Smart Grid Development Engineer (Knowledge Transfer Partnership) Associate with Whittaker Engineering.

Department	Electronic and Electrical Engineering (https://www.strath.ac.uk/research/subjects/electronicelectricalengineering/)		
Faculty	Faculty of Engineering (www.strath.ac.uk/engineering/)		
Staff Category	Research	Reference No	71023
Reports To	The Head of Department, through Dr. Andrew Roscoe (academic supervisor) and Ken Whittaker/Keith Watt (industrial supervisors)	Contract Type:	Fixed Term (30 months)
Salary Range:	£30k pa plus £6k training budget	Closing Date:	Sunday 25th March 2018
FTE:	1		

Job Advert

The Department of Electronic and Electrical Engineering in partnership with Whittaker Engineering Limited (WEL) seeks to recruit a Knowledge Transfer Partnership (KTP) Associate. This is an opportunity for a dynamic and enthusiastic Electrical/Electronic Engineer to become involved in the development of a new and innovative heat pump and energy storage device which can provide valuable ancillary services to smart electrical power networks.

As a KTP Associate you will be principally based at Whittaker Engineering Limited (WEL) (http://www.whittakereng.com/) near Stonehaven, Scotland but you will spend periods of time at the University of Strathclyde as required.

WEL is predominantly a mechanical engineering company, carrying out bespoke precision manufacturing for the offshore and marine sectors. They have recently developed a new Stirling engine containing patented valve technology which allows virtually instant reversal from drive (heat consumption) to re-generate (heat production), which can be used as a bidirectional electrical/heat storage system. It is proposed to use this technology in parallel with renewable power to improve the supply/demand balance, and to increase electrical grid stability through the use of synchronous machine interconnection and all the inherent benefits of that type of connection, compared to converter-connected devices.

The successful candidate will form an essential link between WEL and the expertise and ongoing research at the University of Strathclyde. You will become the electrical engineering expert at WEL, in particular concerning the electrical interactions of the heat engine/heat pump with the power network, and in the operation with emerging electrical markets. You will need to become expert in the technical electrical aspects of power network operation in the modern context of high penetrations of renewables. This will include detailed understanding of inertia, power quality, system stability, interactions with converter-connected devices, control and protection, and islanded operation. You will need to examine the existing body of research in this area, and also carry out your own high-fidelity dynamic power-system simulations to demonstrate the capabilities and benefits of the WEL solution.

You will also need to gain knowledge in the financial aspects of the markets by which owners of the heat engine/heat pump assets (e.g. storage devices) can obtain revenue, either when packaged with renewable generation, or as a stand-alone assets. Markets for small scale power production and ancillary services are just beginning to appear in Ireland, and are under discussion in GB.

Your role will be to gain expertise in the areas described, and support WEL in the development of a functional specification for the prototype machine, business plan, market entry strategy and product launch based on the developed Stirling engine connected to a synchronous machine. You will be responsible for transferring all of this knowledge and strategy to WEL, disseminating the findings at meetings, and formal document/report writing.

In the third year of the project, the newly developed unit is to spend a period under test at the Power Network Demonstration Centre, Cumbernauld (http://pndc.co.uk/). You will be responsible for defining, preparing instrumentation for, carrying out the electrical tests, and analysing the results.

To be considered for this role you should at least have a minimum 2:1 degree in the area of electrical/electronic engineering, physics, or a related discipline.

Job Description

Brief Outline of Job:

The KTP Associate will be primarily based at Whittaker Engineering Limited in Stonehaven and will play a key role in developing the business plan and market entry strategy for a new energy storage product based upon a reversible stirling engine coupled to a synchronous machine. The associate will be supported by the academic team at the University of Strathclyde to develop both technical models/understanding, and also investigate the complex area of emerging ancillary service markets for electrical "products" such as inertia, power quality improvement, and grid stabilisation. The associate will also be responsible for extensive prototype testing and validation at the PNDC.

Main Activities/Responsibilities:

1.	**Project Stage 1 – Situational Awareness: Company, Market, Technology** Undertake a thorough review of the electrical connection of renewables and storage. Tasks 1.1 and 1.2 are front-loaded but also extend as background tasks, as a continuous re-appraisal of the state-of-the-art as the project unfolds.
2.	**Project Stage 2 – Stirling Engine modelling, electrical simulation and performance evaluation.** Develop and intimate knowledge of the exact behaviour of the product within complex network scenarios. Work in conjunction with Whittaker Engineering, using this knowledge to help develop a functional specification for the prototype machine. This knowledge will also inform stages 3 and 4, i.e. the exact technical benefits the product brings, and exactly how to implement the controls.
3.	**Project Stage 3 –Detailed Business Case Development** Use new knowledge of the power system markets, together with knowledge from the supervision team, Whittaker staff, and engagement with potential early-adopter customers and interested organisations (e.g. National Grid, Scottish and Southern, Scottish Power) to determine the optimum model(s) by which to market the product.
4.	**Project Stage 4 –Control System Specification (Active power control and electrical interface).** Work closely with the team at Whittaker to create a detailed specification for the controls for active power and the electrical interface. The output of this stage will provide the basis for the actual development which takes place in stage 5.
5.	**Project Stage 5 – Prototype Development (control system integration with prototype stirling engine platform)** Work closely with the team at Whittaker to actually create and optimise the first prototype. Focusing on the electrical interface, the control of the electrical machine, the overall scheduling (active power control) of the stirling engine, and the ways that revenue can be generated from providing services at the point of electrical (and thermal) connection. This stage will run in parallel with the mechanical development of the stirling engine and associated heat/energy sources/stores, by the main Whittaker project team. The planned capacity of the first machine is 50 kW peak power.
6.	**Project Stage 6 – Prototype Installation, commissioning, and full envelope testing at PNDC** Work closely with the team at PNDC (Power Networks Demonstration Centre, Cumbernauld), to both plan and then carry-out the significant testing and proving of the prototype functions. During this phase, spending at least 50% of time on-site at PNDC, embedded within the team there. As noted in the main bid, the PNDC is a venture between the University of Strathclyde, Scottish Enterprise, the Scottish Funding Council, Scottish Power and Scottish and Southern Energy aimed at accelerating the adoption of novel research and technologies into the electricity industry.
7.	**Project Stage 7 – Product Launch** Update the final business plan, accounting for the detailed findings from stage 6, and any new developments in the power system ancillary market structure, embed the KE within Whittaker, through direct presentation, dissemination and interaction with other Whittaker staff. Ideally, this will continue post-project with the associate joining Whittaker as a permanent member of staff.
8.	**Project Stage 8 – Reporting**

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)	
E1	A minimum 2:1 degree in the area of electrical/electronic engineering, physics, or a related discipline.
Experience	
E2	Sufficient breadth and depth of knowledge in a relevant discipline to contribute to research programmes and to the development of research activities.
D1	Knowledge of synchronous machine properties and performance
D2	Experience of modelling dynamic power systems. Appreciation of inertia.
D3	Experience with energy storage projects
D4	Knowledge of power quality
D5	Knowledge of power markets in electricity
Job Related Skills and Achievements	
D6	Dynamic power system simulation toolsets (e.g. Simulink, PowerFactory, PSSE, IPSA)
D7	Traditional power system analysis techniques, e.g. sequence analysis, harmonic impedances, synchronous machine models.
D8	Conference and/or journal papers in a relevant field
E3	Excellent interpersonal skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences.
E4	Ability to report and present (by writing and direct presentation) plans, progress, results and findings to colleagues, management and customers.
Personal Attributes	
E5	Enthusiastic for the project as specified, self-motivated.
E6	Ability to work both independently and within a team environment, prioritise time and balance multiple tasks simultaneously.
E7	Good communication skills both written and verbal
Other Relevant Factors	
E8	Willingness to be based in Stonehaven, and also spend some time at PNDC in year 3.

Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted before interview without further permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter 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).

This position forms part of the Knowledge Transfer Partnership (KTP) funded by Innovate UK. To find out how KTP works with business and the University, and the vital role you will play if you successfully secure a KTP Associate position. Please visit: www.ktpws.org.ukInformal enquiries about the post can be directed to Dr Andrew Roscoe, Electronic & Electrical Engineering (andrew.j.roscoe@strath.ac.uk / 0141 548 2715).

Conditions of Employment

Conditions of employment relating to the KTP Associate staff category can be found at: Conditions of Employment.

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.

Relocation

Where applicable, the University offers a relocation package to support new employees who meet the eligibility criteria. The relocation package is offered as a contribution towards costs incurred, and is designed to be flexible, allowing staff to use the financial support available in the way that will be most helpful to them. Further details are outlined in the Relocation Policy.

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.



