

Department	School of Computing
Supervisors	Neil Urquhart
Project Title	Supporting Communities through Optimisation of Deliveries
<p>PROJECT DESCRIPTION</p> <p>The delivery of goods and services to urban and rural communities, on a commercial and a voluntary basis, is increasing which in turn has the potential increase environmental impact and congestion. The use of optimisation algorithms to find efficient delivery plans is a well established research area, this project seeks to build on this previous body of work to establish new algorithmic techniques that take into account factors such as:</p> <ul style="list-style-type: none"> - Creating ad-hoc delivery networks through crowd sourcing - Making best use of low-carbon travel modes such as cargo bikes, walking couriers and electric vehicles - Integrating ad-hoc delivery networks with fixed public transport infrastructure - Respecting the privacy and security of members of the community - Prioritising deliveries to vulnerable members of the community - Supporting social aspects of the community, for instance allowing volunteer couriers to spend time with vulnerable individuals when making deliveries - Allowing a fast and flexible response to situations such as a COVID-19 style lockdown and ensuring resilience in power outages or similar emergencies <p>Techniques that might be used include multi-agent systems, evolutionary algorithms and machine learning.</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</p> <p>A first degree (at least a 2.1) ideally in Computer Science, Software Engineering or similar with a good fundamental knowledge of artificial intelligence and/or optimisation.</p> <p>English language requirement</p> <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> <p>Essential attributes:</p> <ul style="list-style-type: none"> • Experience of fundamental artificial intelligence algorithms • Competent in software engineering • Knowledge of optimisation and/or problem solving • Good written and oral communication skills • Strong motivation, with evidence of independent research skills relevant to the project • Good time management <p>Desirable attributes:</p> <p>Knowledge of optimisation and/or problem solving techniques applied to real-world problems.</p>	
Indicative Bibliography	Neil Urquhart, Nature Inspired Optimisation for Delivery Problems - From Theory to the Real World. Natural Computing Series, Springer 2022, ISBN 978-3-030-98107-5, pp. 3-256

	<p>Neil Urquhart, Silke Höhl, Emma Hart: An illumination algorithm approach to solving the micro-depot routing problem. GECCO 2019: 1347-1355</p> <p>Macrina, G., Pugliese, L.D.P., Guerriero, F. (2020). The Green-Vehicle Routing Problem: A Survey. In: Derbel, H., Jarboui, B., Siarry, P. (eds) Modeling and Optimization in Green Logistics. Springer, Cham. https://doi.org/10.1007/978-3-030-45308-4_1</p> <p>Patella, S.M.; Grazieschi, G.; Gatta, V.; Marcucci, E.; Carrese, S. The Adoption of Green Vehicles in Last Mile Logistics: A Systematic Review. Sustainability 2021, 13, 6. https://doi.org/10.3390/su13010006</p> <p>?</p>
Enquiries	For informal enquiries about this PhD project, please contact Dr Neil Urquhart – n.urquhart@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process