NATHAN SIVALINGAM

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CAREER SUMMARY

Engineering student working across mechanical systems and software to design, build, and validate real-world solutions. Experienced in experimental analysis, computational modelling, and application development, with the ability to move fluidly between physical and digital domains. Motivated by technically rigorous problems that benefit from both engineering fundamentals and modern software.

EDUCATION

Bachelor of Mechanical Engineering (Honours) and Bachelor of Science (Computer Science) (BE (Hons) BSc) 2021 - Ongoing
University of New South Wales, Sydney, NSW

Global Summer School Program in Emerging Engineering, Artificial Intelligence and High-end Manufacture 2025 - 2025
South China University of Technology, Guangzhou, Guangdong

WORK EXPERIENCE

Research Assistant at the University of New South Wales, Aug 2025 - Ongoing
Augmented Reality Project *JigSpace, SolidWorks*

- Developed **10+ augmented reality (AR) models** to support the teaching of core mechanical design concepts in a university course with **300–400** enrolled students, enabling interactive visualisation of complex components and assemblies.
- Collaborated with **JigSpace** engineers and product staff to enhance the functionality of AR software used for model development, contributing technical feedback that improved usability and deployment.

Casual Academic at the University of New South Wales, Aug 2024 - Ongoing
Academic Demonstrator *SolidWorks, MATLAB*

- Academic Demonstrator for **MECH3610** (Advanced Thermofluids), **DESN3000** (Strategic Design Innovation), **MMAN3400** (Mechanics of Solids 2), **MECH3110** (Mechanical Design 1), and **DESN2000** (Engineering Design and Professional Practice).
- Delivered **in-person workshops** to classes of **30 students**, working through individual engineering questions and providing guidance on group project activities.
- Responded to **technical and non-technical forum queries** for cohorts of up to **400 students**.

MAICO Property Services, Dec 2021 - Sep 2024
Contractor *Microsoft Office, EWP Licence, General Construction White Card*

- Operated **elevated work platforms (scissor lifts)** to facilitate structural and mechanical inspections, directly supporting consulting engineers in live construction environments.
- Coordinated on-site logistics and contractor activities across **multi-million dollar infrastructure projects**, including the renovation of **Parklea Correctional Facility**.

PROJECT EXPERIENCE

Vortex Generator Height Effects on Photovoltaic Module Cooling, Dec 2024 - Dec 2025
Undergraduate Thesis Project *MATLAB, FLIR, CFD, SolidWorks*

- Used **cylindrical vortex generators** to reduce photovoltaic module temperatures by up to **1.12 °C**, addressing conversion efficiency losses at elevated operating temperatures.

- Established that **15 mm cylindrical vortex generators** were more effective at cooling photovoltaic modules than **75 mm** devices.
- Identified the influence of **tripod positioning** on experimental outcomes, thereby challenging the validity of results recorded by past thesis students.
- Compared experimental testing at the **UNSW Large Aerodynamic Wind Tunnel** with **Computational Fluid Dynamics (CFD)** models to successfully cross-validate results.

AI Cover Letter Builder, Dec 2025 – Jan 2026
Full Stack Development Project *React, JavaScript, Python, Vercel, AWS*

- Developed a **web-based application** that generates **tailored cover letters** by analysing a user's **resume** alongside a **job description**.
- Implemented a **Python-based backend** to extract relevant skills and experience from uploaded resumes and combine them with role requirements for structured input to an **AI language model**.
- Integrated an **AI-driven text generation pipeline** to produce **role-specific, professional cover letters** derived solely from user-provided inputs, with support for **preview and PDF download**.
- Applied **responsible AI design principles**, ensuring no fabrication of qualifications and retaining **user oversight** for review, editing, and final submission.

Alpha Type Stirling Engine, Aug 2024 - Dec 2024
Mechanical Design Project *SolidWorks, MATLAB*

- Designed, manufactured, and assembled a **fully operational alpha-type Stirling engine**.
- Used **Computer-Aided Design (CAD)** software to design engine components and produce a **complete assembly drawing**.
- Manufactured the base plate and support brackets using a **Computer Numerical Control (CNC) drilling machine** to ensure stable engine operation.
- Performed **flywheel performance analysis** to identify the highest-RPM configuration, achieving a **34% increase in rotational speed**.

System and Software for Smart Vehicle Parking Management: Park Pilot, Oct 2025 - Dec 2025
Computer Science Project *React Native, JavaScript, Python*

- Developed a **mobile application** that optimised parking allocation using **shortest-path algorithms** and **real-time occupancy tracking**.
- Analysed the performance of **A*** and **Dijkstra's** shortest-path algorithms across varying car park sizes, finding **A*** to be **0.9× slower** on smaller networks but **1.8× faster** on larger, more realistic car parks.
- Modelled **carbon emission reductions** and simulated **revenue generation** through carbon credit earnings.

LICENSES/CERTIFICATIONS

Elevated Work Platform License, EWPA. Jun 2022 - Jun 2027
General Construction White Card, SafeWork NSW Dec 2021

EXTRA-CURRICULAR ACTIVITIES

Brazilian Jiu Jitsu Competitor Jun 2022 – Ongoing
Semi-Professional Football Player Jun 2018 – Dec 2021