

# Case Study:

## AUV OBSTACLE AVOIDANCE PIPELINE USING ISS360 SONAR



### FEATURES & BENEFITS

- > **90 METER RANGE**  
Long range imaging.
- > **6,000 & 4,000M DEPTH RATINGS**  
Ideal for Shallow and Deep Waters.
- > **PITCH & ROLL\***  
Provides Pitch and Roll to 0.2° accuracy.
- > **SMALL FORM FACTOR**  
Smallest Imaging Sonar available.
- > **BROADBAND TRANSDUCER**  
Excellent image quality & range.
- > **NO SLIP RINGS**  
No components to wear.

\*Optional



Woods Hole Oceanographic Institution has pioneered a new obstacle avoidance pipeline for Autonomous Underwater Vehicles (AUVs) using the Impact Subsea ISS360 Imaging Sonar.

The pipeline is intended to provide a reduced form factor, lower power requirement and a more cost effective solution than traditional approaches.

The team successfully utilised the ISS360 Imaging Sonar integrated with a REMUS 100 AUV and demonstrated automatic obstacle avoidance capability with the new pipeline.



ISS360 Sonar (far left) Installed on the REMUS 100 AUV

### APPLICATIONS INCLUDE:

ROV & AUV Navigation | Target Identification | Diver Navigation |  
Port Surveillance | Motion Reference | Search & Recovery |

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The Software Development Kit (SDK) which is freely available for the ISS360 Sonar was used to provide a simple direct integration of the sonar to the vehicle.

The open source version of the SDK is available on GitHub and is a single project written in C++17.

### Obstacle Avoidance Pipeline for a REMUS 100 Using an ISS360 Sonar

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275 Full Text Views

<b>Abstract</b>	<b>Abstract:</b> Existing obstacle avoidance systems for AUVs require sensors that are large, heavy, expensive, or place other restrictions on vehicle operation. We designed a new obstacle avoidance pipeline around the ISS360, a small, low power, low cost, scanning sonar that leverages existing ROS navigation infrastructure. Because the data from the ISS360 is similar to a planar laser scanner, our pipeline puts the detected objects into the ROS navigation costmap where they can be tracked while the sensor field of view isn't pointed at them. We designed and manufactured a hull section to mount the ISS360 onto a REMUS 100 AUV, integrated the sonar onto the vehicle electrically and in software, and successfully demonstrated a simple divert behavior using this pipeline. When the vehicle got too close to an occupied square of the costmap, it would autonomously drive away. This was tested in the field by giving the REMUS 100 a mission that drove it towards a dock, which it successfully detected and avoided.
<b>Document Sections</b>	
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II. Background	
III. Hardware	
IV. Software	
V. Field Testing	
<a href="#">Show Full Outline</a>	<b>Published in:</b> OCEANS 2021: San Diego – Porto

### Obstacle Avoidance Pipeline for a REMUS 100 Using the ISS360 Sonar paper.

The work has been published in full with the IEEE in the paper titled 'Obstacle Avoidance Pipeline for a REMUS 100 Using an ISS360 Sonar' which can be accessed using the link at the end of this article.

Commenting on the paper, Jeffrey Kaeli, Research Engineer, Woods Hole Oceanographic Institution, stated:

*'We're really excited about the capabilities the ISS360 is enabling for AUVs.'*

The ISS360 is depth rated to 6,000 meters as standard and are provided in Titanium housings.

The design and housing material of each sensor ensures that exceptional performance is coupled with high reliability.

This makes the ISS360 ideal for this project or any other such demanding application.



Obstacle Avoidance Paper