



<b>Job title</b>	Research Associate/Fellow in Design and Control of Continuum Robots for Medical Applications  (Title will be 'Research Associate' where an appointment is made before PhD is completed)	<b>Job family and level</b>	Research and Teaching Level 4 (Appointment will be Level 4 Career Training Grade where an appointment is made before PhD has been completed)
<b>School/ Department</b>	Faculty of Engineering, M3	<b>Location</b>	Advanced Manufacturing Building at Jubilee campus

## Purpose of role

We are looking to recruit a researcher in design and control of continuum robots for medical applications to contribute to UKRI-funded projects and conduct research within the expanding research groups. This is a continuation of the successful projects on continuum robots developed by the Rolls-Royce UTC in manufacturing and on-wing technology team. Continuum robots have been demonstrated on several environment. In this project, we are taking them to further development and applications.

This is an exciting opportunity for an experienced graduate/postgraduate to play a leading role in challenging project to carry out theoretical and experimental work for developing design and control of continuum robot for confined space intervention (e.g., bile duct cancer surgery).

	<b>Main responsibilities</b> (Primary accountabilities and responsibilities expected to fulfil the role)	<b>% time per year</b>
1	<p><b>Research</b></p> <ul style="list-style-type: none"> <li>• Conduct original research to design and control continuum robots for confined space intervention in medical applications such as bile duct imaging.</li> <li>• Conduct mechanical design and optimization of continuum robots. This work includes the simulation of the mechanical behavior of the proposed system (e.g., deformation of components) under operating conditions.</li> <li>• Organize and conduct trials to evaluate the performance of prototypes and demonstrators of the proposed continuum robots on representative environments.</li> <li>• Embedment of sensing units into prototypes for in-situ monitoring of the prototype performance during trials. This includes work on the signal processing and analysis of the raw sensor data.</li> <li>• Control of the robot tip position, orientation and shape to reach the target position/orientation in a constrained environment.</li> <li>• Working with colleagues in the school of Physics and Electrical Engineering (Optics) to integrate optical imaging and spectroscopy devices with the robot.</li> </ul>	70%
2	<b>Dissemination of research results</b>	10%

	<ul style="list-style-type: none"> <li>• To write research reports and papers to disseminate research results and develop a track record of published research findings in internationally respected peer-reviewed journals. Further dissemination of results should also occur through invited oral and poster presentations at international meetings and conferences.</li> <li>• To write reports corresponding to the development of the research work as part of the deliverables of external funded projects.</li> </ul>	
3	<p><b>Support junior members of the team</b></p> <ul style="list-style-type: none"> <li>• Supervise and examine research projects undertaken by undergraduate or master level students if required.</li> </ul>	10%
4	<p><b>Engagement</b></p> <ul style="list-style-type: none"> <li>• Participate in the regular meetings of the research group.</li> <li>• Facilitate the growth of the group through actively seeking funding sources, leading research proposals, and ensuring research excellence.</li> <li>• Contribute to the research work of the group and their partners as required.</li> </ul>	5%
5	<p><b>Adhere to H&amp;S regulations</b></p> <ul style="list-style-type: none"> <li>• Operate within the safety systems, IT code of practice etc. as required by the Division, Department and University.</li> </ul>	5%

## Person specification

	Essential	Desirable
<b>Skills</b>	<ul style="list-style-type: none"> <li>▪ Excellent mechanical design skills, including a track record of problem solving and the production of novel mechanical and mechatronic designs.</li> <li>▪ Skills in developing monitoring solutions for mechatronics/robotic applications.</li> <li>▪ Excellent modelling skills (analytical and numerical)</li> <li>▪ Ability to evaluate mechanical systems with a track record in producing innovative solutions</li> <li>▪ Skilled in the use of relevant 3D CAD/CAE packages (SolidWorks, PTC Creo, Abaqus and COMSOL).</li> <li>▪ Ability to learn new knowledge to support the project progression</li> <li>▪ Good general IT skills, including a good working knowledge of word, PowerPoint, Excel, Outlook, etc.</li> <li>▪ Dedicated and hardworking with a</li> <li>▪ good working attitude for a demanding role</li> <li>▪ Excellent planning and organizational skills with an ability to ensure deadlines are met</li> <li>▪ Excellent communication skills to effectively communicate information to a variety of audiences</li> <li>▪ Communication, presentation, and publishing skills to aid effective interaction with multidisciplinary, international academic and industrial partners</li> </ul>	<ul style="list-style-type: none"> <li>▪ Knowledge in sensor systems and electronic interfaces for mechatronic systems</li> <li>▪ Knowledge on design for manufacture.</li> <li>▪ Knowledge data processing for intelligent control operations</li> <li>▪ Ability to read and produce engineering drawings.</li> <li>▪ Experience of using: C/C++/Java/Python and MATLAB/Simulink</li> <li>▪ Have a genuine interest in engineering.</li> <li>▪ Desire to develop expertise in this area of engineering research.</li> <li>▪ Good computer programming skills with adaptability to learn new programming language if needed</li> <li>▪ Ability to work in a team as well as on own initiative.</li> </ul>
<b>Knowledge and experience</b>	<ul style="list-style-type: none"> <li>▪ Experience in development and construction of mechatronics or robotic systems</li> <li>▪ Experience in developing control solutions for robots</li> <li>▪ Proven experience of on the development of integrated prototypes systems using off-the-shelf control units (e.g., Compact RIO, PLC, etc)</li> <li>▪ Knowledge of kinematic, static, and dynamic analysis, and control</li> </ul>	<ul style="list-style-type: none"> <li>▪ Experience in building multi-degree of freedom systems, simulating complex mechanical systems and analytical or numerical modelling.</li> <li>▪ Expertise in developing customised robots for various applications (e.g., manipulation/surveillance)</li> </ul>

	<p>solutions related to continuum robots</p> <ul style="list-style-type: none"> <li>▪ Experience of developing your own software (e.g., MATLAB, ROS, C++, and/or LabVIEW) to control such systems</li> </ul>	
<p><b>Qualifications, certification and training (relevant to role)</b></p>	<ul style="list-style-type: none"> <li>▪ Good first undergraduate degree (BEng/BSc) in mechatronic /control/manufacturing engineering or in a closely related discipline</li> <li>▪ Must either possess a PhD (or be close to completion) in mechanical design engineering or a related field (e.g. manufacturing engineering)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Postgraduate degree (MPhil/PhD) in mechatronic, robotic or control engineering</li> <li>▪ Higher degree (MEng/ MSc) in mechatronics, robotic, mechanical or engineering</li> </ul>



## Expectations and behaviours

The University has developed a clear set of core expectations and behaviours that our people should be demonstrating in their work, and as ambassadors of the University's strategy, vision and values. The following are essential to the role:

- Valuing people** Is friendly, engaging and receptive, putting others at ease. Actively listens to others and goes out of way to ensure people feel valued, developed and supported.
- Taking ownership** Is clear on what needs to be done encouraging others to take ownership. Takes action when required, being mindful of important aspects such as Health & Safety, Equality, Diversity & Inclusion, and other considerations.
- Forward thinking** Drives the development, sharing and implementation of new ideas and improvements to support strategic objectives. Engages others in the improvement process.
- Professional pride** Is professional in approach and style, setting an example to others; strives to demonstrate excellence through development of self, others and effective working practices.
- Always inclusive** Builds effective working relationships, recognising and including the contribution of others; promotes inclusion and inclusive practices within own work area.

## Key relationships with others

