

# Prachi Singh

Research Scholar

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Webpage, LinkedIn, Google Scholar, GitHub

## RESEARCH INTERESTS

Machine Learning, Self-supervised learning, Graph Neural Networks, Speech & Audio, Multimodal representation learning.

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## EDUCATION

**Indian Institute of Science, Electrical Engineering, Bangalore, India**

PhD in Speech & Audio Processing [GPA : 8.0]

Aug. 2017 – Feb. 2024

**College of Engineering, Pune, Pune, India**

Bachelors of Engineering in Electronics & Telecommunication [GPA : 8.7]

Aug. 2011 – Apr. 2015

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## WORK EXPERIENCES

**Fraunhofer IIS Institute, Erlangen, Germany**

Research Scientist

June. 2024 – Nov. 2024

Speech representation learning using neural audio codec.

**Indian Institute of Science, Bangalore, India**

Research Associate

Aug. 2023 – April. 2024

Organized speaker and language diarization challenge, mentored students and interns.

**Adobe Research, Bangalore, India**

PhD Research Intern

June. 2022 – Aug. 2022

Developed method and dataset for cross-modal music retrieval for design documents using cross-attention.

**Observe.AI, Bangalore, India**

ML Research Intern

Oct. 2021 – Feb. 2022

Built in-house diarization system for contact centres' call recordings. Involved in data pre-processing and training setup which achieved state-of-the-art performance.

**Fiat Chrysler Automobiles, Chennai, India**

Software Modelling Engineer

July. 2015 – June. 2017

Instrument Panel Cluster validation, Hardware In Loop Testing and Validation of Infotainment system.

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## RESEARCH PROJECTS

**DISPLACE Speaker and Language Diarization for multilingual conversations**

Guide: Prof. Sriram Ganapathy, Electrical Engineering, IISc

Aug. 2023 – April. 2024

- Involved in organizing [DISPLACE 2024 challenge](#) and setting up baselines.
- Working towards developing robust language diarization system.

**End to end supervised heirarchical graph clustering for speaker diarization**

Guide: Prof. Sriram Ganapathy, Electrical Engineering, IISc

Aug. 2022 – Aug. 2023

- Developed a supervised heirarchical clustering algorithm using graph neural networks for speaker diarization (task of audio segmentation based on speaker identity) [ [IEEE ICASSP 2023](#) ].
- In collaboration with British Telecom-Indian Research Centre. ([BTIRC](#)).

**Music retrieval and augmentation for design documents**

Guide: Dr. Srikrishna Karanam, Adobe Research

June. 2022 – Aug. 2022

- Framed a novel task of music audio retrieval to best match the document containing design images and text.
- Created one-of-its-kind multimodal dataset and performed audio retrieval using cross-modal attention. [[Webpage](#)]

**Self-supervised learning approaches for speaker diarization**

Guide: Prof. Sriram Ganapathy, Electrical Engineering, IISc

Aug. 2019 – Aug. 2021

- Designed algorithm for representation learning using pseudo-labels clustering [ [ISCA INTERSPEECH, 2020](#) ].
- Introduced graph based path integral clustering to perform speaker diarization [ [IEEE TASLP, 2021](#) ].
- Developed method to jointly perform representation learning and metric learning [ [IEEE ASRU, 2021](#) ].
- In collaboration with [BTIRC](#).

**System for Third DIHARD speech diarization challenge**

Guide: Prof. Sriram Ganapathy, Electrical Engineering, IISc

Aug. 2020 – Jan. 2021

- Contributed in baseline system setup for the DIHARD-III challenge. It involved task to partition an audio into speaker segments, in challenging environment [ [ISCA INTERSPEECH 2021](#) ].
  - Participated in challenge and was among top 10 teams across globe. [[ISCA INTERSPEECH 2021](#)].
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## ACHIEVEMENTS

- **Scholarships:** Awarded MHRD PhD Scholarship (2017-2023). Awarded Full-Tuition Dhirubhai Ambani Foundation Undergraduate Scholarship (2011-2015).
  - **Travel Grants:** Institute Travel Grant (2019,2023), SPS ICASSP Travel Grant 2023, ISCA Interspeech Travel Grant 2019.
  - **Memberships:** IEEE-HKN lifetime honorary member.
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## PUBLICATIONS

### Conferences:

1. Kalluri, S.B., **P. Singh**, P. Roy Chowdhuri, A. Kulkarni, S. Baghel, P. Hegde, S. Sontakke, D. K T, S.R.M. Prasanna, D. Vijayasenan, S. Ganapathy, The Second DISPLACE Challenge: Diarization of SPeaker and LAnguage in Conversational Environments, in Interspeech 2024 [Link].
2. S. Baghel, S. Ramoji, Sidharth, R. H, **P. Singh**, S. Jain, P. Chowdhuri, K. Kulkarni, S. Padhi, D. Vijayasenan and S. Ganapathy, "DISPLACE Challenge: Diarization of SPeaker and LAnguage in Conversational Environments", in Interspeech 2023[Link].
3. **P. Singh**, S. Karanam and S. Shekhar, "Audio Retrieval For Multimodal Design Documents: A New Dataset And Algorithms", arXiv preprint arXiv:2302.14757 (2023) [Link].
4. **P. Singh**, A. Kaul and S. Ganapathy, "Supervised Hierarchical Clustering using Graph Neural Networks for Speaker Diarization", in IEEE ICASSP 2023 [Link].
5. **P. Singh** and S. Ganapathy, "Self-Supervised Metric Learning with Graph Clustering for Speaker Diarization", in IEEE ASRU 2021 [Link].
6. **P. Singh**, R. Varma, V. Krishnamohan, S. R. Chetupalli, and S. Ganapathy. "LEAP Submission for the Third DIHARD Diarization Challenge." in Interspeech 2021 [Link].
7. N. Ryant, **P. Singh**, V. Krishnamohan, R. Varma, K. Church, C. Cieri, J. Du, S. Ganapathy, and M. Liberman. "The Third DIHARD Diarization Challenge." in Interspeech 2021 [Link].
8. **P. Singh** and S. Ganapathy, "Deep Self-Supervised Hierarchical Clustering for Speaker Diarization", INTERSPEECH 2020 [Link].
9. S. Ramoji, P. Krishnan, B. Mysore, **P. Singh**, S. Ganapathy, "LEAP System for SRE19 Challenge – Improvements and Error Analysis", Speaker Odyssey Workshop 2020 [Link].
10. **P. Singh**, Harsha Vardhan MA, S. Ganapathy, A. Kanagasundaram, "LEAP Diarization System for the Second DIHARD Challenge", INTERSPEECH 2019 [Link].
11. A. Kanagasundaram, S. Sridharan, S. Ganapathy, **P. Singh**, C. Fookes, "A Study of X-vector Based Speaker Recognition on Short Utterances", INTERSPEECH 2019 [Link].
12. S. Ramoji, A. Mohan, B. Mysore, A. Bhatia, **P. Singh**, Harsha Vardhan, S. Ganapathy, "The LEAP Speaker Recognition System for NIST SRE 2018 Challenge", ICASSP 2019 [Link].

### Journals:

1. **P. Singh** and S. Ganapathy, " End-to-End Supervised Hierarchical Graph Clustering for Speaker Diarization", in IEEE/ACM Transactions on Audio, Speech, and Language Processing (under review) [Draft].
2. S. Baghel, S. Ramoji, , S. Jain, P. Chowdhuri, **P. Singh**, D. Vijayasenan and S. Ganapathy, "Summary of the DISPLACE challenge 2023-Diarization of SPeaker and LAnguage in Conversational Environments", in Speech Communication 2024 [Link].
3. **P. Singh** and S. Ganapathy, "Self-supervised Representation Learning With Path Integral Clustering For Speaker Diarization", in IEEE/ACM Transactions on Audio, Speech, and Language Processing (2021) [Link].

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## SKILLS & OTHERS

- **Deep learning Tools:** PyTorch, Tensorflow, Matlab, Kaldi.
- **Coding Language:** Excellent in Python, Knowledge of C, C++, Java.
- **Courses taken:** Stochastic Models, Computational Methods for Optimization, Matrix theory, Pattern Recognition & Neural Networks, Detection & Estimation Theory, Adaptive Signal Processing, Speech Information Processing.

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## ACADEMIC SERVICES

- **Teaching Assistant (3):** Machine Learning and Signal Processing [E9:205, Fall 2019] , Deep learning theory and Practice [CCE, Spring 2020] and Advanced Deep Learning [E9:309, Fall 2020].
- **Reviewer (12):** IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions of Audio Speech and Language Processing, Sadhana- Journal of Indian Academy of Sciences, IEEE ICASSP, Interspeech.
- **Presentations (11):** paper presentations (5) in ICASSP 2023, ASRU 2021, Interspeech 2019-2021. Doctoral symposiums (3) in EECS IISc 2021-2022, ACM/IEEE AI-ML systems 2022. Invited talks (3) at IEEE-IISc Shannon's day talk series 2021, DIHARD-III challenge workshop 2020 [link], women in research, PyConIndia 2020 [link].
- **Memberships:** Chair, IEEE-IISc, Women in Science and Engineering Affinity Group (2021-2022), Member, IEEE-IISc SPS student chapter. Organized talks and events for high school, undergrad and graduate students.

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## CO-CURRICULAR & EXTRA-CURRICULAR

- Invited for Google Research week at Google Research, India (2022-2024).
  - Speech Processing Professional Interview in [theinterviewportal.com](https://theinterviewportal.com).
  - Article: Probabilistic Linear Discriminant Analysis Explained in [towardsdatascience.com](https://towardsdatascience.com)
  - Member of IISc Notebook Drive, a college initiative to teach government school children.
  - Hobbies: Enjoy playing Badminton and table tennis, playing Violin, part of college Bhangra group.
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## REFERENCES

1. Prof. Sriram Ganapathy

*Associate Professor, Department of Electrical Engineering, Indian Institute of Science. Mail Id: sriramg@iisc.ac.in*

2. Prof. Emanuel Habets

*Professor, International Audio Laboratories Erlangen, Germany. Mail Id: emanuel.habets@audiolabs-erlangen.de*

3. Dr. Srikrishna Karanam

*Research Scientist, Adobe Research, India. Mail Id: skaranam@adobe.com*

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