




# Lab of IOT Project

Healthcare Monitoring System

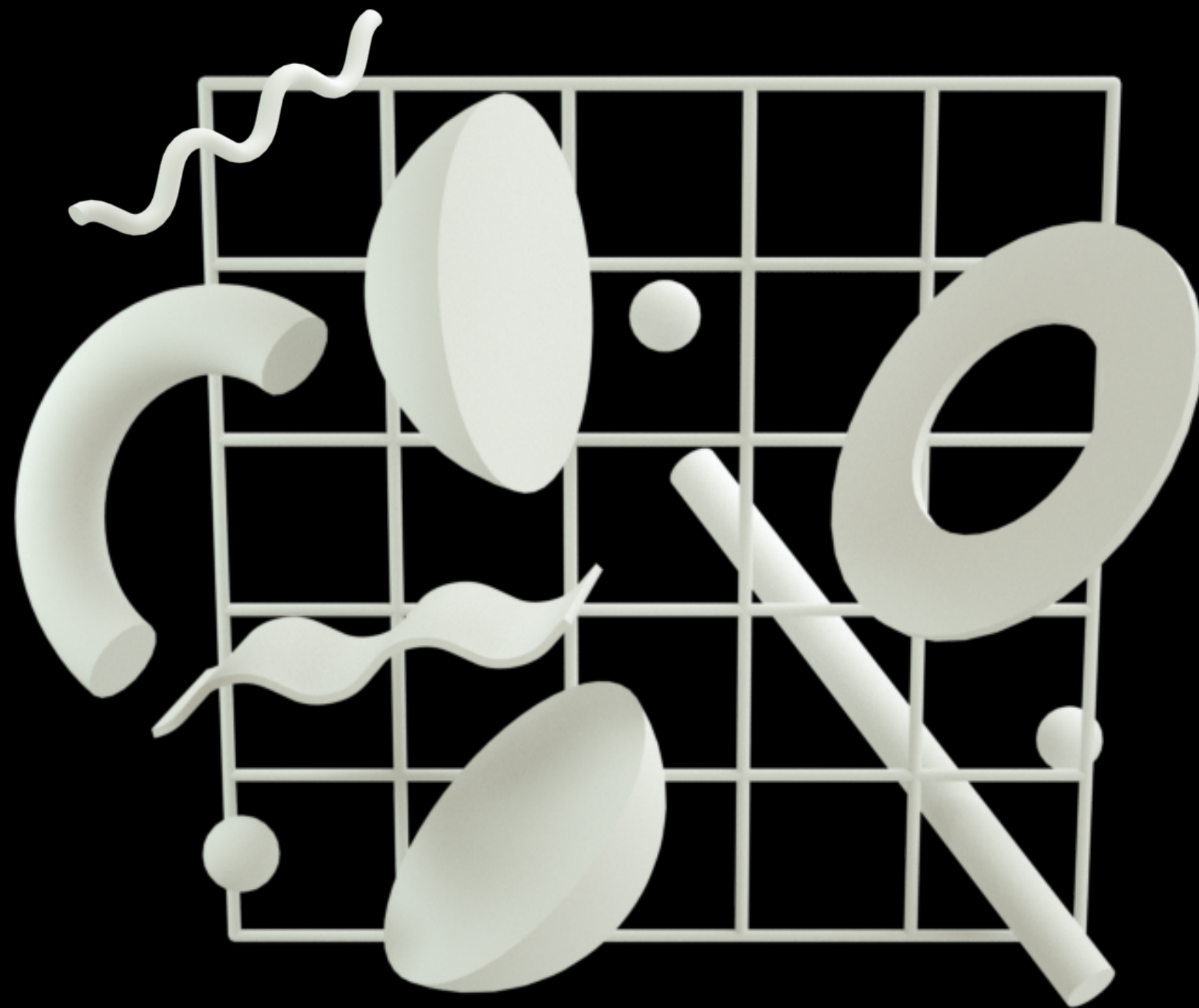
Project by Mohamed Aziz Khitmi  
Supervised by Professor FICCO MASSIMO



# Content

- 01** Overview
  - 02** Hardware & Architecture
  - 03** Software
  - 04** Node Red Dashboard
- 

# **Project Overview**



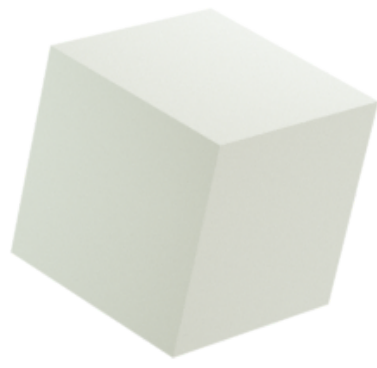
# Healthcare Monitoring System

- This IoT healthcare monitoring system is designed for non-intrusive, continuous monitoring of patients' vital signs. It is particularly beneficial for remote patient monitoring and can be integrated into telehealth platforms.
- This system allows the user to monitor electrocardiogram signals and heart rate.



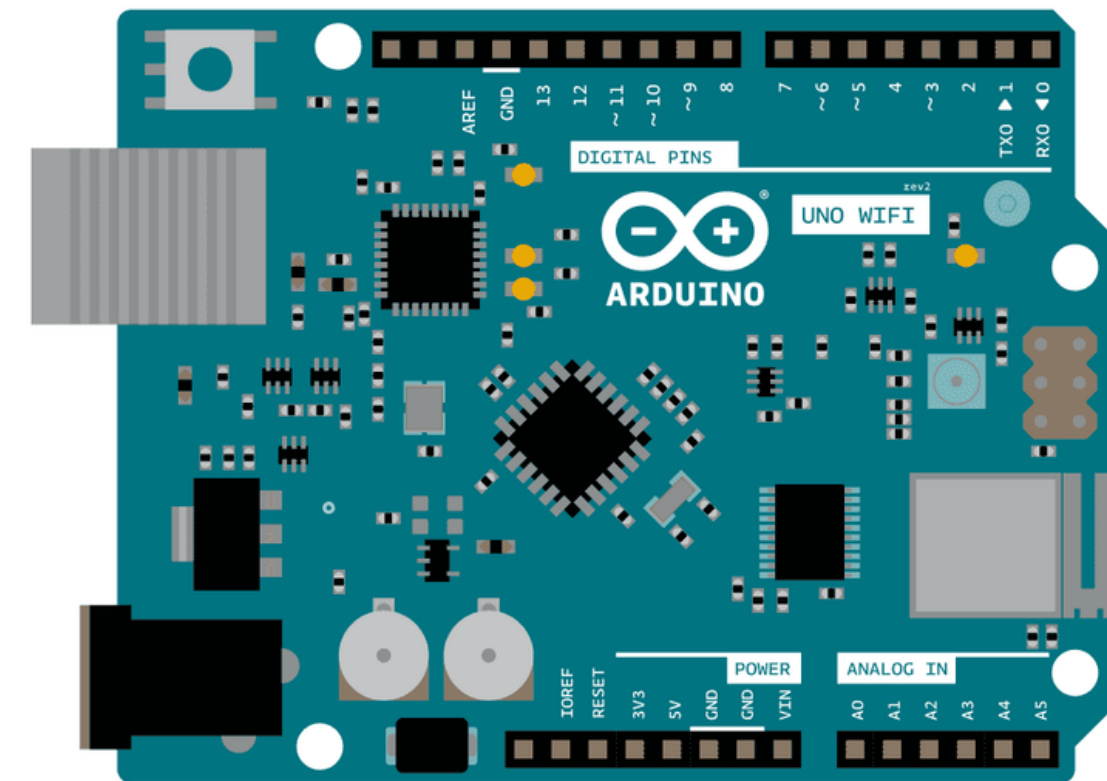
# Hardware Components





# Arduino Uno Rev2

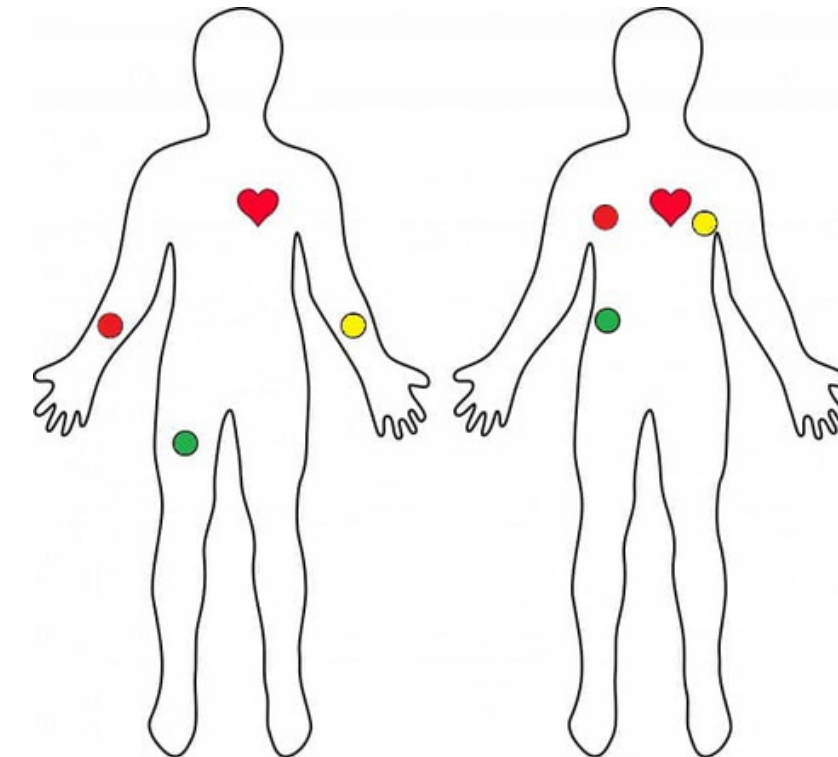
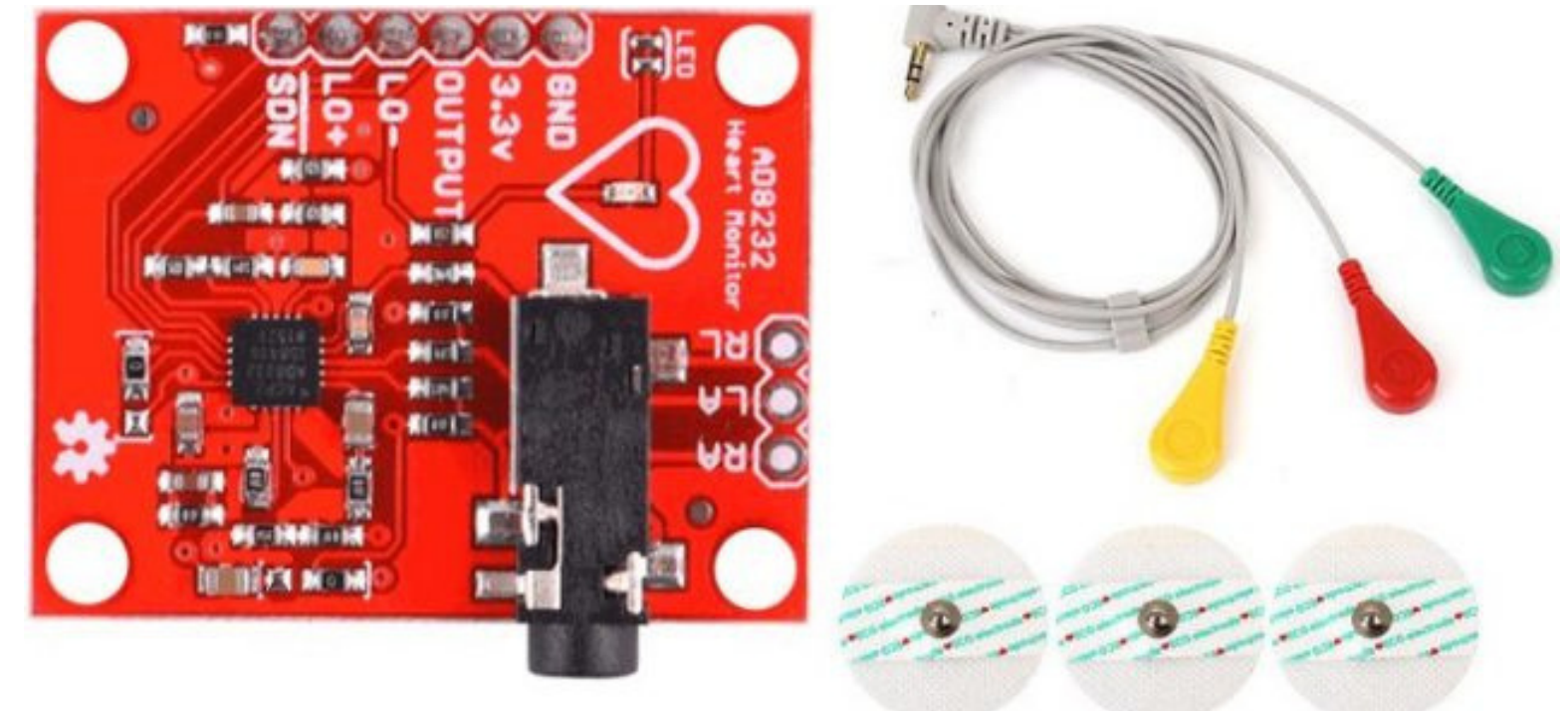
- The Arduino Uno WiFi Rev2 is an evolution of the classic Arduino Uno board, enhanced with integrated Wi-Fi connectivity. As a member of the Arduino family, it inherits the simplicity and versatility that Arduino is known for, while adding new capabilities that are crucial for modern IoT projects.
- The project employs an Arduino Uno WiFi Rev2 as the central processing unit for this main reason.





# AD8232 ECG Sensor

- The AD8232 ECG Sensor is designed to measure the **electrical activity of the heart over time**. It provides an analog signal representing the electrical impulses generated by the heart during each cardiac cycle.
- The sensor helps in monitoring the patient's **heart rate** and detecting irregularities or abnormalities in the ECG signal.



# KY-039 Heartbeat Sensor

- The KY-039 Heartbeat Sensor utilizes infrared light to **detect variations in blood volume as the heart beats**. It translates these variations into electrical signals, allowing the measurement of the heart rate.
- This sensor complements the ECG monitoring by **providing an alternative method for tracking heart rate**. It is particularly useful for scenarios where ECG readings might be challenging to obtain.



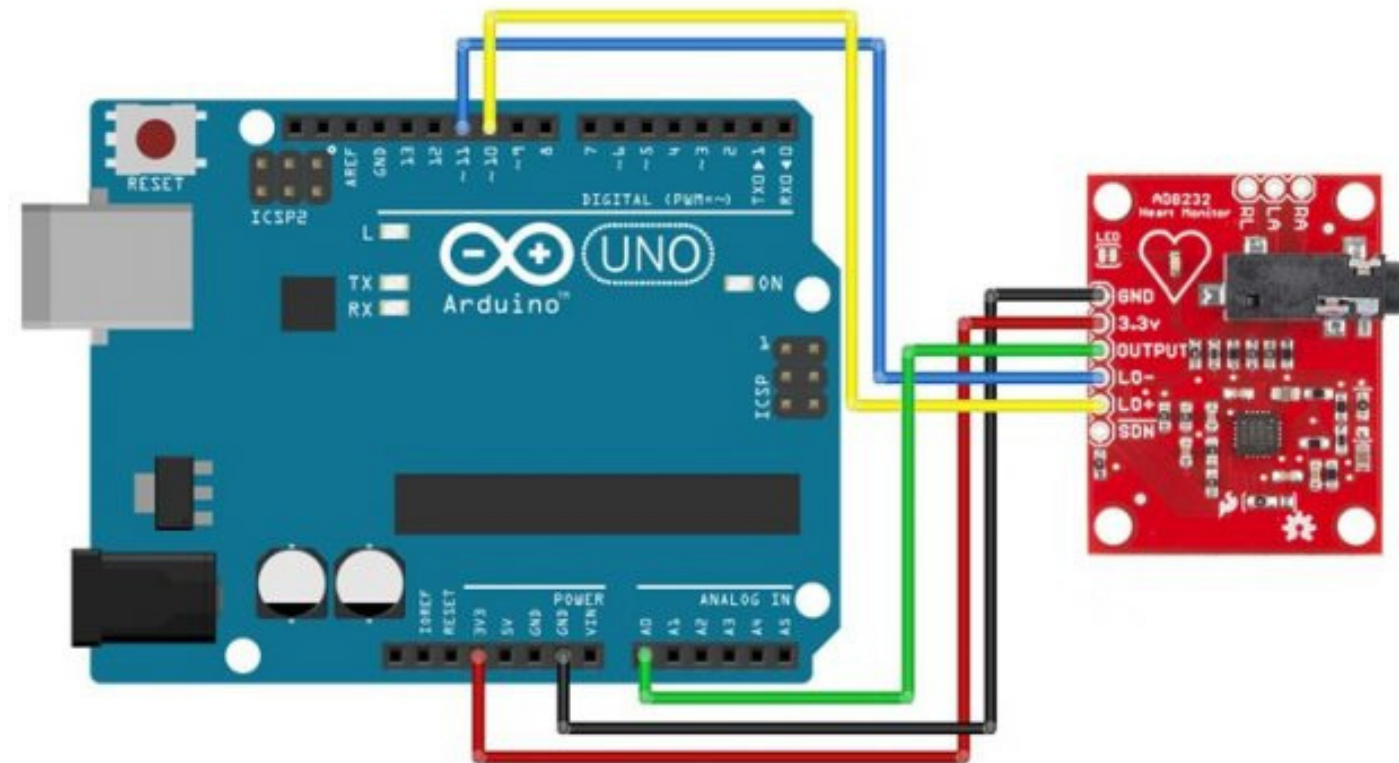


# Architecture

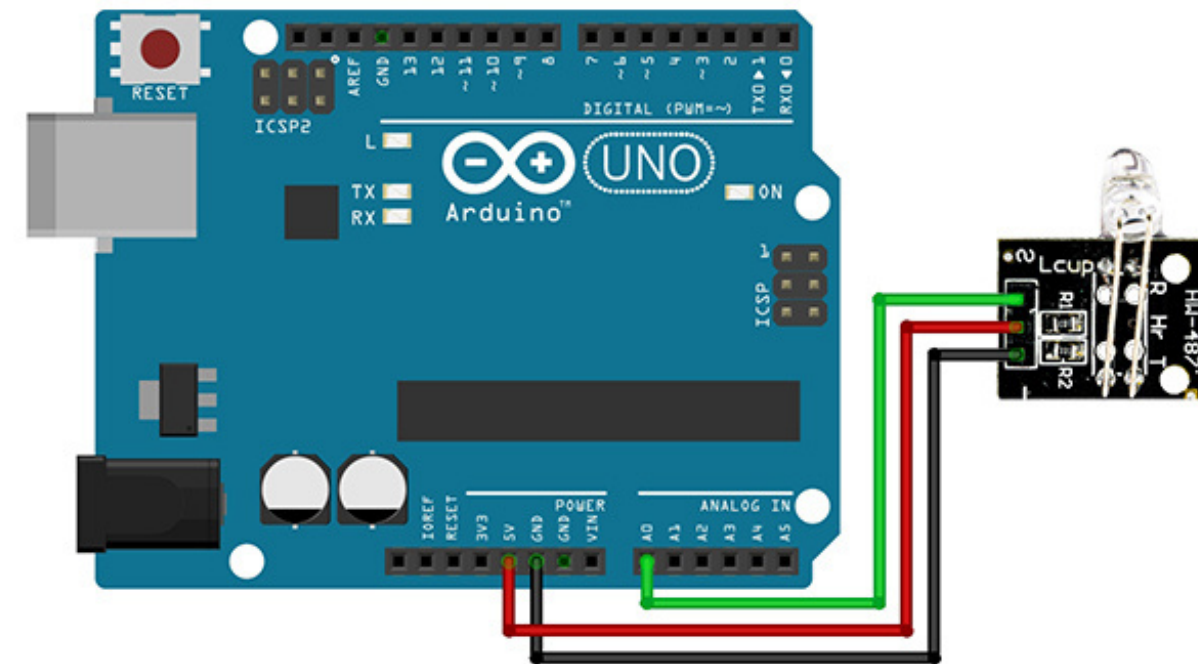


# Architecture

## AD8232 ECG Sensor



## KY-039 Heartbeat Sensor



**Software**





# Software

- The program continually reads data from both sensors, performs necessary calculations, and sends the results to the Serial Monitor and Serial Plotter for real-time visualization.
- Data is formatted in JSON format to be read from a dashboard.

```
// Pin configuration
const int ad8232Pin = A0; // Analog pin to which AD8232 OUT pin is connected
const int ky039Pin = A1; // Analog pin to which KY-039 OUT pin is connected
const int minValue = 100; // Adjust based on your observations
const int maxValue = 900; // Adjust based on your observations
void setup() {
    Serial.begin(9600);
}

void loop() {
    // Read data from AD8232 Heart Rate Monitor
    int ad8232Value = analogRead(ad8232Pin);
    float ad8232Voltage = (ad8232Value / 1024.0) * 5.0;

    // Read data from KY-039 Heartbeat Sensor
    int ky039Value = analogRead(ky039Pin);

    // Print the values to the Serial Monitor

    Serial.print("{\"AD8232_val\":");
    Serial.print(ad8232Value);
    Serial.print(",");

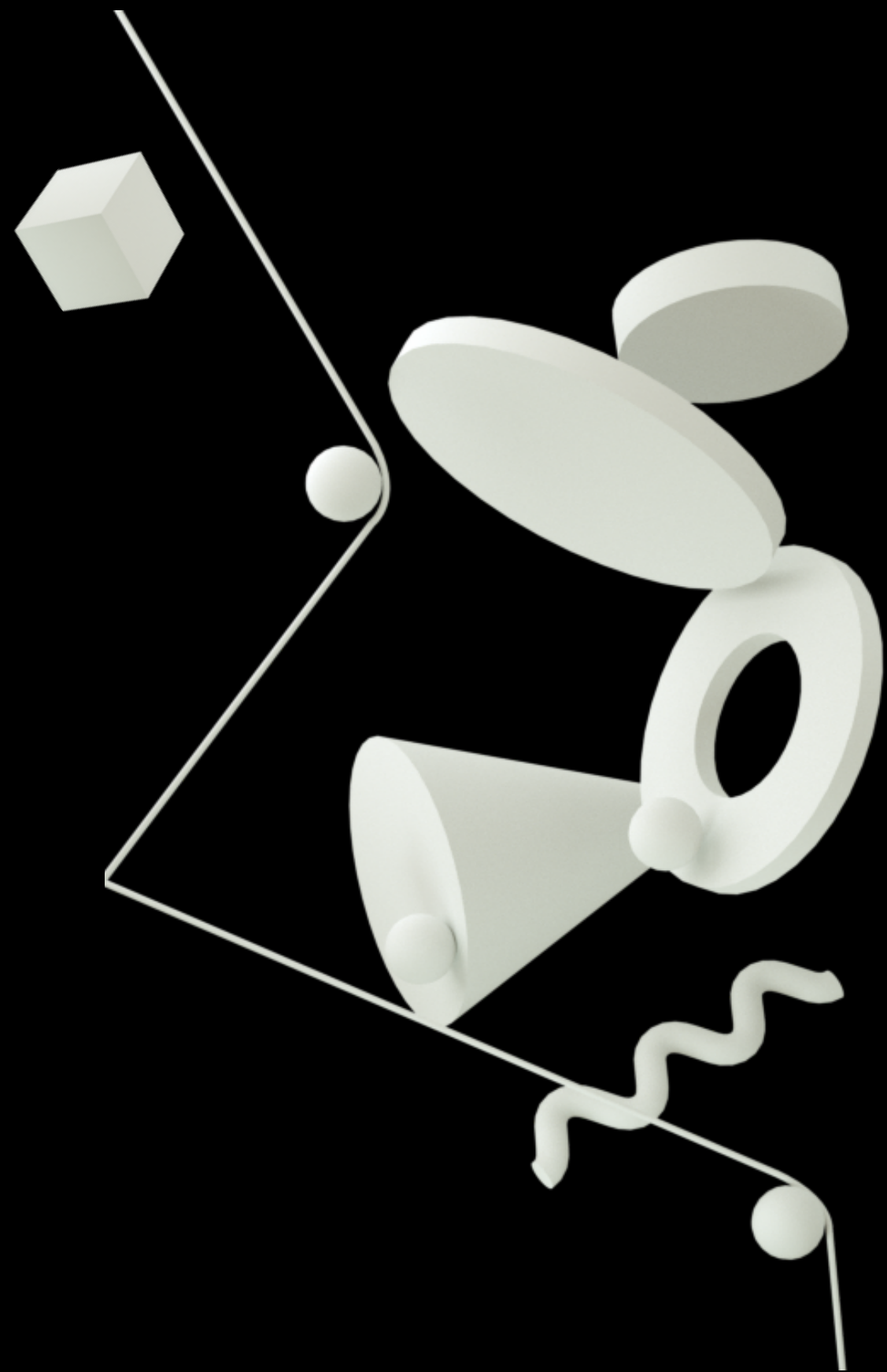
    Serial.print("\"AD8232_volt\":");
    Serial.print(ad8232Voltage);
    Serial.print(",");

    // Map the sensor value to a realistic heart rate range
    int heartRate = map(ky039Value, minValue, maxValue, 75, 85);

    // Print the values to the Serial Monitor
    Serial.print("{\"KY039_val\":");
    Serial.print(ky039Value);
    Serial.print(",");

    Serial.print("\"Heart_rate\":");
    Serial.print(heartRate);
    Serial.println("}");
```

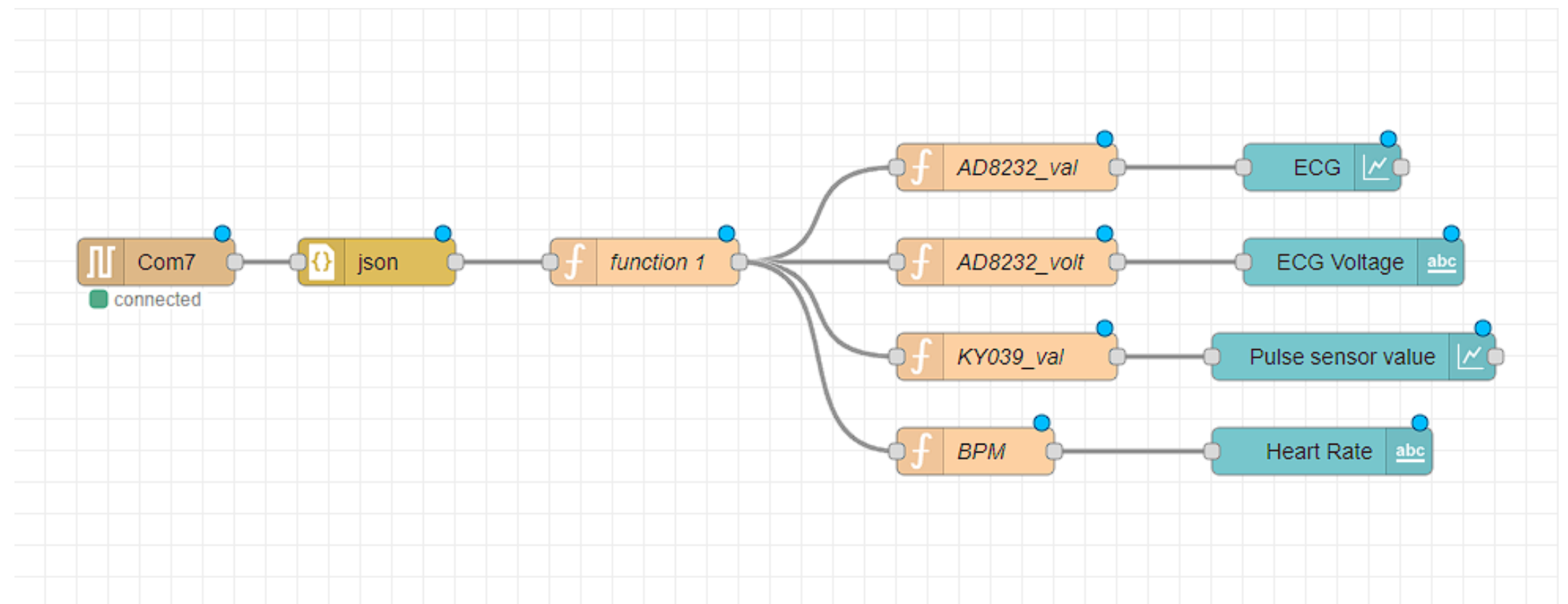
# **NODE RED DASHBOARD**



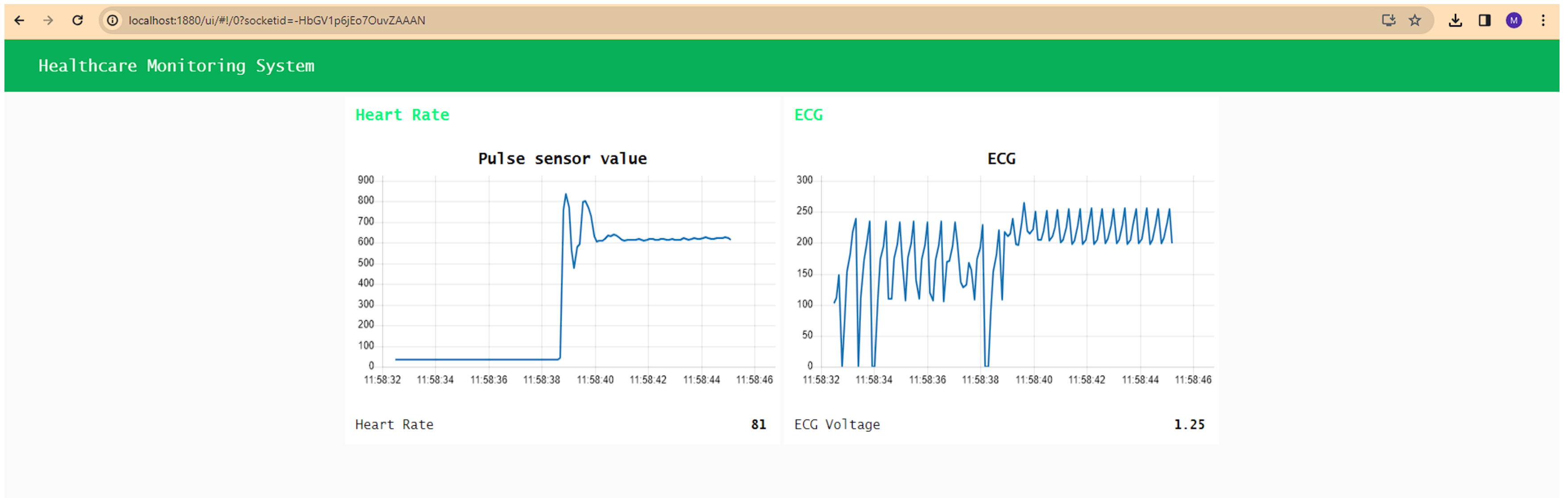


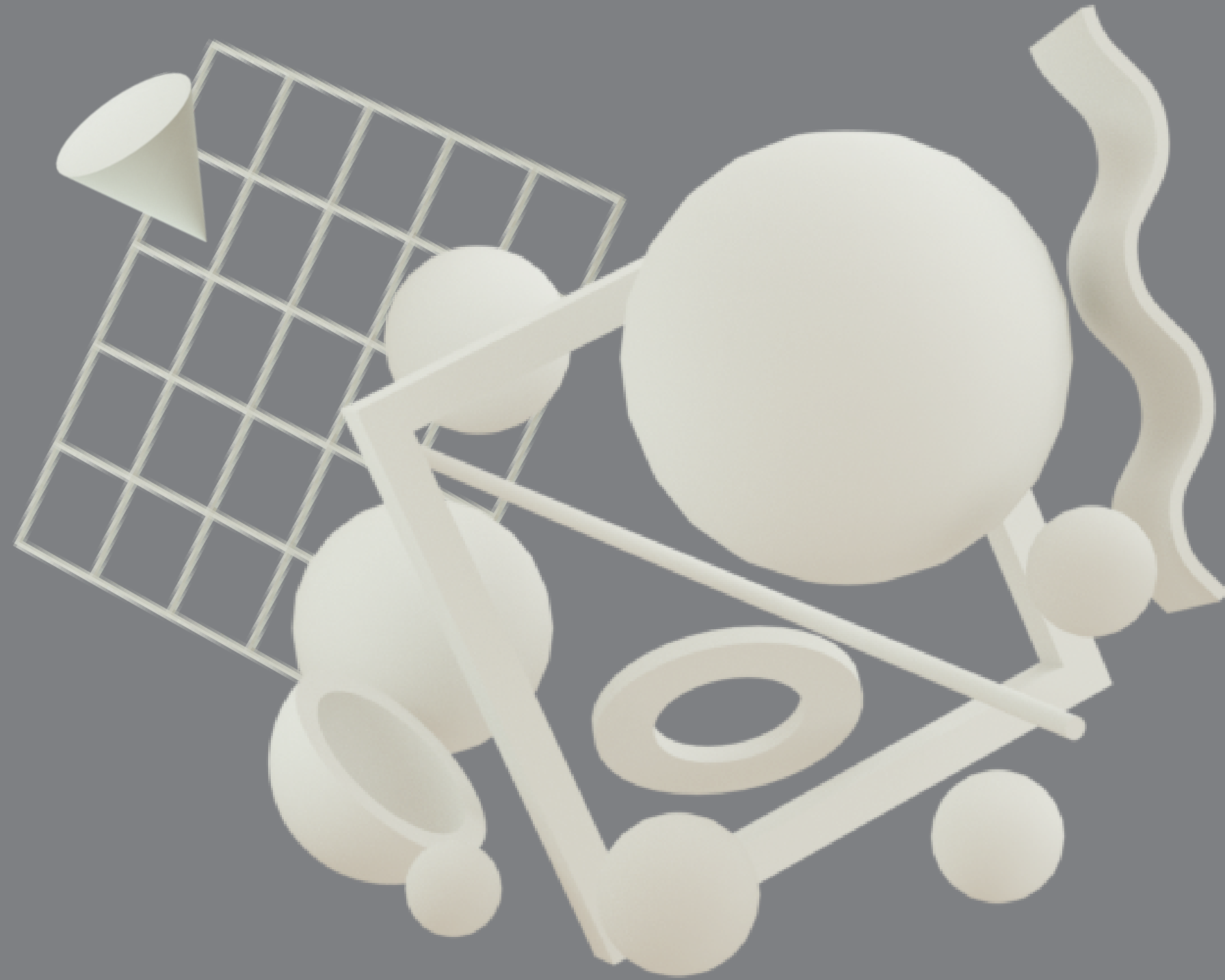
# Node Red Dashboard

- Node Red is used to display data received from sensors.
- It reads parsed data from serial and displays into a dashboard.
- A workflow is implemented for this reason.



# Node Red Dashboard





**Thank you!**