RESEARCH STUDENTSHIP

All studentships are highly competitive, and you should ensure (and demonstrate) that there is a good match between your own qualifications and interests and those being sought for the particular studentship.

Research School where studentship will be held	Lead: School of Computer Science and Mathematics (SCM), Keele University, Faculty of Natural Sciences, UK Partner site: Institute for Infocomm Research (I2R), A*STAR, Singapore.
Studentship reference	FNS_A*Star PhD Studentship
Web link to any further information (e.g. Research Institute/School/Faculty)	Keele Computer Science Research: https://www.keele.ac.uk/research/ourresearch/computerscienceandmathematics/computerscienceresearch/ Faculty Research Office: https://www.keele.ac.uk/natsci/research/ A*STAR research attachment program: https://www.a-star.edu.sg/Scholarships/for-graduate-studies/a-star-research-attachment-programme
Research topic or field - title	Title: Learning procedural knowledge through human-AI interaction (2 years in UK and 1 Year in Singapore) Research areas: Computer Vision, Machine Learning, Pattern Recognition, Human-AI.

Research topic or field full description (or attached document).	This studentship is jointly funded by Keele University and ASTAR in Singapore. The student will be required to spend year 2 of the studentship on site at ASTAR in Singapore. Travel to Singapore and living costs there will be supported by the Studentship. In many domestic and industrial settings, an AI agent, be it a physical robot or a virtual assistant on a wearable device, need to learn new skills from the human partner. Learning procedural knowledge (also called task learning, e.g., cooking, assembling furniture, etc.) is a hallmark ability of AI. It requires a suite of capabilities such as visual perception, language understanding, reasoning, manipulation, and human-machine interaction. To achieve robust and trustworthy task learning, a key element is the intelligence related to the establishment and communication of agent mental model of the task. This project aims to develop technologies that endow an AI agent with the ability to learn procedural knowledge through human-in-the-loop (interactive) learning. The learning process can be designed as an iterative cycle of task learning (establishment of mental model) and communicating the learning outcome to a human teacher via novel information display techniques. We want to train AI models that not only to capture the task knowledge, but more importantly, to let the human know how much has been learned (or not learned). The later requires a quantifiable measurement of the uncertainty level at which the agent infers about a source state and a target state (e.g., "put the cup on the shelf" may be ambiguous if two cups are visible in the scene). In this case, the agent may resolve the ambiguity by asking the human teacher questions (e.g., "Do you mean the red one?"). This leads to many interesting and intriguing research questions, such as (1) How to represent task knowledge in a format that can be communicated easily between human and agent? (2) How to capture simple commonsense knowledge, such as object attributes, affordance, which can be used to restrict the task representation? (3) How to establish an uncertainty measure of agent's mental model of the task? (4) How to design an interaction protocol to allow the agent to ask relevant questions to communicate its learning outcome? (5) How to capture human feedback and transfer it into new knowledge? The candidate will learn to develop novel techniques in computer vision, machine learning and human-machine interaction for the task learning. Relevant domains of research include visual recognition, visual question answering, human-in-the-loop reinforcement learning, augmented reality, and human-machine interaction. The student will explore novel application cases such as assisted living in the domestic setting, collaborative robots in industries, and augmented learning.
Expected start date	27/Jan/2025
Mode of attendance	Full time

Funding support available – Fees, stipend, duration	**Fully funded PhD studentship**
	100% home tuition fees for three years.
	Two years (Year 1 and Year 3) Keele University standard support at the current prevalent rate (set by UKRI), physical site location at Keele University, UK. Current stipend rate for 24/25 = £19,237 per annum.
	One year (Year 2) Singapore A*STAR Monthly stipend and one-time airfare grant. One-time settling-in allowance and other allowances (housing, medical, conference and IT), physical site location at Singapore A*STAR. Details of the 'coverage' here: https://www.a-star.edu.sg/Scholarships/for-graduate-studies/a-star-research-attachment-programme. Additional support from the Faculty of Natural Sciences - £1000 towards travel costs.
	A*STAR is a reputable and the largest research organization in Singapore. You will get lots of opportunity to grow your networks, career and future opportunities both in UK and Singapore.
Source of funding	Keele University (UK) and A*STAR (Singapore).
Eligibility criteria	Keele University: Applications are welcomed from science, technology, engineering or mathematics graduates with (or anticipating) at least a 2.1 honours degree or equivalent. Applicants should have good computing skills and an enthusiasm for designing and testing new algorithms. They should be self-motivated and have the ability to work both independently and as part of a team. Because of the nature of studentships/scholarships, they are only available to home-fee-paying applicants.
	A*STAR, Singapore (details here 'Eligibility': https://www.a-star.edu.sg/Scholarships/for-graduate-studies/a-star-research-attachment-programme):
	• Be enrolled in a PhD programme at the collaborating university; • Possess a bachelor's degree with at least a Second Class (Upper) Honours or equivalent, preferably from a well-ranked university; • Have strong referee reports from past supervisors; and • Preferably have prior research experience.
Terms and conditions of studentship	As per the University Code of Practice
Number of studentships available	1
Application details	Please quote FNS_AStarKeele-Aug 24 on your application;. Please go to http://www.keele.ac.uk/pgresearch/studentships/ and click on the "Apply online here" button in this studentship. Please quote "Keele-A*STAR PhD studentship" on your application.
Closing date for applications	5th August 2024. Interview date: 30th August 2024.
Contact for further information and to whom applications will be sent	Dr Bappaditya Mandal Email: b.mandal@keele.ac.uk

Candidate profile

	Essential	Desirable
Qualifications, Experience and Skills	An undergraduate degree in Computer Science/Engineering, or other cognate discipline with Second Class (Upper) Honours or equivalent. Knowledge of programming and maths. Familiarity with programming in Python/C++/Java. Experience of programming.	A postgraduate qualification in Computer Science/Engineering or other cognate discipline Knowledge of machine learning. Familiarity with computer vision, machine learning and algorithms development. Experience of programming and implementation of algorithms.
Attitude and Personality	Effective communication (oral and written) skills, presentation and training skills Good interpersonal skills Ability to work independently and as part of a team on research programmes Ability to initiate, plan, organise, implement and deliver programmes of work Willingness to learn new skills Ability and willingness to relocate to Singapore for Year 2 of the project. Year 1 and Year 3 are in the UK. Year 2 will be in Singapore.	

Keele University values diversity, and is committed to ensuring equality of opportunity. In support of these commitments, Keele University particularly welcomes applications from women and from individuals of black and ethnic minority backgrounds for this post. More information is available on these web pages:

https://www.keele.ac.uk/equalitydiversity/

https://www.keele.ac.uk/athenaswan/ https://www.keele.ac. uk/raceequalitycharter/disabilityconfident/