Haoyu Ma

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EDUCATION BACKGROUND	**University of Michigan at Ann Arbor**	
	M.S. in Robotics	
	Overall GPA: 4.0/4.0;	**08/2024 - Present**
	University of North Carolina at Chapel Hill	
	B.S. in Applied Mathematics, **B.S.** in Physics	
	Overall GPA: 3.918/4.0;	
	GPA of Applied Mathematics: 3.89/4.0; GPA of Physics: 3.96/4.0	**08/2020 - 05/2024**

PUBLICATION
*DENOTES EQUAL CONTRIBUTION

Song, J.*, **Ma, H.***, Bagoren, O., Sethuraman, A. V., Zhang, Y., Skinner, K. A., "*OceanSim: A GPU-Accelerated Underwater Robot Perception Simulation Framework*," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.*   **Under Review**

Ma, H., Tamim, S. I., Guan, J. H., Sáenz, P. J., "*Solid Particles Walking on a Vibrating Interface.*"   **Under Prep**

CONFERENCE AND WORKSHOP PRESENTATIONS

"*OceanSim: A GPU-Accelerated Underwater Robot Perception Simulation Framework*"
AQ^2UASIM Workshop, IEEE International Conference on Robotics And Automation (ICRA),   **05/2025 Atlanta, GA**

"*Solid Particles Walking on a Vibrating Interface*"
Oral Presentation, APS Division of Fluid Dynamics (DFD),   **11/2024 Salt Lake City, UT**

RESEARCH PROJECT

Underwater Robots Digital Twin   **Ann Arbor, MI**
Supervised by Prof. Katherine Skinner, Field Robotics Group (FRoG)   **01/2025 - Present**
- ➤ 3D Reconstruction of Marine Hydrodynamics Laboratory Towing Tank (MHL, Department of Marine Engineering, UoM) from lidar scan and stereo camera.
- ➤ Created dynamic and high visual fidelity digital twin of underwater environments and BlueROV robot in Isaac Sim.
- ➤ Developed GPU-accelerated underwater sensor (Imaging/Side Scan Sonar, DVL, etc) through Nvidia Warp.
- ➤ Simulated realistic underwater column effects suitable to any water types with Underwater Image Formation Model and GPU rendering.

Solid Particles Walking on a Vibrating Interface   **Chapel Hill, NC**
Supervised by Pedro Sáenz, Physical Mathematics Lab (PML)   **05/2023 - 05/2024**
- ➤ Discovered period-doubling vertical dynamics and" walking" states for solid micro-particles ∼0.4mm diameter on a vibrated liquid-liquid interface.
- ➤ Characterized the" walking" regimes and speed by grayscale image processing and classic object tracking with Kalman Filter.
- ➤ Numerically computed and simulated particles' hydrodynamical behaviors with self-developed PDE numerical solver.
- ➤ Designed and assembled the primary experiment structure for vibrational fluid dynamic research.
- ➤ Paper is expected to be submitted by 2025 Fall.

SCHOLARSHIP AND AWARDS

Daniel C. Johnson Outstanding Junior Award (Top 1 within department)
- ➤ Awarded annually to the physics major who is judged by the faculty to be the most outstanding student of the junior class. *Department of Physics and Astronomy, UNC*   **04/2023**

Summer Undergraduate Research Fellowship (54 recipients, 2023)
- ➤ Granted to undergraduate students conducting research under a faculty mentor. $4000 fellowship included. *Department of Undergraduate Research, UNC*   **04/2023**

SKILLS   **Software/Computing Literacy:** CUDA, Isaac Sim/Lab, Omniverse Kit, ROS2, C/C++, Python, MATLAB, SolidWorks, Arduino, LabView, Unreal Engine, Illustrator, Premiere Pro

Experimental Techniques: High-Speed Videography, 3D Printing, Laser Cutting, Basic Electronics, Metal and Wood Crafting, NI-DAQ based Signal Processing, Particle Image Velocimetry

Professional Membership: *IEEE* and *APS* (American Physical Society)

REFERENCES

Field Robotics Group (FRoG)	Physical Mathematics Lab (PML)
Prof. Katherine Skinner	**Prof. Pedro Sáenz**
Assistant Professor	Assistant Professor
Robotics, UoM	Applied Mathematics, UNC
kskin@umich.edu	saenz@unc.edu