Haotian Liu

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EDUCATION

Worcester Polytechnic Institute — **Worcester, MA, U.S**
Undergraduate in Robotics Engineering, Minoring Mathematics — Expected May 2025

Northeastern University — **Boston, MA, US**
Research Intern with Professor Robert Platt in the Helping Hands Lab — May 2024 – August 2025

PUBLICATIONS (* Indicates co-first author or equal contribution)

[1] **Imagination Policy: Using Generative Point Cloud Models for Learning Manipulation Policies** *Haojie Huang, Karl Schmeckpeper*, Dian Wang*, Ondrej Biza*, Yaoyao Qian**, **Haotian Liu****, *Mingxi Jia**, Robert Platt, and Robin Walters,* Under Review, PDF

[2] **Set-to-Set Similarity Learning via Nearest Neighbor Matching with Gumbel Prior: A Probability Measure** ***Haotian Liu****, *Fangzhou Lin*, Haichong Zhang, Kazunori Yamada, Vijaya B. Kolachalama, Venkatesh Saligrama, and Ziming Zhang,* Under Review, paper upon request

[3] **Automated Control of External Ventricular Drain for Neuro-ICU** ***Haotian Liu****, *Yujie Guo*, Haoran Zhang*, Matthew Duncan*, and Christopher Nycz,* Bachelor Thesis, PDF

[4] **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,* IEEE/RSJ IROS 2024 **Oral Presentation**, PDF

[5] **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

[6] **STREAM: Software Tool for Routing Efficiently Advanced Macrofluidics** *Lehong Wang, Savita V. Kendre,* ***Haotian Liu****, Markus P. Nemitz,* Under Review, PDF

[7] **Toward Wearable Multimodal Neuroimaging** ***Haotian Liu****, *Haohao Yi*, Lehong Wang*, Meng Wang*, Wirt Jones*, Yujie Guo*, and Yifu Yuan*,* Bachelor Capstone, PDF

RESEARCH EXPERIENCE

Point Cloud Generation for Robotic Policy Learning (*Pub Index* [1]) — **NEU**, **Boston**, **MA**
Supervisor: Prof. Robert Platt — May. 2024 - July. 2024

Description:

- Applied various policy learning baselines (single/multi-task), RVT, PerAct, and RPDiff, on our setting to show the superiority of our method's sample efficiency and high success rate.
- Took responsibility for collecting real robot demos (Mug-Tree, Pouring-Ball, Plug-Flower) and conducting real robot evaluations.
- Introduced an articulate object task (open microwave), and multi-step task (stack chairs) to show the generalization ability of our method.

Deep Similarity Learning for Set-to-Set Matching (*Pub Index* [2]) **WPI**, **Worcester**, **MA**
Supervisor: Prof. Ziming Zhang December. 2023 - March. 2024
Description:

- Proposed a similarity learning framework for set-to-set matching by learning a Gumbel prior 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 to show the generalization of our method.

EVD Automated Control (*Pub Index* [3]) **WPI**, **Worcester**, **MA**
Supervisor: Prof. Christopher Nycz September. 2023 - May. 2024
Description

- Build an automated intracranial pressure leveling system with a pressure sensor, linear actuator, depth camera, and stepper motor.
- Recognized the leveling system as a following stabilization problem, using full state feedback and internal model principle to design controller and analysis system error.
- Conduct experiments using VICON motion capture device to validate the controlling quality.

Loss Optimization for Point Cloud Completion (*Pub Index* [4]) **WPI**, **Worcester**, **MA**
Supervisor: Prof. Ziming Zhang May. 2023 - November. 2023
Description:

- Proposed a family of CD-based losses (weighted CD) using gradient weighting scheme to mimic the teaching NN learning behavior.
- Proposed a novel bilevel optimization formula to train the backbone network based on the weighted CD loss, which needs no data related parameters tuning.
- Conducted comprehensive experiments with novel networks in both real (KITTI) and synthesis (ShapeNet) datasets to examine the findings.

Close-loop 3D Printing for Airtight Structures (*Pub Index* [5]) **WPI**, **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 (*Pub Index* [6]) **WPI**, **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 Macrofludic circuits.

Wearable Multimodal Neuroimaging by EEG (*Pub Index* [7]) **WPI**, **Worcester, MA**
Supervisors: Prof. Ali Yousefi and Prof. Soroush Farzin May. 2022 - September. 2022
Description:

- Constructed a compact wearable EEG chip (based on TGAM) for monitoring sleep spindle.
- Integrated a Bluetooth low energy chip (RN4870) with Bleak to build a communication system.
- Designed a user-friendly interface for EEG readings.

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, UR Arms, TurtleBot, PyBullet, OMPL, PDDL
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: NeurIPS 2024; Frontiers in Neuroscience, section Decision Neuroscience