

Intelligent Surveillance with Autonomous Underwater Vehicles

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INTRODUCTION

Monitoring fish stocks and other sea-related tasks can be done with small autonomous underwater vehicles (AUV), instead of big ships, which are cheaper to employ and use less fuel. We consider designing a software framework for an AUV, which makes it easy to deploy.

Monitoring of fish stocks and oxygen levels

Currently monitoring such parameters requires larger manned ships by sailing back and forth over the area. This can take several weeks which makes the result somewhat outdated when they are done. By replacing the ship with several AUVs we save fuel, money and can cover a larger area in shorter time by having them swim in a coordinated fashion. It also leaves the researchers available for analysis of the data. We believe automated coordination is useful in other cases as well and that we can generalize the methods for achieving such.

Tracking movement of sea nutrition

When placing windmills it is important to avoid putting the foundation at sources of sea nutrition which are vital to the local biological life. An AUV can track the nutrition from specific sources to see how important the source is. For various reasons, tracking with divers and ships is very difficult.

METHODS

In this project we solve these tasks at a high level using logical planning instead of the traditional guidance, navigation and control (GNC). The existing AUVs have systems that are able to use GNC for simple movement between points in space and our method simplifies the input for such systems. Rather than specialize an AUV from scratch for each task, we introduce methods for specifying any task at a high level of abstraction. This simplifies the employment of a system of AUVs.

REALISATION

As our project is only concerned with the software of the AUV, the necessary materials are the same as the existing AUVs. They are expensive to produce but can be equipped with tools to make the it clearly visible, in case something goes wrong. This way the AUVs do not have to be replaced and they do not accumulate as trash on the sea floor. It is an open task to decrease the production cost on each physical unit and implement the lower level GNC.

RELATED WORK

AUVs are often discussed in the international magazines Hydro International and Sea Technology. The Kongsberg Hugin is widely popular but to our knowledge there is limited research in the automated coordinated movement between multiple AUVs.