BUOY

IPRO 310

Assistive Devices for Blind and Visually Impaired Swimmers

A vision for blind swimmers

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."

Outline

- Significance
- History
- Problem
- Goals
- Team Organization
- Progress
- Future Activities

Significance

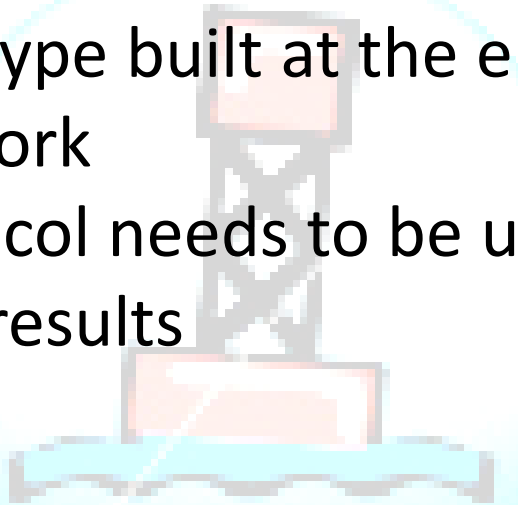
- 1.8 million people with blind condition in the US (US Census)
- 7.8 million people with blind and visually impaired (BVI) condition in the US (US Census)
- Up to 80% abandonment rate of assistive technology (Michigan Dept of Education)

History

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

Problem

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



Goals

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

Team Organization

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

Communication Team
Michaela Healton (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 Healton (C)
Joseph Taylor (C)
Jeffrey Reilly (T)

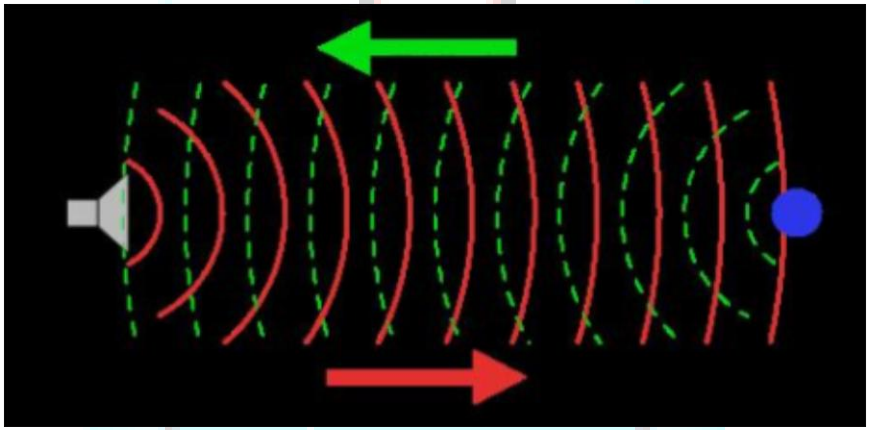
Presentation
Michael Schafer (C): LEAD
Mukarram Amine (T)
Kimberly Dykeman (C)
Ashika Jayanthy (T)
Matthew McKinley (T)
George Noorts (T)

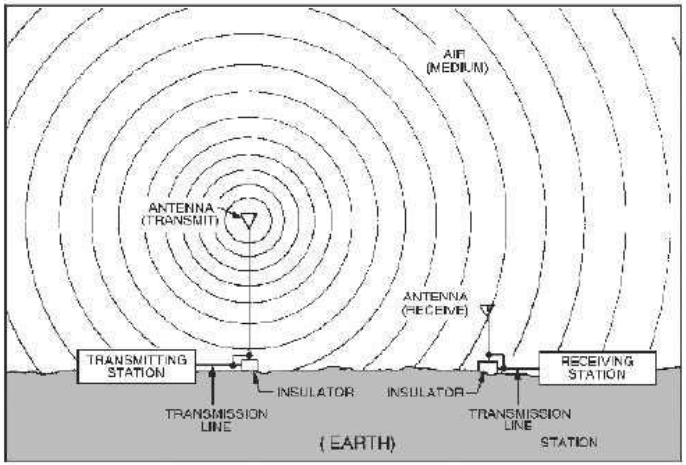
Faculty and Advisors
Frank Lane (Rehab Psyc), Phil Troyk (BME)

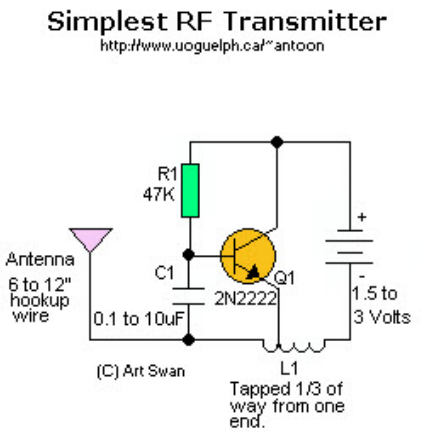
Team Progress

- Assigned students to roles within major and minor team structure
- In-pool blindness simulation
- Completed project plan
- Maintained documentation and improved communication through minutes
- Ethics training
- Completed IRB certification for human subjects
- Work with subject matter experts
- Furthered work within two major teams

Technology Team Diagrams

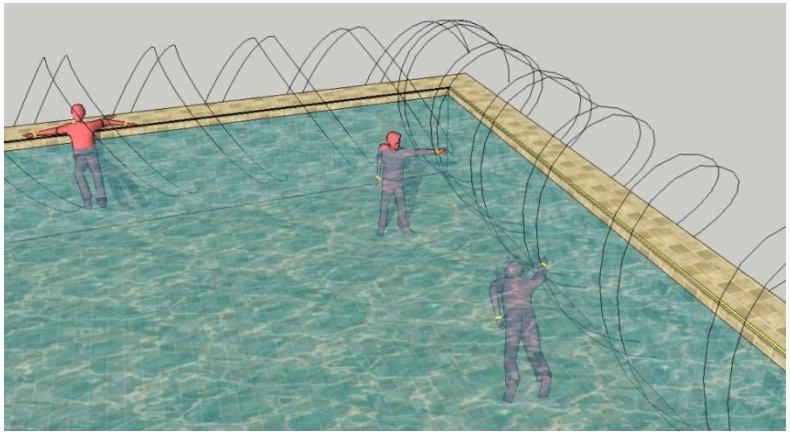






Radio Technology

- 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

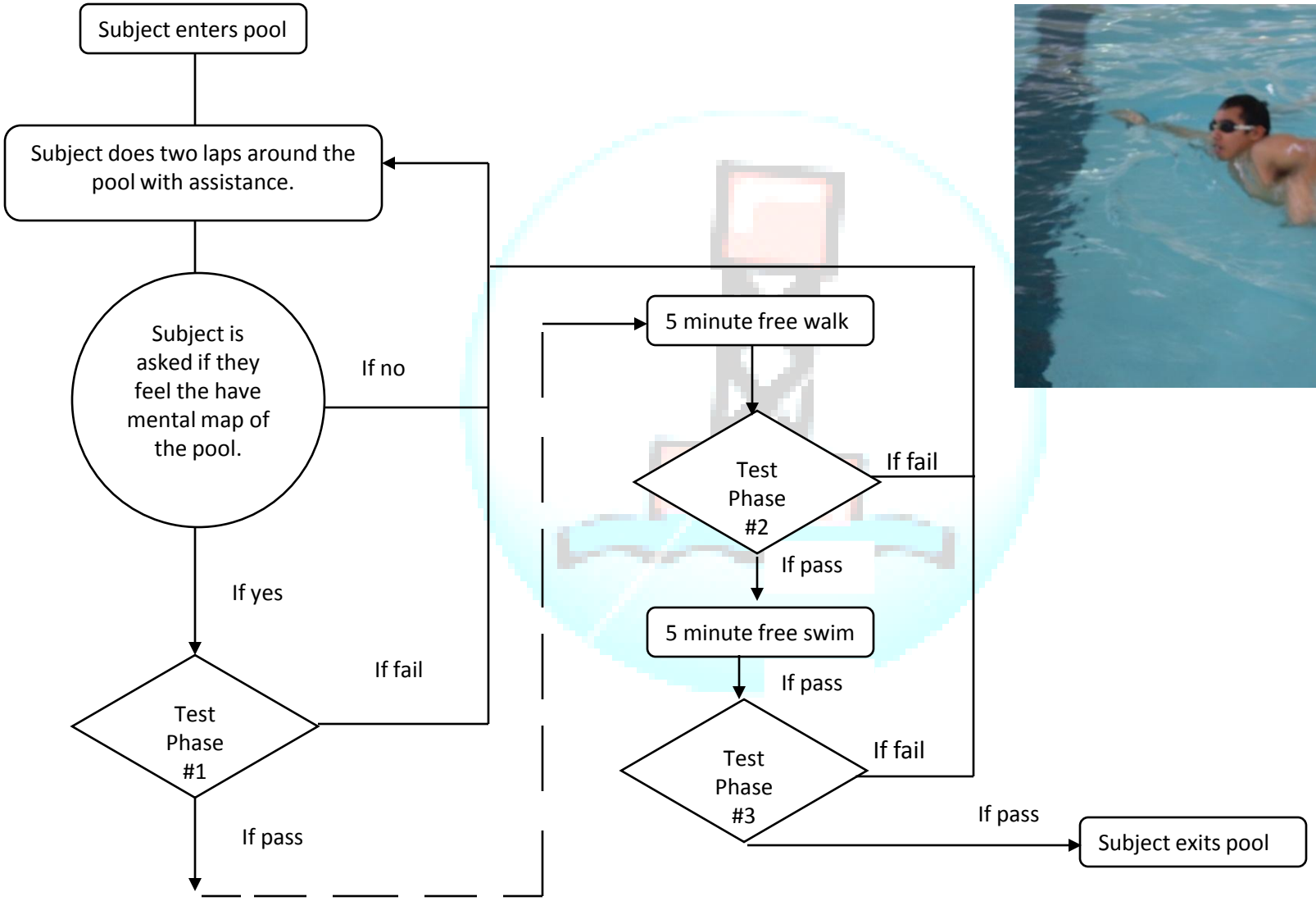


Technology Team Progress

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

Communication Team History

- Mobility training of BVI individuals
- Fall 2009 testing


Subject enters pool
Subject does two laps around the pool with assistance.
Subject is asked if they feel the have mental map of the pool.
If no
If yes
If fail
Test Phase #1
If pass
5 minute free walk
Test Phase #2
If fail
If pass
5 minute free swim
If pass
Test Phase #3
If fail
If pass
Subject exits pool

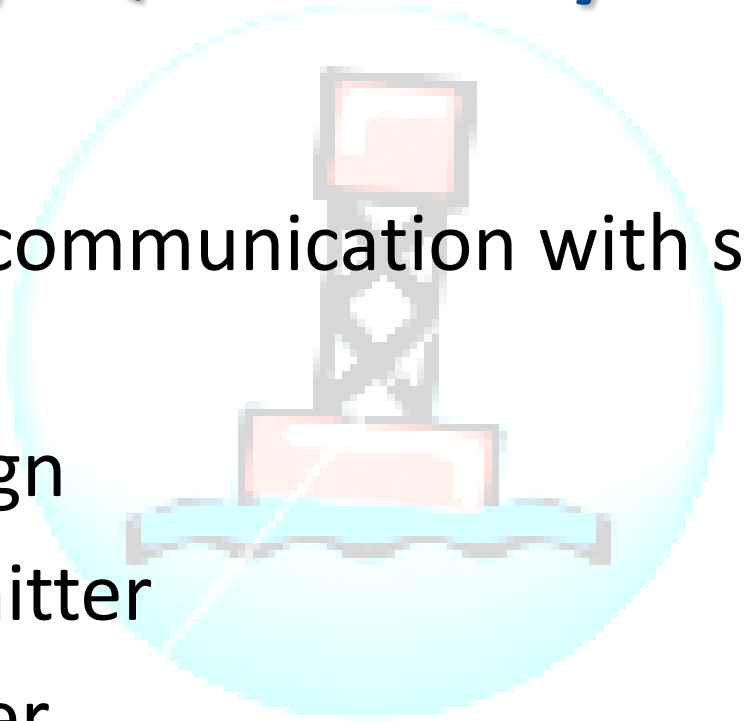
Communication Team Progress

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

Future Activities

- Rebuild the system prototype
- Continued recruitment of research participants
- Continued pool testing

Needs / Questions / Requests



- Continued communication with subject matter experts
- Circuit design
  - Transmitter
  - Receiver
- Research participants for pool testing


Q & A