DAMIEN KOH

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EDUCATION AND SKILLS

Northwestern University, Evanston, IL Expected 2025

Eta Kappa Nu Member, Academic Honor Society of the Institute of Electrical and Electronics Engineers (IEEE)

B.S. in Computer Engineering, M.S. in Electrical Engineering specializing in Robotics | Cum. GPA: 3.96 out of 4.0

Skills

ROS2 | Git | Linux | C & C++ | Python | MATLAB | Embedded System Design & Programming (EAGLE & Microchip Studio) | Rapid Prototyping | Basic Machine Learning & Computer Vision | Next quarter: SLAM for Robotics, Intro to Feedback Systems

WORK EXPERIENCE

Robotics Research – Prof. Matthew Elwin *Jun 2023 – Aug 2023*

Robot Development, Research Assistant

- Developed a ROS package for customizable robot teleoperation across various devices, including game controllers and SpaceNav.
- Implemented configurable input/output schemes, intuitive naming, and Twist/PointStamped message support to enhance functionality.
- Fostered open-source collaboration by encouraging user contributions through demos and documentation for easier adaptation.

Weston Robot (www.westonrobot.com/) *Jun 2022 – Aug 2022*

Robotics Intern

- Developed a Trash-Picking Robot with a team, capable of patrolling an area for trash and disposing of it; developed robot arm and navigation control software in C/C++ and Python using ROS 1 and MoveIt (Demo: www.youtube.com/watch?v=fR2VynbYyuk).
- Implemented Machine Learning and Computer Vision alongside peers using YoloV5 for object detection.

National Service - Singapore Armed Forces *Jan 2019 – Nov 2020*

Army Intelligence and Reconnaissance Officer (Lieutenant)

- Served as Deputy Intelligence & Security Officer of 16th Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Battalion (16 C4I Bn). Attended the Battalion Advanced Intelligence Analysis Course and Officer Cadet School.

PROJECTS & STUDENT INVOLVEMENT

Translator & Writing Robot - PolyglotBot *ME 495 Embedded Systems in Robotics*

- In a team, developed an autonomous system translating written phrases and writing them onto a whiteboard with a Franka Robot Arm.
- Implemented a custom ROS MoveIt library, OCR & Translation APIs, and AprilTags; custom MoveIt library includes varied path planning tasks, pose/orientation options, immediate/delayed path execution capabilities, and dynamic updating the planning scene.
- As Systems Integrator, coordinated to make sure every member's subsystem worked together and managed the team's git workflow.

Omnid Robot Teleoperation & Visualization (www.youtube.com/watch?v=SEuFfONryL0&t=105s) *Robotics Research*

- Implemented Rviz visualization for Northwestern's Omnid robots, enhancing testing and diagnostic capabilities; aided ROS2 transition.
- Developed teleoperation feature for Omnids, supporting varied control modes and enabling experiments in human-robot collaboration.
- Navigated and adapted Omnid robots' complex codebase, effectively collaborating and coordinating with other researchers via Git.

Autonomous Exploration Robot *ME 495 Embedded Systems in Robotics*

- Programmed a virtual robot for autonomous exploration in a simulated environment using Frontier Exploration in Gazebo, developing a custom ROS node in Python for dynamic navigation and terrain mapping; providing an introduction for autonomous navigation.
- Integrated a ROS-based visualization system for real-time path tracking in Rviz, crucial for debugging and optimizing path planning.

Gesture Tracking Glove Prototype *EE 327 Electronic System Design II*

- Developed a gesture-tracking glove with a custom PCB, using ESP32 and FreeRTOS for dual-core concurrency, and integrated it with 6 DoF sensors and flex sensors for real-time visualization on web platforms: via Javascript and Unity.
- Employed Edge Impulse for machine learning gesture recognition and optimized sensor data with algorithms like Madgwick's filter.

Custom Webcam Prototype *EE 326 Electronic System Design I*

- Designed a 50 x 50 mm webcam PCB using EAGLE, incorporating the SAM4S8B MCU, ESP32 WiFi Module, and OV2640 Camera.
- Programmed interrupt-driven firmware that uses UART, SPI, and I2C communication protocols, live streaming the camera feed to a connected client through Web-Sockets; Utilized electrical lab equipment and logic analyzers for PCB assembly and debugging.

Kappa Theta Pi (KTP) – Co-ed Pre-Professional Technology Fraternity (www.ktpnu.com/) *Nov 2022 – Nov 2023*

VP of Programming, Founding Executive Member

- Planned and organized KTP's 20+ events throughout each quarter, such as Resume, Networking, and Technical Interview Workshops.
- Coordinated 40+ members and exec team to start and maintain concurrent initiatives such as Capstone Projects and Big-Little.
- Managed week-long interview process for 80+ applicants, coordinating coffee chats, group interviews, member deliberations and more.

InfernoGuard (www.infernoguardusa.com/) *Jan 2022 – June 2022*

Hardware Development Team, Intern

- Aided sensor device development to optimize device performance; spearheaded InfernoGuard's efforts in the White Space Challenge – conducting primary and secondary research, preparing materials, and presenting. Team won distinguished "Start-Up" Award.