NATHAN SIVALINGAM

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CAREER SUMMARY

Double-degree engineering student bridging mechanical design and software development to solve complex problems. Delivered experimental thermal management research (1.12 °C PV cooling improvement) while developing AR teaching tools and full-stack applications. Skilled in SolidWorks, CFD, React, and Python. Pursuing opportunities where engineering rigor meets innovative software solutions.

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 multiple augmented reality models aimed at enhancing the teaching of mechanical design concepts to university students.
- Collaborated with JigSpace employees to enhance the functionality of the augmented reality software used for model development.

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 and assistance on group project activities.
- Responded to technical and non-technical forum queries for cohorts of up to 400 students.

PROJECT EXPERIENCE

System and Software for Smart Vehicle Parking Management: Park Pilot, Oct 2025 - Dec 2025
Computer Science Project *JavaScript, React, Node.js, Express.js, Nest.js, 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.

Engineering Portfolio Website Dec 2023 - Jan 2024
Full-Stack Development Project *Next.js, React, TypeScript, Tailwind CSS, Vercel*

- Built a modern, responsive portfolio website using Next.js 14+ to showcase mechanical engineering and computer science projects.

- Implemented SEO optimisation, type-safe development practices, and automatic CI/CD deployment pipeline on Vercel.
- Designed a clean, professional interface with smooth animations and full mobile responsiveness using Tailwind CSS.

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

- Designed, manufactured, and assembled a fully operational alpha-type Stirling engine.
- Computer Aided Design (CAD) software was used to design the necessary components and create an assembly drawing of the entire engine.
- A Computer Numerical Control (CNC) drilling machine was used to manufacture the base plate and brackets required to keep the engine stationary during operation.
- Performed flywheel performance analysis to identify the highest-RPM configuration, achieving a 34% increase in rotational speed.

An Investigation into the Height Effects of Vortex Generators in Photovoltaic Module Temperature Reduction under Forced Convection Conditions, 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.
- Compared experimental testing at the UNSW Large Aerodynamic Wind Tunnel with Computational Fluid Dynamics (CFD) models to successfully cross-validate results.

Hand Gesture Robot, Dec 2023 - Jan 2024
Automated Mechatronics Project *SolidWorks, FEA, Python, C++*

- Developed a gesture-controlled autonomous vehicle operable via complex hand signals at distances of up to 100 metres.
- Used Finite Element Analysis (FEA) to optimise the chassis cover design, reducing structural mass by 14% while maintaining integrity.

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