Sandeep Kambhampati
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Education

Harvard University (Boston, MA) *Expected May 2026*
Ph.D. candidate, Bioinformatics and Integrative Genomics

Johns Hopkins University (JHU) (Baltimore, MD) *May 2021*
B.S., Biomedical Engineering (BME) | Genomics & Systems Biology Track | GPA: 3.93

Technical Skills

Proficient: Python, PyTorch, Lightning, Pyro, R, Unix, Git Basic: JAX/NumPyro, Julia, Java

Experienced in Self-Supervised Learning, Generative models, Computer Vision, Distributed Training, Model Optimization, Bayesian Inference, Generalized Linear Models

Research Experience

Microsoft Research New England – *Research Intern* *Summer 2025*
Advisor: Dr. Alex Lu (*Senior Researcher)*

- Designing a channel-adaptive autoregressive transformer for *in silico* generation of fluorescent microscopy data, including downstream *virtual staining* tasks
- Investigating the effect of sequence mutations on protein localization by jointly training the model on Human Protein Atlas and Protein Language Model embeddings of protein sequence

Broad Institute of MIT & Harvard – *Graduate Research Student* *2021-present*
Advisors: Drs. Fei Chen (*Core Member)*, Mehrtash Babadi (*Director of Computational Methods)*

- Built *TissueMosaic,* a self-supervised representation learning framework for spatial transcriptomics (ST) data, by adapting DINO with domain-specific augmentations.
- Formulated *Latent Dynamical Systems* (a latent neural PDE) to model how interactions between local spatial processes generate developmental patterns from time-series ST data
- Developing a Point Cloud Transformer foundation model to learn rules of tissue organization

Johns Hopkins University – *Undergraduate Researcher* *2017-2021*

- Constructed a statistical physics model of DNA methylation from long read ONT sequencing data and applied this model to study genetic heritability of DNA methylation patterns
- Analyzed RNA-seq data to identify key transcriptional regulators of multi-organ development
- Engineered mouse knockout and *in vitro* overexpression models to identify gene targets that enhance the therapeutic potential of stem-cell derived cardiomyocytes

Publications

1. Bhate, S.*, **Kambhampati, S.*,** Babadi, M., Chen, F.#, Uhler, C.# *Latent Dynamical Systems* Learn Rules Generating Spatial Transcriptomics. *Submitted to RECOMB 2026.* Github
2. **Kambhampati, S.**, D'Alessio, L., Grab, F., Fleming, S., Chen, F.#, Babadi, M.# *TissueMosaic* enables cross-sample differential analysis of spatial transcriptomics datasets through self-supervised representation learning. ***Cell Systems*** (2025) Github Paper
3. Davidovich, A., … **Kambhampati, S.,** *et al.* Widespread non-Mendelian inheritance of DNA methylation patterns in mice. ***Nature Genetics*** (2024, In Review)
4. Russell, A.*, Weir, J.*, Nadaf, N.* … **Kambhampati, S.**, *et al.* Slide-tags enables single-nucleus barcoding for multimodal spatial genomics. ***Nature*** (2023)

5. **Kambhampati, S.*,** Murphy, S.*, *et al.* Cross-organ transcriptomic comparison reveals universal factors during maturation. ***Journal of Computational Biology*** (2022)
6. Abanti, J., **Kambhampati, S.**, Feinberg, A., Goutsias, J. Estimating DNA methylation potential energy landscapes from nanopore sequencing data. ***Scientific Reports*** (2021)
7. Murphy, S., … **Kambhampati, S**., *et al.* PGC1/PPAR Drive Cardiomyocyte Maturation through Regulation of Yap1 and SF3B2. ***Nature Communications*** (2021)
8. Manbachi, A., **Kambhampati, S.**, *et al.* Intraoperative Ultrasound to Monitor Spinal Cord Blood Flow After Spinal Cord Injury. ***SPIE Medical Imaging Proceedings*** (2020)

* or # denotes equal contribution

Oral Presentations

Seoul, South Korea	Research in Computational Molecular Biology (RECOMB)	*2025*
Vancouver, Canada	Keystone Symposia: Single-cell Biology and Tissue Genomics	*2024*
Dallas, Texas	SPIE Medical Imaging Conference	*2020*

Leadership and Outreach

Health Professions Recruitment Program – *Mentor* *2021 – 2023*

- Mentored Boston high schoolers from underserved backgrounds to produce a research project and form a comprehensive plan to achieve their goals in science and medicine

Hopkins Undergraduate Research Journal – *Editor-in-Chief* *2018 – 2021*

- Published an annual journal of 15+ STEM and Humanities articles
- Established a faculty review process and a mission on accessible scientific communication

Thread – *Head of Family* *2017 - 2021*

- Managed fellow volunteers to provide a support network "family" for Baltimore high school students confronting significant barriers outside of the classroom

Teaching and Mentorship

Qiyu Gong (Broad Institute, *Associate Computational Biologist*)	*2022-2025*
Ebtisam Alshehri (Broad Institute, *Machine Learning Research Intern)*	2024
Matthew Shum (Harvard undergraduate)	*2022*
Teaching Assistant: Systems and Controls (JHU BME Core Curriculum)	*2019, 2020*

Awards (selected)

NSF Graduate Research Fellowship Program (GRFP) | Covers PhD tuition+stipend for 3 years	*2022*
Hertz Fellowship Finalist | 1 of 45 finalists selected from 650+ applicants	*2022*
Tau Beta Pi Honor Society | Top 1/5 of JHU seniors in engineering	*2021*
Frances Howard Flatau Scholarship | To 1 JHU BME upperclassman annually	*2019, 2020*
Provost's Undergraduate Research Award | JHU grant for original research proposal	*2020*
Vredenburg Scholar | JHU grant for research abroad	*2019*

Hobbies and Interests

Rock climbing, Harvard Mountaineering Club, sailing, mountain biking, Indian classical violin