

Haotian Liu

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EDUCATION

Worcester Polytechnic Institute

Undergraduate Student in Robotics Engineering

Worcester, MA/U.S

Expected May 2025

PUBLICATIONS (* Indicates co-first author)

- [1] **SIMEX: Deep Similarity Learning for Set-to-Set Matching with Extreme Value Distribution** Prior Haotian Liu*, Fangzhou Lin*, Lehong Wang, Kazunori Yamada, Vijaya B. Kolachalama, and Ziming Zhang Under Review, paper upon request
- [2] **Loss Distillation via Gradient Matching for Point Cloud Completion with Weighted Chamfer Distance** Haotian Liu*, Fangzhou Lin*, Songlin Hou, Haoying Zhou, Kazunori Yamada, Gregory S. Fischer, Yanhua Li, and Ziming Zhang Under Review, [PDF](#)
- [3] **Vision-based FDM Printing for Fabricating Airtight Soft Actuators** Yijia Wu*, Zilin Dai*, Haotian Liu, Lehong Wang, and Markus P. Nemitz IEEE RoboSoft 2024 Oral Presentation [PDF](#)
- [4] **STREAM: Software Tool for Routing Efficiently Advanced Macrofluidics** Lehong Wang, Savita V. Kendre, Haotian Liu, Markus P. Nemitz Under Review, [PDF](#)
- [5] **Toward Wearable Multimodal Neuroimaging** Haotian Liu*, Haohao Yi*, Lehong Wang*, Meng Wang*, Wirt Jones*, Yujie Guo*, and Yifu Yuan* Digital WPI, [PDF](#)

RESEARCH EXPERIENCE

Deep Similarity Learning for Set-to-Set Matching (*Publication Index* [1])

Worcester, MA

Supervisor: Prof. Ziming Zhang

December. 2023 – March. 2024

Description:

- Proposed a similarity learning framework for set-to-set matching by learning an EVD with minimum distances between the set items to maximize the likelihood.
- Demonstrate a bilevel optimization problem for the MLE algorithm, where the feature matching forms the lower level, and the MLE forms the upper level.
- Demonstrate comprehensive experiments on point cloud completion and few-shot image classification tasks.

Loss Optimization for Point Cloud Completion (*Publication Index* [2])

Worcester, MA

Supervisor: Prof. Ziming Zhang

May. 2023 – November. 2023

Description:

- Proposed a family of robust weighted CD losses that need no parameters tuning.
- Proposed a novel bilevel optimization formula to train the backbone network based on the weighted CD loss.
- Conducted comprehensive experiments with novel networks in benchmarks to examine the findings.

Vision-based Close-loop 3D Printing for Airtight Structures (*Publication Index* [3]) **Worcester, MA**

Supervisor: Prof. Markus P. Nemitz

August. 2023 – November. 2023

Description:

- Proposed a low-cost, vision-based, and close-loop approach to improving the FDM printing quality.
- Achieved airtightness of printed soft pneumatic actuators without fine-tuning printing parameters.
- Validated the approach through extensive underwater testing and numerical analysis.

A Blender Add-on for Efficient Fluid Circuit Generation (*Publication Index* [4]) **Worcester, MA**

Supervisor: Prof. Markus P. Nemitz

February. 2023 – September. 2023

Description:

- Introduced a software-based workflow that generates printable fluidic networks automatically.
- Proposed a three-dimensional A* algorithm for pathfinding.
- Introduced the concepts of surface-mount technology from PCB design into Macrofluidic circuits.

WPI IQP-Toward Wearable Multimodal Neuroimaging (*Publication Index* [5]) **Worcester, MA**

Supervisors: Prof. Ali Yousefi and Prof. Soroush Farzin

May. 2022– September. 2022

Description:

- Constructed compact, user-friendly, and low-cost wearable EEG chip.
- Developed a Bluetooth low-energy communication system.

SKILLS

Languages: Proficient in Chinese and English; Basic in Japanese

Programming: Python, C++, MATLAB

Tools: SolidWorks, Prusa Slicer, Blender, Illustrator, Multisim, Altium Designer.

Robotics: ROS, UR10, TurtleBot, PyBullet, OMPL, PDDL

Selected Core Courses: RBE 501 Robot Dynamics; RBE 550 Motion Planning; ECE/CS 545 Digital Image Processing; CS4342 Machine Learning; ECE 2049 Embedded System Programming; ES 3011 Control Engineering.

SERVICE

Reviewer: Frontiers in Neuroscience, section Decision Neuroscience