AIR MOUSE

PROJECT DESCRIPTION

Project Scope - Definition and Parts List

The Smart Air Glove (Air Max) is an innovative gesture-controlled glove designed to function as a wireless mouse. It uses a sensor and wireless communication to detect hand movements and translate them into real-time cursor movements and click actions on a computer screen.

Main Objectives:

→ Enable gesture-based control for PC mouse movement.
→ Simulate left-click, right-click, and scrolling through hand gestures and push buttons.
→ Communicate wirelessly with the computer using a Bluetooth USB Dongle.

Problem Statement

Many users find traditional computer mice inconvenient for dynamic or touchless control. Individuals with limited mobility or those seeking gesture-based interaction often need an alternative input device. There is a need for a wireless, hands-free solution that allows users to control a cursor through natural hand movements.

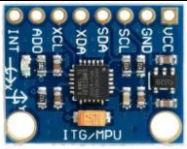
Proposed Solution

To address this, I developed a wearable Air Mouse using the GreyCode Board microcontroller and MPU6050 motion sensor. The device detects hand gestures (tilt and rotation) and translates them into cursor movement via Bluetooth, acting as a standard HID mouse. It also includes:

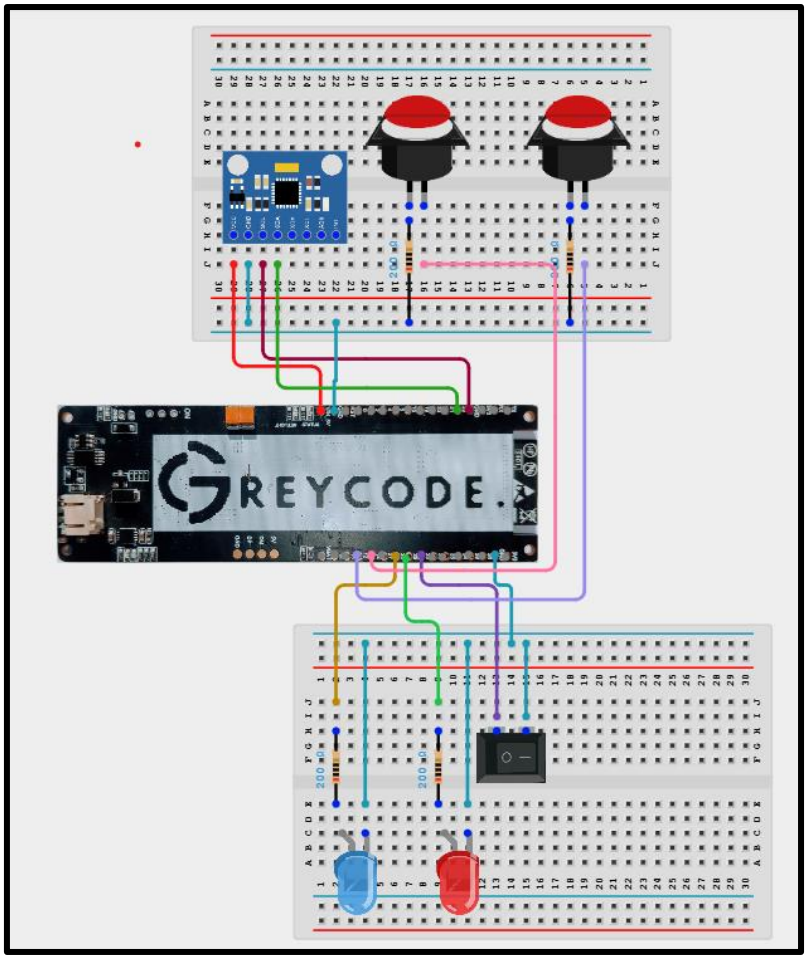
- Buttons for left and right mouse clicks
- Red and blue LEDs for user feedback
- A switch to enable or disable gesture control when needed

This solution offers a low-cost, portable, and touch-free

Parts list:

COMPONENT	PURPOSE	VISUAL IMAGE
Microcontroller: (GreyCode Board)	Main processing unit for I/O control and signal processing.	
MPU6050 Accelerometer and Gyroscope	For motion and orientation detection (cursor movement).	
Power Module:	Powered directly by a Power Bank for ease of charging and extended usage.	
Tactile Push Buttons (2x)	For left-click and right-click simulation.	
Toggle switch	Turns the Air Mouse system on or off.	
LED (2x)	Red LED: Indicates that the Air Mouse is turned OFF via the switch. Blue LED: Lights up when either the Left or Right mouse button is pressed.	
Jumper Wires	Jumper wires carry power or signals between parts	

SYSTEM ARCHITECTURE DIAGRAM

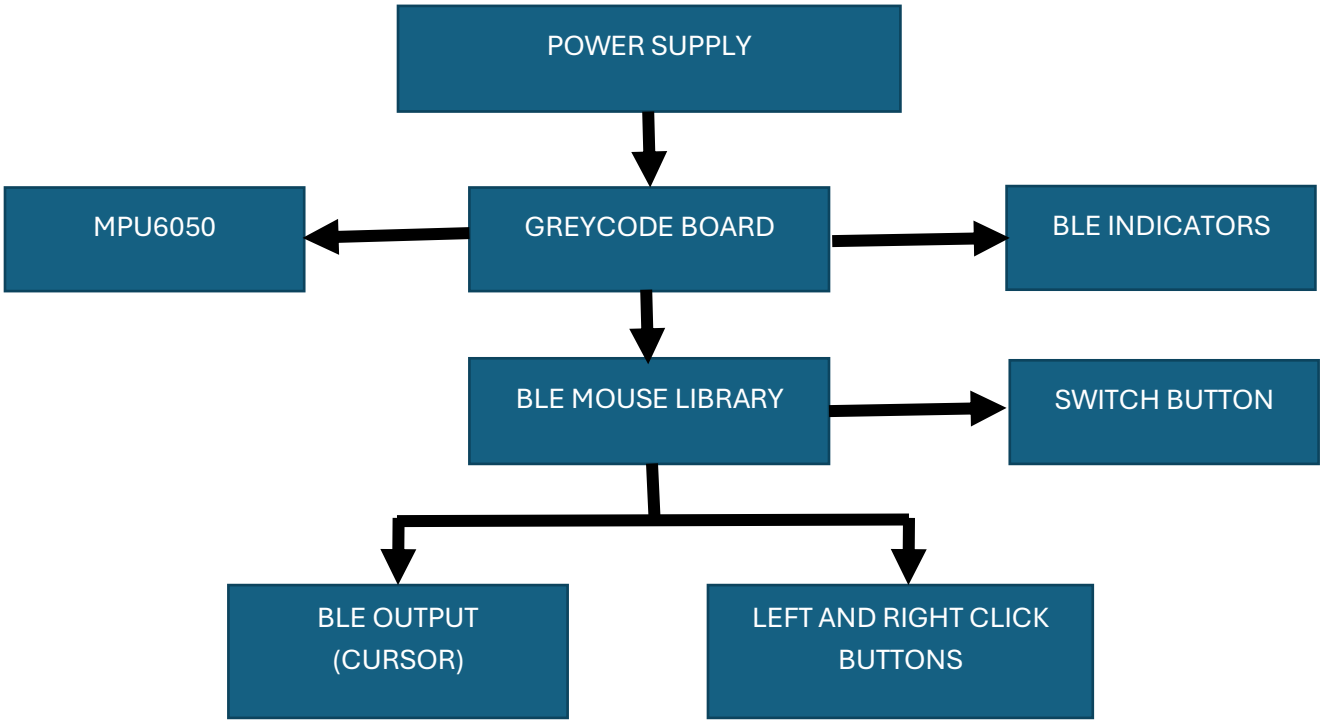


Link: [Air Mouse Circuit Diagram]

Communication Flow Summary:

Component	ESP32 Pin	Notes
MPU6050 VCC	3.3V	Power
MPU6050 GND	GND	Ground
MPU6050 SDA	GPIO 21	I2C data
MPU6050 SCL	GPIO 22	I2C clock
Left Button	GPIO 14	INPUT_PULLUP
Right Button	GPIO 12	INPUT_PULLUP
Switch	GPIO 33	Toggles gyro cursor control
Red LED	GPIO 25	ON when Air Mouse is ON
Blue LED	GPIO 26	ON when a button is pressed

AIR MOUSE BLOCK DIAGRAM



Challenges Faced

Sensor stability: The cursor was unstable at first. We applied a low-pass filter (alpha smoothing) to gyro readings for better control.

Bluetooth pairing issues: Some devices didn't recognize the Air Mouse. We confirmed HID over BLE was correctly initialized and named.

Incorrect motion mapping: X and Y axis movement needed to be adjusted to feel natural on screen.

Component noise: Ensured good I2C communication and clean power by checking all connections and removing magnetic interference from the magnetometer when unused.

Conclusion

This Air Mouse project demonstrates how motion sensing, wireless communication, and human-centered design can create a hands-free input device. It is ideal for presentations, gaming, and accessibility solutions. The device is customizable and low-cost, and can be extended further with:

Gesture-based clicks

Scroll detection

This project enhanced skills in Arduino programming, Bluetooth HID, and motion sensing, making it a great showcase of wearable tech and IoT innovation.