

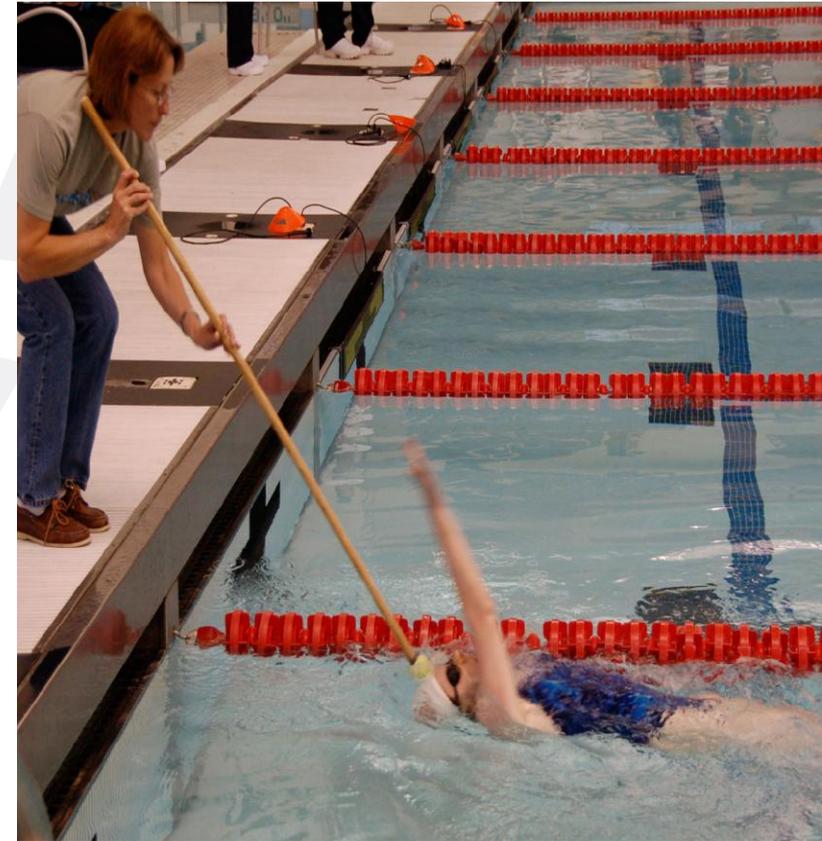
I PRO 310

Final Presentation

Designing and Building Prototypes
for Assisting Blind And Visually
Impaired Athletes

Problem

- Challenge
 - 10 million blind and visually impaired
 - 1.3 million legally blind
- Challenges in swimming
 - Access facilities
 - Orientation in the water
 - Location of the wall

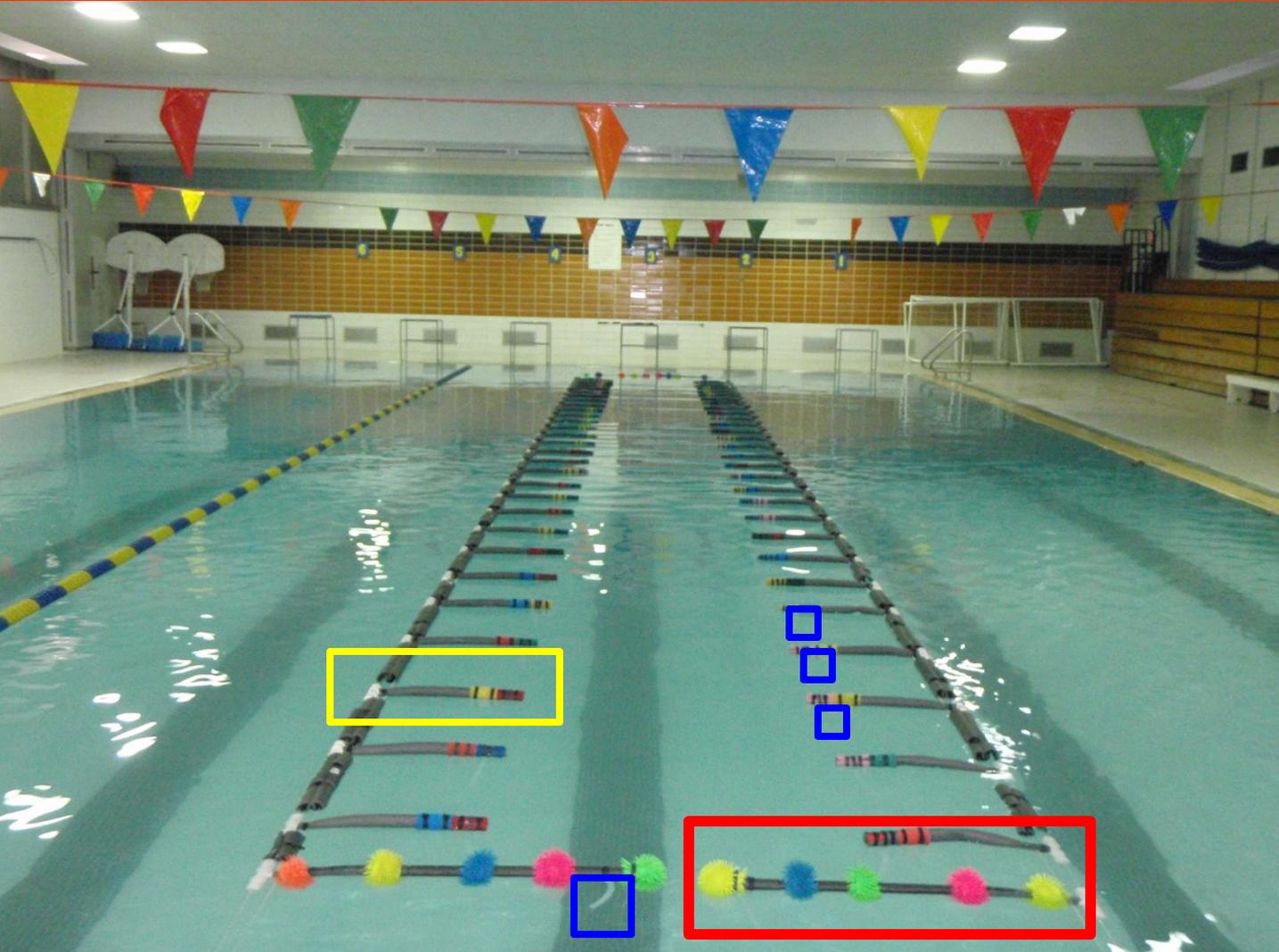


The current method used in swim competitions uses tappers who use a stick to “tap” swimmers to turn

Organization

- **Passive Team**
 - In-pool tactile interface
- **Active Team**
 - Electronic interface to alert swimmers
- **Research Team**
 - Technology application in other sports

Passive Team



Team Members:
Nicholas Przybysz
McLain Hubbard
Madeih Salimi
Ryan Dudek
Kevin Ragauskis

Progression



eyeSwim Version I

eyeSwim Version IV

eyeSwim Version V

eyeSwim Version VI

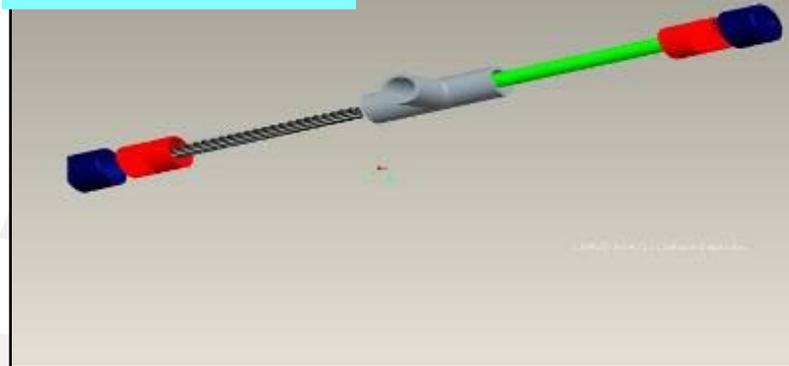
eyeSwim Version VIII

Objectives

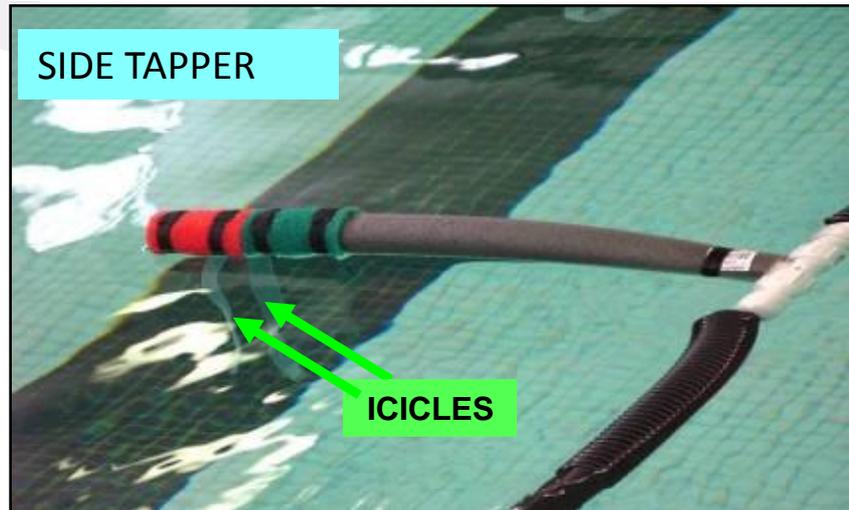


- Improve T connectors and Icicles
- Perform initial Materials Test
- Redesign Storage System
- Improve previous design using feedback from swimmers
- Create device for WCBVI (Wisconsin Center for the Blind and Visually Impaired) for 9th pool test on July 12, 2008 in Janesville, WI

T-CONNECTOR



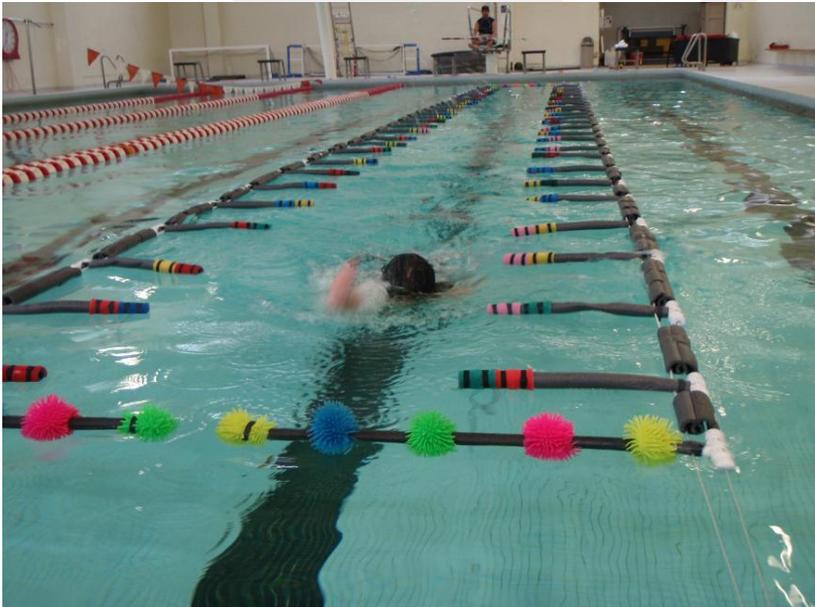
SIDE TAPPER



Pool Tests

On campus

- 2 Tests
- 6/28: 4 students
- 7/19: 6 volunteers



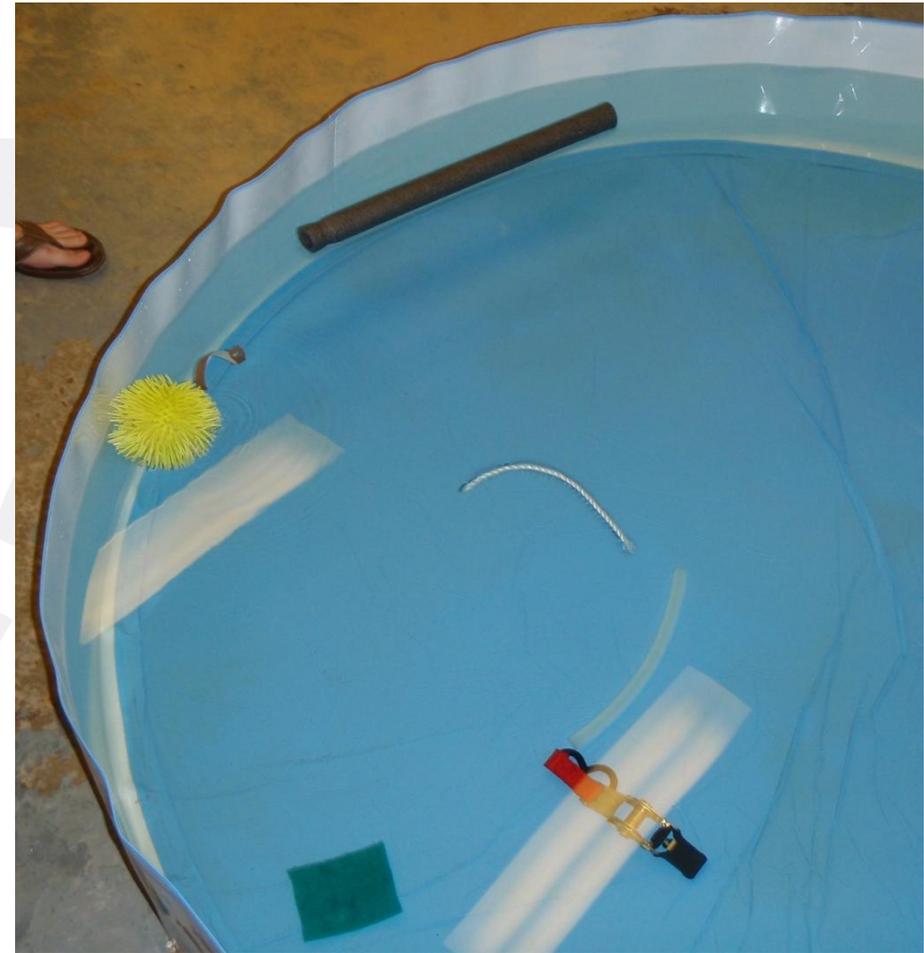
WCBVI

- 29 volunteers
- Extraordinary response



Materials Test

- Children's pool
- All device parts
- 10 days, 2x concentration
- Degrading components

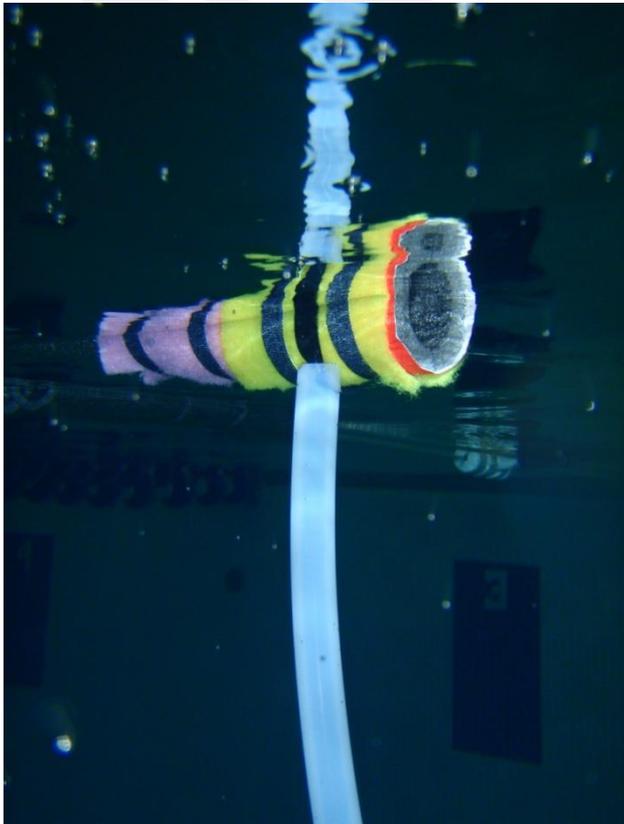


Results



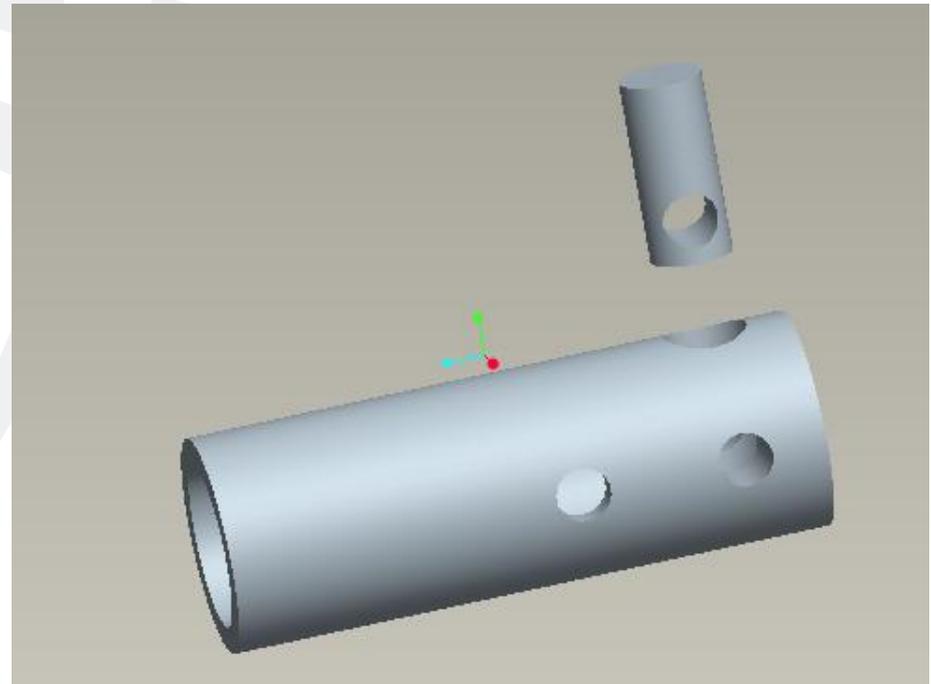
Icicles

- Dense rubber tubing



T/I-connector

- Single piece design
- Spring lock



Results, cont.

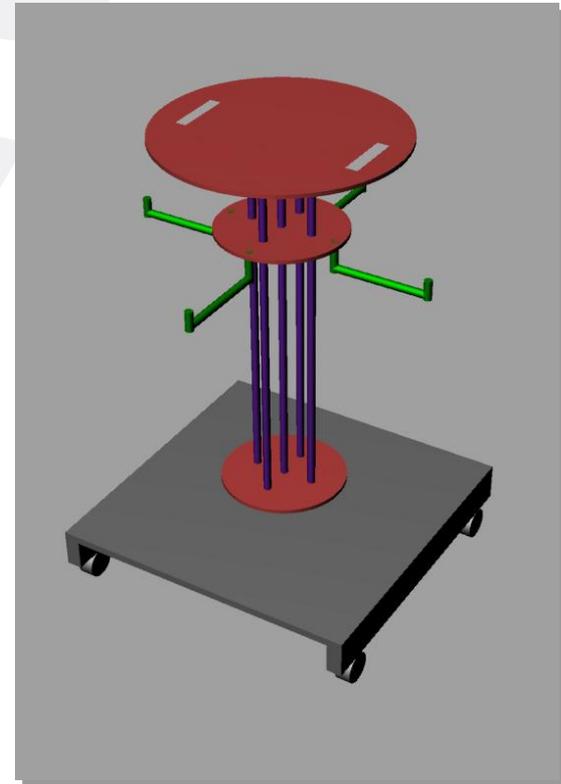
Materials Test

- Unstable water
- 1 degrading component



Storage

- Designs made

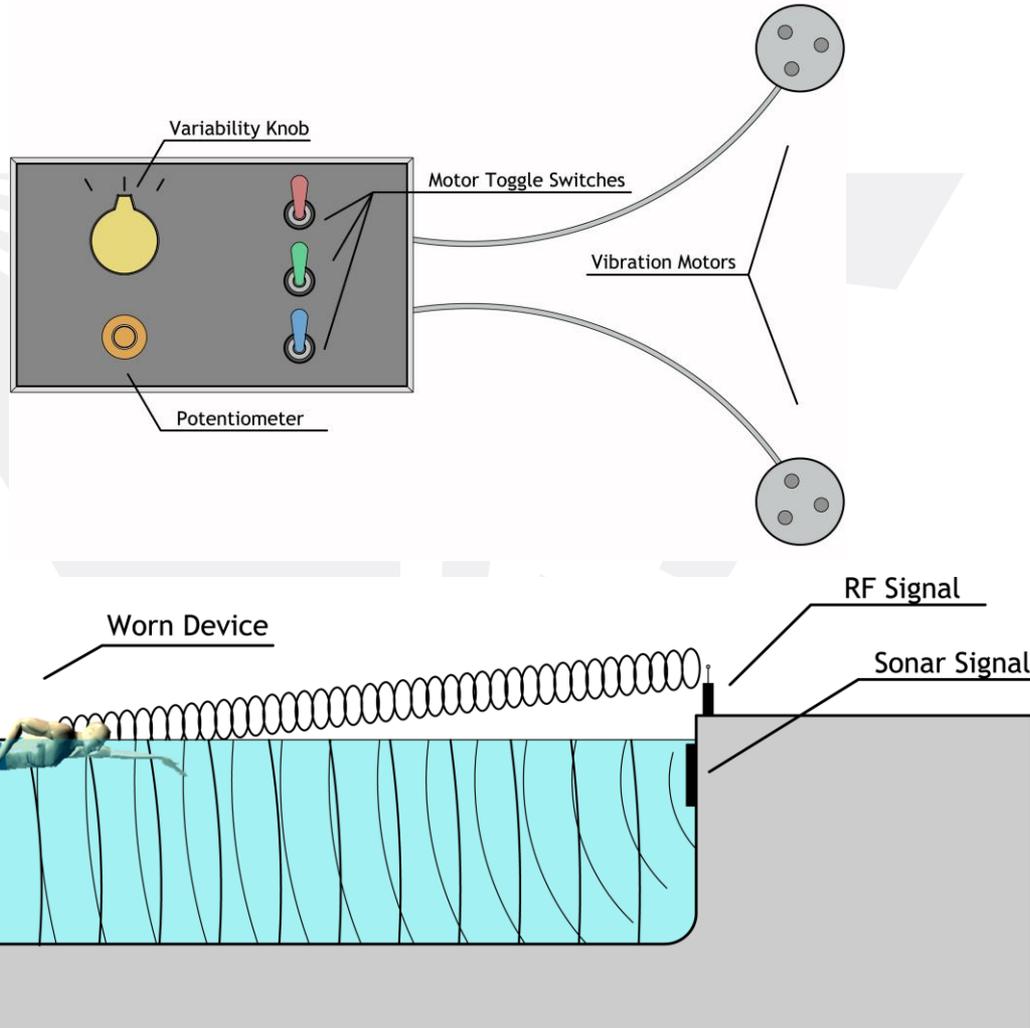


Recommendations



Alright, um. Did you feel that it helped keep you centered?

Active Team



Team Members:
Marta Alvargonzalez
Hussain Biyawerwala
Paul Cordogan
Rob Keane
Dave Malon
Jeff Lin

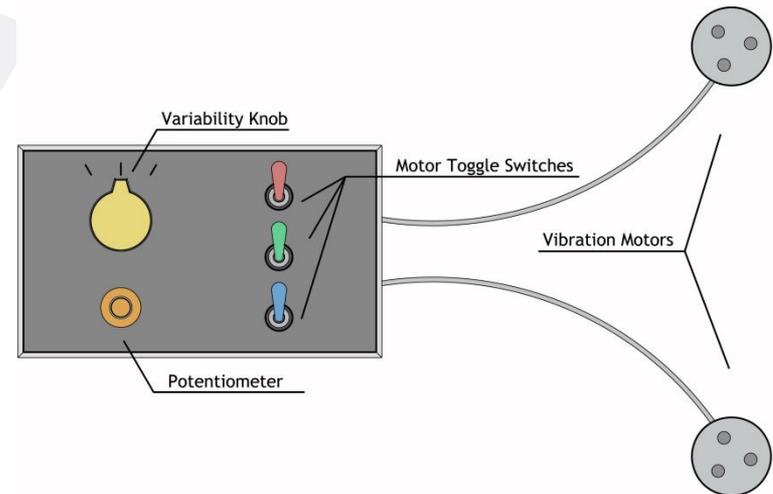
Short Term Active Team

- Objectives:
 1. Fix the Device to Test Following Objectives
 2. Establish a Vibration Language
 3. Determine the Best Location for Motors on Swimmer
 4. Find the Ideal Vibration Intensity



WCBVI

- Tested All Objectives
 - Vibration Language
 - Best Location for Motors
 - Ideal Vibration Intensity



Short Term Active Team

- Results:
 1. Repaired Wired Device
 2. Tested Several Vibration Languages
 3. Understood the Best Location for Motors
 4. Realized Intensity Issues

- Topics of Interest
 - Wireless Transmission
 - Sensing Equipment
 - Swimmer Interface
(Language Component)

Wireless Transmission

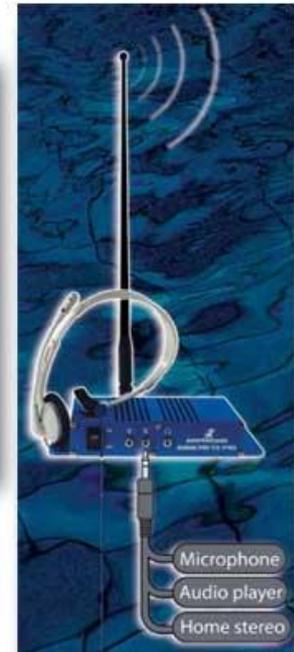
RF (Radio Frequency)

Amphicom's iPod Transmitter

- Range 80 meters (260ft)
- Radio frequency:40.68 MHz
- \$70 plus shipping (includes 1 snorkel)
- FCC compliant

Sonar

- Components overall are more expensive



Pool Wall Awareness System (PWAS)

Snorkel
Receiver
Purchased
from
Amphicom \$20



Motion
Sensor (IR):
Purchased
from Radio
Shack \$30



Transmitter:
Purchased from
Amphicom \$50



AQUA'FM® TX PRO
INTERACTIVE AQUATIC SYSTEM

Sensing Equipment

Pool Wall Awareness System (PWAS)

- Infrared Motion Sensors (Dry)
- Physical Switches (Submerged)
- Ultrasonic Transducer (Wet Motion Sensor)

Swim Path Deviation Awareness System

- Gyrating Compass
- Audio Assistance (Outside Party) through RF signal
(Proved in pool test to be preferable to physical contact warning.)

Swimmer Interface

- Bone conduction: Sound received through the bones of the skull.
- Currently the technology is used in hearing aids, military communications, and civilian/recreational applications.

- Swimp3 \approx \$140, utilizes bone conduction through the cheek bone.

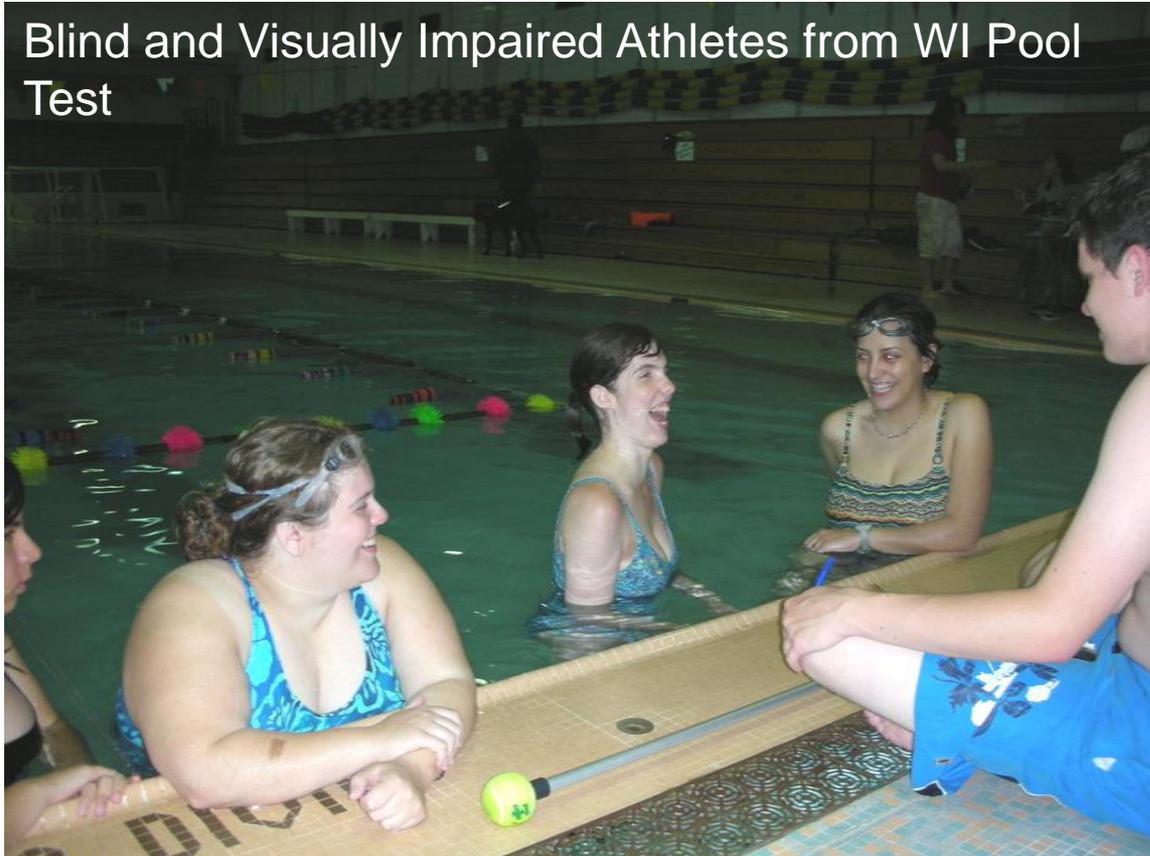
- Amphicom's snorkel \approx \$20 utilizes bone conduction through the teeth (FCC compliant).



Research Team



Blind and Visually Impaired Athletes from WI Pool Test



Team Members

Joshua Cabrera

Team Leader

Assistive Technologies

Andrew Lichaj

Budget

Video Documentation

Nicole Karns

Pool Test Manager

Engineering Report

Fiona Daay

Swimming Equipment

Alex Leasenby

Sports Research

Objectives

Manage Pool Tests



Examine Assistive Technologies



Evaluate alternative Sports



Results Pool Testing



Results

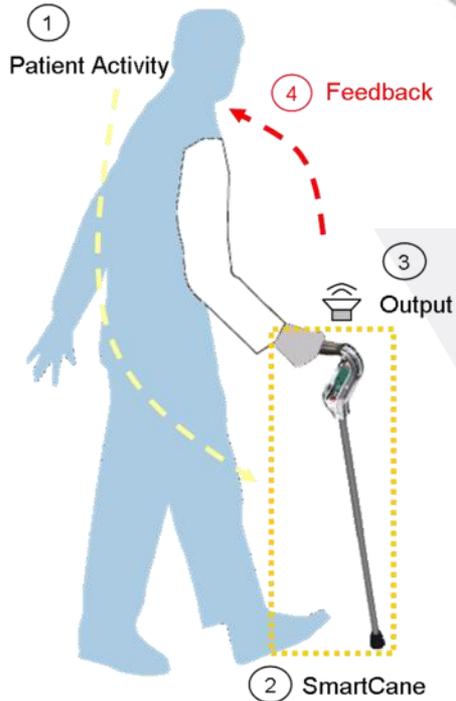
Assistive Technologies



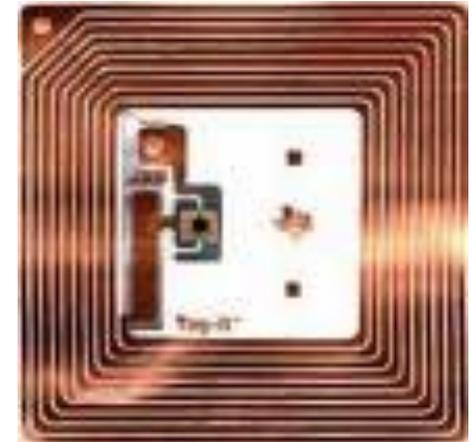
Stand-Alone
Sensors



Fish finder/GPS Devices



Robotic
Sensors



Results

Sports Research

- 1.) Running
- 2.) Cycling
- 3.) Tandem Cycling
- 4.) Soccer
- 5.) Bowling
- 6.) Judo
- 7.) Wrestling
- 8.) Beep Ball
- 9.) Skiing
- 10.) Fencing

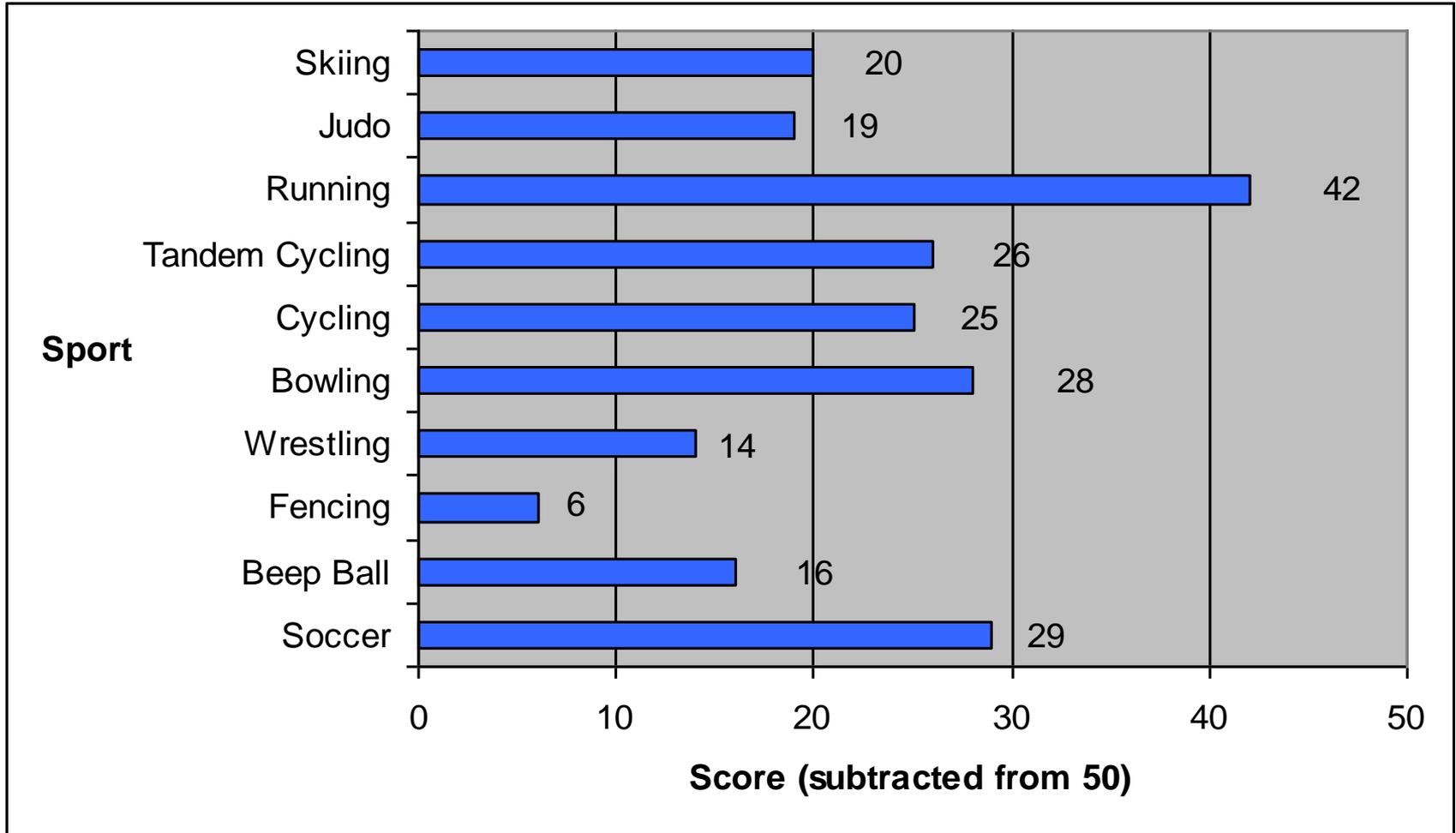


Sports Criteria

- Calories Burned Per Hour
- Cost
- Independence
- Difficult / Safety
- Popularity

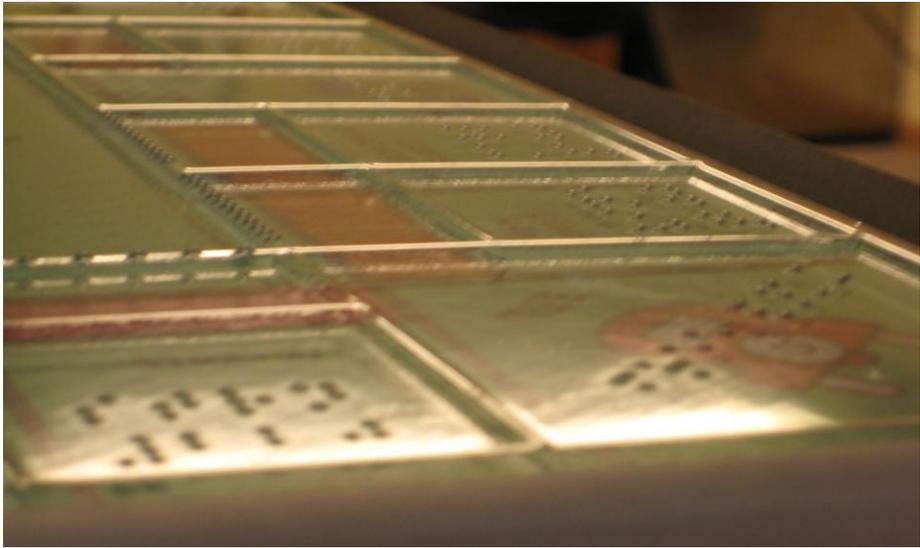


Sports Rank



Results

Trip to Wisconsin Center for the Blind and Visually Impaired



Time Log

| User | Total Time Spent |
|----------------------------|------------------|
| <u>Jeffrey Lin</u> | 94.0 |
| <u>Nicholas Przybysz</u> | 72.5 |
| <u>Paul Cordogan</u> | 76.5 |
| <u>Hussain Biyawerwala</u> | 61.5 |
| <u>Fiona Daay</u> | 44.5 |
| <u>Andrew Lichaj</u> | 117.3 |
| <u>Alex Leasenby</u> | 55.0 |
| <u>David Malon</u> | 81.0 |
| <u>Joshua Cabrera</u> | 107.5 |
| <u>Marta Alvargonzalez</u> | 25.5 |
| <u>McLain Hubbard</u> | 78.5 |
| <u>Nicole Karns</u> | 93.0 |
| <u>Robert Keane</u> | 68.0 |
| <u>Kevin Ragauskis</u> | 102.8 |
| <u>Mahdieh Salimi</u> | 90.0 |
| <u>Ryan Dudek</u> | 61.0 |
| Total | 1231.6 |

Acknowledgments

Collaborative Efforts



The Chicago Lighthouse for People Who Are Blind or Visually Impaired

since 1906, "Seeing What's Possible"®



Wisconsin Center for the Blind And Visually Impaired

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Questions?



Fiona Daay: Member of Research Team