

MARCO LAU

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Education

University of Auckland

Mar. 2025 – Nov. 2028

Bachelor of Engineering (Honours) in Electrical and Electronic Engineering

Auckland

Relevant Coursework

- Embedded Programming
- Electronic Circuits
- Mathematical Modelling
- Altium PCB Design

Projects

Furuta Pendulum | C++, Arduino, Fusion 360, DMM, PSU

Inter-Semester Break 2026

- Designed and built a rotary inverted pendulum using a stepper motor, quadrature encoder, motor driver, and Arduino.
- Developed embedded firmware to read encoder signals and estimate system states, implementing PID and LQR controllers to stabilise the pendulum upright.
- Integrated the control circuit on a breadboard and custom tower build for the electronics and mechanics.

Smart Energy Monitor | Embedded C, ATmega328P, Oscilloscope

Semester 2 2026

- Design an ATmega328P monitor measuring AC mains voltage, current, and power, with a Zener-clamped resistive-divider front end and a shunt-resistor current sensor.
- Configure the ADC, Timer, UART, and digital I/O at the register level, using zero-crossing-synchronised sampling to compute true RMS and peak values.
- Write 9600 baud 8N1 UART firmware streaming readings to an HM10 BLE module and a PC terminal over FTDI with a 7-segment display; verify in LTspice, Proteus, and on Xplained Mini hardware.

Custom Macropad | Firmware, Fusion 360, 3D Printing, DMM

Summer 2026

- Designed and built a programmable mechanical macropad using a microcontroller, mechanical switches, and isolation diodes wired to individual GPIO.
- Configured firmware for key scanning, debouncing, and configurable keyboard shortcuts.
- Designed and 3D-printed a custom enclosure to house the PCB and mechanical switches.

Progressive Overload Device | ESP32, Signal Processing, C++

In Progress

- Develop a portable device to track exercise movement using an ESP32 and inertial measurement unit.
- Process accelerometer and gyroscope data to count repetitions and analyse movement during resistance training.
- Design the circuit architecture integrating the microcontroller, sensor, display, and battery, with a compact enclosure.

Extracurricular Activities

ECSE Design Competition

Inter-Semester Break 2026

Embedded Systems Team Member

University of Auckland

- Built a two-player rhythm game inspired by *Piano Tiles* using two custom 1×4 mechanical macropads.
- Designed a custom PCB using Altium and an enclosure in Fusion 360, then assembled and tested the hardware with the game software.

Work Experience

Tutoring for Excellence / Private Tutor

Feb. 2026 – Present

Tutor

Auckland, New Zealand

- Tutor students in mathematics and physics, preparing tailored lessons and practice problems to build problem-solving skills and confidence.

Sumthin Dumplin / Good Dog Bad Dog

Oct. 2023 – Present

Cook & Customer Service

Auckland, New Zealand

- Prepared customer orders accurately in fast-paced kitchens and served customers directly, helping grow the store's five-star reviews.

Local Cabinet Installation Company

Jan. 2022 – Jan. 2024

Assistant Installer

Auckland, New Zealand

- Assisted with cabinet installation using technical drawings, measurements, and hand/power tools, following accuracy and safety requirements.