DEEKSHA M SHAMA

PhD student in Electrical Engineering ◇ Johns Hopkins University ◇ Boston, MA
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EDUCATION

Johns Hopkins University *August 2021 - Present*
PhD in Electrical Engineering
Advisor: Dr. Archana Venkataraman

Johns Hopkins University *August 2021 - May 2024*
Master of Science in Electrical Engineering — GPA: 3.94/4.00
Advisor: Dr. Archana Venkataraman

National Institute of Techology Karnataka *August 2017 - July 2021*
Bachelor of Technology — CGPA: 9.74/10 **(Rank 1/112)**
Department of Electronics and Communications Engineering

PROFESSIONAL SUMMARY

Experienced AI researcher with interests in biomedical signal processing, time-series analyses, and trustworthy deep learning for applications in brain-computer interfaces. Action-oriented, compassionate, and dedicated problem solver with strong theoretical background and top skills in Python and Matlab-based algorithm development. Highly adept in working in inter-disciplinary teams, independent research, written and oral presentation, and mentoring.
EEG · Interpretable ML · Trustworthy AI · Uncertainty-aware Learning

SKILLS

Areas	Bayesian Deep Learning, Probabilistic inference, Attention models
Languages & Tools	Python, MATLAB, C++, PyTorch, SciPy, Scikit-learn, LaTeX

RESEARCH EXPERIENCE

Microsoft Research May 2025 - Present
Research Intern *Redmond, WA*

· Monitoring and explaining user cognitive load using foundation models in brain-computer-interfaces
· Guided by Dr. Dimitra Emmanouilidou and Dr. Ivan Tashev

Johns Hopkins University - Boston Univesity Aug 2021 - Present
Graduate Research Assistant *Boston, MA*

· Proposed a novel LLM-powered explainable detection method for predicting underlying etiologies of epileptic seizures in deep networks.
· Developed a novel Bayesian weakly-supervised deep learning framework to address noisy annotations in EEG-based diagnostic model, achieving a 50% improvement in detection performance across multiple large datasets.
· Designed and validated a novel multi-task vision transformer for seizure localization with uncertainty quantification in EEG time-series, enhancing point-of-care diagnostics in epilepsy management.
· Created a simulated dataset of biosignals in Matlab increasing the capacity of the lab's validation framework by 5×.
· Spearheaded a project in a multi-center collaboration with neuroscientists to develop ML algorithms for autism diagnosis and enable biomarker discovery, yielding interpretable, biologically sound results.
· Guided by Prof. Archana Venkataraman

EPFL - intelligent Global Health May 2020 - Dec 2020
Research Intern *Lausanne, Switzerland*

- Developed a BERT-based Large Language Model (LLM) to predict respiratory ailments and COVID-19 from audio signals showing high robustness to missing data compared to CNN baselines as outlined in my BTech Thesis
- Performed comparative analyses between various spatiotemporal feature extraction (MFCCs, STFT, Wavelet) and neural network architecture (Transformers, CNNs, GCNs), improving robustness to missing data.
- Jointly supervised two groups of post-graduates to extend the application to other respiratory diseases
- Guided by Dr. Mary-Anne Hartley, Dr. Tatjana Chavdarova, Prof. Martin Jaggi

OneScope-University Hospitals Geneva Aug 2020 - Dec 2020
Data Research Analyst *Lausanne, Switzerland*

- Collaborated with data scientists and clinicians to standardize data analysis pipelines for medical devices with audio sensors to be deployed in low-income countries, leading to multiple publications in top journals. (In collaboration with EPFL Switzerland.)

National Brain Research Centre Mar 2020 - Apr 2020
Undergraduate Research Intern *Gurgoan, India*

- Conducted systematic review of ML methods for Alzheimer's disease diagnosis by perusing over 100 publications between 2000-2020 from multiple imaging modalitites such as MRI, PET, and MRS
- Guided by Prof. Pravat Mandal

Spectrum lab, Indian Institute of Science May 2019 - July 2020
Summer Research Intern *Bengaluru, India*

- Compared high-resolution image reconstruction algorithms based on Fourier Ptychography like iterative phase retrieval, gradient descent and accelerated Wirtinger flow optimization
- Guided by Dr. Chanda Shekhara Seelamantula

TEACHING AND MENTORING

- **Research Mentor** of Michelle Su under Boston University's RISE internship program
- **Research Mentor** of Amruth Niranjan - Undergraduate student in Boston University
- **Teaching Assistant** for Medical Image Analysis EN.520.623 and EN.520.423
- **Research Mentor** of Jiasen Jing - Undergraduate student in JHU Computer Science+Neuroscience

HONORS AND AWARDS

1. NIH-MICCAI STAR award for student author registration in USA (2023) - 1/7 recipients in USA
2. ECE Departmental Fellowship at Johns Hopkins University, USA (2021)
3. Institute Gold medal for highest cumulative GPA in ECE NIT Surathkal, India (2021)
4. Best Graduating Female Student in IEEE India Council by IEEE Women In Engineering and Hope Foundation and Research Centre (2021)
5. Summer@EPFL research fellowship from the school of Computer and Communication Sciences, EPFL Switzerland (2020)
6. Certificate of Merit awarded by Institute of Engineers NITK for securing highest CGPA in ECE 2018

RESEARCH PUBLICATIONS

1. Harnessing Trial-to-Trial Variability of EEG Spectral Characteristics to Understand Autism
   Deeksha M Shama, Michelle Su, Stefen Beeler-Duden, et. al.
   Journal of Autism and Developmental Disorders (2025)

2. LLM-Powered Cross-Modal Alignment for Explainable Seizure Detection from EEG
   Maryam Riazi*, **Deeksha M. Shama***, Archana Venkataraman
   International Conference on Medical Image Computing and Computer-Assisted Intervention (2025)

3. Uncertainty-Aware Bayesian Deep Learning with Noisy Training Labels for Epileptic Seizure Detection
   Deeksha M. Shama, Archana Venkataraman
   International Workshop on Uncertainty for Safe Utilization of Machine Learning in Medical Imaging. Cham: Springer Nature Switzerland, 2024.

4. DeepSOZ: A Robust Deep Model for Joint Temporal and Spatial Seizure Onset Localization from Multichannel EEG Data.
   Deeksha M. Shama, Jiasen Jing, Archana Venkataraman
   International Conference on Medical Image Computing and Computer-Assisted Intervention (2023): 184-194 - Early Acceptance (top 14%)

5. DeepBreath—automated detection of respiratory pathology from lung auscultation in 572 pediatric outpatients across 5 countries
   Julien Heitmann, Alban Glangetas, Jonathan Doenz, Juliane Dervaux, **Deeksha M. Shama**, . . . , Mary-Anne Hartley
   NPJ digital medicine 6, no. 1 (2023): 104

6. Deep learning diagnostic and risk-stratification pattern detection for COVID-19 in digital lung auscultations: clinical protocol for a case–control and prospective cohort study
   Alban Glangetas, Mary-Anne Hartley, Aymeric Cantais, Delphine S Courvoisier, David Rivollet, **Deeksha M. Shama**, . . . , Johan N Siebert
   BMC pulmonary medicine (2021): 21(1), 1-8

TALKS AND POSTERS

2025

. Poster on LLM-Powered Cross-Modal Alignment for Explainable Seizure Detection from EEG at **MICCAI 2025** Daejeon, S. Korea

. Poster and talk on Brain Signals to Action: Monitoring and Explaining User Cognitive Load at **Microsoft Research**, Redmond WA

. Poster on Interpretable and Lightweight Machine Learning Approach for Autism Classification Using Biomarkers Derived from Multi-trial Resting EEG at **INSAR Annual Meeting** at Seattle

. DeepSOZ-HEM at the seizure detection challenge of the **International Conference on Artificial Intelligence in Epilepsy** and Other Neurological Disorders at Breckenridge, CO

. Virtual talk on trustworthy seizure detection models at **IEEE NITK's IMPULSE workshop.**

2024

. Poster at **UNSURE workshop at MICCAI** conference in Marrakesh, Morocco

. Poster at the **Population Health Data Science Workshop, Boston MA**

. Poster on machine learning for autism classification at the **RISE Symposium**, Boston MA

. Oral presentation and poster on BUNDL at the 2nd **International conference on Artificial Intelligence in Epilepsy** and Neurological Disorders in Park city, UT

. Invited speaker at **Innovation Symposium** of Boston University, Boston, MA

2023

. Poster on DeepSOZ presented at the **MICCAI main conference**, Vancouver Canada

. Poster at the **Clinical Translational Science Institute Symposium** in Boston, MA USA

OTHER PROJECTS

1. **Synthetic Telepathy: Inner Speech Recognition using EEG** | Code
   - Developed a novel convolutional model in PyTorch to generate speech from multi-channel EEG time series showing improved performance over baseline algorithms.
2. **Neural style conversion with Generative models** | Report
   - Developed Cycle-GAN and diffusion models for image-to-medieval art style conversion, improving speed and efficiency within the PyTorch pipeline while optimizing performance.
3. **Multi-Atlas Brain Segmentation And Age Prediction** | Report
   - Developed a 3D CNN model in TensorFlow for brain age prediction using whole-brain 3D MRI scans, achieving superior accuracy over traditional hand-crafted volumetric features.

VOLUNTEER SERVICES

- Public Outreach and Membership Officer at Women in MICCAI 2025-2027
- Volunteer to organizing Boston Medical Imaging workshop happening in October 2025
- Reviewer for MICCAI 2025, UNSURE@MICCAI 2025, MIDL 2025, GRAIL@MICCAI 2024, and Journal of Epilepsy and Behaviour 2024
- Social Evening Chair of WiML @ ICML 2022 hosting 100+ international delegates
- Chairperson 2020-21 and Treasurer 2019-20 of IEEE NITK Student Branch
- Teaching Assistant 2017-20 at Centre For Advanced Learning, Mangalore
- Volunteer at the national level Women in Technology Summit at NITK 2018 hosting 100+ delegates