



School of Computing, Engineering, and the Built Environment Edinburgh Napier University

PHD STUDENT PROJECT

Application instructions:

Detailed instructions are available at :

<https://www.napier.ac.uk/research-and-innovation/doctoral-college/how-to-apply>

Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.

Project details

Supervisory Team:

- DIRECTOR OF STUDY: Saima Rafi (Email: s.rafi@napier.ac.uk)
- 2ND SUPERVISOR: Dr Amjad Ullah

Subject Group: Computer Science

Research Areas: Computer Science

Project Title: Towards a Value-Driven DevOps Pipeline: Integrating Human Values into DevOps Practices

Project description:

Integrating human values into DevOps practices is increasingly essential to ensure ethical and responsible technology development. Traditional DevOps practices emphasize efficiency, automation, and continuous delivery. However, incorporating human values such as privacy, fairness, and inclusivity is crucial for addressing broader ethical concerns. This project, Value-Driven DevOps Pipeline, aims to develop a framework that seamlessly embeds human values throughout the DevOps lifecycle, from coding and integration to testing and deployment.

Several notable approaches have previously explored integrating human values into software development. For instance, Value-Based Requirements Engineering (VBRE) guides human values elicitation from stakeholders during the requirements phase [1]. Value Sensitive Design (VSD) from the Human-Computer Interaction (HCI) field addresses values with ethical import during the design phase by identifying potential harms to stakeholders [2, 3]. Values Q-Sort by Winter et al.

measures Schwartz's values in software engineering [4], focusing on the values of software practitioners rather than user-centric values. Additionally, Values-First Software Engineering (SE) by Ferrario et al. integrates Schwartz's broader values across all development phases, offering a more comprehensive approach [5]. Hussain et al., [6] explored Human Values to see how it can be addressed in agile methods.

This project will extend these approaches to DevOps practices, employing Large Language Models (LLMs) and AI techniques to analyze code, documentation, and user feedback for value alignment. By applying the "Five Ws" principle (Who, Where, When, What, Why) to DevOps practices, the project will integrate contextual information such as resource states, network conditions, application requirements, and stakeholders' perspectives. Agile methodologies will support this integration by allowing for iterative feedback and continuous improvement.

Key questions arising from this study include whether DevOps practices facilitate the incorporation of human values or if their emphasis on speed and automation might inadvertently obscure or hinder these values. The project will address these concerns by developing a context-proactive engine that uses AI models to make real-time adjustments, ensuring that human values are aligned with every stage of the DevOps lifecycle.

Ultimately, the Value-Driven DevOps Pipeline project seeks to enhance ethical, responsible, and user-centered software development by embedding human values throughout the DevOps process, addressing both opportunities and challenges in this integration.

Candidate characteristics

Education:

A first-class honours degree, or a distinction at master level, or equivalent achievements in computer science

Subject knowledge:

DevOps principles, Human-Values, Software engineering process management and Machine Learning

Essential attributes:

- Knowledge of ML performing classification (decision trees, support vector machines etc)
- DevOps
- Strong grip of statistical concepts