

## PhD Title: Coached knowledge Transfer for Deep Reinforcement learning

Applications are invited for a **3-year PhD studentship** supported by Aston Institute for Urban Technology and the Environment (ASTUTE), within the School of Engineering and Applied Science, Aston University, Birmingham, UK.

**Start Date:** October 2019

**Keywords:** Deep Learning, Reinforcement Learning, Knowledge Transfer, Domain adaptation

**Background:** In this project we will radically change the way we currently train and deploy **Artificial Intelligence (AI)** agents in real-life problems arising from Logistics and Robotics. Inspired by the way humans learn in complex, challenging domains such as sport, we are putting forward a very different approach to **Deep Reinforcement Learning (DRL)**. Instead of developing new agents and training them from the ground up for each new problem encountered, this PhD project will develop a reliable framework for **knowledge transfer between widely varying tasks**. The student will devise a novel agent architecture that allows agents to be trained on a source task and then transfer the knowledge onto a challenging target task, characterised by a different space of observations, actions and rewards. Used within a staged approach for agent training, this knowledge-transfer-enabling architecture will facilitate reuse and development of the agent's previously acquired skills. As the agent progresses through a suite of sub-tasks, it accumulates discovered knowledge, eventually gaining mastery of the target task much faster and with better performance than training from scratch.

**The successful applicant** will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems, machine learning and probabilistic modelling is essential.

**Financial Support:** This is a fully-funded studentship for home/EU students, with a generous maintenance allowance, plus a fee bursary to cover the home/EU tuition fees rate. Applicants from outside the EU may apply for this studentship, *however will need to pay the difference between the Home/EU and Overseas tuition fees*.

**The successful applicant** will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems and probabilistic modelling is essential.

**For further information**, please contact Dr Maria Chli ([maria-chli.org](http://maria-chli.org), [m.chli@aston.ac.uk](mailto:m.chli@aston.ac.uk)).

**How to Apply:** Applications (**deadline: 12/07/2019**) should be made online at <http://www1.aston.ac.uk/eas/research/prospective-research-students/how-to-apply/>.

Please enclose a research proposal (a maximum of 2,000 words), a full CV and transcripts, giving contact details for two academic referees. Applicants from non-English speaking countries will require an IELTS score of 6.5, TOEFL IBT 93 or Pearson's English language test 63.

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## PhD Title: Personalised Digital Health: Deep Multi-agent Learning for assisted independent living

Applications are invited for a **3-year PhD studentship** supported by Aston Institute for Urban Technology and the Environment (ASTUTE), within the School of Engineering and Applied Science, Aston University, Birmingham, UK.

**Start Date:** October 2019

**Keywords:** Deep Learning, Reinforcement Learning, Multi-agent systems, Digital Health

**Background:** RowAnalytics specialises in personalized digital health. Their RACE platform, capable of fast and deep analysis of extremely large volumes of information such as genomic data as well as drug and food interactions has been successfully used in clinical decision support systems for precision medicine. The platform is embeddable in electrical appliances and its integration with new, advanced AI methods will deliver unique capabilities that are directly relevant to Internet-of-Things (IoT), personalized digital health, autonomous embedded control applications and unobtrusive monitoring of patients' behavioural and clinical data.

**The project** will build an AI/RACE-driven IoT patient monitoring and response system, where **complex edge analytics** and disease knowledge models are combined with a patient's health data to provide fully personalized real-time advice. The student will leverage our previous successes in **deep reinforcement learning for real-time control problems** to develop new learning architectures that will allow fast convergence of networks despite the presence of non-stationarity. The complexity introduced by the highly non-stationary sensor inputs will be reduced with state of the art probabilistic models. At the same time the student will extend our deep reinforcement learning transfer work in a **multi-agent setting**. We envision that this will empower seamless cooperation and coordination in **distributed sensor and actuator networks**, ultimately leading to efficient decision-making in these challenging decentralised settings.

**Financial Support:** This is a fully-funded studentship for home/EU students, with a generous maintenance allowance, plus a fee bursary to cover the home/EU tuition fees rate. Applicants from outside the EU may apply for this studentship, *however will need to pay the difference between the Home/EU and Overseas tuition fees.*

**The successful applicant** will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems, machine learning, probabilistic modelling and bioinformatics is essential.

**For further information**, please contact Dr Maria Chli ([maria-chli.org](http://maria-chli.org), [m.chli@aston.ac.uk](mailto:m.chli@aston.ac.uk)).

**How to Apply:** Applications (**deadline: 12/07/2019**) should be made online at <http://www1.aston.ac.uk/eas/research/prospective-research-students/how-to-apply/>.

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