Kaihua (William) Hou

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Education

University of California, Berkeley
University of California, San Francisco — **California, U.S.**
Ph.D., Computational Precision Health — *Aug. 2023 – May. 2028 (Expected)*

Johns Hopkins University — **Maryland, U.S.**
B.S., Computer Science — *Aug. 2019 – May. 2023*

Research Experiences

- **University of California, Berkeley** — **Berkeley, CA, U.S.**
  Computational Precision Health (CPH) Rotation — *Aug. 2023 – Present*
  Advisors: Adam Yala, Rima Arnaout
  Designing attention architecture for memory-efficient self-supervised learning in medical imaging.
  Using large language models and knowledge graph to harmonize and structure clinical text data.

- **Massachusetts Institute of Technology** — **Boston, MA, U.S.**
  Clinical and Applied Machine Learning Group — *Jun. 2022 – May. 2023*
  Advisors: Emma Pierson, John Guttag
  Using probabilistic modeling and machine learning to estimate relative prevalences of underdiagnosed diseases.
  Investigating how different ways of reporting demographic info can affect classic AI for health tasks.

- **Johns Hopkins University** — **Baltimore, MD, U.S.**
  Malone Center for Engineering in Healthcare — *May. 2021 – May. 2023*
  Advisors: Jithin Yohannan, Mathias Unberath
  Forecasting rapid glaucoma worsening using Long Short-Term Memory (LSTM) and Transformer models.
  Regenerating visual field measurements with optical coherence tomography (OCT) data using GAN.
  Investigating how AI predictions affect the decision-making process of ophthalmologists.

- **Johns Hopkins Medicine** — **Baltimore, MD, U.S.**
  Division of Health Sciences Informatics — *Aug. 2020 – Jan. 2022*
  Advisors: Ali Afshar, Hadi Kharrazi
  Analyzed & visualized 6 million hospital admissions in the Healthcare Cost and Utilization Project (HCUP) in R.
  Developed interpretable machine learning models to predict hospital readmission using the HCUP dataset.

- **Johns Hopkins University** — **Baltimore, MD, U.S.**
  Delineo Disease Modeling Group — *May. 2020 – May. 2021*
  Advisor: Anton Dahbura
  Designed and implemented interactive COVID-19 maps at the county and state levels using ReactJS.
  Developed statistical disease drivers to model disease spread using population movement information.

Publications & Preprints

(*: equal contribution)

7. Divya Shanmugam, **Kaihua Hou**, Emma Pierson. **Quantifying Disparities in Underreported Health Conditions: An Application to Intimate Partner Violence**. *npj Women's Health*. 2024.
6. Rajiv Movva*, Divya M Shanmugam*, **Kaihua Hou**, Priya Pathak, John Guttag, Nikhil Garg, Emma Pierson. **Coarse race data conceals disparities in clinical risk score performance**. *Machine Learning*

for Health (ML4H) Conference ***Honorable Mention Findings Paper***. 2023.

5. **Kaihua Hou**, Chris Bradley, Patrick Herbert, Chris Johnson, Michael Wall, Pradeep Ramulu, Mathias Unberath, Jithin Yohannan. **Predicting Visual Field Worsening with Longitudinal Optical Coherence Tomography Data Using a Gated Transformer Network**. *37th AAAI Conference on Artificial Intelligence (AAAI). Ophthalmology*. 2023.
4. Patrick Herbert, **Kaihua Hou**, Christopher Bradley, Greg Hager, Michael Boland, Pradeep Ramulu, Mathias Unberath, Jithin Yohannan. **Forecasting Risk of Future Rapid Glaucoma Worsening Using Early Visual Field, Optical Coherence Tomography, and Clinical Data**. *Ophthalmology Glaucoma*. 2023.
3. Chris Bradley, Patrick Herbert, **Kaihua Hou**, Pradeep Ramulu, Mathias Unberath, Jithin Yohannan. **Comparing the accuracy of peripapillary OCT scans and visual fields to detect glaucoma worsening**. *Ophthalmology*. 2023.
2. Jasdeep Sabharwal*, **Kaihua Hou***, Patrick Herbert, Chris Bradley, Chris Johnson, Michael Wall, Pradeep Ramulu, Mathias Unberath, Jithin Yohannan. **A deep learning model incorporating spatial and temporal information successfully detects visual field worsening using a consensus based approach**. *Scientific Reports.* 2023.
1. Chris Bradley, **Kaihua Hou**, Patrick Herbert, Mathias Unberath, Michael Boland, Pradeep Ramulu, Jithin Yohannan. **Evidence-Based Guidelines for the Number of Peripapillary OCT Scans Needed to Detect Glaucoma Worsening**. *Ophthalmology*, 2023.

Honors & Awards

AAAI Undergraduate Consortium Scholar
- *Association for the Advancement of Artificial Intelligence (AAAI)*
  11 undergraduate researchers were selected — *Jan. 2023*

Computing Research Association Outstanding Undergraduate Researchers Nominee
- *Johns Hopkins University*
  4 undergraduate researchers were nominated to CRA by each North American university — *Oct. 2022*

Provost's Undergraduate Research Award
- *Johns Hopkins University*
  Awarded to undergraduate students who demonstrate excellence in academic research — *Oct. 2022*

FUTURE Ignited Fellow
- *California Institute of Technology*
  Selected from underrepresented Ph.D. applicants nominated by faculty members — *Oct. 2022*

Members-in-Training Most Outstanding Poster Award Nomination
- *Association for Research in Vision and Ophthalmology (ARVO) Annual Conference*
  The top 5 student posters were nominated from each 100-poster section — *May. 2022*

Intuitive Surgical Best Project Award
- *Intuitive Surgical Inc. & Johns Hopkins University*
  Awarded to the top 2 student-led deep learning projects among 32 projects — *May. 2022*

- **Upsilon Pi Epsilon (UPE) Member**
  International Honor Society for the Computing and Information Disciplines — *Dec. 2021 – present*

Professional Services

Student Volunteer — **Washington D.C.**
- *Association for the Advancement of Artificial Intelligence (AAAI)*
  Organizing and moderating technical sessions — *Feb. 2023*

Teaching Assistant — **Johns Hopkins University**

- *EN.601.464/664: Artificial Intelligence*
  Holding weekly office hours and 2 lectures (class size: 91) — *Aug. 2022 – May. 2023*

Teaching Assistant — **Johns Hopkins University**

- *EN.601.484/684: Interpretable Machine Learning Design*
  Creating course materials & assignments (class size: 27) — *May. 2022 – Dec. 2022*

Student Mentor — **Johns Hopkins University**

- *Association for Computing Machinery (ACM)*
  Advising one undergraduate student each semester — *May. 2021 – May. 2023*

Student Advisor — **Johns Hopkins University**

- *Student Advisory Committee*
  Advising university development from student perspectives — *Feb. 2021 – May. 2023*

Peer-Led-Team Learning and Tutoring (PILOT) Leader — **Johns Hopkins University**

- *AS.171.107: General Physics II*
  Organizing weekly review sessions (class size: 12) — *Aug. 2020 – Dec. 2020*