Ayush Tripathi

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Experience

Indian Institute of Technology, Indore — Indore India
Assistant Professor — September 2025 - present
Department of Electrical Engineering

Beth Israel Deaconess Medical Center, Harvard Medical School — Boston, MA, USA
Postdoctoral Research Fellow — June 2024 - August 2025

- Supervisor: Dr. M. Brandon Westover
- Project: Complete AI Sleep Report (CAISR)

TCS Research & Innovation — Mumbai, India
Systems Engineer — July 2019 - September 2020

- Supervisors: Dr. Sunil Kumar Kopparapu, Dr. Rupayan Chakraborty
- Project: Analyzing Audio biomarkers for early state detection of Dysarthria and Dementia

Arizona State University — Tempe, Arizona, USA
Research Aide — Summer 2018

- Supervisor: Dr. Visar Berisha
- Project: Development of a nasality grading system for adult Dysarthric subjects.

Indian Institute of Technology, Guwahati — Guwahati, India
Research Intern — Summer 2017

- Supervisor: Dr. S.R. Mahadeva Prasanna
- Project: Development of a signal processing based hypernasality grading system.

Education

Indian Institute of Technology Delhi — New Delhi, India
Ph.D. in Electrical Engineering (PMRF Fellow), CGPA: 9.52/10 — September 2020 - May 2024
Supervisors: Dr. Lalan Kumar & Dr. Prathosh A.P.

Visvesvaraya National Institute of Technology Nagpur — Nagpur, India
B.Tech. in Electrical and Electronics Engineering — 2015 - 2019
CGPA: 9.09/10, Department Rank : 3

Publications

Peer Reviewed Journals (Published):

1. **A. Tripathi**, W. Ganglberger, H. Sun, et al., "The Boston Children's Hospital Sleep Study Corpus: A collection of 15,695 Annotated Pediatric Polysomnograms," Accepted in SLEEP.
2. **A. Tripathi**, S. Nasiri, W. Ganglberger, et al., "Automated Analysis of the AASM Inter-Scorer Reliability Gold Standard Polysomnogram Dataset," Accepted in Journal of Clinical Sleep Medicine.

3. S.Ranjan*, **A. Tripathi***, Harshal Shende, Amit Kumar, Robin Badal, Pramod Yadav, Deepak Joshi, L. Kumar, "Deep Learning-based Classification of Dementia using Image Representation of Subcortical Signals," in BMC Biomedical Informatics and Decision Making (2025).

4. P. Singh, **A. Tripathi**, L. Kumar, T.K. Gandhi, "Exploring Age-Related Functional Brain Changes During Audio-Visual Integration Tasks in Early to Mid-Adulthood," in Neuroscience Informatics (2024): 100172.

5. **A. Tripathi**, A.Gupta, A.P. Prathosh, S.P. Muthukrishnan and L. Kumar, "NeuroAiR: Deep Learning Framework for Airwriting Recognition from Scalp-recorded Neural Signals," in IEEE Transactions on Instrumentation and Measurement, vol. 73, pp. 1-13, 2024.

6. **A. Tripathi**, A.P. Prathosh, S.P. Muthukrishnan and L. Kumar, "TripCEAiR: A Multi-Loss minimization approach for surface EMG based Airwriting Recognition," Biomedical Signal Processing and Control, 85, 104991.

7. **A. Tripathi**, A.P. Prathosh, S.P. Muthukrishnan and L. Kumar, "SurfMyoAiR: A surface Electromyography based framework for Airwriting Recognition," in IEEE Transactions on Instrumentation and Measurement, vol. 72, pp. 1-12, 2023.

8. **A. Tripathi**, A. K. Mondal, L. Kumar and Prathosh AP, "ImAiR: Airwriting Recognition framework using Image Representation of IMU Signals," in IEEE Sensors Letters, vol. 6, no. 10, pp. 1-4, Oct. 2022.

9. **A. Tripathi**, A. K. Mondal, L. Kumar and Prathosh AP, "SCLAiR: Supervised Contrastive Learning for User and Device Independent Airwriting Recognition," in IEEE Sensors Letters, vol. 6, no. 2, pp. 1-4, Feb. 2022.

10. **A. Tripathi**, S. Bhosale and S. K. Kopparapu, Automatic speaker independent dysarthric speech intelligibility assessment system, Computer Speech & Language, Volume 69, 2021, 101213, ISSN 0885-2308.

11. M. Saxon, **A. Tripathi**, Y. Jiao, J. M. Liss and V. Berisha, "Robust Estimation of Hypernasality in Dysarthria With Acoustic Model Likelihood Features," in IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 28, pp. 2511-2522, 2020.

12. A. K. Dubey, **A. Tripathi**, S. R. M. Prasanna, and S. Dandapat, "Detection of hypernasality based on vowel space area", The Journal of the Acoustical Society of America, 2018, vol. 143, no. 5, EL412–EL417.

Peer Reviewed Journals (Under Review):

1. W. Ganglberger, H. Sun, **A. Tripathi** et al., "Brain health from sleep EEG: A multi-cohort, deep learning biomarker for cognition, disease and mortality," Under Review in NEJM AI.

2. **A. Tripathi***, R. Kachroo*, R. Nayak*, L. Kumar, A.P. Prathosh, "DeWoAiR: Deep Learning-Based Word-Level Airwriting Recognition Using Wearable IMU," Under Review in Engineering Applications of Artificial Intelligence.

3. P. Singh, **A. Tripathi**, L. Kumar, T.K. Gandhi, "Age-Dependent Brain Connectivity and Activation Patterns: A Resting-State EEG Study in Spherical Harmonics and Source Domain," Under Review in IEEE Transactions on Cognitive and Developmental Systems.

Peer Reviewed Conference/Workshops:

1. P. Singh, **A. Tripathi**, L. Kumar, T.K. Gandhi, "Brain Connectivity Features-based Age Group Classification using Temporal Asynchrony Audio-Visual Integration Task," in 2023 45th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC).

2. **A. Tripathi**, R. Chakraborty and S. K. Kopparapu, "Dementia Classification using Acoustic Descriptors Derived from Subsampled Signals," 2020 28th European Signal Processing Conference (EUSIPCO), 2021, pp. 91-95.

3. **A. Tripathi**, R. Chakraborty and S. K. Kopparapu, "A Novel Adaptive Minority Oversampling Technique for Improved Classification in Data Imbalanced Scenarios," 2020 25th International Conference on Pattern Recognition (ICPR), 2021, pp. 10650-10657.

4. **A. Tripathi**, S. Bhosale and S. K. Kopparapu, "A Novel Approach for Intelligibility Assessment in Dysarthric Subjects," ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2020, pp. 6779-6783.

5. **A. Tripathi**, S. Bhosale and S. K. Kopparapu, "Improved Speaker Independent Dysarthria Intelligibility Classification Using Deepspeech Posteriors," ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2020, pp. 6114-6118.

6. **A. Tripathi**, S. Bhosale, and S. K. Kopparapu, "Automatic Speech Intelligibility Assessment in Dysarthric Subjects", in ICDS 2020, The Fourteenth International Conference on Digital Society, 2020.

7. **A. Tripathi** and S. K. Kopparapu, "CNN based Parkinson's Disease Assessment using Empirical Mode Decomposition", in Proceedings of the CIKM 2020 Workshops, October 19-20 2020, Galway, Ireland,2020.

8. C.M. Vikram, **A. Tripathi**, S. Kalita and S.R.M. Prasanna, Estimation of Hypernasality Scores from Cleft Lip and Palate Speech. Proc. Interspeech 2018, 1701-1705.

Patents

- **Ayush Tripathi**, Swapnil Bhosale, Sunil Kumar Kopparapu, **"Methods and systems for assessment of speech intelligibility in dysarthric subjects"**, Indian Patent (Application No. 202021008649; Patent No. 549763), Filed: 28-Feb-2020, Granted: 06-Sept-2024, Tata Consultancy Services, Mumbai, India.

Teaching and Student Supervision

Teaching Assistantship at IIT Delhi:

- **Spring 2024** ELL319 Digital Signal Processing
- **Autumn 2023** ELL715 Digital Image Processing
- **Spring 2023** ELL319 Digital Signal Processing
- **Autumn 2022** ELL205 Signals and Systems
- **Spring 2022** ELL319 Digital Signal Processing
- **Autumn 2021** ELL824 Selected Topics in Information Processing - II
- **Spring 2021** ELL319 Digital Signal Processing

PMRF Teaching Assistantship:

- **August-December 2023** Hands-on Machine Learning, Dronacharya College of Engineering, Gurugram.
- **February-June 2023** Electrical Machines Lab, G B Pant DSEU Okhla I Campus.
- **June-September 2022** Basics of Electrical Technology Lab, G B Pant DSEU Okhla I Campus.

Student Supervision:

Amit Gohel Spring 2024
IMU-based mixed case airwriting recognition

Roshan Nayak Spring 2024
Word-level airwriting recognition using wrist-worn IMU

Aryan Gupta Autumn 2022 - Spring 2023
EEG-based airwriting recognition in sensor & source domain

Ayush Kumar, Pranav Bansal Summer 2022
Electromyography-based airwriting recognition

Skills

- **Programming:** Python, MATLAB, Shell Scripting
- **Software Packages:** Keras, Tensorflow, PyTorch, Weka, EEGLab, Brainstorm, GNU Octave, PsychoPy, LaTeX
- **Operating Systems :** Microsoft Windows, Linux
- **Data Acquisition:** Noraxon Ultim EMG System, Brain Products actiCAP Xpress Twist EEG System, Brain Products BrainCap EEG System, MbientLab MetaMotionS, XSens Motion Tracking System

Projects

- Complete Artificial Intelligence based sleep report.
- Inter-Rater Reliability analysis for sleep and related events from Polysomnography.
- Deep Learning-based Multi-modal Airwriting Recognition for Smart Wearables
- Speech Intelligibility Assessment System for Dysarthric subjects.
- Improved Dysarthria Severity Classification system using acoustic bio-markers.
- Early stage Dementia Identification using Acoustic descriptors
- Objective Assessment of Hypernasality in Dysarthria and Cleft Lip and Palate.
- Numerical techniques for steady state and fault analysis of Power Systems.

Presentations

- Presented the poster "Pediatric Sleep Staging with U-Sleep: A Study on Boston Children's Hospital Polysomnography Dataset" at the 2025 BILH Artificial Intelligence and Machine Learning Symposium.
- Presented the poster "FuseAiR: Fusing IMU-EMG modalities for Airwriting Recognition" at the 45th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC).
- Presented a poster on "Deep Learning based airwriting recognition using surface ELectromyography signals" in IEEE Signal Processing Society (SPS) conclave, Delhi Chapter, IIT Delhi
- Presented the paper "Estimation of Hypernasality Scores from Cleft Lip and Palate Speech" at Interspeech 2018.
- Virtually presented the papers "A Novel Approach for Intelligibility Assessment in Dysarthric Subjects" and "Improved Speaker Independent Dysarthria Intelligibility Classification Using Deepspeech Posteriors" at the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2020
- Virtually presented the paper "Dementia Classification using Acoustic Descriptors Derived from Subsampled Signals" at the European Signal Processing Conference (EUSIPCO) 2020

Selected Coursework

- **Electrical Engineering:** Signals and Systems, Digital Signal Processing, Array Signal Processing, Human & Machine Speech Communication, Computational Neuroscience, Machine Learning, Digital Image Processing.
- **Mathematics:** Linear Algebra, Calculus, Integral Transforms and Partial Differential Equations, Numerical Linear Algebra, Probability Theory, Optimization.

Reviewer Work

- IEEE Transactions on Instrumentation and Measurement, Elsevier Biomedical Signal Processing and Control, IEEE Transactions on Cognitive and Developmental Systems, Nature Scientific Reports, Wiley Statistics in Medicine, Elsevier Information Sciences, IEEE Sensors Letters, IEEE Transactions on Audio, Speech and Language Processing, Elsevier Food Research International, BMC Medical Informatics and Decision Making, Array