

STAFFORD HO SHENG XIAN

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Summary

Final-year Robotics Systems Engineering undergraduate with hands-on experience in industrial automation, embedded systems, and edge AI deployment. Skilled in C/C++, Python, PLC programming, and ROS2, with a track record of delivering autonomous robotic systems, sim-to-real reinforcement learning pipelines, and stakeholder-facing demonstrations at national and international levels.

Work Experience

Student Assistant – Research, Singapore Institute of Technology

Aug 2025 – Present

- Contributed to an **NVIDIA academic grant** application and **GTC 2026 poster** submission for OctopAI, a biomimetic soft-robotics manipulation project built on Adaptive Visual-Language Navigation (AdaVLN).
- Remotely supervised Shanghai University students on OctopAI experiments.
- Trained reinforcement learning policies in **MuJoCo** using Stable-Baselines3 for OctopAI soft robotic arm manipulation; developed an STM32-based control stack with UART telemetry and ESP32 Wi-Fi bridging, and built a Python GUI for **sim-to-real policy deployment** to the physical arm.

Application Engineer Intern – Robotics Solution, OMRON

Jan 2025 – Dec 2025

- Deployed a fully autonomous **Mobile-Manipulator (MoMa)** system for 24/7 industrial operations, improving throughput by 10%. Wrote the PLC decision-making and navigation stack, mapped environments for traversal and docking, and built **Digital Twin** simulations using Virtual Fleet Manager (VFM) for multi-robot path planning and traffic control.
- Programmed pick-and-place routines in **TMflow** on OMRON TM cobots with end-to-end error-recovery sequences; delivered stakeholder POC demonstration videos showcasing multiple vision-based picking techniques.
- Architected a **generic C++ ONNX inference API** for edge vision controllers, achieving a 36% inference speedup through ONNX Runtime optimization. Built an automated 2D imaging pipeline for industrial liquid-lens cameras in Python.
- Delivered a real-time **hand-tracking demonstration for ITAP 2025**, presented to the Minister of State for Trade and Industry. Deployed NPU-accelerated palm and hand-landmark detection on an **STM32 edge AI board**; wrote a Python bridge to stream joint coordinates over serial to a **6-DoF dexterous robotic hand** via **Modbus RTU**, mounted on an OMRON TM cobot for live gesture mirroring.

Student Assistant – Research, Singapore Institute of Technology

Sep 2024 – Aug 2025

- Trained Neural Network and Random Forest models to predict microbial concentration from colourimetric biosensor readings; deployed the final model as a **TensorFlow Lite** pipeline on Android and Raspberry Pi for real-time contamination classification and automated biocide dispensing.
- Delivered a successful live demonstration for **MINDEF Singapore** and co-authored a manuscript presented at **Biosensors 2025**.

Student Assistant – Projects, Singapore Institute of Technology

Aug 2023 – Feb 2025

- Led a 3-member team to design and fabricate a proof-of-concept net launcher for **National Parks Board (NParks)** within a 4-week sprint.

- Developed technical documentation for **Mechatronics Design** workshops on **ROS2**-based sensor and actuator integration with TurtleBot3 Burger and Arduino serial communication.
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Projects

SPARK Challenge 2026 – Event-Based Pose Estimation (Stream 2)

Feb 2026 – Mar 2026

- Achieved **9th place globally** at the AI4Space 2026 workshop (CVPR 2026) in **Stream 2** by building a **6-DoF spacecraft pose estimation** pipeline from event-camera data.
- Trained and evaluated on the **SPADES** dataset using both **Synthetic** and **Real** event data, with a voxel-grid representation (5 temporal bins \times 2 polarities) for spatio-temporal encoding.

CV-RL Autonomous Drone Pipeline (Isaac Sim + OmniDrones)

Dec 2025 – Feb 2026

- Developed a **Teleop** \rightarrow **Behaviour Cloning** \rightarrow **PPO fine-tuning** pipeline for autonomous quadrotor navigation with obstacle avoidance in NVIDIA Isaac Sim.
- Built a custom Gymnasium environment with collision detection, obstacle randomization, expert-demonstration capture, and training diagnostics.

Cube Satellite Building Workshop (SpaceFaculty)

Apr 2026

- Built a complete CubeSat avionics stack comprising three Arduino-based subsystems (**Ground Station**, **OBC**, **ADCS**) communicating over **LoRa 434 MHz** radio with token-based security routing, onboard camera image capture with chunked binary transmission, and asynchronous inter-subsystem command routing.
 - Developed ADCS firmware integrating an IMU, sun sensors, GPS with NMEA parsing, and a reaction wheel driven by a **PID sun-pointing controller** with shake-override safety logic.
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Education

Bachelor of Engineering (Honours) in Robotics Systems, Singapore Institute of Technology

Aug 2022 – Apr 2026

- Ngee Ann Kongsi Scholarship Recipient (AY2025/26)
- Leadership: President, Student Management Committee (2022/23); Year Representative (2023–2026)
- Academic: Student Coach at Catalyst Makerspace-SIT@Dover and ProjectHub-SIT@Punggol

Diploma in Electronic Systems, Nanyang Polytechnic

Apr 2017 – Apr 2020

Technical Skills

- **Programming Languages:** C, C++, Python, Kotlin, MATLAB, Structured Text (PLC), Ladder Logic
- **AI / Machine Learning:** PyTorch, ONNX Runtime, OpenVINO, OpenCV, Stable-Baselines3, TorchRL, Gymnasium, Behaviour Cloning, PPO, SAC, A2C, TD3
- **Robotics & Simulation:** ROS/ROS2, micro-ROS, MuJoCo, SOFA, NVIDIA Isaac Sim, OmniDrones, MATLAB/Simulink, Simscape Multibody, RoboDK, SolidWorks, Visual Components
- **Industrial Automation:** Sysmac Studio, Mobile Planner, TMflow, EtherNet/IP, Modbus (RTU/TCP), MQTT, MQTTX, MQTT Explorer, OpenVPN
- **Embedded:** STM32 (CubeIDE/MX), ESP32, Arduino, Raspberry Pi, UART, I2C, SPI, CAN bus, Motor control, UDP Wi-Fi-to-Serial bridging