

RUIRUI (ANNIE) HUANG
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EDUCATION

Johns Hopkins University

Robotics, MSE.

Baltimore, MD

Expected May 2026

- General robotics tracks
- Conducted research on medical robotics and machines / deep learning
- Relevant course skills: algorithms, method development, machine/deep learning

Computer Science, BS. Applied Mathematics/ Statistics

Expected May 2026

- GPA: 3.90/4.0, Honors: High Honor Roll (2024-2026), BDP Awardee (2024)
- Conducted research on computational biology
- Relevant course skills: algorithms, method development, machine/deep learning
- Software skills: Unix, C/C++, Java, Python, MATLAB, Solidworks, Blender

Garrison Forest School

Owings Mills, MD

High School Diploma

June 2023

- GPA: 98.02/100, SAT: 1550 (EWR: 750, M: 800)
- Member of the Cum Laude Society; Honors: High Honor Roll (2019-2023), Maryland Certificate of Merit (2023), AP Scholar with Distinction (2022), National Merit Commended Finalist (2023)

PUBLICATIONS

D. Liu, **R. Huang**, et al. "Toward Autonomous Marker Localization for Lumbar Epidural Steroid Injection Robot," 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Orlando, FL, USA, 2024, pp. 1-6, doi: 10.1109/EMBC53108.2024.10782105.

D. Liu, **R. Huang** and G. Shen, "An Error Correction Method for MRI-HIFU Robot Based on Dynamic Optical Tracking System," 2024 10th International Conference on Mechatronics and Robotics Engineering (ICMRE), Milan, Italy, 2024, pp. 110-113, doi: 10.1109/ICMRE60776.2024.10532157.

R. Huang and J. Li, "MedCondDiff: Lightweight, Robust, Semantically Guided Diffusion for Medical Image Segmentation," submitted to IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2026.

RESEARCH

INDEPENDENT RESEARCH

Baltimore, MD

Undergraduate Independent Research

May 2025 – Present

- Designed and implemented a lightweight conditional diffusion model tailored for medical image segmentation, integrated semantic prior to improving structure-aware reconstruction accuracy.
- Demonstrated improved Dice and mIoU scores over baseline diffusion and transformer-based methods. Contributed to the theoretical formulation, method design, and reproducibility framework.

SALZBERG LAB

Baltimore, MD

Undergraduate Research Intern, BDP Undergraduate Researcher

May 2024 – June 2025

- Conducted research under Prof. Salzberg; Project supported by a scholarship from Hopkins Undergraduate Research Office.
- Developed Liftoff+, an improved gene annotation lift-over method for human genome assemblies. Investigated protein-level and region-specific strategies to enhance annotation accuracy in challenging genomic regions (Y chromosome, VDJ, rDNA).
- Presented research at JHU Undergraduate Research Seminar (Spring 2025).

SENSING, MANIPULATION, AND REAL-TIME SYSTEMS (SMARTS)

Baltimore, MD

Visiting Researcher

October 2022 – June 2023

- Conducted research under Dr. Peter Kazanzides and Dr. Adnan Munawar; Presented during ISMR 2023 Workshop.
- Expanded functionalities of Asynchronous Multi-Body Framework (AMBF) simulator to allow interpolation of path.
- Utilized MATLAB to perform temporal alignment and visualization of kinematics data of PSM motions in dVRK and AMBF

PROJECTS

Performance Evaluation of AMBF on Simulating dVRK trajectories (2024). Performed temporal alignment and visualized kinematics data of PSM in dVRK and AMBF. Worked on minimizing sim2real reality gap.

Liftoff+: Multi-reference, Biotype-aware DNA Annotation Lift-over (2024). Developed a high-accuracy lift-over pipeline with improved handling of complex genomic regions and pre-processing for reference canonicalization. Contributed to algorithm improvement and evaluation for reproducible large-scale genome annotation.

MedCondDiff: Semantically Guided Diffusion for Medical Image Segmentation (2025). Developed a diffusion-based framework for multi-organ medical image segmentation that integrates semantic priors from PVT-backbone to improve robustness; Achieved competitive performance across multi-organ, multi-modality datasets.

TEACHING

<i>Johns Hopkins Department of Computer Science</i>	January 2024 – May 2025
<ul style="list-style-type: none">• Intermediate Programming 601.220 (Spring 2024, Fall 2024)• Sketching and Indexing for Sequences 601.446/646 (Spring 2025)	
<i>Johns Hopkins Department of Applied Mathematics and Statistics</i>	September 2024 – Present
<ul style="list-style-type: none">• Probability 553.420 (Fall 2024, Spring 2025, Fall 2025)	
<i>Johns Hopkins Department of Mechanical Engineering</i>	May 2025 – Present
<ul style="list-style-type: none">• Robot Devices, Kinematics, Dynamics, and Control 530.646 (Fall 2025)• Summer course development 530.646 (Summer 2025)	

EXTRACURRICULAR ACTIVITIES

THE NEWS-LETTER	Baltimore, MD
<i>SciTech Editor, Johns Hopkins student-run newspaper</i>	September 2023 – January 2025
<ul style="list-style-type: none">• Ran weekly meeting and SciTech section budget list; Helped publishing monthly physical newspaper.• Interviewed on the achievement of researchers and graduate students affiliated with Johns Hopkins; Published +10 pieces.	
THE EPIDEMIC PORTIONS	Baltimore, MD
<i>E-board member, Copy Editor, Author, Johns Hopkins Undergraduate Public Health Journal</i>	September 2023 – May 2025
<ul style="list-style-type: none">• Wrote a piece on the implication of Artificial Intelligence in the field of healthcare• Revised student research, fieldwork, and articles to emphasize a unique perspective or experience	