Research Fellow in Robotics and Machine Learning: Learning from humans how to manipulate objects in cluttered environments

University of Leeds, UK

Are you interested in making robots more able to perform complex manipulations, particularly in cluttered environments? Would you like to work on an EPSRC funded project in their Human‐Like Computing initiative? Do you have the knowledge and experience to take data from humans performing manipulations of objects in virtual environments and apply machine learning methods to extract rules which embody the strategies humans use to reach their goals? Would you like the challenge of then implementing these rules on a robot to test their efficacy?

You will work on a feasibility study entitled “Humanlike physics understanding for autonomous robots” to investigate whether data garnered from how humans manipulate objects in cluttered environments can be used to improve robots’ abilities to do the same. State-of-the-art robot motion/manipulation planners use low-level probabilistic methods often based on random sampling. There are two drawbacks to this approach: (1) it restricts robots to plan their motion at the bottom-most geometric level and, without any top-down guidance, resulting in the limited object manipulation ability displayed by today’s intelligent robots; (2) this approach produces randomized motion that is not legible to humans, which limits robots’ collaboration capabilities with humans. Through incorporating human-like decision making in robot planning, we aim to overcome these limitations and produce a fundamental step-change in the sophistication of these robots.

An example task we are considering is how to reach something at the back of crowded fridge shelf. Similar challenges arise in commercial settings – e.g. the Amazon picking challenge. We will start by exploring how humans perform such tasks in a VR setting – which will allow us to vary the task parametrically and extract data easily. This task will be primarily performed another researcher working on this project. We then plan to use symbolic machine learning techniques to extract rules expressed using qualitative spatial representations to represent tacit human knowledge gained ontogenetically and phylogenetically. Finally we plan to test the learned model in a robotic setting. We will be guided in our research by an advisory team from our three industrial partners, Ocado Technology, Dubit and Shadow Robot.

To explore the post further or for any queries you may have, please contact:

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The other investigators on the project are: Prof Mark Mon‐Williams (Psychology), Dr Mehmet Dogar (Computing), Dr Matteo Leonetti (Computing), Dr Faisal Mushtaq (Psychology), and Dr He Wang (Computing).

Further information
Grade: Grade 7
Salary: £32,548 to £38,833 p.a.
Due to funding restrictions an appointment will not be made above £34,520.
Post Type: Full Time
Contract Type: Fixed Term (18 months (external funding)) Closing Date: Sunday 04 February 2018
Reference: ENGCP1058
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