

# NATHAN SIVALINGAM

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## EDUCATION

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**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

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**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

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**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.

**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.

**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.

### **Hand Gesture Robot,**

*Automated Mechatronics Project*

Dec 2023 - Jan 2024

*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.

### **Personalised Website,**

*Frontend Development Project*

Dec 2023 - Jan 2024

*JavaScript, React, TypeScript, HTML, CSS*

- Developed a personal website using React and modern front-end development practices.
- Deployed an interactive mini-games module enabling users to play online games including Tic-Tac-Toe and Sudoku.
- Applied colour theory principles to design an accessible and visually appealing user interface.

## **LICENSES/CERTIFICATIONS**

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Elevated Work Platform License, EWPA.

Jun 2022 - Jun 2027

General Construction White Card, SafeWork NSW

Dec 2021

## **EXTRA-CURRICULAR ACTIVITIES**

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Brazilian Jiu Jitsu Competitor

2022 - Ongoing