

NEIL JANWANI

Pasadena, CA | (989) 423-4188 | njanwani@caltech.edu | njanwani.github.io | github.com/njanwani

EDUCATION

California Institute of Technology | Pasadena, CA

EXPECTED JUN. 2024

- B.S in Computer Science: Robotics and Machine Learning Tracks
- Cumulative GPA: 4.0/4.3
- Relevant Coursework: Adv. Motion Planning, Motion Planning & Kinematics, Mobile Robotics, Large Language and Vision Models, Learning Systems, ML & Data Mining, Linear Systems Theory, Applied Linear Algebra, Feedback Control Systems, Computing Systems, Software Design, Discrete Mathematics, Differential Equations, Probability and Statistics

SKILLS

- **Languages:** Python, C/C++, x86 Assembly, OCaml, Haskell, Java
- **Technologies:** ROS1&2, Linux, Git, Catkin, OpenCV, PyTorch, TensorFlow, Scipy, Scikit-learn, Matplotlib, Numpy, Pandas, MATLAB/Simulink, Solidworks, SimpleFOC

RESEARCH EXPERIENCE

Research Fellow: Kiyo and Eiko Tomiyasu Named Scholar, Burdick Group | Pasadena,

JUN. 2023 – PRESENT

- Combined long short term memory (LSTM) machine learning architecture with backup control barrier functions to enhance performance in safety-critical control by leveraging human intention.
- Developed graphical and haptic user interface for 20+ team in accordance with team meetings and deadlines.
- Submitted a first author paper to the International Conference on Robotics and Automation.
- Currently improving safety guarantees with future uncertainty estimation and improving human-robot performance through preference-based reinforcement learning and imitation learning.

Research Fellow, Caltech Amber Lab | Pasadena, CA

JAN. 2021 – PRESENT

- Developed a novel ankle exoskeleton built from a shin-mounted hand-shearing auxetic elastic actuator.
- Designed printable circuit boards to house electronic components while prioritizing user safety.
- Achieved 90% accuracy using LSTM, deep neural network, and Fourier-based algorithms for human gait state estimation.
- Programmed field oriented control and controller communication protocol for Maxon motors using SimpleFOC.
- Currently conducting human trials to evaluate the effectiveness of ankle exoskeleton as measured by metabolic output.

Research Intern, MIT Lincoln Laboratory, Group 099 | Lexington, MA

JUN. 2022 – SEP. 2022

- Formulated additions to linear time-invariant control methodology for sensorless control of gimbal motor.
- Refactored Simulink and Jupyter API for experimentation of sensorless control algorithms on gimbal testbed.
- Achieved accurate sensorless estimation of steady-state electrical phase in under 20 seconds.

TEACHING EXPERIENCE

Single Board Computers in Research, Caltech CS 12 Course | Pasadena, CA

JAN. 2023 – MAR. 2023

- Developed 10-week course on prototyping robotic and computing systems for research applications.
- Taught 20 students in concurrent software and circuit design, sensor interfacing, microcontroller communication.
- Wrote hands-on labs in basic circuitry, hardware input, motor control and coached groups through final projects.
- Hired and trained an undergraduate teaching assistant to assist with course activities and grading.

Teaching Assistant, Caltech Robotics and Computer Science | Pasadena, CA

JAN. 2022 – PRESENT

- Designed a differential drive robot as Robotics Head Teaching Assistant for a 35 student diversity, equity and inclusion program.
- Held office hours and wrote exam materials for classes of 100+ students in Experimental Robotics (ROS2: Python), Kinematics (ROS2: Python), Data Structures (Java), Software Design (C), and Computing Systems (x86 Assembly).

PROJECTS

General Robotics Projects | Pasadena, CA

SEP. 2021 – JUN. 2023

- Wrote forward and inverse kinematics to simulate walking quadrupedal robots designed in Solidworks using ROS1 and Rviz.
- Formulated a hierarchical A* and PRM planner for quadrupedal walking on diverse terrains with simulations in Matplotlib.
- Implemented occupancy-grid based localization, obstacle avoidance, and wheel/inertial odometry algorithms on hardware.
- Built a D* planner from scratch and compared its computational efficiency with A* and Dijkstra methods for replanning.
- Designed an exploration algorithm to prioritize information gain of an unknown space with probabilistic sensor feedback
- Used large vision models and high performance computing to predict pathologies from “CheXpert” chest X-rays.

VOLUNTEER OUTREACH

Tutor, Caltech Y | Pasadena, CA

OCT. 2021 – JUN. 2023

- One-on-one tutored secondary school students in math, physics, and robotics