School of Architecture, Building and Civil Engineering
Abacus Lighting Limited

Job Ref: REQ250583

Job title: KTP Associate in Intelligent Remote Health Monitoring of Steel High-Mast Structures

Period: 30 months
Salary: £36,000 - £40,000 per annum (Starting salary to be confirmed on offer of appointment), plus £2000 per annum training budget
Application deadline: Sunday 3rd August 2025

Key words: Structural Health Monitoring (SHM), Structural Dynamics, Sensor Integration and Processing, Internet of Things (IoT), Machine Learning (ML), Predictive Maintenance

Project Title: Intelligent Remote Health Monitoring of Steel High-Mast Structures

This is a 30-month Knowledge Transfer Partnership (KTP) project between Loughborough University and Abacus Lighting, funded by UKRI Innovate UK.

The Associate role will be based at the Abacus Lighting Ltd premises in Nottinghamshire, working closely with and be supported by the company's technical team and experts at the knowledge base, Loughborough University, throughout the project. KTPs aim to help businesses improve their competitiveness and productivity through the better use of knowledge, technology and skills that reside within the UK Knowledge Base.

This is an exciting opportunity for a proactive and motivated engineer or applied scientist to lead the design and deployment of an intelligent Structural Health Monitoring (SHM) solution for steel high-mast structures - a sector with a global market currently valued at around £200 million and projected to reach £500 million by 2026, driven by growing infrastructure investments and technological innovation. This Knowledge Transfer Partnership (KTP) between Loughborough University and Abacus Lighting Ltd will develop and commercialise a bespoke low-cost SHM system, integrating MEMS sensors, embedded data processing, and AI-driven analytics. The system will enable predictive maintenance of steel mast structures and improve their safety across key industries including rail, ports and airports.

About the project

Mast structures—whether used for lighting, mobile networks, or other applications—are becoming increasingly common. Any failure of these structures can have serious consequences, potentially disrupting

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traffic, communications, and public safety. Therefore, real-time monitoring of their structural integrity is essential. The project aims to create a real-time, cost-effective SHM solution that offers actionable and reliable information concerning health status of mast structures. It integrates MEMS sensors with IoT components and ML algorithms to interpret structural behaviour and detect early signs of deterioration or failure. The Associate will contribute to the design, development, validation, and deployment of this SHM solution, drawing on expertise from both the Abacus engineering team and Loughborough University's academics.

KTP Associate Role:

The KTP Associate role focuses on leading the development of an end-to-end SHM system specifically designed for high-mast steel structures. This includes selecting and integrating MEMS-based sensors (e.g. accelerometers, gyroscopes, thermocouples), developing embedded systems for real-time data acquisition and transmission, and conducting comparative testing under laboratory and real-world conditions. The Associate will prototype the SHM hardware using embedded platforms (e.g. single-board microcontrollers), perform digital signal acquisition and processing, e.g. operational modal analysis, and coordinate field deployments in challenging environments including offshore and rail sites. The Associate will also contribute to experimental shake table testing at Loughborough University and validate numerical models using tools such as Abaqus. By working closely with both academic experts and the engineering team at Abacus Lighting Ltd, the Associate will ensure that the system is robust, reliable, and commercially viable.

In parallel, the Associate will design a cloud-based data management platform, incorporating AI-driven algorithms to detect structural deterioration and recommend predictive maintenance actions. The system will include intuitive data visualisation tools and a reporting Application Programming Interface (API) for end users, delivering actionable insights through health indicators. The Associate will also play a key role in evaluating commercial potential, safeguarding intellectual property, and embedding knowledge across the business through training and documentation. This role offers an exciting opportunity to contribute to advanced research and product innovation while gaining commercial, technical, and leadership experience across both academic and industrial settings.

The KTP Associate will be based at the Abacus Lighting Ltd premises in Nottinghamshire, the Associate will form an integral part of the Abacus Lighting Ltd Research and Development team, working closely with CEng Matt Naughton, whilst supervised by Dr Mojtabaei, Dr Jesus, and Dr El-Hamalawi, who bring their expertise in SHM, Structural Dynamics, Finite Element Modelling, and Intelligent Infrastructure Systems to the project. As a KTP Associate, the successful applicant will have access to a wide range of commercial, R&D and management training programmes, as well as technical training resources and facilities at the School of Architecture, Building and Civil Engineering, Loughborough University.

Introduction to Abacus Lighting Limited

Abacus Lighting Ltd is a UK-based engineering company with over 60 years of experience in the design, manufacture, and maintenance of high-performance exterior lighting and mast systems. Their products are widely deployed in critical infrastructure sectors such as rail, airports, ports, sports venues, and large retail environments. With a strong reputation for delivering end-to-end lighting and structural solutions, from

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initial consultation and design through to installation and ongoing maintenance, Abacus combines engineering precision with customer-focused service.

The company's vision is to lead the next generation of mast structures through innovation, sustainability, and digital integration, having been awarded "The King's Award for Enterprise". By embedding smart technologies, such as bespoke SHM systems, Abacus aims to move from reactive to predictive maintenance, enhancing structural reliability and operational efficiency. Their strategic direction focuses on reducing environmental impact, extending product lifespan, and providing clients with timely, real-time, data-driven information for asset condition management. This KTP plays a central role in enabling that transformation, positioning Abacus as a technological leader in smart, sustainable mast structures.

Loughborough University

Loughborough University is a research-intensive institution, consistently ranked in the UK's top 10 universities since 2017 across the Complete University Guide, Guardian League Table, and the Times Good University Guide. It has been awarded a record seven Queen's Anniversary Prizes for its outstanding research impact on society and UK industry, and offers an environment where anyone can realise their full potential.

School of Architecture, Building and Civil Engineering

With an international reputation for research excellence and track record in high quality training the School of Architecture, Building and Civil Engineering at Loughborough University is one of the largest centres for built environment education in the UK. The School is ranked 1st in the UK for Architecture, Building, and Planning (Times and Sunday Times Good University Guide 2025) and is among the top 100 globally for Architecture and the Built Environment (QS 2024). The School brings together outstanding facilities, superb teaching and commercial industry links across a wide range of sectors. With experts across a range of disciplines including Architecture, Transport and Urban Planning, Construction Management, and Civil Engineering the School provides training, research, and consultancy to shape the world we live in, from the design of buildings resilient to climate change, through to the management of contractors during construction and the planning, operation, and maintenance of transport systems. The School is also home to one of the UK's largest integrated civil engineering laboratories, supporting structural testing, geotechnics, hydraulics, and materials research. On behalf of Loughborough University, the School is taking the lead on £1.3 million of investment by the UK Government in infrastructure delivery and maintenance, drawing on its intensive innovative and industry-relevant research and enabling numerous research opportunities around the themes of infrastructure resilience to environmental and usage change, and emissions reductions.

Job Description and Person Specification

Job Grade: Other

Job Purpose

The KTP Associate will:

- Work with stakeholders, including Abacus Lighting senior leaders, engineers, commercial, sales, marketing teams, clients and academic experts, developing networks across the business and understanding of project needs, deliverables and the regulations of the mast industry.
- Determine technical scope, objectives, specifications, and opportunities for technology advancement.

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- Explore state-of-the-art technology in embedded real-time SHM, including sensor integration, edge computing, wireless data transmission, and AI-driven analytics, to develop a robust, reliable and scalable monitoring system for steel high-mast structures.
- Deploy and monitor SHM systems in real-world settings (e.g. rail and offshore masts).
- Conduct experiments, testing, and evaluation for the developed SHM system for commercial trials and measure its impact in the mast industry.
- Document work regularly, ensuring knowledge and outcomes are transferred to other team members at Abacus Lighting, embedding, recording, creating a repository throughout the project.
- Write reports, academic publications (eg conference and journal papers) and make presentations, sharing these as project updates at supervision meetings, Local Management Committees (LMC) meetings, advisory panel meetings, and other necessary forms of engagement and dissemination.

Job Duties

- Carry out the KTP project tasks and deliver the outcomes as outlined in the project workplan.
- Manage the project and disseminate key deliverables/findings to the project team and key stakeholders, to facilitate commercialization of the product.
- Undertake KTP management training, as well as personal development training and courses as deemed necessary.
- Prepare research papers for publication in journals/conferences, in line with the expected scholarly activities of the University Research Staff, and in accordance with the commercial sensitivity of collaborating companies.
- Assist with the capture of intellectual property.
- Travel to Company business partners within the UK and possibly overseas, when necessary.
- To undertake such 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.

Applicants must have completed their last qualification (degree, masters, PhD), no more than five years before the closing date.

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.

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

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Belonging and Inclusion, Health & Safety, etc.

We actively encourage applicants from women, disabled and Black, Asian and Minority Ethnic candidates, who can bring their experiences and voices to the partnership.

Organisational Responsibility

Reports to the KTP Lead Academic: Dr Seyed Mohammad Mojtabaei

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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 – Presentation
3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	Experience in sensor integration and real-time data acquisition using embedded platforms such as single-board microcontroller (e.g. arduino, ESP-32 or similar)	1,2,3
	Practical experience in SHM, structural testing, or data-driven analytics/diagnostics	1,2,3
	Development of software systems for data collection, filtering, telecommunication, and analysis	1,3
Skills	Solid programming skills in signal processing, big data, data management and embedded systems (e.g. Python, MATLAB, C++)	1,2,3
	Design, develop, code, test, debug and validate Application Programming Interface (API) system	1,3
	Ability to develop and validate AI/ML algorithms for condition monitoring and/or anomaly detection	1,3
	Integrate and validate new product designs	1,3
	Authoring original work, technical reports and presentations	1,2,3
	Good project management, team-work and communication skills	3
	Strong problem-solving and analytical skills, particularly in applied engineering or monitoring contexts	1,3
Qualifications	PhD (or near completion) in Civil/Structural Engineering, Control/Embedded Systems Engineering, Mechatronics, Computer science, or a related field	1

Desirable Criteria

Area	Criteria	Stage
Knowledge	Knowledge of structural dynamics, vibration-based monitoring, or finite element modelling	1,3

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	Understanding of edge computing principles and wireless sensor networks	1,3
	Familiarity with cloud platforms for data management and visualisation (e.g. InfluxDB, Azure, Prometheus, Grafana, or similar)	1,3
Experience	Experience in laboratory or field testing of structural systems	1,3
	Experience working on interdisciplinary R&D or industry-academic collaboration projects	1,3
Skills and abilities	Ability to design user-facing dashboards or interfaces for visualising structural condition data	1,3
	Competence in using tools such as Abaqus, OpenSees, or similar for physics-based modelling	1,3
	Ability to take part in collaborative activities and work with technical staff in other subject domains in a commercial environment.	1,3
Qualifications	Licenced to drive in the UK	1,3

Conditions of Service

The position is FULL TIME and FIXED TERM for 30-months. Salary will be between £36,000 - £40,000 per annum at a starting salary to be confirmed on offer of appointment. The successful applicants will also receive a £2,000 per annum training budget.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff/Operational and Administrative staff, details of which can be found here.

We 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/.

Applications

The closing date for receipt of applications: Sunday 3rd August 2025

The interviews will take place w/c Monday 18th August 2025.

Due to the nature of the funding, the employment aims to start no later than 31st January 2026. This job is applicable for applying for a Global Talent visa (if needed).

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