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Cambridge, MA 02139

# Ramya Muthukrishnan

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## EDUCATION

**Massachusetts Institute of Technology** | Cambridge, MA

Expected May 2029

*Candidate for Ph.D. in Computer Science*

*Research Area:* Computer vision and medical imaging

*Advisor:* Dr. Polina Golland

**University of Pennsylvania** | Philadelphia, PA

May 2023

*Master of Science in Engineering*

*Major:* Data Science | *GPA:* 3.97/4.00

*Thesis:* Graph neural networks for scalable, real-world coverage control in distributed multi-robot systems

*Advisor:* Dr. Alejandro Ribeiro

*Relevant Coursework:* Learning in Robotics; Deep Learning; Graph Neural Networks; Machine Learning; Optimization

*Awards:* Best Departmental Masters Thesis

**University of Pennsylvania** | Philadelphia, PA

May 2022

*Bachelor of Applied Science*

*Major:* Computer Science | *Minor:* Data Science | *GPA:* 3.99/4.00

## EXPERIENCE

**MIT Lincoln Laboratory, Research Intern** | Lexington, MA

May 2022 – May 2023

- Developed a novel transformer-based algorithm that solves the inverse physics problem of object shape estimation from spatiotemporal radar signals. Utilized PyTorch, Git, and Hydra.
- Collaborated with a team of 7 employees to design an SE(3)-equivariant neural network to solve the forward physics problem of radar signal generation from object shape.

**Penn Center for Neuroengineering and Therapeutics, Undergraduate Researcher** | Philadelphia, PA

May 2019 – Aug 2022

- Developed a deep learning pipeline (UNet) for automated segmentation of surgically removed tissue from over 3GB of brain MRI data and built it into a pipeline for clinical use. Utilized Tensorflow, Keras, and Google Cloud.
- Investigated template-based data augmentation techniques to improve a BERT-based algorithm for automated seizure frequency extraction from clinical notes.

**Penn Center for Biomedical Image Computing and Analytics, Undergraduate Researcher** | Philadelphia, PA

Aug 2021 – Oct 2022

- Collaborated with a team of 5 students to develop a federated learning tool for training and deploying a novel deep learning architecture for quantitative breast density estimation from mammography.
- Utilized PyTorch and OpenFL.

**Expedition Technology, Machine Learning Intern** | Herndon, VA

May 2021 – Aug 2021

- Collaborated with an Agile team of 5 employees to develop a deep learning model (VoxelNet) for object detection in 3D point clouds from over 5GB of raw point cloud data.
- Implemented a novel self-supervised learning method to pretrain the model on an unlabeled dataset.
- Participated in weekly scrum meetings and code reviews. Utilized technologies such as PyTorch, Tensorflow, S3, EC2, Docker, Git/BitBucket, Jupyter, Jenkins, and Jira.

**University of Pennsylvania, Teaching Assistant** | Philadelphia, PA

Jan 2021 – May 2023

- Courses taught: Deep Learning, Senior Design, Machine Learning, Big Data Analytics
- Hold office hours and recitations covering class concepts, curate and grade homework and exams, and mentor student groups on term projects.

## PUBLICATIONS AND PREPRINTS

Arnold T.C.\*, **Muthukrishnan R.\***, Pattnaik A.R., Gibson A., Sinha N., Das S., Litt B., Englot D.J., Morgan V.L., Davis K.A., Stein J.M. (2022). Deep learning-based automated segmentation of resection cavities on postsurgical epilepsy MRI. *NeuroImage: Clinical*.

\*Denotes equal contribution

**Muthukrishnan R.**, Heyler A., Katti K., Pati S., Mankowski W., Alahari A., Sanborn M., Conant E.F., Chaudhari P., Kontos D., Bakas S. (2022). MammoDL: mammographic breast density estimation using federated learning. *arXiv*.

Xie K., Gallager R.S., Conrad E.C., Garrick C.O., Baldassano S.N., Bernabei J.M., Galer P.D., Ghosn N.J., Greenblatt A.S., Jennings T., Kornspun A., Kulick-Soper C.V., Panchal J.M., Pattnaik A.R., Scheid B.H., Wei D., Weitzman M., **Muthukrishnan R.**, Kim J., Litt B., Ellis C.A., Roth D. (2022). Extracting seizure frequency from epilepsy clinic notes: a machine reading approach to natural language processing. *Journal of the American Medical Informatics Association: JAMIA*, ocac2018.

## **PRESENTATIONS AND POSTERS**

**Muthukrishnan R.**, Goodwin J., Kern A., Vaska N., Caceres R. (2023). InvRT: solving radar inverse problems with transformers. Presented orally at *2<sup>nd</sup> AAAI Workshop on AI to Accelerate Science and Engineering*.

Arnold T.C.\* , **Muthukrishnan R.\***, Gibson A., Davis K.A., Litt B., Stein J.M. (2021). DeepResection: automated segmentation of postoperative epilepsy neuroimaging. Poster presented at *59<sup>th</sup> Annual Meeting of the American Society of Neuroradiology*.