

Jason Zhenhao Zhou

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Personal Profile

I'm a PhD graduate student at the University of Wisconsin Madison.

Education

University of Wisconsin-Madison

Doctor of Philosophy in Mechanical Engineering

Madison, WI

Jan 2021 - May 2025

University of Wisconsin-Madison

Master of Science in Mechanical Engineering

Madison, WI

Jan 2021 - May 2023

University of Wisconsin-Madison

Master of Science in Computer Science

Madison, WI

Jan 2021 - Dec 2022

- GPA: 3.9.
- Graduated on Dec. 18, 2022.
- Courses:** Data Science, Machine Learning, Wireless Communication, Computer Networks, Distributed Computing, Computer Architectures.

University of Wisconsin-Madison

Bachelor of Science in Mechanical Engineering

Madison, WI

Sep 2017 - Dec 2020

- GPA: 3.8.
- Graduated on Dec. 13, 2020.
- Graduated with distinctive scholastic achievement awarded by College of Engineering.
- Courses:** Robotic Systems, Manufacturing Automation, Design Optimization, Thermal Dynamics, Fluid Dynamics, Static and Dynamic Systems

University of Wisconsin-Madison

Bachelor of Science in Computer Science

Madison, WI

Sep 2017 - Dec 2020

- GPA: 3.8.
- Graduated on Dec. 13, 2020.
- Graduated with Distinctive Scholastic Achievement awarded by College of Letters & Science.
- Courses:** Machine Learning, Computer Vision, Computer Graphics, Operating System, Optimization Theory, Database

Work Experience

Simulation-Based Engineering Lab at UW-Madison

Graduate Research Assistant

Madison, WI

Jan 2021 - Present

- Advisor: Professor Dan Negrut.
- Autonomous vehicle coordination and simulation of vehicle dynamics, leveraging simulation fidelity and real-time performance for Human-In-The-Loop(HIL) and Software-In-The-Loop(SIL) applications. Head developer of chrono::HIL, a submodule of Project Chrono (<https://projectchrono.org/>) to provide HIL, real-time simulation support for traffic scenarios and vehicle dynamics. chrono:HIL provides flexible simulator hardware coupling capabilities, distributed simulation support, soft real-time simulation support, and multiple vehicle dynamic models.
- Integrating Sensor (LIDAR/RADAR/CAM) simulation using chrono::sensor into traffic scenarios to assist the development of autonomous vehicle control policies.
- Extraterrestrial rover and robot mechanical component simulation. Applications/development/validation of SCM (Soil Contact Model), SPH, and DEM deformable terrain. Head developer of the VIPER lunar rover model and the Curiosity mars rover model in the chrono::robot module.

Simulation-Based Engineering Lab at UW-Madison

Undergraduate Research Assistant

Madison, WI

Jun 2020 - Dec 2020

- Advisor: Professor Dan Negrut.
- Development and validation of chrono::granular (later renamed as chrono::gpu), a CUDA solver for granular dynamics. chrono::granular can be used to simulate homogeneous granular material; applications include granular material properties testing and deformable terrain for off-road vehicle research.
- Development of synchronization functionalities in chrono::synchrono - MPI and DDS interfaces of chrono::vehicles; utilization of parallel computing for real-time performance.

- Advisor: Professor Bilge Mutlu.
- Developing a QR Marker object tracking program based on OpenCV in C++. The program helps educational robots to identify objects and their movements in order to facilitate human-computer interaction.
- Designing and developing of simulation environment for robot localization algorithm using ROS2. The simulation environment allows a Turtlebot model to follow certain trajectories in an indoor environment relying purely on QR codes identified by the machine learning algorithm.
- Creating of the CAD models for robot's parts using Solidworks and 3D printing software.

Alstom

Melbourne, FL

Software Engineering Intern & Embedded System Engineering Intern

May 2019 - Aug 2019

- Cooperating with Alstom's System Validation Team to perform system tests and review code (primarily in C++ and Python) on Alstom DAU (Data Acquisition Unit), a vital wayside component of the Alstom's Automatic Railway Signaling System; Debugging lower-level program, scanning and hacking the Apache server installed to search for possible bugs which may lead to the fatal crash of the system.
- Developing a C++ testing program for Alstom's Wayside Linux-Based Core ACE board to meet Hardware Serial Test Specifications including multi-CPU communication (based on C++ socket), I2C, UART, SPI, onboard GPIO connection, Watchdog Timer, and other hardware checks. The testing program includes both lower-level hardware programming (hardware read and write interfaces, UDP socket communication designed for multi-CPU connection, file read and write operations used to check the functionalities of FRAM, Flash Memory, and eMMC) and higher-level software programming (user Interface, comparison algorithm used to determine whether the actual result matches original expectations).
- Participating in technical reviews, technology transfer meetings, and code reviews. Learning the coding standard in Alstom.
- Learning concepts and architectures of the modern autonomous railway system and contributing to the design of the system.

Projects

Mechanical Engineering Senior Design Project

Madison, WI; Milwaukee, WI

Milwaukee Tool

Feb 2022 - Apr 2022

- Designing a glove impact testing fixture to quantitatively measure the impact protection provided by impact-resistant gloves.
- Completing three iterations of CAD model design and FEA analysis, and creating engineering drawings for Milwaukee Tool's workshop to manufacture parts
- Working with resistance-based force sensor circuits and related component.
- Designing and creating ready-to-deliver LabView programs to integrate pneumatic system and data acquisition unit (NI C-DAQ)

Skills

Programming	Python, C/C++, HTML/CSS, Java, JavaScript, Julia, R, SQL.
Engineering/Design	Solidworks, Blender, MSC Adams, ROS.
Miscellaneous	Linux, Shell, \LaTeX (Overleaf/R Markdown), Microsoft Office, Firebase, Git.

Publication

- Serban, R, Taves, J, **Zhou, Z.** "Real-Time Simulation of Ground Vehicles on Deformable Terrain." *Proceedings of the ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 9: 18th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC).* St. Louis, Missouri, USA. August 14–17, 2022. V009T09A012. ASME. <https://doi.org/10.1115/DETC2022-89470>
- Hu, W., **Zhou, Z.**, Chandler, S., Apostolopoulos, D., Kamrin, K., Serban, R., Negrut, D. Traction control design for off-road mobility using an SPH-DAE cosimulation framework. *Multibody Syst Dyn* 55, 165–188 (2022). <https://doi.org/10.1007/s11044-022-09815-2>
- Hu, W., **Zhou, Z.**, Serban, R., Negrut, D., Using an SPH-based continuum representation of granular terrain to simulate VIPER rover mobility, 2021/10, *Preprint*, https://www.researchgate.net/publication/358872957_Off-Road_Rover_Mobility_Simulation_Using_a_Continuum_Representation_of_Deformable_Terrains
- Hu, W, **Zhou, Z.**, Serban, R, Negrut, D. "Using an SPH-Based Continuum Representation of Granular Terrain to Simulate the Rover Mobility." *Proceedings of the ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 9: 17th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC).* Virtual, Online. August 17–19, 2021. V009T09A028. ASME. <https://doi.org/10.1115/DETC2021-71289>