

CONTACT LESS THERMO METERS FOR COVID DETECTION USING ARDUINO AND TEMPERATURE SENSORS

¹Dr.N.Ashok Kumar, ²V.Ganesh, ³L.Prathima

¹Professor, ^{2,3}Assistant Professor, ^{2,3}Department of Electronics and Communication Engineering, Kasireddy Narayanreddy college of engineering and Research, Hyderabad

ABSTRACT

There is no need to introduce the current COVID-19 situation. Therefore, everyone involved in this situation should act appropriately and take care. The most crucial step in this technique is temperature measurement, although social distance must be maintained. We must employ contactless thermometers in order to reduce this because conventional thermometers are unsure of preserving social distance. The Arduino Nano, along with the MLX90614 infrared sensor and TCRT5000 temperature sensor, can be used as the primary control device to regulate the temperature on the device. As a result, contactless thermometers have advantages over traditional thermometers, including ease of handling, convenient reading, and accuracy.

Keywords –IR, Contactless thermometer, Arduino nano, TCRT5000, MLX90614

1. INTRODUCTION

The primary symptom of all chronic diseases is fever, which is nothing more than an imbalance in body temperature. So you can use a tool called a thermometer to measure your body temperature. At first, we relied on traditional thermometers like mercury thermometers, but the procedure was time-consuming and even if the bulb broke, mercury may flow into the body, poisoning it. Traditional thermometers no longer have any issues thanks to infrared technology. Contactless thermometers have been used as screening methods to check passengers at airports, train stations, and other crowded places since the Covid-19 outbreak. However, non-contact thermometers are used in ordinary locations as well as in hazardous locations. It's simple, safe and portable. Non-contact thermometers are designed to measure temperature from a distance, which helps avoid the penetration of viruses from one body to another. Non-contact thermometers are also known as infrared thermometers. Non-contact thermometers are thermometers that infer the temperature based on the proportion of thermal radiation, also known as black body radiation emitted by the measured object. Sometimes it is also called a laser thermometer. In this article, we will discuss the principle, design and implementation of a non-contact thermometer using Arduino. The system includes an Arduino Nano, an MLX90614 temperature sensor, a TCRT5000 IR sensor, and the smartphone used to develop the system.

2. DESIGN PRINCIPLES

Traditional thermometers should be in contact with the body. On the other hand IR thermometers doesnot need any contact in measuring temperature. The MLX90614 and TCRT5000 are connected to Arduino Nano. When the desired body or object is in the range of thermometer thenMLX90614 reads the temperature and shows it in mobile phone. There is IR sensor for detecting the presence of an object. If the object is detected then IR temperature sensor will measure temperature and send it to Arduino NANO. Both sensors are connected to analog pins of Arduino Nano. The block diagram is shown in figure-2.Which describes about the detailed design of the project along with various components present in it.

3. FLOWCHART

The flowchart of the developed system is shown in figure-1. By connecting the USB of smart phone to Arduino nano supply is provided to it, the Arduino and both the sensors becomes on. Following this the IR sensor detects the presence of an object, the temperature sensor detects the temperature and shows the result

on smart phone. Firstly, the system initializes analog pins A0,A4 and A5,if the power supply is continuous through USB, then the following loop repeats again and again.It reads data from the Nano and if the temperature is greater than the threshold value it indicates red ,i.e high temperature. If the temperature is lower than the threshold value it indicates green,i.e Normal temperature. If the supply is interrupted then the loop breaks and stops working.

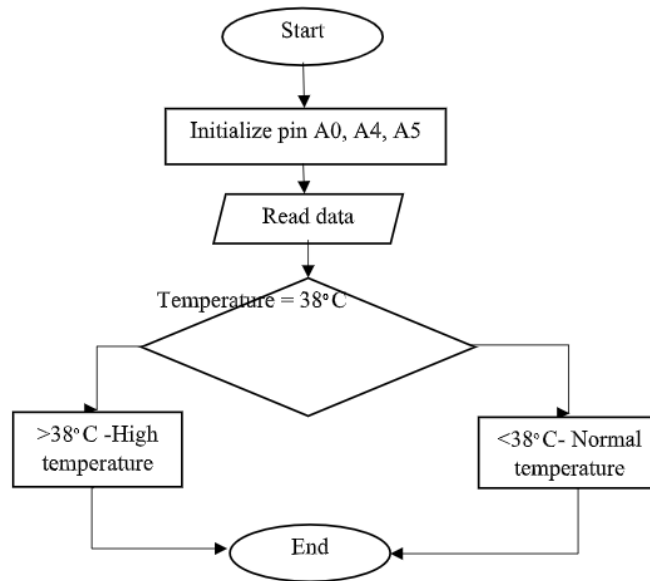


Figure 1: Flowchart of Contactless thermometer

4. BLOCK DIAGRAM

The block diagram is shown in Fig.2.It depicts all the equipment which connects each other. Firstly, the TCRT5000 IR sensor detects the presence of an object, the MLX90614 temperature Sensor reads data from body or object. Secondly, the received data is sent to Arduino for further processing, after that it displays results on smart phone.

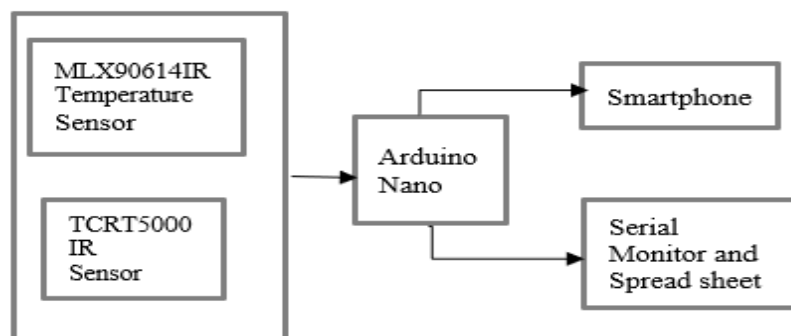


Figure 2: Block diagram of contactless thermometer

5.CIRCUIT DIAGRAM

The circuit diagram depicted in fig. 3 shows circuit design of the system. MLX90614 temperature sensor and TCRT5000 IR sensor are connected with Arduino nano. The SDA pin is connected to A4,SCL is connected to A5. It has characteristics such as a simple circuit, a smaller size, a larger range of applications, and is more cost effective. The temperature on-site is directly transmitted via "bus line" digital mode, which considerably improves the anti-jamming system. It's designed for on-site temperature monitoring in severe situations including environmental control, equipment or process control, and electronic consumables that require proximity temperature measurement. Figure 3 shows the MLX90614 schematic and illustration, which aids in circuit comprehension.

Features of MLX90614 Temperature sensor:

- Operating Voltage: 3-5V
- Object Temperature Measurement Range: -70°C to 380°C
- Accuracy of 0.5 °C (0-50 °C)
- Measurement Resolution: 0.02 °C
- I2C Wiring is compatible with both Arduino and the Raspberry Pi
- To achieve communication, only two ports were required.
- The DS18B20 has a serial number for each component.

TCRT5000 IR Sensor is used to detect the presence of object. It is available with four pins.

Features of TCRT5000 IR sensor:

- The detector in use is a photo-transistor.
- The emitter's wavelength is 950 nanometers.
- The o/p of a transistor is included in the infrared sensor.
- 5V is the operational voltage.
- The diode's forward current is 60mA.
- Analog/digital data is output.
- The transistor's collector current is 100mA.
- The temperature ranges from -25°C to +85°C during operation.

Arduino Nano is a compact, open-source electronic development board based on an 8-bit AVR microprocessor that is interoperable with other Arduino boards. It is a microcontroller board based on AT mega328P.

Features of Arduino Nano:

- It has crystal Oscillator of 16MHz
- It has 14 digital pins and 8 analog pins
- Nano has 6 PWM pins along with digital pins
- Operating voltage varies from 5V -12V
- It also includes small USB pin for uploading code
- It has a reset pin

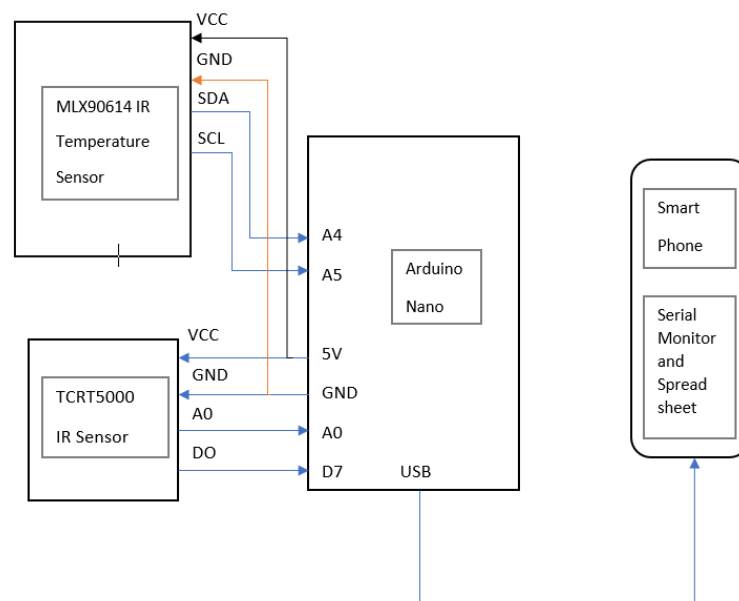


Figure 3: Circuit Diagram of Contactless thermometer

5. RESULTS

This is the result after completing of our project. We set a target for monitoring temperature in this system, which may be someone's body or an object. The output will be shown in mobile phone using an application. The TCRT5000 IR Sensor detects the presence if an object and if led glows the MLX90614 Temperature sensor reads the data and is used for measuring the temperature. Through the USB cable the Arduino is connected to mobile phone or PC. The result of the temperature measurement in Easyscan application is shown in fig.4. It also can be shown in Serial monitor fig.5 and we can provide spread sheet and we can save the results as shown in fig.6.

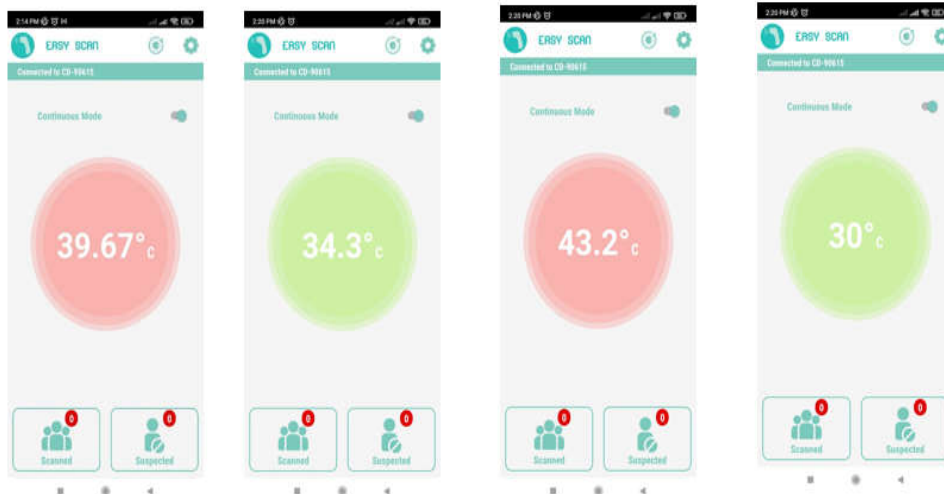


Figure 4: Result in Smart Phone



Figure 5: Result in Serial Monitor app

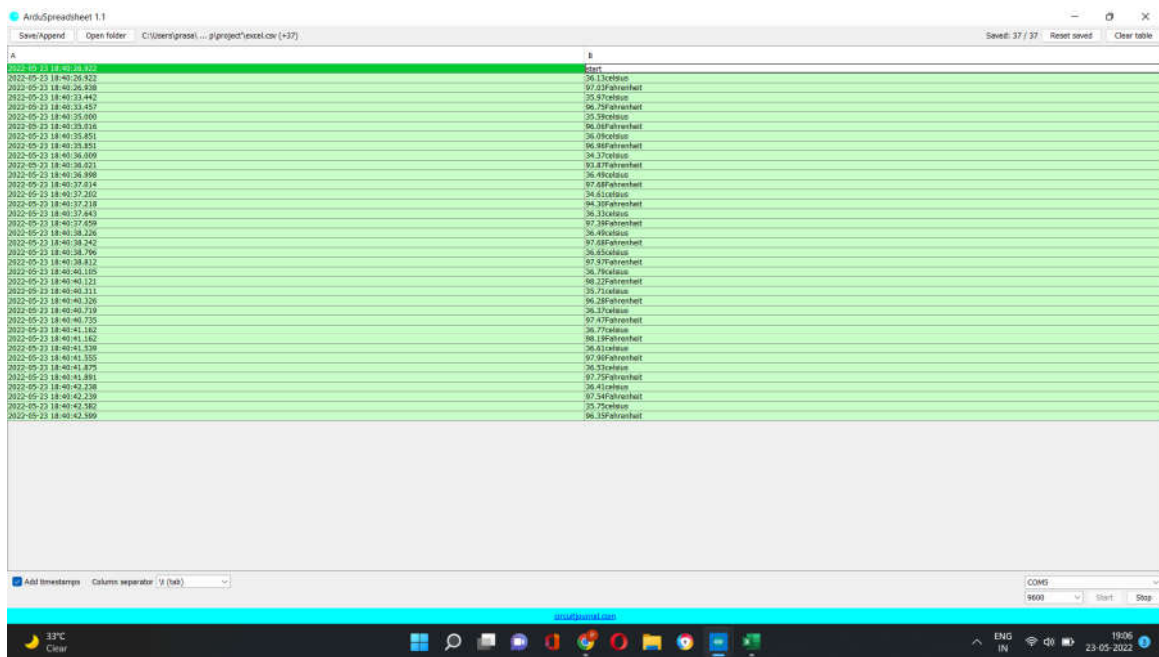


Figure 6: Spread Sheet

6. CONCLUSION

The technology demonstrates the creation of a contactless thermometer. where we are constantly battling unseen illnesses that spread from person to person. In order to measure body temperature without touching, we must maintain social space. Any contactless thermometer may be made with the help of this technology, which also makes it possible to monitor temperature without making physical touch. The contactless thermometer also offers a wider range of applications, particularly in the medical industry. The system is successfully implemented and assessed using cutting-edge ICs and technology.

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