Gyroscopic Wrist-Mounted Mouse (GWMM)

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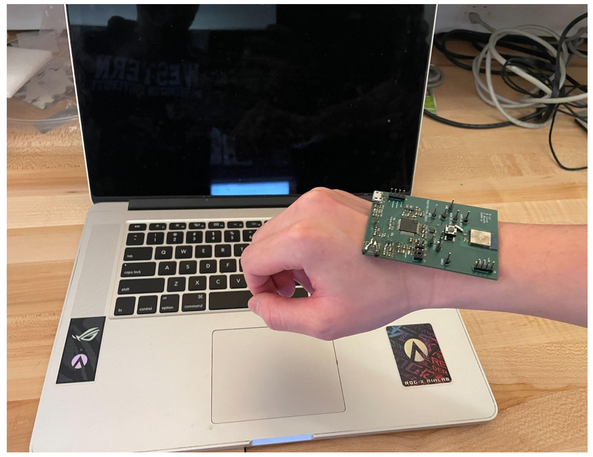
Abstract

The Gyroscopic Wrist-Mounted Mouse is a Human Interface Device focused on emulating the functions of a traditional optical mouse. Typically, the standard ways to control a computer cursor are standard optical mouses and trackpads and alternative mouses, such as eye trackers, can be extremely expensive. The GWMM was created to explore an affordable alternative approach to using your computer. The GWMM utilizes a gyroscopic accelerometer, Bluetooth module, and other integrated circuits to accomplish this task. Data received from the gyroscopic accelerometer is processed by our microcontroller and used to determine cursor movements and mouse clicks. The GWMM connects through Bluetooth to allow wireless functionality while being powered by a LiPo battery. The GWMM has other features such as LEDs to indicate battery level and USB charging. The GWMM also utilizes low power functionality which allows it to be functional for over 24 hours. In essence, the GWMM is a low-cost battery powered Bluetooth mouse that utilizes user gestures and movement to perform mouse functions.



GWMM Mounted on user's wrist

Acknowledgements

John Lund
Hardware design

Todd Morton
Software design

Results

Bluetooth Capabilities:

- Able to connect via Bluetooth to computer as HID

Sensor Data Acquisition:

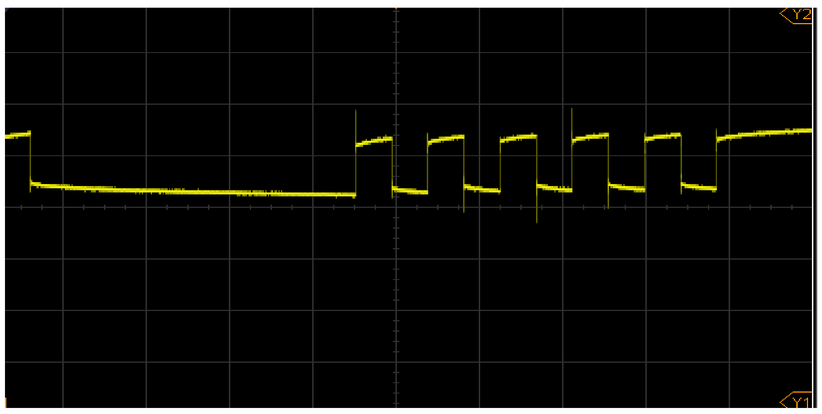
- Sensor data is being read and processed by the main MCU and being sent via UART to the Bluetooth module

Recharge Capabilities:

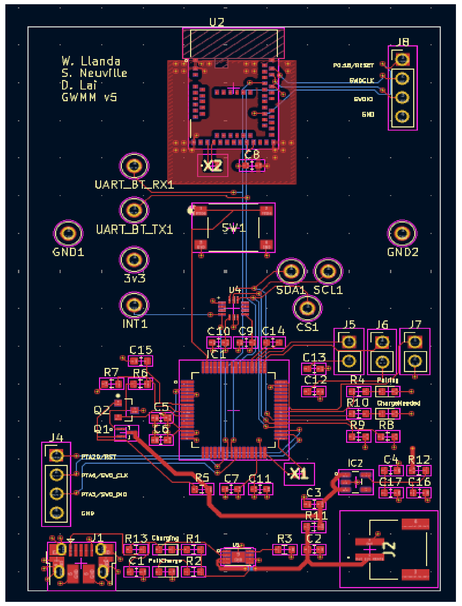
- The onboard battery is able to be connected via Micro-USB to be recharged

Mouse Functionalities:

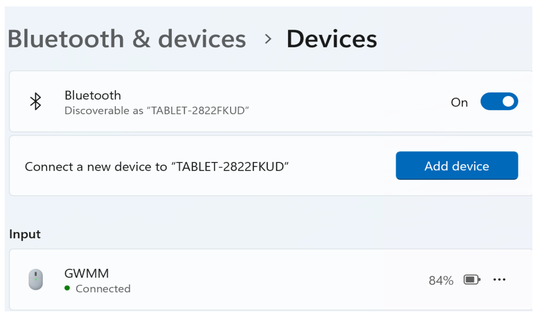
- Performs both left and right clicks when the appropriate gesture is inputted
- Cursor moves in the direction that the user is moving the GWMM



Waveform of UART stream



PCB Layout of GWMM



GWMM Connected to PC through Bluetooth

Future Direction

Continued development of the GWMM would feature:

- Streamlined Bluetooth connectivity process
- Eliminate the need for multiple MCUs
- Revamp calculation process for better one-to-one mapping of mouse movements

Conclusion

The GWMM utilizes the LSM6DSO gyroscope and accelerometer to implement the functionality of an optical mouse. It is able to connect via Bluetooth to a computer, recharge its onboard battery. It's able to recognize gestures that map to left and right clicks. The GWMM provides an alternative and hands-free mouse option for consumers. In the future, the GWMM could look to compact down its size even more in order to keep wear on user minimal.

References

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