Ex No :4 Deploy IOT applications using platforms such as Blink app

Pulse Rate (BPM) Monitor using Arduino & Pulse Sensor

Aim

To design a pulse rate monitoring system using an Arduino and a Pulse Sensor to measure the heart rate in Beats Per Minute (BPM) in Blink app

Tools Required

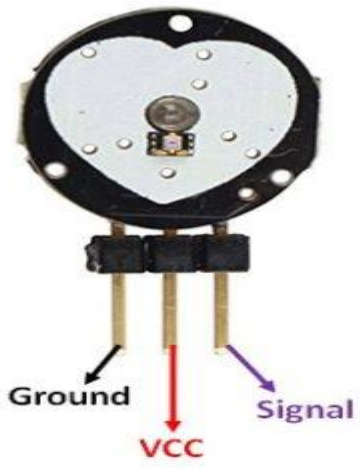
1. **Arduino Board** (Uno)
2. **Pulse Sensor** (e.g., Pulse Sensor Amped)
3. **Jumper Wires**
4. **OLED Display (Optional for visualization)**
5. **Resistors (if required)**
6. **USB Cable** (for programming and power supply)
7. **Arduino IDE** (for coding and uploading the program)

Connection

Pulse Sensor Pin	Arduino Pin
VCC (Red)	5V
GND (Black)	GND
Signal (Purple)	A0 (Analog Pin)

(Optional: If using an OLED display, connect it to the appropriate I2C pins on the Arduino.)

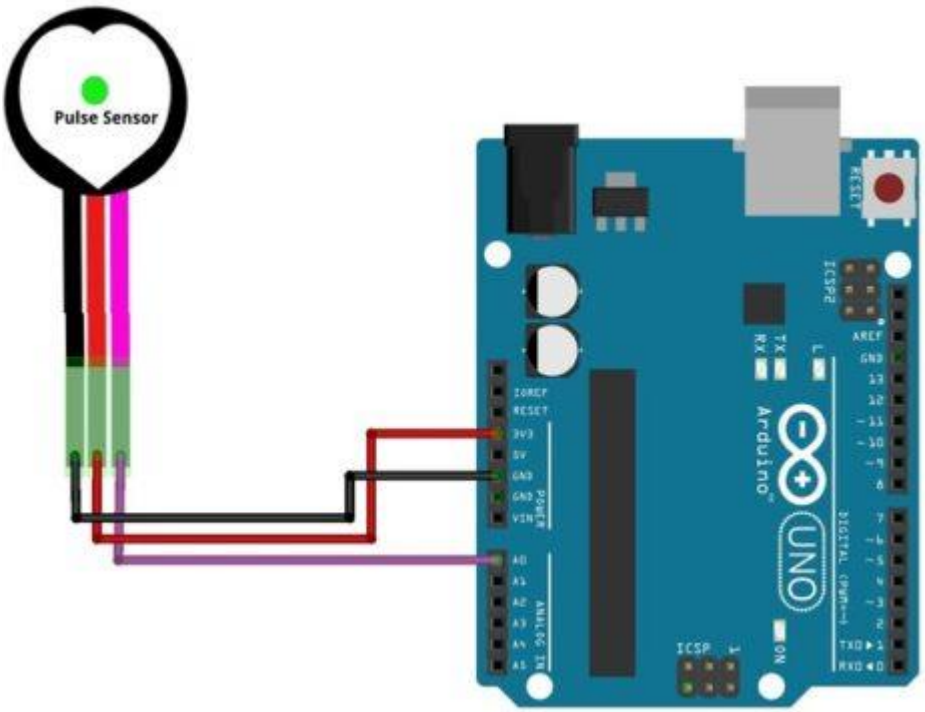
Pulse Sensor



Background Theory

The Pulse Sensor works on the principle of Photoplethysmography (PPG), which is a non-invasive method for measuring changes in blood volume under the skin. The sensor essentially consists of two main components: a light-emitting diode (LED) that shines light into the skin and a photodetector that measures the amount of light that is reflected back

Connection Diagram



Download the PulseSensor Playground Library from the Arduino IDE (Go to Sketch -> Include Library -> Manage Libraries, then search for "PulseSensor Playground" and install it).

Coding

```
#define USE_ARDUINO_INTERRUPTS true
// Include necessary libraries
```

```
#include <PulseSensorPlayground.h>

// Constants
const int PULSE_SENSOR_PIN = 0;  // Analog PIN where the PulseSensor is connected
const int LED_PIN = 13;          // On-board LED PIN
const int THRESHOLD = 550;       // Threshold for detecting a heartbeat

// Create PulseSensorPlayground object
PulseSensorPlayground pulseSensor;

void setup()
{
  // Initialize Serial Monitor
  Serial.begin(9600);

  // Configure PulseSensor
  pulseSensor.analogInput(PULSE_SENSOR_PIN);
  pulseSensor.blinkOnPulse(LED_PIN);
  pulseSensor.setThreshold(THRESHOLD);

  // Check if PulseSensor is initialized
  if (pulseSensor.begin())
  {
    Serial.println("PulseSensor object created successfully!");
  }
}

void loop()
{
  // Get the current Beats Per Minute (BPM)
  int currentBPM = pulseSensor.getBeatsPerMinute();

  // Check if a heartbeat is detected
  if (pulseSensor.sawStartOfBeat())
  {
    Serial.println("♥ A HeartBeat Happened!");
    Serial.print("BPM: ");
    Serial.println(currentBPM);
  }

  // Add a small delay to reduce CPU usage
  delay(20);
}
```

Attach Blink app result

Blink app is assignment

Result

The system successfully detects and displays the pulse rate in **BPM**.