Peter W. Hsu

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Education

University of Illinois Urbana-Champaign | **GPA: 4.0/4.0** ***Expected Graduation: May 2026***

Bachelor of Science in Bioengineering, Minor in Computer Science

Organic Chemistry I	Intro. to Comp. Sci. II (C++)	Discrete Structures	Bioinstrumentation Lab
Physics (Calculus-Based)	Signals & Systems	Data Structures	Neural Cell and Tissue Eng*
Differential Equations	Bioeng Conservation Principles	Biosensors	Computational Photography*
Multivariate Calculus	Design & Use of Biomaterials	Tissue Engineering	Bio Control Systems*
Linear Algebra	Transport & Flow in Bioeng	Neuroscience	Biophotonics*
Computation for Bio Data	Cellular Bioengineering	Quantitative Physiology Lab	Immunoengineering*
Intro. to Comp. Sci. I (Java)	Modeling Human Physiology	Cell & Tissue Engineering Lab	Applied Machine Learning*

* 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** | **Urbana, 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 workflow 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 Histology Images," 2025. (In preparation)

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 and 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 16 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 | **Urbana, 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 | **Urbana, IL** ***August 2022 – Present***

Engineering Open House Exhibitor, Member

- 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 | **Urbana, 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, 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 other researchers to adapt for their own use

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

- Improved the lab's image pre-processing workflow 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 as the first author 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 and 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+ slide dataset
- Collaborated with lab members to create an organized dataset currently in use by multiple ongoing AI projects

Published Articles

P. Hsu, "Where is 3D printing for orthotics and prosthetics (O&P) headed next?," *3DHEALS*, Nov. 14, 2025. Available: https://3dheals.com/where-is-3d-printing-for-orthotics-and-prosthetics-op-headed-next

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