

Persistent Autonomy for Marine Robotics

Workshop at ICRA 2014

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I. STATEMENT OF OBJECTIVES

In recent years, *persistent autonomy* has become a key area of interest for marine robotics researchers. Ocean observatories require autonomous robot deployments over months or years, observing dynamic phenomenon both synoptically and over variational scales in space and time. Deep-water oilfield inspection and intervention with autonomous vehicles is now a commercial reality, but fielded robots rely heavily on accurate *a priori* models of the subsea assets. Robustness to errors in autonomous contact tasks, such as valve turning on a wellhead, requires detection of execution errors and correction at any or all of dynamic control, motion planning or task planning levels. Numerous coastline security applications require extended operations over the horizon, with the ability to detect, track and re-plan when objects of interest are located, or shared between robots.

Today, our current generations of Autonomous Underwater Vehicles (AUVs) are generally limited to preplanned missions, or to limited forms of autonomy involving script switching and re-parametrisation in response to pre-programmed events. Realising the persistent autonomy that users in the ocean increasingly demand is involving a greater capability in understanding sensed events to detect failure and error, and more capable task planning approaches that can adapt behaviour and control in new ways. Research activities include richer semantic modelling of the environment using ontologies derived from sonar and video sensor data, skill learning applied to underwater autonomous manipulation using machine learning, plan adaptation to correct errors, and robust control to reduce effects of poor low level control exciting higher level decision making unnecessarily.

This workshop is aimed to promote exchange and sharing of experiences among researchers in the field of persistent long-term autonomy for autonomous underwater vehicles. The programme of the workshop will consist of invited talks and selected papers for oral presentation. The format will encourage active interaction among participants, with short presentations to give time for discussions and brainstorming on future directions.

II. LIST OF SPEAKERS

The programme of the workshop will consist of invited talks and selected peer-reviewed papers for oral presentation. The list of invited speakers includes:

- **Ralf Bachmayer**, Canada Research Chair in Ocean Technology, Memorial University Canada

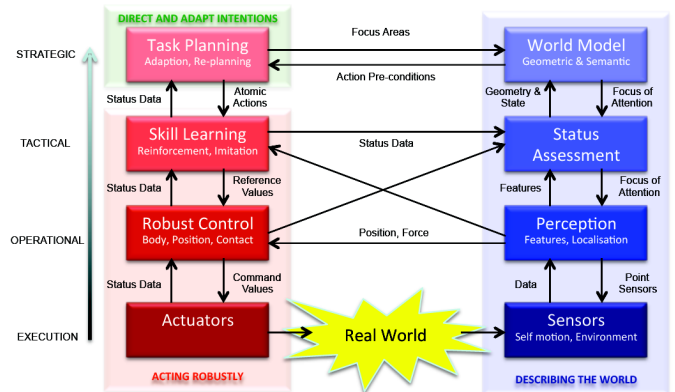


Fig. 1. Computational architecture for persistent autonomy

- **Kanna Rajan**, Principal Researcher for Autonomy, Monterey Bay Aquarium Research Institute (MBARI), expert in planning for marine robots and long term autonomy;
- **Gaurav Sukhatme**, Professor and Chairman Department of Computer Science, University of Southern California, expert in monitoring and intervention with autonomous underwater vehicles.

III. LIST OF TOPICS

The topics of interest include, but are not limited to:

- Autonomous long-term navigation, localisation and SLAM
- Dynamic replanning, planning under uncertainty
- Semantic-based world modeling, probabilistic approaches in ontologies
- Architectures for long-term autonomy
- Smart control strategies
- Robust learning techniques
- Probabilistic graphical models
- Bio-inspired and bio-mimetic approaches

IV. IMPORTANT DATES

2014/03/07: deadline for paper submission
2014/03/24: notification to authors
2014/04/02: final submission

V. CONTACTS

Workshop website: <http://kormushev.com/ICRA-2014>
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