

## Problem Definition

Heat stress is the condition in which the body is dangerously overheated. Undetected, heat stress can eventually lead up to heat strokes, which is **most common in football players**.

With **no current method** to monitor temperature during games or practice, heat strokes have led to the death of **54** football players from 1995 to 2010.

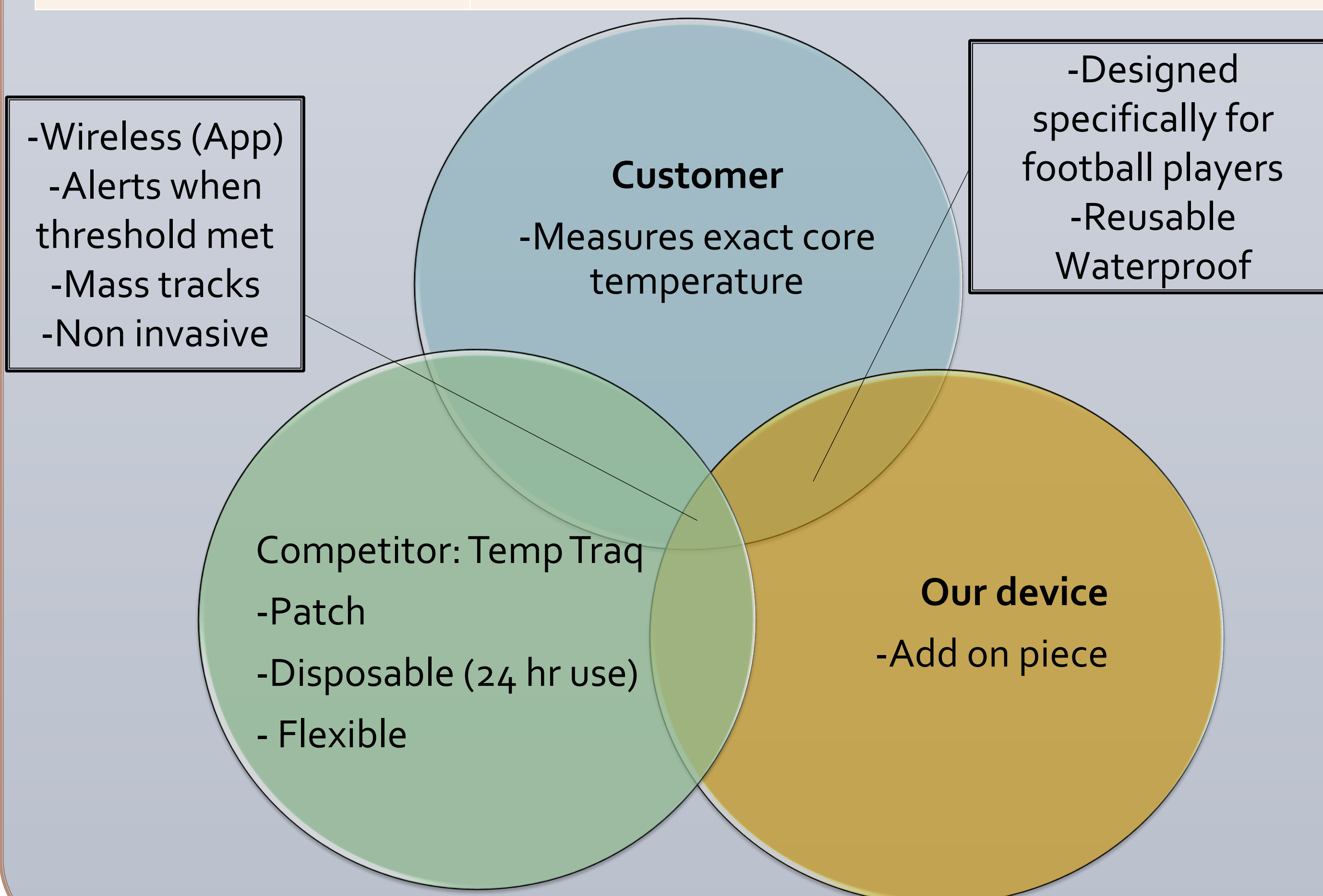


## Need Statement

“A way to track body temperature amongst football players in order to prevent dangerous progression of heat stress”

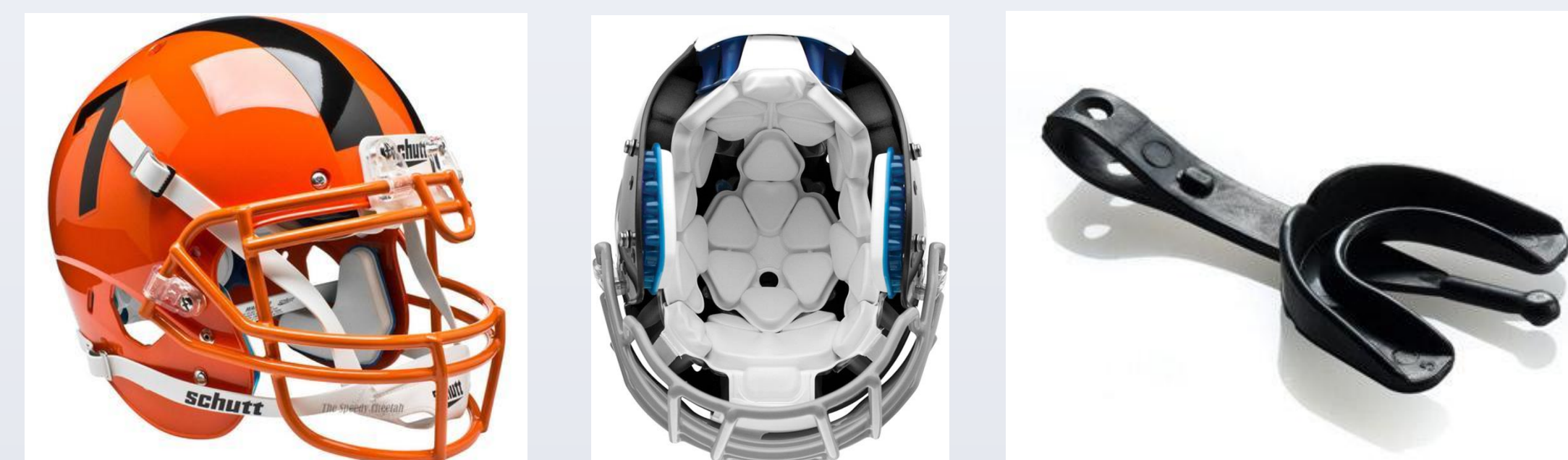
## Design Inputs

<b>Customers</b>	Football players, parents, coaches/fitness trainers, sport companies
<b>Functional Requirements</b>	Mass track body temperature, notify when temperature is outside of safe ranges
<b>Constraints</b>	Does not interfere with game, withstands impact, water/sweat proof, safe, and wireless



## Engineering Design Solution

Integrate a temperature detecting device, such as a thermistor, onto a mouthguard, which football players are required to wear. The circuitry can be hidden within the padding of a football helmet.



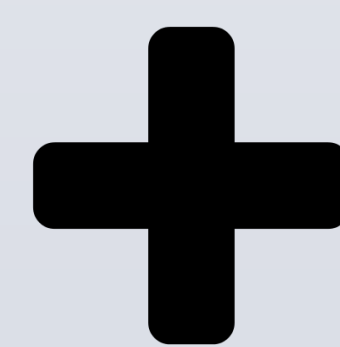
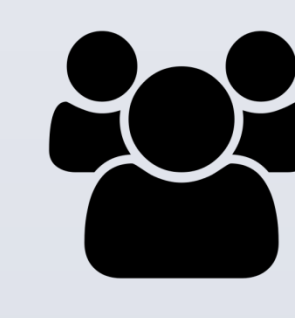
Waterproof



Wireless



Mass Track



Add On Piece

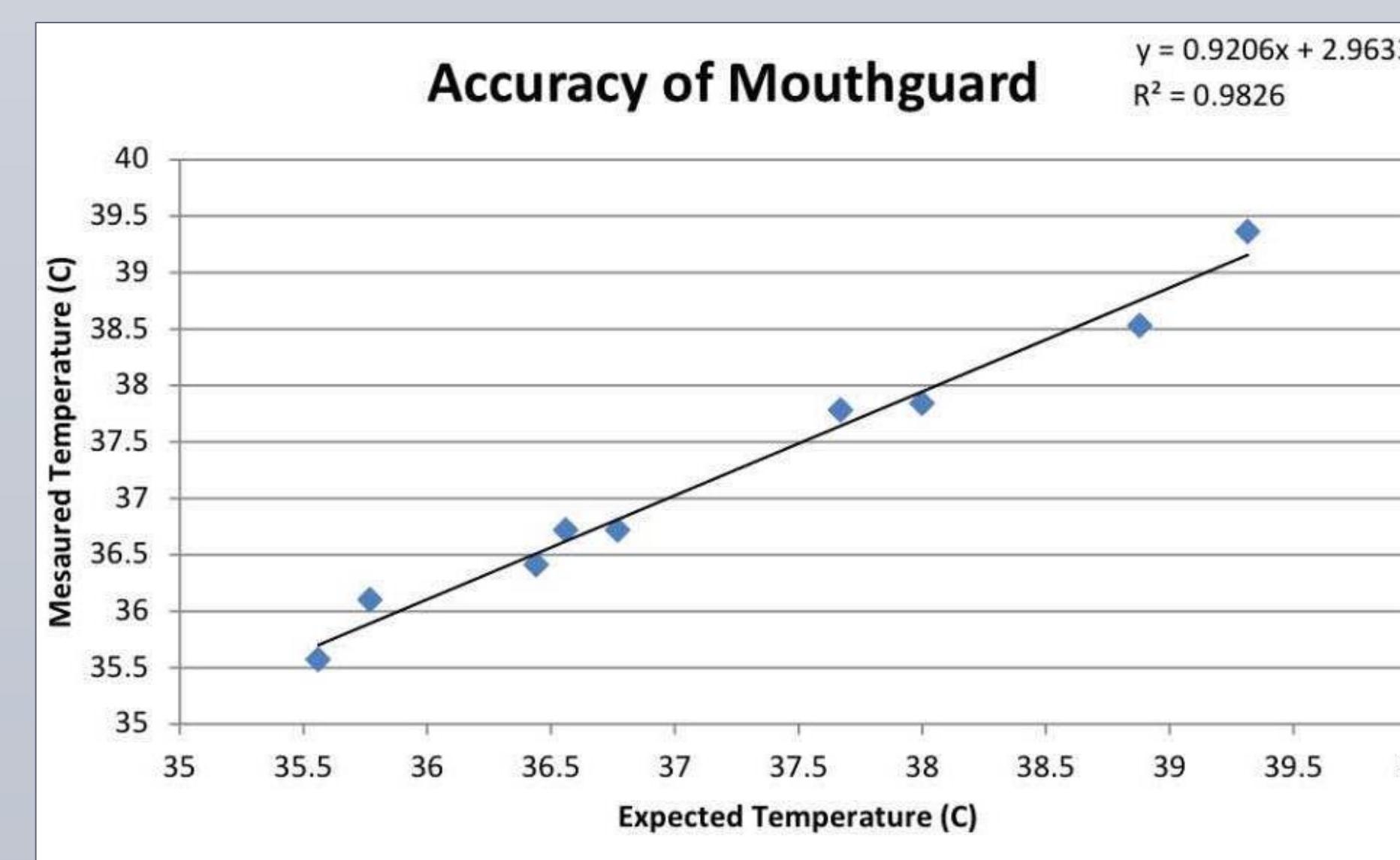


Non Invasive



No Interference

## Prototype & Testing Outcomes



Graph 1: Measure of accuracy by comparing actual temperature from a thermometer and measured temperature from our mouthguard

## Conclusions

	Desired	Our Device
Sensitivity	>95%	100%
Specificity	>95%	100%
Wireless	350 ft	10 ft
Waterproof	✓	✓
Mass Track	11 people	1 person

The device met most of our specifications of our functional requirements and constraints.

- The mouthguard is accurate and robust
- The correlation in graph one is nearly 1, meaning that our data is mostly accurate
- Our device is wireless, but only for a short range
- Our device still worked when submerged in water
- Due to time constraints, only one person was able to be tracked at once

Cost of our device: **\$18.81**

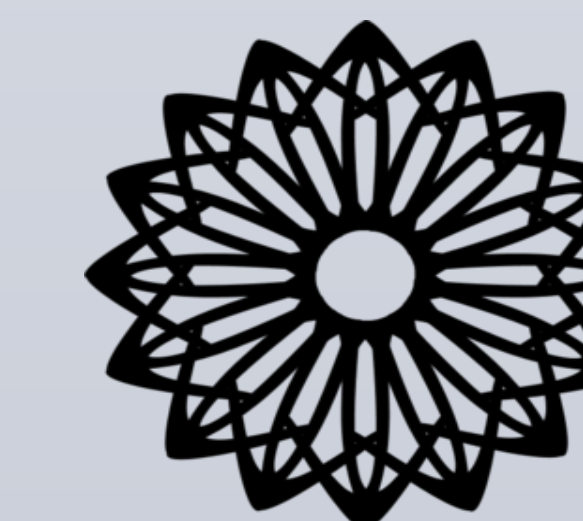
## Business Model and Future Work

Market



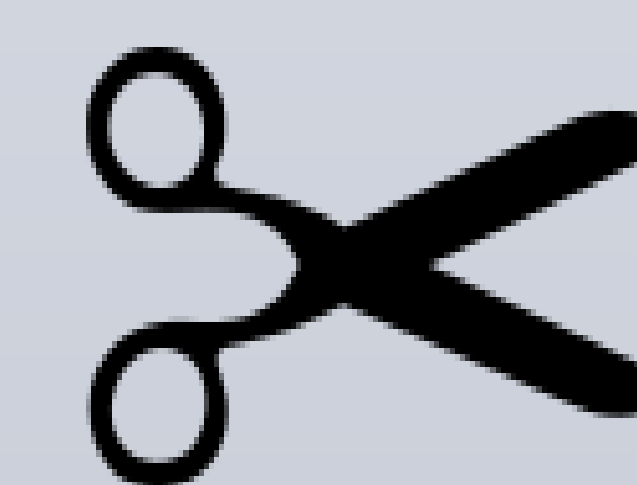
- Acquire a Patent
- Partner with sporting goods manufacturer

Design



- Develop mobile app
- Track at least 11 people at once
- Extend range to 350"
- Refine prototype

Application



- Branch out to other sports
- Use for outdoor work and military

## Acknowledgements

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