

Research Associate – Photogrammetry for Inspection

Department	Electronic and Electrical Engineering (www.strath.ac.uk/eee/)		
Faculty	Faculty of Engineering (www.strath.ac.uk/engineering/)		
Staff Category	Research	Reference No	101581
Reports To	The Head of Department, through Dr Gordon Dobie	Grade:	7
Salary Range:	£31,604 - £38,833	Contract Type:	Fixed Term (24 months)
FTE:	1	Closing Date	Wednesday, 28 February 2018

Job Advert

The Department of Electronic and Electrical Engineering (EEE) at the University of Strathclyde seeks to recruit a Research Associate to participate in a multi-partner, collaborative research project focused on automated visual inspection / Non-Destructive Testing.

This project will feed into several areas of state-of-the-art research in photogrammetry and sensor fusion running at the University supported by a highly active and growing team of talented researchers. Ongoing projects involve 3D photogrammetry deployed in a diverse and challenging range of applications including the visual inspection of wind turbine blades from drones, 3D model generation to aid medical images of breast tissue and a system for creating photorealistic models of the internal geometry of industrial pipework.

This specific role will consider automated 3D photogrammetry for use in the manufacturing and remanufacturing/refurbishment process. The research will use a large KUKA inspection cell to perform automated visual inspection of two types of sample, notably aerospace composite wing segments during manufacturing and car engines that are to be disassembled for remanufacturing. You will use a form of 'structure from motion' to generate a textured 3D model of the sample which will be used to guide the inspection process.

Research Challenges:

1. 3D model reconstruction, particularly in situations with low surface detail.
2. Camera calibration and optimisation of camera parameters/lighting.
3. Robot programming for optimal camera placement (dynamically positioning camera as the model is built)
4. Fusion with other datasets including laser scans and volumetric ultrasonics.
5. Interface with University of Sheffield team on compressive sensing.
6. Applications to manufacturing and remanufacturing.

This is a fertile area for publication and it is expected that developments are published in high quality journals. The role will require the development of robust software to process real world data and also the design and implementation of laboratory experiments to test ideas. You will work as part of a research team of 15 members, featuring academic staff, postdoctoral researchers and PhD students interested in visual processing research.

To be considered for the role, you will be educated to a minimum of PhD level in a relevant subject (e.g. Electrical or Software Engineering); or have significant relevant experience in addition to a relevant degree. You will have demonstrable capability in algorithm development in Matlab or similar. You will have a strong background in algorithm development, linear algebra and optimisation. You will have an ability to conduct individual research work, to disseminate results and to prepare research proposals. You will have excellent written and verbal communication skills, with an ability to listen, engage and persuade and to present complex information in an accessible way to a range of audiences. You will have the ability to work as part of a team, integrating with existing research team members and collaborating effectively with both academic and industrial partners.

Job Description

Brief Outline of Job:

To programme multiple industrial robots in an industrial environment and collect ultrasonic NDT and surface metrology data from a variety of test specimens, interpreting experimental results; responsible for all aspects of the operation of the NDT cell, including programming, data collection and safety; responsible for troubleshooting both mechanical and electrical systems on a daily basis; undertaking extensive low-level programming and instrument interfacing; responsible for the interpretation of data and reporting scientific results to the supervision team, industrial stakeholders, and the overall project management team; scientific publication and dissemination of results through academic journals and conferences; to engage where required in relevant teaching, professional and knowledge exchange activities; and to input to administrative activities.

Main Activities/Responsibilities:

1.	Develop 3D photometric algorithm generation, optimising for quality and reconstruction speed.
2.	Data capture using a Kuka robot inspection cell, including robot programming and control of optics including lighting and camera selection
3.	Apply a Bayesian filtering approach to fuse datasets from cameras, robot positional estimates and laser scans to produce 3D models of the structure.
4.	Apply research in manufacturing and remanufacturing applications
5.	Undertake research in novel approaches to robotic programming, continually updating knowledge in the field.
6.	Interface with compressive sensing team at the University of Sheffield.
7.	Develop new techniques in robotics and NDT research, applying appropriate approaches to identify areas for research and develop new research methods and extend the research portfolio.
8.	Undertake research in 3D surface metrology and machine vision systems.
9.	Write up research work for publication, individually or in collaboration with colleagues, and disseminate results as appropriate to the discipline by, for example, peer reviewed journal publications and presentation at conferences.
10.	Identify sources of funding and contribute to the securing of funds for research, including drafting grant proposals and planning for future proposals.
11.	Work on-site in an industrial environment at numerous site locations.
12.	Participate in Departmental teaching and project supervision.
13.	Plan and manage own workload, with guidance from colleagues as required.
14.	Contribute in a developing capacity to Department/School, Faculty and/or University administrative and management functions and committees.

Person Specification

Educational and/or Professional Qualifications

(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

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| E.1 | A minimum of 2:1 Honours Degree in an appropriate discipline (e.g. physics, control engineering, automation, mechanical or electrical engineering) |
| E.2 | A PhD in a relevant discipline (e.g. physics, control engineering, automation, mechanical & electrical engineering) or significant, relevant professional experience |
| D.1 | Membership of relevant Chartered/professional bodies (including Higher Education Academy). |

Experience

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| E.3 | Experience in 3D photogrammetry |
| E.4 | Experience in NDT and visual inspection |
| D.2 | Experience in industrial robot programming (ideally KUKA) |
| D.3 | Relevant experience in industrial safety systems for robotics |

E.5 Experience of the integration of multiple complex measurement systems

Job Related Skills and Achievements

E.6 Ability to deliver projects to industrial customers i.e. to specification and within set timescales

E.7 A detailed knowledge of safety considerations in industrial automation

E.8 Developing ability to conduct individual research work, to disseminate results and to prepare research proposals.

E.9 Knowledge of 3D systems, machine vision and metrology

E.10 Excellent mathematics and software development skills

Personal Attributes

E.11 Self-starting capability on complex projects

E.12 Ability to work effectively within a team environment

E.13 Excellent written and verbal communication skills, with an ability to listen, engage and persuade and to present complex information in an accessible way to a range of audiences.

E.14 An ability to plan and organise own workload effectively

Other requirements

E.15 Willing and able to travel to partner sites for technical meetings and project demonstrations

D.4 Valid UK driving licence with access to own vehicle

Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted before interview without permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter as a single document detailing the knowledge, skills and experience you think make you the right candidate for the job. Applicants should also complete the Equal Opportunities Monitoring Form.

Other Information

Further information on the application process and working at Strathclyde can be found on our website (<http://www.strath.ac.uk/hr/workforus>).

Informal enquiries about the post can be directed to Dr Gordon Dobie (gordon.dobie@strath.ac.uk).

Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from [Payroll and Pensions](#).

Equality and Diversity

We value diversity and welcome applications from all sections of the community.

The University currently holds a Bronze Athena SWAN award, recognising our commitment to advancing women's careers in science, technology, engineering, maths and medicine (STEMM) employment in academia.

