Dingkun Guo

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EDUCATION

Carnegie Mellon University, Pittsburgh, PA, GPA: 4.07/4.00 — Expected May 2023
Master of Science in Robotics

University of Michigan, Ann Arbor, MI, GPA: 3.83/4.00 — Apr 2021
Bachelor of Science in Computer Science & Mechanical Engineering (Double Major, Summa Cum Laude)

Relevant Courses: Autonomous Robotics, Computer Vision, Manipulation, Artificial Intelligence, Machine Learning, Reinforcement Learning, Optimal Control, Dynamics & Modeling, Design & Manufacturing

RESEARCH EXPERIENCES ⬀

Robot Learning from Video Demonstrations in Kitchen — Jan 2022 – Present
Research Assistant, Advisor: Prof. Chris Atkeson — Carnegie Mellon University, Pittsburgh, PA
- Improved object pose estimation results with multi-view voting, filters, and hand-object relationships
- Set up a data collection system in kitchen to record dish washing videos with eight RGB-D cameras
- Implementing optimal control algorithms to detect and classify motor primitives in videos

Autonomous Walking-to-Rolling Robot Design and Control ⬀ — Sep 2019 – Dec 2021
Research Assistant, Advisor: Prof. Kenn Oldham — University of Michigan, Ann Arbor, MI
- Prototyped a robot with four 10-cm curved-beam legs as a testbed for small-scale locomotions and controls
- Created control strategies that allow robot's smooth walking-to-rolling transitions with only two degrees of freedom
- Designed and wired control circuitry to fit motors, encoders, batteries, and motor drivers into a small robot body
- Implemented and optimized an event-driven controller with PID loops to maximize forward velocity of the robot

Uncertainty Quantification in Machine Learning Models — Sep 2018 – Dec 2020
Research Assistant, Advisor: Prof. Xun Huan — University of Michigan, Ann Arbor, MI
- Analyzed sensitivity and robustness of deep neural network models for medical diagnosis
- Developed systematic capabilities to assess ML models on high-performance computing (HPC) systems
- Optimized and validated a practical inference algorithm for Bayesian neural networks

PROJECTS ⬀

Robot Solving Long-horizon Tasks with Action Library — Feb – Apr 2022
- Constructed a framework for learning long-horizon manipulation tasks by chaining a series of pre-defined primitives
- Simulated a Franka robot tracing short trajectories with TVLQR and iLQR to complete multiple tasks sequentially

Adaptive Gripper for Sorting Electronics Waste — Sep – Dec 2021
- Developed an adaptive gripping policy on a direct-driven gripper to pick up devices of different types and sizes
- Implemented kinematics, closed-loop position feedback control, and impedance control on the gripper

Autonomous Chess-Playing Robot Arm — Jan – Apr 2021
- Integrated control and path planning algorithms on a desktop robot arm to grab and move chess pieces
- Implemented a computer vision program to identify and locate chess pieces

Configurable High-Throughput Puncher — Jan – May 2020
- Performed mechanics analyses and engineering validation on multiple design concepts to find the best design
- Designed and CAD modeled a customized mechanical apparatus for rapidly punching holes on soft materials

PUBLICATIONS

Journal Papers

[J1] **D. Guo**, L. Wermers, K.R. Oldham. "Leg Shaping and Event-Driven Control of a Small-Scale, Low-DoF, Two-Mode Robot." IEEE/ASME Transactions on Mechatronics. May 2022. Also oral presented at IEEE/ASME International Conference on Advanced Intelligent Mechatronics in July 2022. [website] [paper] [slides]

[J2] (under review) S. Prabhudesai, J. Hauth, **D. Guo**, A. Rao, N. Banovic, X. Huan. "Lowering The Computational Barrier: Partially Bayesian Neural Networks for Transparency in Medical Imaging AI." Frontiers in Computer Science.

Symposiums

[S6] S. Prabhudesai, J. Hauth, **D. Guo**, et al. "Partially Bayesian Neural Networks: Low-Cost Bayesian Uncertainty Quantification for Deep Learning in Medical Image Segmentation." SIAM Conference on Uncertainty Quantification. April 2022. [abstract]

[S5] **D. Guo***, M. Kohler*, S. Sober*, D. Stanton*, I. Tackett*. "Configurable Puncher for Microfluidic Ports." Mechanical Engineering Capstone Design Showcase, University of Michigan. April 2020. [report] [slides]

[S4] **D. Guo**, X. Huan. "Assessing Uncertainty and Robustness in a Deep Neural Network Model for the Determination of Gene Mutation Status in Gliomas." Mechanical Engineering Undergraduate Symposium, University of Michigan. April 2019. [report] [slides]

[S3] **D. Guo**, X. Huan. "Uncertainty Quantification in Deep Neural Network Models for the Determination of Gene Mutation Status in Gliomas." Undergraduate Research Symposium, University of Michigan. April 2019. [poster]

[S2] **D. Guo**, X. Huan, "Assessing Uncertainty in Neural Network Models for Predicting Gene Mutation Status in Brain Tumor Patients." Mechanical Engineering Undergraduate Symposium, University of Michigan. December 2018. [poster]

[S1] **D. Guo*** , E. Zhao*, Y Zhang*, et al. "Design, Development, Construction, and Operation Plans of the First Large Space Settlement Community in Orbit Around the Planet Mercury." China Regional Final of 13th International Space Settlement Design Competition. October 2016. [proposal]

(* indicates equal contribution)

SELECTED HONORS AND AWARDS

2021	James B. Angell Scholar at the University of Michigan
2018–2021	Dean's List and University Honors in all semesters at the University of Michigan
2016	Runners-Up Team in China Final of 13th International Space Settlement Design Competition
2016	Outstanding Contributor in Public Service, granted by the Sichuan State Children Foundation
2015	Excellent Leadership Prize, granted by Chengdu No. 7 High School

SKILLS

Programming: Python, C++, JavaScript, Julia, HTML, LaTeX, and MATLAB

Softwares: ROS, PyTorch, PyBullet, OpenCV, Photoshop, Lightroom, and Final Cut Pro

Mechanical: SolidWorks, Arduino, Mill, Lathe, Water Jet, and 3D Printing