile phone, laptop and tablet. WIFI protocol stack and driver are run in Android, Windows and IOS systems, which require very powerful CPU to complete the application;

2. WIFI module of router solution, which is typical for home routers. The protocol and driver are Linux operating system with the help of chips with powerful Flash and Ram resources;

3. Embedded WIFI module, 32-bit single-chip microcomputer, built-in WIFI driver and protocol, the interface is general MCU interface such as UART, etc. Suitable for all kinds of intelligent home or intelligent hardware single products.

Now many manufacturers have tried to add WIFI modules to TV, air conditioning and other devices to build wireless home intelligent systems. The implementation of APP control, can make the IoT devices more intelligent and achieve interconnection with many other appliances[2].

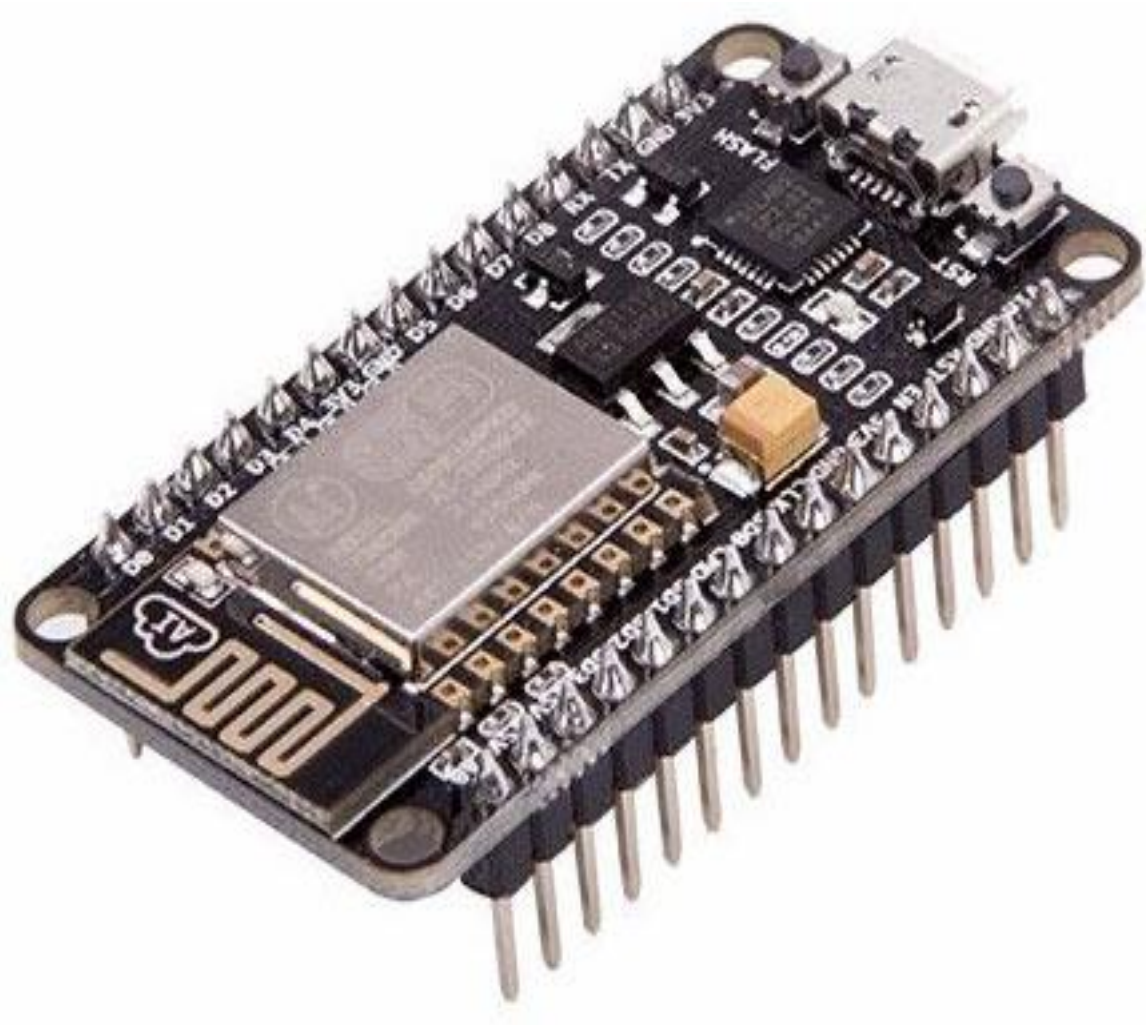


FIGURE 1.0 WIFI MODULE

2.22 RESET BUTTON

This project about temperature control system which is a particular system for server room. This system consists of temperature sensor, PIC, LCD (Liquid Crystal Display), driver circuits, AC air heater and AC motor. To switch on the AC heater three drivers are used for triggered process and another two used for triggered levels of the motor. This motor operated based on two levels of speed and functioning for controlling the temperature value inside of a regular room automatically. This system would operate based on values or ranges of the temperature inside the room that would be detected by using the temperature sensor. If the temperature in the first ranges (0˚C to 15˚C) the air heather will be operated to heat the very cold server room. Second range between (16˚C to 25˚C) made this system not be enabled because it is achieving normal range of temperature [3].

Motor will be triggered for level 1 when temperature ranges between 26˚C to 40˚C to decrease the temperature value. If the temperature become more than 40˚C, the motor will triggered for level 2 and become faster for this level. Both output devices are important to maintain the temperature value in the room. This system can solve be categorized into automatic system class. Problem always happened if air-conditioner broke down and made room becomes hotter or high temperature. Temperature become too cold and influenced by weather from outside of the server room. To keep maintaining the server room in suitable temperature range the motor and air heater are most important. The surrounding temperature and the outputs are operated based on the temperature ranges that may detected by temperature sensor. Programming for PIC is very important to read data and accept the signal from the sensor. At the same time, it will be maintains the temperature inside of the room and make it suitable for user.

2.23 BUZZER

Since the self-excited buzzer is driven by DC voltage, it does not need to use AC signal to drive. It only needs to output the driving level at the drive port and amplify the driving current through the triode to make the buzzer sound. It is very simple, and the self-excited buzzer is not explained here. This paper only explains the other excited buzzer which must be driven by 1/2-D square wave signal.

There are two ways to drive the separately excited buzzer: one is to drive the PWM output port directly; the other is to drive the buzzer by using I/O timing flip level to generate driving waveform.

PWM output port direct drive is to use PWM output port itself can output a certain square wave to drive buzzer directly. In the software setting of MCU, several system registers are used to set the output of PWM port. Duty cycle, cycle and so on can be set. After setting these registers to generate the frequency waveform meeting the requirements of buzzer, as long as PWM output is opened, PWM output port can output square wave of this frequency. At this time, the buzzer can be driven by using this waveform. For example, when driving a buzzer with a frequency of 2000Hz, you can know that the period is 500 μ S. in this way, you only need to set the PWM cycle to 500 μ s and the duty cycle level to 250μs, and then a square wave with a frequency of 2000Hz can be generated. Through this square wave, the buzzer can be driven by using a triode.

However, it is more troublesome to use I/O timing flip level to generate driving waveform. Timer must be used to do timing. The frequency waveform meeting the requirements of buzzer can be generated by timing flip level. This waveform can be used to drive buzzer. For example, when driving a 2500Hz buzzer, you can know that the period is 400μS. in this way, only the I/O port of the buzzer needs to be turned over every 200μs to generate a square wave with a frequency of 2500Hz and a duty cycle of 1/2duty. Then, the buzzer can be driven by the amplification of triode.

The common small sound signal device uses piezoelectric buzzer, which mainly depends on piezoelectric effect to produce vibration and sound. This kind of buzzer is generally divided into two types with or without vibration source. The direct current signal is used to drive the buzzer with vibration source, while the AC signal is required to drive the buzzer without vibration source. SIEMENS APT small signal buzzer adopts piezoelectric type[3].

2.3 Chapter Summary

Based on the previous formulation we can see that the determination of components is very important to complete the functioning of this system. This is because it can help users to determine whether they need help or not

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques.

To realize this Project as a product that ready to use with safety characteristic, a very comprehensive plan is undertaking. A step-by-step procedure is done so that the Project can be completed in time. Data was gathered as a consequence of earlier study conducted by other academics using books, periodicals, papers, and the internet. This previous study alludes to previous research, and this research was conducted to supplement the thesis title's research.

3.2 Project Design and Overview

A survey will be conducted based on observational techniques to determine customer behavior and response to these suspended items. This audit will also be carried out around the Shah Alam area. This strategy is used randomly, especially in student settlements and urban areas. In addition, the approach is implemented conceptually

and practically through the use of research methods, observation methods and methods.

3.3 Project Development

This project is carried out using increment development method.

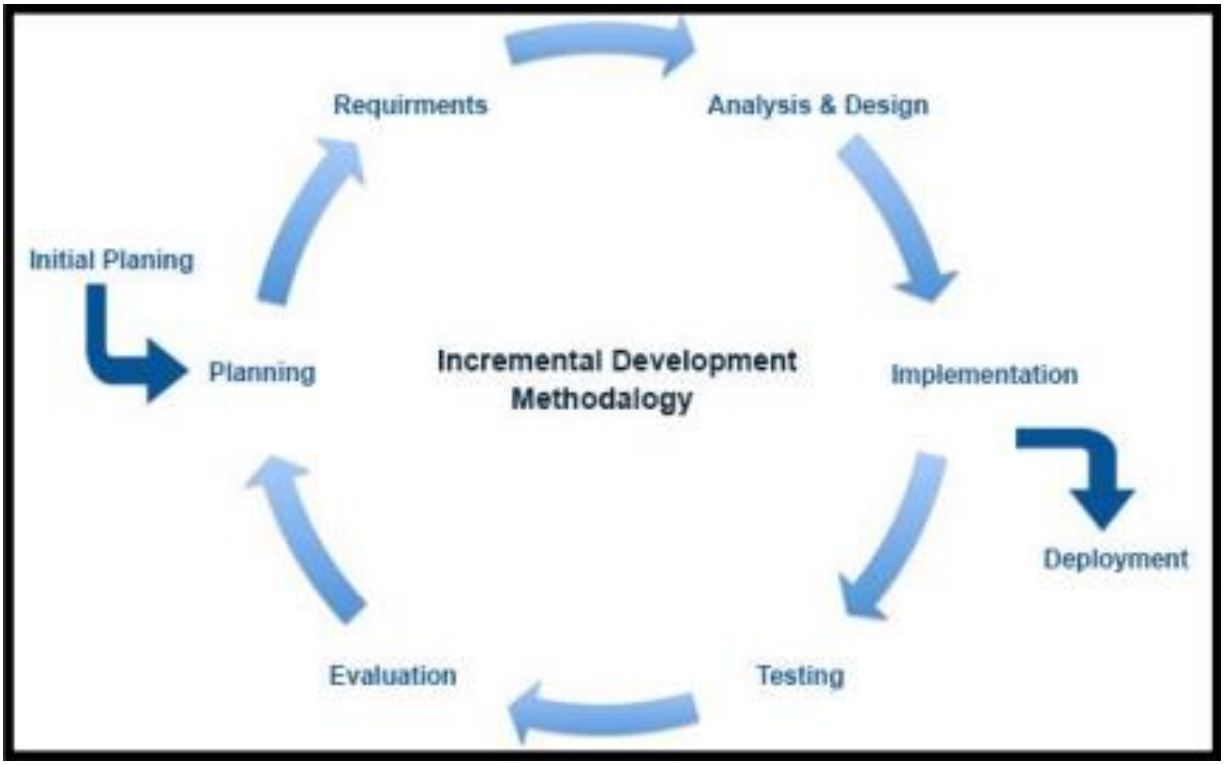


Figure 3.3: Incremental development methodology used.

From the initial planning of the project until the deployment for the project, this project is divided into few parts carrying simple goals. Analysis will be carried out from time to
time in order to achieve the goals. From planning, requirement gathering, analysis and design, testing to evaluations are the cycles which will be carried out repeatedly until the prototype reaches the goals. When the goals and the requirement had been achieved, the prototype is now ready for deployment

3.4 Block diagram

Our products have been innovated to be products that are easy to use and market. The installation and use of my product only requires a sufficient power supply to keep the system running.

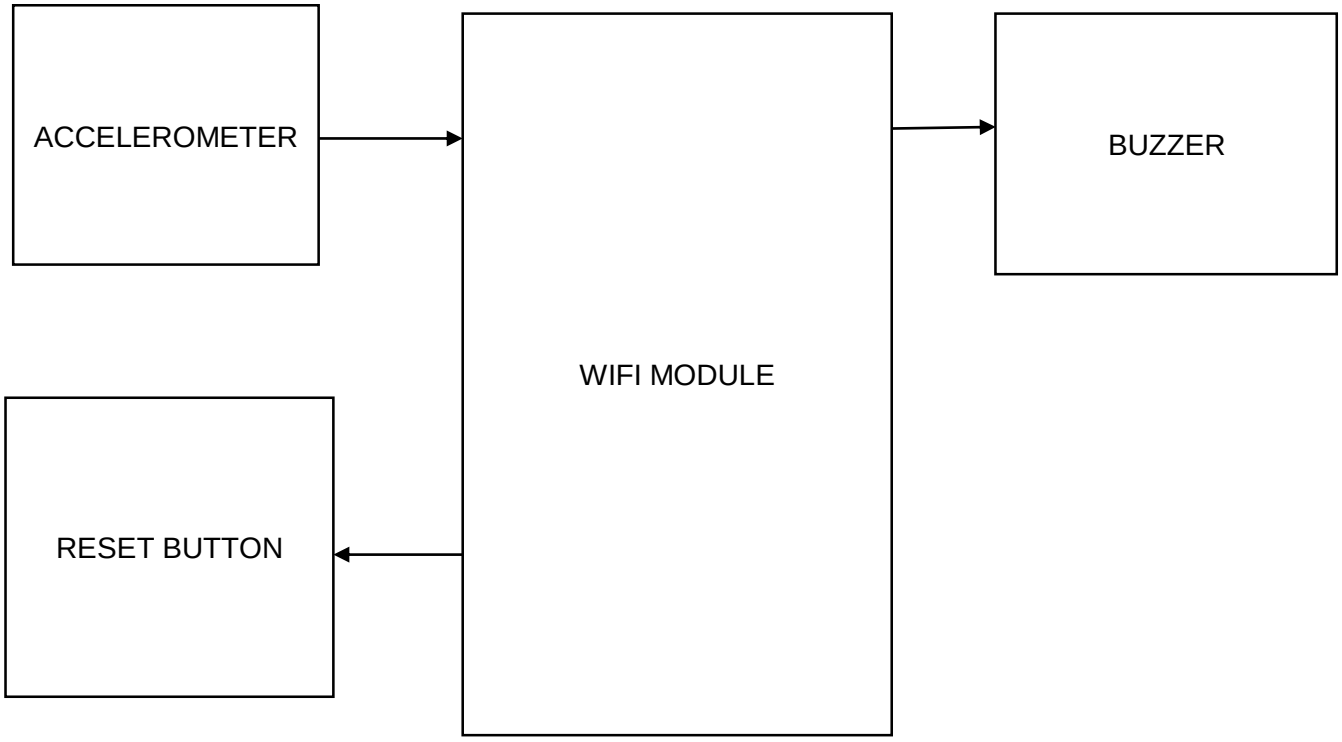


Figure 3.4 Block Diagram

3.5 Prototype

3.5.1 Advantages of Prototype model

- Users are actively involved in the development.

- Since in this methodology a working model of the system is provided, the users get a better understanding of the system being developed.

- Errors can be detected much earlier.

- Quicker user feedback is available leading to better solutions.

- Missing functionality can be identified easily.

- Confusing or difficult functions can be identified requirements validation, Quick implementation of, incomplete but functional application.

- Prototyping improves the quality of the specifications and requirements provided to customers. With prototyping, customers can anticipate higher costs, needed changes and potential project hurdles, and most importantly. potential end result disasters. Strong prototyping can ensure product quality and savings for years to come.

- Improved and increased user involvement: Most customer want to feel like they are involved with the intricate details of their project. Prototyping requires user involvement and enables them to see and interact with a working model of their project. With prototypes, customers can give their immediate feedback. request project changes and alter model specifications. Prototyping most importantly helps eliminate misunderstandings and miscommunications during the development process.

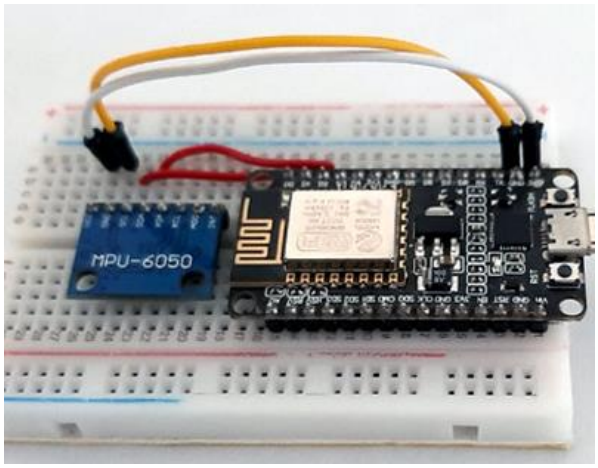


FIGURE 2.0 PROTOTYPE

3.5.2 Disadvantages of Prototype model

- Leads to implementing and then repairing way of building systems**.**

- Practically, this methodology may increase the complexity of the system as scope of the system may expand beyond original plans.

- Insufficient analysis: A focus on a limited prototype can distract developers from properly **analyze** the complete project. The potential end result: A potential overlooking of better solutions, incomplete specifications or the conversion of limited prototypes into poorly engineered and developed final projects that are hard to maintain.

- User confusion: The worst-case scenario of any prototype is customers mistaking it for the finished project. Customers seeing a rough prototype may not understand it merely needs to be finished or polished. Also, customers can wrongly perceive the prototype to accurately model the performance of the final system. Customers may also grow fond of prototype features that are not part of the final system.

- Developer misunderstanding of user objectives: For every project to be successful, developers and customers must be on the same page and share the same project objectives. If customers require all proposed features of a prototype be included in the final product, this can lead to team and mission conflicts**.**

- Excessive Development Time**.**

3.6 Hardware Requirements

Below is the list of the entire electronic components and other material that will support to complete this project.

3.6.1 Hardware Specifications

- WIFI MODULE
- ACCELEROMETER
- BUZZER
- RESET BUTTON

3.7 Experimental Works

3.7.1 WIFI MODULE

Figure 3.7.1 WIFI MODULE

Based on the diagram above, which is the Wifi Module that functions to send information to the emergency number by using the network.

- This sensor module uses good quality of double-sided material.
- Anti-conductivity & oxidation with long time use.
- The sensitivity can be adjusted by a potentiometer.
- The required voltage is 5V.
- For easy installation, it uses bolt holes.
- The output of the comparator is a clean waveform and driving capacity is above 15mA.

3.7.2 ACCELEROMETER

Figure 3.7.2 ACCELEROMETER

This component is used to detect angle changes and vibrations around it. This component is installed to send information to the wifi module that the vehicle has been hit by a shock or significant angle change.

3.7.3 BUZZER

Figure 3.7.3 BUZZER

This comonent is used to issue buyi. This is intended to make victims of car accidents aware only so that they can decide whether to continue to let the system send information to the emergency number or not.

3.7.4 RESET BUTTON

Figure 3.7.4 RESET BUTTON

This component aims to delete the system so that it does not send information to the emergency number.

3.8 Circuit Diagram

A circuit diagram is a graphical representation of an electrical circuit. A circuit diagram, also called an electrical diagram, elementary diagram, or electronic schematic, is a simplified graphical representation of an electrical circuit. Circuuit diagrams are used for the design, construction and maintenance of electrical and electronic equipment.

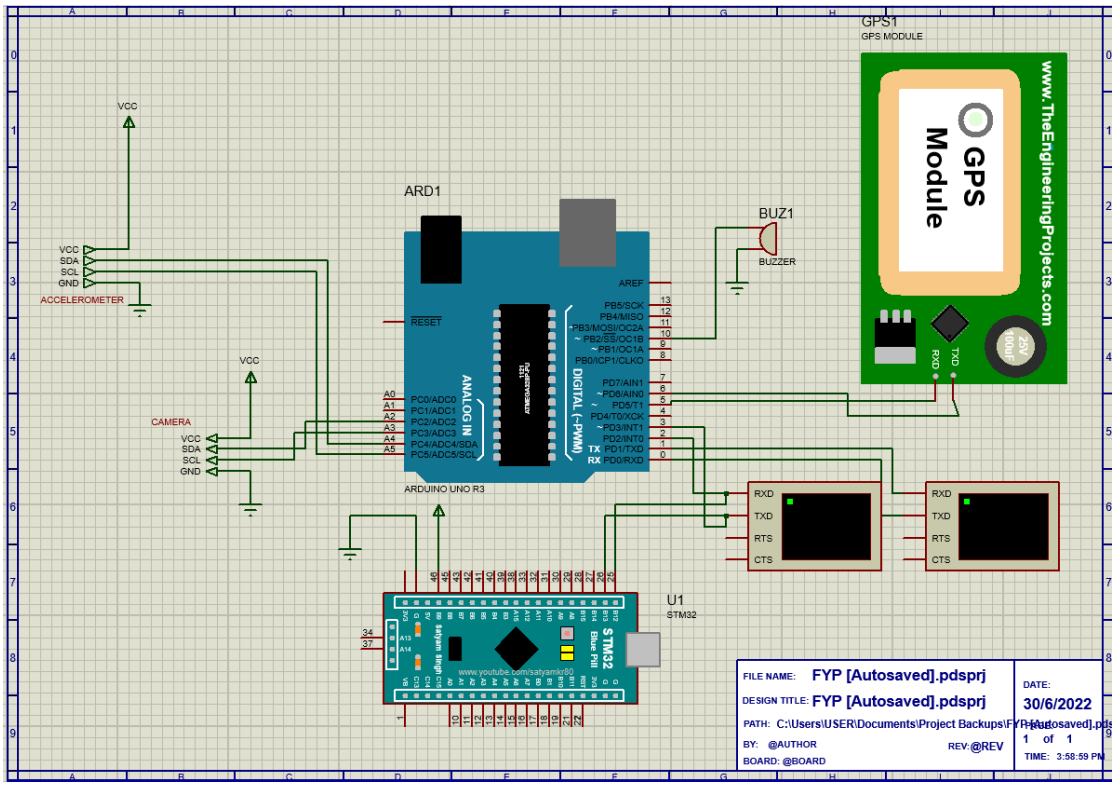


Figure 3.8 Circuit Diagram

3.9 Flowchart of Project

A flowchart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows. This allows anyone to view the flowchart and logically follow the process from beginning to end.

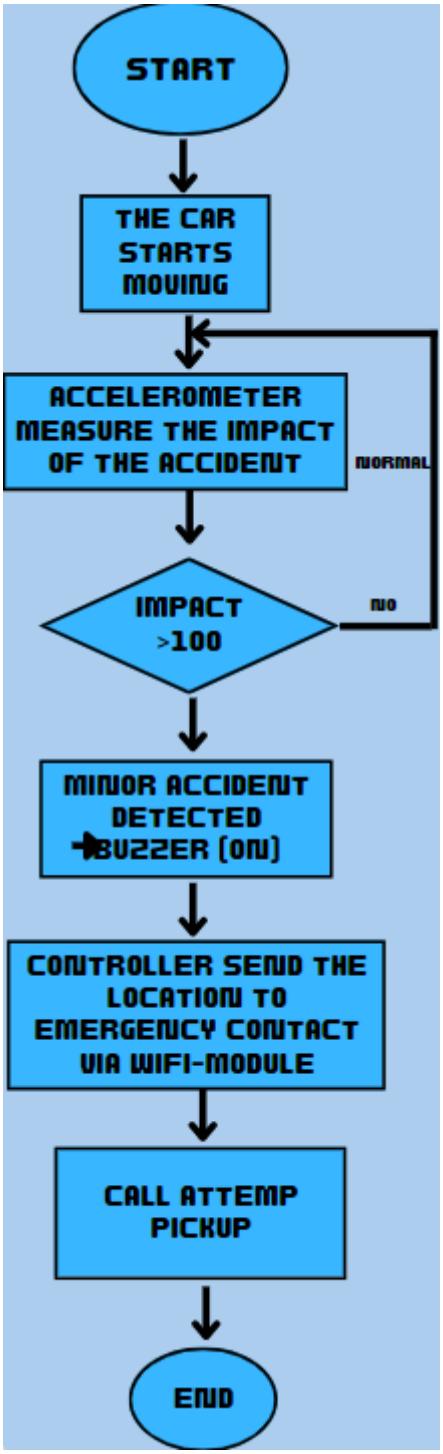


Figure 3.9.1 FLOWCHART

3.10 Chapter Summary

Based on chapter 3, I can conclude that by providing the best system can help us complete the project with better and effective results.

CHAPTER 4

RESULT AND ANALYSIS

4.1 Introduction

n this chapter, which is chapter 4, it presents the data and analysis obtained from the ***IOT ACCIDENT DETECTION SYSTEM*** test. This is to ensure that all research objectives and scope are achieved. To ensure the success of the project, every data was analyzed.

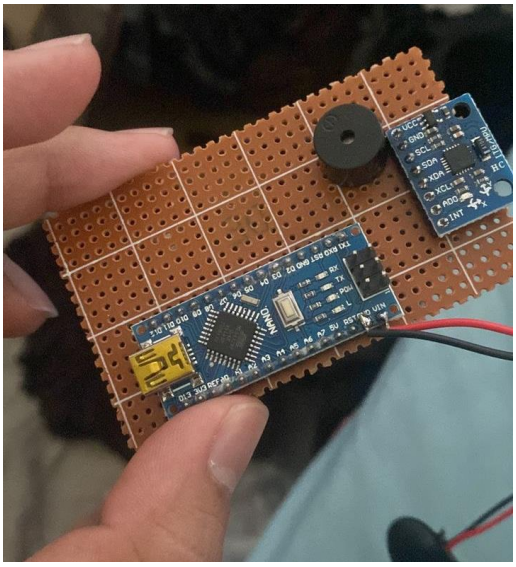
4.2 Process of The Project

A project begins with the initiation phase, where a project begins as a conceptualized idea. The initiation stage helps create a high-level project proposal that outlines the idea of the project, how it will work, and how it will meet the business' requirements. The key decision-makers will then determine if the project is feasible and whether or not it's worth undertaking.

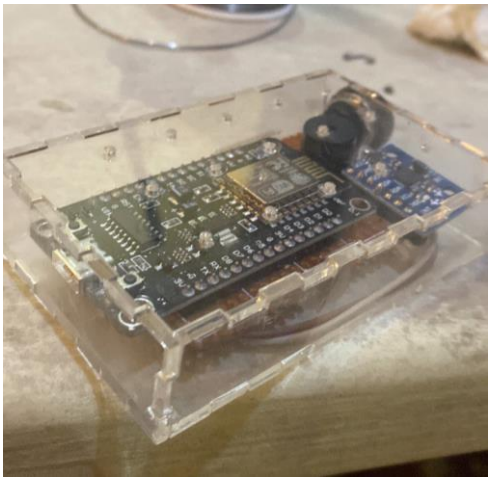
This process group involves defining the project on a broader level, determining the business need, and creating a project charter.

4.2.1 Make an Improvement

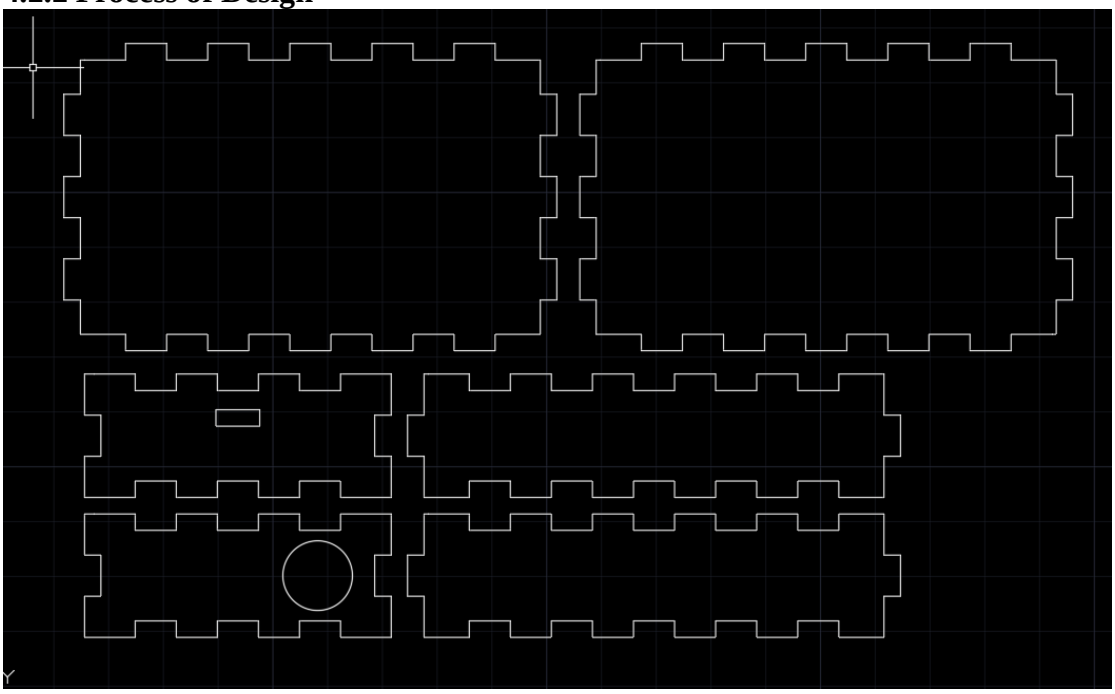
BEFORE

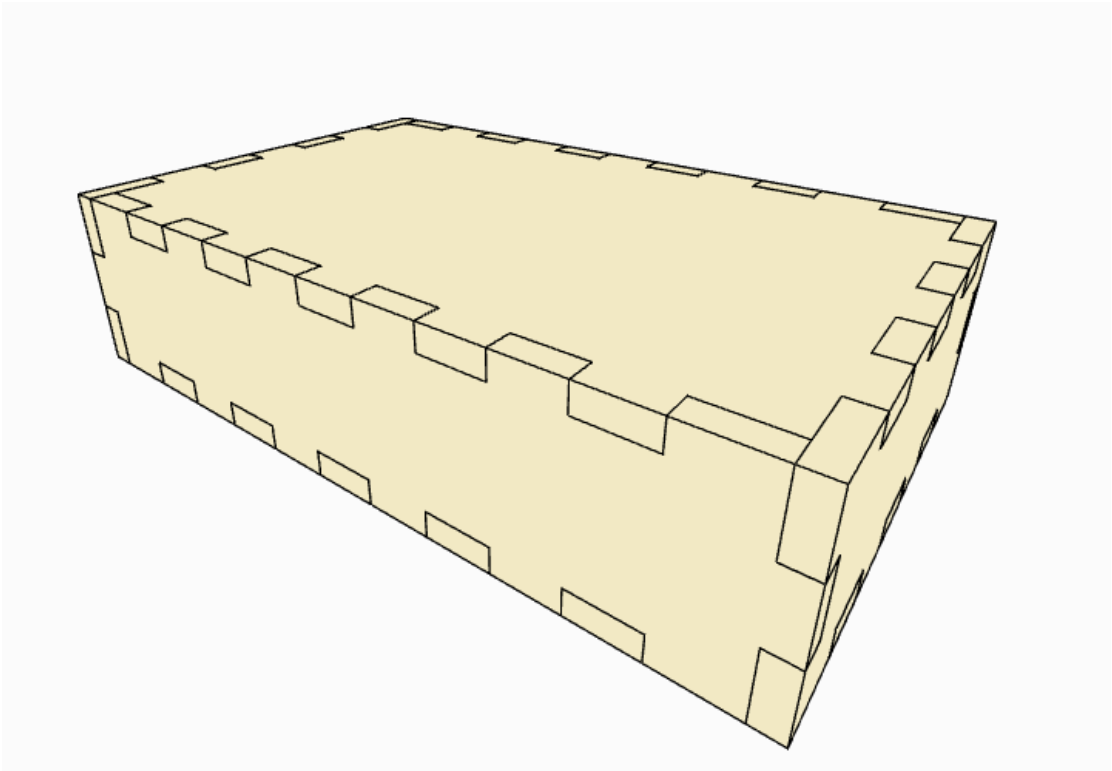


AFTER

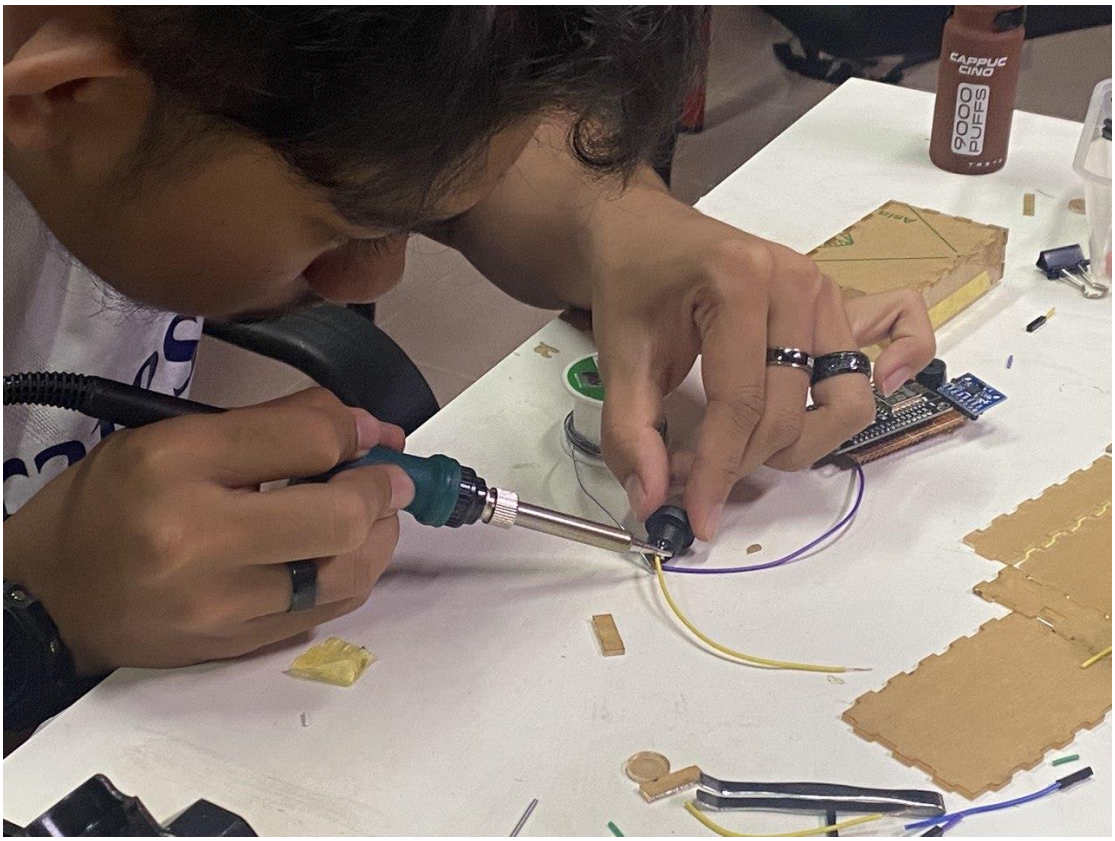


4.2.2 Process of Design

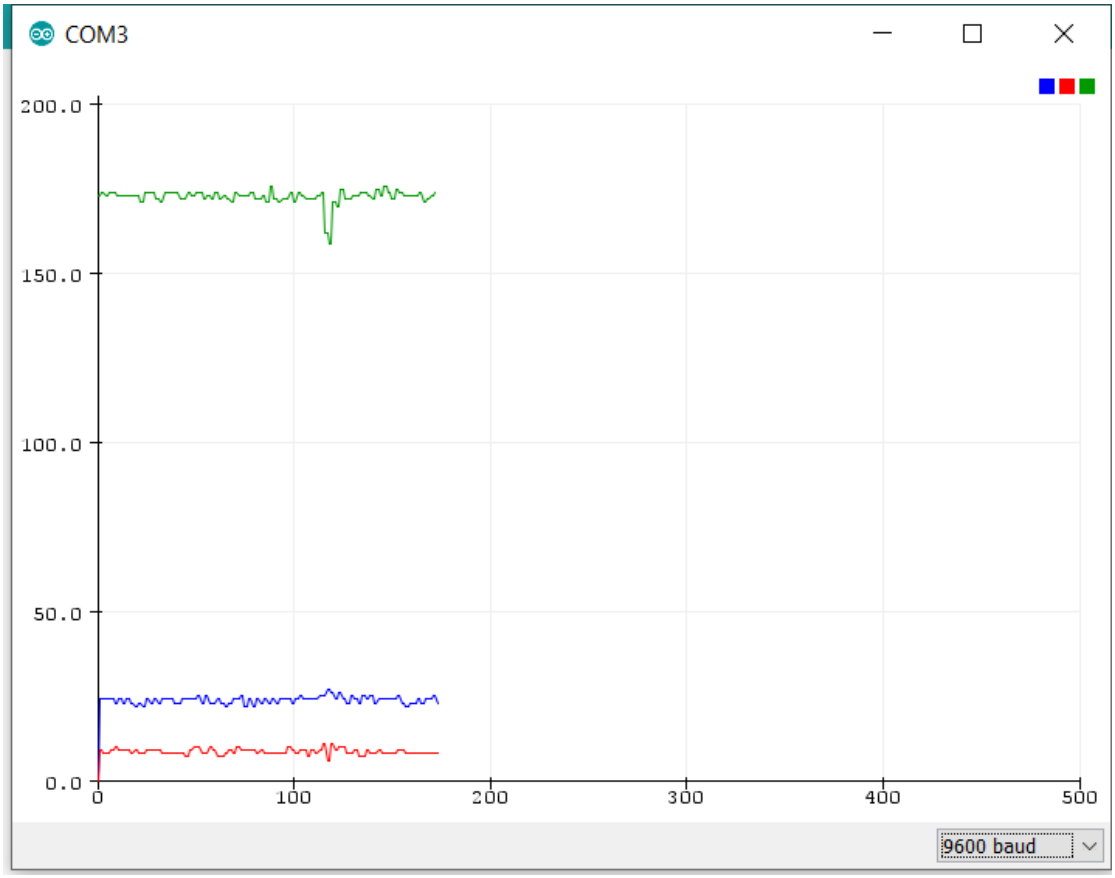


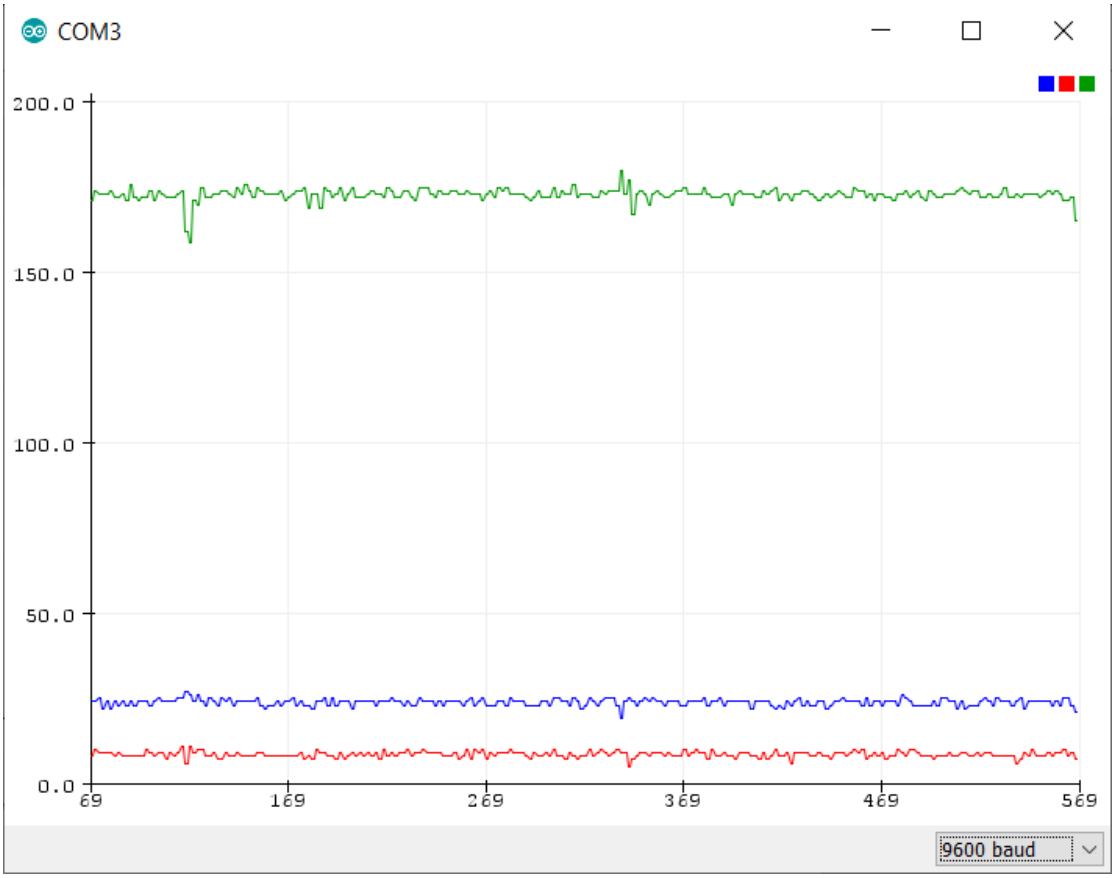


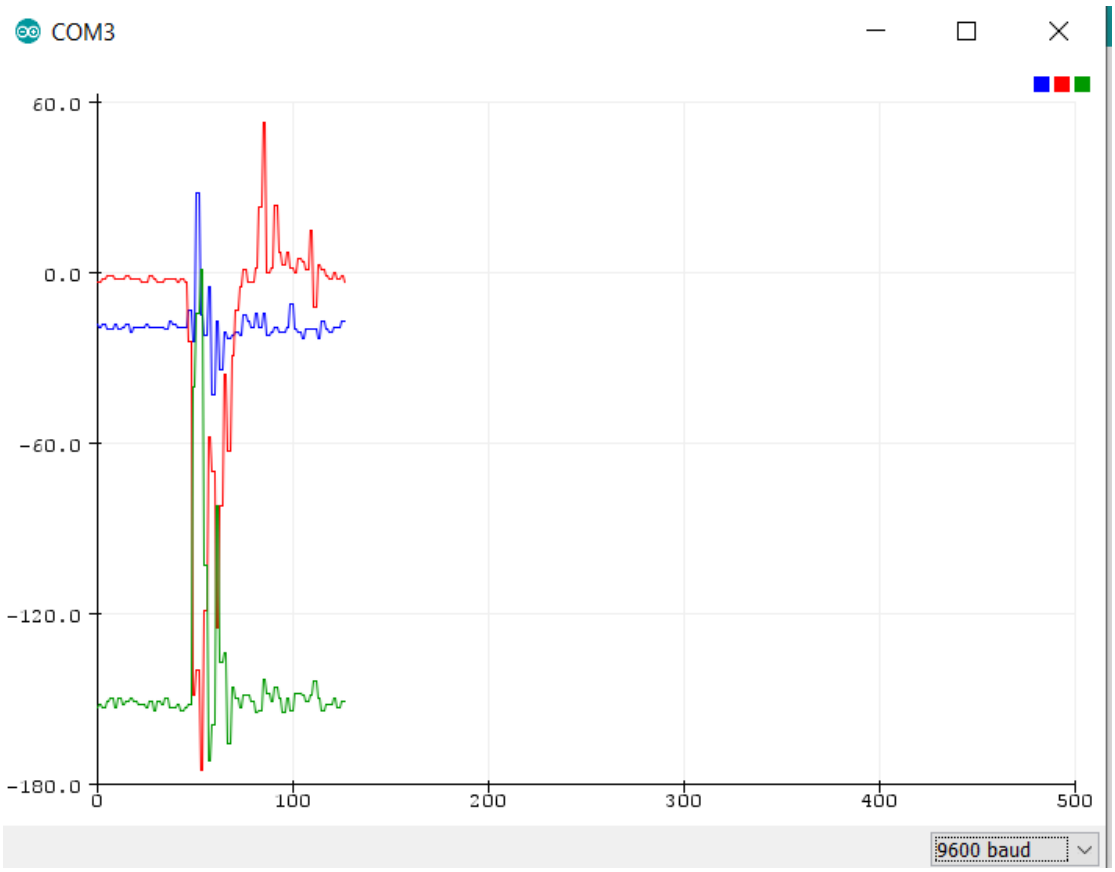
4.2.3 Soldering



4.3 Data of Testing






COM3
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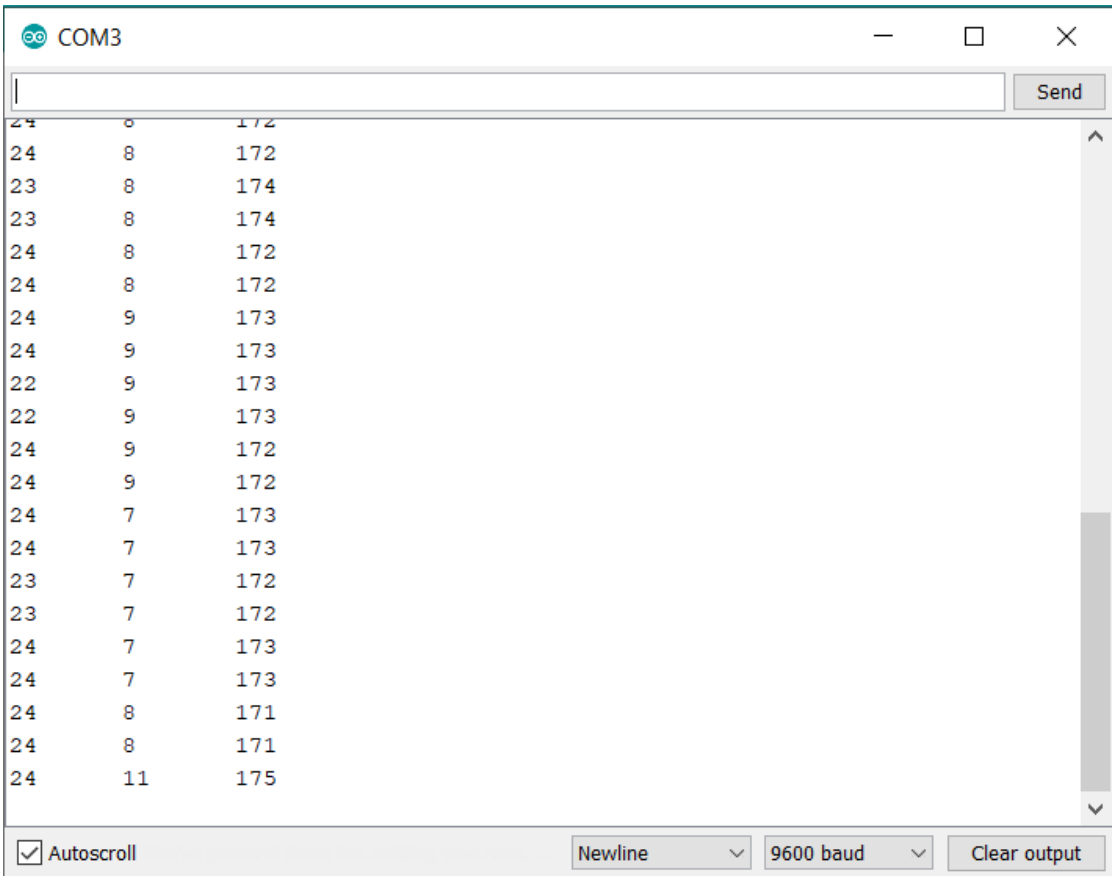
-60.0
-120.0
-180.0
0
100
200
300
400
500
9600 baud


COM3
Send
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24 7 173
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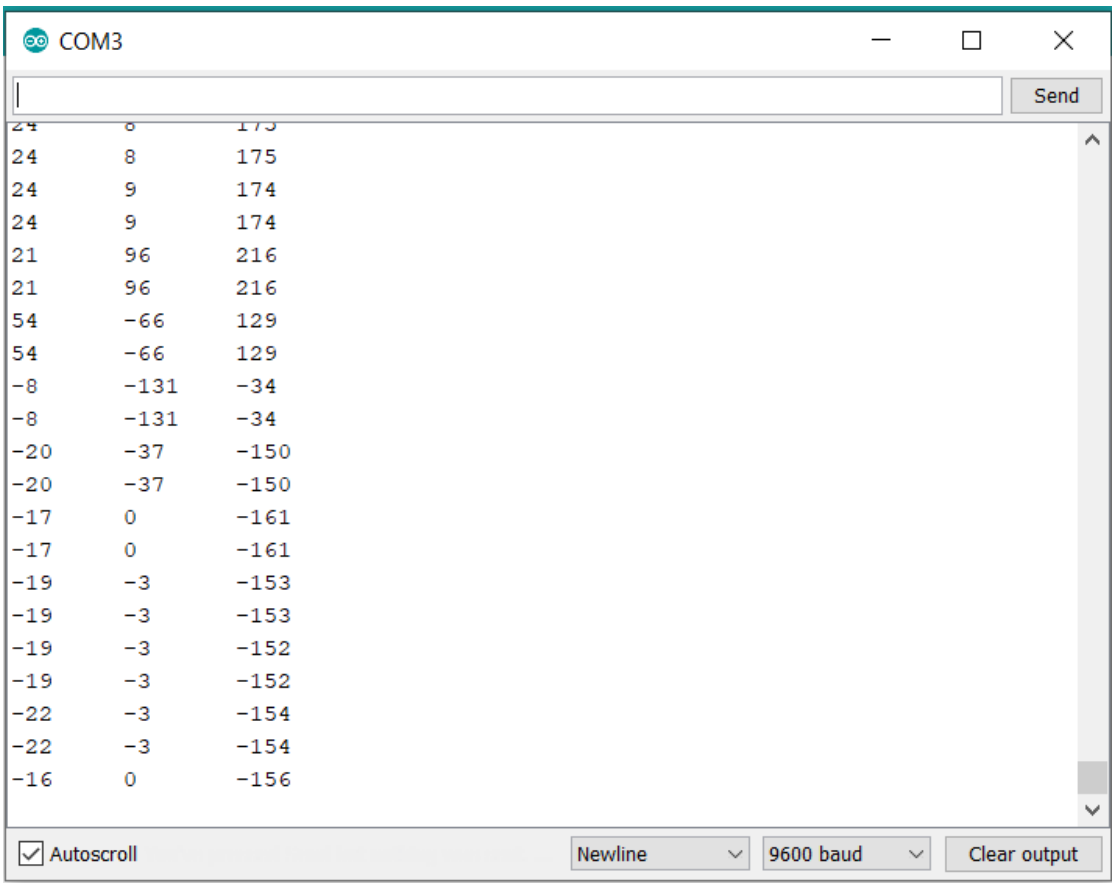
24 7 173
24 7 173
24 8 171
24 8 171
24 11 175
Autoscroll
Newline
9600 baud
Clear output


COM3
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24 9 174
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21 96 216
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-8 -131 -34
-8 -131 -34
-20 -37 -150
-20 -37 -150
-17 0 -161
-17 0 -161
-19 -3 -153
-19 -3 -153
-19 -3 -152
-19 -3 -152
-22 -3 -154
-22 -3 -154
-16 0 -156
Autoscroll
Newline
9600 baud
Clear output

4.4 Discussion

As already discussed, I have learned that this project is a good achievement for myself and others. I can see that this project brings me many good advantages as well as achieving the objective. For me, this project is a good start to gain more experience and knowledge about engineering and Iot that can lead us to help more people in the future as electrical engineering students. I use the process of 3D printing and engraving to make prototypes, and the material I use is acrylic. Acrylic is recyclable and biodegradable, making it the most environmentally friendly filament.

4.5 Summary

This chapter had explained that the result of the project has a great success rate as it develop well in the community. So much that I had learned from the result and gradually practice it inthis new norm. Even with so many hurdles I crossed path, I had continuously gotten better toovercome the problem so as result it happen with flying colors. As the method I used, I had could do many of the electrical practices that been learn especially for the programming and the engraving machine.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

It can be concluded that, with enough information such as location, the problem of death or more serious injuries such as continuous blood loss can be eliminated with quick emergency help.

By studying people's experiences regarding the length of time it takes to find the location of an accident, I can improve the system that has been built. This system can help ambulances or trusted people to find the location of the victim's accident faster

With specially selected sensors that are reliable and affordable have helped reduce the development cost by more than 50% and therefore make the entire system affordable to the masses.

5.2 Objective

The objectives that had been achieved are as follows:

1) Study the public's experience in conducting accident scene searches

2) To investigate iot accident detection

This is achieved through the research and study had been made on the Iot accident detection system.

3) To develop an iot accident detection prototype for the public

This is achieved by using simple, affordable and reliable tools.

4) To evaluate the performance of the developed prototype

This is achieved by carried out various kind of testing to the developed

prototype.

5.3 Summary

In conclusion, the iot accident detection system can help to reduce the time of searching for the location of an accident. With this system, it will make it easier for all parties so that nothing worse happens to the victim. It is built with an Arduino board. By using low-cost and reliable software and hardware, it will definitely be a system that everyone can afford.

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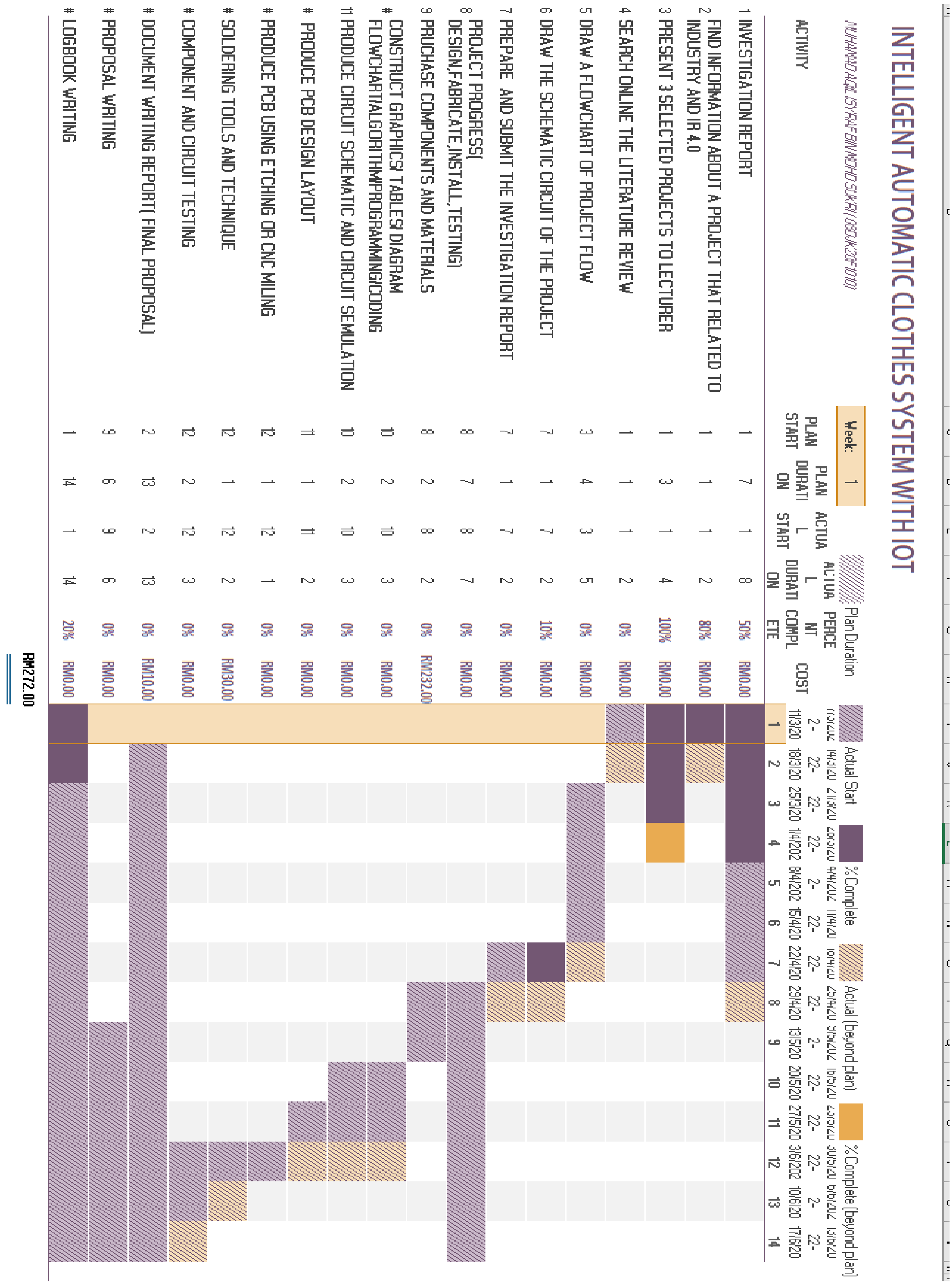
APPENDICES

ATTACHMENT A	**Gantt Chart (Project 1)**
ATTACHMENT B	**Project Budget**
ATTACHMENT C	**Coding of Project**

ATTACHMENT A

Gantt Chart (Project 1)



ATTACHMENT B

Budget of The Project

NO	COMPONEN	RM	QUANTITY	TOTAL (RM)
1.	WIFI MODULE	33.00	1	33.00
2.	BUZZER	3.00	1	3.00
3.	ACCELEROMETTER	20.00	1	20.00
4.	RESET BUTTON	3.00	1	3.00
5.	ACRYLIC	10.00	1	10.00
TOTAL				RM69.00

ATTACHMENT C

Coding of Project

INCIDENT_CODING

```
//Working with ESP-01
#define BLYNK_PRINT Serial

#include <ESP8266WiFi.h>
#include <BlynkSimpleStream.h>
#include "Wire.h" // This library allows you to communicate with I2C devices.

#define Buzz D3

// Your WiFi credentials.
// Set password to "" for open networks.
const char* ssid = "WIFI";
const char* pass = "12345678";

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "6a4Ep0AUj4lXh9zGmYKKqEpNP458z5Vg";
char server[] = "139.59.206.133";
```

```
int indexs=0;
int Alarm=0,Alarm1=0;
int TMPX=0;
int Almxx=0;
float IV=0,OldIV=0;
float PerIV=0,OldPerIV=0;
int MODE=0;
int Beat,BPM,SPO2;
int Counter,BeatCycle = 0;
int countsend=0;
int cycle=0;  float voltage=0;
String DATA="";
int P1=0, P2=0, P3=0, P4=0;
int Rly1=0, Rly2=0, Rly3=0, Rly4=0, Rly5=0;
int led1x=0.led2x=0.led3x=0.led4x=0:
WiFiClient wifiClient;

// This function tries to connect to the cloud using TCP
bool connectBlynk()
{
  wifiClient.stop();
 // return wifiClient.connect(BLYNK_DEFAULT_DOMAIN, BLYNK_DEFAULT_PORT);
  return wifiClient.connect(server, BLYNK_DEFAULT_PORT);
}

// This function tries to connect to your WiFi network
void connectWiFi()
{
  Serial.print("Connecting to ");
  Serial.println(ssid);

  if (pass && strlen(pass)) {
    WiFi.begin((char*)ssid, (char*)pass);
  } else {
    WiFi.begin((char*)ssid);
  }

  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
}
```

```
BLYNK_WRITE(V4)
{
   lat=param[0].asFloat();
   lon=param[1].asFloat();
   alt=param[2].asFloat();
   spd=param[3].asFloat();
}
WidgetMap myMap(V3);
//----------------------Manage Virtual Pin--------------------------
BLYNK_WRITE(V10)
{
  int pinValue = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly1=pinValue;
  if (Rly1==1){
    Alarm=0;
    Alarm1=0;
    Blynk.virtualWrite(V0, "NORMAL");
  }
  // process received value
}
BLYNK_WRITE(V11)
{
  int pinValue1 = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly2=pinValue1;
  // process received value
}

BLYNK_WRITE(V12)
{
  int pinValue3 = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly3=pinValue3;
  // process received value
}
BLYNK_WRITE(V13)
{
  int pinValue4 = param.asInt(); // assigning incoming value from pin V1 to a variable

  Rly4=pinValue4;
}
BLYNK_WRITE(V14)
{
  int pinValue5 = param.asInt(); // assigning incoming value from pin V1 to a variable

  Rly5=pinValue5;
}



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

const int MPU_ADDR = 0x68; // I2C address of the MPU-6050. If AD0 pin is set to HIGH, the I2C address will be 0x69.

int16_t accelerometer_x, accelerometer_y, accelerometer_z; // variables for accelerometer raw data
int16_t gyro_x, gyro_y, gyro_z; // variables for gyro raw data
int16_t temperature; // variables for temperature data

char tmp_str[7]; // temporary variable used in convert function
String Temp,x,y,z;
char* convert_int16_to_str(int16_t i) { // converts int16 to string. Moreover, resulting strings will have the same length in the debug monitor.
  sprintf(tmp_str, "%6d", i);
  return tmp_str;
}
```

```
void setup()
{
pinMode(Buzz,OUTPUT);
  Serial.begin(9600);
  Wire.begin();
  Wire.beginTransmission(MPU_ADDR); // Begins a transmission to the I2C slave (GY-521 board)
  Wire.write(0x6B); // PWR_MGMT_1 register
  Wire.write(0); // set to zero (wakes up the MPU-6050)
  Wire.endTransmission(true);

  connectWiFi();

  connectBlynk();

  Blynk.begin(wifiClient, auth);

delay(3000);
Blynk.virtualWrite(V0, "NORMAL");
digitalWrite(Buzz,HIGH);
delay(30);
digitalWrite(Buzz,LOW);
delay(30);
digitalWrite(Buzz,HIGH);
delay(30);
digitalWrite(Buzz,LOW);
delay(30);

*/

Timer++;
Wire.beginTransmission(MPU_ADDR);
 Wire.write(0x3B); // starting with register 0x3B (ACCEL_XOUT_H) [MPU-6000 and MPU-6050 Register Map and Descriptions Revision 4.2, p.40]
 Wire.endTransmission(false); // the parameter indicates that the Arduino will send a restart. As a result, the connection is kept active.
 Wire.requestFrom(MPU_ADDR, 7*2, true); // request a total of 7*2=14 registers

 // "Wire.read()<<8 | Wire.read();" means two registers are read and stored in the same variable
 accelerometer_x = Wire.read()<<8 | Wire.read(); // reading registers: 0x3B (ACCEL_XOUT_H) and 0x3C (ACCEL_XOUT_L)
 accelerometer_y = Wire.read()<<8 | Wire.read(); // reading registers: 0x3D (ACCEL_YOUT_H) and 0x3E (ACCEL_YOUT_L)
 accelerometer_z = Wire.read()<<8 | Wire.read(); // reading registers: 0x3F (ACCEL_ZOUT_H) and 0x40 (ACCEL_ZOUT_L)
 temperature = Wire.read()<<8 | Wire.read(); // reading registers: 0x41 (TEMP_OUT_H) and 0x42 (TEMP_OUT_L)
 gyro_x = Wire.read()<<8 | Wire.read(); // reading registers: 0x43 (GYRO_XOUT_H) and 0x44 (GYRO_XOUT_L)
 gyro_y = Wire.read()<<8 | Wire.read(); // reading registers: 0x45 (GYRO_YOUT_H) and 0x46 (GYRO_YOUT_L)
 gyro_z = Wire.read()<<8 | Wire.read(); // reading registers: 0x47 (GYRO_ZOUT_H) and 0x48 (GYRO_ZOUT_L)

 // print out data
// Serial.print("aX = "); Serial.print(convert_int16_to_str(accelerometer_x));
// Serial.print(" | aY = "); Serial.print(convert_int16_to_str(accelerometer_y));
// Serial.print(" | aZ = "); Serial.print(convert_int16_to_str(accelerometer_z));
 // the following equation was taken from the documentation [MPU-6000/MPU-6050 Register Map and Description, p.30]
// Serial.print(" | tmp = "); Serial.print(temperature/340.00+36.53);
x=convert_int16_to_str(accelerometer_x);
y=convert_int16_to_str(accelerometer_y);
z=convert_int16_to_str(accelerometer_z);
 Temp=temperature/340.00+36.53;
//  Serial.print(" | gX = "); Serial.print(convert_int16_to_str(gyro_x));
//  Serial.print(" | gY = "); Serial.print(convert_int16_to_str(gyro_y));
//  Serial.print(" | gZ = "); Serial.print(convert_int16_to_str(gyro_z));
```

```
  Timer=0;
}



 while (Serial.available()) {
    // get the new byte:
    char inChar1 = (char)Serial.read();
  if (inChar1 == '*') {
      DataIn++;

    }

if (inChar1 == 'X'){
  if (ALERT!=1){

  DATA="";
  ALERT=1;
  DATA= "ALERT!";



  }

}

    while (DataIn > 0){
        while (Serial.available()) {
    // get the new byte:
    char inChar = (char)Serial.read();
    if (inChar == '*') {
      DataIn++;
```

```
  }
  if (inChar != '*' && inChar != '#' && DataIn==1) {
    Temp1x+=inChar;

  }
  if (inChar != '*' && inChar != '#' && DataIn==2) {
    Temp2x+=inChar;

  }
  if (inChar != '*' && inChar != '#' && DataIn==3) {
    Temp3x+=inChar;

  }
   if (inChar != '*' && inChar != '#' && DataIn==4) {
    Temp4x+=inChar;

  }


  if (inChar == '#') {
    DataIn=0;
   Temp1y=Temp1x;    PHy=PHx;       Temp2y=Temp2x;   Temp3y=Temp3x;   Temp4y=Temp4x;
   Temp1x="";
   PHx="";    Temp2x=""; Temp3x="";



  }
      }

  }
//*************************************************************************************************************************
```