Snowboard Support System

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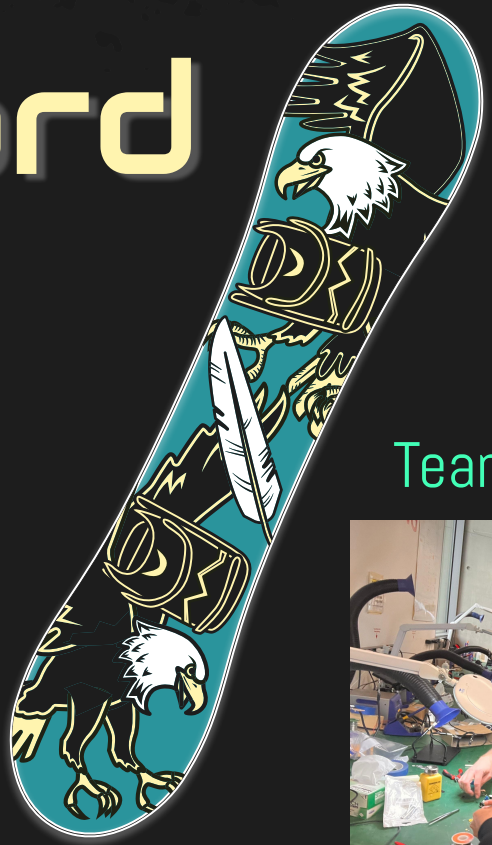


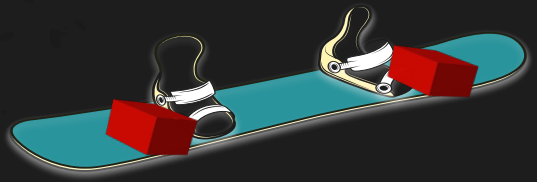
Team Old vs New

Problem Definition

Many snowboarders, particularly beginners, encounter injuries and struggle to identify areas for improvement on their own.

Self-assessment or outside feedback can be very limited due to lack of perspective.

Proposed Idea



Device

- Rectangular boxes attached to the snowboard
- Next to their feet
- Inside will be our sensor system

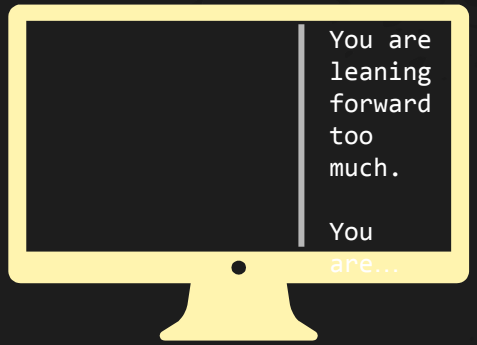
Features

Alert System:

- Buzzer that activates when detecting unstable movement

Personalized Tips:

- Shifting their weight (Balance)
- Slowing down or speeding up (Velocity)



Application

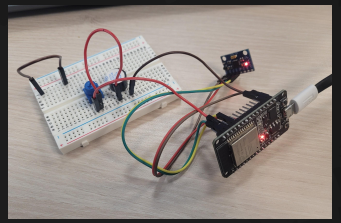
- Displays the tips to the user
- Tracks their velocity
- Maintains list of all tips provided

Testable Hypothesis

- A beginner will use the prototype.
- They should realize that they are moving too fast or are unstable upon hearing the buzzers
  - They do not fall or get hurt
- If they do fall
  - They can check the application and the advice provided to improve

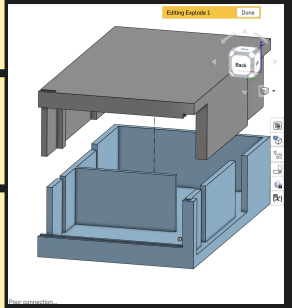
Milestone Achievements

Milestones	Tasks	Percent Complete	Projected/ Completion Date
(1) Planning	PCB Hub Design, Outline for Website and Poster, BLE code setup	100%	Week 6
(2) Assembly	Prototyping, Software for displaying data, Enclosure Design	80%	Week 7
(3) Testing/Printing	Using data to solve the problem. How interpret? Printing enclosure	20%	Week 8/9
(4) Debugging	Ensuring buzzers go off when they are supposed to, correct tips documented	5%	Week 9
(5) Production	Recording our video demo, adding more details/images to poster/website	33%	Week 9

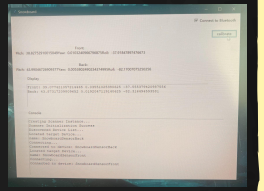


Prototype

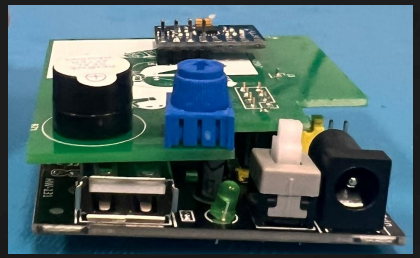
Blown up View of Enclosure



User Interface



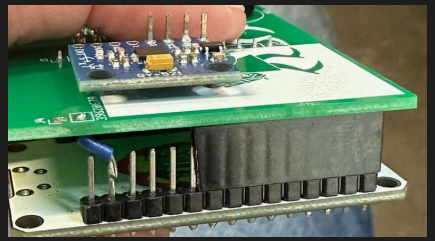
Soldered Hub



Where We Struggled

Dimensions/Positioning

- The PCB hub we designed had a GND pin off by 1 pin.
- Our Enclosure was too tight and needed more tolerance

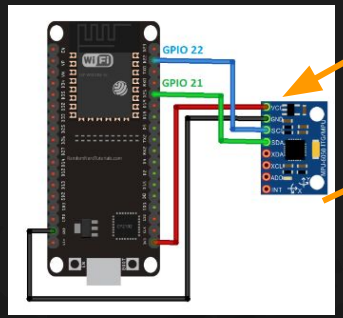


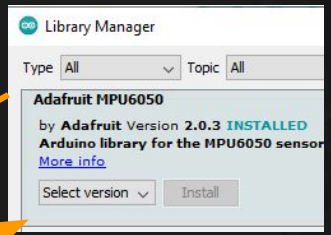
Software Barriers

- Communication with Accelerometer module
  - Existing MPU6050 libraries did not work

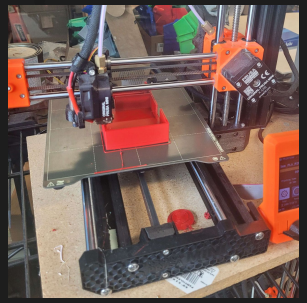
Being In A Waiting Period

- After prototyping, coding, and designing, we didn't know what to do.
- Waiting for PCB hub to connect





What's Next?

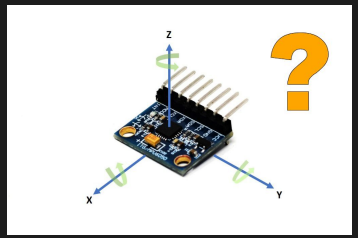


Turning the data we receive to information that can help the user

Interpretation

Recording our demo, taking images of the prototype, adding to the website/poster

Documenting



Enclosure Printing

3D printing the enclosure/door

TESTING!!

Attach to board and see what happens

Resources/References

Connections

- https://randomnerdtutorials.com/esp32-mpu-6050-accelerometer-gyroscope-arduino/
  - Figuring out the pins we were going to connect to while designing PCB
- https://bleak.readthedocs.io/en/latest/api/client.html
  - Making python act as a BLE receiver.

I2C Communication

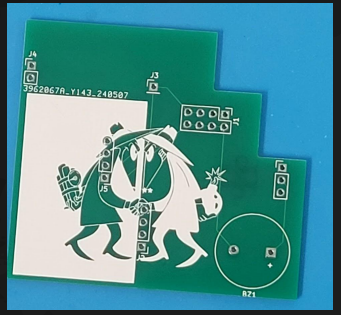
- https://randomnerdtutorials.com/esp32-i2c-communication-arduino-ide/
  - Understanding how to read values from an I2C device via “wire” transmission

Velocity Calculations

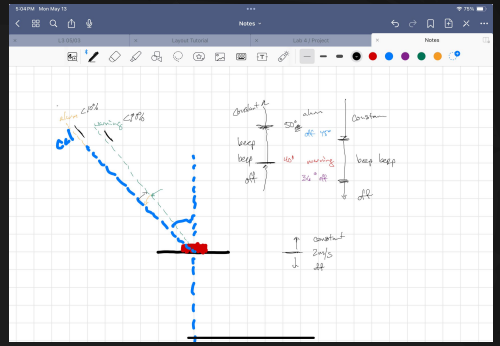
- https://arduino.stackexchange.com/questions/22798/can-i-measure-velocity-from-an-accelerometer-how-accurately

Adin’s Python GUI code

- We built our Python receiver code on top of Adin’s ControlWithPython assignment.
  - Basically it was our foundation for our GUI, instead of starting from scratch



Thanks!



- What other features should we include in our UI?
- How can we improve User Experience?

Do you have any questions?