

SUHAS BETTAPALLI NAGARAJ

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EDUCATION

Pennsylvania State University University Park, PA
* **Ph.D. in Informatics** (Machine Learning & HCI) GPA **4.0/4.0** 2021–2025
* **M.S. in Electrical Engineering** (Communications & Signal Processing) 2019–2021
Coursework: Data Mining, Neural Networks, Probability, Signal Processing, Optimization,
Wireless Networks & IoT, Data Structures, UX Evaluation, Human-Centered Design, Research Design

PUBLICATIONS

1. **ICASSP 2022** Suhas BN, Saeed Abdullah. "Privacy Sensitive Speech Analysis using Federated Learning to assess Depression" (Paper Link: [DOI: 10.1109/ICASSP43922.2022.9746827](https://doi.org/10.1109/ICASSP43922.2022.9746827))
2. **CogMI 2020** Suhas BN. "Automatic bird sound detection in long range field recordings using Wavelets & Mel filter bank features" (Paper Link: [DOI: 10.1109/CogMI50398.2020.00035](https://doi.org/10.1109/CogMI50398.2020.00035)) ([Github Code](#))
3. **SPCOM 2020** Suhas BN, J. Mallela, A. Illa, B. K. Yamini, N. Atchayaram, R. Yadav, D. Gope, and PK Ghosh. "Speech task-based automatic classification of ALS and Parkinson's Disease and their severity using log Mel spectrograms." In 2020 International Conference on Signal Processing and Communications (SPCOM), pp. 1-5. IEEE, 2020. (Paper Link: [DOI: 10.1109/SPCOM50965.2020.9179503](https://doi.org/10.1109/SPCOM50965.2020.9179503)) ([Gitlab Code](#))
4. **ICASSP 2020** Mallela, J, A Illa, Suhas BN, S. Udupa, Y. Belur, N. Atchayaram, R. Yadav, P. Reddy, D. Gope, and PK Ghosh. "Voice-based classification of patients with Amyotrophic Lateral Sclerosis, Parkinson's Disease and Healthy Controls with CNN-LSTM using transfer learning." In ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 6784-6788. IEEE, 2020. (Paper Link: [DOI:10.1109/ICASSP40776.2020.9053682](https://doi.org/10.1109/ICASSP40776.2020.9053682))
5. **INTERSPEECH 2019** Suhas BN, D. Patel, NR Koluguri, Y. Belur, P. Reddy, A. Nalini, R. Yadav, D. Gope, and PK Ghosh. "Comparison of Speech Tasks and Recording Devices for Voice-Based Automatic Classification of Healthy Subjects and Patients with Amyotrophic Lateral Sclerosis." In INTERSPEECH, pp. 4564-4568. 2019. (Paper Link: [DOI:10.21437/Interspeech.2019-1285](https://doi.org/10.21437/Interspeech.2019-1285))
6. **IC4 2018** Suhas BN, S. Bhagavat, V. Vimalanand, and P. Suresh. "Wireless Sensor Networks Based Monitoring of Railway Tracks." In 2018 International CET Conference on Control, Communication, and Computing (IC4), pp. 187-192. IEEE, 2018. (Paper Link: [DOI: 10.1109/CETIC4.2018.8531029](https://doi.org/10.1109/CETIC4.2018.8531029))

WORK EXPERIENCE

Penn State University Park, PA
Graduate Teaching Assistant 01/2020–Present

- Engaged with over 500+ students over 5 semesters to resolve doubts in course material.
- Conducted bi-weekly lab sessions on implementing theoretical concepts.
- Assisted in: Data Visualization (SP '22), Data Integration & Fusion (FA '21), Data Analytics for Healthcare (SP '21), Data Analytics for Machine Learning (SP & FA '20).

3M (M*Modal) Pittsburgh, PA
Speech Recognition R&D Intern 06/2020–08/2020

- Implemented a deep learning based speaker separation method for improving physician-patient conversations as part of the internship.
- Wrote LibriMixR code ([Github Link](#)) for extending ConvTasNet for real-world conditions with reverberated audio using phase difference information (2+ mic data).

Indian Institute of Science Bangalore, India
Research Assistant 05/2018–08/2019

- Developed an automated method to detect neurological disorders from speech.
- Interviewed 300+ subjects with ALS & Parkinson's disease. Recorded multimodal data, extracted features and performed classification on Speech (150+ hours), Video (10+ hours), and Electromyography data.
- Communicated with clinical staff, and research coordinators routinely regarding scheduling, and documentation.
- Designed and evaluated smartphone app concepts for use in a clinical setting at [NIMHANS, Bangalore](#).

SELECT PROJECTS

- **UX Research** -
 1. **Competitor Analysis** of Netflix,
 2. **Heuristic Evaluation** of Target App, and
 3. **User Testing** of BuzzFeed Website (Moderated & Unmoderated)
- **ML & Health:**
 1. **Federated Learning** to identify Depression,
 2. Multiple online **time-series analysis** to identify relapse of Bipolar,
 3. **Multi-modal analysis** of subjects with Dementia (Speech + Text)
 4. **Differential Privacy** to clip gradients for training ML-Dementia models
 5. Identifying Obstructive Sleep Apnea from a subject's snore recording using **HMM**.
- **Other ML:**
 1. SwingSense: Collected & analyzed real-time bat swing data (IMU sensors + video) to improve athletic performance.
 2. Proposed wavelet-based features for real-time detection of bird sounds. ([Github Code](#))
 3. Language identification via I-Vectors and Dimensionality Reduction: using Mann-ki-Baat dataset among 13 languages for a given speech utterance using PCA + LDA.

TALKS

1. [Privacy-preserving assessment of depression using Speech signal processing](#) (MS EE Thesis Defense) [School of EECS, Penn State, Apr 2021] – [View the Thesis here](#)
2. [Neural interfacing and mapping using electrochemical sensors](#) (Biosensors Presentation) [School of EECS, Penn State, Dec 2020]
3. [MIMO in 5G Wireless Systems](#) [School of EECS, Penn State, Dec 2019]
4. [Performance characterization of Sound Recorders](#) [EE Dept, Indian Institute of Science, Aug 2019]
5. [Introduction to Music Information Retrieval, Audio licensing & Blockchains](#) [EE Dept, Indian Institute of Science, Nov 2018]

SKILLS

Bash, SQL, Python, MATLAB, GCP, AWS, Git, JIRA, Tableau, ~~LaTeX~~TeX, SoX, FFmpeg, Kaldi
Keras, Tensorflow, PyTorch, TF Federated, PySyft
Pandas, NumPy, SciPy, Scikit-learn, Matplotlib, spaCy, OpenCV

POSITIONS OF RESPONSIBILITY

1. **EGT Chair**, Engineering Graduate Student Council, Penn State
2. **Treasurer**, Indian Graduate Student Association - Interact with funding agencies, university officials, and vendors for organizing various events at Penn State by managing a USD 40,000 budget every year.
3. **Editor of CERS** - Supervise 200+ students to publish an engineering journal every year informing the University community of Penn State's cutting-edge engineering research

(The blue texts are web links)