INFRARED CONTACTLESS TEMPERATURE SENSOR

BACHELOR OF TECHNOLOGY

IN ELECTRONICS & COMMUNICATION ENGINEERING

Electronic Design Workshop

Project Synopsis

Submitted By: -

Rohan Kumar (2023UEC2649)

Karan Raj (2023UEC2653)

Aryan Rattan (2023UEC2660)

INFRARED CONTACTLESS TEMPERATURE SENSOR

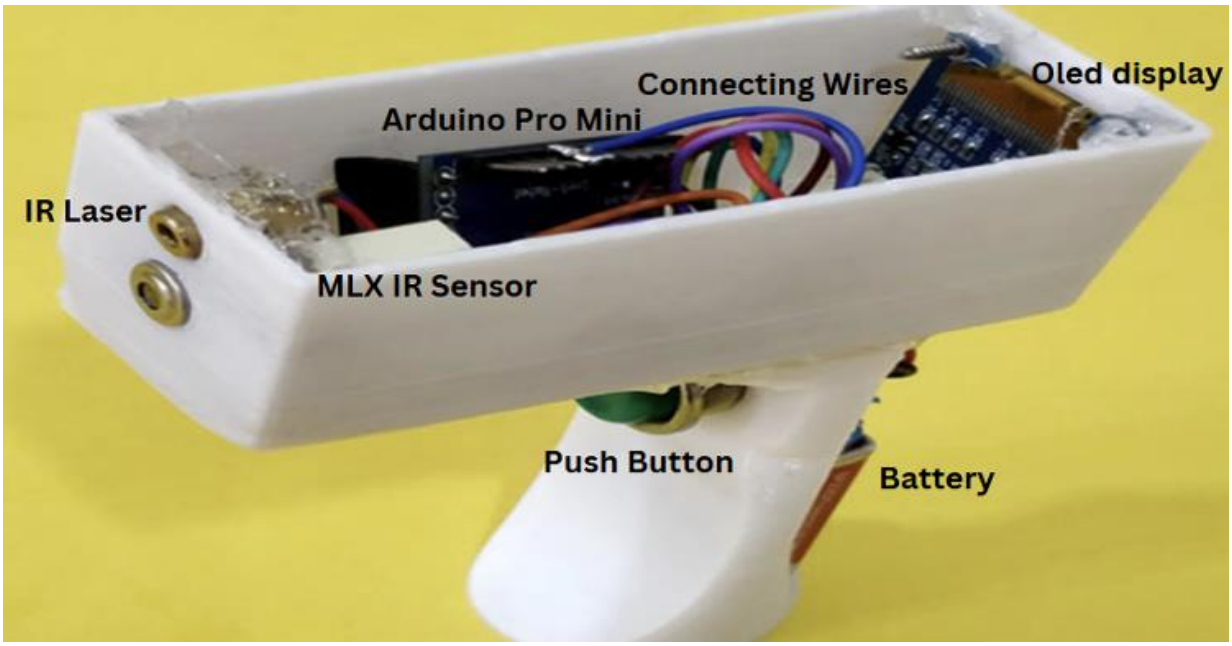
Introduction: -

- Temperature measurement plays a critical role in various fields, such as healthcare, industrial applications, and environmental monitoring.
- Traditional thermometers often present challenges, including the need for direct contact with the object or individual being measured. This can lead to hygiene concerns, inconvenience, or even inaccuracies.
- The ability to measure temperature from a distance, with high accuracy and without physical contact, provides a safer, more efficient solution in these contexts.
- The **MLX90614** temperature sensor, will be at the core of the system, enabling quick precise temperature measurements without the need for physical contact.
- **SSD1306 OLED** display will be used for real-time visualization of the temperature data
- The system will be powered by a battery
- The **Arduino Mini Pro** microcontroller will serve as the brain of the system, processing sensor data and controlling the display, buttons, and other components.
- 3D printed gun model will be used as an enclosure for various electronic components like **Arduino** mini pro, OLED display etc.

Project Objectives: -

- **Non-contact Temperature Measurement**
- **Real-Time Display of Data:** To provide a clear and concise real-time display of the measured temperature using the **SSD1306 OLED** display.
- **Portable System:** To integrate a battery-powered solution, without relying on an external power source.
- **Precision and Accuracy:** To ensure the system can deliver reliable temperature readings with high accuracy.
- **Laser Diode for Targeting:** It will act as a target marker, helping us aim the sensor at the correct object to ensure accuracy in measurements.

Methodology & Implementation



Components Used: -

- Arduino Pro Mini – The microcontroller that processes sensor data.
- MLX90614 Infrared Temperature Sensor – A non-contact IR sensor for measuring object temperatures.
- OLED Display (SSD1306) – Used to display the temperature readings.
- Laser Diode – Helps in aiming the sensor at the target.
- 9V Battery & Battery Clip – Power supply for the circuit.
- Push Button – Used to trigger temperature measurement.
- Connecting Wires – For establishing connections between components.

Working & Integration: -

- The MLX90614 sensor detects the IR radiation emitted by an object and calculates the temperature using the Stefan-Boltzmann law.
- The sensor has two units:
- Thermopile detector – Captures IR energy from the object.

• Signal conditioning unit – Converts the captured IR data into temperature readings using a 17-bit ADC.

• The sensor outputs data via the I2C communication protocol to the Arduino Pro Mini.

• The Arduino processes the data and sends the temperature values to the OLED Display, showing both object and ambient temperatures.

• The laser diode helps in accurately aiming at the target for precise readings.

• When the push button is pressed, the sensor takes a reading and displays the temperature on the OLED Screen.

• The 9V battery powers the system, making it portable.

Expected Results: -

• The thermometer should accurately measure body temperature without physical contact.

• The MLX90614 IR sensor should provide precise temperature readings with minimal error.

• The Arduino Pro Mini should process the sensor data and display the temperature on an OLED or LCD screen.

• The device should have a simple user interface, such as a button to take readings and an LED or buzzer to indicate successful measurements.

Challenges & Solutions: -

• **Sensor Calibration:** The MLX90614 sensor might require calibration to ensure accurate temperature readings.

Solution: Compare readings with a standard thermometer and apply necessary offsets in the Arduino code.

• **Power Management:** Since it's battery-powered, optimizing power consumption is crucial.

Solution: Use low-power modes of the Arduino Pro Mini and turn off the display when not in use.

• **Data Processing Speed:** The system should update readings quickly for real time use.

Solution: Optimize the Arduino code to process data efficiently.

Conclusion: -

• This project provides a cost-effective and efficient alternative to traditional thermometers.

• It is contactless, reducing the risk of infection transmission—a key advantage in medical and public health applications.

• The successful completion of the project will help develop practical IoT-based health monitoring solutions.

• Future improvements could include wireless connectivity (Bluetooth/Wi-Fi) to send temperature readings to a smartphone or a cloud database