

Design and advanced control of an ROV

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The purpose with the proposed projects is to design and build a Remote Operated Vehicle (ROV) for underwater use. Once the platform is built, the control hardware should be installed and programmed. The idea is to base the control hardware on standard hardware for UAVs (including an IMU). The purpose with the control is to stabilize the platform and compensate for disturbances such that precision control from the surface is possible. On the surface an operator equipped with VR goggles control the vessel using one or two joysticks. The expected outcome is insight of both academic as well as industrial relevance, and of course, a very cool demonstrator and potential future research platform.



The main tasks in this work is

- Review existing designs for (relatively) low-cost ROVs on the Internet.
- Based on this review, design an ROV.
- Model the vessel mathematically and use that model to create a simulation environment.
- Build the vessel and install the electronics.
- Program the on-board electronics and a surface-laptop to make it possible to control the vessel and to send video in real-time.

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- Perform hardware-in-the-loop simulations by combining the simulation model and the hardware.
- Field tests that aim at ending with a fully functioning ROV.
- Future extensions
 - Use vision to enable improved disturbance estimation and improved possibilities for locking on static and moving underwater objects.
 - Add a sonar array to be able to do for example SLAM.
 - Incorporate mission planning and make the boat autonomous.

A typical background for this project is a student who has taken advanced control courses as Control theory and Optimal control. Interest in applied automatic control is of course also necessary. Programming skills are required (advanced skills are of course an advantage).

If there are some ideas of changes to the project, we are open for such discussions. Please send me an e-mail or pass by my office if you are interested, and we can discuss a tailored project for your interests and background!