



Integrated System for 3D Optimisation of Construction Site Layout Planning

Description: Construction site layout planning affects construction safety and field performance greatly, especially for large scale and complex projects. Traditionally, site layout relies on visual inspection and 2D drawings, but the layout issues related to construction equipment, resources, activities and neighbourhood existing buildings are by nature a 3D problem. Frequent changes on the construction site due to construction progress, relocation of major equipment and material storage, etc, require an efficient method to capture the construction site layout and produce an accurate representation of the job site.

The recent photo-modelling approaches to produce coloured point clouds and create 3D texture models provide opportunities for project managers to quickly access the latest 3D site layout information and make decisions on site space planning.

This research aims to streamline the site space planning process by using photo-modelling to develop an automated process for a 3D model of a construction site. This 3D model can be used for space and layout planning of the construction site. The photo-modelling approach is intended to be integrated with other techniques, e.g. laser scanners, etc. for better outcome. Augmented reality will be used to enhance the visual perception on the construction site. Generated 3D models will be integrated with space optimisation mechanism and rule-based criteria to provide an efficient and cost-effective approach for construction site layout/space planning.

Keywords: construction site layout, 3D optimisation, site planning, point cloud, 3D photogrammetry



Ideal Candidate: The ideal candidate for this project would have a degree in engineering, geoinformatics, construction management, computer science, architecture or other related area, and with relevant experience on programming, image analysis, photogrammetry, 3D modelling and developing optimisation approaches. Additional skills and experience on developing 3D computational geometry algorithms, and knowledge of international standards such as BIM, IFC, CityGML, are desirable. The candidate is expected to have a publication record, and practical experience in one of the above mentioned areas is beneficial.

Supervisory Team: Dr. Cynthia Wang, Dr. Samad Sepasgozar, Prof Dr. Sisi Zlatanova

Dr. Wang is an expert in construction scheduling and site planning, with excellent understanding of the issues related to construction site layout planning. She will guide the student to establish optimisation mechanisms and rule-based system to be implemented into the 3D models. Dr. Sepasgozar has an extensive expertise in using real time locating systems, BIM, laser scanners and photogrammetry technology to solve practical problems in the construction industry. He will guide the student to utilise the technology in real-time situations. Prof. Sisi Zlatanova is recognised a world-class expert in 3D spatial modelling and analysis. She will provide extensive technical guidance and career development supervision to the student. The supervisory team is experienced in dissemination of research results via peer-reviewed publications. The student will be encouraged and mentored to publish high quality research papers, and develop a solid basis for future scientific career development.

The student and the scholarship will be managed within the Faculty of Built Environment at UNSW. The faculty offers excellent research, management and organisational environment, facilitating high quality and innovative research. Drones and other appropriate research equipment will be provided for this project.

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 international research collaboration, 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/integrated-system-3d-optimisation-construction-site-layout-planning>

Contact: cynthia.wang@unsw.edu.au; sepas@unsw.edu.au; s.zlatanova@unsw.edu.au;