SUHAS BETTAPALLI NAGARAJ

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EDUCATION

Pennsylvania State University   University Park, PA
* **Ph.D. in Informatics** (Machine Learning & Human-Computer Interaction) GPA **4.0/4.0**   2021–2025
* **M.S. in Electrical Engineering** (Communications & Signal Processing)   2019–2021
    with a Graduate minor in Engineering Leadership and Innovation Management

Relevant Coursework: Data Mining, Probability & Random Processes, Signal Processing, Deep Learning, Computer Vision, Wireless Network Design, Data Privacy, UX Evaluation, Human-Centered Design, Research Design

SELECT PUBLICATIONS

1. **[Submitted to ICASSP 2024]** **Suhas BN**, R.S. Srinivasa, Y.M. Saidatta, J. Cho, C.H. Lee, C. Yang, Y. Shen, H. Jin. "End-to-End Personalized Cuff-less Blood Pressure Monitoring using ECG and PPG Signals"

2. **[In progress]** **Suhas BN**, R. Hridoy, S. Ganna, A. Rebar, S. Abdullah. "Automated Interviewer Dialog Generation with Large Language Models and Reinforcement Learning for Enhanced Outcomes in Cardiovascular and Pulmonary Diseases"

3. **INTERSPEECH 2023** **Suhas BN**, S. Rajtmajer, S. Abdullah. "**Privacy-Preserving Dementia Classification with Differential Privacy**: An Exploration of the Privacy-Accuracy Tradeoff in Speech Signal Data" In INTERSPEECH, pp. 346-350. 2023. (Paper)

4. **Springer Nature 2023** HJ. Han, **Suhas BN**, L. Qiu, S. Abdullah. "Automatic classification of dementia using text and speech data." In Multimodal AI in Healthcare, pp. 399-407. Springer, Cham, 2023. (Chapter Link)

5. **ICASSP 2022** **Suhas BN**, S. Abdullah. "**Privacy Sensitive Speech Analysis using Federated Learning to assess Depression**." In ICASSP 2022-2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 6272-6276. IEEE, 2022. (Paper)

6. **CogMI 2020** **Suhas BN**. "Automatic bird sound detection in long range field recordings using Wavelets & Mel filter bank features". In 2020 IEEE Second International Conference on Cognitive Machine Intelligence (CogMI), pp. 218-226. IEEE, 2020. (Paper) (Code)

7. **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) (Code)

8. **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)

9. **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)

10. **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)

WORK EXPERIENCE

Samsung Research America   Mountain View, CA
AI Research Intern   05/2023–08/2023
- Collaborating with a multidisciplinary team to develop innovative machine learning solutions for health applications.
- Submitted a part of our work to ICASSP 2024 (Check Publications).

Penn State   University Park, PA
Graduate Teaching Assistant   01/2020–Present
- Engaged with over 500 students across 5 semesters, providing assistance with course material and resolving doubts.
- Conducted bi-weekly lab sessions to help students implement theoretical concepts.
- Assisted in multiple courses, including Theories & Methods of Information Science Research (FA 2023), Cyber-Crime & Cyber-Warfare (FA 2023), Data Visualization (SP 2022), Data Integration & Fusion (FA 2021), Data Analytics for Healthcare (SP 2021), and Data Analytics for Machine Learning (SP 2020 and FA 2020).

3M Health Information Systems (M*Modal)   Pittsburgh, PA
Speech Recognition R&D Intern   06/2020–08/2020
- Improved speaker-separation in reverberant environments for physician-patient conversations.
- Extended ConvTasNet using phase difference information for far-field audio, achieving a **Si-SDR of 11.96-12.69**.

Indian Institute of Science (IISc)   Bangalore, India
Research Assistant   05/2018–08/2019
- Developed an automated method to detect neurological disorders from speech, interviewing 300+ subjects with ALS and Parkinson's disease and recording speech, video, and electromagnetic articulography (EMA) data.
- Extracted audio-visual features and performed classification experiments, communicating regularly with clinical staff and research coordinators.
- Led the product deployment of a smartphone app to supplement neurologist's diagnosis at NIMHANS, Bangalore.

Fellowship, Honors, and Service

- Paper Reviewer for ACM CUI 2023   03/2023
- Paper Reviewer for IEEE Signal Processing Letters   02/2023
- Google CS Research Mentorship Scholar (2022b Cohort) Mentor: Jo Schaeffer.   09/2022
- Google Developers Machine Learning Bootcamp Scholar (2022)   07/2022
- Awarded the NSF NRT LinDiv Fellowship (2022-23). [**Program Website**]   06/2022

Select Projects

- **UX Research** -
    1. **Competitor Analysis of Netflix**: Conducted a comprehensive analysis of Netflix and its direct/indirect competitors. Analyzed publicly reported numbers, target base, product-specific information, and brand positioning. Performed usability heuristics and recommended improvements to the product offering. [**Slides**].
    2. **Heuristic Evaluation of Target App**: Conducted a heuristic evaluation of the Target app using Nielsen's 10 points heuristic scale. Identified areas of improvement across login, item selection, search, and checkout screens. [**Slides**].
    3. **User Testing of BuzzFeed Website** (Moderated & Unmoderated Usability Testing): Conducted user testing of the BuzzFeed website through moderated and unmoderated usability testing. [**Slides**].

- **ML & Health**:
    1. **Federated Learning** to identify Depression (see Talks section),
    2. **Interpretable** multiple online time-series analysis to identify relapse of Bipolar,
    3. **Multi-modal analysis** of subjects with Dementia: **Winner** of AAAI 2022 Hackallenge
    4. **Differential Privacy**: Clipped gradients for training ML-Dementia models
    5. Identifying Obstructive Sleep Apnea from a subject's snore recording using HMM.

- **Sensor-based ML**:
    1. **SwingSense**: Collected and analyzed real-time cricket bat swing data using IMU sensors and video. Designed and implemented a data visualization and feedback system to provide insights on swing patterns and improve athletic performance. Collaborated with coaches and athletes to fine-tune the system and ensure its effectiveness.
    2. **SeniorSync**: Leading a team in the Nittany AI Challenge 2023 to develop a system to track the movements and behavior of elderly individuals using data from wearable devices and qualitative surveys. Enabled proactive care by providing actionable insights to family members and healthcare providers. [**News article**]

Talks

1. Privacy-preserving assessment of depression using Speech signal processing
   (MS EE Thesis Defense) [School of EECS, Penn State] – View the Thesis here   04/2021
2. Neural interfacing and mapping using electrochemical sensors
   (Biosensors Presentation) [School of EECS, Penn State]   12/2020
3. MIMO in 5G Wireless Systems
   [School of EECS, Penn State]   12/2019
4. Performance characterization of Sound Recorders
   [EE Department, Indian Institute of Science]   08/2019
5. Introduction to Music Information Retrieval, Audio licensing & Blockchains
   [EE Department, Indian Institute of Science]   11/2018

Skills

Bash, SQL, Python, MATLAB, C++, GCP, AWS, Git, JIRA, Tableau, LaTeX, SoX, FFmpeg, Kaldi
PyTorch, Tensorflow, Keras, TF Federated, PySyft

Positions of Responsibility

1. **President, Indian Graduate Student Association, Penn State**   **05/2022 - 05/2023**
   Provide vision and leadership for an organization of 600+ graduate student members. Organize large-scale events, set meeting agendas, facilitate discussions, and represent the organization to external stakeholders. Manage a yearly budget of $40,000 by interacting with funding agencies, university staff, and vendors.

2. **EGT Chair, Engineering Graduate Student Council, Penn State**   **06/2020 - 05/2021**
   Led the Equity, Diversity, and Inclusion committee to promote a welcoming and inclusive environment for all graduate students. Organized events and initiatives to promote diversity and inclusion within the College of Engineering.

3. **Editor of CERS, Engineering Graduate Student Council, Penn State**   **06/2020 - 05/2021**
   Supervised 200+ students to publish an engineering journal every year, informing the university community of Penn State's cutting-edge engineering research. Managed the editorial process, provided feedback to authors, and ensured the publication met high standards of quality and accuracy.

(Note: The blue texts are web links)