

BUOY

IPRO 310

Assistive Devices for Blind and Visually Impaired Swimmers

A vision for blind swimmers

Outline

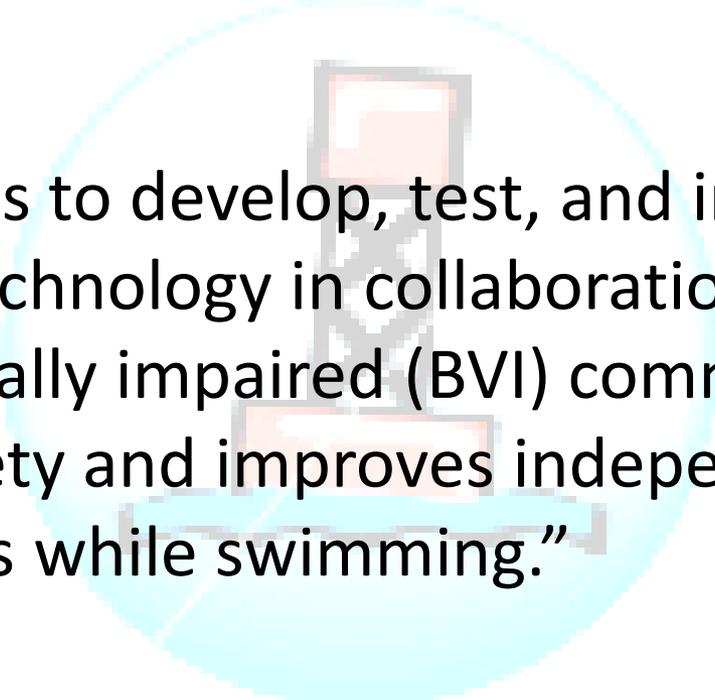
- Significance
- Mission Statement
- Ethics
- History
- Problem and Goals
- Team Organization
- Preparatory and Supplemental Activities
- Progress
- Suggested Next Steps



Significance

- 1.8 million people with blind condition in the US (US Census)
- 7.8 million people with blind and visually impaired (BVI) condition in the US (US Census)
- Up to 80% abandonment rate of assistive technology (Michigan Dept of Education)

Buoy Mission Statement



“Our mission is to develop, test, and implement an assistive technology in collaboration with the blind and visually impaired (BVI) community that promotes safety and improves independence of BVI individuals while swimming.”

Ethics

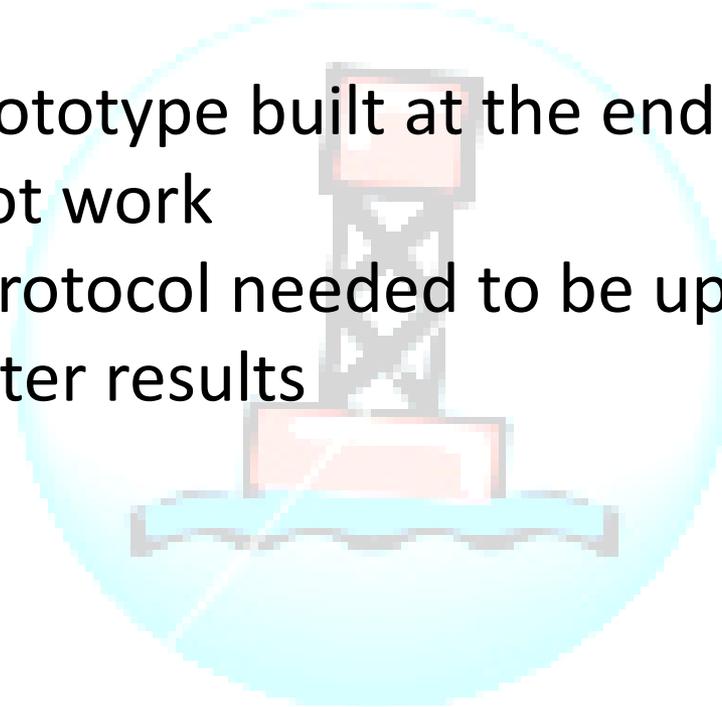
- Beneficence
- Non-maleficence
- Autonomy
- Justice
- Fidelity

History

Then	Now
Exploring possible technology to use	Using radio technology
Prior prototypes did not meet consumer needs	System prototype designed and constructed Initial testing in progress
Did not know how to introduce the device to the BVI community	Communication team formed Testing protocol developed

Problems

- Past system prototype built at the end of Fall 2009 semester did not work
- Pool training protocol needed to be updated based on previous semester results



Goals

- Redesign and build a radio frequency transmitter and vibrating receiver system prototype
- Revise and improve the method of communicating available information between device and swimmer

Team Organization

Technology Team

Aubrey Chipman (BME): LEAD
Mukarram Amine (BME)
Lien Choi (MBB)
Ashika Jayanthi (MBB)
Matthew McKinley (MechE)
George Noorts (CS)
Jeffrey Reilly (Physics)

Communication Team

Michaela Heaton (Chem): LEAD
Claude Antony (Psyc)
Kimberly Dykeman (Psyc)
Michael Schafer (Arch)
Joseph Taylor (Tech Comm)

Status Documents

Lien Choi (T): LEAD
Claude Antony (C)
Aubrey Chipman (T)
Michaela Heaton (C)
Joseph Taylor (C)
Jeffrey Reilly (T)

Presentation

Michael Schafer (C): LEAD
Mukarram Amine (T)
Kimberly Dykeman (C)
Ashika Jayanthi (T)
Matthew McKinley (T)
George Noorts (T)

Faculty and Advisors

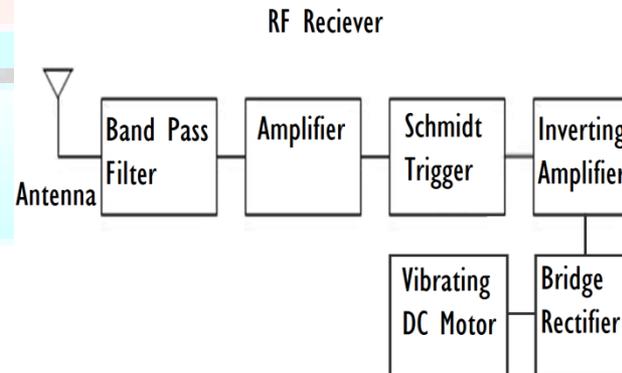
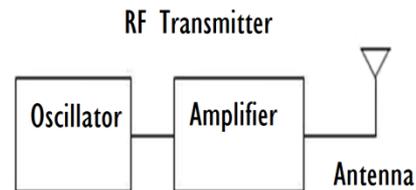
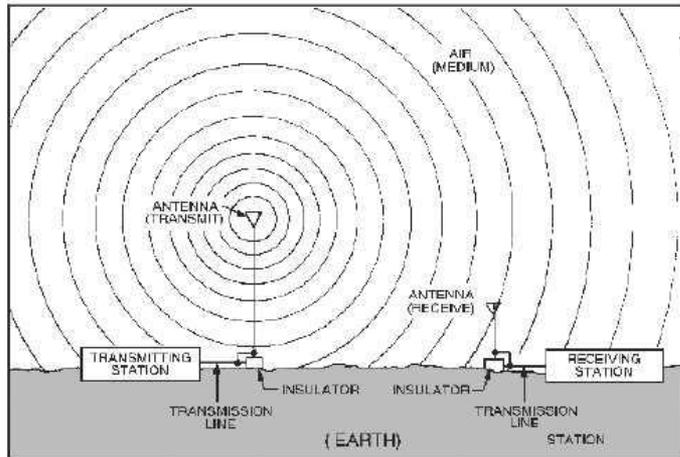
Frank Lane (Rehab Psyc), Phil Troyk (BME)

Preparatory and Supplemental



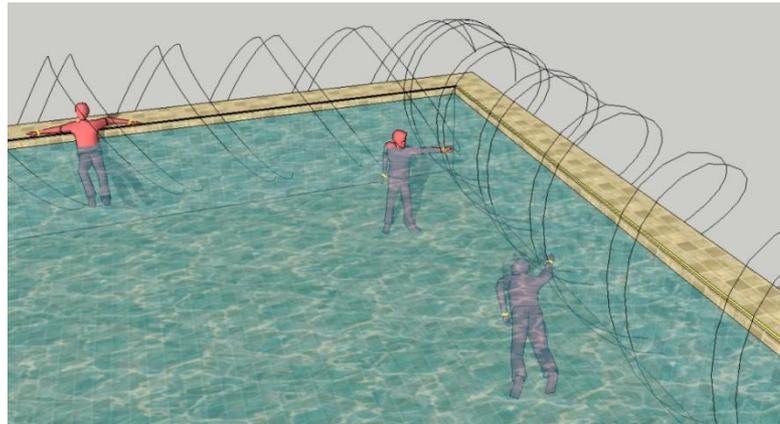
- Team building
- In-pool blindfold activity
- Strategic division of labor
 - Communication
 - Technology
- Extensive ethics training and code of ethics
- Completed IRB certification

Technology Team Diagrams



Radio Technology

- Transmitters produce an invisible wall by broadcasting a unique signal
- Receiver detects signal at or above threshold intensity and produces tactile feedback indicating relative position to obstacles

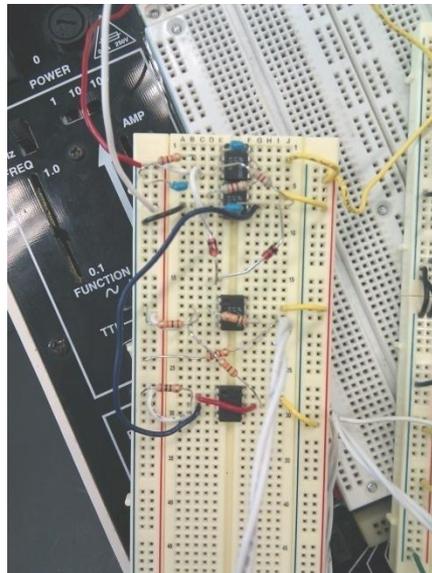


Technology Team Progress

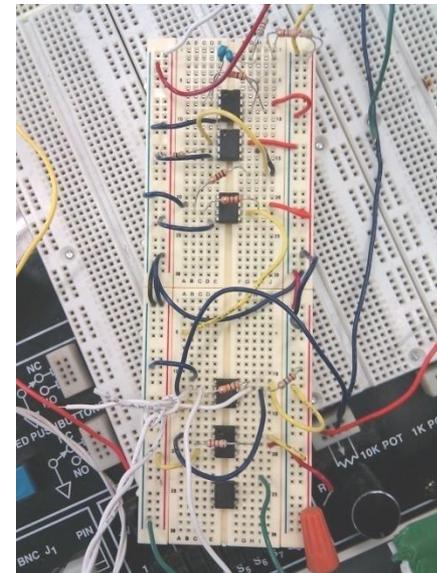
- Concluded device in theory should work but did not due to poor workmanship
- Met with subject matter expert
- Determined desired system specifications
- Tested economy of power specifications

Technology Team Progress

- Constructed and tested receiver and transmitter prototype



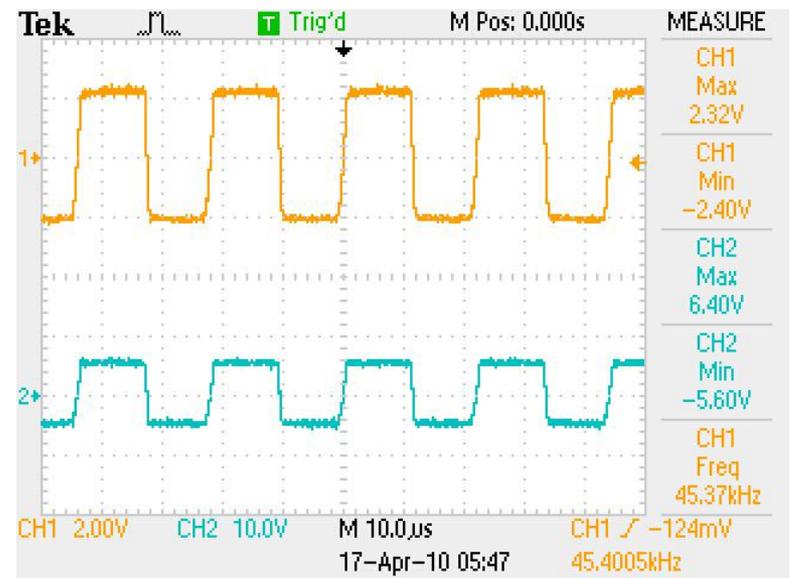
Transmitter



Receiver

Technology Team Progress

- Verified correct operation of transmitter
- Troubleshooting receiver

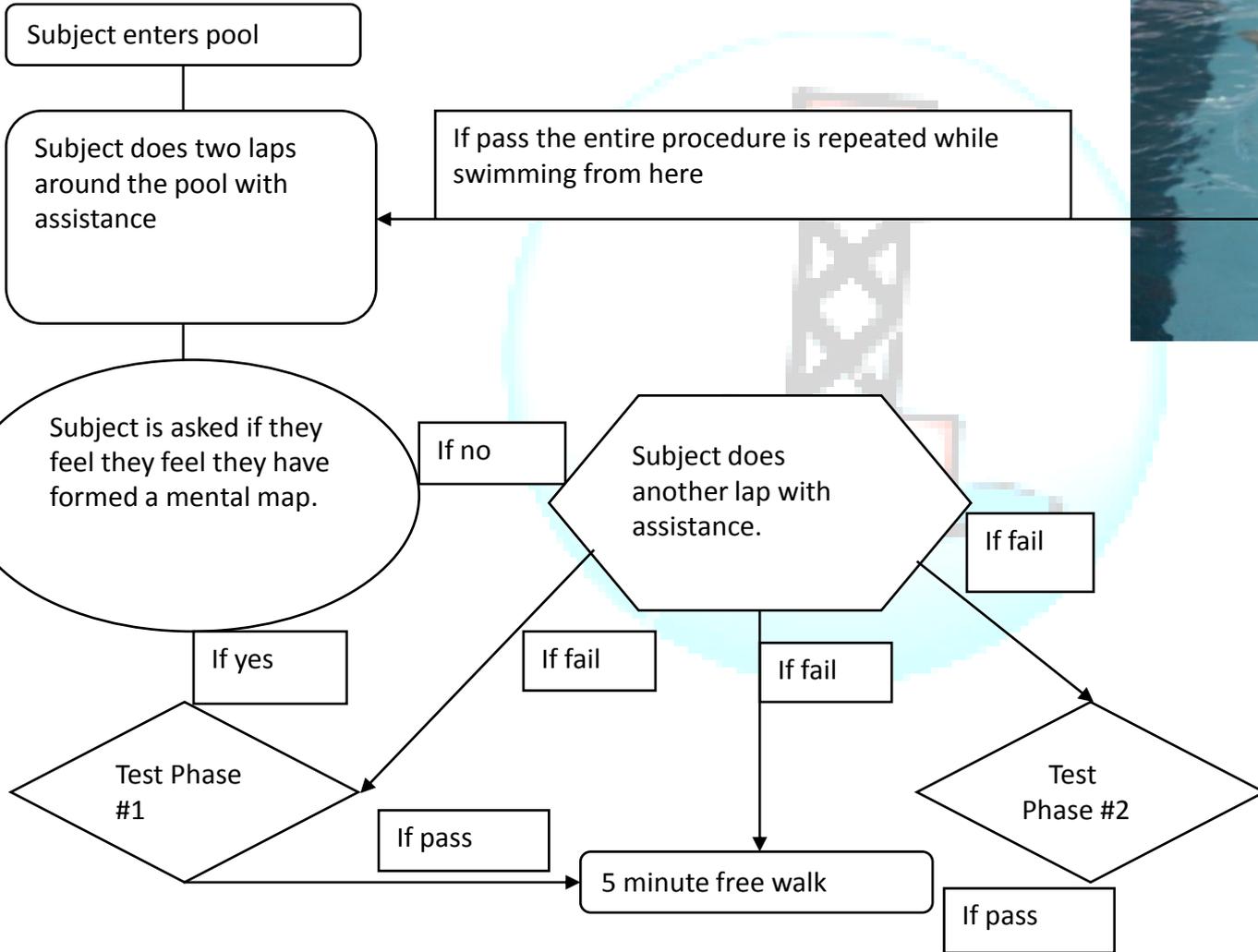


Transmitter Oscilloscope Readout

Communication Team History

- Mobility training of BVI individuals
- Fall 2009 testing





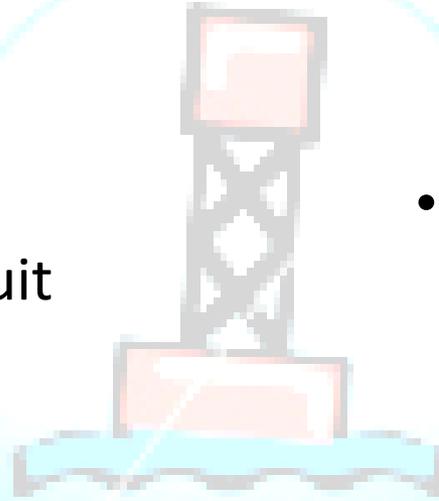
Communication Team Progress

- Maintenance and upkeep of devices
 - Waterproofed testing device
 - Made new blacked-out goggles
- Revision of protocol
- Recruitment of research participants
- Pool testing
- IRB revision
- Constructed scale model of pool

Suggested Next Steps

Technology

- Develop prototype onto a printed circuit board
- Incorporate the receiver into a wrist band
- Waterproof the system



Communication

- Continue testing in order to determine the range of laps required to form a strong spatial-cognitive map
- Incorporate the BVI community into pool testing

