Nathanael Richard Ha Hanes 夏國龍

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Education

國立台灣大學 National Taiwan University — *Taipei City, Taiwan*

BSc in Biomechatronics Engineering — *August 2022 –June 2026*

University of Waterloo — *Ontario, Canada*

Exchange Student Program in Mechatronics Engineering — *August 2024 –December 2024*

- Involved in exoskeleton testing (designed to assist individuals with disabilities in their rehabilitation) in the Neuromechanics and Assistive Robotics Lab

Work Experience

Robots and Medical Mechatronics Lab (RMML) — *Taipei City, Taiwan*

Undergraduate Researcher | Delta Electronics - NTU Joint Research (Surveillance Robots) — *June 2024 –Present*

- Developed a simulation environment on Linux using NVIDIA Isaac Sim to extract data and generate a digital twin for supervisory teleoperation by implementing a ROS bridge via a ROS node that subscribes to the physical robot, ensuring that movements in the real robot are mirrored in the simulation
- Designed buttons and valves by converting CAD files into simulation-ready formats and added spring-damping dynamics

Waterloo Reality Labs — *Ontario, Canada*

Software and Firmware Engineer — *September 2024 –December 2024*

- Leveraged Scikit-Learn to implement AUC-ROC and AUC-PR metrics, significantly improving the accuracy tracking of the existing PyTorch model, achieving consistently high values—0.9998-1.0000 for AUC-ROC and 0.9996-0.9999 for AUC-PR
- Developed and optimized a few-shot learning model using the siamese neural network architecture with a contrastive loss function, improving test accuracy by +30.49% (from 71.19% to 92.87%) and boosting precision by +52.74% (from 0.5735 to 0.8760) over the feedforward model
- Implemented triplet loss function in the PyTorch siamese neural network model, achieving +29.66% improvement in test accuracy (from 71.19% to 92.27%) and maintaining perfect recall (1.0000) compared to the feedforward model baseline
- Integrated NeonDB with various PyTorch models, storing training metrics while managing 0.5 GB storage limits by dynamically deleting older rows
- Designed and implemented a storage monitoring and automated cleanup system for managing feedforward neural network model weights on Backblaze B2, reducing storage overhead by up to 20% and ensuring seamless uploads within the 10GB free tier limit
- Configured Raspberry Pi 5 as a USB-C gadget by managing kernel modules and overlays for USB device mode
- Created custom USB gadget interfaces (Ethernet over USB) using libcomposite and configfs
- Automated system bring-up through systemd services to ensure reliable, repeatable firmware initialization

Instant NanoBiosensors — *Taipei City, Taiwan*

Software Engineer — *June 2024 –August 2024*

- Developed robotic automation systems for Brooks PreciseFlex 400 robot arm using telnet over LAN for control and calibration
- Built a Node.js application for TCP Command Server communication and automated cabinet operations with Python, incorporating threading and queue data structures; managed code with Git
- Created Python classes for real-time monitoring of the cabinet states
- Utilized SQL for database operations and normalization; wrote documentation for troubleshooting and code functionality. Furthermore, I explored STM32F103C8T6 microcontrollers for circuit testing and fan performance analysis

GIS (Global Initiatives Symposium) — *Taipei City, Taiwan*

GPDA (Global Partnerships and Delegate Affairs) — *September 2023 –July 2024*

- Promoted GIS Taiwan 2024 at Mahidol University, Thailand, and invited attendees to join our summer event in Taiwan
- Managed delegate affairs and global partnerships using Gmail and Excel, collaborating with organizations like the Canadian Trade Office in Taipei
- Organized key events, including a Day 0 introductory session to set the stage for the symposium and a Cultural Festival for cultural exchange
- Emceed the AI Keynote Speech event for around 150 participants

國立台灣大學 National Taiwan University — *Taipei City, Taiwan*

EMI (English as a Medium of Instruction) TA Tutor — *August 2023 –June 2024*

- Engage EMI TAs in discussions to refine and practice useful English phrases for their job, seeking their feedback on applicability
- Foster collaboration through scenario-based training to help TAs learn how to support troubled students and maintain an open-door feedback policy
- Facilitate a smooth student-to-TA transition by involving TAs in decision-making

NTUAI *Taipei City, Taiwan*

Technology Department Cadre (學術部干部) *June 2023 –June 2024*

- Took on the role of managing projects related to the democratization of AI and other events
- Acted as a team leader in presenting a CVPR paper in detail to lots of people
- Delivered lectures on AI fundamentals, tools (Gamma AI, ChatGPT, ChatPDF), Python programming, and Introduction to Machine Learning to a class of 10 students across two semesters

WillStudy *Taipei City, Taiwan*

Marketing Specialist *June 2023 –September 2023*

- Used SEO (Search Engine Optimization) and Google's data analytics, as well as performing some data analysis and changing the articles accordingly to make them optimized on the Google search engine
- Wrote 10 overseas study articles about my study-in-Taiwan experience and useful information about Taiwan overall
- Conducted and led interviews with 5 individuals using pre-researched and tailored scripts to gather qualitative insights and support data-driven decision-making

Volunteering

Feb 2023 - Jun 2023: International Companions for Learning, NTU Meet and Greet, International Student Volunteer
Jun 2023 - Aug 2023: OC16 (Orientation Camp 16) Volunteer

Skills and Languages

Technologies: ROS2 Humble, Python, C++, JavaScript, SOLIDWORKS, PyTorch, MATLAB/Simulink, Git/GitHub
Languages: English (Native/Fluent), Bahasa Indonesia (Native/Fluent), Chinese (Professional Working Proficiency)

Projects

Fluid Mechanics Optimization Project *MATLAB*

Collaborated on a 5-person project to develop a MATLAB-based simulation for optimizing the drainage efficiency of a fluidic system. Leveraged engineering principles, including Bernoulli's equation, frictional losses, and flow regime transitions (laminar, turbulent, and transitional), to analyze system performance and determined the optimal discharge pipe length to minimize drain time while maximizing water travel distance

View Project

Mobile Job Search App *JavaScript, HTML/CSS, React Native*

This job search application uses the React Native framework while fetching an API from the RapidAPI.com website. This application was also coded using Javascript, HTML, and CSS as its main programming language

View Project

Line Tracking and Object Avoidance Robot *C/C++, Arduino, Atmel AVR*

Collaborated on a two-person project to design and develop a Line Tracking and Object Avoidance Robot using advanced algorithm logic and hardware integration. The project involved programming infrared sensors for precise line tracking and implementing distance measurement sensors for effective obstacle avoidance

View Project

SOLIDWORKS Tractor Project *SOLIDWORKS*

Designed and modeled a Kubota L2202DT tractor using SOLIDWORKS, creating 32 detailed parts and assembling them into a comprehensive 3D model. The project involved taking precise measurements of the real tractor, ensuring accuracy in the CAD model

View Project

Licenses and Certifications

Jan 2025	**AWS Certified Cloud Practitioner (CCP)**,	*Amazon Web Services (AWS)*
Nov 2024	**AWS Educate Introduction to Cloud 101**,	*Amazon Web Services (AWS)*
Aug 2023	**Google Cybersecurity**,	*Google*
Dec 2019	**Web Master Certificate**,	*Computer First Indonesia*