Problem Statement

For the purpose of reducing the number of infections caused due to contact, a contactless temperature monitoring system has to be developed which will sound an alarm every time the scanned individual's temperature crosses a certain threshold. This will help in notifying not just the person but also individual's around the potential patient to be careful and note down any further symptoms. Also, the system should be smart enough for sending a notification to the system admin alerting them about the same. E-Mail notifications should also be configured for the same to alert the nearest center for detection of the disease, thereby reducing the number of potential cases.

The system should be able to detect the temperature in a contactless manner with the help of MLX90614 IR temperature system, display the temperature on an OLED screen(ambient and object temperature), sound an alarm and send notifications wirelessly using the ESP8266(NodeMCU) Wi-Fi module over the Blynk app. The system will also be able to fetch the current number of cases in India and display it to the system admin over Thingspeak.

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System Design and Requirements
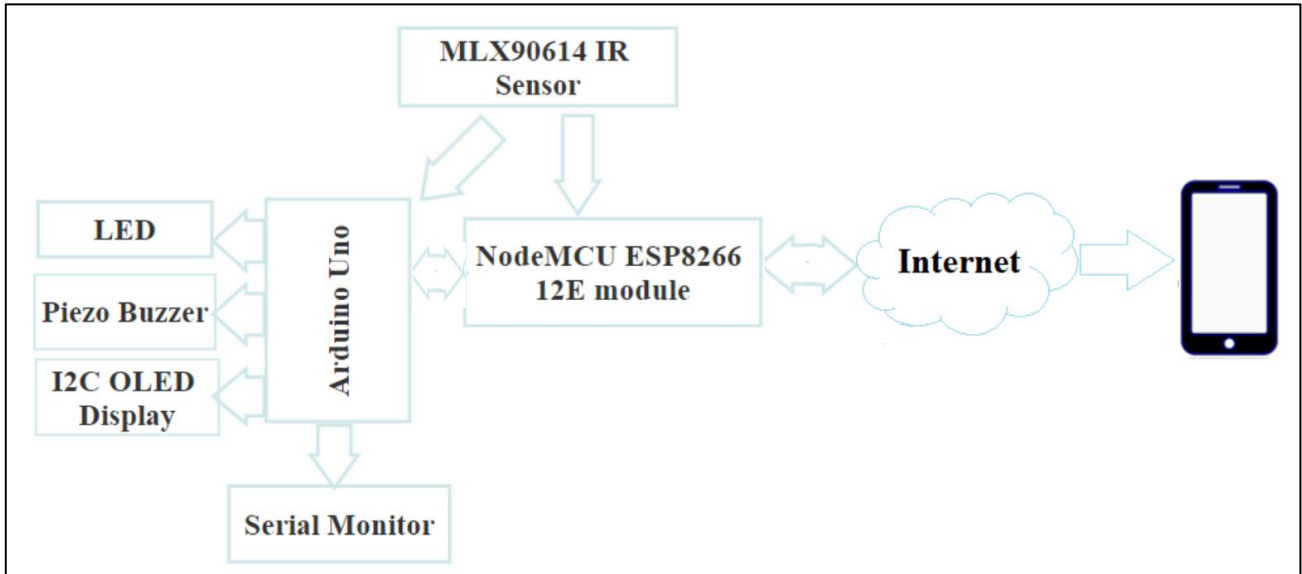
System Design:

Fig. 1. System Design

The sensor, buzzer and LED display are all connected to the Arduino Uno detecting the temperature after every 10 seconds. The NodeMCE Esp8266 12E module is connected to the Arduino which in turn connects to the Internet, enabling the system to be connected to Thingspeak for posting and retrieval of data wirelessly. The Blynk app will be on the user/admin side which will be used for displaying push notifications and sending e-mails to the concerned authorities letting them know of a possible infection.

For constructing the system, following are the requirements:

	Hardware requirements		
Sr. No.	Component	Numbers	Cost (Rs.)
1	Arduino Uno Board	1	1 ×300= 300
2	MLX90614 IR Temperature Sensor	1	1 x 2000=2000
3	ESP8266: Wi-Fi Module(NodeMCU)	1	1 x 500= 500
4	Breadboard	1	1 x 80=80
5	OLED i2C Display	1	1 x 400 = 400
6	Buzzer	1	1 x 80=80
7	Jumper Wires	10-15	15 x 20=300
	Software requirements		

Ketaki Keluskar

	Software	---	Cost
1	OS: WINDOWS 10	--	15000
2	For App development: BLYNK	--	--
3	Thinger.io and Thingspeak cloud platform	--	--
4	Arduino IDE	--	--
	Total		4000

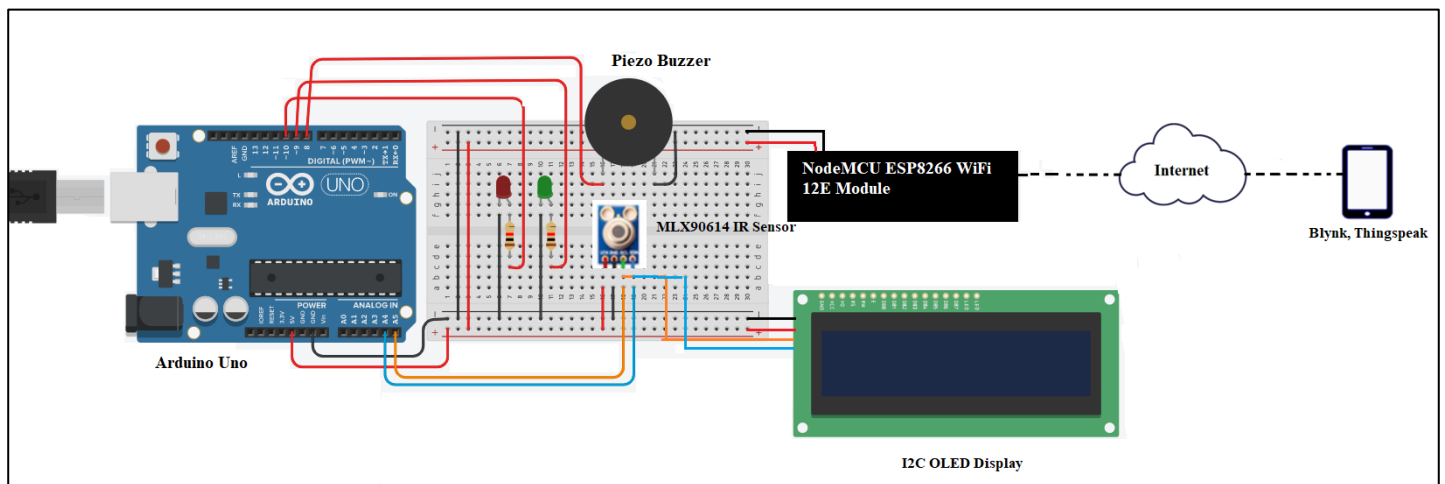Table 2. Hardware and Software requirements

Circuit diagram:

Fig. 2. Circuit diagram

The above attached figure shows how the components will be connected to each other. The data collected from the sensor and Arduino will be sent to the mobile device and cloud platform for in detail analysis.

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Results

We have constructed a Contactless Temperature Monitoring and Alert system using Arduino Uno, MLX90614 IR temperature sensor, Buzzer, OLED display, LED, NodeMCU ESP8266 12E module for connecting to the Internet, Thingspeak platform and Blynk app for sending push and e-mail notification to the admin device.
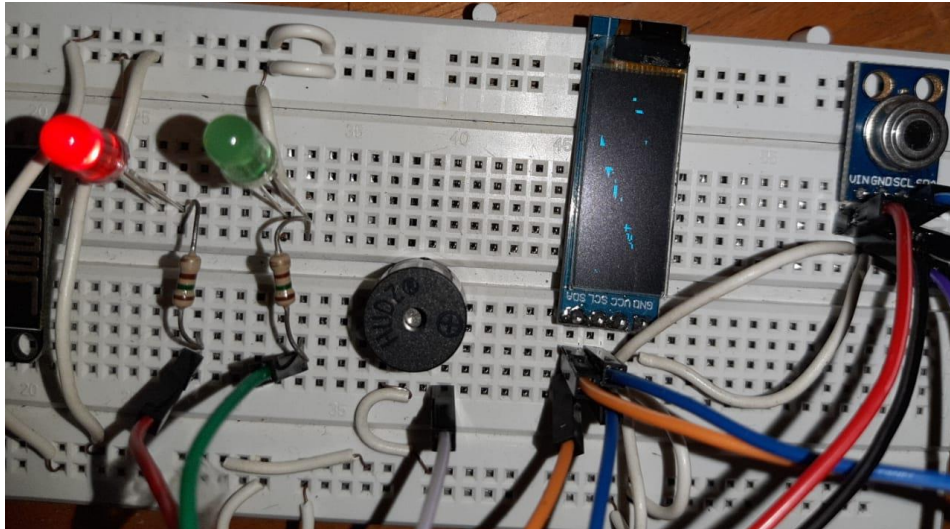

Fig. 3. Circuit not ready to take input

The MLX90614 IR temperature sensor senses the temperature after every 10 seconds and sends the data to Thingspeak cloud platform. After a period of 10 seconds, the green LED will turn on indicating that the system is ready to take input.
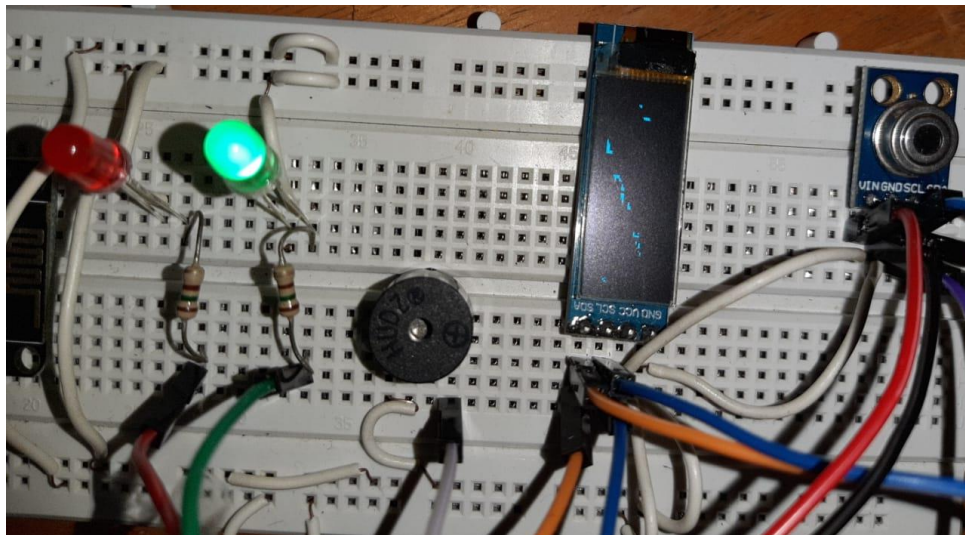

Fig. 4. Circuit ready to take input

If the temperature sensed is below 35 degrees Celsius, no action will be taken and the temperature will be displayed on the OLED display along with the ambient temperature. But if the temperature exceeds the threshold, the Buzzer will play its tone for a certain amount of time and a push notification will be sent to the admin device. Also, an e-mail notification will be

Ketaki Keluskar

sent to the concerned authorities once the temperature exceeds the set threshold via Blynk. Also, the admin can also view the number of COVID-19 patients via Serial Monitor in realtime.

```
21:47:25.594 -> Ambient = 29.49*C        Object = 28.85*C
21:47:26.584 -> Cases: 9,449,093
21:47:26.584 -> Deaths: 137,397
21:47:26.584 -> Recovered: 8,865,846
```

Fig. 5. Real time collected data for COVID-19 over Serial Monitor

Since the notifications sent are in real time, detecting the potential patient and containing the spread becomes easier and can be done remotely, hence decreasing the number of possible infections that could take place.
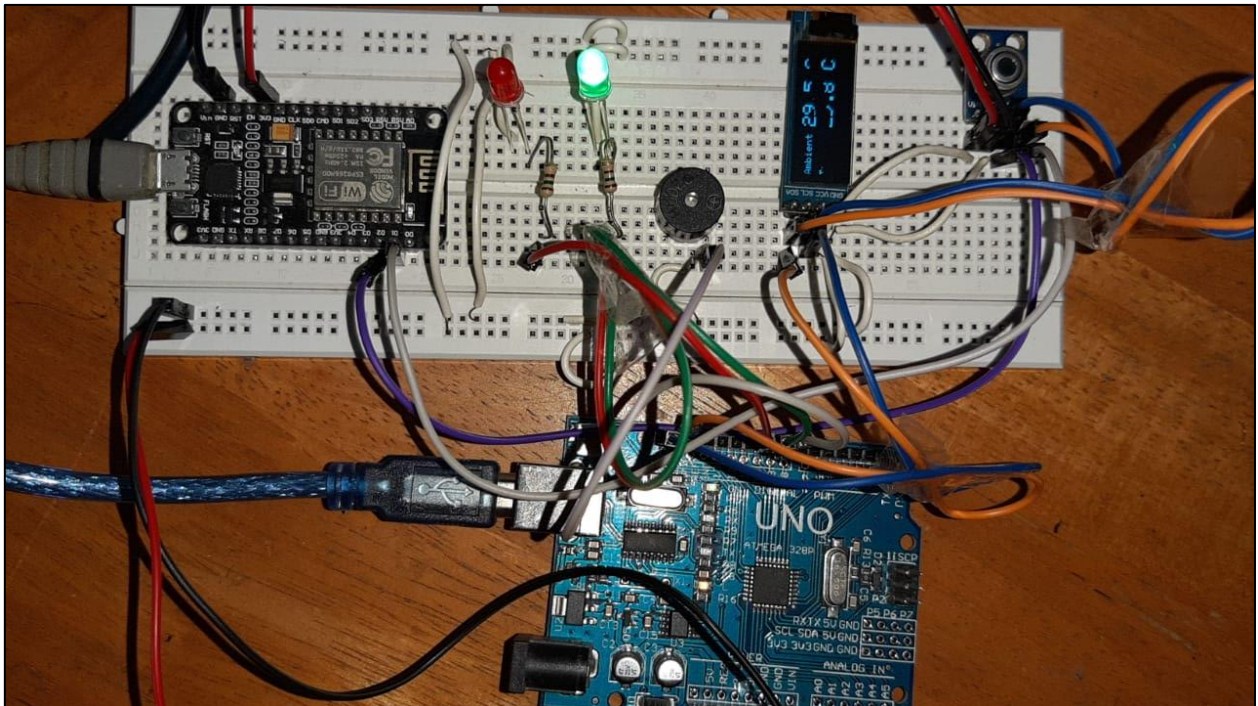

Fig. 6. Contactless Temperature Monitoring and Alert system
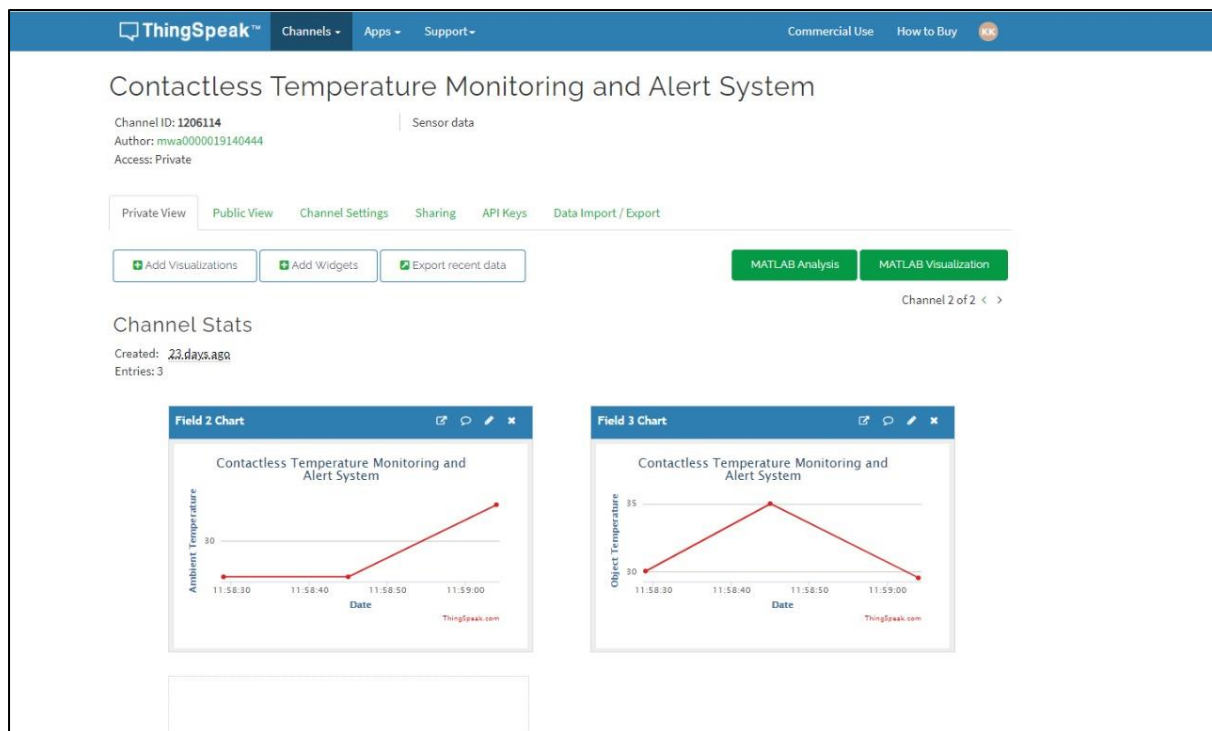
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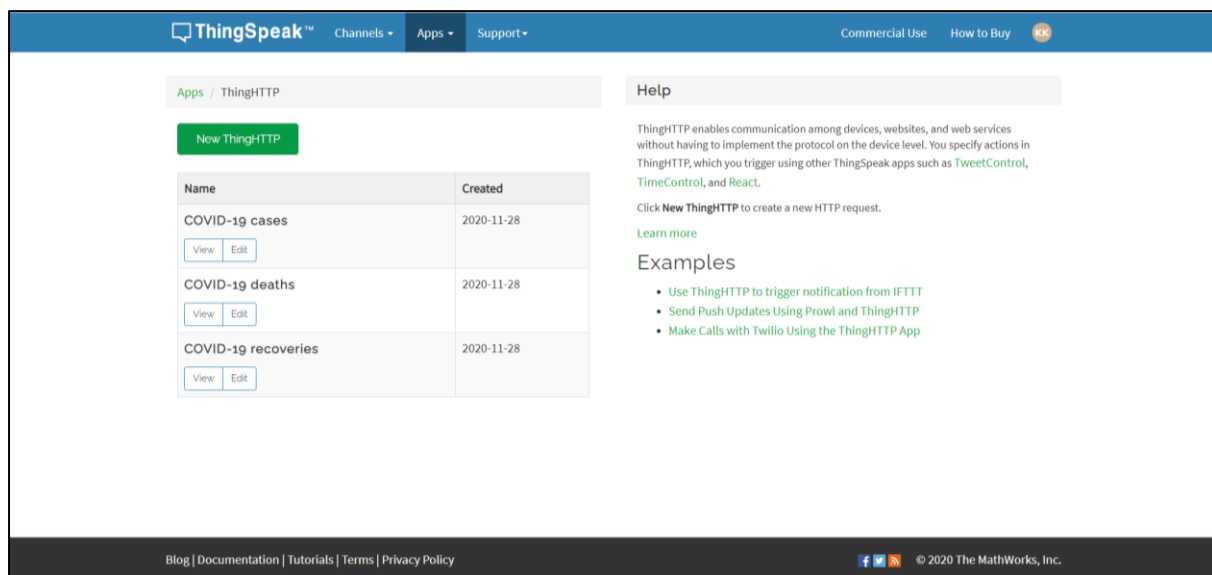Fig. 7. Thingspeak channel for temperature data

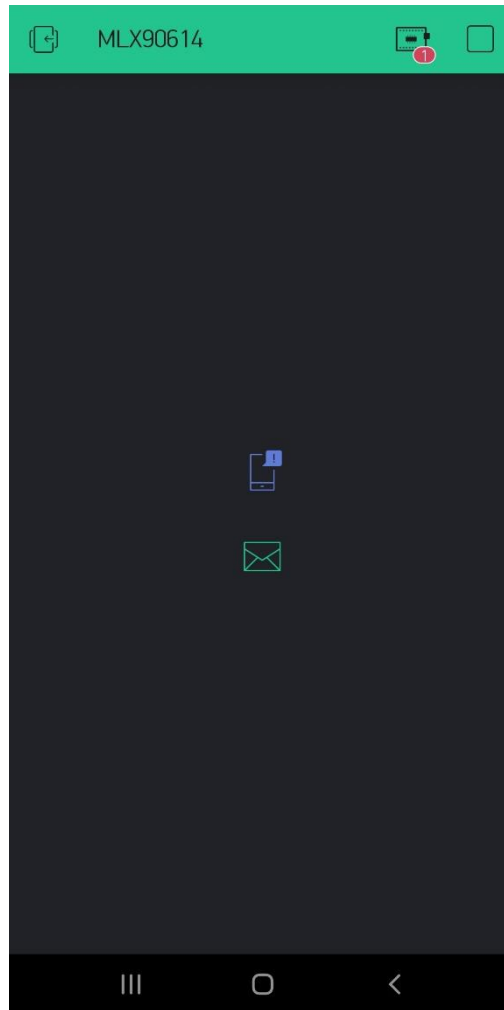Fig. 8 Thingspeak ThingHTTP channels for retrieving real time data
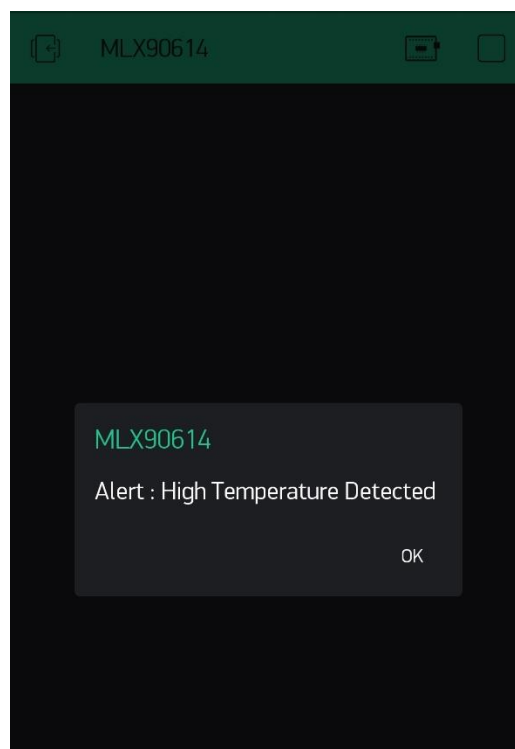
Fig. 9. Blynk app

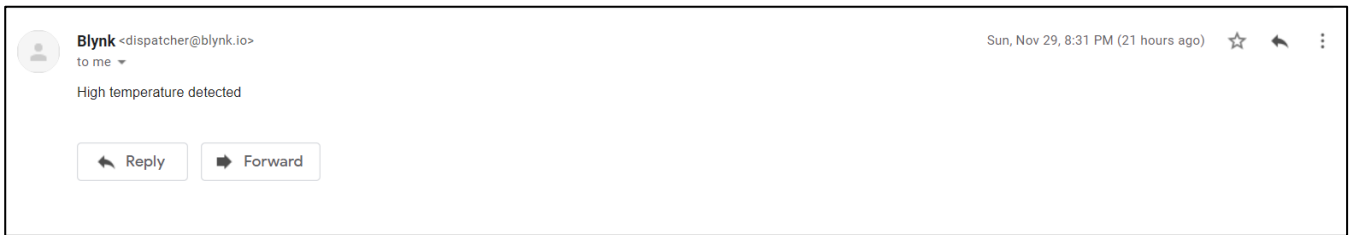Fig. 10. Received push notification

Fig. 11. Received e-mail notification

Conclusions and Future Scope

Conclusion:

   We have developed a Contactless Temperature Monitoring and Alert system to help the users sense the temperature in a contactless manner and alert the system administrator and local COVID-19 agencies about a potential infection and help curb the spread to the individual's colleagues. The total system costed about Rs. 4000 for the hardware and software side components.

   This system will not only measure the temperature of people, but will also alert the system administrator about the slight increase in temperature with the help of buzzer, e-mail notifications and notifications via blynk app.

Future Scope:
- This system can be further extended to have a sanitization system.
- This system can be developed by including a medical grade long range MLX90614-DCI sensor for medical purposes requiring higher efficiency.
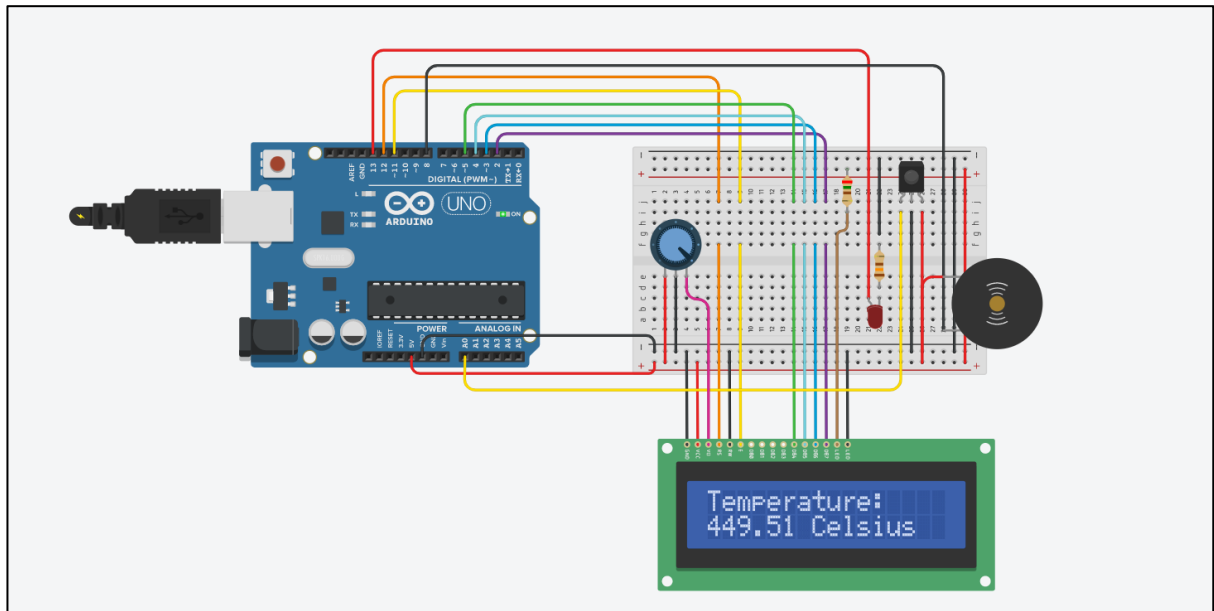
Annexure I
Simulation

Fig. 12. Tinkercad simulation circuit

Simulation link:
https://www.tinkercad.com/things/6NaUjJeQCeY

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