2027 Summer Research Project Template

Section	Description
Project title	Assessing Congruence between Road Speed Signs and Digital Map Data for Intelligent Speed Assistance (ISA) Systems.
Hours & delivery	This project will commence on the 1 January 2027 and will involve **36 hours per week**. The successful applicant will be expected to be on campus, at the St Lucia Campus.
About the project	Modern vehicles are increasingly equipped with Advanced Driver Assistance Systems (ADAS), including Intelligent Speed Assistance (ISA), which rely on a combination of onboard cameras and digital map data to determine the applicable speed limit. At the same time, navigation applications such as Google Maps and other digital mapping services also provide speed limit information to drivers. However, digital map databases are not always updated at the same rate as changes to roadside traffic signs, potentially resulting in conflicting speed limit information. This project aims to assess the level of congruence between physical roadside speed limit signs and the speed limit information available through digital map providers using real-world road network data. The project will investigate where and why discrepancies occur and evaluate the potential implications for ISA systems, driver trust, and road safety.
What you'll do	You will contribute to collecting, processing, and analysing traffic sign and map-based speed limit data, helping to identify patterns of inconsistency and opportunities to improve the reliability of digital road infrastructure supporting connected and automated vehicles.
What you'll learn	You will gain practical experience in transport systems research, data analysis and intelligent transportation technologies. Throughout the project, students will develop skills in: * Collecting and processing traffic sign and digital map data. * Comparing and analysing speed limit information from multiple sources. * Identifying and classifying discrepancies between physical road assets and digital maps. * Using data analysis and visualisation techniques to communicate findings. * Understanding the role of digital infrastructure in supporting ADAS and Intelligent Speed Assistance systems.
Project outcomes	At the conclusion of the project, the student will be expected to produce: * A summary report documenting the methodology, analysis, and findings. * A presentation of the project outcomes to the research team. * Well-documented datasets and analysis outputs that may contribute to future research publications.

Who should apply?	This project is open to applications from students with: * A background in coding, data science, computer science, software engineering, mechatronics, civil engineering, or related disciplines; or * Third- or fourth-year undergraduate students with an interest in intelligent transport systems, GIS, or autonomous vehicle technologies.
Team & supervision	Dr. Stephany Berrio Perez Senior Lecturer, School of Mechanical and Mining Engineering
Additional requirements	If you are interested in this project, please send your CV and a brief statement outlining why you would like to join the project to **s.berrioperez@uq.edu.au**
Contact	Direct enquiries to: **s.berrioperez@uq.edu.au**

2027 Summer Research Project Template

Section	Description
Project title	Design of class 4 laser enclosure for the X2 Expansion Tube's optical benches.
Hours & delivery	This project will be 36 hours a week for 6 weeks, on-site.
About the project	UQ's X2 expansion tube is a hypersonic impulse wind tunnel used for the study of planetary entry and high-speed flight through the Earth's atmosphere. Due to the facility's short test time of around 100 microseconds, most experiments performed on the facility generally use optical diagnostic techniques to probe the test flows generated in the facility. While test conditions often generate appreciable flow emission which can be imaged with cameras and/or spectrometers, laser-based diagnostic techniques can allow us to measure quantities which cannot be measured using emission techniques alone. This is an important opportunity for the laboratory moving forward. However, lasers often produce concentrated light which can be hazard to the eyes and skin of people around them, necessitating enclosures to protect laboratory workers form the lasers being used. Recently, the laboratory has started the process of using lasers again, with small bespoke enclosures made for particular experiments.
What you'll do	This project aims to expand the focus of those efforts to encompass larger laser enclosures which completely enclose the optics benches used on the facility. It will also include consideration of a secondary barrier such as laser curtains or temporary walls to create a dedicated "laser area" on the facility and the use of interlocks on the enclosures and the facility to ensure that everything is in a safe state before the lasers are operated.
What you'll learn	The applicant will be able to get involved in work in a large experimental hypersonics laboratory and the engineering work required to perform upgrades and improvements on such a facility. They will also be exposed to the types of experiments which can be done with lasers in hypersonic flows, how they are set up and how people can operate laser-based diagnostics safely.
Project outcomes	Expected outcomes are a preliminary design for the enclosure and a report detailing the decisions made and why.
Who should apply?	As engineering design experience is required for this project, it is open to Mechanical and Mechanical and Aerospace students in their 3rd and 4th years. Students with some actual engineering design experience outside of coursework would be preferred but is not essential. Students will be required to do a basic laser safety training course to install awareness of all the safety issues associated with their use. Essential features of the design will be structural integrity and function and incorporating appropriate ergonomics so that the laser equipment can be used by researchers efficiently.

Team & supervision	Dr Chris James UQ Amplify Fellow, School of Mechanical and Mining Engineering
Contact	Direct enquiries to: **c.james4@uq.edu.au**

2027 Summer Research Project Template

Section	Description
Project title	Cloud-Based Geotechnical Data Analytics Platform with Web UI
Hours & delivery	30 hours per week. Offered via a hybrid arrangement (minimum 2 days per week on-site for collaborative working, with the remainder remote).
About the project	Modern geomechanical engineering generates vast datasets from laboratory and field testing, yet this data often remains siloed in static spreadsheets and disconnected local storage networks. This project seeks to bridge the gap between geotechnical engineering and modern data science by developing an integrated web application. The project aims to design an intuitive front-end user interface (UI) backed by scalable cloud storage to host and process high-frequency test telemetry. Furthermore, the platform will implement machine learning algorithms (such as regression trees or neural networks) to automate data filtering, predict failure parameters, and detect anomalies in real-time testing datasets.
What you'll learn	You will gain deep experience in full-stack web development, cloud data architecture, and the practical deployment of machine learning models on real-world engineering data.
Project outcomes	Key deliverables include: • A functional web UI prototype allowing users to seamlessly upload and visualize laboratory test files. • Configured cloud storage pipelines for secure data ingestion and backend computing. • A trained and integrated machine learning module capable of predicting rock strength parameters from raw test curves. • Submission of a repository containing clean, documented code alongside a brief technical report and system architecture diagram.
Who should apply?	This project is open to 3rd, or 4th-year students in Computer Science, Software Engineering, Data Science, or dual engineering degrees. You should have proficient programming skills in Python and familiarity with web frameworks (e.g., React, Flask, Django) and basic machine learning libraries (e.g., Scikit-Learn, TensorFlow).
Team & supervision	Dr Jimmy Li Postdoctoral Research Fellow, School of Mechanical and Mining Engineering

Additional requirements	You are requested to contact the supervisor via email before applying. Please also attach a brief 1-page CV and a copy of your academic transcript highlighting relevant programming coursework.
Contact	Direct enquiries to: **jimmy.li@uq.edu.au**

2027 Summer Research Project Template

Section	Description
Project title	Characterisation of Rock Strength via Comprehensive Laboratory Testing
Hours & delivery	28 hours per week. Delivered strictly on-site due to laboratory safety and physical testing requirements.
About the project	Accurate characterization of rock mass strength and deformation behaviour is foundational to safe civil infrastructure and mining designs. Traditional empirical design methods often oversimplify complex geomechanical responses under varied stress states. This project aims to systematically evaluate the mechanical properties of intact rock specimens through a rigorous laboratory testing program.
What you'll do	You will prepare and test core samples using Unconfined Compressive Strength (UCS) and Triaxial compressive testing equipment. Using the resulting stress-strain data, the project will map out critical failure envelopes (e.g., Hoek-Brown and Mohr-Coulomb criteria) across multiple lithologies. This research will help refine baseline datasets used in predictive slope stability and underground excavation engineering models.
What you'll learn	You will gain highly practical, hands-on experience operating specialized rock mechanics laboratory equipment and managing strict engineering safety protocols.
Project outcomes	Key deliverables include: • Active participation in sample preparation and physical triaxial/UCS testing sequences. • Processing, filtering, and analysis of high-frequency stress-strain data. • Generation of a comprehensive final laboratory testing report outlining determined failure envelopes. • A 10-minute presentation summarizing findings to the research group at the conclusion of the 6 weeks.
Who should apply?	This project is open to undergraduate students of year 1-3 with strong interests in mining geotechnical engineering.
Team & supervision	Dr Jimmy Li Postdoctoral Research Fellow, School of Mechanical and Mining Engineering
Additional requirements	You are encouraged to contact the primary supervisor via email to discuss the project scope and arrange a brief lab tour prior to submitting a formal application.

Contact	Direct enquiries to: jimmy.li@uq.edu.au