

# Project Title: ESP32 with MLX90614 Infrared Temperature Sensor

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## 1. Overview

This program reads the **ambient temperature** and **object temperature** using the **MLX90614 infrared temperature sensor**, and prints the values to the Serial Monitor every 2 seconds. It communicates with the ESP32 via the **I2C protocol**.

## 2. Hardware Connections

MLX90614 Pin	Connect to ESP32	Description
VIN	3.3V or 5V	Power Supply (most modules support both)
GND	GND	Ground
SCL	GPIO 22	I2C Clock
SDA	GPIO 21	I2C Data

ESP32 uses default I2C pins:

- **SDA = GPIO 21**
- **SCL = GPIO 22**

## 3. Code Explanation – Line by Line

```
#include <Arduino.h>
#include <Wire.h>
#include <Adafruit_MLX90614.h>

Adafruit_MLX90614 mlx = Adafruit_MLX90614();

void setup() {
  Serial.begin(115200);
  if (!mlx.begin()) {
    Serial.println("MLX90614 not found. Check wiring!");
    while (1);
  }
  Serial.println("MLX90614 Ready!");
}

void loop() {
  float ambient = mlx.readAmbientTempC();
  float object = mlx.readObjectTempC();
```

```

Serial.print("Ambient Temp: ");
Serial.print(ambient);
Serial.print(" °C | Object Temp: ");
Serial.print(object);
Serial.println(" °C");

delay(2000);
}

```

## EXPLANATION

```
#include <Arduino.h>
```

- Includes core Arduino functions like `setup()` and `loop()` required for all Arduino programs.

```
#include <Wire.h>
```

- Includes the **Wire** library, which provides communication over the **I2C bus**.

```
#include <Adafruit_MLX90614.h>
```

- Includes the **Adafruit MLX90614 library**, which simplifies communication with the MLX90614 sensor.

```
Adafruit_MLX90614 mlx = Adafruit_MLX90614();
```

- Creates an instance of the `Adafruit_MLX90614` class named `mlx`. This object will be used to communicate with the sensor.

### `setup()` Function – Initialization Code

```

void setup() {
  Serial.begin(115200);
}

```

- Starts the Serial Monitor at a **baud rate of 115200** to print temperature data.

```

if (!mlx.begin()) {
  Serial.println("MLX90614 not found. Check wiring!");
  while (1);
}

```

- Call `mlx.begin()` to initialize the sensor.
- If the sensor is **not detected** on the I2C bus, it prints an error message and **halts execution** in an infinite loop (`while(1)`).
- This helps detect hardware issues immediately.

```
Serial.println("MLX90614 Ready!");
```

- If the sensor is found and initialized correctly, this prints a confirmation message.

## loop() Function – Repeating Logic

```
void loop() {  
    float ambient = mlx.readAmbientTempC();
```

- Reads the **ambient temperature** (air around the sensor) in Celsius using the sensor's built-in function.

```
float object = mlx.readObjectTempC();
```

- Reads the **object temperature** by detecting infrared radiation from a surface in front of the sensor.

```
Serial.print("Ambient Temp: ");  
Serial.print(ambient);  
Serial.print(" °C | Object Temp: ");  
Serial.print(object);  
Serial.println(" °C");
```

- Prints both temperatures to the Serial Monitor in a single readable line.

```
delay(2000);  
}
```

- Wait for **2 seconds** before repeating the readings.

## 4. How the MLX90614 Works

- The MLX90614 is a **non-contact infrared thermometer**.
- It measures:
  - **Ambient Temperature:** From its internal thermopile sensor.
  - **Object Temperature:** Using IR radiation received from an external surface (without touching it).
- Communication is handled over the **I2C protocol**, making it simple to connect to microcontrollers like ESP32.

## 5. Required Libraries

Install via Arduino IDE:

- **Adafruit MLX90614 Library**
- **Adafruit Sensor Library**
- **Wire Library** (comes by default)

6. Summary of What Happens

Step	Action
1	ESP32 powers up and initializes Serial and I2C communication
2	MLX90614 sensor is initialized and checked for connection
3	Every 2 seconds, the ESP32 reads both temperatures
4	The readings are printed to Serial Monitor