Department	School of Engineering and the Built Environment
Supervisors	Dr Timothy Olawumi; Dr Suha Jaradat; Dr Nirodha Fernando
Project Title	Data-driven blockchain system implementation for effective project delivery and built asset management.

PROJECT DESCRIPTION

Blockchain is a distributed ledger containing a growing list of blocks that include records of data and transactions that are cryptographically linked together to enhance its immutability. The blockchain network also allows for the integration of decentralised storage, such as the BigchainDB, to store data such as BIM models and data from RFID scanners, IoT cameras generated during the project. Blockchain, via its traceability functionality, also helps to promote sustainability in the supply chains. As a result, the carbon footprint of a product can be tracked from its point of source to delivery. Blockchain, via its digital asset management capabilities, also help provide solutions to the legal issues related to BIM models' ownership and intellectual property rights. Its accurate ledger allows for identifying the ownership of such digital assets efficiently, among other benefits of a data-driven blockchain system.

However, to facilitate the effective implementation of a data-driven blockchain system in the construction industry, it is necessary to scrutinise its actual applicability to the construction business and use-cases; and assess whether a blockchain solution might be required or not. Also, it is imperative to address the legal and organisational challenges faced in construction projects where data exchange, information processing, and participants' collaborations are involved – via the development of generic IT systems' governance mechanisms. The successful candidate will investigate and develop all these in this PhD project.

Also, this PhD project will, in part, draw on theories such as the innovation diffusion theories, technology acceptance theories, institutional theory, resource dependence theory, and the likes to understand associated variables that could facilitate blockchain technology implementation for information and data exchange (with particular emphasis on BIM models) for project delivery and built asset management.

Prospective 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.

Academic qualifications
A first degree (at least a 2.1) ideally in Construction Management, Civil Engineering, Architecture, Building, Surveying, or a related discipline with a good fundamental knowledge of BIM, Supply Chain Management, Blockchain, Internet of Things (including its application in construction).

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 blockchain and construction supply chain
- Competent in data models and analysis
- Knowledge of BIM, technology adoption model.
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project

- Good time management

Desirable attributes:
• Competency in atleast a programming language and keenness to learn new ones and apply it in your PhD project.
• Positive, passionate, team player, hardworking and self-motivated.
• Ability to do research independently with minimal supervision.
• Knowledge of data used in built asset management.

Indicative Bibliography	1. Olawumi, T. O., Chan, D. W. M., Ojo, S. and Yam, M. C. H. (2022) 'Automating the modular construction process: A review of digital technologies and future directions with blockchain technology', Journal of Building Engineering. Elsevier Ltd, 46(April), p. 103720. https://doi.org/10.1016/j.jobe.2021.103720 2. Olawumi, T. O., Ojo, S., Chan, D. W. M. and Yam, M. C. H. (2021) 'Factors Influencing the Adoption of Blockchain Technology in the Construction Industry – A System Dynamics Approach', in Lu, X., Zhang, Z., Lu, W., and Peng, Y. (eds) Proceedings of the CRIOCM 2020 Conference – 25th International Symposium on Advancement of Construction Management and Real Estate. 28-29 November 2020. https://doi.org/10.1007/978-981-16-3587-8_84 3. Perera, S., Nanayakkara, S., Rodrigo, M. N. N., Senaratne, S. and Weinand, R. (2020) 'Blockchain technology: Is it hype or real in the construction industry?', Journal of Industrial Information Integration. Elsevier, 17(June 2019), p. 100125. https://doi.org/10.1016/j.jii.2020.100125 4. Helo, P. and Hao, Y. (2019) 'Blockchains in operations and supply chains: A model and reference implementation', Computers and Industrial Engineering. Elsevier, 136(July), pp. 242–251. https://doi.org/10.1016/j.cie.2019.07.023
Enquiries	For informal enquiries about this PhD project, please contact Dr. Timothy Olawumi – T.Olawumi@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process