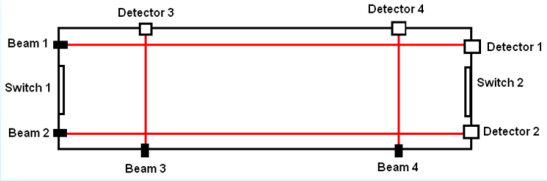
Objectives

- Promote independence of BVI
- Ensure device allows for a low profile during exercise
- Testing the applications of sonar, invisible fence and laser technology
- Include the BVI community in the design process using surveys, interviews, facility visits, and outreach group feedback

Laser Alarm System

Description:

Create a boundary using laser alarms to alert the user when they are out of the specified boundary.

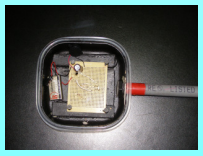


Testing:

- Determine the feasibility of using a laser system through waterproofing and pool testing.

Results:

- The system setup is operational
- Waterproofing was proved out through a submergence test



Laser Future Application:

- Create a system for alerting the user when a beam is interrupted
- Design end switches to change left and right lane alert signals
- Build supports to hold the laser beams and detectors

Conclusions

Because of the price and difficulty in modifying the sonar device, our team decided to focus more heavily on the invisible fence and laser alarm system which both show promising applications. By studying and documenting the applications of each of these technologies, we are providing a path for future IPROs to develop the technologies further. Through continued research and development, we hope to incorporate one or more of these technologies into a safe and reliable prototype.

Invisible Fence

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A Special Thanks to:

The Chicago Lighthouse for People Who are Blind or Visually Impaired

WCBVI

TECHNOLOGY

Assisting Blind and Visually Impaired Individuals

BUOY

IPRO 310

I Swim, You Swim, We All Swim

MISSION STATEMENT

Our mission is to develop, test, and implement assistive technology with the community to promote safety and improve independence of blind and visually impaired individuals (BVI).

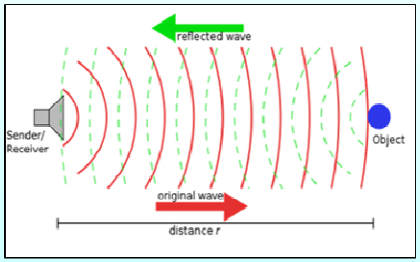
Technology

Designing and Building Prototypes for Assisting Blind and Visually Impaired Swimmers

SONAR

Description:

Sonar reflects sound waves off obstacles to determine the distance between the device and the obstacle.



Testing:

- Determine the detection zone; consisting of the angle of detection and the distance of detection.

Results:

- Each transmitter/receiver's detection zone had a distance of 4.5 feet and an angle of detection of 10 degrees.
- Testing underwater showed the water itself reflected the device's propagated waves and was interpreted as an obstacle by the device.

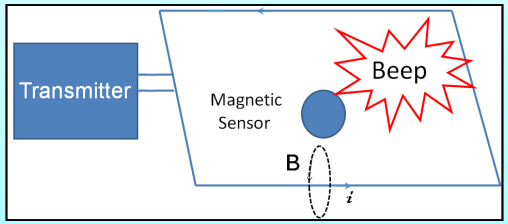
SONAR Future Applications:

- Need a transducer made for underwater use, so that propagated waves penetrate the water.
- Question further development due to cost

Invisible Fence

Description:

Use electric fence technology to create a perimeter for a BVI swimmer to detect a boundary in a pool.



When the magnetic sensor approaches a certain distance from the wire, it gives off an alarm.

Testing:

- Determine the functionality of invisible fence technology in pool applications
- Examine the air to water interactions of the transmitter and receiver
- Test the technology in various potential device setups
  1. Above lane lines
  2. Below lane lines
  3. Through flag lines
  4. General perimeter

Results:

- Pool tests showed that the detection distance between the receiver did not change when the receiver, the wire, or both were underwater or in air.
- Looping the wire in the same direction with the current significantly increased detection distance.
- Looping the wire in the opposite direction with the current canceled out the signal.

Invisible Fence Future Applications:

- Design a method of alerting user to the difference between left lane, right lane, and end of the pool.
- Incorporate the receiver into swim wear to maintain a low profile.

- Waterproof the receiver and the transmitter.
- Develop a working prototype
- Test cue conflict theory and it's effect on disorientation
- Involve faculty experts in the testing of communication and application