

Steven Nguyen

Graduate Student in Control Theory

9393 Discovery Way, Apt. H, La Jolla, CA, 92037

☎ 408-644-3035 | ✉ stn030@ucsd.edu | 🏠 www.nguyensteven01.github.io | 📧 nguyensteven01 | 🌐 stevencnguyen01

Education

UC San Diego

Ph.D. in Mechanical and Aerospace Engineering -- GPA: 4.0/4.0

San Diego, CA

Fall 2023 -- Present

- Advisors: Professors Boris Kramer and Jorge Cortes
- Research interests: control theory, data-driven control design, reduced-order modeling, control in design optimization

UC Santa Barbara

B.S. in Mechanical Engineering -- GPA: 4.0/4.0

Santa Barbara, CA

September 2019 -- June 2023

- Graduated with highest honors

De Anza College

Concurrent Enrollment -- GPA: 4.0

Cupertino, CA

September 2018 -- June 2019

- Concurrent enrollment while in high school

Relevant Coursework

Systems & Control

Linear/Nonlinear Systems, Linear/Nonlinear Control, Optimal Control/Estimation, Model Reduction, Hybrid Systems

Mathematics

Real Analysis, Numerical Linear Algebra, Semidefinite Programming and Sum of Squares Optimization

Research & Work Experience

UC San Diego -- Advisors: Prof. Boris Kramer & Prof. Jorge Cortes

Graduate Researcher

La Jolla, CA

Fall 2023 -- Present

- Currently developing control-oriented metrics using reachability theory to inform the design optimization of aircraft.
- In data-driven control design, studied techniques using semi-definite and sum-of-squares programming and their application in nonlinear systems.
- 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.

Nonlinear Dynamical Systems Lab, UC Santa Barbara

Undergraduate Researcher -- Applications of Koopman Operator Theory

Santa Barbara, CA

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.

NSF REU: Smart Cities

Research Intern -- Design & Implementation of Control for Autonomous Vehicles

Las Vegas, NV

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.

ATA Engineering

Intern -- Structural Analysis and Internal Research Tools

San Diego, CA

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.

Interfacial Engineering Lab, UC Santa Barbara

Undergraduate Research Assistant -- Design of Surface Science Instrumentation

Santa Barbara, CA

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. S. Nguyen, Nicholas Orndorff, Jorge Cortés, Boris Kramer. Reachability-Based Design Optimization for Aircraft Maneuverability. *Submitted to AIAA Journal*.
2. S. Nguyen, Jorge Cortés, Boris Kramer. Reachability for Design Optimization. *2026 American Control Conference*, New Orleans, May 26--29, pp. TBD, doi: TBD.
3. 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.
4. S. Nguyen, Z. Rahman, B. Morris. Pedestrian Emergency Braking in Ten Weeks. *IEEE International Conference on Vehicular Electronics and Safety*, November 2022.

Conference Presentations

Aircraft Design Optimization Using Reachability Theory

American Control Conference 2026 (ACC)

New Orleans, LA

May 2026

Data-Driven Control via Semidefinite Programming in Nonlinear Systems

SIAM Conference on Computational Science and Engineering (CSE25)

Fort Worth, TX

March 2025

Pedestrian Emergency Braking in Ten Weeks

IEEE International Conference on Vehicular Electronics and Safety (ICVES)

Bogota, Colombia

November 2022

Projects

Vine Robot for Industrial Pipe Inspection Capstone Project, UC Santa Barbara

Lead Designer -- Novel vine robot platform for pipe inspection

Santa Barbara, CA

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, UC Santa Barbara

Team Member -- Designing fuel injector for bipropellant rocket

Santa Barbara, CA

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.
- Simulated fluid flow and stress tests on designs using ANSYS Fluent/Mechanical.

Automatic Blind-Controller, UC Santa Barbara

Designer -- Arduino class project

Santa Barbara, CA

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

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| September 2023 | Powell Fellowship, UC San Diego |
| June 2023 | Graduated with Highest Honors, UC Santa Barbara |
| June 2023 | Best Technical Capstone Project, UC Santa Barbara |
| Fall 2019 -- Spring 2023 | Dean's Honors, UC Santa Barbara |
| November 2021 | Tau Beta Pi Engineering Honor Society, UC Santa Barbara |

Technical Skills

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

Outreach & Other Activities

Contextual Robotics Institute Graduate Student Organization, UC San Diego

Social Events Chair

San Diego, CA

September 2024 -- June 2025

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

Private Tutoring

Math Tutor

Cupertino, CA

January 2019 -- June 2019

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

La Jolla Symphony, Finest City Winds/Orchestra, Brass Ensemble

Trombonist

San Diego, CA

September 2012 -- Present

- Playing trombone since age 11; currently involved with music groups around San Diego.

Various San Diego Leagues

Ultimate Frisbee

San Diego, CA

September 2024 -- Present

- Plays in various ultimate frisbee leagues around San Diego weekly.