



DARTMOUTH

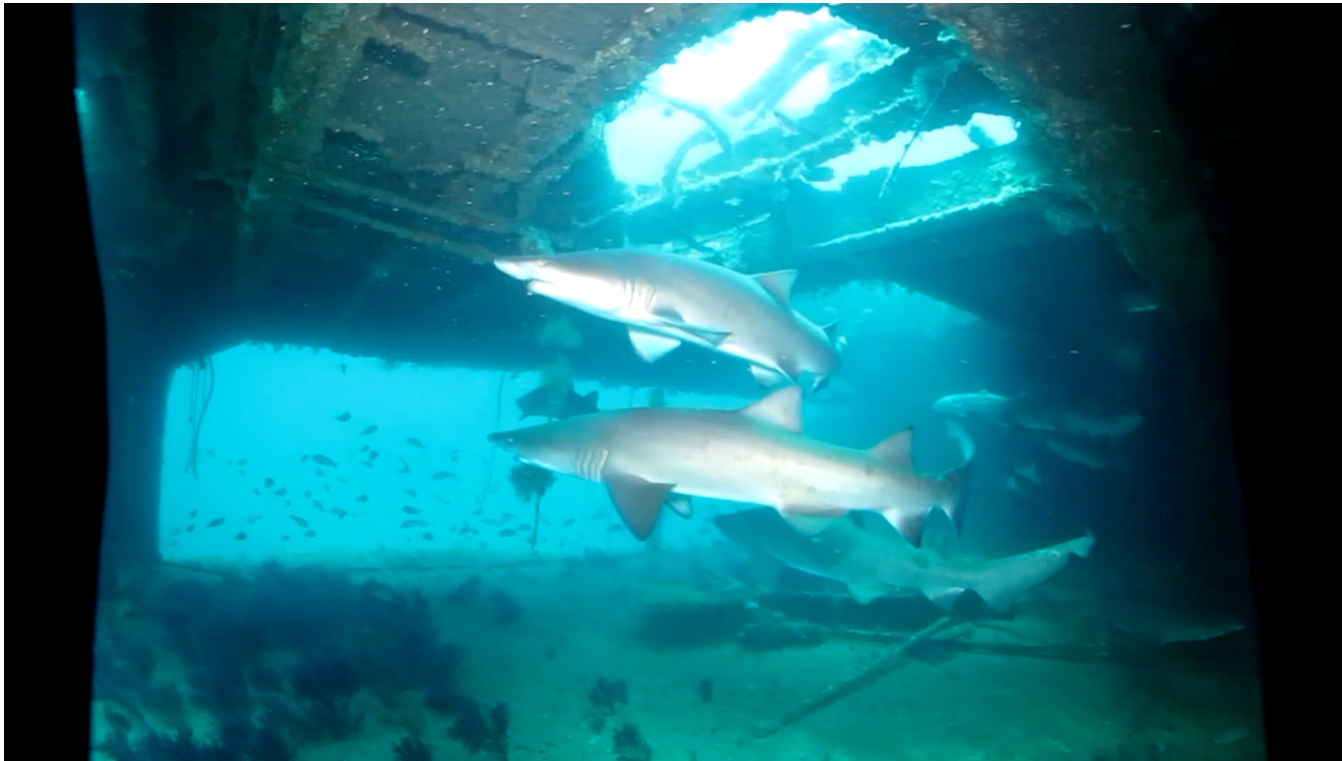


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Collaborative Research: NRI: INT: Cooperative Underwater Structure Inspection and Mapping

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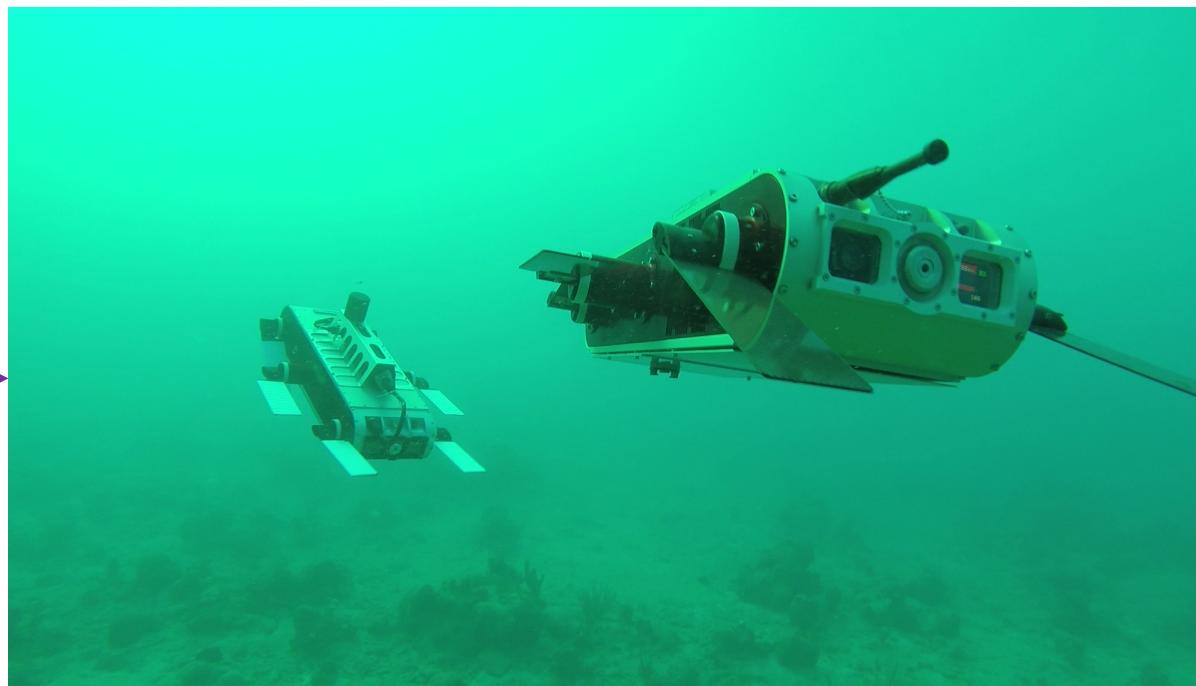
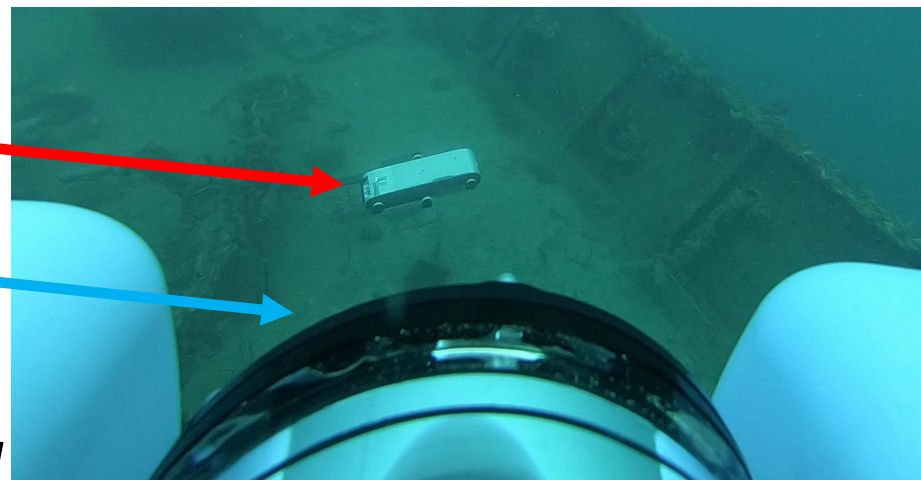


[www.youtube.com/
watch?v=gRQ1qd01
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Overview

Team of robots explore an underwater structure

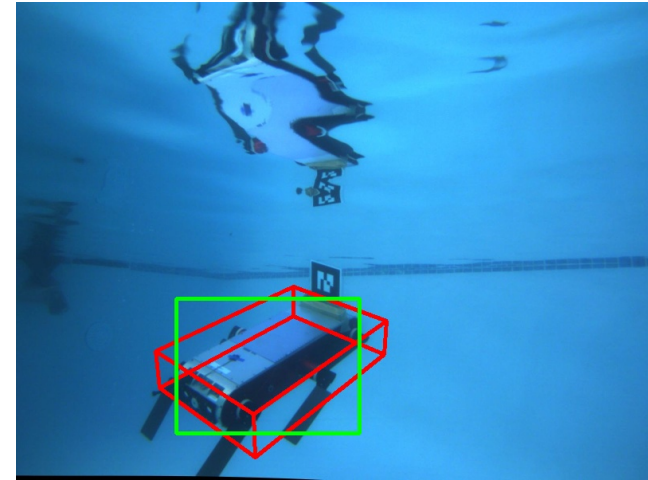
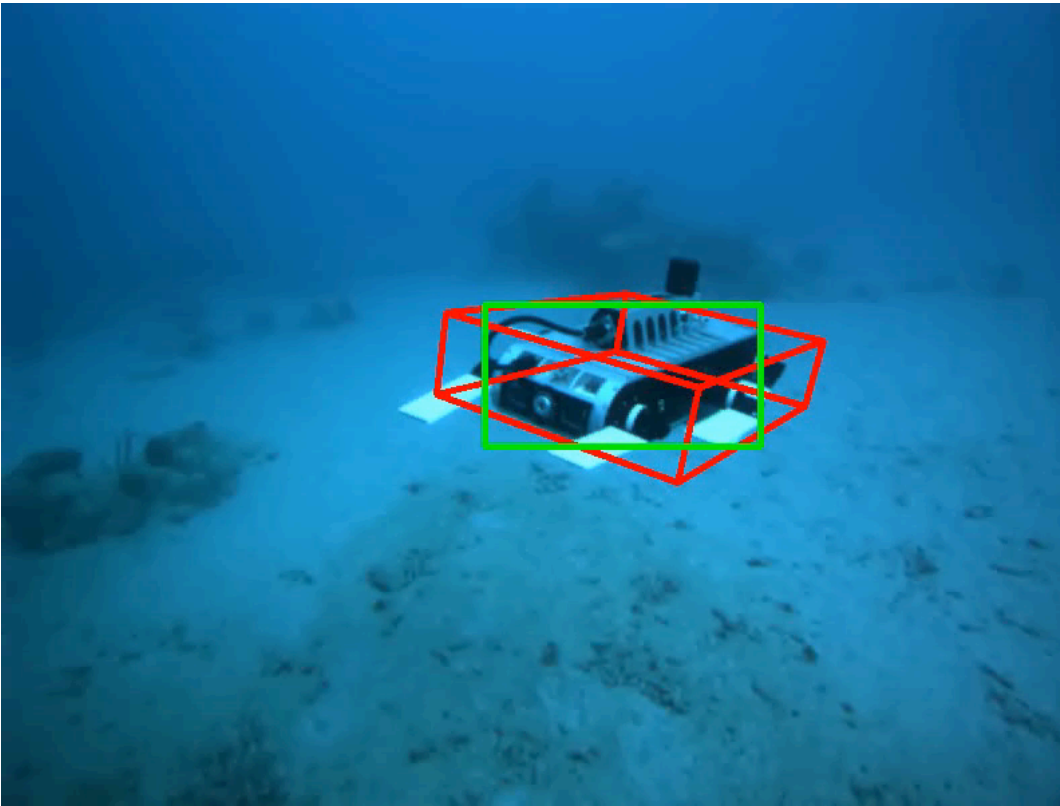
- Robots operate near the wreck (*Proximal Observers*) -- Detailed mapping
- Robots operate from a distance (*Distal Observers*) -- Overview of the situation
- **Cooperative Localization** provides the relative pose between *Distal* and *Proximal Observers*



Cooperative Localization

CNN based relative localization

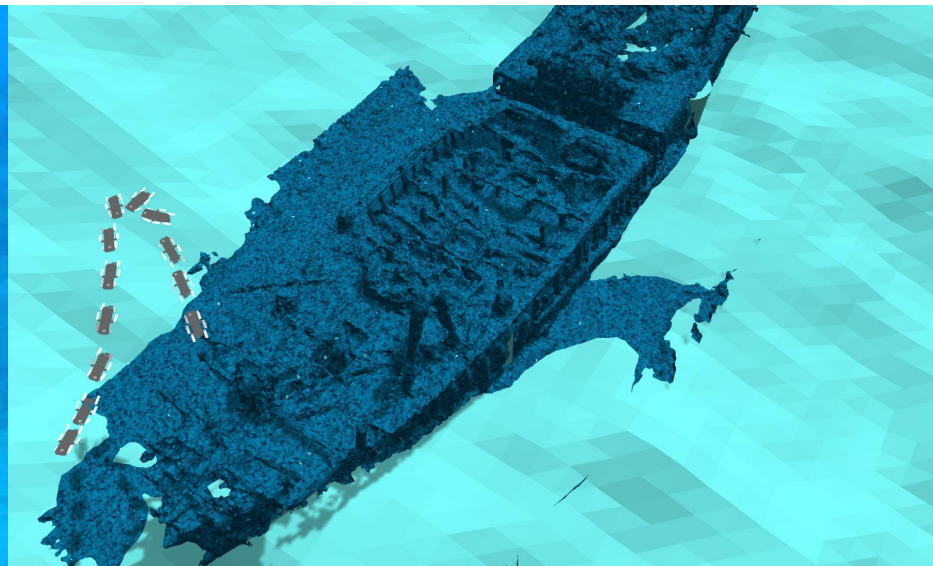
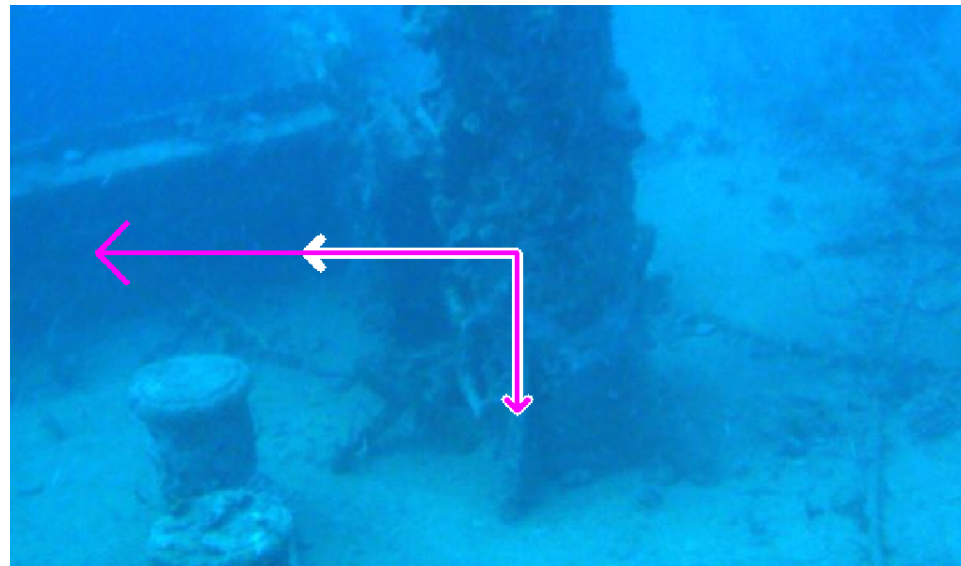
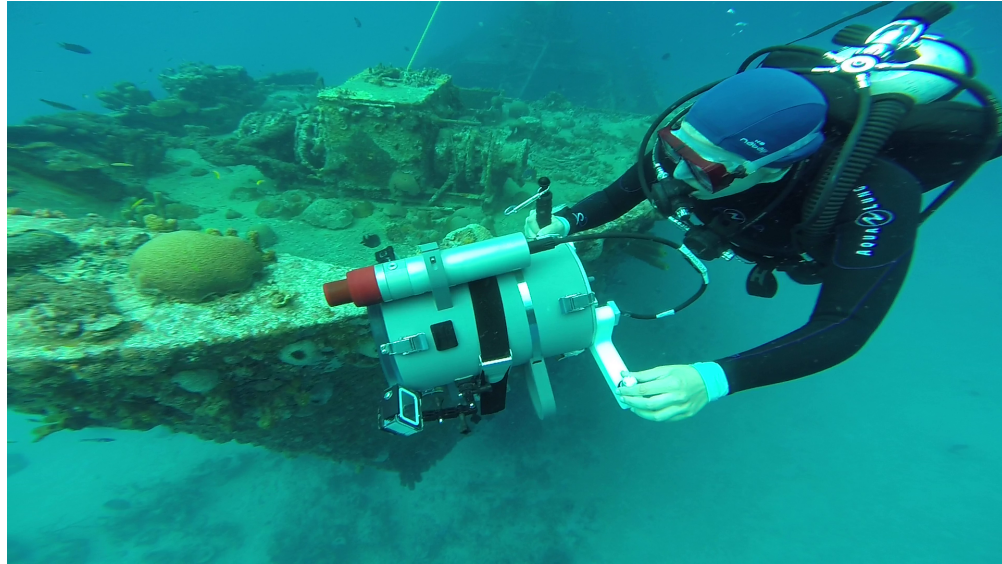
- Trained on Simulation
- Tested on Real Images
- Augmented with IMU, Compass, and Water-Depth Sensors



B. Joshi, et al. DeepURL: Deep Pose Estimation Framework for Underwater Relative Localization. IROS, 2020

Proximal Observer

- CNN trained on human diver collected data
- Annotations mark best direction of motion
- AUV guided to explore the wreck



Future work

- Photorealistic reconstruction of the wreck
- Distal Observer moves to see the proximal observer and the wreck
- Limited acoustic communications

Aqua2 AUV with USBL

