Steven Nguyen

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Education

UC San Diego — San Diego, CA
PhD in Mechanical and Aerospace Engineering – GPA: 4.0/4.0 — Fall 2023 – Present
Research interests: control theory, data-driven control design, reduced-order modeling, control in design optimization

UC Santa Barbara — Santa Barbara, CA
B.S. in Mechanical Engineering – GPA: 4.0/4.0 — September 2019 – June 2023

De Anza College – GPA: 4.0 — Cupertino, CA
Concurrent Enrollment while in high school — September 2018 – June 2019

Research and Work Experience

Graduate Researcher at UCSD — La Jolla, CA
Advisors: Professors Boris Kramer and Jorge Cortes — Fall 2023 – Present

- Currently developing control-oriented metrics using reachability theory to inform the design optimization of aircraft.
- In data-driven control design, I have studied techniques using semi-definite and sum-of-squares programming and their application in nonlinear systems.
- I have also studied control design for linear reduced-order models (ROM), to understand the cases in which controllers designed for ROMs work for their full-order models.

Undergraduate Researcher in Nonlinear Dynamical Systems Lab — Santa Barbara, CA
Studying applications of Koopman Operator Theory — March 2022 – June 2023

- Tested varying input delay observables for data-driven modeling of soft arm.
- Studied implementation of model predictive control through LabView for soft arm.
- Studied stability and model accuracy of numerical approach to Carleman linearization via DMD.
- Implemented different EDMD algorithms and wrote one from scratch in MATLAB.
- Tested effectiveness of EDMD using varying amounts of monomial lifting functions

Research Intern at NSF REU: Smart Cities — Las Vegas, NV
Designed & implemented control for autonomous vehicles — June 2022 – August 2022

- Designed nested PID controllers for autonomous vehicle longitudinal/lateral motion.
- Incorporated position, velocity, yaw rate feedback to ensure stability, safety, and comfort.
- Implemented control in actual vehicle via drive-by-wire system and ROS.
- Demonstrated safe autonomous braking with vision-based detection of pedestrians in under 10 weeks.
- Applied filter to a free-space estimation model to track lane centers.
- Published in ICVES 2022 conference.

Intern at ATA Engineering — San Diego, CA
Assisted in structural analysis and internal research tools — June 2021 – September 2021

- Performed tolerance load analysis on rocket engine models using Femap and NX Nastran.
- Wrote MATLAB function to renumber Abaqus node/element IDs.
- Improved workflow by recording macros in STAR-CCM+ and Notepad++.
- Designed fixture plates for vibration test in SolidWorks and meshed in NX.

- Independently led internal research project to investigate automation for data transfer between SolidWorks and NX.
- Improved precision of macro for data translation between SolidWorks and NX and created geometric matching method.

Undergraduate Research Assistant in Interfacial Engineering Lab Santa Barbara, CA
Design of surface science instrumentation January 2020 – December 2020

- Designed shape and dimensions of custom clamp to hold ultrasonicating horn inside sound enclosure.
- Fashioned the clamp using vertical band saw, end mill, and boring head.
- Machined acrylic sheets down to size to cover holes on glove box using drill press and end mill.
- Inspected measurements of engineering drawings of new tribometers to ensure they were consistent.
- Modeled and made engineering drawings for custom adapter stage to hold specimen for study through SolidWorks.

Publications

1. W. Heap, S. Man, V. Bassari, **S. Nguyen**, E. Yao, N. Tripathi, N. Naclerio, E. W. Hawkes. Large-scale Vine Robots for Industrial Inspection. *IEEE Robotics and Automation Magazine*, October 2024.
2. **S. Nguyen**, Z. Rahman, B. Morris. Pedestrian Emergency Braking in Ten Weeks. *IEEE International Conference on Vehicular Electronics and Safety*, November 2022.

Conference Presentations

1. **S. Nguyen**, B. Kramer, J. Cortes, "Data-Driven Control via Semidefinite Programming in Nonlinear Systems", *SIAM Conference on Computational Science and Engineering (CSE25)*, March 2025.
2. **S. Nguyen**, Z. Rahman, B. Morris, "Pedestrian Emergency Braking in Ten Weeks", *IEEE International Conference on Vehicular Electronics and Safety (ICVES),* November 2022.

Relevant Coursework

- Linear/Nonlinear systems
- Linear/Nonlinear control
- Real Analysis
- Optimal Control/Estimation
- Numerical Linear Algebra
- Model Reduction
- Hybrid Systems
- Semidefinite programming and Sum of Squares Optimization

Educational Experience

Vine Robot for Industrial Pipe Inspection Capstone Project Santa Barbara, CA
Designed a novel vine robot platform for pipe inspection September 2022 – June 2023

- Developed novel model for vine robot buckling during operation to determine operating parameters.
- Created user interface using PyQT to control motors and fan during operation of robot.
- Demonstrated operation of vine robot on sample pipe system for Bechtel at their headquarters.
- Team won Best Technical award in capstone class.
- Published results of project in IEEE Robotics and Automation Magazine.

Rocket Propulsion Laboratory Injector Team Santa Barbara, CA
Designing fuel injector for bipropellant rocket September 2020 – June 2021

- Researched coaxial swirl injectors and read papers to learn about swirl design.
- Created complex geometries in SolidWorks with revolve, projected curve, and boundary features.

- Wrote MATLAB script to calculate effects of changes in geometry on spray characteristics.
- Created 3D surfaces, isosurfaces, and contour plots in MATLAB to optimize swirl injector geometry.
- Created function to find intersecting points between two isosurfaces in MATLAB.
- Simulated fluid flow and stress tests on designs using ANSYS Fluent/Mechanical.

Automatic Blind-Controller Santa Barbara, CA
Arduino class project May 2020

- Designed and constructed device that could turn window blinds based on light coming in window.
- Employed phototransistors to detect incoming light and added controls with potentiometer.
- Secured assembly on wooden beam by window for light detection and control of blinds.
- Nominated for best technical project in class.

Awards

- UCSD Powell Fellowship September 2023
- Graduated from UCSB with highest honors June 2023
- UCSB Dean's Honors Fall 2019 – Spring 2023
- Best Technical Capstone Project June 2023
- Tau Beta Pi Engineering Honor Society November 2021

Outreach Experience

Social Events Chair for Contextual Robotics Institute Grad Student Org. San Diego, CA
Planned social events for UCSD RoboGrads student organization September 2024 – June 2025

- Organized 9 hikes and 3 socials for the robotics research community at UCSD.

Math Tutor Cupertino, CA
Tutor January 2019 – June 2019

- Taught math to students ranging from middle school through high school.

Core Technical Skills

Programming:	Python, MATLAB
CAD:	SolidWorks (CSWA cert.), Siemens NX
Analysis:	NX Nastran, Femap, Abaqus, STAR-CCM+, ANSYS Fluent, COMSOL
Operating Systems:	MacOS, Windows, Linux Ubuntu

Other Interests

Trombone September 2012 – Present

- I have been playing trombone since the age of 11 and am currently involved with music groups around San Diego like La Jolla Symphony and Finest City Winds/Orchestra, Brass Ensemble.

Ultimate Frisbee September 2024 – Present

- One of my favorite sports is ultimate frisbee, I play in various leagues around San Diego weekly.