A MINI- PROJECT REPORT ON

"CONTACTLESS INFRARED TEMPERATURE SENSOR"

SUBMITTED TO UNIVERSITY OF PUNE
FOR PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF ENGINEERING
In
Electronics and Telecommunication

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CERTIFICATE

This is to certify that the Mini-Project Report entitled
"CONTACTLESS INFRARED TEMPERATURE SENSOR"
Has been successfully completed by

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towards the partial fulfillment of the degree of

BACHELOR OF ENGINEERING

in DEPT. OF ELECTRONICS AND TELECOMMUNICATION

as awarded by the Savitribai Phule Pune University,

at PUNE VIDYARTHI GRIHA'S COLLEGE OF ENGINEERING & TECHNOLOGY
&
G. K. PATE(WANI) INSTITUTE OF MANAGEMENT, PUNE-9

during the academic year 2022-2023.

(Prof.Mr.Ravi Patil) Mini-Project Guide	(Dr. Y. B. Thakare) Head of Department E&TC

Place: Pune

Date:

ACKNOWLEDGEMENT

It gives us an immense pleasure to submit this project report on "**Contactless Infrared Temperature Sensor** " We tried our level of best to represent this topic in precise manner briefing the important points related to this topic.

We have great pleasure in expressing our gratitude to Dr. Yogesh B. Thakare, the head of our department, for providing sufficient infrastructure and good environment in the college to complete our course. We would like to express our sincere thanks to our teacher's for their meticulous attention towards our work.

We wish to express our sincere thanks with proudful gratitude to our guide Mr. R.K. Patil for her instrumental guidance and constant motivation without which it would have been impossible for us to present and complete this project successfully.

We also want to thank all our dear friends for their unconditional and timely help and support. It is our pleasant privilege to express our sincere gratitude to our beloved parents to have been our pillars of strength throughout and it's all because of their blessings that we are standing here at this stage of our life. We thank almighty for everything we have received in our life.

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ABSTRACT

In present situations, social distancing is the most important fact. Furthermore, the fact is COVID-19 patient's first symptom is body temperature is high. The reason why, measuring body temperature is most important, but needs to maintain social distancing. While traditional thermometers can't make sure of social distancing, where our developed contactless thermometer can achieve temperature on display by using Arduino unoR3 as the main control device as well as MLX90614 as the infrared (IR) thermometer sensor.

As a result, compared with the traditional thermometer, it shows strong points such as convenient reading, wide range of temperature measurement, and accuracy where temperature output is displayed digitally. Besides, it would be used everywhere because of its easy-handling.

In order to realize the human body temperature fast and non-contact measurement, an infrared thermometer is designed. The infrared human body temperature sensor is mainly used to convert the human body's infrared into voltage signal, an operational amplifier to amplify the signal, filter circuit to filter the signal, the analog signal into digital signal by the A/D conversion circuit, data processing by the MCU, LCD display and voice reporting body temperature and time, so the human body non-contact measurement is realized.

Chapter 1

1. INTRODUCATION

Introduction to project :

In recent times, World is going towards a bad situation due to the Coronavirus disease (COVID-19). Where most of the country in hugely are suffering from this disease as well as everyone is endangered for unseen viruses. An infrared thermometer is a thermometer which infers temperature from a portion of the thermal radiation sometimes called black-body radiation emitted by the object being measured. They are sometimes called laser thermometers as a laser is used to help aim the thermometer, or non-contact thermometers or temperature guns, to describe the device's ability to measure temperature from a distance. Infrared thermometers can be used to serve a wide variety of temperature monitoring functions. A few examples provided include checking mechanical or electrical equipment for temperature and hot spots, measuring the temperature of patients in a hospital without touching them, checking heater or oven temperature, for calibration and control, checking for hot spots in fire-fighting, monitoring materials in processes involving heating or cooling .

A traditional thermometer which is now being developed and used for measuring body temperature from objects is high risk for all because of keeping nearly touch that is not long distance from the affected people. In that case, contactless thermometers can be used everywhere such as normal places or risky places. For example, to measure hot bodies temperature in industries and research laboratories. Furthermore , in the medical field, where a badly infected/burned patient's body temperature measurement is unsafe and insecure. In this place a contactless thermometer is much helpful. It is easy, safe and accurate to measure temperature. In this paper we describe the principle of making contactless thermometers. In this system, an Arduino Pro mini, MLX90614 temperature sensor, OLED Display and battery as power source are included for providing the developed system. In our thermometer wide -70 to 380˚C range temperature measurement with accuracy of 0.5˚C .The digital display system for the output of the temperature is simple and economic, operation reliable and environmental friendly.

1.1 Aim :

The aim of the Contactless Infrared Temperature Sensor Project using Arduino is Using non-contact temperature measurement devices may help reduce the risk of spreading COVID-19 infections. So, the objective of project is to design a Low cost, Easy to build Contactless .Thermometer that can measure body temperature.

1.2 Objective of the work :

Today in many public places and in other gatherings, it has become common to screen individuals for body temperature, as a preventive measure to check for fever. The device that is used to do this is called a Contactless Infrared Thermometer. As many might have noticed, there is a huge surge in demand for this product,so we decided to make this project.

1.3 Purpose of the project :

The purpose of the contactless infrared thermometer project is to develop a device that can accurately measure body temperature without the need for direct contact. The project aims to provide a non-invasive and hygienic solution for temperature monitoring in various scenarios, addressing the limitations and risks associated with traditional contact-based thermometers.

The primary purpose of the project is to promote public health and safety. By enabling contactless temperature measurement, the project aims to reduce the risk of cross-contamination and the spread of infectious diseases. This is particularly relevant in situations such as the COVID-19 pandemic, where early detection of fever symptoms is crucial for identifying potential cases and implementing appropriate measures to prevent transmission.

Another purpose of the project is to improve the efficiency and convenience of temperature monitoring. The contactless infrared thermometer offers quick and reliable temperature readings, allowing for swift screening of individuals in high-traffic areas such as healthcare facilities, workplaces, schools, airports, and public spaces. This helps to streamline processes, enhance workflow, and minimize disruptions while maintaining accurate temperature records.

The project also aims to enhance user experience and accessibility. By developing a user-friendly device with intuitive controls and clear display, the project intends to make temperature measurement more accessible to individuals of all backgrounds and skill levels. The contactless nature of the thermometer improves user comfort and reduces anxiety, especially for those who may be sensitive to direct contact or have special needs.

Furthermore, the project aims to contribute to data collection and analysis. By incorporating features such as digital memory or connectivity options, the thermometer can facilitate the storage and tracking of temperature measurements over time. This data can be valuable for monitoring temperature trends, conducting research, and aiding in medical diagnoses or public health studies.

Overall, the purpose of the contactless infrared thermometer project is to provide an accurate, convenient, and hygienic solution for measuring body temperature. By prioritizing public health, user experience, and data accessibility, the project aims to enhance temperature monitoring practices and contribute to the well-being and safety of individuals in various settings.

1.4 Proposed System with Features :

Certainly! The purpose of the contactless infrared thermometer system is to provide a non-contact and hygienic method for accurately measuring body temperature. The system incorporates various features to ensure convenience, accuracy, and user safety. Some of the key features of the project are as follows:

1. Infrared Temperature Measurement: The system utilizes infrared technology to detect and measure the thermal radiation emitted by the human body. This enables accurate temperature readings without the need for physical contact.

2. Non-Contact Operation: The system allows temperature measurement without direct contact with the individual, minimizing the risk of cross-contamination and promoting hygiene.

3. Quick and Efficient Readings: The system is designed to provide rapid temperature detection, allowing for efficient screening in high-volume scenarios. This feature is particularly useful in healthcare facilities, workplaces, airports, or other public spaces where time is of the essence.

4. Accuracy and Precision: The system is engineered to provide precise temperature measurements, ensuring accuracy within an acceptable range. This allows for reliable monitoring and early detection of fever or abnormal body temperature.

5. User-Friendly Design: The system is designed with a user-friendly interface, featuring intuitive controls and clear instructions. This ensures ease of use for both operators and individuals being measured.

6. Alarm System: The system incorporates an alarm or alert mechanism to notify the user when a high temperature reading is detected. This feature helps in identifying potential fever cases promptly.

7. Portable and Compact: The system is designed to be portable and lightweight, allowing for easy transportation and use in various settings. This feature enables flexibility and convenience in deployment.

8. Data Recording and Analysis: The system may include options for storing temperature measurements, such as digital memory or connectivity features. This allows for further analysis, tracking, and documentation of temperature trends over time.

9. Power Efficiency: The system is designed to optimize power consumption, ensuring extended battery life or efficient energy usage. This feature contributes to the longevity and usability of the device.

10. Durability and Reliability: The system is built to withstand frequent usage and varying environmental conditions. It may incorporate robust materials and quality components to ensure durability and reliability.

The purpose of the contactless infrared thermometer system, with its array of features, is to provide a reliable, convenient, and hygienic solution for temperature measurement. By offering accurate and non-contact temperature readings, the system aims to contribute to public health and safety, particularly in contexts such as healthcare, workplace settings, and public spaces where efficient and accurate fever screening is essential.

1.5 Motivation behind project topic :

Certainly! The motivation behind the development of the contactless infrared thermometer project stems from the need for accurate and hygienic temperature measurement methods, particularly in situations where direct contact may not be feasible or desirable. Traditional methods of measuring body temperature often involve physical contact with the individual, such as placing a thermometer under the tongue or in the armpit. While these methods are effective, they can be inconvenient, time-consuming, and pose risks of cross-contamination.

The COVID-19 pandemic, in particular, has highlighted the importance of non-contact temperature measurement as a key tool in screening individuals for potential fever, which is one of the symptoms of the virus. The pandemic has emphasized the need for reliable, non-invasive, and contactless temperature monitoring solutions in various settings, including healthcare facilities, workplaces, schools, airports, and public spaces.

The contactless infrared thermometer project aims to address these challenges by utilizing infrared technology to detect and measure the thermal radiation emitted by a person's body. This technology allows for accurate temperature measurement without the need for physical contact, ensuring both user safety and hygiene. By developing a contactless infrared thermometer, the project seeks to provide a convenient, efficient, and reliable solution for temperature monitoring in various scenarios.

Additionally, the project's motivation lies in promoting public health and safety by enabling early detection of potential fever cases, which can help in the identification and prevention of the spread of infectious diseases. The non-contact nature of the thermometer contributes to minimizing the risk of cross-infection, making it a valuable tool for healthcare professionals, essential workers, and individuals who need to regularly monitor their body temperature.

Overall, the motivation behind the contactless infrared thermometer project is driven by the need for a reliable, non-invasive, and hygienic method of temperature measurement, particularly in the context of the COVID-19 pandemic and other scenarios where contact-based thermometers may present limitations or risks. By addressing these needs, the project aims to provide a valuable tool for temperature monitoring, contributing to public health and safety.

Chapter 2

2. LITERATURE SURVEY

DESIGN AND IMPLEMENTATION OF A PORTABLE ASSISTIVE

a) Non-contact Infrared Temperature Acquisition System based on Internet of Things for Monitoring Laboratory Activities (19 August 2019) :

This paper presents an IoT solution for temperature real-time supervision named iRT. The solution is composed of a hardware prototype for temperature data collection and Web compatibility for data access. The iRT uses an infrared thermometer sensor module which incorporates an MLX90614 and provides object and ambient temperature .

b) Design and Development of a Low Cost, Non-Contact Infrared Thermometer with Range Compensation (31 May 2021) :

This paper present design and assembly of a low cost IR thermometer with distance and environmental temperature sensing capabilities to

provide more accurate measurements. Experiments were conducted to validate compensation adjustments made in the algorithm, as well as the effects of measurements on different

locations of the forehead.

Typically, IR thermometer casings are manufactured by the expensive injection molding (due to mold production and tooling costs), producing significant waste material.

Chapter 3

i. SYSTEM REQUIREMENTS SPECIFICATIONS

A system requirements specification for a contactless infrared temperature sensor may include the following components:
1. Sensor: The sensor should be able to detect infrared radiation emitted from a surface and convert it into an electrical signal.
2. Signal Processing: The electrical signal should be processed to obtain an accurate and reliable temperature reading.
3. Display: The temperature reading should be displayed on a clear and easy-to-read display.
4. Power Supply: The sensor should be powered by a reliable and long-lasting power source.
5. Communication: The sensor should be able to communicate with other devices for data transfer and analysis.
6. Durability: The sensor should be able to withstand harsh environments and be durable enough to last for a long time.
7. Calibration: The sensor should be calibrated regularly to ensure accurate and consistent readings.
8. User Interface: The sensor should have a user-friendly interface for easy operation and customization.
9. Data Logging: The sensor should be able to log temperature data over time for analysis and future reference.

3.1 Functional requirements:

A contactless infrared temperature sensor should be able to detect temperatures without making physical contact, provide accurate readings, and have a quick response time. It should also be easy to use, have a clear display, and be able to store data.

3.2 Non-functional requirements:

Some non-functional requirements of a contactless infrared temperature sensor may include

- Accuracy
- Precision
- Resolution
- repeatability.
- It should also have a wide temperature range, fast response time, and low power consumption.
- Additionally, it should be easy to use, reliable, and durable

3.3 Hardware Requirements:

- **Arduino board (Arduino PRO MINI)**

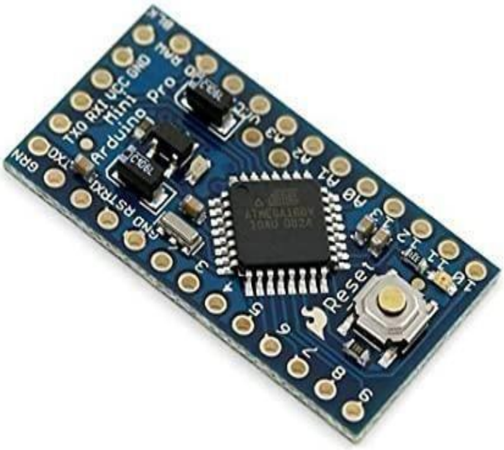


Figure 3.3.1: Arduino Pro mini board

The **Arduino Pro Mini** is a microcontroller board based on the ATmega328P.

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, an on-board resonator, a reset button, and holes for mounting pin headers. A six pin header can be connected to an FTDI cable or Sparkfun breakout board to provide USB power and communication to the board.
The Arduino Pro Mini is intended for semi-permanent installation in objects or exhibitions. The board comes without pre-mounted headers, allowing the use of various types of connectors or direct soldering of wires. The pin layout is compatible with the Arduino Mini. There are two version of the Pro Mini. One runs at 3.3V and 8 MHz, the other at 5V and 16 MHz. The Arduino Pro Mini was designed and is manufactured by SparkFun Electronics.

The Arduino Pro Mini has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328P provides UART TTL serial communication, which is available on digital pins 0 (RX) and 1 (TX). The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board via a USB connection.

A SoftwareSerial library allows for serial communication on any of the Pro Mini's digital pins.

The ATmega328P also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the reference for details. To use the SPI communication, please see the ATmega328P datasheet.

Specifications:

Microcontroller	ATmega328P *
Board Power Supply	3.35 -12 V (3.3V model) or 5 - 12 V (5V model)
Circuit Operating Voltage	3.3V or 5V (depending on model)
Digital I/O Pins	14
PWM Pins	6
UART	1
SPI	1
I2C	1
Analog Input Pins	6
External Interrupts	2
DC Current per I/O Pin	40 mA
Flash Memory	32KB of which 2 KB used by bootloader *
SRAM	2 KB *
EEPROM	1 KB *
Clock Speed	8 MHz (3.3V versions) or 16 MHz (5V versions)

- **MLX90614 CONTACTLESS INFRARED TEMPERATURE SENSOR**

3.3.2: MLX90614 contactless infrared temperature sensor

The MLX90614 is an **infrared thermometer** for **non-contact temperature measurements** capable of measuring temperature between **-70 to 380°C**. The sensor uses IR sensitive **thermopile detector chip** and the signal conditioning ASIC integrated into a single chip. The thermometer comes factory calibrated with a **digital SMBus output** giving full access to the measured temperature in the complete temperature range(s) with a **resolution of 0.02°C**. Even though it works on SMBus protocol, but can be used with **I2C pins**.The MLX90614 sensor has 4 pins. The working voltage of the sensor is **3.6V** to **5V** but the **3.3V** version is also available. It has I2C Pins as **SDA & SCL**. The SDA is the Serial data pin & SCL is the Serial Clock pin used for I2C Communication.
As mentioned earlier, the MLX90614 sensor can measure the temperature of an object with any physical contact. This is often made possible with a law called **Stefan-Boltzmann Law**, which states that each one objects and living beings emit **IR Energy** and therefore the intensity of this emitted IR energy is going to be directly proportional to the temperature of that object or living being. Therefore the MLX90614 sensor calculates the temperature of an object by measuring the quantity of **IR energy** emitted from it.

SPECIFICATIONS :

a. Operating Voltage: **3.6V to 5**

b. Supply Current: **1.5mA**

c. Object Temperature Range: **-70°C** to **382°**

d. Ambient Temperature Range:**40°C** to **125°**

e. Accuracy: **0.02°**

f. Field of View: **80**

g. Distance between object and sensor: approx. **2cm-5cm**

- **OLED LCD DISPLAY**

3.3.2 : OLED LCD DISPLAY

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted.

SPECIFICATIONS :

a. High resolution: 128*64
b. Ultra-wide viewing angle: greater than 160°
c. Ultra-low power consumption: 0.06W in normal display
d. Wide power supply range: DC 3.3V-5V
e. Industrial grade: working temperature range -30°C~70°C

Small size: 27mm*27mm*2mm

- **PUSH BUTTON SWITCH**

3.3.3 : Push button switch

A push button switch is a small, sealed mechanism that **completes an electric circuit when you press on it**.

SPECFICATIONS :

a. Current Rating:3 Amps, 11 Amps
b. Operating Voltage:12 Volts
c. Connector Type :Solder
d. Switch Type :Push Button

Laser Diode

3.3.4 : Laser Diode

To point the object, you can use Laser Diode Breakout Board. **Laser Diode Module** is a low-cost module with having a wavelength of **650nm** and an operating voltage of **3V-5V**. The laser head is composed of a light-emitting tube, condenser lens, and adjustable copper sleeve. It can work directly after connecting to a dc power supply. In our circuit, we connect the Laser Diode output pin to **D12** of Arduino Pro Mini.

SPECIFICATIONS :

a. Output Power : 5mW
b. Wavelength : 650nW
c. Working Voltage : 5V
d. Operating Current : Less than 40mA
e. Working Temperature : -10~40

- **Battery**

3.3.5 : Battery

3.7 Volt lithium-ion rechargeable batteries are cylindrical batteries. Lithium Batteries ,primarily lithium -ion batteries (LIB),are widely used in our daily life , such as in mobile phones , tablets and cameras .In the LIB system ,carbon materials usually replace the metal lithium to store and release lithium ions in the electrochemical process.

SPECIFICATIONS :

a. Voltage: D3.7V
b. Capacity:2000mAh
c. Package Content: 1Lithium Polymer
   Battery Material: Lithium Polymer

- **Connecting Wires**

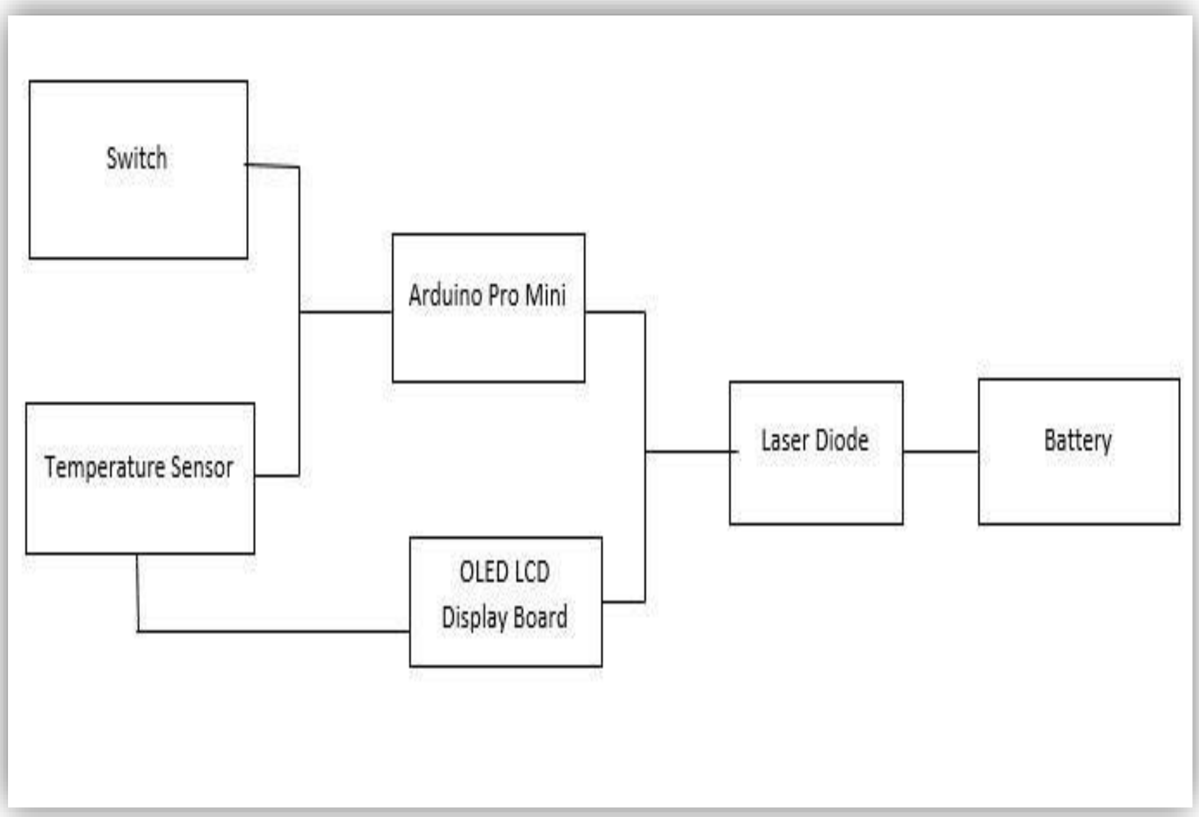
3.3.6 : Connecting Wires

These wires are used to interconnect components

Chapter 4

4. SYSTEM DESIGN

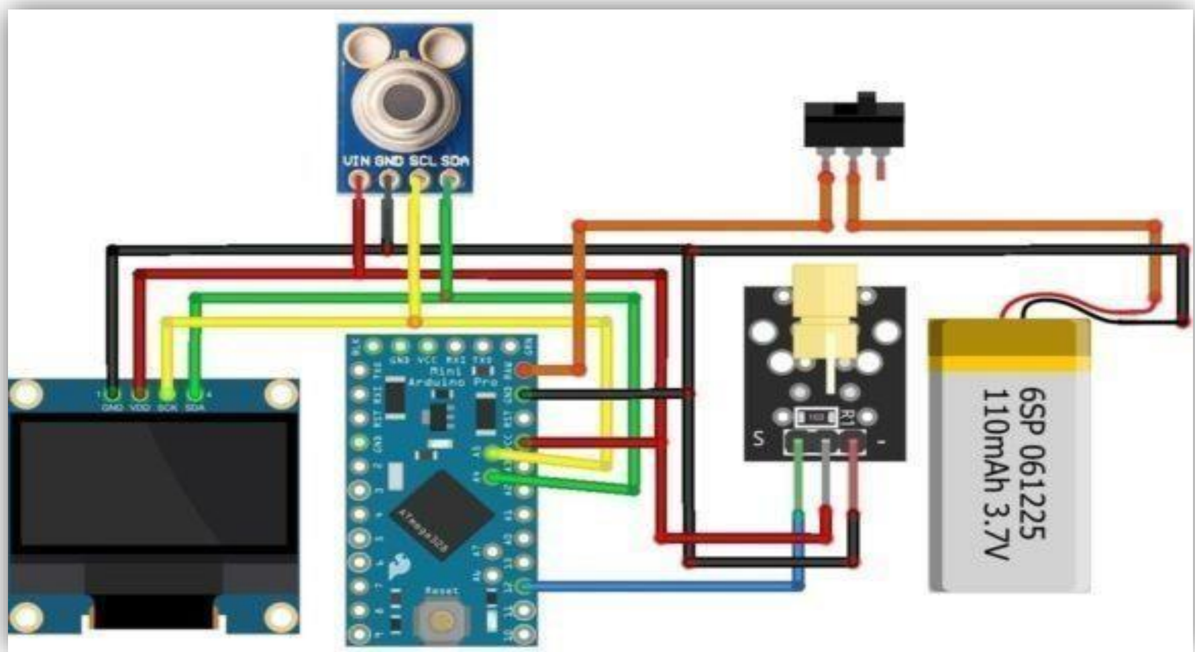
4.1 System Block Diagram /Architecture Diagram



4.1.1Block diagram of Contact Infrared Temperature Sensor

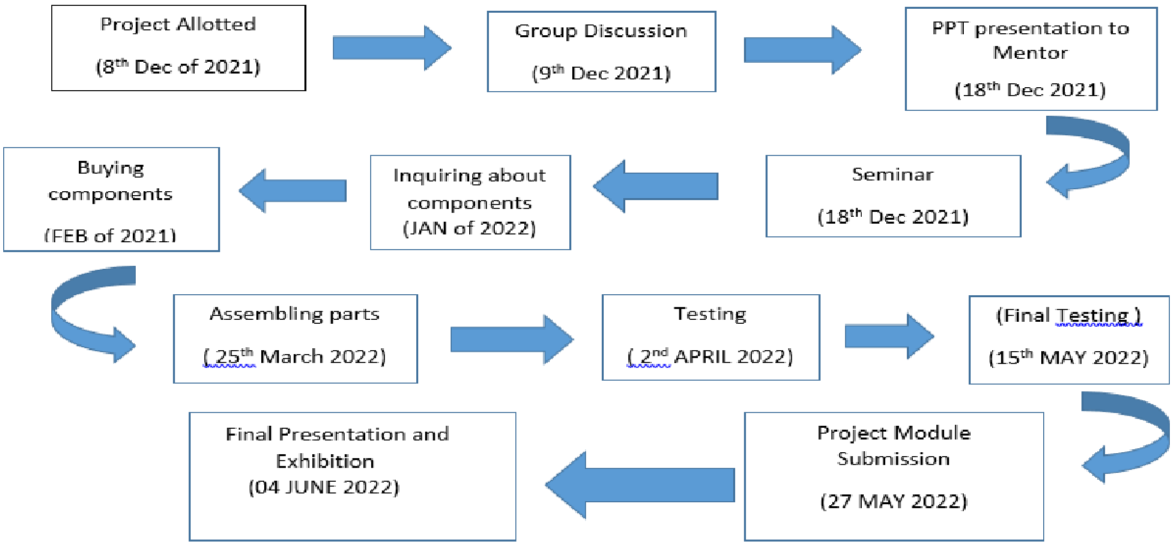
The block diagram is shown in Fig where it depicts all the equipment which are connected to each other. Firstly, the pressing power switch,the Arduino becomes on and temperature sensor on too, following this MLX90614 temperature sensor reads data from body or object. Secondly, the received data is sent to Arduino for further processing and after performing the operations the system display the result .

Circuit Diagram

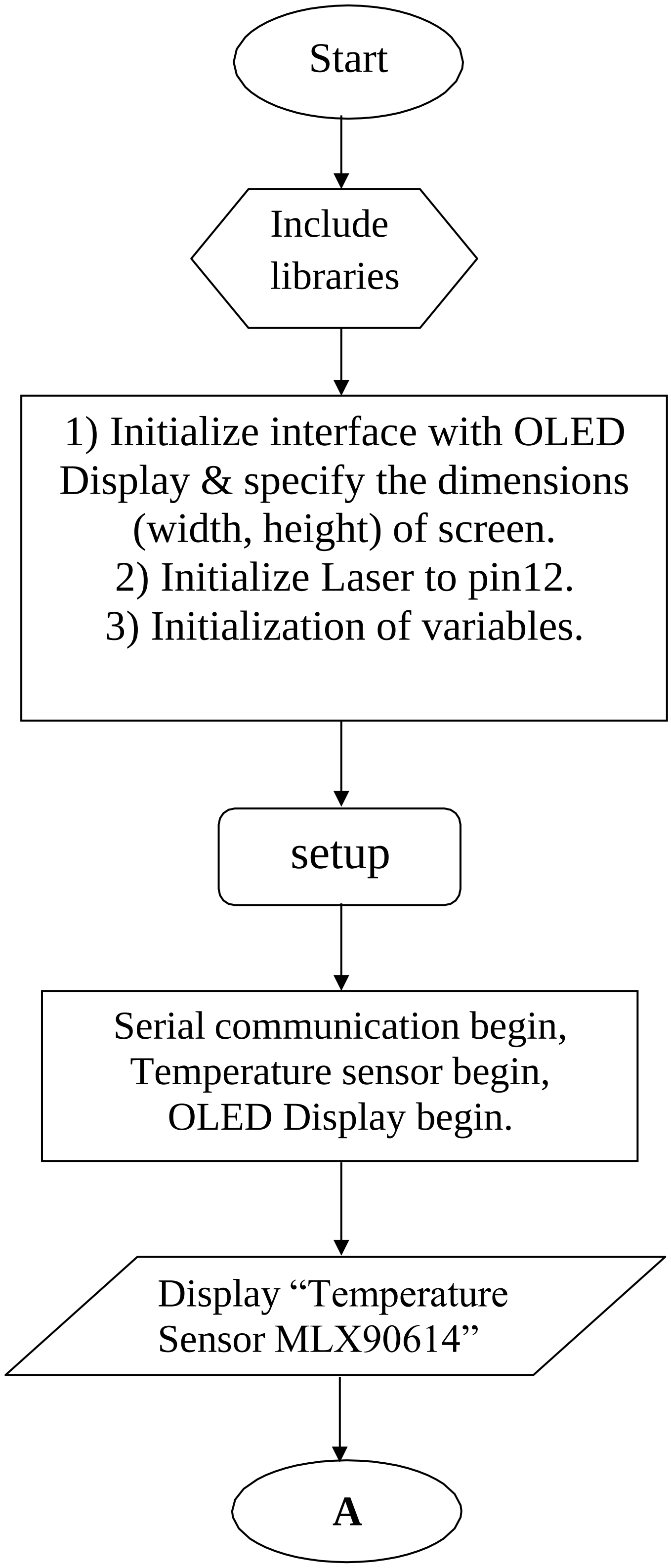


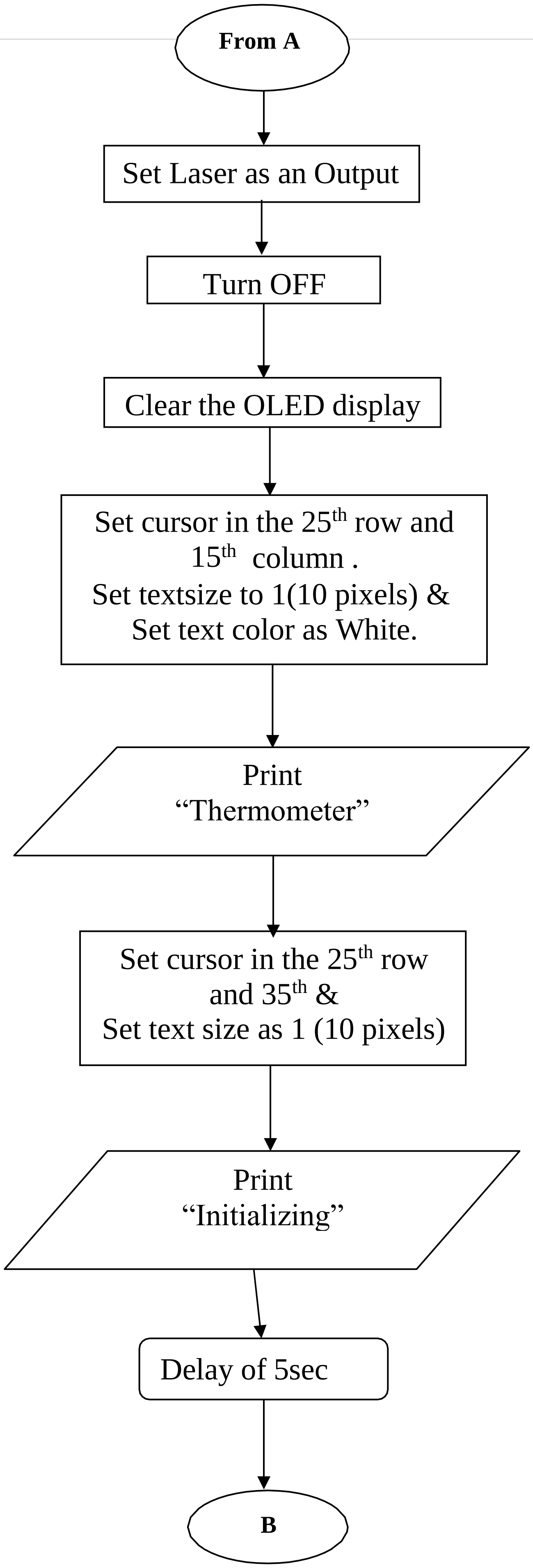
The **Circuit diagram** for making an **Infrared Thermometr** using MLX90614, Arduino, OLED Display & Battery is given below. The circuit has **Arduino Pro Mini Board** which is used because of the small and compact size. The Arduino Pro Mini Board has 2 versions, one of them works at 5V, 16MHz, and the other at 3.3V, 8 MHz. You can select **3.3V, 8MHz Arduino Pro Mini** as you are powering the device using **3.7V Lithium-Ion Battery**. The **RAW** pin of Arduino pro-Mini is directly connected to the battery VCC Pin via a push switch. To point the object, you can use Laser Diode Breakout Board. **Laser Diode Module** is a low-cost module with having a wavelength of **650nm** and an operating voltage of **3V-5V**. The laser head is composed of a light-emitting tube, condenser lens, and adjustable copper sleeve. It can work directly after connecting to a dc power supply. In our circuit, we connect the Laser Diode output pin to **D12** of Arduino Pro MiniThe MLX90614 contactless infrared temperature sensor & 0.96″ I2C OLED Display is connected to I2C Pin of Pro Mini Board. The SDA and SCL pin is connected to **A4 & A5** of Pro Mini respectively. The **OLED Display** and **MLX90614** both works at **3.3V**, hence their VCC can be connected to 3.3V of Pro Mini.

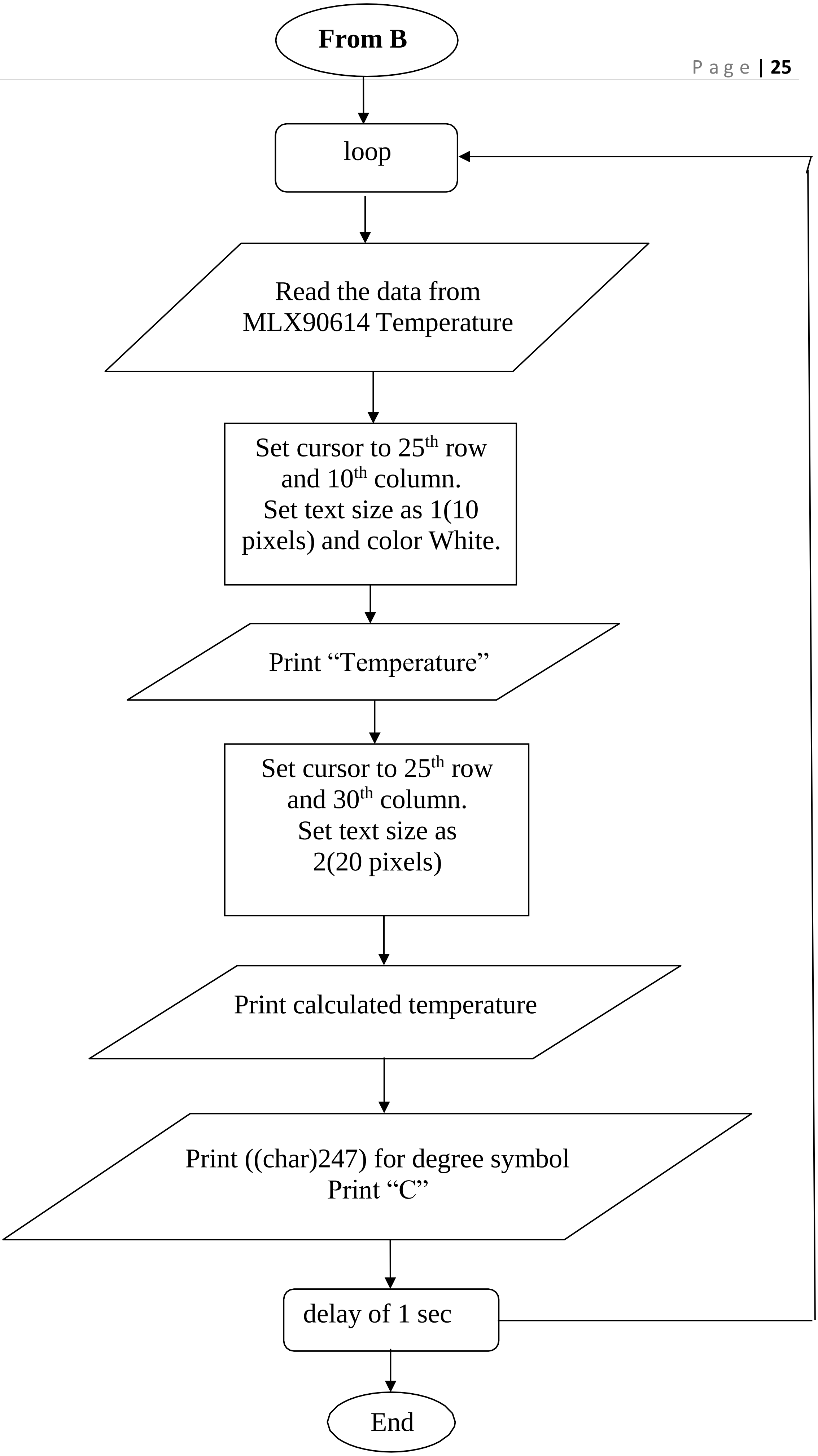
Time Line :


Project Allotted
(8th Dec of 2021)
Group Discussion
(9th Dec 2021)
PPT presentation to Mentor
(18th Dec 2021)
Seminar
(18th Dec 2021)
Inquiring about components
(JAN of 2022)
Buying components
(FEB of 2021)
Assembling parts
(25th March 2022)
Testing
(2nd APRIL 2022)
(Final Testing)
(15th MAY 2022)
Project Module Submission
(27 MAY 2022)
Final Presentation and Exhibition
(04 JUNE 2022)

4.2.2 Flow Chart




From A
Set Laser as an Output
Turn OFF
Clear the OLED display
Set cursor in the 25th row and 15th column . Set textsize to 1(10 pixels) & Set text color as White.
Print "Thermometer"
Set cursor in the 25th row and 35th & Set text size as 1 (10 pixels)
Print "Initializing"
Delay of 5sec
B


From B
loop
Read the data from
MLX90614 Temperature
Set cursor to 25th row
and 10th column.
Set text size as 1(10
pixels) and color White.
Print “Temperature”
Set cursor to 25th row
and 30th column.
Set text size as
2(20 pixels)
Print calculated temperature
Print ((char)247) for degree symbol
Print “C”
delay of 1 sec
End

Flow of program used :

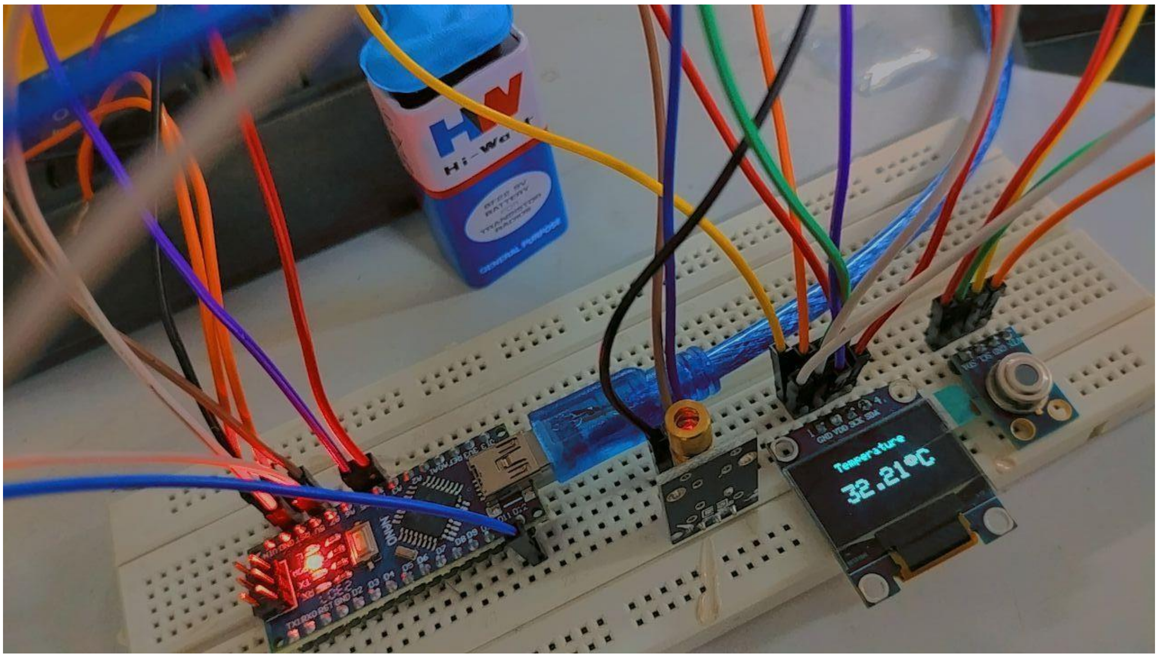
```
#include <Wire.h>
#include <Adafruit_MLX90614.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

#define SCREEN_WIDTH 128    // OLED display width, in pixels
#define SCREEN_HEIGHT 64    // OLED display height, in pixels
#define OLED_RESET -1       // Reset pin # (or -1 if sharing Arduino reset pin)
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire,
OLED_RESET);

#define laser 12

Adafruit_MLX90614 mlx = Adafruit_MLX90614();

double temp_amb;
double temp_obj;

void setup()
{
Serial.begin(9600);
mlx.begin();         //Initialize MLX90614
display.begin(SSD1306_SWITCHCAPVCC, 0x3C); //initialize with the I2C addr
0x3C (128x64)

Serial.println("Temperature Sensor MLX90614");

pinMode(laser, OUTPUT);     // Connect LASER

digitalWrite(laser, LOW);

display.clearDisplay();
display.setCursor(25,15);
display.setTextSize(1);
display.setTextColor(WHITE);
```

```
display.println(" Thermometer");
display.setCursor(25,35);
display.setTextSize(1);
display.print("Initializing");
display.display();
delay(5000);
}

void loop()
{
//Reading room temperature and object temp
//for reading Fahrenheit values, use
//mlx.readAmbientTempF() , mlx.readObjectTempF() )
temp_amb = mlx.readAmbientTempC();
temp_obj = mlx.readObjectTempC();
digitalWrite(laser, HIGH);

//Serial Monitor
Serial.print("Room Temp = ");
Serial.println(temp_amb);
Serial.print("Object temp = ");
Serial.println(temp_obj);

display.clearDisplay();
display.setCursor(25,10);
display.setTextSize(1);
display.setTextColor(WHITE);
display.println(" Temperature");
display.setCursor(25,30);
display.setTextSize(2);
display.print(temp_obj);
display.print((char)247);
display.print("C");
display.display();
delay(1000);
}
```

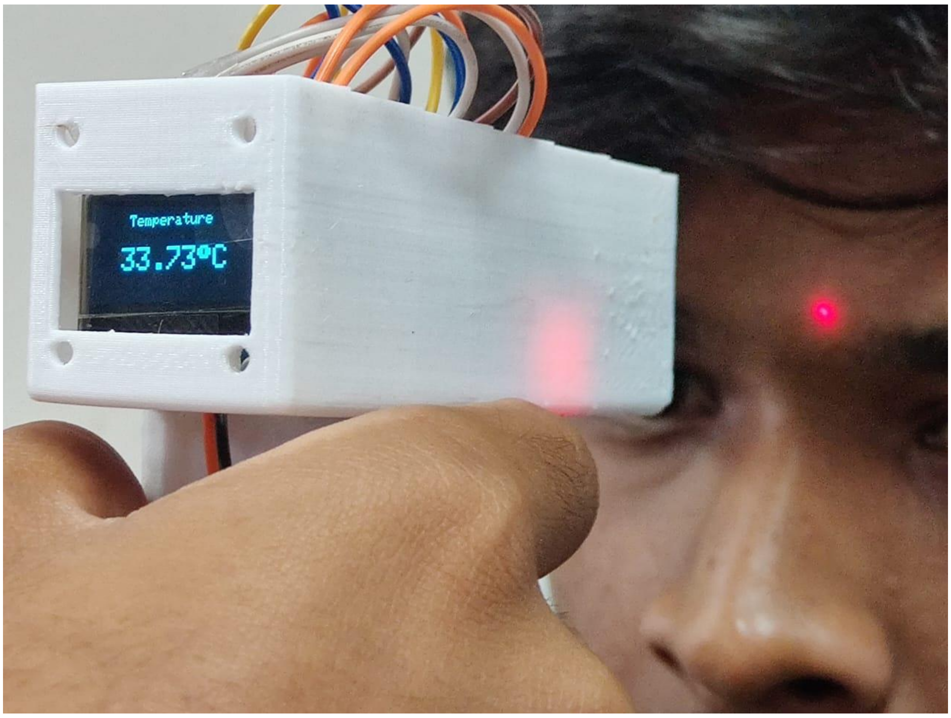
Chapter 5

5. GRAPHICAL USER INTERFACE

5.1 Photographs while Mounting components :



5.1.1 Photo while mounting components and testing



5.2 Bill Of Material :

Components	Quantity	Price	Total Price
MLX90614 contactless infrared temperature sensor	1	1200	1200
OLED LCD Display Board	1	250	250
Push Button Switch	1	30	30
Laser Dioide	1	100	100
Battery	1	60	60
Connecting	2 Bunch	30	60
Arduino Pro Mini	1	750	750

Table 1: Cost Details

5.2.2 Bill Of Material

6 FUTURE ENHANCEMENTS

- **Automotive**—Mechanics and automotive enthusiasts can use digital infrared thermometers to troubleshoot overheating issues and perform routine spot checks on many components, including, brakes, tires, radiators, and engine timing.
- **HVAC**—Heating and cooling professionals use infrared thermometers to perform equipment checks and to diagnose, duct leaks, insulation issues, malfunctioning coils, and other heat-related HVAC problems.
- **Electrical systems and circuit boards**—IR thermometers can be used when working with electrical systems by checking for hot spots, diagnosing potential problems and preventing equ
ipment failure.
- **Manufacturing**—In industrial and manufacturing applications, infrared thermometers are used
to monitor products for quality assurance and perform routine temperature audits of equipment
to schedule repairs and prevent expensive equipment breakdowns.

7 CONCLUSION

The system depicts the development of a contactless thermometer. Where we are fighting against unseen viruses which increase day by day contacting by person to person. So we need to maintain social distancing and need to measure body temperature without any contact. This system will help for making any contactless thermometer and measuring temperature without contact .
In conclusion, a contactless infrared temperature sensor is a useful and versatile tool in many applications such as medical, industrial, and home use. The system requirements specification for such a sensor should include components such as the sensor, signal processing, display, power supply, communication, durability, calibration, user interface, and data logging. The non-functional requirements should include accuracy, precision, resolution, repeatability, temperature range, response time, power consumption, ease of use, reliability, and durability. Overall, a contactless infrared temperature sensor is an essential tool for measuring temperature without physical contact and can provide valuable data for analysis and decision making.

8 REFERENCES

List all the material used from various sources for making this project proposals

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