IFN712 Research Project Form

(Submitted to [y.feng@qut.edu.au](mailto:y.feng@qut.edu.au) by 30 June 2025)

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| Project agency (School, industry, funded/HDR) | School of Computer Science |
| Industry/project supervisor and contact emails | N/A |
| Academic Supervisor name(s) and contact emails | Dr Vicky Liu [v.liu@qut.edu.au](mailto:v.liu@qut.edu.au) |
| Information Technology major(s) | Cyber Security, Computer Science, Internet of Things |
| Project title | Leveraging IoT for Smart City Solutions: Comparative Analysis and Strategic Insights |
| Brief description of the research problem, aims, method and expected outputs (100~200 words) | This project investigates how the Internet of Things (IoT) supports smart city solutions to enhance urban living, sustainability, and public safety. It examines key technologies - sensors, communication networks, and data analytics - applied in areas such as flood control, earthquake detection, environmental monitoring, wastewater management, and emergency response. Exploring real-world implementations, the study compares technologies, system architectures, and deployment strategies across global smart cities. It aims to identify successful practices, challenges, and future opportunities. It also requires exploring how Australian cities can benefit from international case studies by applying relevant lessons and strategies to local urban development.  **Objectives**   * Analyse IoT technologies: Examine the roles of sensors, communication networks, and data platforms in smart city systems. * Evaluate application areas: Assess the effectiveness of IoT in water management, earthquake detection, environmental sensing, and emergency response. * Compare global strategies: Investigate implementation approaches and architectures across international smart city projects. * Identify best practices and gaps: Highlight successful models and uncover limitations in current deployments. * Support Australian adoption: Provide strategic recommendations for Australian cities, informed by insights from global case studies.   **Expected outcomes:**   * Comprehensive Analysis of IoT Technologies: A detailed understanding of how sensors, communication networks (e.g., Wi-Fi HaLow or LoRaWAN), and data analytics platforms contribute to smart city functionalities. * Evaluation of IoT Applications: Evidence-based insights into the effectiveness of IoT systems in specific domains such as flood control, earthquake detection, environmental monitoring, wastewater management, and emergency response, highlighting performance metrics like response time, accuracy, and reliability. * Comparative Framework for Global Smart City Strategies: A structured comparison of IoT deployment strategies and system architectures across global smart cities, identifying key factors (e.g., governance models, public-private partnerships, or technology stacks) that drive success or pose challenges. * Identification of Best Practices and Limitations: A set of actionable best practices for IoT-driven smart city solutions, alongside a clear outline of current technological, regulatory, or infrastructural gaps that limit scalability or effectiveness. * Strategic Recommendations for Australian Cities: Tailored strategies for Australian urban planners and policymakers to adopt IoT-based smart city solutions, informed by global case studies, with a focus on addressing local challenges like water scarcity or disaster preparedness. |
| Key words (4-6) | * IoT (Internet of Things) * Smart Cities * Smart Water Management * Emergency Response |
| Answerable research questions for 3-5 students (desirable) | * How do different IoT sensor technologies (e.g., water level sensors, seismic sensors, air quality monitors) compare in terms of accuracy, cost, and scalability for smart city applications like flood control, earthquake detection, and environmental monitoring? * What are the key architectural differences (e.g., centralised vs. decentralised systems, cloud vs. edge computing) in IoT deployments across global smart cities, and how do these impact system performance and resilience? * What are the measurable impacts of IoT-based systems on urban challenges (e.g., reduced flood response times or enhanced emergency response efficiency) in at least three global smart city case studies? * What are the primary barriers (e.g., technological, regulatory, or financial) to implementing IoT-based smart city solutions in Australian cities, and how have international cities addressed similar challenges? * How can lessons from international smart city IoT deployments be adapted to support sustainable urban development in Australian cities? |
| 4-5 key references (desirable) and website resources | 1. Helen K. Liu, Yu-Wei Guo, and Liang-Yu Chen. 2023. Crowdsourcing Smart City: SmartTaipei Project. In Proceedings of the 24th Annual International Conference on Digital Government Research. 2. Belli, L., Cilfone, A., Davoli, L., Ferrari, G., & Adorni, P. (2020). IoT-Enabled Smart Sustainable Cities: Challenges and Approaches. MDPI Sustainability, 12(18), 7268. 3. Shahid, M. A., & Sharma, S. (2021). A Disaster Management Framework Using Internet of Things‐Based Interconnected Devices. https://doi.org/10.1155/2021/9916440. 4. Haque, A. K. M. B., Bhushan, B., & Dhiman, G. (2021). IoT-enabled smart cities: a hybrid systematic analysis of key research areas, challenges, and recommendations for future direction. Discover Cities, 1(1), 1-27. 5. Bibri, S. E., & Krogstie, J. (2020). Environmentally sustainable smart cities and their converging AI, IoT, and big data technologies and solutions: an integrated approach to an extensive literature review. *Energy Informatics*, 3(1), 4. |
| Required major of studies, desirable skill sets, knowledge, and speciality | Required fields of study   * Understanding of IoT architectures/technologies, sensor networks, and data analytics. * Ability to conduct systematic literature reviews, smart city case studies, and comparative analyses. * Technical writing skills in documenting research findings, creating reports, and presenting actionable recommendations |
| **Industry-based project: Student IP Agreement.** This is the IP model agreed between the parties. Please note that it is QUT policy that where possible students should be allowed to keep their IP. If students are asked to assign their work, then please **provide a brief rationale** as additional permissions are needed by QUT to approve. | Project IP vests in the student with a license back to Industry Partner **(licence)**  OR  Project IP vests in the Industry Partner/Project owner with a licence back to the student **(assignment)**  OR  Academic project (No IP agreement needed) |
| Number of students (4-5) | 4-5 |
| The message from supervisor(s) about the acceptance for this project |  |
| Student name(s)  (Print your name and submit this form by the end of Week 2) |  |
| Date |  |
| Remarks on conditions of offer |  |