

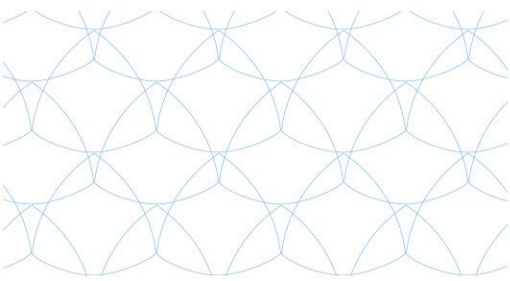
EXCELLABUST
EXCELLING LABUST IN MARINE ROBOTICS

INVITED TALK

18th January 2017

Bringing Smart Underwater Manipulators & Vision to Work-Class ROVs: Recent Field Trials

Dr Gerard Dooly
University of Limerick, Ireland



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691980.



1. INVITED TALK DETAILS

Date: 18th January 2017
Time: 09:00 – 10:00
Location: Gray Hall, University of Zagreb Faculty of Electrical Engineering (UNIZG-FER)
Unska 3, Zagreb, Croatia

Title: Bringing Smart Underwater Manipulators & Vision to Work-Class ROVs: Recent Field Trials
Name: Dr Gerard Dooly, Research Fellow
Affiliation: Mobile & Marine Robotics Research Centre, Electronic and Computer Engineering Department, University of Limerick, Ireland

2. ABSTRACT

The MMRRC have recently completed ROV operations using a work-class SMD Quasar in a flooded quarry in North Tipperary, Ireland. The ROV ops were the first in-water trailing of new systems for close quarter underwater automated manipulator tasks. The ROV Ops contained three ocean engineering/technology objectives which are particularly relevant to UL research within the SFI Research Centre, Marine Renewable Energy Ireland (MaREI). The MMRRC research team is specifically addressing the need for ROV systems capable of performing Inspection, Repair & Maintenance (IRM) on subsea infrastructure in harsh sea conditions. The engineering objectives included:

- Advanced Manipulator Controls
- Smart Navigation & Pose Estimation
- Pressure and Motion Reference Sensor

The trials were carried out in depths of 35m in collaboration with the Marine Institute in November 2016. The invited talk will describe the operations from inception to execution and will detail the various tasks completed over the 3 days of in-water trials.



Figure: ROV ops site setup

3. BIOGRAPHY OF LECTURER



Dr Gerard Dooly

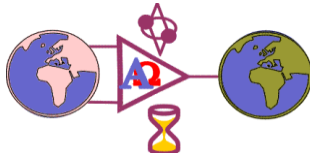
Email: gerard.dooly@ul.ie

Gerard Dooly has worked extensively in the optical fibre sensors and marine robotics research centres at UL since the completion of his PhD in 2008. His research interests include optical fibre sensors, differential optical absorption spectroscopy, advanced control systems, underwater robotic engineering and advanced sonar operations and processing. He is focused on the design and development of underwater robotics and has engaged in numerous offshore maritime operations and survey missions both here in Ireland and on the continent. Some of his recent research topics include environmental monitoring, subsea event triggered sensing platforms, miniature daughter-ROV's, anti-mine countermeasure ops and remote vehicles for incident response. He also has a keen interest in underwater shipwreck discovery, survey and identification and has participated in many deep water diving expeditions worldwide. He is a qualified closed circuit trimix rebreather diver and has successfully dived and identified newly discovered shipwrecks to depths of up to 135 metres.

4. DESCRIPTION OF THE INSTITUTION:



University of Limerick



Mobile & Marine Robotics
Research Centre

Mobile & Marine Robotics Research Centre

Address: ECE Department
University of Limerick
V94 T95X
Limerick
Ireland

Website: <http://www.mmrrc.ul.ie>

The University of Limerick (UL) with over 13,000 students and 1,300 staff is an energetic and enterprising institution with a proud record of innovation and excellence in education, research and scholarship. The dynamic, entrepreneurial values which drive UL's mission and strategy ensure that we capitalise on local, national and international engagement and connectivity. Research at UL is renowned for its close alignment to real world problems and the university has an enviable reputation in fundamental research, which can have real impact on society and the economy alike. This strong focus allowed UL to gain a five-star rating for innovation and excellence from QS, the international ranking body. UL has a strong international reach and Involvement in the European

Framework actions from FP2 to FP7, and current involvement in Horizon 2020 has grown UL's international network of collaborators.

Established in 2000 by Director Dr. Daniel Toal, the Mobile & Marine Robotics Research Centre (MMRRC) in the University of Limerick is the only research centre focused on the application and development of marine robotics within the island of Ireland. This research centre consists of a mix of academics, postdoctoral researchers, research engineers and PhD students from various disciplines including electronic, computer, mechanical and aeronautical engineering backgrounds. The research centre brings together a highly capable engineering group focused on developing innovated, practical and industrial relevant marine technologies and field robotics. From marine robotics to navigation, sensor development, emergency response planning, remote operated vehicle (ROV) and unmanned aerial (UAS) technologies, they are actively involved in developing a diverse range of practical technologies in national funded, European funded and industry collaborative projects. The core research activities of the research centre are listed below:

- Remotely operated vehicle smart systems- fault tolerant control, auto tuning, one-click auto survey, augmented reality visualisations (transparent ocean).
- Remote & auto flight control of tethered parafoil kites for airborne wind energy & aerial sensor/comms platforms.
- Sensored telemetry streaming from fixed wing aircraft, system identification, controller design.
- Emergency response exercise planning & coordination. UAVs deployed in segregated airspace over three-day exercise. Key partners: Irish Aviation Authority, Irish Naval Service, Irish Coast Guard, Commissioner of Irish Lights.
- Long Range High Bandwidth comms- remote presence, live interaction with distant robotic vehicles independent of existing infrastructure.
- Ocean sensing platforms with daughter mini ROVs- for persistent remote presence offshore with global satellite comms (controlled & monitored anywhere in world).

Over the last ten years the MMRRC research centre has developed OceanRINGS – a suite of smart technologies for subsea operations, designed to be integrated with any ROV – support vessel combination. It includes advanced control solutions for full range of ROVs – from mini ROVs used for remote monitoring & inspection to full-size work-class ROVs. Remotely Operated Vehicle (ROV) LATIS is a 1000 m depth-rated underwater robot developed at MMRRC and has been used to test and validate OceanRINGS. System validation and technology demonstration has been performed over the last six years through a series of test trials with different support vessels off the north, south and west coast of Ireland and in the Mediterranean sea.