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Department	School of Engineering and the Built Environment
Supervisors	James McWhinnie, Naghmeh Moradpoor, Keng Goh
Funding Status	Funded PhD Project (Worldwide)
Application Deadline	14/04/2022
Project Title	A Next-Generation HoneyPot for Industrial Control Systems
PROJECT DESCRIPTION <p>The recent cyber-attacks reveal that the ICS and its major components such as PLCs are the target of sophisticated attacks set to disturb their operation. Therefore, given their vital role in people's daily life, this may cause significant loss and damage. In this context, honeypots have been shown to be of substantial assistance and huge benefit to better understand the complex methodologies and techniques that attackers use. They provide this understanding by creating a virtual trap and security mechanisms to trick hackers, and then collect real data from their exploitations. This information can be further studied by the security analysts to remove vulnerabilities and improve their security policies. However, the existing state-of-the-art ICS honeypots, particularly those simulating its major components such as PLCs, lack the sophisticated service simulations required to collect valuable data, as well as ICS specific network protocols such as Modbus and Profinet. Additionally, based on our best knowledge, there is no ICS honeypot simulating water services (e.g., clean water supply or clean water treatment systems). Therefore, the aim in this studentship is to employ the current honeypots, such as those particularly designed for leading PLCs, and further extend and develop an ICS honeypot simulating the entire water services. This is to fully understand and study the complicated methodologies and techniques that attackers use in this field for further remediations.</p>	
Academic qualifications <p>A first degree (at least a 2.1) ideally in Computing OR Engineering with a good fundamental knowledge of Cybersecurity for Computing or Automation and Control for Engineering.</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.</p>	
Essential attributes: <ul style="list-style-type: none">• Experience of fundamental Cybersecurity for Traditional Computer Networks/Industrial Control Systems OR Automation and Control Engineering• Competent in one of the programming languages such as MATLAB, Python, C/C++, IEC61131-3• Knowledge of cybersecurity OR Engineering, Mathematics• Good written and oral communication skills• Strong motivation, with evidence of independent research skills relevant to the project• Good time management	
Desirable attributes: <p>Cybersecurity for Industrial Control Systems, IoT, IIOT Cybersecurity for Industrial Automation and Control Systems</p>	
Indicative Bibliography	Schuba, M., Höfken, H., & Linzbach, S. (2021, December). An ICS HoneyNet for Detecting and Analyzing Cyberattacks in Industrial Plants. In <i>2021 International Conference on Electrical, Computer and Energy Technologies (ICECET)</i> (pp. 1-6). IEEE. Dalamagkas, C., Sarigiannidis, P., Ioannidis, D., Iturbe, E., Nikolis, O., Ramos, F., ... & Tzovaras, D. (2019, June). A survey on honeypots, honeynets and their applications on smart grid. In <i>2019 IEEE Conference on Network Softwarization (NetSoft)</i> (pp. 93-100). IEEE.

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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 Jim McWhinnie J.McWhinnie@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process

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