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Department	School of Engineering and the Built Environment
Supervisors	Dr Gokula Vasantha, Professor Pat Langdon
Funding Status	Funded PhD Project (Worldwide)
Application Deadline	14/04/2022
Project Title	Development of a Knowledge Architecture for Designing Smart Products

PROJECT DESCRIPTION

The aim of developing smart products is to develop special in-built characteristics such as adaptiveness, context-aware, personalisation, and pro-activeness to provide enhanced value for the customer. The first generation of smart products mostly tracks and monitors product usage and provide feedback. For example, Procter & Gamble, Inc.'s smart toothbrush is one such product that uses a Bluetooth-enabled toothbrush to track and monitor the style of brushing and provides dentist-inspired feedback in real-time. However, the next generation of smart products needs to be interactive with the users and the environment. They should take autonomous decisions to the best for delivering the intended functionalities, enhance value for all stakeholders and ensure safety. The important elements for developing interactive and intelligent smart products are to develop knowledge-based systems (KBS) that are able to capture real-time data and convert it into information and actionable knowledge and have unique interactive mechanisms to communicate with users.

The objectives of this PhD position in the Smart Product research are:

- To develop dynamic KBS that structures knowledge of smart products into a network of function, behaviour and structure elements concerning user's interaction and environmental changes.
- To create artificial intelligence knowledge schema for real-time value creation that enhances operational performance objectives for end users by enabling through-life product intelligence within smart products.

The researcher joining this project will develop and train in the appropriate technical areas. The researcher will be actively encouraged to present the work in leading international conferences and workshops. The researcher should have an appetite for undertaking an enquiring and rigorous approach to research together with a keen intellect and disciplined work habits.

Academic qualifications

A first degree (at least a 2.1) ideally in Mechanical Engineering, Data Science or Product Enginieering with a good fundamental knowledge of Data Analytics and Knowledge Engineering.

English language requirement

IELTS score must be at least 6.5 (with not less than 6.0 in each of the four components). Other, equivalent qualifications will be accepted. Full details of the University's policy are available online.

Essential attributes:

- Experience of fundamental Product development and knowledge engineering.
- Competent in Programming and Data analytics.
- Knowledge of Statistical techniques and product data modelling.
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:

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Indicative Bibliography	Duffy, A., Whitfield, I., Ion, B., & Vuletic, T. (2016). Smart Products Through-Life: Research Roadmap. University of Strathclyde Publishing. Quigley, J., Vasantha, G., Corney, J., Purves, D., and Sherlock, A. (December 6, 2021). "Design as a Marked Point Process." ASME. J. Mech. Des. February 2022; 144(2): 021713.
Funding notes	This project may be funded by a scholarship of the School of Engineering and Built and Environment. Please see School-funded PhD scholarships - RESEARCH AND INNOVATION (napier.ac.uk) for information on the scholarships and how to apply for them.
Enquiries	For informal enquiries about this PhD project, please contact Dr Gokula Vasantha, G.Vasantha@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process

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