Master Student Projects in Robotics: Autonomous Underwater Vehicles, AUV

Keywords: SLAM, Autonomous Underwater Vehicles, Deep Learning, Sensor fusion

Within the Swedish Maritime Robotics Center, SMaRC, we will have access to several AUV platforms and a great deal of sensor data from sonar, camera and others.   The RPL AUV group consists of two faculty, two post docs, 4 PhD students, and between 4-7 Master program students doing either individual **research projects (DD2414, DD2411) or Master thesis projects**. We also collaborate heavily with the research going on next door at the Aeronautical and Vehicle Engineering, AVE, department where they are developing some of the AUVs that we use. This leads to a mix of students with 0 to many years experience working in the group. The group structure has lead to much faster learning for new students entering the group as all help all and knowledge is not lost as new students join.   Master students have contributed to 6 publications so far, mostly as the lead author.   Two of the PhD students began with Master theses in the group (we are not expecting any more PhD positions soon).

There are numerous very challenging problems in the perception, navigation and planning domains. There is a need for example to apply machine learning to the sensor data for navigation, feature detection, and semantic segmentation.   Much of the focus has been on developing Simultaneous Localization and Mapping, SLAM, using various combinations of sensors.   SLAM is potentially much more important underwater than in any other environments since there are few alternatives to reduce the drift in navigation estimates. The interest from our industrial partners, SAAB and Ocean Infinity (formerly MMT), is great.

We regularly conduct testing and data collection from the three SMaRC AUV platforms as well as expeditions aboard the Ocean infinity ships.   Some of the

projects can be tightly coupled to the industrial partners and the problems they have with regular inspection and survey of underwater infrastructure. If any of this sounds interesting I will be glad to speak with you and see if there is a project for you. You must be a good C++/python programmer. Knowledge of ROS and/or a deep learning framework is a big plus as well. This is going to be challenging but with a team of support.

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