

Department	School of Engineering and the Built Environment
Supervisors	Dr Gokula Vasantha, Professor Pat Langdon, Asso Prof Alistair Lawson
Project Title	Development of a Data-Driven Design Methodology for Smart Products
<p>PROJECT DESCRIPTION</p> <p>Edinburgh Napier University is ranked the top modern University in Scotland in the 2022 Times World University Rankings. The School of Computing, Engineering, and the Built Environment is highly regarded. It has recently invested heavily in research in terms of staff and facilities to conduct world-class research in a wide range of disciplines.</p> <p>In the 2021 Research Excellence Framework (REF), our research was ranked the top modern university in Scotland in terms of research power. In addition, as part of our recent significant research investments, we have recruited other academics with outstanding research capabilities.</p> <p>The aim of Smart Products development is to create products with unique in-built characteristics such as adaptiveness, context-awareness, personalisation, and pro-activeness to enhance customer value. The first generation of intelligent products mostly track and monitor 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 brushing style and provides dentist-inspired real-time feedback. However, the next generation of smart products will need to have a wider interaction with and adaptation to users and the environment. This should include making good autonomous decisions that will best deliver the intended functionalities, enhance value for all stakeholders, and ensure safety. Considering the multi-faceted data elements involved in developing interactive and intelligent smart products, there is a need to create a Data-Driven Design Methodology for designing Smart Products. This design methodology should consider the types of real-time data to be captured and the process of converting data into actionable knowledge to develop unique interactive mechanisms to communicate with and adapt to users and the environment.</p> <p>The objectives of this PhD position in Smart Product research are:</p> <ul style="list-style-type: none"> • To understand and elicit the data requirements for creating a smart product that enables unique interactive mechanisms to communicate with and adapt to users and the environment. • To create an artificial intelligence knowledge schema for real-time value creation that enhances operational performance objectives for end users and other stakeholders by enabling through-life product intelligence within the smart products. <p>The researcher joining this project will develop and train in the appropriate technical areas. In addition, the researcher will be actively encouraged to present the work at leading international conferences and workshops. Therefore, the researcher should have an appetite for undertaking an enquiring and rigorous approach to research together with a keen intellect and disciplined work habits.</p> <p>Perspective applicants are encouraged to contact the Supervisor before submitting their applications. Applications should make it clear the project you are applying for and the name of the supervisors.</p> <p>Academic qualifications A first degree (at least a 2.1) ideally in Mechanical Engineering, Computer Science or Product Engineering with a good fundamental knowledge of Data Analytics and Knowledge Engineering.</p> <p>English language requirement</p>	

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:

- Skills or interests in investigating usability and human-device interaction.

Indicative Bibliography	<p>Duffy, A., Whitfield, I., Ion, B., & Vuletic, T. (2016). Smart Products Through-Life: Research Roadmap. University of Strathclyde Publishing. https://pureportal.strath.ac.uk/en/publications/smart-products-through-life-research-roadmap</p> <p>Pessôa, M. P., & Becker, J. J. (2020). Smart design engineering: a literature review of the impact of the 4th industrial revolution on product design and development. <i>Research in engineering design</i>, 31(2), 175-195.</p>
Enquiries	<p>For informal enquiries about this PhD project, please contact Dr Gokula Vasantha, G.Vasantha@napier.ac.uk or Professor Pat Langdon, P.Langdon@napier.ac.uk or Asso Prof Alistair Lawson</p>
Web page	<p>https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process</p>