# Andrew Zheng

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## EDUCATION

**Clemson University** **Clemson, SC**
*Master of Science in Mechanical Engineer*, Control Systems, December 2023
Cumulative GPA: 3.87/4.00

*Bachelor of Science in Mechanical Engineering*, Minor in Math, May 2021
Cumulative GPA: 3.86/4.00
Honors: magna cum laude

## SKILLS

**Software:** ROS1, Gazebo, Linux, Git, CoppeliaSim, CasADi, Oracle VM Virtualbox, Tensorflow, Anaconda, Simulink, Solidworks
**Programming Language:** Python, Matlab, C++, LaTeX, VBA Excel

## PROFESSIONAL EXPERIENCE

**DIRA Lab**, Research Assistant, May 2021 – Present **Clemson, SC**
- Developed a real-time perceptive legged locomotion adaptation module for off-road navigation for quadruped
- Integrated robot motion planning framework using C++ ROS, increasing the ease of integrating standard planning algorithms for robot navigation
- Developed and integrated novel safe navigation algorithm using analytical density functions for quadruped locomotion
- Developed linear time-varying model predictive controller in MATLAB for legged robot system, increasing the tracking capabilities.

**Clemson University,** Mentor, May 2023 – Present **Clemson, SC**
- Coordinated and guided robotic research theses for undergraduate honors students

**Clemson University**, Teacher Assistant, August 2021-May 2023 **Clemson, SC**
- Enhanced knowledge and critical thinking of students by highlighting key concepts covered in course

**Parker TechSeal**, Mechanical Engineer Intern, May 2019 – Aug 2019 **Spartanburg, SC**
- Performed nondestructive damage control by identifying defective rubber seal product, saving $5000+ in product sales
- Designed and validated manufacturing process to create batches military gaskets of up to $50,000 for Staver Hydraulics
- Conducted ASTM D142 Tensile Test to ensure product meet customer quality
- Programmed data searching algorithm to analyze runtime/downtime of company's vulcanizers
- Identify strengths and weakness of newly mechanical splicing to company's traditional splicing process

## SELECTED PUBLICATIONS

- **Andrew Zheng**, Sriram S.K.S. Narayanan, and Umesh Vaidya. "Safe Navigation Density: Analytical Construction". *IEEE Robotics and Automation Letters (RA-L)*, 2023.
- Joseph Moyalan, **Andrew Zheng**, et. al. "Off-Road Navigation of Legged Robots using Linear Transfer Operators". *Model, Estimation, and Control Conference (MECC)*, October 2023. Awarded Best Robotics Paper

## PROJECTS

**DIRA Lab Motion Capture System**
- Setup localization system using Phasespace Motion Capture system for accurate robot navigation

**Deep Koopman Autoencoder**
- Developed custom physics-informed autoencoder using Tensorflow capable of identifying physical parameters of dynamical systems

**Quadruped Robot Challenge**
- Participated in Quadruped Robot Challenge hosted in IEEE Robotics and Automation Society (ICRA) 2023

- Integrated high-level density algorithm for legged robot to traverse through a disaster environment

**Tail Landing Controller**
- Designed a multi-linked tail controller algorithm to aid locomotion underactuated quadruped on contact-critical terrain

**Undergraduate Research**
- Integrate sensor fusion algorithm utilizing 2d lidar and camera for navigation of mobile vehicle in Gazebo simulator

## RELEVANT COURSEWORK

**Mechanical Design:** Fundamentals of Machine Design
**Thermodynamics:** Foundation of Thermal and Fluid Systems, Heat Transfer
**Dynamic & Controls:** Modern Control, Modeling & Analysis of Dynamic Systems, Classical Controls, Vibrations, Advanced Controls, Applied Optimal Control
**Fluid Flow:** Fluid Mechanics, Compressible Flow
**Mathematics:** Linear Algebra, Numerical Methods, Statistical Analysis, Complex Variables
**Computer Science:** Applied Deep Learning

## PUBLICATIONS

- Joseph Moyalan, Sriram S.K.S Narayanan, **Andrew Zheng**, and Umesh Vaidya. "Synthesizing Controller for Safe Navigation using Control Density Functions". Accepted at American Control Conference, 2024.
- Sriram S.K.S. Narayanan, **Andrew Zheng**, and Umesh Vaidya. "Safe Motion Planning for Quadruped Robots Using Density Functions". *Indian Control Conference* (ICC), 2023.
- **Andrew Zheng**, Sriram S.K.S. Narayanan, and Umesh Vaidya. "Safe Navigation Density: Analytical Construction". *IEEE Robotics and Automation Letters (RA-L),* 2023.
- Joseph Moyalan, **Andrew Zheng**, et. al. "Off-Road Navigation of Legged Robots using Linear Transfer Operators". *Model, Estimation, and Control Conference (MECC)*, October 2023.
- Sarang Sutavani, **Andrew Zheng**, et. al. "Artificial Neural Network Based Terrain Reconstruction for Off-Road Autonomous Vehicles Using LiDAR". *Ground Vehicle Systems Engineering and Technology Symposium (GVSET)*.
- Alex Krolicki, Dakota Rufino, **Andrew Zheng**, et al. "Modeling Quadruped Leg Dynamics on Deformable Terrains using Data-driven Koopman Operators". *Modeling Estimation and Control Conference (MECC)*, September 2022, Conference Presentation

## AWARDS & SCHOLARSHIPS

- 2023 Best Robotics Paper Award from ASME DSC
- President's List (4.0 GPA)
- Dean's List (3.50+ GPA)
- Clemson Scholars
- Lancaster Endowed Memorial Scholarship
- SC Palmetto Fellows Enhancement
- SC Palmetto Fellows Scholarship