EXCELLABUST

EXCELLING LABUST IN MARINE ROBOTICS

Staff exchange 5

Research plan

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1. Experiment description

Situational awareness and teleoperation of underwater, surface and aerial systems can be challenging using multiple conventional screens. Current systems for virtual and augmented reality have opened a multitude of new possibilities. Compared to standard remotely operated underwater vehicle (ROV) cockpits that contain many screens and require a larger area for operation, virtual reality systems with controllers (e.g. HTC Vive) allow an immersive interactive 3D cockpit. Virtual reality systems additionally provide real-life (e.g. via stereo camera) and virtual telepresence to gain better situational awareness.

The experiment will consist in integrating ROS and Unity3D with the University of Limerick OceanRings framework over the IXBlue protocol. The research and development will focus on utilizing or adding features to Unity3D to allow immersive operation of the University of Limerick ROV. The Unity3D work will include researching methods for creating georeferenced 3D environments in Unity3D. The ship and ROV model states from real sensor data will be added to 3D environment and allow virtual telepresence. The HTC Vive system will be integrated improve immersion of opertors. Finally, possibilities for creating shoreside 3D environments based on existing maps (e.g. google earth) will be investigated.

The development and connected experiments will provide necessary knowledge about the design procedures for modern augmented user interfaces. Additionally, the new knowledge will also provide initial experience for developing simulation systems that can be consistently and comfortably used by end-users for marketing, education and training purposes.

2. Expected outcomes

1. Learned Unity3D engine operation and development methodologies.
2. Learned HTC Vive and similar virtual reality goggle operation and usage.
3. Learned development of simulators and modern ergonomic user interface design.
4. Report on staff exchange and experiences.

3. Further work

1. Create a full immersive 3D cockpit.
2. Integrate teleoperation capabilities via HTC Vive controllers.
3. Develop a system for operator education and training.