

# Case Study:

## COMPARING SONAR SUITABILITY FOR AUV OBSTACLE AVOIDANCE



### ISS360HD FEATURES & BENEFITS

- **100 METER RANGE**  
Long range imaging.
- **6,000M DEPTH RATING**  
Ideal for shallow and deep water.
- **PITCH & ROLL\***  
Provides Pitch and Roll to 0.2° accuracy.
- **SMALL FORM FACTOR**  
Highly compact high resolution imaging sonar.
- **BROADBAND TRANSDUCER**  
Excellent image quality & range.
- **NO SLIP RINGS**  
No components to wear.

Massachusetts Institute of Technology (MIT) and Woods Hole Oceanographic Institute have produced a comparison study titled 'Comparing Sonar Suitability for AUV Obstacle Avoidance'.

**Comparing sonar suitability for AUV obstacle avoidance**  
Andrew Motz<sup>1</sup>, Nathan McGuire<sup>1</sup>, Jeff Kaeli<sup>2</sup>  
<sup>1</sup>Department of Mechanical Engineering, Massachusetts Institute of Technology  
<sup>2</sup>Department of Oceanography, Woods Hole Oceanographic Institution

By introducing the ability to detect and avoid obstacles in real-time, operators can expand the use of Autonomous Underwater Vehicles (AUVs) while minimizing risk to vehicles, personnel, and undersea infrastructure.

We compared the use of single, low-resolution mechanically scanned single beam sonar to determine this capability. This paper presents the development, implementation, and comparison of an Impact Subsea mechanical scanning 360° sonar with a 360° low profile and priced to be comparable to the ISS360. The paper presents a point-to-point comparison of the new ISS360HD with the original ISS360 for suitability for the AUV obstacle avoidance problem.

**The ISS360HD provides significant improvements in SNR, particularly at longer ranges and lower frequencies.**

**Signal to Noise Ratio Comparison Between ISS360HD and ISS360**

AUVs operating at higher speeds or with larger turning radiuses, such as the REMUS vehicles, would benefit from the ISS360HD.

**Why does this matter?**  
Risk Planning  
AUV Design

**What next?**  
We aim to build off our previous work by comparing the performance of the ISS360HD to other sonar systems.

• Applying customer input to modify the sonar system  
• Evaluating alternative sonar systems  
• Comparing alternative sonar systems to the ISS360HD

Questions? Please ask us!

MIT OSLS OCEANOGRAPHIC SYSTEMS LAB WOODS HOLE OCEANOGRAPHIC INSTITUTION

### Comparing Sonar Suitability for AUV Obstacle Avoidance Poster

The study was presented at the IEEE AUV Symposium in Boston.

Led by Andrew Motz, Nathan McGuire and Jeff Kaeli, the study evaluated the two sonar systems under various underwater conditions, including different ranges and target types. The researchers compared the sonars' signal-to-noise ratio (SNR), average target strength, average noise level, overall average intensity and level of sensor saturation.



\*Optional

### APPLICATIONS INCLUDE:

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





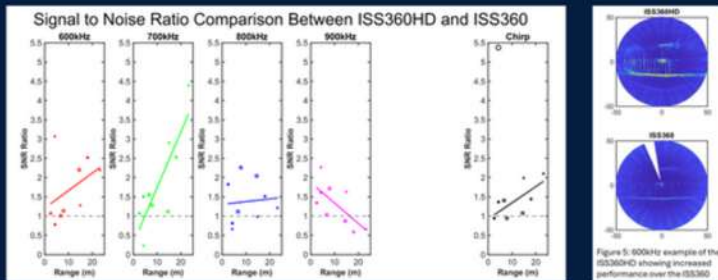
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## COMPARING SONAR SUITABILITY FOR AUV OBSTACLE AVOIDANCE

The results were clear: the ISS360HD demonstrated superior performance in all categories, particularly in terms of SNR, which is crucial for detecting obstacles at longer ranges and in challenging underwater environments.

This improved performance is due to the increased angular resolution of the ISS360HD, which enables the ISS360HD to capture more detailed and accurate information about the surrounding environment.

The ISS360HD provides **significant improvements in SNR**, particularly at **longer ranges and lower frequencies**.



AUVs operating at **higher speeds** or with **larger turning radiuses**, such as the REMUS vehicles, would **benefit from the ISS360HD**.

Extract from poster

The work has been published in full with the IEEE in the poster titled 'Comparing Sonar Suitability for AUV Obstacle Avoidance' which can be accessed using the QR Code at the end of this article.

Ben Grant, Managing Director of Impact Subsea said;

“With the ISS360HD sonar we were keen to provide high resolution sonar imagery to all classes of underwater ROV and AUV.

We are pleased to review the exciting work of MIT and WHOI and their thoughts on the ISS360HD benefits for future AUV integrations.”

The study's findings have important implications for the marine technology industry, as AUVs are increasingly being used for a wide range of applications, including scientific research, offshore exploration and environmental monitoring.

The ISS360HD's superior obstacle avoidance capabilities can help to ensure the safety and reliability of AUV operations while also improving their efficiency and effectiveness.



Comparing Sonar Suitability for AUV Obstacle Avoidance Poster