Shashank Manjunath

Boston, MA

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EDUCATION

Northeastern University   **Boston, MA**

Ph.D., Computer Science   *2022-Present*

Advisor: Dr. Aarti Sathyanarayana

Boston University   **Boston, MA**

M.S., Electrical Engineering   *2020-2022*

Vanderbilt University   **Nashville, TN**

B.Eng, Biomedical Engineering & Mathematics   *2014-2018*

EXPERIENCE

Northeastern University   **Boston, MA**

Graduate Research Assistant   *September 2022-Present*

Research into time-series signal processing for health applications. Published papers, posters, and abstracts into applications of topological data analysis to electroencephalogram (EEG) signals for early detection of sleep apnea at competitive conferences. Implemented dynamical systems techniques to embed EEG signals into high-dimensional space and applied topological techniques to analyze embedded spaces. Leveraged Fourier analysis and machine learning/deep learning techniques to build baseline models using PyTorch. Researched transition of EEG signal processing techniques on clinical EEG systems to consumer wearable systems. Applied wavelet-based signal processing techniques to EEG signal analysis for epileptic spike identification and detection in collaboration with Dr. Michael Brandon Westover.

Linus Health   **Boston, MA**

Senior Data Scientist   *February 2022-August 2022*

Developed novel signal processing and machine learning techniques to improve brain health assessment.

Charles River Analytics   **Cambridge, MA**

Scientist - Signal Processing & Computer Vision   *May 2018-February 2022*

Performed novel research into signal processing and computer vision techniques through funding provided by the Department of Defense. Acted as lead engineer and Principal Investigator on projects investigating real-time machine learning based image denoising techniques in the presence of complex noise sources. Acted as a supporting scientist on projects involving mobile health, connectome fingerprinting, and applications of machine learning techniques to information extraction from laser vibrometry data, among others. Led GPU programming efforts across the Sensor Processing and Applied Robotics division. Designed, built, and administered GPU Compute Cluster for internal company use. Won funding for novel research from the DoD through various grant sources. Responsibilities included proposal writing and support, algorithm development, and professional as well as academic presentations.

LumaSil   **Nashville, TN**

Founder & Engineer   *2018-2019*

Founded a company focused on developing low level light therapy devices for diabetic foot wounds. Designed and implemented software on embedded platforms for device prototype. Performed novel

research into light effects on methicillin-resistant *Staphylococcus aureus* (MRSA). Performed efficacy studies on therapy device for diabetic foot wounds.

Vanderbilt University Institute of Imaging Science   Nashville, TN
Undergraduate Research Assistant   2016-2018
Initiated a project investigating applications of machine learning techniques to segment magnetic resonance images. Implemented convolutional neural network based techniques to handle sciatic nerve segmentation from MRI volumes. Investigated and designed novel signal processing techniques to account for inflammation in diffusion-weighted MR images. Validated techniques on *ex vivo* MRI data of rat sciatic nerve.

CONFERENCE PAPERS AND PROCEEDINGS
Manjunath, S., Sathyanarayana, A. "Detection of Sleep Oxygen Desaturations from Electroencephalogram Signals." IEEE Engineering in Medicine and Biology Conference, July 2024.

Manjunath, S., Perea, J. A., Sathyanarayana, A. "Topological Data Analysis of Electroencephalogram Signals for Pediatric Obstructive Sleep Apnea." IEEE Engineering and Medicine in Biology Conference, July 2023.

Manjunath, S., Thornton, W. "Deep Learning for Maritime Imagery." Submarine Technology Symposium, May 2019.

JOURNAL PAPERS
Manjunath, S., Perea, J. A., Sathyanarayana A. "Electroencephalogram Signal Analysis Of Pediatric Obstructive Sleep Apnea with Topological Data Analysis." (Under Review).

McGraw, C. M., Rao, S., **Manjunath, S.**, Jing, J., Westover, M. B. "Automated Quantification of Periodic Discharges in Human Electroencephalogram." (Under Review).

POSTERS
Manjunath, S., Sathyanarayana A. "Real-time Detection of Oxygen Desaturation Using Electroencephalogram Signals." AASM/SRS Annual Sleep Meeting. June 2024.

Manjunath, S., Perea, J. A., Sathyanarayana A. "Analysis of Pediatric Sleep Electroencephalogram with Sleep Apnea using Topological Data Analysis" AASM/SRS Annual Sleep Meeting. June 2023.

Manjunath, S., Perea, J. A., Sathyanarayana A. "Applications of Topological Data Analysis to Electroencephalogram Signals." Third Graduate Student Conference: Geometry And Topology meet Data Analysis and Machine Learning. June 2023.

Manjunath, S., Bracken, B., German, S., Monnier, C., and Farry, M. "User Activity Context Recognition From Smartphone Data Using Deep Neural Networks." Biomedical Engineering Society, October 2019.

Grisham, C., **Manjunath, S.**, Perlin, B., Russo, A., Wigginton, N., Walker III, M. "Low-Level Light Therapy for Improvement of Diabetic Foot Ulcer Infection Outcomes." Biomedical Engineering Society, October 2018.

Manjunath, S., Manzanera-Esteve, I., Thayer, W., Does, M., Dortch, R. "Free-Water Elimination Diffusion Tensor Imaging to Assess Nerve Recovery in Excised Rat Nerve." International Society of Magnetic Resonance in Medicine, June 2018.

Hancock, M., **Manjunath, S.**, Dortch, R. "Sciatic Nerve Segmentation in MRI Volumes of the

Upper Leg via 3D Convolutional Neural Networks." International Society of Magnetic Resonance in Medicine, June 2018.

Manjunath, S., Dortch, R., "Sciatic Nerve Segmentation in MR Images of the Upper Leg via Convolutional Neural Networks." Biomedical Engineering Society, October 2017.

PREPRINTS

Manjunath, S., Nathaniel, A., Druce, J., German, S. " Improving the performance of fine-grain image classifiers via generative data augmentation." arXiv preprint, arXiv:2008.05381, August 2020.

PATENTS

Manjunath, Shashank; Sathyanarayana, Aarti. Diagnosing Sleep Apnea from Awake EEGs. U.S. Patent Application No. 63/481,123, filed January 23, 2023. Provisional Patent.

Agaron, Shamay; Tobyne, Sean; **Manjunath, Shashank**. Contextual Awareness for Unsupervised Administration of Cognitive Assessments Remotely or in a Clinical Setting. U.S. Patent Application No. 63/377,435, filed September 28, 2022. Provisional Patent.

AWARDS AND HONORS

- PhD Network Travel Funding Award (2024)
- AWS Cloud Credits for Research (2022)
- Graduate Merit Scholarship (2020)
- Thomas Arnold Prize for Biomedical Systems Design (2018)
- Thomas J. Watson Scholarship (2014)

MEDIA COVERAGE

Zoe Menezes, Brent Phillips, and Shashank Manjunath. Pitt Health and Explainable AI Podcast. "Shashank Manjunath on Pitt HexAI." Available on Spotify and Apple Podcasts. Posted December 5, 2023.

References provided upon request