Multi-beacon Ranging System

Our programmed beacons helps robotic engineers to locate the underwater robot with multiple customized beacons and sonar based communications.

Brian Ma, Yoyo Lam, Xingyu Luan, Xu Ben, Xiang Peng, Xinyu Qiao,Yifan Wu

The problem

- Traditional positioning methods are either too expensive or unusable underwater.

- Existing sonar systems only support single-beacon ranging, limiting accurate positioning for underwater robots.

Our solution

- A master-slave sonar system that sends unique ID-encoded data packets, allowing each beacon to respond individually without collision.

- Integrate GPS and IMU, validate full system in real environments, and compile a complete technical package.

Project Roadmap

- **Phase 1:** Previous developer of the project Managed to measure the distance between 2 beacons.
- **Phase 2:** Our team established the data transmission protocol from a master beacon to 3 minor beacons and a coordinate measurement system based on the distance from the master beacon to 3 minor beacons.
- **Phase 3:** Compensate the locomotion of the master beacon to make the coordinate more accurate.

Master Beacon

Data Packet

1 1 3 1 1 1 2 1

Data Structure

| Flag |
| Parity Bits |
| Data Bits |

Git Repository

Landing Page