

PhD studentship in Versatile Dual-Arm Manipulation – Learning and Generalizing from Human Operators at University of Bristol, United Kingdom

A PhD studentship is available at the University of Bristol under the theme of the Nonlinear Robotic Control Group (NRCG) of the Bristol Robotics Laboratory: Humans provide dexterous, versatile and easily adapted two-arm manipulation of objects. This is enabled by two five fingered hands and two highly multi-degree of freedom arms, coupled with human intelligence, allowing for easily adapted tasks. For that reason, human operators are still essential to work in high-risk environments or on non-trivial, possibly strenuous tasks. Hazardous operations, such as in biological or chemical laboratories or at nuclear decommissioning sites, are best carried out by a human, often carefully protected by specially designed gloves within a glovebox arrangement. Learning such tasks in a repeatable fashion has guaranteed to replace tedious operations and created exciting products such as automated dual-armed robotic cooks. Robustness of such products is required when the setting, e.g. environment, space, for the task changes. Thus, a purely learned, repetitive process may “be disrupted” by seemingly small modifications, which a human can easily deal with. At the same time, bimanual manipulation of an object can create an additional complexity which in such tasks requires a high level of robustness and failure tolerance.

This project looks at an important aspect of human-robot interaction, where the robot has to conduct a single complex dual-arm, bimanual task in a human-like fashion. The methods which will be explored on the lowest level are adaptive, learning-enabled, distributed control methods to guarantee dual-arm cooperation and object manipulation. This will have to be supported by high-level learning techniques to allow the robust succession of specific primitive movements/task components.

The interested PhD-candidate should have a (prospective) excellent degree in engineering and a keen, well-founded interest in control, robotics and dynamics.

This PhD will be sponsored by UK’s Engineering, Physics and Science Council and an industrial sponsor, Sellafield Ltd., UK. Normally to be eligible for a full award, a student must have no restrictions on how long they can stay in the UK and have been ordinarily resident in the UK for at least 3 years prior to the start of the studentship (with some further constraint regarding residence for education, <http://www.rcuk.ac.uk/documents/news/terms-and-conditions-of-research-council-training-grants/>). The PhD will be carried out at the University of Bristol.

Enquiries about this PhD-opportunity should be sent to

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