

Project #	Project Name	Project Track	Project Family
P13481	Underwater Leak Detector		
Start Term	Team Guide	Project Sponsor	Doc. Revision
Fall 2012	Ed Hanzlik	Mark Smith, RIT	

Project Description

Project Background:

A colleague came to a student for advice on ways to locate leaks in pools. After suggesting currently used above water technology for pool leak detection, it was discovered by the colleague that a hand held unit was needed. After attempting to find a unit that could satisfy his needs it was realized that nothing like it exists, especially on a consumer-affordable level. The student sought an opportunity to develop a similar technology for the detection of above ground pool leaks built for the average consumer. This is a blank slate project.

Problem Statement:

The primary objective of this project is to design and develop a underwater handheld leak detector that is affordable to the general above ground pool owner. The leak detector should capture acoustic energy produced by an underwater leak and visually indicate to user the unit location in proximity to the leak.

Objectives/Scope:

1. Create a low-cost and easy to use leak detector
2. Detector must have a range of detection to within a foot.

Deliverables:

- A working hand held underwater prototype unit
- Methodology and hardware to test leak detection system. The system will include most of the common types of leaks.
- A design proposal for a cost-effective , user friendly production design.
- A concise documentation package of development and design activities, test methods and results, shortfalls, and proposed next steps.

Expected Project Benefits:

- Functional handheld underwater leak detector(MSDII)
- New Design, Drawings, Sketches
- Well documented acoustic energy produced by various size leaks.
- Attachment to pool pole (MSDII)

Core Team Members:

- Brendan Harder-Project Manager
- Gabe Nicasio
- Peter Goebel
- Joe Malanga-Systems Engineer
- Matt Strickler

Strategy & Approach

Assumptions & Constraints:

1. Using a pre-made hydrophone would increase the cost of our overall system. However, there is an assumption that a large order of hydrophones for a “mass-production” of leak detectors would result in a discounted price per hydrophone, therefore resulting in a lower final system cost than our prototype cost.
2. We are assuming that the material which has a leak is vinyl.
3. Project budget not to exceed \$1000
4. Measurements will be taken at rest. (Holding breath, not moving unit/moving very slow)
5. Leaks are influenced by top to bottom location in pool; leaks near the top are harder to detect due to lower hydrostatic pressure.
6. Users of system will be able to differentiate noise and real leak signal.
7. We are assuming an above ground circular pool, depth of 5 feet.

Issues & Risks:

Project Issues/Risk/Constraints

- Project Understanding and Digesting By Team
 - New project
 - New Area of Study for most team members (working with pools)
- Design Issues
 - Failure of waterproofing the unit
 - Possibility of signal strength too low to detect
 - Noise effects of scuba gear/equipment
 - Frequency getting lost in noise
 - Legal issues if we use hydrophone ordered
- Available Resources
 - Budget Constraints for development (trial & error)
 - Fabrication (Vacuum Molding, Injection Molding, etc.)
 - Warm weather (Outdoor testing)