



**Heriot-Watt University
Riccarton
EH14 4AS EDINBURGH**



Robocademy – The Maritime Robotics Research and Training Network

The Robocademy ITN will establish a European training and research network to develop key skills and enabling technologies in underwater robotics for the scientific and economic exploration of the oceans (e.g. offshore oilfield of the future). Through the close collaboration of leading research institutes, academia, industry, and SMEs in robotics, marine technology, marine science, and offshore industry, Robocademy will provide first-class training and research opportunities for ESRs. In well-defined and well-tutored PhD research projects, the Robocademy fellows will push the state-of-the-art in the area of robust, reliable and autonomous underwater robots.

Specialized scientific training modules will enable the fellows to obtain both a sound basis in robotics and an introduction to topics that are specific to their research areas. This will be complemented by a high quality soft-skills training programme and the opportunity to gain extensive on-site hands-on experience through secondments to maritime industry and oceanographic research institutes. Thus Robocademy will foster the formation of young professionals that are able to meet the urgent demand for highly qualified researchers and engineers in the growing field of underwater systems and robotics.

For the European industry and scientific community, such specialists are crucial gain ground against competitors from North America and Asia. For the ESRs, the Robocademy training will open up excellent career opportunities in both academia and industry.

For more information, please visit: www.robocademy.eu or email contact@robocademy.eu

Job Posting Reference: Robocademy ESR-3**Post Type:** Early Stage Researcher (ESR)**Start Date:** October 2014**End Date:** September 2017**Host Institution:** Heriot-Watt University**Host Institution Description:**

The Ocean Systems Laboratory is located in the School of Engineering and Physical Science. The 25 strong team specializes in subsea robotics and signal processing for Ocean applications. Particular strengths are in; autonomous underwater vehicles; autonomy and the linkage of perception and action; sonar modelling, design and signal processing (including biologically inspired device); computer aided detection/classification in sonar and video; data fusion; navigation data processing (e.g. using SLAM methods); automated mission planning; visual serving; data visualization; intelligent diagnostic systems; augmented reality methods for training, mission analysis and operation. The laboratory partners with industrial and research groups on multiple projects supporting Offshore, Naval and Marine Science applications

Background and Motivations

Two thirds of our planet's surface is covered in water. Our Oceans provide critical energy and food resources, and drive the patterns of our weather across the globe. To sustainably utilise and understand these resources and phenomena we need much-improved means of access and of making measurement in our Oceans. Subsea robotics is of great importance to European economic and environmental interests. The Deep Water Horizon disaster in the Gulf of Mexico in 2010 underpins the oil industry's desire to install, operate and decommission it's infrastructure particularly in deep water as well as the environmental risks associated with subsea operations. Unmanned robots perform inspection, repair and maintenance tasks in a cost effective, safe and timely manner. As worldwide concern grows over global warming and pollution, autonomous subsea robots play an increasingly important role in making the essential measurements that develop our understanding and monitoring of key scientific phenomena. And as global threats to our national security grow, unmanned subsea robots are now routinely deployed to investigate potential threats in economically critical ports and harbours, and for humanitarian demining along our coastlines. Unmanned Underwater Vehicles (UUVs) do not only have to be sturdy and well-engineered. More importantly, they have to be equipped with advanced cognitive and reasoning capabilities to perceive and understand their environment and to act accordingly. The Strategic Research Agenda for Robotics in Europe issued by the European Technology Platform on Robotics (EUROP) in July 2009 emphasizes the strong future need for robots with higher levels of autonomy and reliability. Subsea robotics presents key challenges that are distinct from other domains, as a direct consequence of the medium and it's physical properties. The Ocean medium is often moving, through currents, tides or wave action. The morphology of the robot's physical design, and of its associated sensing and control systems must take this into account. Further, the Ocean is all but opaque to electromagnetic signal propagation, and offers limited optical visibility. Sound is therefore the key means of sensing and of signaling, as exhibited by many marine animals. Such acoustics presents key challenges of noise on sensor data of all kinds, and of very limited communication bandwidth. The latter limits the possibilities of direct operator control, enforcing a need for greater autonomy in the robot.

Project Title

Biosonar for Object Characterization

Aims and Objectives

Develop novel methods to adapt broadband multi-chirp sonar signals so as to best detect features on a subsea structure for subsequent matching with a world model for localization, or to update the world model features

Main research tasks:

- Analysis of the existing methodologies and instruments for underwater localization and matching with 3D models of structures
- Development of new solutions
- Simulative/Experimental validation of the developed solutions

Main responsibilities of the ESR:

- Carrying out the above described research
- Participating at training events and meetings within the network
- Participating at international conferences outside the network
- Participating in the organization of the Local Training Workshop
- Participating in outreach activities such as public seminars, journal clubs,...

Deliverables

- 3 scientific conference papers (including participation in conference) or 2 papers (including conference participation) + 1 journal submission
- Participation in international AUV competition SAUC-E 2015, 2016, 2017

Secondments and Internships

Two secondments are planned:

- 5 months to Tallinn University of Technology to learn about FILOSE project and UW flow-sensor developed there
- 3 months to Atlas Elektronik to implement biosonar in Atlas AUV system

Person Specifications

Educational and/or Professional Qualifications	A successful candidate must hold a Master degree in Robotics, Computer Science, Mathematics or related fields.
Experience and Training	Any previous research experience in underwater technologies is a plus.
Skills	A candidate should have good oral and written communication skills in English. Good programming skills are required.
Personal Attributes	We are looking forward for a talented and highly motivated candidate. He/she should have an independent and well-structured working style, but has to be able to work in teams as well.

Early-Stage Researchers (ESR) must, at the time of recruitment, be in the first of four years (of full-time equivalent research experience) of their research careers and have not yet been awarded a doctoral degree. The post of Early-Stage Researcher is for 36 months, and maybe done in conjunction with a doctoral degree.

For all available positions, at the time of recruitment, applicants must not have resided or carried out the main activity (work, studies, etc) in the country of the host institution (defined as the research institution or company cited in the job posting) for more than 12 months in the 3 years immediately prior to the reference date. Compulsory national service and/or short stays such as holidays are not taken into account. The applicant must not have spent more than 12 months in the 3 years immediately prior to their recruitment at the host organization.

Person Specifications

Applicants must send: a curriculum vitae (CV) and a cover letter to D.M.Lane@hw.ac.uk stating clearly your qualifications for the post, the job posting reference number and title, host institution and research stream. In addition, two letters of references must be sent on your behalf directly from your referees to D.M.Lane@hw.ac.uk. Any applications and general emails not meeting these requirements will not be considered.

If is not possible to send the documents by email, applications may also be sent by post to: Heriot-Watt University, Riccarton, EH14 4AS EDINBURGH.

The deadline for the submission of applications is **30. July 2014**

For more information about the research or host institution, please contact Prof. David Lane (D.M.Lane@hw.ac.uk)