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: C++, Python, Matlab, LaTeX, VBA Excel

PROFESSIONAL EXPERIENCE

DyCo AI Lab, Research Specialist, Clemson, SC **May 2021 - Present**
- Developed a real-time perceptive legged locomotion adaptation module for off-road navigation for quadruped, resulting in legged robot to walk through terrains such as ramps, stairs, and stepping stones.

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

Parker TechSeal, Mechanical Engineer Intern**,** Spartanburg, SC **May 2019 – Aug 2019**
- 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 new mechanical splicing to company's traditional splicing process.

RESEARCH EXPERIENCE

DyCo AI Lab, Graduate Research Assistant, Clemson, SC **May 2021 – Dec 2023**
- Integrated robot motion planning framework using C++ ROS, increasing the ease of integrating standard planning algorithms for robot navigation.
- Developed novel navigation algorithm that guaranteed safety and convergence, which was integrated in real-time onto a quadruped robot.
- Prototyped linear time-varying model predictive controller in MATLAB for legged robot system, increasing the tracking capabilities.
- Coordinated and guided robotic research theses for undergraduate honors students.

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