



# DEUS: Distributed, Efficient, Ubiquitous and Secure Data Delivery Using Autonomous Underwater Vehicles

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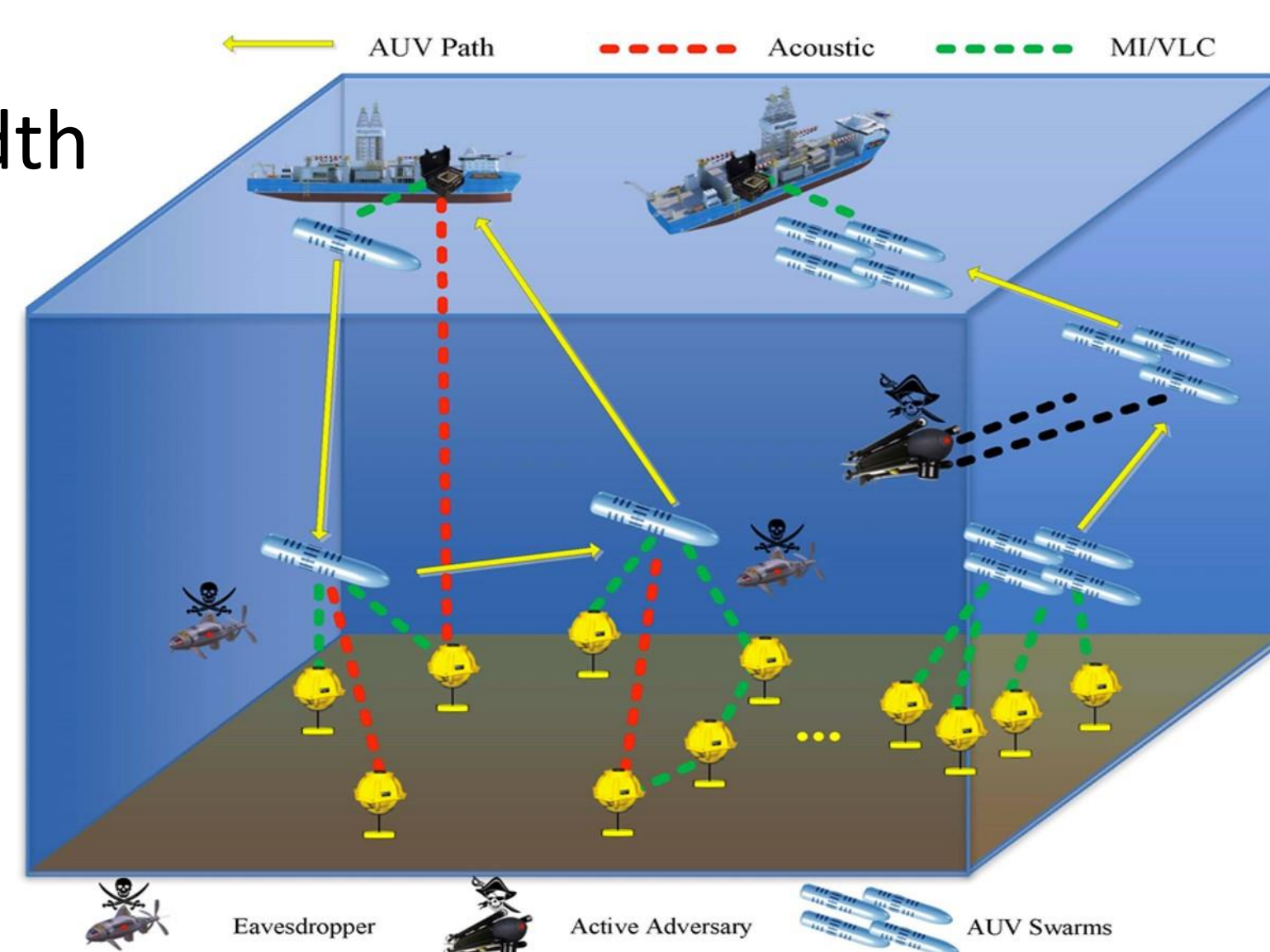
## Introduction

This project aims to providing a viable cyber interconnection scheme that enables distributed, efficient, ubiquitous, and secure (DEUS) data delivery from underwater sensors to the surface station.

## Challenge

- ❑ These sensing activities are scattered, isolated
- ❑ Impractical to connect every possible underwater sensor by wire
- ❑ Wireless acoustic communication suffer from

- Limited bandwidth
- Low data rate
- Long delay
- High BER
- Multipath
- Doppler spread



## Goals of This Project

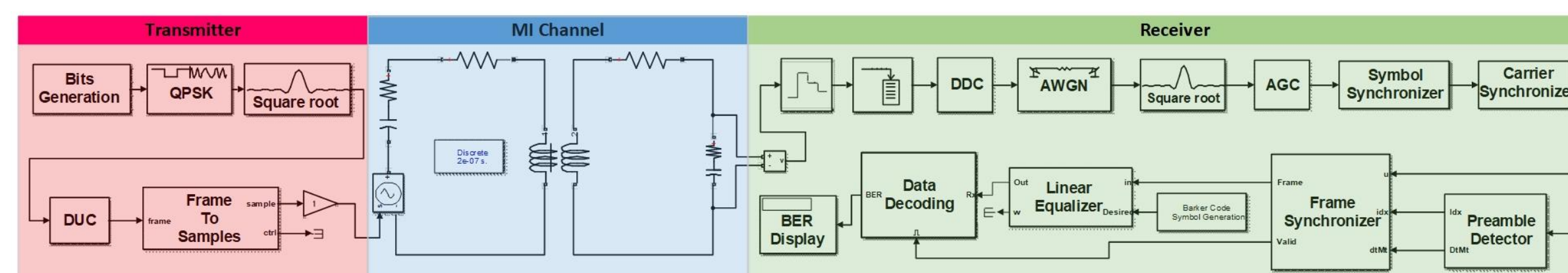
- ❑ Underwater CPS with Autonomous Underwater Vehicles
- ❑ Magnetic Induction, Acoustic Communications and Networking
- ❑ Ubiquitous & Secure Data Delivery

## Underwater MI Wireless Communication

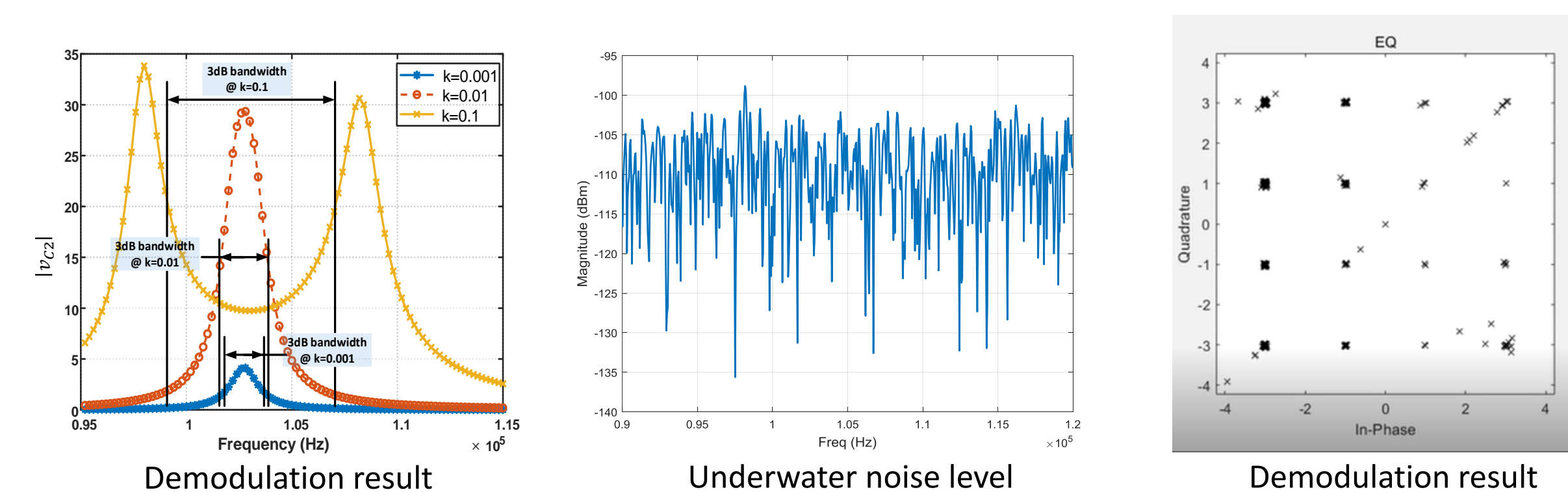
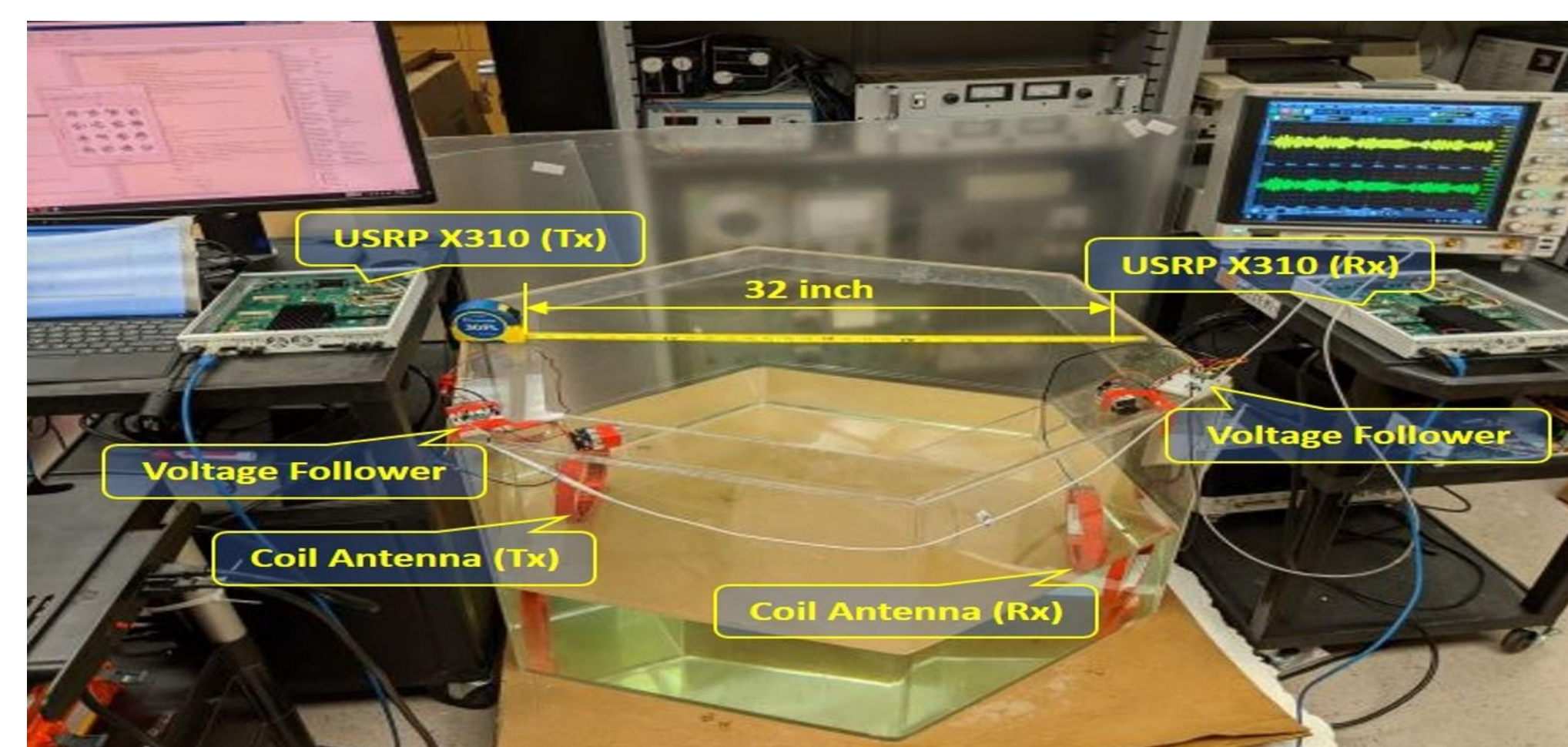
- ❑ Ferrite Assisted Geometry-Conformal MI Antenna



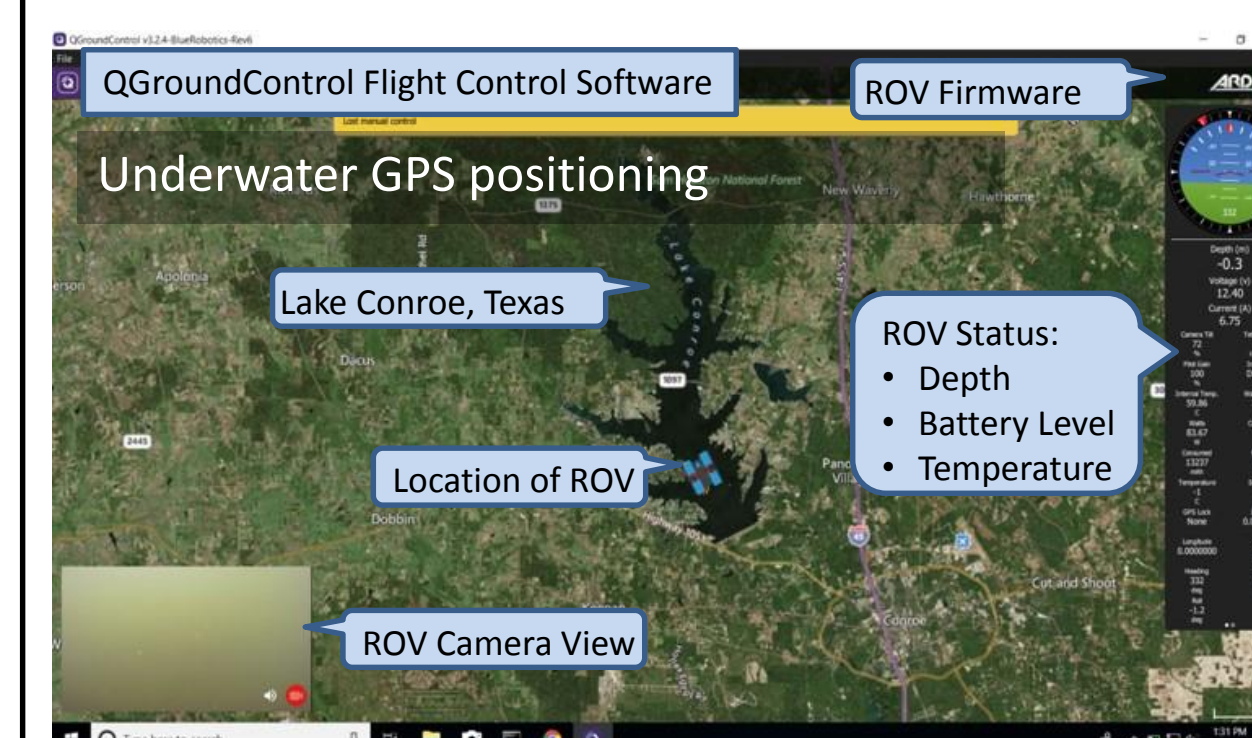
- ❑ MI Communication Block Diagram



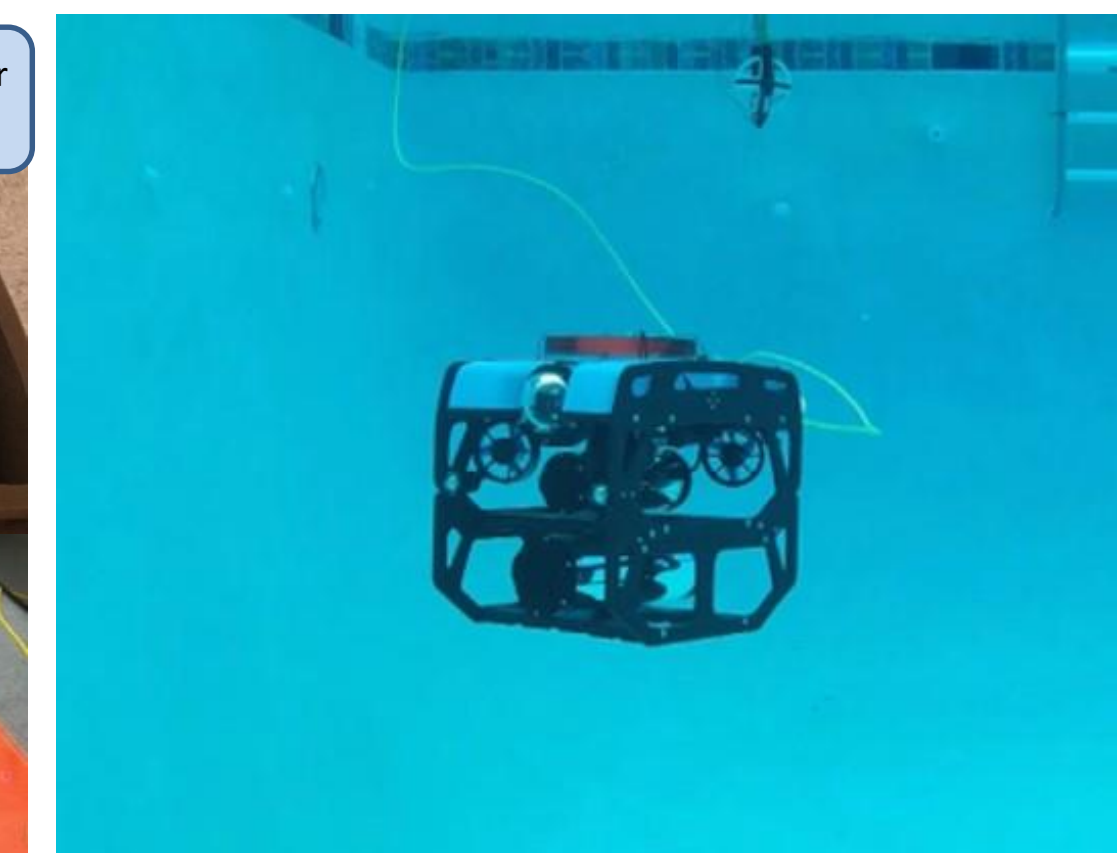
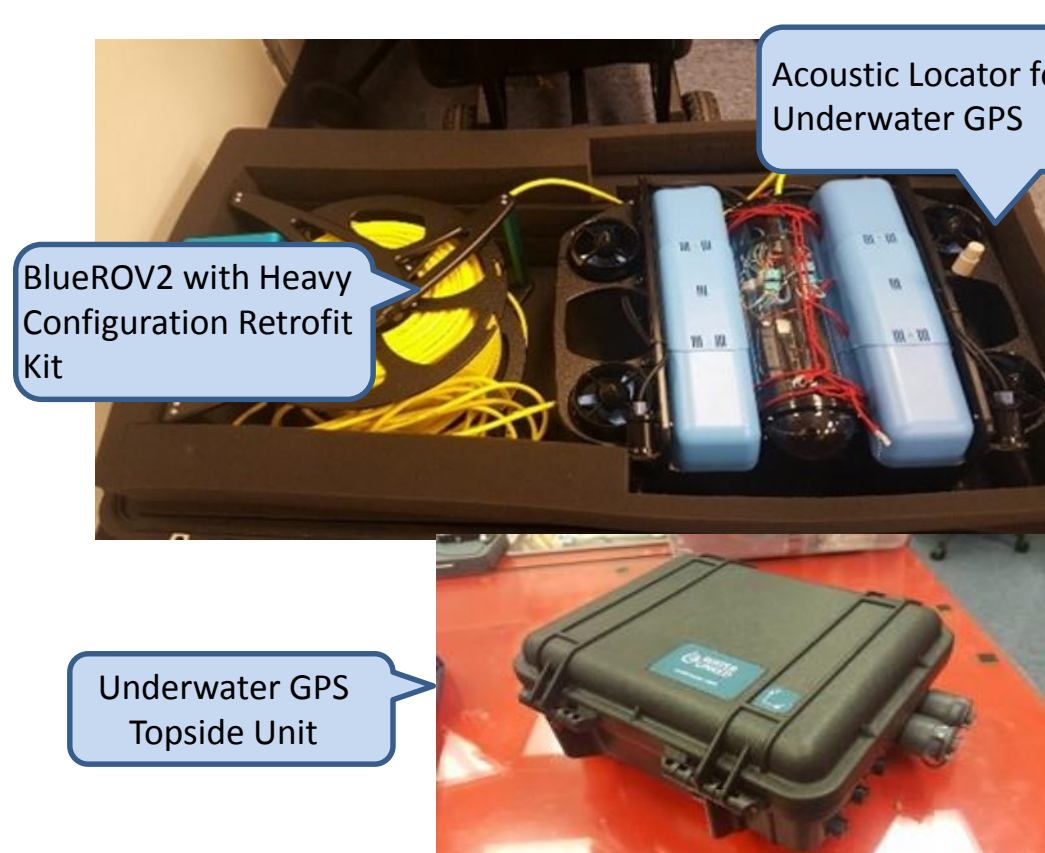
- ❑ Testbed and Result



## ROV + MI Underwater Platform



- The ROV sends an acoustic signal, which is captured by four receivers on the boat
- The received signals are used to calculate the position of the ROV based on the GPS signal on the boat



## Broader Impacts

