Nathan Chun

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Education

University of Southern California — Los Angeles, CA

Bachelor of Science in Mechanical Engineering, Minor in Artificial Intelligence Applications — *Aug. 2022 – May 2026*

Relevant Coursework — GPA: 3.95

Linear Control Systems, Mechanics of Materials & Structures, Materials Behavior & Processing, Applied Natural Language Processing & Gen AI, Measurement & Instrumentation Lab, MEMS, Optimal Control

Experience

USC Dynamic Robotics and Control Lab | Provost & CURVE Fellow — Los Angeles, CA

Humanoid Pose Optimization | Demonstration Video — *May 2025 – Present*

- Implemented kinodynamic pose optimization and MPC with 6 ROS2 packages to control HECTOR v2
- Simulated in MuJoCo to debug and ensure expected behavior

Teleoperated Construction Robotics | Demonstration Video — *Aug 2024 – Present*

- Developed ROS2 & Gazebo robot simulation on Linux with barrier avoidance to demonstrate enhanced user safety
- Implemented 2-stage control framework with RRT* path planning algorithm and joy stick modes
- Explored LiDAR sensor configurations & utilized point cloud data for object detection & avoidance
- Investigated encoder integration for joint tracking to transition from simulation to real hardware

HECTOR Humanoid v2 | More about HECTOR v2 — *Aug 2023 - Aug 2024*

- Designed 8+ iterations of control board PCB to manage RS485, CAN, & ethernet communication
- Advised on PCB design and perused data sheets to ensure proper usage of electronics for signal integrity
- Coordinated with electrical and mechanical team members to ensure compatibility between systems
- Tracked and documented iterative design changes using Git version control

Robotic Quadruped Arm — *June 2024 - July 2024*

- Engineered robotic arm mounted on 2 Unitree Go1 quadrupeds for collaborative manipulation of large objects
- Collaborated with PhD team to ensure arm design met research needs; finalized in 2 weeks

Wheelchair Stabilizer | Demonstration Video — *Jan 2023- Sept 2024*

- Designed 4 prototypes of an automated wheel for wheelchairs, accounting for ease of use, cost, and compactness
- Slashed material cost and weight by 50% using ANSYS stress and topology optimization and low-cost sensors
- Specified, tested, and assembled embedded system to control motorized wheel using low-cost, efficient components
- Proved concept with Simulink and MATLAB to model control system and simulating stabilizer triggering situations

USC Viterbi Baum Family Makerspace — May. 2024 – Present

CNC Machinist/Student Worker/Roboticist — *Los Angeles, CA*

- Developing interactive web-based feeds and speeds calculators tailored for amateur machinists
- Operating & programming manual & CNC mills & lathes using MasterCAM for USC design teams and projects
- Proposed design for manufacturing (DFM) practices & designed tools (e.g. fixtures) to facilitate machining
- Created GD&T drawings for designed parts including custom fixtures to allow replication by other machinists

Projects

Cart Pole Pendulum | *Optimal Control, MATLAB/Simulink, Embedded Systems, Fabrication* — July 2025

- Simulated CartPole stabilization after perturbation with LQR controller
- Designed, manufactured, and assembled physical system for $170 in less than 2 weeks
- Devised empirical methods to determine conversions between controller outputs and physical system commands

Technical Skills

Languages: English (Native), Mandarin (Fluent)
Software: C++, Python, MATLAB, Simulink, Wolfram Mathematica, ROS, Julia, GitHub, Excel
Mechanical: SolidWorks, NX, ANSYS, FEA, 3D Printing, DFM, GD&T, CNC, Material Selection, Manufacturing
Electrical: PCB Design (KiCad), Soldering, Arduino, EPS32, Teensy 4.1, Oscilloscope, Multimeter, Logic Analyzer