

HS Sports Concussion Detector

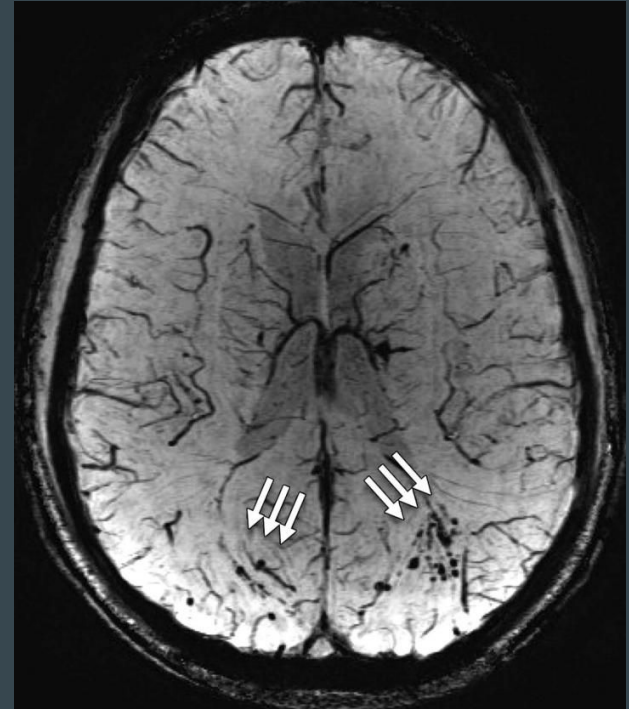
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Problem #1: Safety

Problem 1: Unnoticed Concussions

Many concussions are not recognised quickly enough

- **2 out of every 3** concussions go unnoticed in high school sports
- **1 out of every 3** high school athletes have suffered a concussion without knowing it
- **Half of concussions** are unreported by players
- Not all concussions display **visible signs**
- Symptoms of concussions can **disappear rapidly** after impact



PPCS & SIS

Continuing to play after receiving a concussion could lead to life changing brain conditions

- **Prolonged Post Concussion Syndrome**
 - Undetected concussions can **worsen over time**
- **Second Impact Syndrome**
 - Receiving an impact with an **untreated concussion** is EXTREMELY DANGEROUS
 - Mortality rate is **50%**



Second impact syndrome

Difficulty Recognizing Concussions

Athletic trainers at football games and practices are in need of better methods of quickly diagnosing concussions the moment they occur

- Less than **10% of concussions** result in loss of consciousness
- Not all concussions display **visible signs**
- Key symptoms of concussions can **disappear rapidly** after impact
- The majority of sideline evaluation tactics involve **verbal questions** about the athletes symptoms and memory
- Some athletes struggle to properly reveal their symptoms and others **intentionally withhold** crucial information to remain on the field.

Problem 2: Youth Hesitancy

Hesitancy

Due to increased attention to the long term negative effects of playing contact sports, parents are hesitant to let their kids participate in football

The Washington Post
Democracy Dies in Darkness

Brett Favre warns parents not to let children play tackle football before the age of 14

TODAY ON THE SHOW SHOP WELLNESS PARENTS FOOD

Poll: Parents uncomfortable with youth football

health Life, But Better Fitness Food Sleep Mindfulness Relationships

Would you let your child play football?

By Victoria Larned, CNN
Updated 5:04 PM EST, Wed November 8, 2017

f t e

STUDENT WELL-BEING OPINION

It's Time to End Football in High School

By Randall Curren & Jason Blokhuis — September 10, 2018 ⌚ 5 min read

HIGH SCHOOL

Survey: Valley parents hesitant to let kids play football, yet approve other contact sports



Richard Morin

The Republic | azcentral.com

Published 4:09 p.m. MT Aug. 17, 2017

AP-GfK POLL July, 2014

SPT1. [ASK OF PARENTS] Here's a list of sports that children often play in organized leagues or at school. Given what you know about safety in each of these sports, please indicate if you would feel comfortable allowing your child / any of your children to participate in that sport, or not.

| | Would feel comfortable allowing child to play | Would not feel comfortable allowing child to play | Refused/Not answered |
|-----------------|---|---|----------------------|
| Swimming | 89 | 7 | 4 |
| Basketball | 88 | 9 | 4 |
| Track and field | 87 | 8 | 5 |
| Soccer | 86 | 10 | 4 |
| Softball | 84 | 10 | 6 |
| Baseball | 84 | 11 | 5 |
| Gymnastics | 78 | 17 | 5 |
| Cheerleading | 74 | 22 | 5 |
| Field hockey | 63 | 32 | 5 |
| Football | 51 | 44 | 5 |
| Ice hockey | 51 | 44 | 6 |
| Wrestling | 50 | 45 | 4 |

Based on: Parents

N= 233

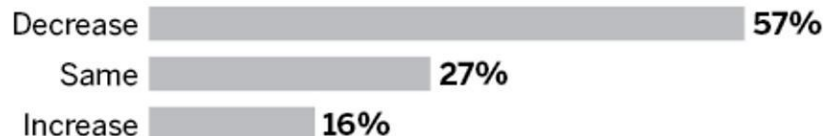
U.S. News

*High School Football
Participation in the U.S. has
dropped by 100,000 Players in
the last 15 years*

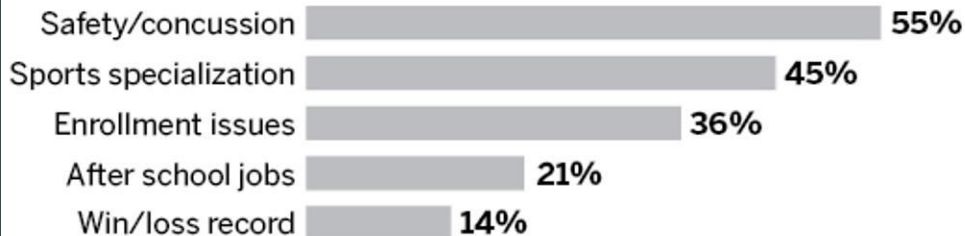
FOOTBALL PARTICIPATION DOWN

According to a survey of 275 high school football coaches, more than half said their program has seen a decline in participation in the past three years; safety (including concussions), sport-specialization and changing enrollment were cited.

Football enrollment statewide



Top reasons for football participation decrease/increase



Source: Minnesota Football Coaches Association

Star Tribune

Effect on the NFL

The younger generations simply have not been watching cable sports compared to their older counterparts, especially when considering the NFL

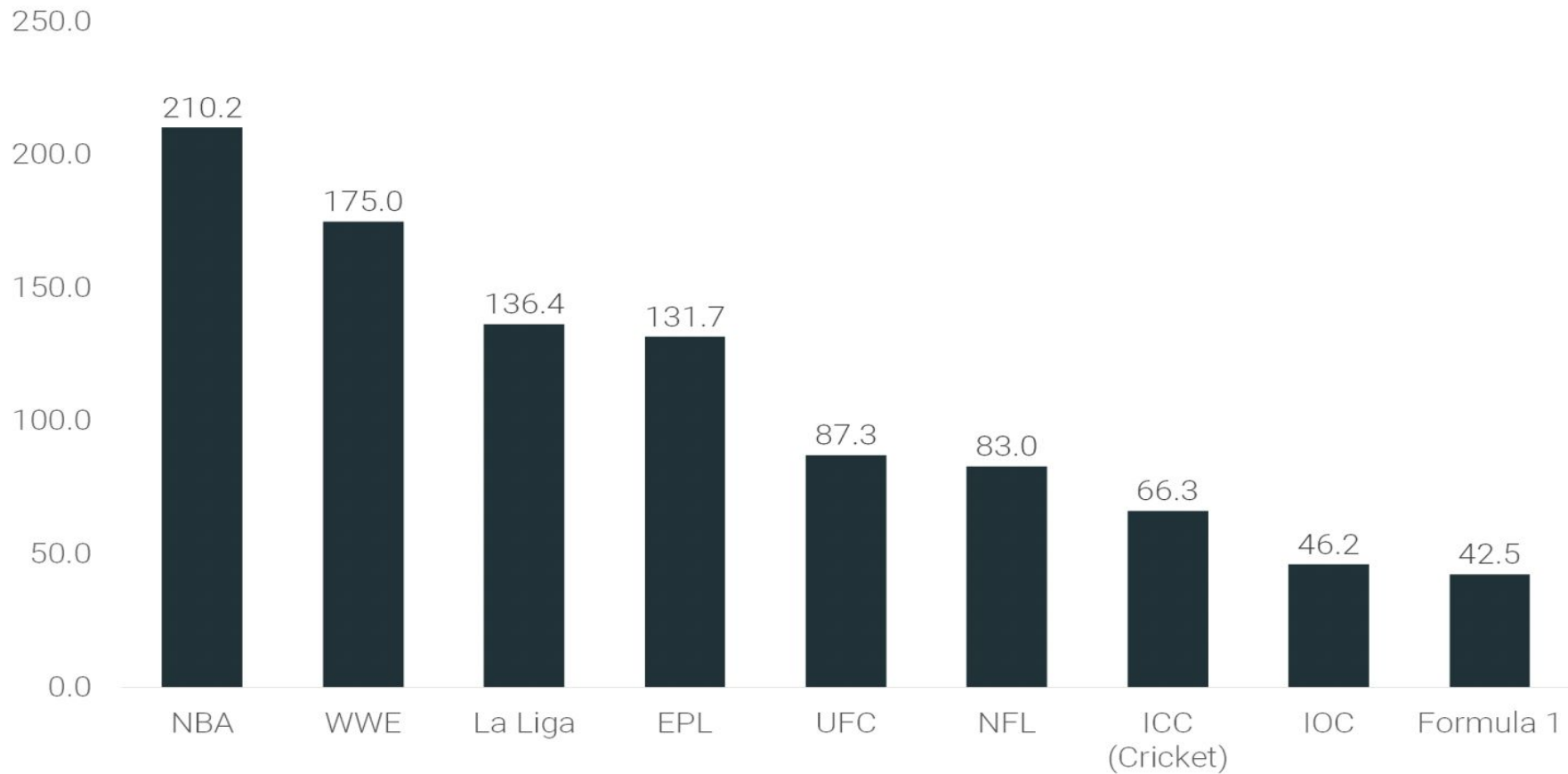
- The current average NFL viewer is **50**, in 2000, it was **42** - Nielsen
- **Only 9%** of the NFL's audience is kids **under 18** - Sports Business Journal
- This has had a crucial effect on the NFL's advertiser's target demographic

Adults 18-49 Super Bowl viewership and share of audience (2008-)

SportsMediaWatch.com



Sports leagues with most social media followers (million followers)



What is one way to mend this issue?

An easier way to detect concussions

Research has shown that concussions occur primarily with impacts between 70g and 120g.

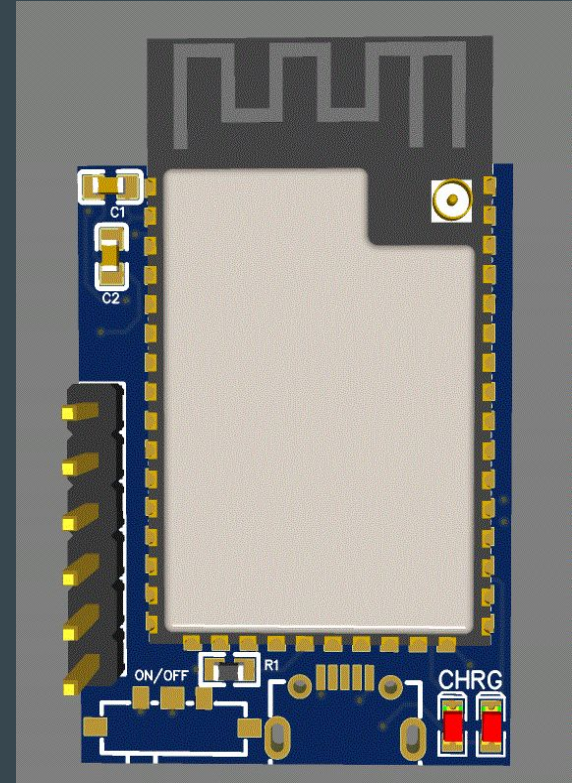
- If a device could wirelessly alert the sidelines when impacts in this range occur, players could be assessed for brain injury **immediately**
- Such a device could **prevent concussed players from going back on the field** and **help diagnose** concussions on field/at hospitals
- Such a device would have to be **extremely small and affordable** enough for any youth football program to afford

Our Product

High School Concussion Detector

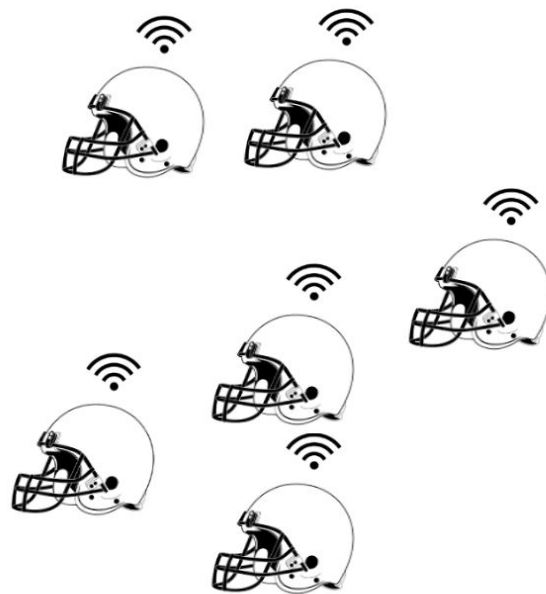
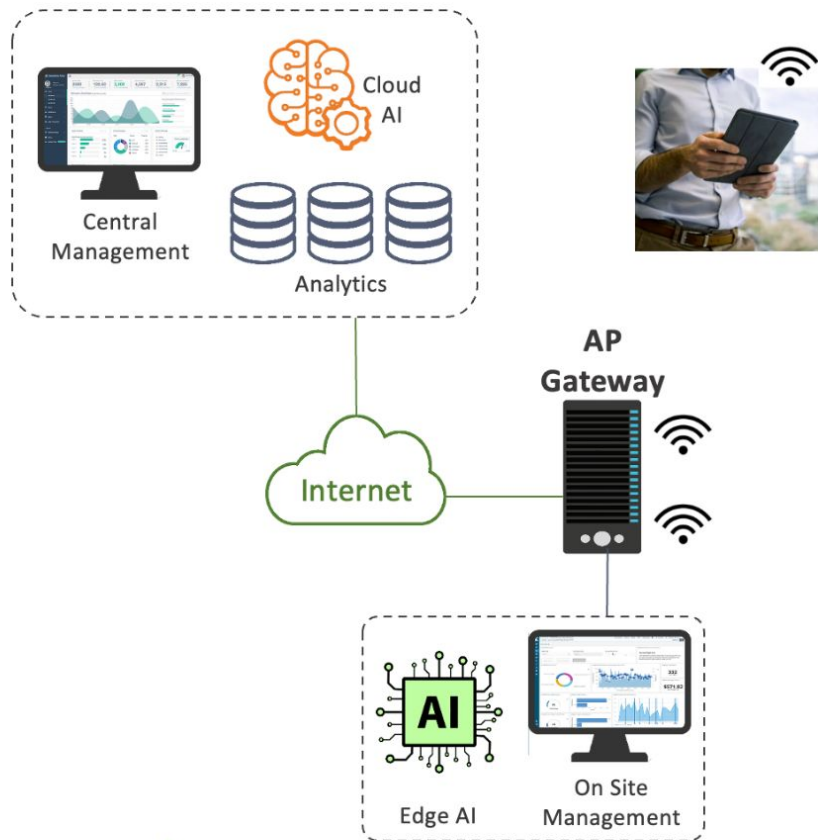
Our product aims to bring this solution into reality

- A small, rechargeable, battery powered device that wirelessly transmits head acceleration data to a computer on the sidelines
- Consisting of a precise, high-g accelerometer, a microchip, and a wireless antennae, it is easily mass-producible and affordable.



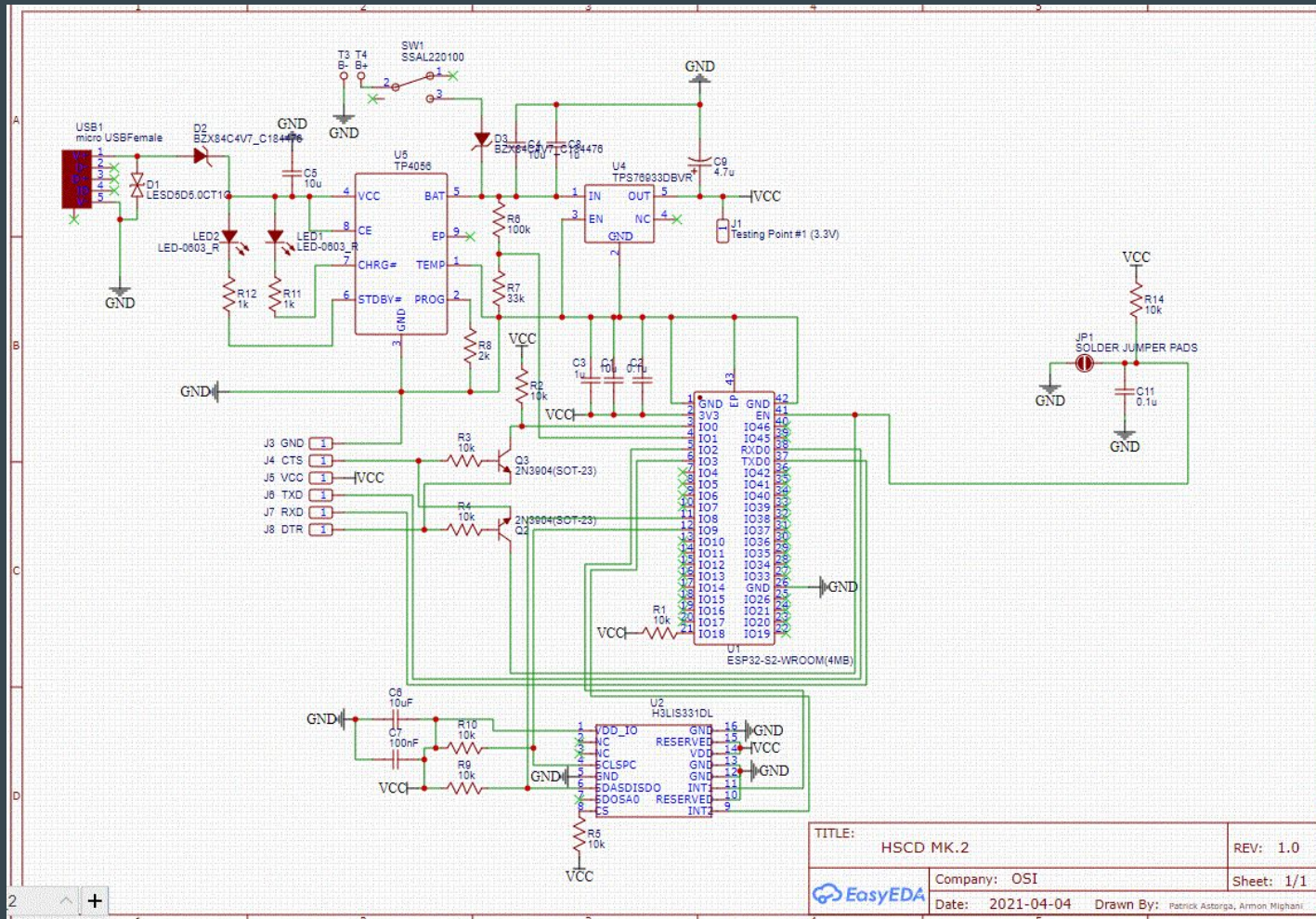
End-to-End System

Portal

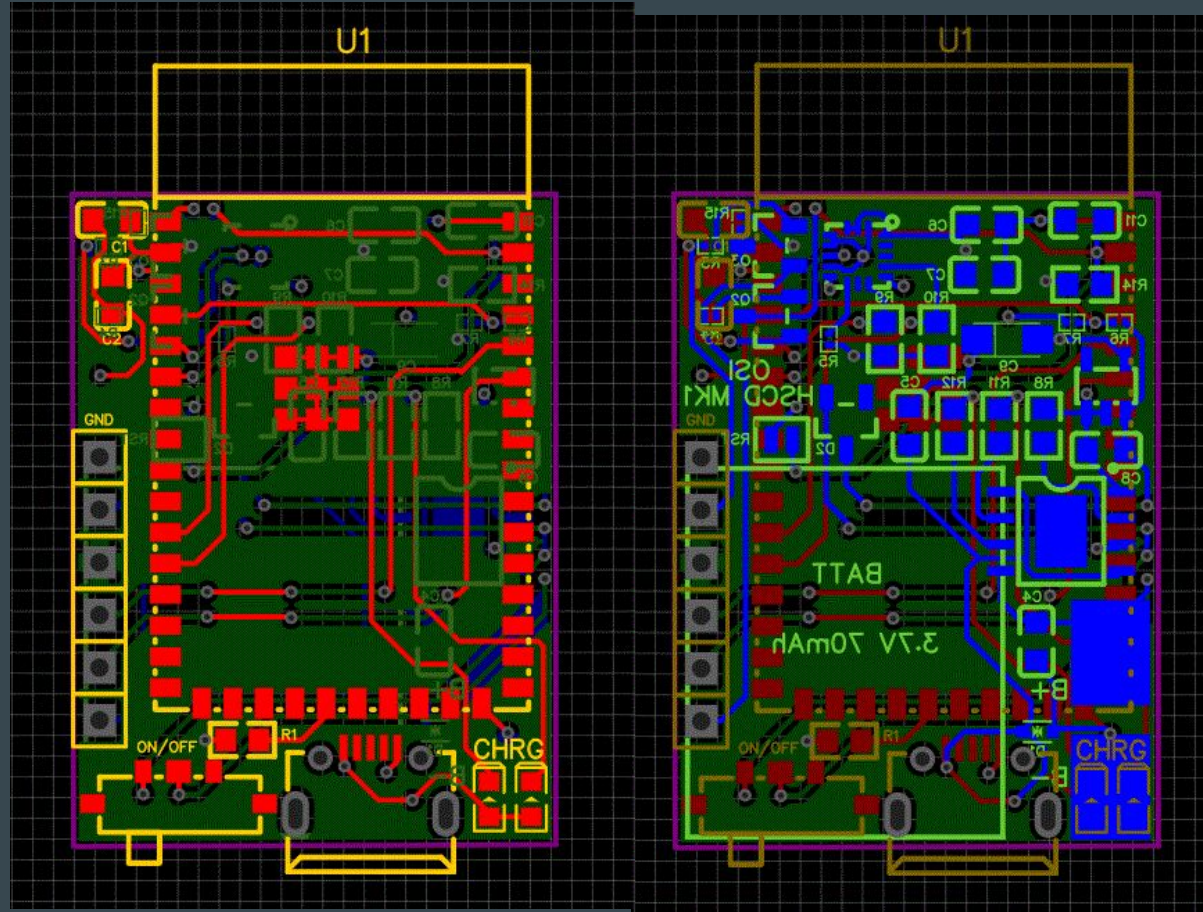


The helmets are equipped with concussion detection and recording.
The data is communicated real time to be observed by the coaches and stored and analyzed on the edge or cloud

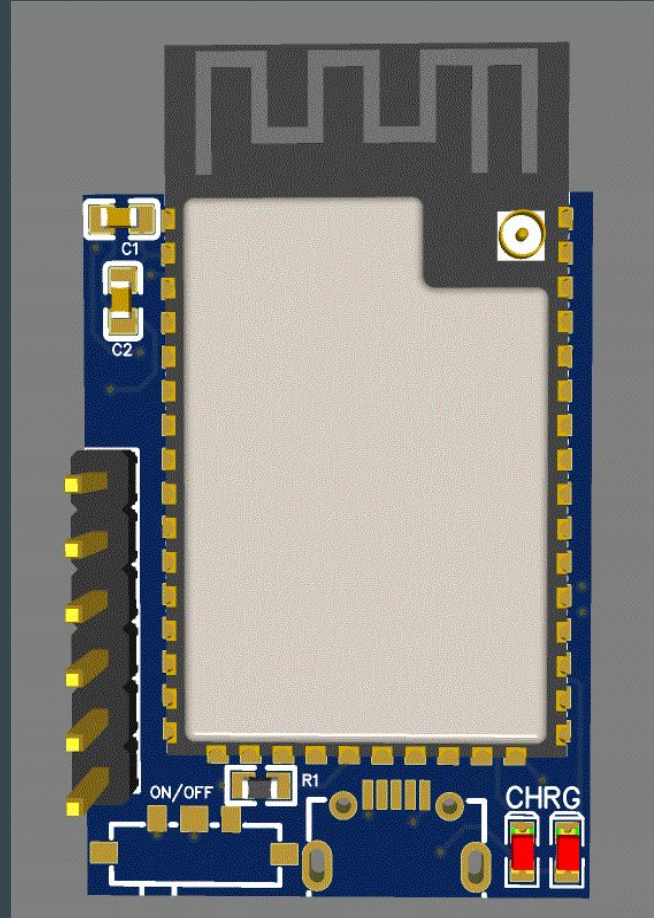
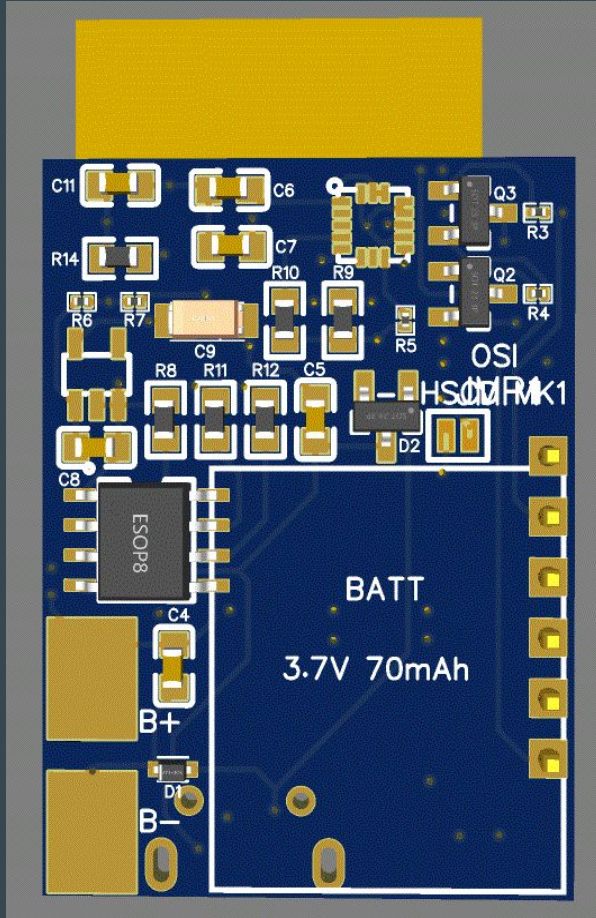




Final Prototype



Final Prototype

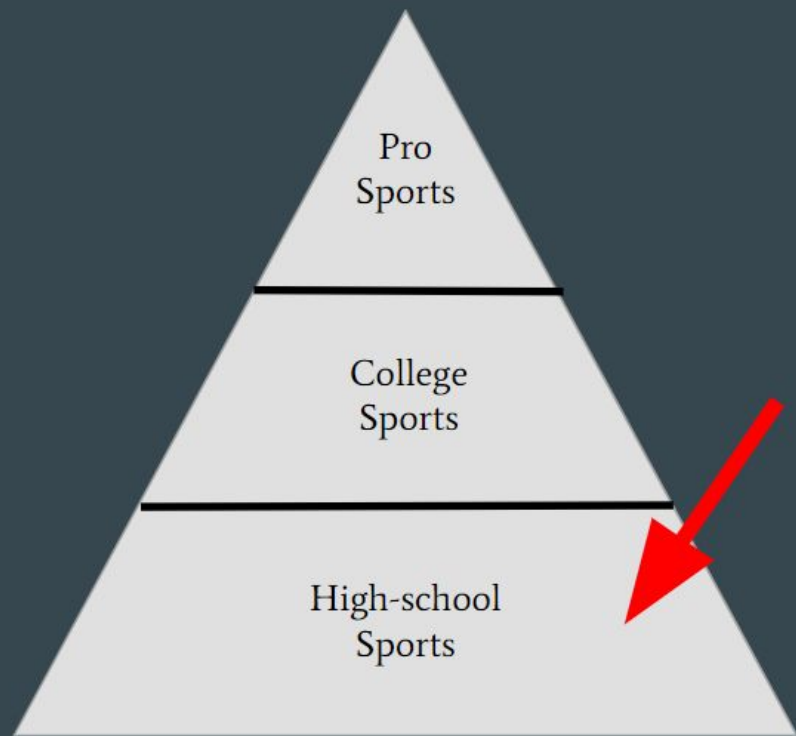


The Market

Market

- When it comes to concussion safety technology, almost all devices are aimed at the Pro and College Levels leaving the High School market **completely barren** .
- Our product is priced at a level aimed at district level high school football, lacrosse, and hockey which is a market of 1.2 million new athletes every 4 years.

Yet How Does Our Product Reach this Market?



Competition

- The current market is **very limited**
- **Riddell** is working on an EKG impact measuring helmet priced at **\$999**, which does not transmit data **in real-time**
- A similar product from Gridiron Tech is **extremely bulky** and costs **\$180 per unit**

Nobody has created a product capable of accessing this market yet



Financials

| Parts | Unit Price |
|----------------------|------------|
| 100x PCB | \$0.56 |
| 100x ESP-32 | \$2.61 |
| 100x h3lis331dl | \$3.80 |
| 100x 3.3V reg. | \$1.17 |
| 100x LiPo | \$3.49 |
| 100x LiPo Controller | \$0.15 |
| 100x Switch | \$0.41 |
| 100x Micro USB | \$0.05 |
| 100x Resistors | \$0.05 |
| 100x Capacitors | \$0.05 |
| 100x Transistors | \$0.05 |
| 100x Diodes | \$0.05 |
| Assembly | \$0.50 |
| Unit price | \$12.93 |

*With production cost included, we can assume a final product cost of **\$13!***

- If Units were to be Priced between **25\$-35\$**, we could expect Revenue between **30-45 Million** every four years
- This means our product is **not only small** enough to comfortably fit in any helmet, but is **affordable** enough for purchase by even the lowest budget schools!

Financials

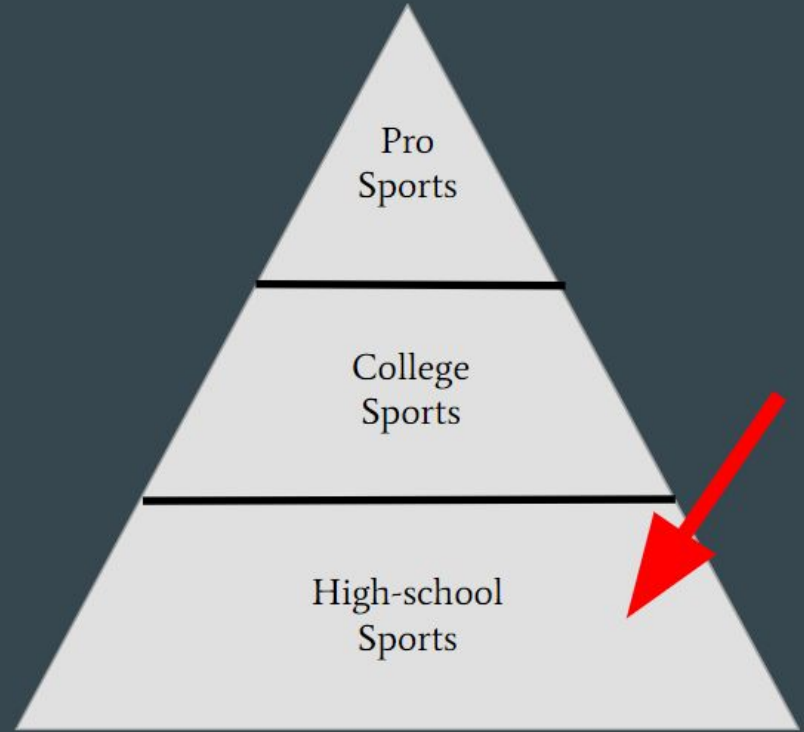
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- Overall basic equipment costs for a team of 50 can be up to **\$32,700**
- If sold for a price of \$30 per unit, equipping a team of 50 would **only cost \$1,500** , which is comparatively **not very significant** .

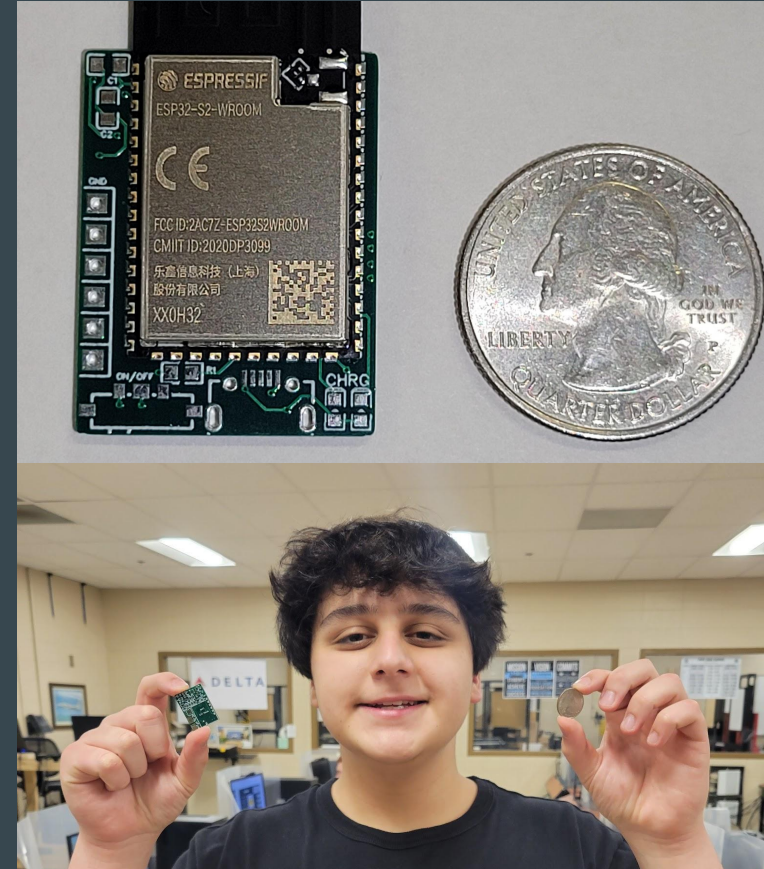
Market

- Compared to the unit cost of **\$999** of the Riddell system, our **\$13** cost is significantly more affordable
- There is **absolutely nothing** on the market to solve such a **critical** and **important** problem for high school athletes.
- It is aimed at district level high school football, lacrosse, and hockey which is a market of **1.2 million** new athletes every **4 years**.



Differentiator

- Besides affordability, our product is unique in its **immense versatility** due to its **miniscule size** and **modular nature**.
- While competing devices are either **built into the helmet** or tailor made to only fit into **certain helmet models**, our device can be affixed into **almost any helmet**.
- This includes **other sports** such as hockey, lacrosse, or even biking



Go-to-Market Strategy

Option 1: NFHS



The National Federation of State High School Associations is the body that writes the rules of competition for most high school sports and activities in the United States.

Option 1: NFHS

- The NFHS puts **huge resources** , even collaborating with the **CDC**, in research and educating coaches and staff all over the nation on concussion detection. It is one of their KEY roles/interests.
- With the aid of an organization like the NFL, we could convince them that a product like this is both a **necessity** in their mission to make sure no concussion goes undetected while **not being a detriment** to any player nor high school football program monetarily.
- The NFHS would be able to **mandate** it as a required part of player's gears.
- Lastly, the **data** these devices would produce on players would greatly benefit their efforts, in collaboration with the CDC, in improving the sport's safety.

Option 2:

- State and County level football programs are also able to **mandate certain gear** and technology for player safety.
- By using the same approach at State/County levels, we could convince school legislators and parents of the **value of the technology** , and they would be able to vote on mandating this tech.



Roadmap

- With our first and second prototypes respectively, our team went on to win **first place** in the Georgia Tech K-12 **InVenture prize state finals** and third place in the Henry Ford **Invention Convention U.S. Nationals**
- We continued pursuing a patent and developing our prototype



Current Status

- Currently we have **filed a patent!**
- We are now in our testing stage, while finishing our back-end server to handle the data and have developed a work-in-progress front end website!

U.S. Provisional Application No. 64/434,792

Filed: December 22, 2022

Title: TECHNIQUES FOR CONCUSSION DETECTION AND REPORTING

Applicants/Inventors: Armon Mighani, Patrick Mauricio Astorga, Tate Jackson Smith

KTS Ref.: 999993-1290301