

## IEEE UK&I RAS Chapter Prestige Lecture Series



**Prof. Darwin G Caldwell, FREng**

Deputy Director of the Italian Institute of  
Technology (IIT)

Director of the Dept. of Advanced Robotics  
(IIT)

**Register:** [Eventbrite](#)

### **Title: Building Humanoid, Centaur and Quadruped Robots**

**Host:** Centre for Intelligent Autonomous Manufacturing Systems, Queens' University Belfast

**Venue:** Queen's University Belfast, Ground Floor, Sir Bernard Crossland Lecture Theatre, Ground Floor, Ashby Building, Stranmillis Road BT9 5AG.

**Time:** 18:00-19:00, 24 Oct. 2018

**Contact:** Dr Nikolaos Athanasopoulos [n.athanasopoulos@qub.ac.uk](mailto:n.athanasopoulos@qub.ac.uk)

#### **Abstract:**

Crisis occur, both from natural disaster e.g. earthquake, weather, volcanoes, climate, fire, etc. and following human intervention e.g. nuclear, chemical, biological, oil and gas refining/exploration, mining, excavation, etc. that place people at extreme, direct and indirect risk. Under such circumstances, and/or in these environments, where there is a massive safety driven need for robots to enter the domain and assist, augment or replace humans. But operation in these potentially devastated, multifaceted, unstructured, dynamic and dangerous, outdoor or human engineered environments, using tools designed for humans, requires robots that have human or human/animal-like levels of **agility, compliance, dexterity, robustness, reliability** and **movement/locomotion**. The challenges for both the software and the mechatronics are therefore immense.

The research needed to solve the problem of operation in these domains raises many fundamental robotic questions in areas such as: robot design, actuation, power and energy efficiency, motion and locomotion control, gait generation, perception, sensing etc. This presentation will explore the core mechatronic technologies needed to create and operate humanoid (**COMAN, COMAN+ and WalkMan**), quadruped (**HyQ and HyQ-real**) and "centaur" quadruped (**HalfMan**) robots in complex, unstructured and destructed environments, and will demonstrate how many key loco-manipulation tasks may be addressed.

## Biography

**Prof. Darwin G Caldwell, FREng** is Deputy Director of the Italian Institute of Technology (IIT), and Director of the Dept. of Advanced Robotics at IIT. He is or has been an Honorary Professor at the Universities of Manchester, Sheffield, Bangor, Kings College London and Tianjin University, China. His research interests include; innovative actuators, force augmentation exoskeletons, medical, rehabilitation and assistive robotic technologies, dexterous manipulators, haptics, humanoid and quadrupedal robotics (**iCub, cCub, COMAN, WalkMan, HyQ, HyQ2Max, HalfMan, COMAN+**). He is the author or co-author of over 500 academic papers, and 19 patents and has received awards and nominations from many international journals and conferences. Caldwell is a past chair of the IEEE Robotics and Automation Chapter (UKRI), a past co-chair of the IEE (IET) Robotics and Mechatronics PN. He is on the editorial advisory board of Science Robotics, Senior Editor for the Journal of Medical Robotics Research, Editor for Frontiers in Robotics and AI, and on the editorial boards of the International Journal of Social Robotics and Industrial Robot. Prof. Caldwell is a Fellow of the Royal Academy of Engineering.