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# Sea depth measurement

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## Abstract

The sea covers 71% of the Earth's surface 95% of which is unexplored [1]. Monitoring the properties of the ocean has both environmental and commercial applications, depth being one of the most important properties to monitor as it could represent a significant environmental change or aid ships navigate without becoming beached or damaged.

## Current Methods

### Satellite

This method uses satellites currently in orbit to monitor several aspects of the ocean such as depth and temperature. This is good for mapping large areas but due to the nature of the technology it is inaccurate [2]

### Automated underwater vehicles (AUV)

These are small vehicles are typically deployed from larger vessels that follow a set path along the sea floor mapping depth using sonar. These devices are much more accurate as they are a lot closer to the object being measured however are slow to map large areas. [3]

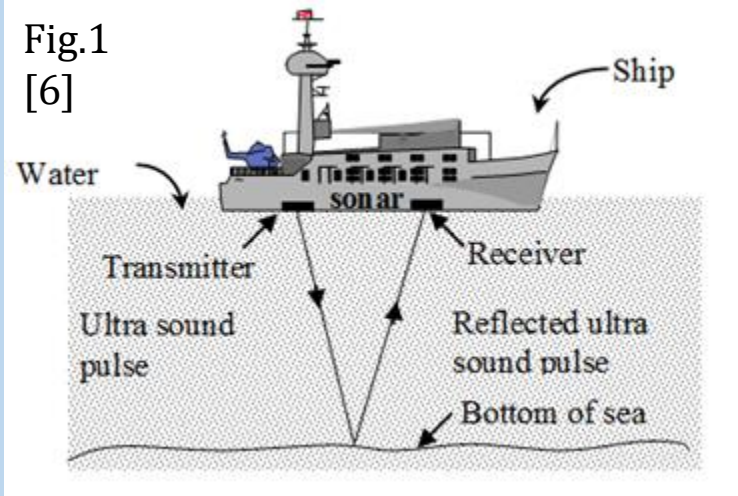
### Restricted floating sensors

These sensors are typically used to map a small area such as a harbour. They operate by using a floating object that is tethered to the sea floor, this then uses the length of the tether and the drift of the float to determine currents and depth[4].

## Sonar

This technology uses the emission and reflection of high frequency sound waves to detect the proximity of an object as shown in the image below [5]. This is the technology that has been selected to develop this device due to the other technologies researched being too complex to implement and test within the timeframe.

Fig.1
[6]




## Aims

Create an accurate sensor with a large measurement area. This sensor should also be waterproof and have the ability to withstand high pressures so it could be attached to an AUV.

## Achieving those aims

Due to the short time frame a spiral development method has been selected. This development method relies on the development of increasingly complex/complete prototypes until completion, this allows for a development of knowledge that will build with the development of the project.

## References

[1] National Oceanic and Atmospheric Administration , "Oceans and coasts," U.S. Department of Commerce, Unknown. [Online]. Available: http://www.noaa.gov/oceans-coasts. [Accessed 08 April 2017].

[2] S. Castro, W. Emery and G. Wick, "Accuracy improvement in an infrared satellite skin sea surface temperature product," in Geoscience and Remote Sensing Symposium, Seoul, 29-29 July 2005.

[3] Y. Essaouari and A. Turetta, "Cooperative underwater mission: Offshore seismic data acquisition using multiple autonomous underwater vehicles," in 2016 IEEE/OES Autonomous Underwater Vehicles (AUV), Tokyo, 2016.

[4] M. LI, Z. YANG and Y. LIU, "Sea Depth Measurement with Restricted Floating Sensors," ACM Transactions on Embedded Computing Systems (TECS), vol. 13, no. 1, pp. 1-21, 2013.

[5] L-3 Communications SeaBeam Instruments, "Multibeam Sonar Theory of Operation," 2000. [Online]. Available: https://www.ldeo.columbia.edu/res/pi/MB-System/sonarfunction/SeaBeamMultibeamTheoryOperation.pdf. [Accessed 18 April 2017].

[6] Knowledge universe online, "Sonar," Knowledge universe online, 2017. [Online]. Available: http://www.knowledgeuniverseonline.com/ntse/Physics/sonar.php. [Accessed 17 04 2017].