Department	School of Computing
Supervisors	Dr. Isam Wadhaj and Dr. Baraq Ghaleb
Project Title	Intelligent and Privacy-preserving security solutions for IoT networks

PROJECT DESCRIPTION

Over the past decade, several cyber security attacks have made the headlines targeting several sectors and causing irreversible damage on both the financial and social fronts. While the emergence of the Internet of Things (IoT) networks has facilitated the deployment of several applications ranging from smart homes to smart cities, the state-of-the-art research into the current IoT standards and technologies (e.g., 6LoWPAN and LoRa) has uncovered several security issues and shows that IoT networks are unavoidably exposed to a large number of attacks targeting their scarce resources, traffic, and topology. In addition, large amounts of private information are captured and processed by IoT nodes giving rise to serious privacy threats. Hence, ignoring such security and privacy threats can lead to undesired consequences that may limit the adoption of the IoT paradigm and realising its full potential. This project aims to conduct, beyond state-of-the-art research into novel secure, scalable, intelligent, and reliable IoT solutions that protect against IoT security threats and preserve the privacy of its users. This includes, but is not limited to, the following:

- Develop intelligent security countermeasures for a wide range of IoT attacks
- Devise a suite of privacy-preserving solutions for IoT networks that satisfy critical privacy requirements

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.

Academic qualifications

A first degree (at least a 2.1) ideally in Computer Science with a good fundamental knowledge of programming.

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 IoT security and privacy
- Competent in c/c++ programming
- Knowledge of Machine learning, and Privacy-preserving techniques
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Indicative Bibliography	
	1. Raoof, Ahmed, Ashraf Matrawy, and Chung-Horng Lung. "Routing attacks and mitigation methods for RPL-based Internet of Things." *IEEE Communications Surveys & Tutorials* 21.2 (2018): 1582-1606.

	2. Al-Amiedy, Taief Alaa, et al. "A Systematic Literature Review on Machine and Deep Learning Approaches for Detecting Attacks in RPL-Based 6LoWPAN of Internet of Things." Sensors 22.9 (2022): 3400. 3. Agiollo, Andrea, et al. "DETONAR: Detection of routing attacks in RPL-based IoT." IEEE Transactions on Network and Service Management 18.2 (2021): 1178-1190. 4. Pu, Cong. "Sybil attack in RPL-based internet of things: analysis and defenses." IEEE Internet of Things Journal 7.6 (2020)
Enquiries	For informal enquiries about this PhD project, please contact Dr. Isam Wadhaj at i.wadhaj@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process