

Real-Time Motion Tracking with IMU and Blender

Project Overview:

You will work with an IMU sensor and an Arduino to capture motion data (e.g., orientation and rotation) and process it to control a 3D model in Blender. The model must respond in real-time to the movement and rotation of the IMU, bringing your chosen object to life. Creativity is key - avoid using basic shapes like cubes or spheres and aim for a model with more complexity and character

Objective:

Design and implement a system that uses IMU data to control the movement and rotation of a complex 3D model in Blender, simulating real-time motion tracking. The 3D model should be creative and engaging - examples include a hand, aircraft, or another dynamic object. The goal is to create an interactive, visually appealing simulation.

Requirements:

1. **IMU and Arduino:** Use the IMU to track motion and the Arduino to send data to Blender.
2. **3D Model:** Select or design a model in Blender that is dynamic and interesting.
3. **Real-Time Interaction:** Ensure the model moves and rotates realistically based on IMU data.

Suggested Approach:

1. **Setup:** Assemble the circuit with your Arduino Uno and IMU sensor. Test it to confirm the sensor readings can be observed.
2. **Experiment with the integration of blender:** Integrate the IMU readings to blender. You are free to use any library.
3. **Experiment and select a 3D model:** Try using the readings and your code on existing basic 3D models and then progress to your own model or more complex models.

Project Deliverables:

1. **Project Report (Group):** A concise report (2 pages) covering:
 - a. **Circuit Design:** Diagram or schematic of the Arduino and sensor setup, showing wiring and connections.
 - b. **Pipeline and Methodology:** Description of the pipeline and method – How do the readings from the IMU translate into the blender simulation. For example this can be a flow diagram.

- c. A brief **individual reflection** on what the student learned from the project, any challenges faced, and any additional improvements they might consider if they had more time.

2. **Video Demonstration (Group):**

- a. A short (1 minute or less) video demonstrating their setup in action, showing real-time motion with the IMU sensor.

Helpful links:

1. **Introduction to Arduino**

- a. <https://www.youtube.com/watch?v=JnJIKX5J0Cc&list=PLwWF-ICTWmB7-b9bsE3UcQzz-7ipI5tbR>
- b. <https://www.arduino.cc/en/software>

2. **MPU6050 Guide**

- a. <https://howtomechatronics.com/tutorials/arduino/arduino-and-mpu6050-accelerometer-and-gyroscope-tutorial/>