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# PCB Design for IoT Based Fire Alarm System

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# INTRODUCTION

## Fire Alarm System

A fire alarm system is a system applied in the field of security and safety, as it detects if there is an indication of a fire situation. Omar et al (2014) state the general components of a hardwired fire alarm circuit comprise sensors, a controlling device, and a buzzer.

## Server Room Fire

Abhinav et al (2017) state that it has been found in a survey that 80% of losses are caused due to fire would have been avoided if the fire was detected immediately. A server room is a place where important data is stored inside physical hardware called servers. Fire in server rooms is common due to overheated CPUs blowing up, electronic components short-circuiting or overloading.

# Objectives

01. To design and determine the components of the fire alarm on a PCB for a server room.

02. To design a low-cost and low-maintenance system, by implementing on a Printed Circuit Board (PCB).

03. To integrate and test the fire detection system on the PCB (Printed Circuit Board) with IoT platform.

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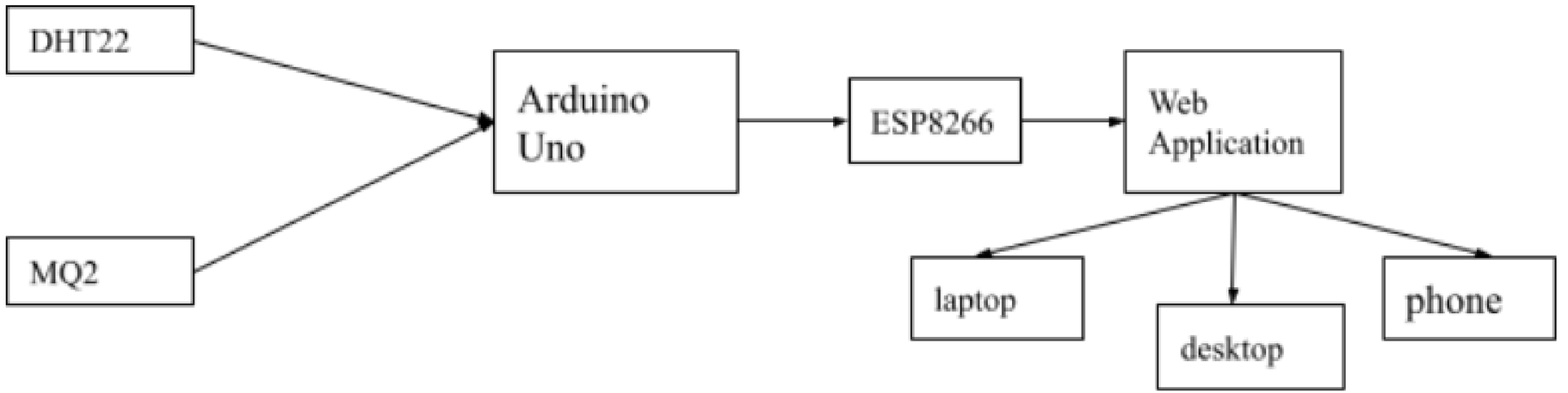


Figure 3.5 Proposed System Architecture

STEP 1

# RESEARCH METHODOLOGY

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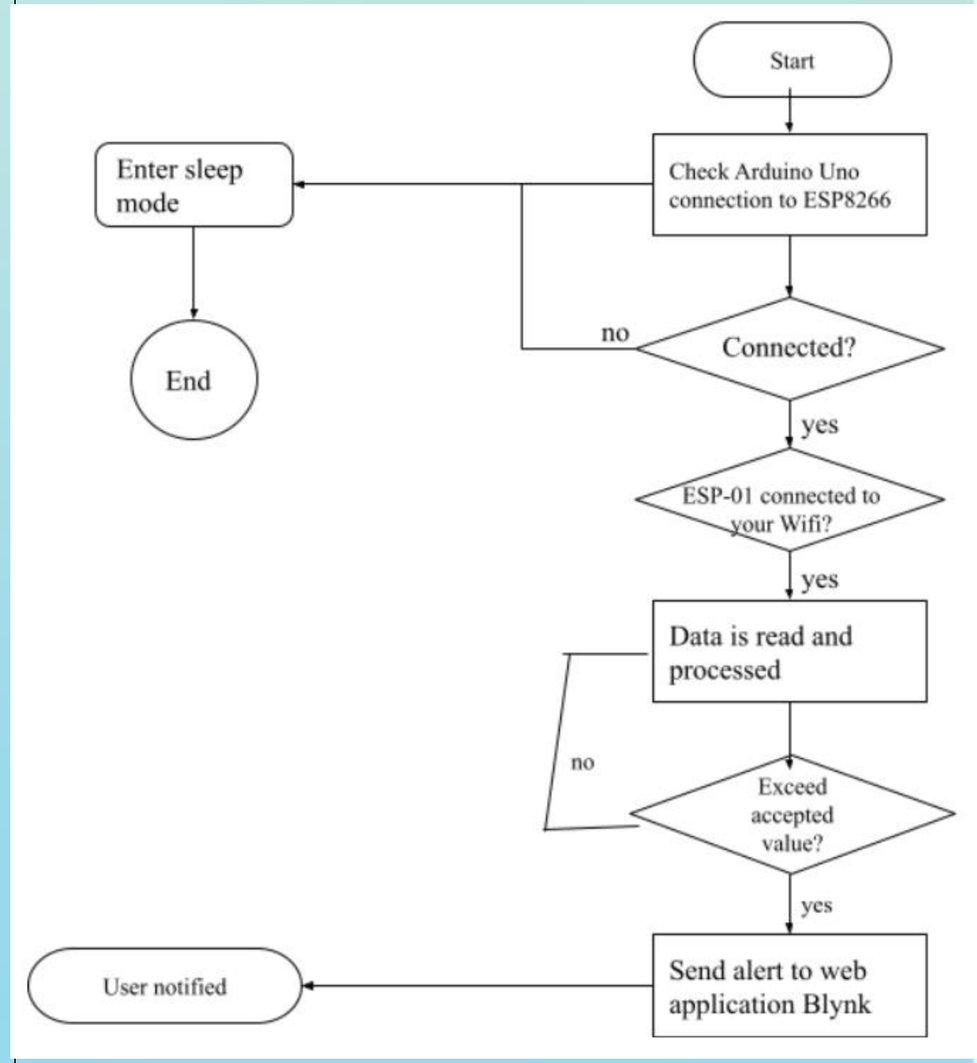
# Data Flowchart

1.The data received from the sensors are processed by the Arduino Uno and sent to the ESP8266 WiFi Module for communication purposes. The connections between the board and WiFi module will be checked, and if it is established, the WiFi module connected to the user's WiFi network is also checked. If the connections are faulty, the system will remain in sleep mode. Once the connections are established, the data is collected and processed. If the measured value is lower than the desired value, the processor continues to read the data from the processor. If the measured value exceeds the desired value, the data will be sent to the web application Blynk which will alert the user graphically.



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# PCB Flowchart

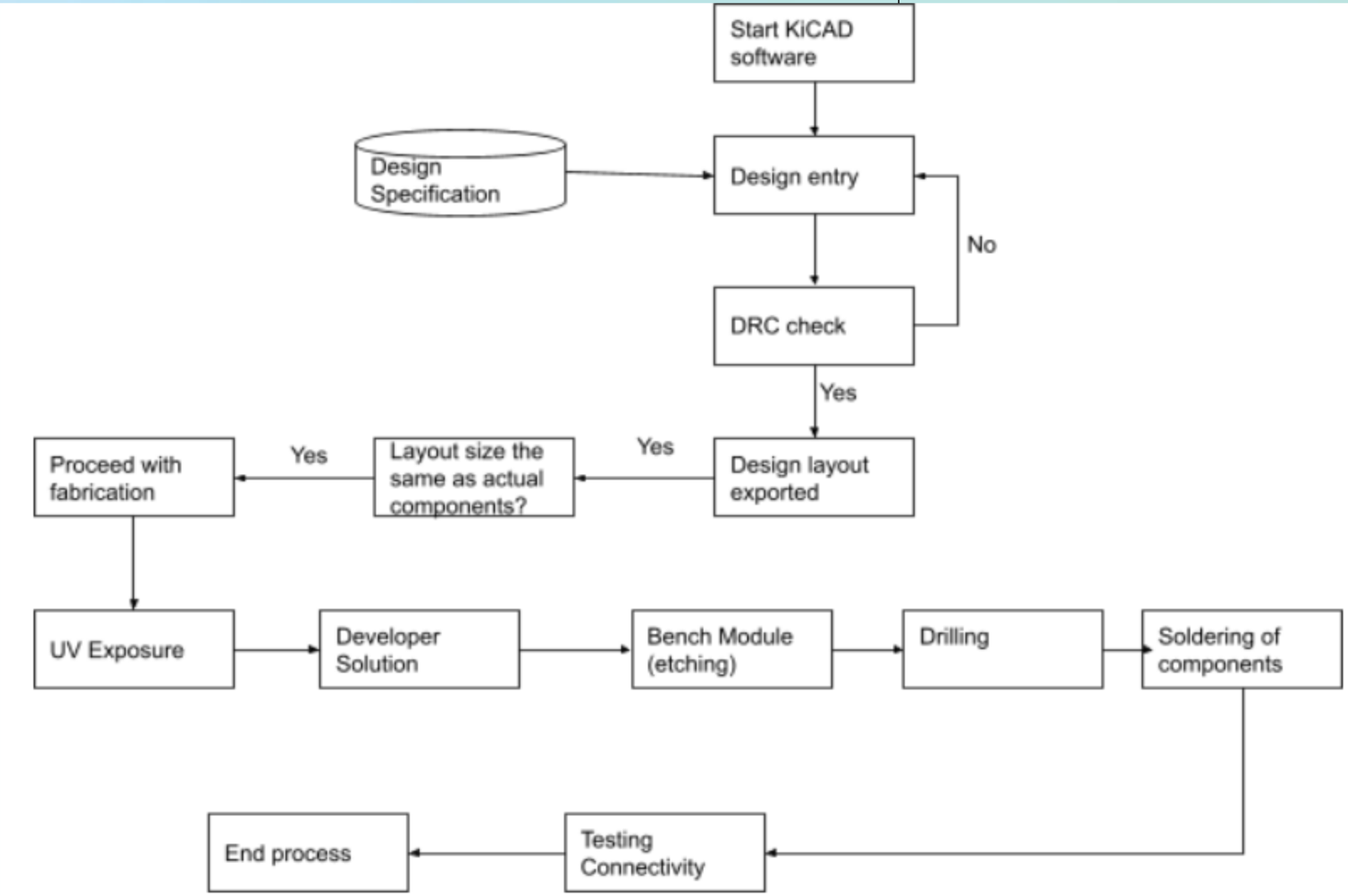


Figure 3.4 PCB Fabrication Flowchart

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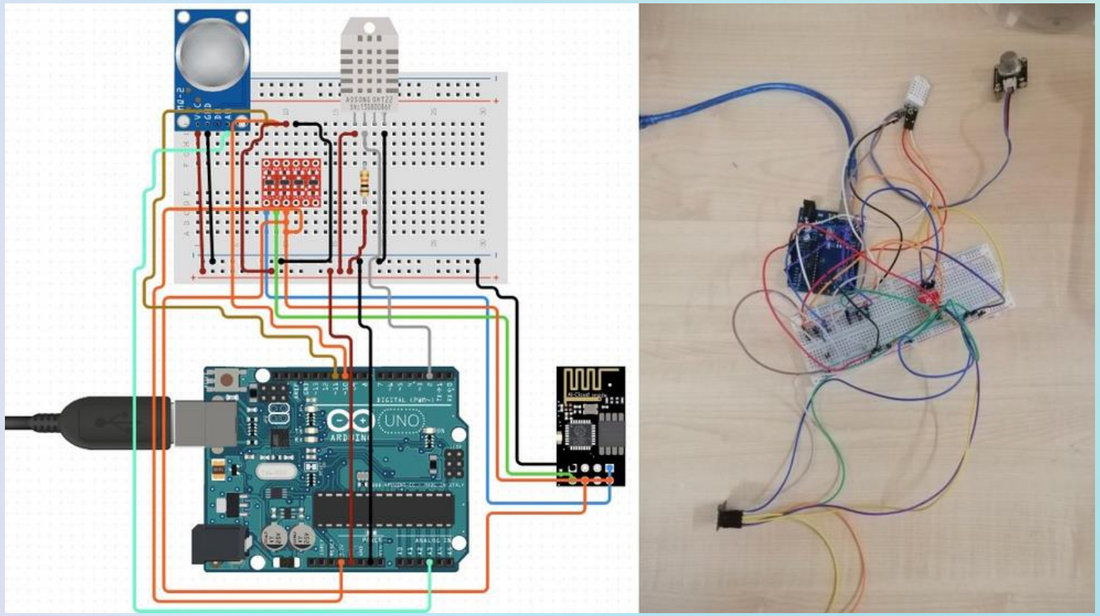
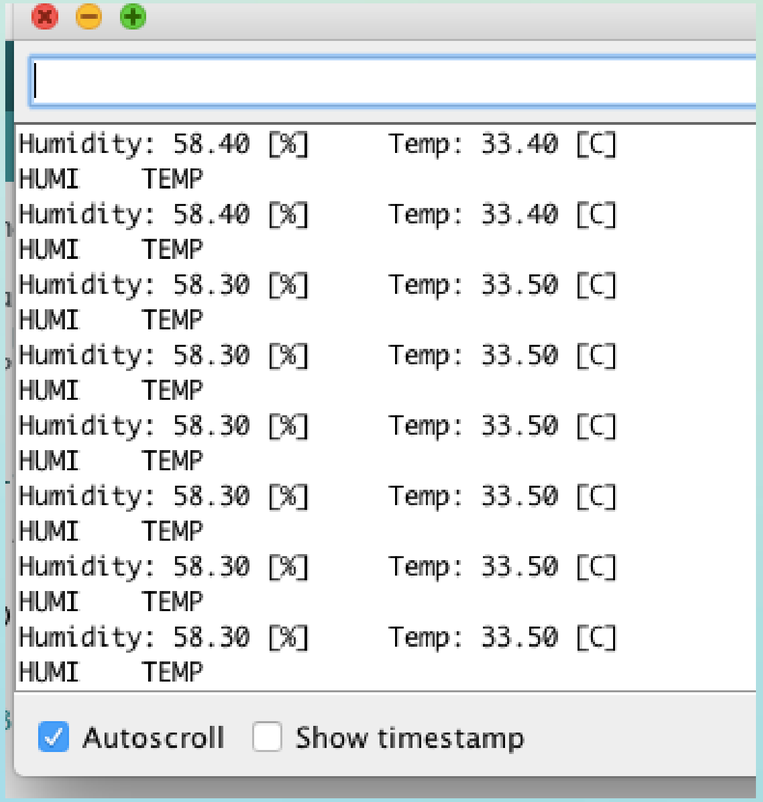
# TEST STAGE RESULTS

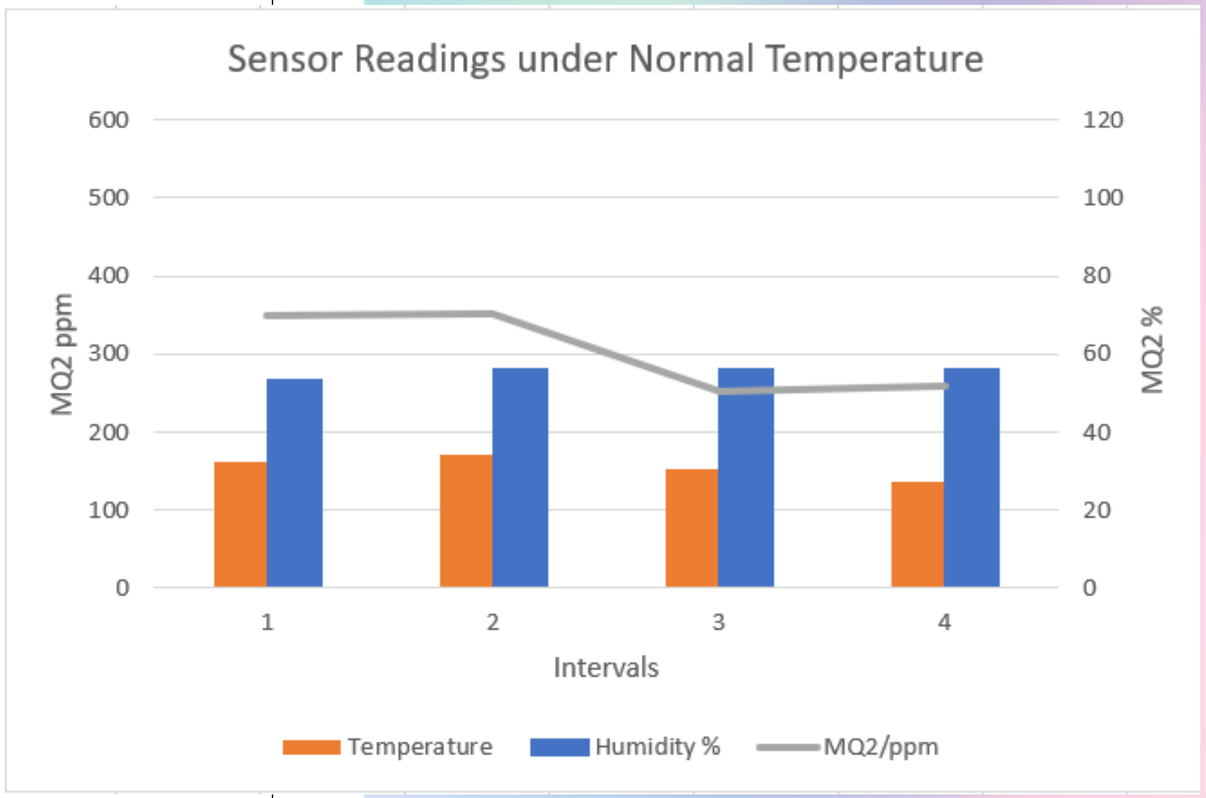
The figures below illustrate the finding at the testing stage, after connecting all the components. The readings obtained from the sensors under normal temperature is given below



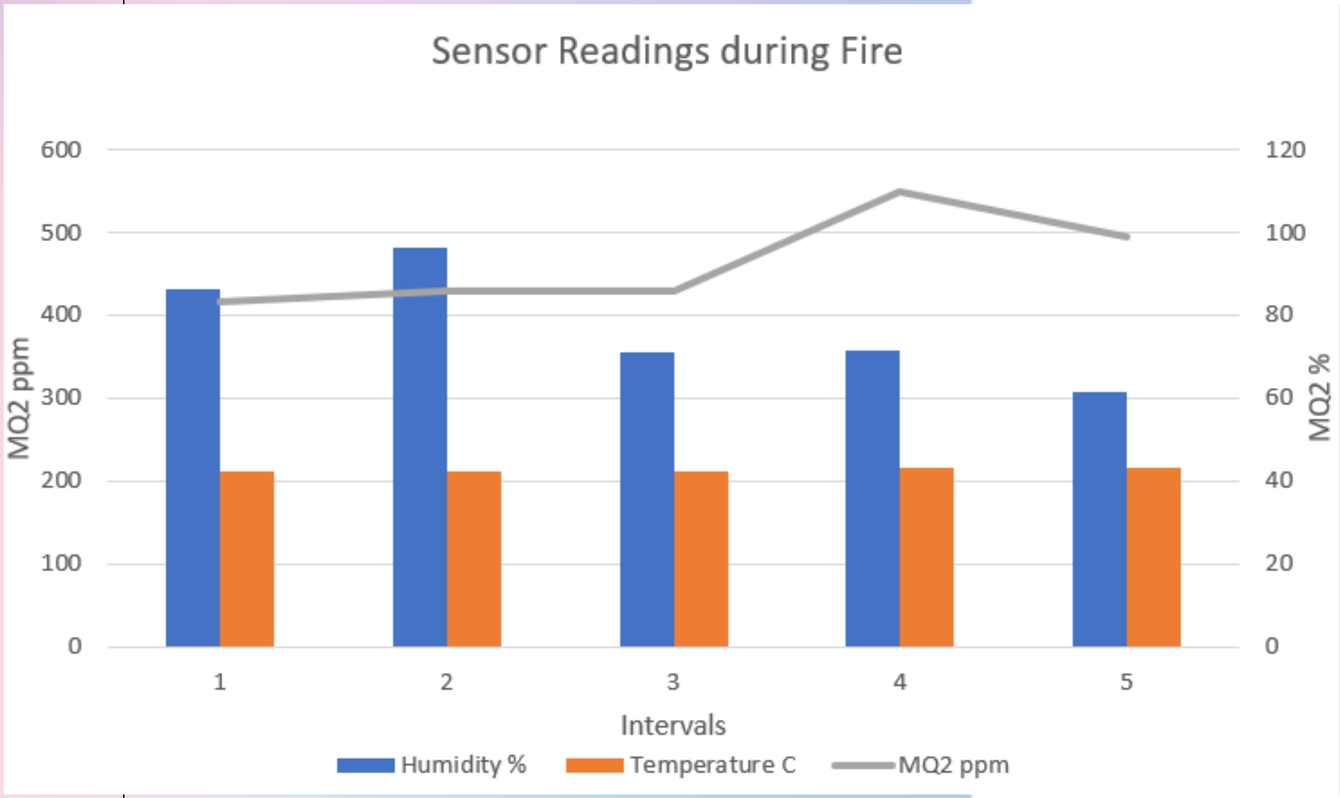





Blynk Application readings during normal temperature and during a fire hazard:




Under Normal conditions




Under a Fire hazard condition

The readings suggest that when a fire erupts, the temperature readings increases and therefore sends a notification to the user. Hence, we can conclude that the system is working properly and is ready to be designed and developed into a PCB.

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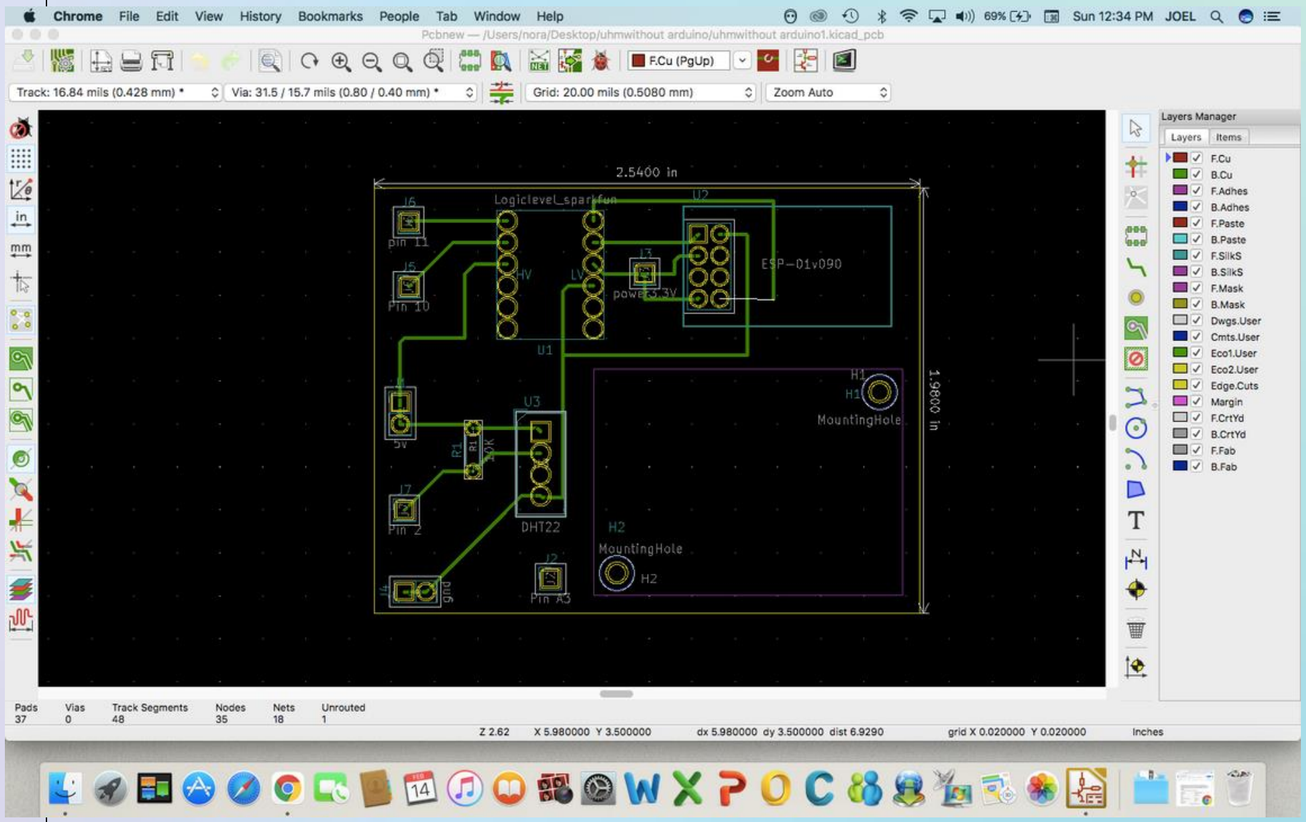
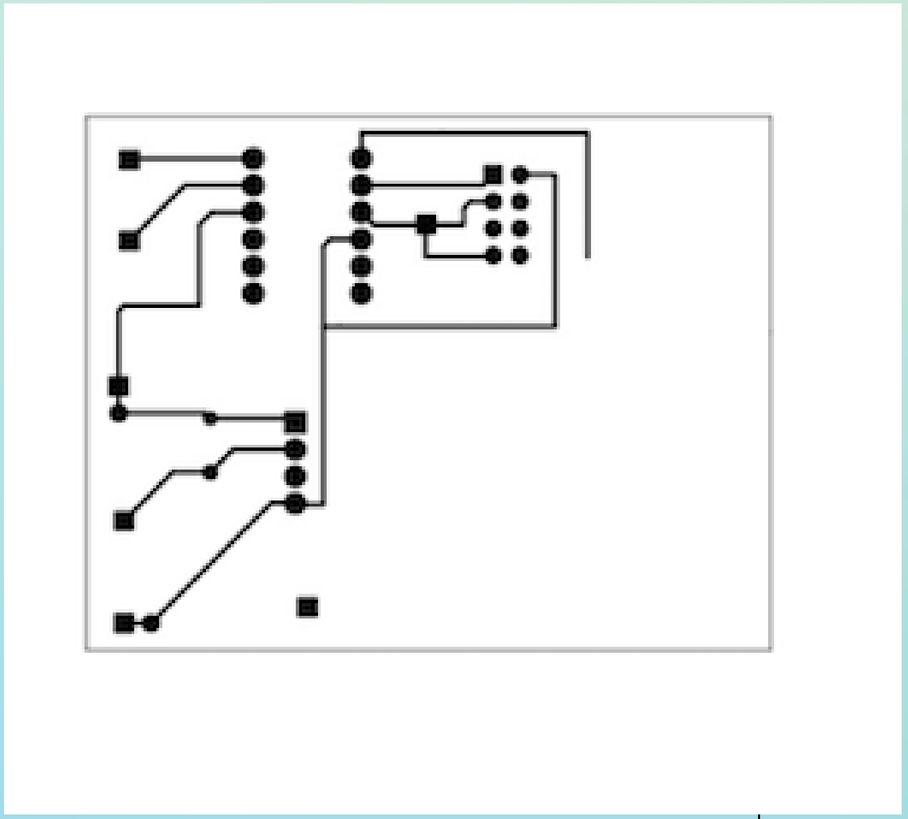
# PCB RESULTS

At PCB design stage, the following layout was made:



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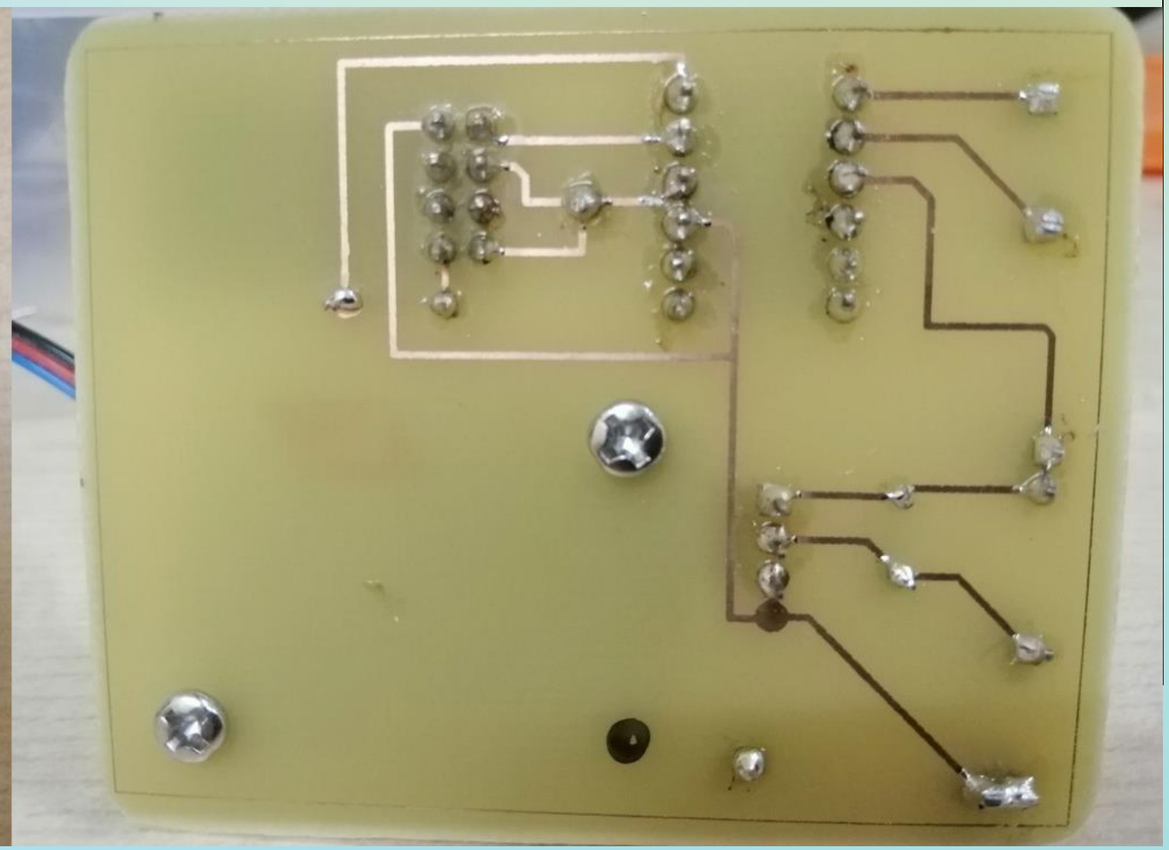
At fabrication stage, the design simulation is complete and prepared for fabrication. The components are physically integrated on a copper-routed circuit board and the end product is shown below:

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# CONCLUSION

*The proposed fire alarm system has advantages over existing fire alarms in terms of size, IoT gateway used, and the use of one-layered PCB. The main components are chosen based on expense, reliability, and availability.*

- *Choosing optimum components and testing on a breadboard before manufacturing.*
- *Designing the PCB on software to produce a print out the layout.*
- *Manufacturing a single-sided PCB and soldering components on the board*
- *To analyze the performance of the circuit after PCB manufacturing and achieving data successfully.*