

Peter W. Hsu

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Education

University of Illinois at Urbana-Champaign | GPA: 4.0/4.0

Expected Graduation: May 2026

Bachelor of Science in Bioengineering, Minor in Computer Science

Calculus I/II/III	Neuroscience	Cell & Tissue Engineering Lab	Data Structures
Differential Equations	Bioeng Conservation Principles	Quantitative Physiology Lab	Computation for Biological Data
Linear Algebra	Tissue Engineering	Bioinstrumentation Lab	Computational Photography*
Physics Mech/Elec/Mag	Modeling Human Physiology	Neural Cell and Tissue Eng Lab*	Artificial Intelligence*
Organic Chemistry I	Design & Use of Biomaterials	Intro. to Comp. Sci. I (Java)	Biophotonics*
Signals & Systems	Biosensors	Intro. to Comp. Sci. II (C++)	Stem Cell Engineering*
Cellular Bioengineering	Transport & Flow in Bioeng	Discrete Structures	Bio Control Systems*

* Senior year, In progress

- GRE General Test: Quantitative 170/170, Verbal 167/170, Analytical Writing 5/6

Research Experience

Chemical Imaging and Structures Laboratory | Beckman Institute | Champaign, IL

September 2022 – Present

Principal Investigator: Dr. Rohit Bhargava, Grainger Distinguished Chair in Engineering, Department of Bioengineering

Undergraduate Researcher

- Conducted independent research projects to improve the lab's biomedical image pre-processing algorithms and develop novel machine learning models for automated diagnoses
- Performed imaging, computational processing, and annotations to create a 100+ whole slide cancer pathology image dataset for use by multiple ongoing artificial intelligence projects in collaboration with Mayo Clinic
- Presented at bi-weekly group meetings and 2 poster symposiums to clearly convey research findings to group members and the public

Journal Publications

- **P. Hsu**, K. Falahkheirkhah, R. Bhargava, "Rapid Stain Normalization Pipeline for Whole Slide Images," 2025. (In preparation, available upon request)

Poster Presentations (* denotes equal contribution)

- **P. Hsu***, C. Devineni*, A. Shahi*, K. Falahkheirkhah, R. Bhargava. "Deep Learning Diagnostic Tools for Digital Chemical Pathology," presented at the STEM Career Exploration Symposium, Urbana, IL, July 2025. Available: <https://peterhsu48.github.io/prostate>
- **P. Hsu**, K. Falahkheirkhah, R. Bhargava. "Designing a Machine Learning Architecture for Cancer Detection in Histological Images to Address Inter-Hospital Variation", presented at the Undergraduate Research Symposium, Urbana, IL, April 2023. Available: <https://peterhsu48.github.io/vit-densenet>

Code Repositories

- **P. Hsu**, K. Falahkheirkhah, R. Bhargava. *Stain Normalization of Lymph Node Histology Images using Consistency Models*. GitHub. (2024). Available: <https://peterhsu48.github.io/consistency-stainnorm>

Internship Experience

3DHEALS | San Francisco, CA

May 2024 – Present

Founder and CEO: Jenny Chen, M.D., Neuroradiologist, Former Adjunct Clinical Faculty, Stanford Healthcare

Editorial Intern

- Wrote 14 articles on the latest innovations in medical 3D printing to inform industry, research, and clinical professionals (published on 3DHEALS.com, see Published Articles below)
- Created and managed the company's scientific social media content to increase awareness of 3D bioprinting and establish a community network
- Identified key figures in 3D bioprinting through extensive reviews to curate speaker panels for our global networking webinars

Involvements and Leadership

Engineering Ambassadors | Champaign, IL

August 2023 – Present

Off-Campus Executive (January 2024 – May 2024), President (August 2024 – May 2025)

- Instructed 300+ K-12 students and led hands-on activities using effective communication skills to inspire students from diverse backgrounds to pursue careers in engineering
- Coordinated and led 25 members to provide 40+ outreach classroom visits and 7+ STEM fairs to the community, increasing access to engineering education
- Represented the university at the 2025 National Leadership Conference at Penn State to collaborate with other chapters on organizational development

Biomedical Engineering Society | Champaign, IL

August 2022 – Present

Engineering Open House Exhibitor

- Designed and prototyped a novel epinephrine injection device to improve ease-of-use during life-threatening allergic reactions
- Created a project website to convey the design process and internal components to visitors at the University's 2023 Engineering Open House as part of BMES' mission to promote recent biomedical advances
- Collaborated with a team of bioengineering and materials science students in a competition, winning Distinguished Biomedical Application

CreAlgae, Illinois Enactus | Champaign, IL

August 2022 – December 2022

Bioplastics Technical Production Fellow

- Created 10+ bioplastic and resin-based prototypes for the student startup, which worked on developing a sustainable plastic alternative made from algae to protect the environment
- Improved product design to increase marketability for the first product the startup sold to the public
- Conducted materials testing on new prototypes to quantitatively analyze the quality of the bioplastic

Awards

- **Distinguished Biomedical Application**, University of Illinois Engineering Open House (2023)
- **Dean's List**, University of Illinois (Fall 2022, Spring 2023, Fall 2023, Spring 2024, Fall 2024, Spring 2025)

Skills

- **Certificate:** Biotechnology Lab Assistant (granted August 2022 by Irvine Valley College)
- **Laboratory:** mammalian cell culture, gel electrophoresis, Western blot, SDS-PAGE, PCR, spectrophotometry, brightfield microscopy, whole slide imaging, FDM 3D printing
- **Computer:** Python (with PyTorch, NumPy, Matplotlib, OpenCV), C++, Java, MATLAB/Simulink, High-Performance Computing, ImageJ (Java plugin development), Autodesk Fusion 360

Research Projects

Project #1: Designing a Machine Learning Architecture for Cancer Detection in Histological Images to Address Inter-Hospital Variation (2022-2023)

- Investigated the effectiveness of prior machine learning methods in the literature, developing critical literature review skills
- Created an innovative machine learning architecture that obtained competitive results compared to state-of-the-art approaches
- Communicated results to the public at the university's 2023 Undergraduate Research Symposium

Project #2: Stain Normalization of Lymph Node Histology Images using Consistency Models (2023-2024)

- Developed a stain normalization method based on recent advancements in consistency (diffusion-inspired) models, outperforming traditional approaches
- Published an open-source code repository for public use

Project #3: Rapid Stain Normalization Pipeline for Whole Slide Images (2024-2025)

- Improved the lab's image pre-processing pipeline by designing a novel stain normalization pipeline that creates coherent, tile artifact-free images
- Implemented the algorithm as an easy-to-use ImageJ plugin for reproducible use
- Wrote a manuscript that is currently in preparation

Project #4: Knowledge Distillation for Prostate Cancer Segmentation (2025 – Present)

- Built a knowledge distillation approach to improve automated detection of prostate cancer in whole slide histology samples imaged with infrared microscopy
- Presented preliminary results to the public at the 2025 STEM Career Exploration Symposium

Project #5: Creation of a Machine Learning Dataset for Cancer Pathology (2024 – Present)

- Performed brightfield whole slide imaging of human cancer tissue samples from Mayo Clinic, processed images using registration and normalization algorithms, and created hand-drawn annotations for a 100+ sample dataset
- Collaborated with lab members to create an organized dataset currently in use by multiple ongoing AI projects

Published Articles

P. Hsu, "What are the latest advances in biomaterials for 3D bioprinting?," *3DHEALS*, Sep. 12, 2025. Available: <https://3dheals.com/what-are-the-latest-advances-in-biomaterials-for-3d-bioprinting>

P. Hsu, "3D Printed Pharmaceuticals," *3DHEALS*, Aug. 18, 2025. Available: <https://3dheals.com/event-recap-3d-printed-pharmaceuticals>

P. Hsu, "The 3D Bioprinting Frontier," *3DHEALS*, Jul. 28, 2025. Available: <https://3dheals.com/event-recap-the-3d-bioprinting-frontier>

P. Hsu, "Artificial Intelligence Updates For 3D Printing and Bioprinting," *3DHEALS*, Jun. 29, 2025. Available: <https://3dheals.com/event-recap-artificial-intelligence-updates-for-3d-printing-and-bioprinting>

P. Hsu, "Microfluidic Devices and 3D Printing," *3DHEALS*, May 1, 2025. Available: <https://3dheals.com/event-recap-microfluidic-devices-and-3d-printing>

P. Hsu, "San Francisco 3D Printing and Bioprinting for Health," *3DHEALS*, Apr. 5, 2025. Available: <https://3dheals.com/event-recap-san-francisco-3d-printing-and-bioprinting-for-health>

P. Hsu, "3D Printing for Veterinarian Medicine," *3DHEALS*, Mar. 29, 2025. Available: <https://3dheals.com/event-recap-3d-printing-for-veterinarian-medicine>

P. Hsu, "3D Printed Devices in Orthopedics," *3DHEALS*, Mar. 6, 2025. Available: <https://3dheals.com/event-recap-3d-printed-devices-in-orthopedics>

P. Hsu, "Revolutionizing Pet Care With 3D," *3DHEALS*, Sep. 8, 2024. Available: <https://3dheals.com/event-recap-revolutionizing-pet-care-with-3d>

P. Hsu, "3D Microfabrication," *3DHEALS*, Aug. 25, 2024. Available: <https://3dheals.com/event-recap-3d-microfabrication>

P. Hsu, "3D Bioprinting Biofabricating Skin Components," *3DHEALS*, Aug. 1, 2024. Available: <https://3dheals.com/event-recap-3d-bioprinting-biofabricating-skin-components>

P. Hsu, "Point of Care 3D Printing," *3DHEALS*, Jul. 25, 2024. Available: <https://3dheals.com/event-recap-point-of-care-3d-printing>

P. Hsu, "3D Printing and AI in Orthopedics," *3DHEALS*, Jul. 13, 2024. Available: <https://3dheals.com/event-recap-3d-printing-and-ai-in-orthopedics>

P. Hsu, "In Silico Simulation for Medtech and Biopharma," *3DHEALS*, Jul. 4, 2024. Available: <https://3dheals.com/event-recap-in-silico-simulation-for-medtech-and-biopharma>

P. Hsu, "Innovation in Melt-Electrowriting (MEW) & 3D Printing," *3DHEALS*, Jun. 15, 2024. Available: <https://3dheals.com/event-recap-innovation-in-melt-electrowriting-mew-3d-printing>