John Z. Zhang

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Education

Georgia Institute of Technology **Atlanta, GA**

BS in Mechanical Engineering GPA: 3.9/4.0 *Expected Graduation: May 2022*

- Minor in Computing and Intelligence GPA: 4.0/4.0

Work Experience

Undergraduate Researcher, advised by Prof. Ye Zhao **Atlanta, GA**

Laboratory for Intelligent Decision and Autonomous Robots, Georgia Tech *March 2019 - Present*

- Investigated trajectory optimization and motion planning algorithms for robot locomotion and manipulation
- Developed a novel trajectory optimization algorithm for robust and feasible robot locomotion planning under terrain uncertainty
- Lead authored a journal article, a conference abstract and poster, and multiple research grant proposals

Undergraduate Researcher, advised by Prof. Matthew Gombolay **Atlanta, GA**

Cognitive Optimization and Relational (CORE) Robotics laboratory, Georgia Tech *Jan 2021 - Present*

- Developed Neural Network based Model Predictive Controller for high dimensional dynamics systems
- Empirically validated both meta-active learning and model predictive control algorithms on physical RC planes

Software Development Engineering Intern **Columbus, IN**

Cummins Inc., Machine Integration and Electrification *May2021 - Aug 2021*

- Worked on new electric/hybrid bus systems in the Dynamic Systems and Controls team
- Developed and on-site tested *Kalman Filter* and *Gaussian Process Regression* algorithms for online vehicle acceleration noise reduction and estimation
- Performed on-vehicle testing for regenerative braking and adaptive cruise control features
- Presented internship project entitled *Novel Methods for Online Acceleration Filtering and Estimation* to senior company executives

Teaching Assistant, ME 3017 System Dynamics **Atlanta, GA**

G. W. Woodruff School of Mechanical Engineering, Georgia Tech *Aug 2020 - May 2021*

- Led weekly office hours and long tutoring sessions for individual advising on course related subjects
- Designed grading rubrics, evaluated homework and exams, and provided detailed feedback
- Led the transition to online/hybrid format during the COVID-19 pandemic
- *Key topics:* Laplace transformation, mechanical and electrical systems modeling, transfer functions, state-space approach, feedback control, transient response, stability analysis, etc.

Additional

- **Relevant Coursework:** Robot Intelligence - Planning, Machine Learning, Robotics and Perception, Data Structures and Algorithms, Numerical Methods, Statistics, Dynamics of Rigid Bodies, System Dynamics, Machine Vision
- **Activities:** ASME, Yellow Jacket Club Baseball, Intramural athletics
- **Software:** Python, C, C++, Java, HTML/CSS, Javascript, MarkDown, Arduino, Raspberry Pi, MATLAB/Simulink, ROS, TensorFlow, Pytorch, scikit-learn, LaTeX, GitHub, SolidWorks, Calterm, Adobe Illustrator
- **Languages:** English, Mandarin Chinese, Spanish

Publications

Journal Articles

[J1] **Zhang, John Z.**, L. Drnach, and Y. Zhao. Mediating between contact feasibility and robustness of trajectory optimization through chance complementarity constraints. *IEEE Access*, 2021. *submitted.*

[J2] M. L. Schrum, **Zhang, John Z.**, and Matthew Gombolay. Meta-active learning in probabilistically safe optimization. 2021. *in progress.*

Abstracts & Poster Presentations

[P1] **Zhang, John Z.**, L. Drnach, and Y. Zhao. Can chance-constrained contact uncertainty quantification improve feasibility of robust trajectory optimization? *Dynamic Walking*, 2021.

Selected Projects

Electric Skateboard **Shenzhen, China**

Georgia Tech Shenzhen Institute Maker Venture Project *May 2019 - August 2019*

- Designed a low-cost, light weight, and user-interactive than electric skateboards
- Prototyped a proof of concept with a remote-less speed control feature
- Won the Best Tech Award for the best prototype in the Maker Venture contest at GT Shenzhen

Creative Decisions and Design Competition **Atlanta, Georgia**

Georgia Tech ME 2110 *August 2019 - December 2019*

- Designed and fabricated a fully autonomous system capable of wheeled locomotion and armed manipulation in the competition arena
- Programmed mechatronics tasks with a Raspberry Pi in Python: included an open-looped locomotion algorithm and a reactive arm manipulation algorithm
- Fabricated the autonomous system using 3D printing, laser cutting, water jetting, and traditional woodworking

Athena Robot Design Team Leader **Atlanta, Georgia**

Laboratory for Intelligent Decision and Autonomous Robots *March 2019 - December 2019*

- This project aims for low-cost design while achieving high-fidelity motion control for contact-rich manipulation behaviors such as hand grasping
- Led team of 10 members to design and fabricate the Athena robot, a lightweight, 3D printed humanoid upper body robot
- Won the Late Breaking Result Best Poster Award at Advanced Intelligent Machines conference 2020

Honors and Awards

- Faculty Honors
- President's Undergraduate Research Award