



Master Thesis Proposal

1. Student Information

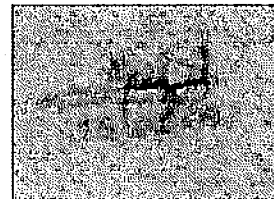
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2. Master Thesis Information

Title: 3D Reconstruction for Ship Hull Inspection

Description:

One of the main objectives of Autonomous Underwater Vehicles (AUV) is to navigate and inspect the underwater environment autonomously. In order to perform the aforementioned task successfully, information must be collected and processed efficiently. Sonar systems are key inputs to this process and provide high resolution imagery of the underwater scene. However, the imagery can be difficult to process autonomously and can be noisy. Furthermore, due to the conversion of the sonar beam into a 2D image, some errors on the depth of a detected object are incorporated.

Seebyte Ltd. which is based on Edinburgh, Scotland processes the data from the Bluefin Hovering Autonomous Underwater Vehicle (HAUV) which is fitted with a Doppler Velocity Log (DVL) to achieve hull-relative navigation and control. However, the DVL cannot be used to navigate and inspect in complex regions, such as the ship rudder or propellers. To autonomously servo around these regions, it is necessary to use the sonar information to provide a range and bearing to the hull. The sonar may also be used to build up a 3D representation of the complex hull regions as the vehicle navigates around the hull. SeeByte has proposed using 3D reconstruction technique using the sonar data of the complex regions to enable the vehicle to inspect the ship fully in real time.

Aims:





The aim of the thesis is to enable full ship hull inspection by integrating the DVL information with the sonar sensor data to enable the 3D reconstruction of the complex regions of the ship hull for real time applications.

Tasks:

The project consists of an image processing part which applies some image enhancement algorithms for noise removal from the sonar image. Feature extraction techniques will extract important features from the image such as lines and curves which may be used for the reconstruction process. The 3D reconstruction is performed by merging information from consecutive sonar images in order to correct the errors incorporated due to the noisy image. The vehicle navigation may be used to build up the 3D hull shape.

Planning:

Time Plan	Task Plan
January 19,2009 – February 05 ,2009	Literature Review
Febraury 06,2009 – March 05 ,2009	Implementation of basic algorithms in MATLAB
March 06,2009 – April 05 ,2009	Implementation of 3D Reconstruction in MATLAB
April 06 ,2009– May 07 ,2009	Coding in C++ and Refinement
May 08 ,2009 – May 25 ,2009	Paper Presentation
May 25 ,2009-June 05,2009	Poster Presentation

3. Supervisor Information

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Date and Signature

Scott Reed
16/2/09

