Jeremy Choo

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EDUCATION

Nanyang Technological University, Singapore Aug 2022 – May 2026

Bachelor of Engineering (Mechanical Engineering)

Ngee Ann Polytechnic, Singapore Jun 2017 – Nov 2020

Diploma in Clean Energy Management

WORK EXPERIENCE

Home Team Science & Technology Agency (HTX) Jan 2025 – Jun 2025

Robotics and AI Intern

- Developed an AI chatbot with a Retrieval-Augmented Generation (RAG) pipeline using Ollama and LangChain with four languages (English, Chinese, Malay and Tamil).
- Designed user interface for AI chatbot using REACTJS Frontend and FASTAPI Backend.
- Simulated motion control for Bipedal Humanoid Robot Platforms(Fourier GRX and AGI Bot A2) on Webots, before implementing gestures and actions.
- Conducted field testing in Changi Airport for Patrol Robot, GIBSON, ensuring robustness and seamless user transition.
- Deployment of roadshow robot, CODY, with Singapore Police Force at Expo to gather user feedback.

Nanyang Technological University Sep 2023 – Current

Maker and Tinkering Lab Assistant

- Researched most optimal components for a high performance VORON 3D printer, sourcing each part individually.
- Constructed the VORON with suitable high voltage transformers and appropriate crimps and connectors for electronics, and an improved toolhead, sensorless homing and inductive probe, using Klipper firmware.
- Designed a Smart Lab by integrating LLM using Home Assistant to seamlessly control Smart Lights and Fume Extractor.
- Developed an AI Assistant for students to consult on projects and lab guidelines.
- Mentored over 50 CN Yang Scholars in electronics, CAD design, and prototyping.
- Designed and 3D-printed over 100 custom components in SOLIDWORKS for research projects.
- Maintained and serviced over 30 3D printers and 8 soldering stations, minimising downtime.

Nanyang Technological University Jan 2024 – Apr 2024

Teaching Assistant

- Taught a Motion Study Control Class using Ender 3 frames, Marlin firmware, and CNCjs software for 32 students.
- Evaluated student assignments and supported lab sessions, ensuring concepts were applied effectively.
- Troubleshooted technical issues with stepper motors and circuitry issues.

Ngee Ann Polytechnic Mar 2020 – Sep 2020

Software Developer

- Developed ROS-based software for mobile bases, with a focus on enhancing navigation.
- Successfully delivered three robotics projects, fulfilling all technical requirements and standards.
- Autonomous Mobile Base
  - Led a team of 3 in the end-to-end development of an Autonomous Mobile Base.
  - Designed and constructed the mechanical structure, circuitry, and SLAM algorithm from the ground up.
- NParks Patrol Robot
  - Partnered with NParks to deploy a safe-distancing robot at Bukit Timah Nature Reserve, enhancing public safety.
  - Integrated 3D SLAM on a SCOUT base with 3D LiDAR, enabling navigation in complex and obstructed environments on uneven terrain using 3D pointcloud.
  - Developed facial recognition and person detection software using OpenCV and PyTorch, improving real-time monitoring and compliance.
- Teaching Assistant Robot – CODDIE
  - Led the development of ROS navigation stack, and integration with LattePanda for user control.
  - Deployed in Hougang Primary School as a Teaching Assistant Robot to facilitate lessons.
  - Featured in multiple media outlets including Straits Times for innovative contributions to educational technology.
  - On-site troubleshooting with Oscilloscope to solve power issues and sensor failures.

ACADEMIC PROJECT

Nanyang Technological University, Singapore Aug 2025 – Current

Final Year Project – Development of a Avian-Inspired Bipedal self-takeoff Ornithopter

- Developed an avian-inspired jumping robot utilising a 2-bar leg linkage with spring element, achieving performance of $2m/s$ takeoff velocity and $10cm$ jumping height.
- Designed custom Wolfram Drive 3K planetary gearbox with Herringbone gears for a single stage gear reduction ratio of 22:1.
- Implemented CANBUS protocol for communication between Odrive controller for BLDC motors.

Ngee Ann Polytechnic, Singapore Oct 2019 – Mar 2020

Final Year Project – Autonomous Docking Station for Mobile Base

- Designed and fabricated a compliant docking station using SOLIDWORKS, to provide a return point for self-charging.
- Developed a docking protocol for an Autonomous Mobile Base using ROS, ensuring accurate and reliable docking.
- Troubleshoot mechanical failures restoring optimal docking procedure.

ACCOMPLISHMENTS

Dyson-NTU Product Development Challenge May 2023

Best Project

- Fabricated a prototype to provide communication for construction workers in defeaning environment.
- Integrated UWB modules with ESP32 and developed python software to triangulate position in realtime using MQTT.

Making & Tinkering 2023 Dec 2023

Best Project

- Developed a Mars Rover with Rocker-bogie suspensions, showcasing innovation in Automotive technology.
- Engineered and fabricated a custom PCB using KiCAD, enhancing the rover's operational efficiency by integrating 6 motor drivers, 2 PWM expansion boards, and power distribution with 3 distinct step-down voltages.
- Performed an in-depth motion study and stress analysis using SOLIDWORKS, significantly improving the rover's mobility and overall performance.

IdeasJam Hackathon May 2023

2^{nd} Place

- Designed an AR app for mental health consultation, integrating usercentric features to enhance accessibility.
- Developed a comprehensive business proposal with a roadmap and financial plan, demonstrating market viability.

CO-CURRICULAR ACTIVITIES

MECATRON Aug 2022 – Aug 2023

Software Lead

- Directed the software team for the Underwater Autonomous Vehicle competition.
- Simulated Vehicle platform, cameras and IMU sensors in Gazebo.
- Integrated a control system using Pixhawk with Jetson Nano and ROS.

SKILLS

Programming: Python, C, C++, HTML, Javascript, CSS, ReactJS, FASTAPI, Django, Selenium WebDriver, LabVIEW

Robotics & AI: ROS, ROS2, SLAM, Navstack, Gazebo, OpenCV, PyTorch, LLM, llama.cpp, LangChain, MQTT, ABB RobotStudio, Arduino, STM32

Software: Linux, Windows Powershell, Github, Bitbucket, SOLIDWORKS, Autodesk Fusion 360, Altium, KiCAD, AutoCAD, Simplify3D, LightBurn, CNCJS, Adobe Premiere Pro, Adobe Photoshop, Microsoft Office, Confluence

HardSkills: Troubleshooting, Soldering, Electronics, Multimeter, 3D Printer

LINKS

LinkedIn: https://www.linkedin.com/in/professionalchoo
Autonomous Mobile Base Project: https://tinyurl.com/mobilebase
Teaching Assistant Robot: https://tinyurl.com/coddieNP
Mars Rover Project: https://tinyurl.com/marsrovermnt