

JAY TAVES

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EXPERIENCE

Simulation Based Engineering Lab

Research Assistant

October 2019 – Present

Madison, WI

- Managed development of SynChrono; an open-source C++ library which parallelizes the physics-based simulation engine Chrono, allowing hundreds of vehicles to operate in real-time.
- Prototyped and helped implement a re-write of Chrono::Vehicle's off-road terrain algorithm, speeding it up around 60 times and enabling it to scale to arbitrary deformable terrain sizes.
- Involved in project aiming to connect physical simulators such as the National Advanced Driving Simulator (NADS) with the SynChrono virtual environment for distributed simulation of scenarios involving autonomous and conventional vehicles.
- Established a Lie group-based approach to solving the index-3 Differential Algebraic Equations that govern the time evolution of multi-body systems made of rigid bodies, allowing for two to four times faster simulation compared to classical approaches.

Epic Systems — Leading vendor of EMR (Electronic Medical Record) software

Interfaces Developer and Project Manager

August 2017 – June 2019

Madison, WI

- Developed a new parsing library and several smaller projects for Epic's HL7 pharmacy interfaces.
- Managed the conversion of Olmsted Medical Center's legacy patient data into Epic as they went live on Epic's EMR on one of the fastest time-lines that Epic has done to date.
- Managed interface testing and validation for United Regional Health Care System's transition to Epic.

PAPERS

- SynChrono: A Scalable, Physics-Based Simulation Platform For Testing Groups of Autonomous Vehicles and/or Robots, presented at 2020 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference.
- SynChrono: An MPI-Based, Scalable Physics-Based Simulation Framework for Autonomous Vehicles Operating in Off-Road Conditions, poster presented at Supercomputing 2020.
- Enabling Artificial Intelligence Studies in Off-Road Mobility Through Physics-Based Simulation of Multi-Agent Scenarios, presented at 2020 National Defense Industrial Association (NDIA) Ground Vehicle Systems Engineering and Technology Symposium (GVSETS).
- Dwelling on the Connection Between $SO(3)$ and Rotation Matrices in Rigid Multibody Dynamics. Part 1: Description of an Index-3 DAE Solution Approach, and Part 2: Comparison Against Formulations Using Euler Parameters or Euler Angles, presented at 2021 ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference.

EDUCATION

University of Wisconsin–Madison *Masters in Mechanical Engineering*

May 2021

Thesis on using Lie group numerical integrators to speed up rigid body dynamics simulation

Courses in high-performance computing, computational fluid dynamics, numerical analysis and linear algebra

Cornell University

May 2017

B.S. in Mechanical Engineering, Minor in Mathematics

Courses in Finite Element Analysis, Nonlinear Dynamics and Chaos

SKILLS

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|-------------|---|
| Programming | High-performance (CUDA, OpenMP, MPI), Web (JavaScript, C#, HTML), Scientific (C++, MATLAB, Python), Database (SQL, Mumps) |
| Management | Project leader for software development of the open-source library SynChrono. Project management for several Epic Systems interface installations |