# Akash Parvatikar

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**RESEARCH OBJECTIVES**

- *PhD student in Computational and Systems Biology specializing in biomedical imaging informatics and computational and systems pathology*
- *Investigate the intrinsic characteristics of biomedical images at multi-scale resolutions using statistical modeling, computer vision, machine learning, and graph-based deep learning techniques*
- *Develop explainable computational pathology algorithms to understand the origins of diagnostic discordance in differentially diagnosing a broad spectrum of breast lesions from digitized histopathology images*

**EDUCATION**

**Joint Carnegie Mellon-University of Pittsburgh School of Medicine**, Pittsburgh, PA, USA     Sep 2018 - Present
PhD in Computational Biology     GPA: 3.6/4

**University of Pittsburgh**, Pittsburgh, PA     Aug 2016 - May 2018
Masters in Information Science     GPA: 3.7/4

**R.V. College of Engineering**, India     Aug 2012 - May 2016
Bachelor of Electronics and Communication Engineering     GPA: 8.3/10

**PROFESSIONAL EXPERIENCE**

**Graduate Student Researcher**     Sep 2018 - Present
Prof. S. Chakra Chennubhotla's Lab, University of Pittsburgh

- Investigate the mechanistic underpinnings of inter- and intra-class diagnostic variability in histopathology images and spatial intratumoral heterogeneity in multiplex image data
- Develop computational pathology tools for the challenging task of correctly classifying sub-categories present within the diagnostic spectrum of breast lesions
- Conceptualize an explainable AI framework intended to capture the visual diagnostic thinking of the pathologists
- Build a computational pathology-based cognitive assistant by demonstrating perceptual and planning components which are useful in bringing the above technologies to everyday pathology practice

**Graduate Teaching Assistant, University of Pittsburgh**     Sep - Dec 2019
MSC 2065 Scalable Machine Learning for Big Data Biology

**Member of Review Board**     June 2021 - present
Signal, Image and Video Processing Journal

**INTERNSHIP**

**Oak Ridge National Laboratory (ORNL)**     Oak Ridge, TN
*Advanced Short-Term Research Opportunity (ASTRO) Program*     May - Aug 2018

- Developed computational tools to analyze high-throughput, low-resolution Cryo-Electron Microscopy images for betagalactosidase, a bacterial enzyme
- Gathered necessary skills to use RELION (Regularized Likelihood Optimization) software that uses Bayesian statistics to reconstruct three-dimensional representation of biomolecules to near atomic resolution from two-dimensional micrographs data obtained by taking snapshots of macromolecule in different orientations

**Oak Ridge National Laboratory (ORNL)**     Oak Ridge, TN
*Advanced Short-Term Research Opportunity (ASTRO) Program*     May - July 2017

- Contributed in developing ANCA software (Anharmonic Conformational Analysis) as an extensible framework to characterize anharmonic events and enable a deeper analysis of their functional relevance
- Contributed in developing toolbox that provides modules to measure long tail behavior of complex protein fluctuations by chasing higher order statistics
Project link: https://github.com/acadev/anca

**ORGANIZATIONS**

**Core committee member** — *Diversity and Inclusion Committee* Sep 2020 - present

- Support department's efforts to attract and retain talented trainees and scientists from diverse socio-economic backgrounds, carrying diverse life experiences and perspectives
- Under the auspices of the University's Office of Diversity and Inclusion, this committee aims to increase awareness, sensitivity, and respect of all individuals

**Member** — *Digital Pathology Association (DPA)* Dec 2020 - present

**Co-founder** — *The Grad School Playbook (YouTube)* Podcast May 2020 - present

- A casual guide to be well-informed about an exciting graduate life experience and beyond. We discuss a plethora of topics that help in navigating through one's career trajectory

**Career Mentor** — *Gradvine* Dec 2017 - present

- Mentored 50+ students to help them craft a stellar, technically correct *Personal Statement* for graduate applications

**PUBLICATIONS**

- **Parvatikar, A.**\*, Furman, S\*., Ramanathan, A., Tosun, A. B., Fine, J.L., Chennubhotla, S. C., Pullara, F. Development and evaluation of spatial intratumor heterogeneity metrics from hyperplexed immunofluorescence based spatial proteomics data for prognosing disease outcomes. In *Frontiers in Oncology Journal* - to be submitted
- **Parvatikar, A.**, Falkenstein, B., Choudhary, O., Ramanathan, A., Navolotskaia, O., Carter, G., Tosun, A. B., Fine, J.L., Chennubhotla, S. C. (2021, October). Prototype-driven computational pathology. In *The International Conference on Computer Vision (ICCV)* - rebuttal submitted, pending final decision: July 22, 2021.
- **Parvatikar, A.**, Falkenstein, B., Choudhary, O., Ramanathan, A., Jenkins, R., Navolotskaia, O., Carter, G., Tosun, A. B., Fine, J.L., Chennubhotla, S. C. (2021, October). Prototypical models for classifying high-risk atypical breast lesions. In $24^{th}$ *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)* - accepted
- Ramanathan, A., Ma, H., **Parvatikar, A.**, Chennubhotla, S. C. (2021). Artificial intelligence techniques for integrative structural biology of intrinsically disordered proteins. Current Opinion in Structural Biology, 66, 216-224.
- **Parvatikar, A.**, Choudhary, O., Ramanathan, A., Navolotskaia, O., Carter, G., Tosun, A. B., Fine, J.L., Chennubhotla, S. C. (2020, October). Modeling Histological Patterns for Differential Diagnosis of Atypical Breast Lesions. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)* (pp. 550-560). Springer, Cham.)
- Ramanathan, A., **Parvatikar, A.**, Chennubhotla, S. C., Mei, Y., Sinha, S. C. (2020). Transient Unfolding and Long-Range Interactions in Viral BCL2 M11 Enable Binding to the BECN1 BH3 Domain. *Biomolecules*, 10(9), 1308.

- **Parvatikar, A.**, Vacaliuc, G. S., Ramanathan, A., Chennubhotla, S. C. (2018). ANCA: Anharmonic Conformational Analysis of Biomolecular Simulations. *Biophysical journal*, 114(9), 2040-2043.
- Rao, K. U., **Parvatikar, A.** G., Gokul, S., Nitish, N., Rao, P. (2016). A novel fault diagnostic strategy for PV micro grid to achieve reliability centered maintenance. In 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES) (pp. 1-4). IEEE.

**TECHNICAL SKILLS**

- Programming Language: Python, MATLAB, R, JAVA, C++, C
- Data Analysis Tools: NumPy, SciPy, Pandas, Scikit-learn, TensorFlow, Keras, PyTorch, Jupyter, Conda
- Data Visualization: Matplotlib, Seaborn
- Bioimaging Tools: ImageJ, QPath
- Version control: GitHub
- Other Tools: Notion

**POSITIONS OF RESPONSIBILITY**

- **Event Organizer** — *Under25 Summit, India's Largest Youth Festival*    2016
- **President** — *Avventura, Adventure Club of R.V. College of Engineering* 2015-2016
- **Head, Hospitality Team** — $7^{th}$ *International Congress of Environmental Research*      Dec 2014