Workshop on the Future of Nuclear Robotics Safety Cases

11th September 2018

Manchester

Organised by EPSRC RAIN Hub, Office for Nuclear Regulation, Assuring Autonomy International Programme, and EPSRC Verification & Validation of Autonomous Systems Network
Welcome to the Workshop

Thank you for taking part in this *Workshop*, supported by:

- EPSRC-funded *RAIN Hub*
  
  https://rainhub.org.uk

- *Office for Nuclear Regulation*
  
  http://www.onr.org.uk

- *Assuring Autonomy International Programme*
  
  https://www.york.ac.uk/assuring-autonomy

- EPSRC-funded *Network on the Verification & Validation of Autonomous Systems*
  
  http://vavas.org
EPSRC funded Academic Network

Website: .................................................. http://vavas.org

Start of funding: 1st Sept 2015.

Aims:

to stimulate, coordinate, promote, and disseminate academic research on the verification and validation of autonomous systems

Progress: Over 70 academic members so far.
Network (1)

Across all Techniques:
Simulation and Testing; Formal Proof; User Validation; Hybrid Control Systems; Agents; Model-Checking; Human Robot Interaction; Probabilistic Verification; ... 

Across all Potential Applications
Safety Critical Systems; UAV Certification; Safe driverless cars; Autonomous robotics in nuclear/chemical/biological processes; Deep underwater/space/underground exploration; Autonomous ocean surface monitoring; Trustworthy robotic assistants for home and health-care; Robotic diagnosis, rehabilitation, or surgery; Human-robot teamwork; Autonomous satellites handling sensing/monitoring/comms; Precision farming; Robotic cleanup; ... 

Across all Issues
Legal Issues, Standards, and Certification; Validation; Reliability and Robustness; Robot Ethics; Predictability and Uncertainty; Safety and Security; Fault Tolerance; ...
We aim to enhance collaboration and understanding among academics, and see how verification and validation techniques can support new directions and developments between academics, regulators, and industry practitioners:
Events so far

Sep 2015: Agent Verification Workshop, Liverpool
Dec 2015: Winter School on Verification of Mobile and Autonomous Robots, York
Jul 2016: Workshop on Industrial Perspectives on the V&V of Autonomous Systems, Sheffield [with Innovate UK]
Nov 2016: Workshop on V&V for Autonomous Road Vehicles, London [with CCAV]
Mar 2017: Workshop on V&V of Sensing and Control Models in Autonomous Systems, Sheffield
May 2017: Workshop on Software Verification and Validation for Complex Systems, London [with Innovate UK]
Nov 2017: Ethical, Social and Trustworthy behaviour, Windsor
Feb 2018: Dynamic Testing for Autonomous Systems, Bristol
Sep 2018: this workshop
Why are we here?

Robotic systems are increasingly being used, or at least proposed for use, in nuclear environments.

However, the key issues don’t involve building such systems, but:

- understanding the certification process required;
- collecting appropriate evidence and justifying claims; and
- being clear where/how complex issues can be handled.

First Workshop: brings together those developing, researching, or assuring future robotic systems for nuclear environments.

Why now?

- practical systems close to deployment
- key regulator — ONR — keen to be involved at an early stage
- large ISCF funding in this area, e.g RAIN, NCNR
- additional interest, through UKRI, Assuring Autonomy, etc
- academic developments across V&V, autonomy, robotics, etc
Programme

09:20  Welcome & Introduction
09:30  Introducing RAIN, NCNR, RNE
       Barry Lennox, ...
10:00  Introduction to Nuclear Safety and Regulation
       Steve Frost, Daniel Finnigan [ONR]
10:45  BREAK
11:15  Claims, Arguments, Evidence (inc case study)
       Tim Parkes [ONR]
12:00  Future Issues: Autonomy, Uncertainty, Security
       Michael Fisher [Liverpool]
12:30  LUNCH
14:00  Assuring Autonomy International Programme
       Tim Kelly [York]
14:30  Discussions, directions, etc.
16:00  CLOSE