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EXECUTION VIDEO OF THE DEMO :

GITHUB LINK :
https://github.com/renganathan077/L-T-Project-batch-11

Industrial Internet of Things (IIoT) – Position Monitoring System

AIM :

The primary goal of this project is to design and implement a **Position Monitoring System** that utilizes **accelerometer and gyroscope sensors** to track the orientation of an object in real-time. The system will process motion data and display it on an **OLED screen** through a **simulated environment** (Wokwi).

This project focuses on **Industrial Internet of Things (IIoT)** applications where **precise position monitoring** is critical, such as **robotics, industrial machinery monitoring, and asset tracking**.

Problem Statement :

In various industrial and automation applications, tracking the position and orientation of objects is crucial. Factories and warehouses rely on monitoring moving parts, robotic arms, or industrial tools to ensure efficient operation and safety.

Existing solutions often require expensive hardware or complex setups, making them difficult to implement in smaller or budget-constrained industries.

This project aims to provide a cost-effective and simulated solution by utilizing MPU6050 (Accelerometer + Gyroscope) sensors to detect movements and display real-time data on an OLED screen. By using a Wokwi simulation, industries can test and implement such systems virtually before deploying physical prototypes.

3. Scope of the Solution:

This project has a broad scope in various industrial applications:

Short-Term Scope

✓ Real-time motion detection using MPU6050

✓ OLED visual representation of position data

✓ Software-based simulation (Wokwi) to validate design

✓ Basic position tracking for industrial automation

Long-Term Scope

✓ Integration with cloud platforms for remote monitoring

✓ Physical hardware implementation for IoT-based industries

✓ Improved accuracy by fusing sensor data with Kalman filters

✓ Wireless transmission of position data via MQTT or WiFi

4. Required Components:

◆ **Software Requirements**

- Arduino IDE – For programming the microcontroller
- Wokwi Simulator – For running the virtual circuit

- GitHub – For version control and project documentation
- Libraries Required:
  - Wire.h – I2C communication
  - Adafruit_GFX.h – OLED graphics
  - Adafruit_SSD1306.h – OLED display driver
  - MPU6050.h – Sensor library

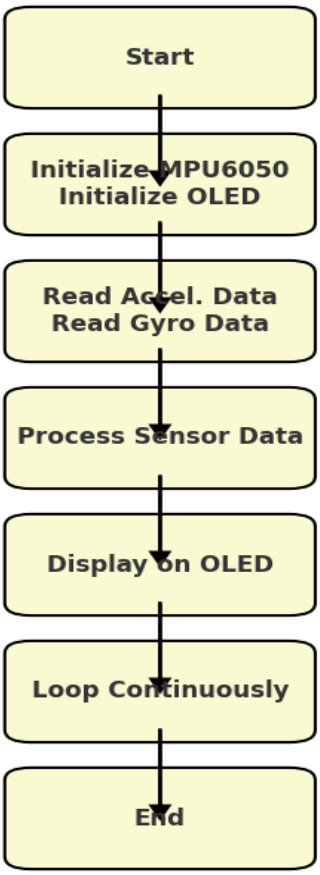
◆ **Hardware Components** (For Physical Implementation)

1. Microcontroller: ESP32 / Arduino
2. MPU6050 Sensor: Measures accelerometer and gyroscope data
3. OLED Display (SSD1306): Displays real-time position data
4. Connecting Wires: For circuit connections

◆ **Cloud Environment** (Optional for Future Development)

- Thingspeak / Firebase / AWS IoT – For cloud-based monitoring
- MQTT Protocol – For wireless data transmission

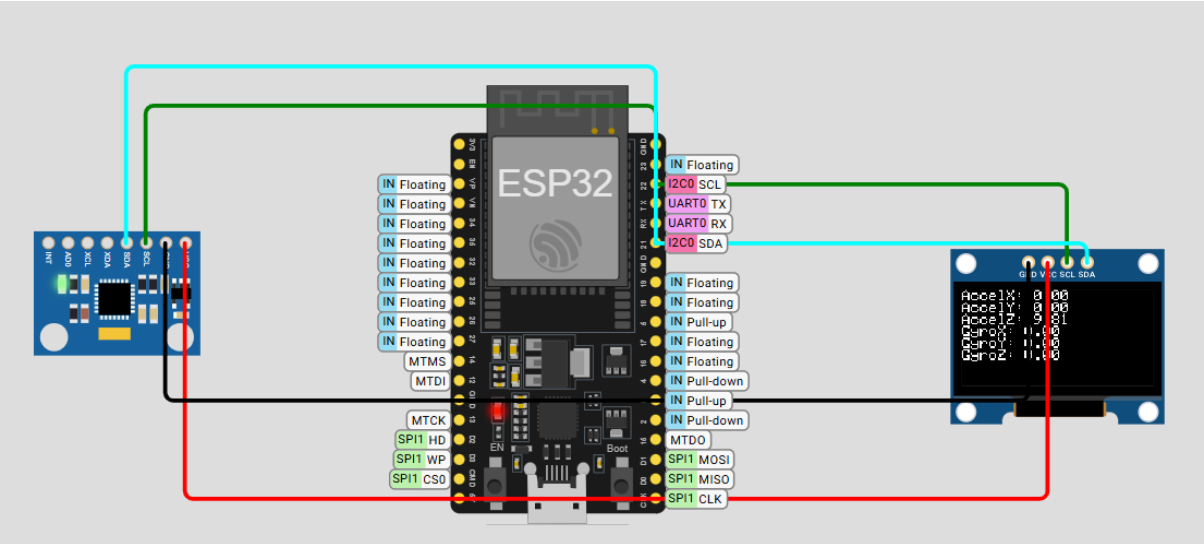
5. Flowchart of the Code



This flowchart represents the working process of the **Position Monitoring System** using the **MPU6050 sensor** and an **OLED display**.
Steps in the Flowchart:

1. **Start** – The system begins execution.
2. **Initialize MPU6050 & OLED** – The **MPU6050 sensor** (for accelerometer & gyroscope data) and the **OLED display** are initialized.
3. **Read Accelerometer & Gyroscope Data** – The system collects **real-time motion data** from the MPU6050 sensor.
4. **Process Sensor Data** – The collected data is **filtered, processed, and analyzed** to determine movement and orientation.
5. **Display on OLED** – The processed **position data** is displayed on the **OLED screen** for monitoring.
6. **Loop Continuously** – The system runs in a loop, continuously updating position data.
7. **End** – The process terminates when required.
This system is useful for **real-time motion tracking** in IIoT applications.

Simulated circuit (Wokwi):
Here is the circuit created in wokwi



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