



4th Term - MSc Proposal

MSc title: AUV Localization Within an Penstock Gallery of an Hydroelectric Dam	Host University: UdG
	Supervisor: Dr. Pere Ridao

Brief description of the project:

This Master Thesis will be developed in the context of an Spanish National Research Project about AUVs designed and developed for Dam inspection tasks. One of the challenges of this project consists on the use of an AUV for the inspection of the Penstock Gallery. This gallery is a big pipe that conducts the water from the water intake to the Turbine where the electricity is generated. Commonly this pipes have a diameter of 3 or 4 meters. The goal of this thesis consists on developing a navigation system able to localize an AUV that navigates through this pipe. To do so, the candidate will need to study how a sonar profiler works and will have to develop the software needed to access, and process the sonar data in real time. In particular, the candidate will use a dual frequency sonar profiler which uses a pencil shaped sonar beam which is rotated by means of a motor. The sonar provides a scan consisting on an array of range and bearing information forming a polar acoustic image of the pipe section. The student will be responsible of fusing this information in real-time with the Roll-Pitch-Yaw information coming from an Inertial Measurement Unit to correct for the distortion that the smooth AUV attitudes oscillation cause in the acoustic image. The corrected image will then be used to provide the 2D position of the robot within circular cross section of the pipe. Moreover, the student will need to study and propose a system to localize the longitudinal position of the robot within the pipe by means of acoustic time of fly sonar or an alternative method to be proposed.

Software/Hardware needs:

Sw requirements: Most of the work will be done offline in MATLAB using a Data set gathered with an AUV. Depending on time availability it will be considered the possibility of developing the system in real time using C++ to the system with the robot control architecture in a Linux framework.

Hw requirements: All the hw. Needed will be provided by the Underwater Robotics Lab of the University of Girona.

Special remarks:

The ICTINEU^{AUV} will be used as the research testbed for this project.

Submit a single page proposal.

Host University: Bourgogne/Heriot-Watt/Girona

Software/Hardware needs: Detail the programming platform (matlab, C++, etc) and the lab facilities required for the project (cameras, acquisition cards, lasers, etc).