Hongyu Wang

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EDUCATION

University of Wisconsin – Madison *Sept. 2024 - Dec. 2025*
*M.Sc. in **Electrical and Computer Engineering** / GPA: **3.769/4***

University of Electronic Science and Technology of China *Sept. 2020 - Jun. 2024*
Joint Educational Programme with **University of Glasgow**
*B.E. in **Electronic Information Engineering** / GPA: **3.44/4***

Programming Languages: C*, C++, CUDA, Python, MATLAB, Verilog, Java, Kotlin*
***IDE & Tools：** Android Studio, OpenMV, Chrono, Pychrono, Vivado, IsaacLab, Mujoco, Modelsim*

EXPERIENCE

Mechanical Engineering Department, University of Wisconsin-Madison *Feb. 2025 - Dec. 2025*
Independent Study Student/Research Asistant, Simulation Based Engineering Lab *Madison, US*

- Participate in advanced research on machine learning in multibody dynamics and LLM benchmarking for digital twin
- Developed a novel flow-matching based Neural ODE framework and benchmarked it against state-of-the-art baselines to validate its robustness on complex constrained dynamics
- Leveraged statistical analysis to validate Judge-LLM evaluation metrics against ground truth in open-source simulations.

PROJECT & RESEARCH

FNODE: Flow-Matching for data-driven simulation of constrained multibody systems
UW-Madison Independent Study Program / First Author *Feb. 2025 - Mar. 2026*

- Developed a data-driven simulation framework that learns acceleration vector fields via Flow Matching, effectively bypassing the computational bottleneck of backpropagation through ODE solvers
- Formulated a hybrid numerical differentiation strategy combining FFT with Finite Differences to generate high-fidelity targets.
- Demonstrated superior computational efficiency by reducing training time by **2x** compared to conventional methods, and successfully applied the model to predictive control tasks with high accuracy
- **Publication (CMAME IF=7.6)**: ***H. Wang**, J. Wang and D. Negrut, "FNODE: Flow-matching for data-driven simulation of constrained multibody systems", Computer Methods in Applied Mechanics and Engineering, Volume 455, 2026, 118912, ISSN 0045-7825, https://doi.org/10.1016/j.cma.2026.118912.*

Simbench: A Framework for Evaluating and Diagnosing LLM-Based Digital-Twin Generation for Multi-Physics Simulation
UW-Madison Research Program / Key Member *Jul. 2025 - Mar. 2026*

- Co-developed a comprehensive benchmark designed to evaluate the proficiency of Large Language Models (LLMs) in generating complex multi-physics simulation codes
- Orchestrated extensive experiments on over 20 open-source and closed-source LLMs by designing a "Judge-LLM" pipeline that utilizes API documentation and ground truth code to assess simulation logic automatically
- Validated the evaluation metric's reliability by securing a 0.69 Spearman correl4ation with the rigorous pass@1 execution metric, significantly surpassing traditional similarity metrics like CodeBLEU (0.42)
- **Pulication**: *J. Wang, A. Negrut, **H. Wang**, H. Zhang and D. Negrut, "SimBench: A Framework for Evaluating and Diagnosing LLM-Based Digital-Twin Generation for Multi-Physics Simulation," in IEEE Access, vol. 14, pp. 61784-61808, 2026, doi: 10.1109/ACCESS.2026.3685519.*

Muscle Fatigue State Recognition in Neural Regulation Research
Neural Regulation National Engineering Research Center / Research Intern, *Jul. 2023 - Aug. 2023*

- Engaged in cutting-edge research on artificial spinal cords, with a primary focus on monitoring muscle fatigue states
- Conducted review of pertinent literature and replicated the experiments mentioned therein to gather empirical data
- Assessed the indicators proposed in the literature to determine their accuracy in monitoring muscle fatigue conditions