THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

RESEARCH ASSOCIATE IN PERCEPTION AND THEORY OF MIND FOR HRI

VACANCY REF: S&E-016386

Salary:	£32,816 to £40,322 per annum (depending on experience)
Hours:	Full time
Duration:	starting 1 April 2021 for 12 months
Location:	Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:
 Name: Professor Guido Herrmann
Email: guido.herrmann@manchester.ac.uk

BACKGROUND

The understanding and resolution of how humans and robots dynamically interact with each other is an important aspect of future robotic systems. This is vital for robots such as teleoperation systems, autonomous vehicles or for robotic arms, which physically interact with humans in an industrial, professional or home service environment.

You will contribute to the success of an exciting, highly successful robotics hub (rainhub.org.uk) supported by the EPSRC: 'Robotics and Artificial Intelligence for Nuclear (RAIN)'; RAIN recently obtained further significant funding approval to continue its high impact research. This project is a collaboration between the Departments of Electrical Electronic Engineering (EEE), Mechanical, Aerospace and Civil Engineering (MACE), Computer Science (CS) and Physics and Astronomy at the University of Manchester, the Universities of Oxford, Bristol, Liverpool, Reading, Leeds, Warwick, Sheffield, Nottingham and Lancaster, the UKAEA's Remote Applications in Challenging Environments centre (RACE) and leading industrial companies. Until previously, robotic systems have had limited impact on the nuclear industry, but it is clear that they offer the potential to deliver improvements in

productivity and significant reductions in risk. The RAIN hub has provided some of the necessary step changes in fundamental robotics science and established strong pathways to impact.

The project will be led by Professor Guido Herrmann, University of Manchester.

Overall Purpose of the Role

You will build on the outcomes of RAIN on Human-Robot Interaction (HRI) and robotic arm control in teleoperation and previous experience of the team of Professor Herrmann, i.e. sensor-based (mostly vision-based) characterisation and subsequently prediction of decisions for actions of a human in a HRI-scenario.

The project will investigate HRI in the context of teleoperation, i.e. the development of models of human operators (decision and actions, theory-of-mind) in well-defined HRI-scenarios for teleoperation.

You will work closely with various external institutions, e.g. RACE and the University of Reading, and academics of highly different background, i.e. Psychology, Engineering and Computer Science.

Key Responsibilities, Accountabilities or Duties:

The range of duties will include:
- Design and work on experiments involving humans in HRI scenarios
- Understand, interpret and classify data from HRI-experiments
- Develop models from HRI-scenarios using a realm of approaches and techniques, e.g. machine learning, decision models, such as Markov models, action models, e.g. regressive models
- Devise decision and action making techniques using traditional and more modern control and decision methods
- Develop adequate simulation systems to numerically verify models
- Write up research work for publication
- Communicate material of a specialist or highly technical nature
- Liaise with colleagues and students from various fields of research in robotics
- Build internal contacts and participate in internal networks for the exchange of information and to form relationships for future collaboration
- Collaborate with academic colleagues of various academic fields on areas of HRI
- Plan and manage own research activity in collaboration with others
- Balance with help the competing pressures of research and administrative demands and deadlines
- Be aware of the risks in the work environment of HRI and their potential impact on their own work and that of others

PERSON SPECIFICATION

Essential Knowledge, Skills and Experience:

- Have, or be about to obtain, a relevant PhD (or equivalent) in Mechanical Engineering, Mechatronics, Robotics or a similar discipline
- Experience in HRI and relevant mathematical models
- Experience with system integration of sensors and actuators (hardware and software) for robotics and specifically HRI
- Strong experience in machine learning (shallow and deep learning) for classification and regression tasks in HRI
- Background using physiological measurements for robotics (heart rate, eye gaze, skeletal tracking)
- Knowledge about experiment design for concept validation using human test subjects
- Experience with simulators for robotics (e.g. Gazebo)
- Knowledge of high-level programming languages (MATLAB, Python)
- Experience of preparing and delivering presentations, reports and journal papers to the highest levels of quality
- Excellent communication and interpersonal skills
- Ability to work independently and as part of a team