**JOB DESCRIPTION**

Last updated: 05/04/2018

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| Post title: | **Research Fellow in Swarm Robotics** | | |
| School: | Electronics and Computer Science | | |
| Faculty: | Engineering and Physical Sciences | | |
| Career Pathway: | Education, Research and Enterprise (ERE) | Level: | 4 |
| \*ERE category: | Research pathway | | |
| Posts responsible to: | Principal Investigator | | |
| Posts responsible for: | N/A | | |
| Post base: | Office-based | | |

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| Job purpose |
| To carry out high quality research towards the EPSRC funded project on *Fault Recovery Strategies for Resilient Robot Swarms*. The overall aim of the project is to lay the algorithmic foundations for resilient robot swarms, capable of rapidly -- in no more than a few minutes -- recovering from faults and damages sustained by individual robots of the swarm. This is to be achieved by developing a novel family of algorithms to (i) creatively discover a large and diverse map of swarm robot behaviours, and (ii) when damaged (discovered by a drop in robot's performance), efficiently select compensatory behaviours from the map via trial-and-error reset-free learning. Through close collaboration with project partners, this research will ultimately lead to the next generation of robot swarms, capable of sustained operation for extended periods of time without human intervention. The developed algorithms will be demonstrated on, (i) wheeled mobile robot, and (ii) aquatic surface drone swarms. |

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| Key accountabilities/primary responsibilities | | % Time |
|  | To undertake a range of high quality research activities under supervision associated with research of the Fault Recovery Strategies for Resilient Robot Swarms project. This may include the following activities performed in consultation with the research award holder or supervisor:   * Development of robot swarm simulations. * Designing novel machine learning algorithms. * Performing experiments in simulation and on physical robot swarms. * Data-analysis and evaluation. | 70 % |
|  | Regularly disseminate findings by taking the lead in preparing publication materials for referred journals, presenting results at conferences, or exhibiting work at other appropriate events. | 15 % |
|  | To attend project meetings and workshops, and assist in setting up workshops with external participants including industrial partners. | 5 % |
|  | Public outreach responsibilities:   * Develop and regularly update the project website * Assist with robot demonstrations at public outreach events | 5 % |
|  | Assist in interactions with industrial partners with monthly or bimonthly updates on the project. | 5 % |
|  | Any other duties as allocated by the line manager following consultation with the post holder. |  |

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| Internal and external relationships |
| Perform collaborative research across the areas of evolutionary computation, machine learning and swarm robotics.  To interact with the industrial partners of the project. |

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| Special Requirements |
| To develop the experiment setup and perform experiments on a physical robot swarm.  To attend national and international conferences for the purpose of disseminating research results.  *Applications for Research Fellow positions will be considered from candidates who are working towards or nearing completion of a relevant PhD qualification. The title of Research Fellow will be applied upon successful completion of the PhD. Prior to the qualification being awarded the title of* ***Senior Research Assistant*** *will be given.* |

**PERSON SPECIFICATION**

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| Criteria | Essential | Desirable | How to be assessed |
| Qualifications, knowledge and experience | PhD or equivalent professional qualifications in relevant area (Computer Science, Engineering, Robotics, Artificial Intelligence, Machine Learning or a closely related discipline).  Experience in evolutionary algorithms or Bayesian optimization techniques.  Very strong programming, statistical and data analysis skills  Published research in top quality journals and conferences | Experience in developing robot swarm algorithms  Experience in developing robot simulations  Experience working with physical robots. | Thesis  Thesis, publications  CV, interview  Publications  CV, publications, interview  CV, publications, interview  Thesis, publications, interview |
| Planning and organising | Able to lead research agenda and organise own research activities to deadline and quality standards  Ability to organise events, such as workshops |  | Publications, interview, CV, references |
| Problem Solving and Initiative: | Able to develop understanding of complex problems and apply in-depth knowledge to address them  Able to develop original techniques/methods |  | Thesis, publications |
| Management and Teamwork: | Able to contribute to School management and administrative processes  Work effectively in an interdisciplinary team consisting of researchers from multi-agents systems and autonomous systems. |  | Interview, references |
| Communicating and Influencing: | Communicate new and complex information effectively, both verbally and in writing, engaging the interest and enthusiasm of the target audience  Able to present research results at group meetings and conferences  Able to write up research results for publication in leading peer-reviewed journals  Work proactively with colleagues in other work areas/institutions, contributing specialist knowledge to achieve outcomes |  | Publications, interview  Publications  Publications  References, interview |
| Other Skills and Behaviours: | Understanding of relevant Health & Safety issues  Positive attitude to colleagues and students |  |  |
| Special Requirements: | Able to attend national and international conferences to present research results |  |  |

**JOB HAZARD ANALYSIS**

**Is this an office-based post?**

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| ✓ Yes | If this post is an office-based job with routine office hazards (eg: use of VDU), no further information needs to be supplied. Do not complete the section below. |
| ☐ No | If this post is not office-based or has some hazards other than routine office (eg: more than use of VDU) please complete the analysis below.  Hiring managers are asked to complete this section as accurately as possible to ensure the safety of the post-holder. |

## - HR will send a full PEHQ to all applicants for this position. Please note, if full health clearance is required for a role, this will apply to all individuals, including existing members of staff.

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| **ENVIRONMENTAL EXPOSURES** | **Occasionally**  (<30% of time) | **Frequently**  (30-60% of time) | **Constantly**  (> 60% of time) |
| Outside work | N/A |  |  |
| Extremes of temperature (eg: fridge/ furnace) | N/A |  |  |
| ## Potential for exposure to body fluids | N/A |  |  |
| ## Noise (greater than 80 dba - 8 hrs twa) | N/A |  |  |
| ## Exposure to hazardous substances (eg: solvents, liquids, dust, fumes, biohazards). Specify below: | N/A |  |  |
| Frequent hand washing | N/A |  |  |
| Ionising radiation | N/A |  |  |
| **EQUIPMENT/TOOLS/MACHINES USED** | | | |
| ## Food handling | N/A |  |  |
| ## Driving university vehicles(eg: car/van/LGV/PCV) | N/A |  |  |
| ## Use of latex gloves (prohibited unless specific clinical necessity) | N/A |  |  |
| ## Vibrating tools (eg: strimmers, hammer drill, lawnmowers) | N/A |  |  |
| **PHYSICAL ABILITIES** | | | |
| Load manual handling | N/A |  |  |
| Repetitive crouching/kneeling/stooping | N/A |  |  |
| Repetitive pulling/pushing | N/A |  |  |
| Repetitive lifting | N/A |  |  |
| Standing for prolonged periods | N/A |  |  |
| Repetitive climbing (ie: steps, stools, ladders, stairs) | N/A |  |  |
| Fine motor grips (eg: pipetting) | N/A |  |  |
| Gross motor grips | N/A |  |  |
| Repetitive reaching below shoulder height | N/A |  |  |
| Repetitive reaching at shoulder height | N/A |  |  |
| Repetitive reaching above shoulder height | N/A |  |  |
| **PSYCHOSOCIAL ISSUES** | | | |
| Face to face contact with public | N/A |  |  |
| Lone working | N/A |  |  |
| ## Shift work/night work/on call duties | N/A |  |  |