UNSW Scientia PhD Scholarship

Fusion of Earth Observation data and 3D city models

Description: Earth observation platforms (drones, micro-satellites) have become inexpensive, recording massive amounts of data via thermal, colour, infrared, and radar cameras for different applications, such as urban planning, vegetation dynamics monitoring, and natural hazard monitoring. 3D data fusion, a crucial piece missing in the big puzzle of remote sensing data, would accelerate existing research in city analytics, urban heat islands, land use change, water surface dynamics or mangrove systems.

The aim of this project is to develop innovative approaches to automatically integrate data from different observation platforms, diverging spatial and spectral parameters, considering scale and resolution and automatically merging them with highly detailed 3D models. This is an extension to modelling scenes as complete, 3-dimensional objects using voxels (3D pixels), which will also allow analysis of temperatures, air flows or pollution in the air between the objects. 3D fusion of the aforementioned information with in-situ sensor data will better support modelling comprehensive radiation balances and will contribute to obtaining highly accurate estimates of energy balance and biomass, key parameters of the water and carbon cycles at vegetation systems, and of micro-climate in urban environments.

Keywords: 3D modelling, Earth Observation, Imaging Sensors, Image Data Fusion, 3D Reconstruction

Ideal Candidate: The candidate must have a background in Geomatics with a strong interest in image analysis, or a background in computer vision with a strong interest in 3D spatial information. In both cases, the candidate should have good programming skills, competence in 3D modelling and spatial analysis, understanding of machine learning, and fascination for Earth science applications. The candidate must have passion and a strong commitment to making a difference in the world. A publication record and project/work experience would be beneficial.

Supervisory Team: Prof Dr. Sisi Zlatanova, Dr. Ben Gorte, Prof. Dr. Graciela Metternicht

The supervisory team has been working together to establish an interdisciplinary, cross-faculty, Geospatial Research Innovation and Development Hub (GRID) at UNSW. The team also has a common passion and track record in the field of theoretical and applied geomatics for solution-oriented research in different applications; and a strong track record in supervision of over 100 HDRs to completion.

This project falls under the umbrella of the GRID initiative, strengthening ongoing collaboration. Zlatanova and Gorte will host the PhD student at the purpose-built facility in the Faculty of Built Environment (FBE) to host the GRID; guiding the student in all aspects of image data fusion, 3D modelling, programming and testing. Metternicht will advise on land and environmental application needs of data fusion, assisting in securing datasets through her involvement with Australian initiatives like the Terrestrial Ecosystem Network (TERN); as well as her guidance in mainstreaming of research outputs in policy and planning.

The FBE will provide drones and other appropriate for the research equipment. The team is highly experienced in dissemination of research results via peer-reviewed publications. This practice will apply to this project, mentoring the HDR candidate to publish and, hence develop a solid basis for future career development.

UNSW Scientia scholarship: The UNSW Scientia PhD Scholarship Scheme is a prestigious scholarship and is part of UNSW's dedication to harnessing cutting-edge research to solve complex problems and improve the lives of people in local and global communities. A Scientia scholarship consists of a stipend of 40k per year, up to 10K per year for career development and full cover of tuition fees for four years.

Expression of Interest will close at 11.59pm on 20 July 2018

UNSW Scientia PhD scholarship: https://www.2025.unsw.edu.au/apply/

Application: https://www.2025.unsw.edu.au/apply/scientia-phd-scholarships/fusion-earth-observation-data-and-3d-city-models

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