Loughborough University

Research Associate – Sustainable Use of Water in Food Manufacturing
Job Ref: REQ16928

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Centre for Sustainable Manufacturing and Recycling Technologies (SMART)

The Centre for SMART was established in the Wolfson School of Mechanical, Electrical and Manufacturing Engineering at Loughborough University to provide synergy for the growing teaching and research activities in sustainable design and manufacture (www.lboro.ac.uk/smart). The remit of the Centre is to develop strategies, methodologies and supporting technologies for the design, production, consumption and disposal of products, that meet consumer needs as well as legislation, environmental and ethical standards, whilst safe-guarding the future prosperity of manufacturing businesses.

Since its establishment in 2004, the Centre has attracted more than £6.5 million of national and European research funds to support its activities, and this has supported the successful completion of 15 PhD programmes and the publication of 60 refereed journal papers. The Centre members have a wide range of expertise and are currently involved in a number of national and European programmes researching the social, economic and environmental aspects of a variety of consumer products and industrial processes. The Centre provides core knowledge and expertise in life cycle analysis, sustainable design, resource efficient manufacturing, sensoring, monitoring and process control, sustainable business and consumption models, and end-of-life processing and recycling technologies.

Project Description

Water is an abundantly available resource, however only 3% of global supply is in the form of freshwater, with a much smaller proportion of this (0.4%) being easily accessible freshwater from lakes, rivers, etc. The growth of global population is increasing pressure on freshwater availability which is further compounded by the changes in climate. At present, demand from manufacturing industry accounts for 22% of global freshwater withdrawal, and with predicated significant growth in manufacturing activities, in particular within developing countries, industrial water consumption is set to increase by 90%, to 1500 billion m3/year in 2030. In addition, recent national and European regulations have set clear objectives emphasising the reduction of water abstraction and wastewater discharge, leading to a significant increase in the cost of using and treating water in the manufacturing industry. In this context, the predicted freshwater shortage and associated cost will have restrictive and/or disruptive consequences for manufacturing applications in the foreseeable future, in particular within water-intensive industries such as food manufacturing.

Previous work in the centre has identified that an in-depth understanding of water and effluent at the production process level is required in order to develop appropriate tools and technologies to better manage this consumption in the future. However the capability for easy and fast content measurement and monitoring of in-plant water flows does not currently exist. To remedy the situation SMART has developed prototype instrumentation for Digital Water Fingerprinting of industrial water using processes. This involves the use of multi-purpose, low maintenance, minimally invasive, broad spectrum measurements, which are sensitive to multiple water contaminating species and capable of producing a characteristic fingerprint for a water waste stream. Additional design requirements for the system are non-invasive to avoid interference with factory operation, low cost to allow economic use of multiple sets of sensors throughout the process chain, the need for little or no maintenance and capable of continuous data streaming to allow capture of the time variation due to the nature of production and varying manufacturing schedules.

The Digital Water Fingerprinting concept must now be validated with samples of effluent from real industrial processes, in addition to addressing a number of research questions:

- How does having real time process pollution data help with reduction of waste water production in food manufacturing?
- How does having real time process pollution data help with water conservation in food manufacturing?
- What is the capability of the system?
- How can the capability of the system be improved?
- What near term opportunities are there to improve manufacturing using Digital Water Fingerprinting?
- How can Digital Water Fingerprinting be applied to improve the overall water sustainability of manufacturing processes, products and systems over the longer term?

This project will involve instrumentation development and characterisation, and experimental investigation. While the project focusses on food manufacturing, the applicability of the work to wider industry will be a consideration. The researcher assigned to this post will develop a knowledge base and skill set highly sought after by forward-thinking industries and academic research groups alike.

The project is part of a national 'EPSRC Centre for Innovative Manufacturing in Food', which is a £5M multi-disciplinary research programme that commenced in October 2013. Nottingham, Birmingham and Loughborough Universities form the academic core of this national Centre, which also has the support of a number of large food manufacturing companies and retailers including AB Sugar, Cargill, Mars, McCain Foods, PepsiCo, Premier Foods, Nestle, Unilever, Marks and Spencer, and J Sainsbury.

The Research Associate in this project will work as part of a multidisciplinary team within the Centre for SMART, as well as with the other academic and industrial partners within the EPSRC Centre for Innovative Manufacturing in Food.

Job Description

Job Grade: Research Grade 6

Job Purpose

The post holder will hold a research position within the Centre for SMART and be responsible for the further development of Sustainable Water Technology. They will also contribute to the development of new research themes around the concept of Digital Water Fingerprinting for the Food Industry and to the preparation of substantial national and European proposals.

Job Duties
- To review the relevant literature and the state-of-art practices and commercial solutions.
- To make a significant contribution to research activities in the area of Sustainable Water Technology.
- To carry out experimental validation and characterisation of the capabilities of Digital Water Fingerprinting;
- To carry out experimental studies of manufacturing effluents using Digital Water Fingerprinting techniques
- To apply previous knowledge and experience to extend the capabilities of Digital Water Fingerprinting
- To take a leading role in developing and proving concepts for improvement of manufacturing using Digital Water fingerprinting
- To travel, when required, to national, European and international partners, manufacturers and equipment suppliers.
- To provide support and supervision of research students and associates.
- To make presentations to industry and academia.
- To deputise for the project leader(s) when required.
- To work as part of a project and university team.
- To work effectively with relevant administrative, technical and academic staff in the Department and across the University.

- To engage in training programmes at the University (e.g. through Staff Development) which are consistent with your needs and aspirations and those of the project team and the host department.
- To pursue excellence and maintain high standards of safety in all activities.
- To undertake other such 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

Reports to the Professor of Sustainable Engineering.

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	Current or recent relevant work experience in an academic or industrial environment	1, 3
	Practical experience of characterisation and use of analytic or process monitoring instrumentation	1, 3
	Relevant project management experience	1, 3
	Experience of authoring original work for academic journals with high citation factors, conference papers or technical reports for industry	1, 3
Skills and abilities	Ability to plan and execute an experimental programme	1,3
	Excellent practical and problem solving skills	1,3
	Excellent numerical data analysis skills	1,3
	Excellent interpersonal and organisational skills	1,3
	Ability to engage with industry on projects	1,3
	Ability to work independently, plan own work and meet deadlines	1, 3
	Good IT and administrative skills	1
	Excellent written and oral communication skills	1, 3
	Excellent knowledge of presentation and report writing software	1
	Ability to support research students in relevant areas	1
	Ability to define research proposals and seek industrial support	1, 3
Training	A willingness to undertake further training as appropriate and to adopt new procedures as and when required	3
Qualifications	A good honours degree in a physical science, food science, chemical engineering, mechanical engineering or related disciplines.	1
	Post-graduate qualification to doctorate level in a relevant subject area or significant relevant experience at a senior level	1, 3
Other	Commitment to observing the University's Equal Opportunities policy at all times	1
	Willingness and ability to travel	3
	Commitment to maintaining confidentiality at all times	3

Desirable Criteria

Area	Criteria	Stage
Experience	Industrial or academic experience of manufacturing process	1,3

	monitoring	
	Industrial or academic experience of industrial effluent analysis	1,3
	Experience of working in, or collaborating with industry	1,3
	A track record in the exploitation of research results	1, 3
	Experience of reporting on technical projects in academic and industrial environments	1, 3
Skills and abilities	A good understanding of sensor technologies for fluid content analysis	1, 3
	A good understanding of the science of measurement	1, 3
	A working knowledge of programming languages/packages	1, 3
	A good understanding of sustainability issues in industry	1,3
Qualifications	A higher degree (or equivalent experience) in industrial process monitoring or effluent analysis	1
Other	Valid licence for driving in the UK	1

Conditions of Service

The position is full time and fixed term for 24 months. Salary will be on Specialist and Supporting Academic 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

Informal enquiries should be made in the first instance to Dr Patrick Webb, Lecturer in Advanced Manufacturing, by e-mail at D.P.Webb@lboro.ac.uk or by telephone on +44 (0)1509 225402; or Professor Shahin Rahimifard, Professor of Sustainable Engineering by email at s.rahimifard@lboro.ac.uk or by telephone on +44 (0)1509 227657.

Applications

The closing date for receipt of applications is the **5 February 2017.**

Interviews will be held on the **9 February 2017** and the **15 February 2017.**