



CONCUSSION: HEAD BANGERS

Lauren Stark, Sofia Main, Greg Defalco, Brennah
Satterfield, Mackenzi NierDuffy




PURPOSE



- 1.6-3.8 m sports and recreation related concussions occur each year in the U.S.
- 10% of all contact sport athletes sustain concussions yearly.
- For football alone, In any given season, 10% of all college players and 20% of all high school players sustain brain injuries.
- 5 to 10 concussions for every 1 concussion goes unreported
- Brain injuries cause more deaths than any other sports injury

Concussions are serious life altering traumatic brain injuries and not everyone reports them or know that they've occurred at impact. Our device plans to change that.

- By notifying of the occurrence of a possible concussion hit, the player can be taken out instead of risking a second impact now in that game, or later which causes Second Impact Syndrome and can lead to irreversible brain damage or even death
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SENSOR/APPLICATION

I. Sensors

- A. Detect a neutral position of the head
- B. Measure the change of position of the head during a potential hit
- C. Identify changes of pressure to the head during a potential hit
- D. Transmit position of head to application

II. Application

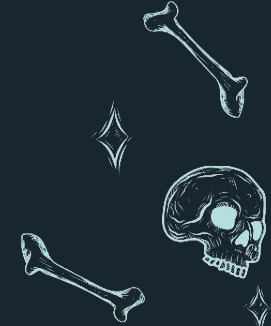
- A. Store data provided by the acceleration and pressure sensors
- B. Organize the data into programmable formats
- C. Distinguish between a potential concussion hit and a regular hit from the organized acceleration and pressure data
- D. Add regular hits together to account for potential concussions from consecutive hits
- E. Display a functional and easy-to-use interface for users to see the live-data from the sensors on their phones
- F. Alert the user on their phone when a possible concussion has occurred

III. Design

- A. Create a light-weight, sweat-resistant, and heat-repellent headband that houses the acceleration and pressure sensors
- B. Fabricate the headband such that it fits in various helmet types and sizes



AVAILABLE TECH

1. Wireless Communication: Available on ESP32 - Free
 2. Application: Available to build online - Free
 3. Circuit Board - \$50
 4. Accelerometers
 - a. [IIS2D Series 3.6 V Ultra-Low-Power 3-axis Digital Magnetic Sensor - LGA-12](#) - \$2.62/unit
 - b. [LIS2MDL Series 3.6V 50 Hz High Performance 3-Axis Digital Magnetic Sensor-LGA-12](#) - \$1.81/unit
 5. Pressure Sensors
 - a. [Digi-key 101020031 Grove Piezo Vibration Sensor](#) - \$6.50/unit
 - b. [Piezo Vibration Sensor](#) - \$5.50/unit
 6. Headbands
 - a. [Acozycoo HeadBands](#) - \$11.99/5 units
 - b. [BEACE SweatBands](#) - \$16.95/3 units
 7. Helmets
 - a. [Hockey Helmet](#) - \$49.99
 - b. [Football Helmet](#) - \$150.00
 - c. [Boxing Helmet](#) - \$17.99
 - d. [Rugby Helmet](#) - \$39.99
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CONCLUSION

We plan to

- report to a team when a concussion occurs at impact to reduce traumatic brain injuries on the field from being unreported and potentially harming someone's life.
- Reduce the cost of equipment needed to detect a concussion
 - Currently, only professional and college football teams can afford to have concussion detection and even that is after the fact not during.
 - Detection equipment even then is thousands of dollars for DOI's or EEG's