

Research Associate

Optical Metrology for the Future Advanced Metrology Hub

Job Ref: REQ17695

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project summary

The Future Advanced Metrology Hub runs for 7 years from March 2017. The Hub, which is led by the University of Huddersfield, with Loughborough University and the universities of Sheffield and Bath acting as academic partners, will receive £10M from EPSRC and over £15M from the consortium's industrial partners. The vision of the Hub is to create ground-breaking embedded metrology and universal metrology informatics systems to be applied across the manufacturing value chain. The resulting pervasive embedding and integration of manufacturing metrology by the Hub will have far reaching implications for UK manufacturing as maximum improvements in product quality, minimization of waste/rework, and minimum lead-times will ultimately deliver direct productivity benefits and improved competitiveness. Two Research Associates and five PhD students will be appointed to implement the Loughborough University work packages.

The project for the current post will involve the development of an interferometer that is capable of measuring the shape of large scale aerospace and automotive structures, to an accuracy of a few micrometres, at stand-off distances of 10 m or more. Current laser tracker systems measure distance to a retro-reflective sphere which has to be placed in contact with the component's surface – an indirect, labour intensive and very slow process. The new system will make measurements directly from the component's surface, which will provide dramatic improvements in coordinate data acquisition rate and allow the automation of key processes such as robotic assembly and machining to a much higher degree of precision than is currently possible. The new system will also provide additional measurement capability, in particular of surface roughness and vibration, at little or no additional hardware cost.

The successful applicant will become a member of the Advanced Metrology hub. He/she will be based in the recently refurbished laboratories of the Optical Engineering research group at Loughborough, which has a long history of innovative development in applied optics technologies, and won a Queens Anniversary Prize in 2001. Dedicated equipment available for this project includes state of the art tunable lasers, laser vibrometers, wavemeter, and all the necessary opto-mechanical hardware. A total of 40 industrial collaborators, including the National Physical Laboratory, Renishaw and Rolls Royce, provide opportunities for eventual commercialisation of the developed technology.

Job Description

Job Grade: Research Grade 6

Job Purpose

The aim of the project for the current post is to carry out research activities in the field of large volume optical metrology, developing new knowledge in areas such as: absolute distance measurement using frequency scanning interferometry; characterisation of high speed optical frequency sweeps; development of custom phase shifting and phase unwrapping algorithms; estimation of surface roughness using the experimental data and optical scattering models; improving the performance of the measurement system in terms of measurement speed and

response to 'uncooperative' surfaces such as machined metal or carbon fibre composites; and finally building a demonstrator system with the other participating institutions and companies.

Job Duties

- Search for and study research publications related to the research topic to generate and maintain a state of the art view of the field.
- Design, set up and test novel frequency scanning interferometers.
- Develop structured numerical algorithms in MATLAB with appropriate documentation.
- Design experiments, including preparation of CAD models and manufacture of custom parts.
- Perform experiments involving frequency scanning interferometers and other optical metrology systems.
- Keep accurate records of experimental and other research work and meetings (in written and/or electronic format).
- Analyse experimental data, summarise results and prepare reports, research papers and presentations for dissemination at project meetings, National and International conferences and seminars.
- Assist in the supervision of PhD students working in a related area.
- Undertake occasional undergraduate or postgraduate teaching duties including assisting in the supervision of individual projects.
- Liaise with industrial partners and travel to other locations across UK and Europe to carry out experiments at the sites of the partners.
- Maintain confidentiality of results and other confidential information.
- Comply with University Health and Safety Policy and with all University Rules and Regulations.
- Be willing to undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.

Points To Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

The Postholder will carry out the duties outlined above as required by the project supervisors (Dr P. D. Ruiz and Prof. J M Huntley).

Person Specification

Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

- 1 – Application
- 2 – Test/Assessment Centre/Presentation
- 3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	Design of experiments	1,3
	Experience of developing and/or using optical metrology systems	1,3
	Experience in implementing numerical algorithms for analysis of data from optical metrology systems	1,3
	Working with or in manufacturing companies	1,3
Skills and abilities	Ability to work accurately and consistently to a methodology in order to gather and record information	3
	Ability to design and carry out experimental studies	1,3
	Excellent programming skills in MATLAB	1,3
	Ability to implement, develop and validate numerical algorithms for analysis of experimental data	1,3
	Self-motivated and able to work without close supervision	3
	Ability to work to deadlines	3
	Good communication skills, including report writing and presentations	1,3
	Ability to work independently and as part of a team	3
	Ability to maintain confidentiality at all times	3
	Training	A willingness to undertake further training as appropriate and to adopt new procedures as and when required
Qualifications	Good honours degree in engineering, computing, physics or related discipline	1
	PhD in engineering, physics, ICT or related discipline	1
Other	Willingness and ability to travel to industrial and academic sites within the UK and across Europe	3
	Commitment to observing the University's Equal Opportunities policy at all times	3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in use of Computer Aided Design software	1,3
	Experience in development and/or application of optical interferometers	1,3
Skills and abilities	Ability to develop mathematical models for optical scattering phenomena	1,3
	Knowledge of relevant Health & Safety issues	3

	Interviewing skills or experience for qualitative information gathering	1,3
	Experience of working in collaborative projects	1,3
Other	Able to travel independently	3

Conditions of Service

The position is full time, and fixed term for 36 months or to 28 February 2024, whichever is soonest in the first instance, but may be extended subject to the availability of funding. Salary will be on Research Grade 6, (£29,301 - £38,183) per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff, details of which can be found [here](#).

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which are available at <http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html>.

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: <http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html>)

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see <http://www.lboro.ac.uk/services/hr/athena-swan/>

Informal Enquiries

For informal enquiries, please contact: Prof Jon Huntley (j.m.huntley@lboro.ac.uk) or Dr Pablo Ruiz (p.d.ruiz@lboro.ac.uk).

Applications

The closing date for receipt of applications is **29 August 2017**.

We expect to hold interviews on 20 September 2017.