Andrew Zheng

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EDUCATION

Clemson University   **Clemson, SC**
Master of Science in Mechanical Engineer, Control Systems, May 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

PROFESSIONAL EXPERIENCE

DIRA Lab, Research Assistant, May 2021 – Present   **Clemson, SC**
- Integrated legged planner framework, which increased the ease in integrating standard planners into quadrupeds
- Developed and integrated novel safe navigation algorithm for quadruped locomotion
- Developed model predictive controllers for quadruped locomotion
- Facilitated 2-year integration plan of state-of-the-art planning and control for legged robots

Clemson University, Mentor, May 2023 – Present   **Clemson, SC**
- Guided two undergraduate honors students on their thesis research

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". Submitted to *Model, Estimation, and Control Conference (MECC)*.

PROJECTS

DIRA Lab System Setup
- Setup robust motion capture system for accurate localization for robot navigation

Quadruped Robot Challenge
- Top 6 in Quadruped Robot Challenge hosted in IEEE Robotics and Automation Society (ICRA) 2023
- Designed 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

Deep Koopman Autoencoder
- Created custom autoencoder model to learn physics informed linear operator with neural networks

Undergraduate Research
- Integrate sensor fusion algorithm for navigation of mobile vehicle
- Developed safety stop mechanism on a microcontroller integrated with DIRA Lab's quadruped

SKILLS

Software: ROS1, Gazebo, Linux, Git, CoppeliaSim, CasADi, Oracle VM Virtualbox, Tensorflow, Anaconda, Simulink, Solidworks

Programming Language: Python, Matlab, C++, LaTeX, PLC, VBA Excel

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

- Sriram S.K.S. Narayanan, **Andrew Zheng**, and Umesh Vaidya. "Density Functions for Safe Navigation of Robotic Systems in Dynamic Environments". Submitted to *American Control Conference (ACC)*, 2024.
- Joseph Moyalan, Sriram S.K.S Narayanan, **Andrew Zheng**, and Umesh Vaidya. "Synthesizing Controller for Safe Navigation using Control Density Functions". Submitted to 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". Submitted to *Model, Estimation, and Control Conference (MECC)*.
- 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