

# PRACHI SINGH

PhD Scholar

LEAP Lab

Electrical Engineering

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## RESEARCH INTERESTS

Speaker Diarization, Machine Learning, Variational Inference, Metric Learning, Self-supervised learning, Graph Clustering, Joint Automatic Speech Recognition and Diarization, Multimodal Music Retrieval.

## SKILLS

Languages	Python, C, C++, Shell
Libraries	Kaldi, Pytorch, OpenCV
Software & Tools	Spyder, Jupyter Notebook, MATLAB, MS Office, Visual Studio

## EDUCATION & COURSES

Ph.D. 2017 - Present  
Electrical Engineering (CGPA : 8.00/10)  
Indian Institute of Science, Bangalore

B.Tech 2011 - 2015  
Electronics & Telecommunication (CGPA : 8.67/10)  
College of Engineering, Pune

### Courses

- Machine Learning for Signal Processing
- Pattern Recognition and Neural Networks
- Data Structures
- Computational Methods of Optimization
- Speech Information Processing
- Stochastic Models and Applications
- Matrix Theory
- Detection and Estimation Theory

## EXPERIENCE

ML Research Intern

Adobe Research, India

June 2022 - August 2022

- Worked in intelligent music retrieval for design documents.

ML Research Intern

Observe.AI

October 2021 - February 2022

- Built in-house diarization for contact centres and achieved state-of-the-art performance.

Software Modelling Engineer

Fiat Chrysler Automobiles

July 2015 - July 2017

## ACHIEVEMENTS

- Reviewer of IEEE Transactions on Audio, Speech and Language Processing (TASLP) and Sadhana- Journal of Indian Academy of Sciences.
- ISCA Travel Grant for INTERSPEECH, 2019
- Runner-up in "Second DIHARD Challenge 2019", April 2019
- Late Shri Manoharbhairam Patel Memorial Gold Medal in XII Std
- Dhirubhai Foundation Scholarship in XII Std

## RECENT PROJECTS

Research advisor: Dr. Sriram Ganapathy

### Third DIHARD speech diarization challenge

- Contributed in baseline system setup for the DIHARD-III challenge. It involves task to partition an audio into speaker segments, in challenging environment.
- Participated in challenge and was among top 10 teams across globe. Our system involved combination of End-to-End diarization based on transformers for telephone conversation and graph based clustering for multi-speaker conversations.

### Self-supervised speaker diarization with path integral clustering

- This work involves learning representations using clustering based loss. The task is self-supervised because we learn the representations using the clustering output given by the clustering algorithm to make the representations more speaker discriminative. We explored graph structural path integral clustering to encode embedding space in the form of graph. Accepted in IEEE Transactions on Speech, Audio and Language Processing.

### Graph Neural Network based speaker diarization

- This ongoing work relates to performing metric and representation learning using Graph Neural Network (GNN) by learning ideal similarity matrix using the adjacency matrix obtained from GNN training.
- Another direction is supervised hierarchical clustering using GNN by using labelled conversational speech.

## PUBLICATIONS

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- **P. Singh** and S. Ganapathy, "Self-Supervised Metric Learning with Graph Clustering for Speaker Diarization" accepted in IEEE ASRU 2021.
- **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).
- **P. Singh**, R. Varma, V. Krishnamohan, S. R. Chetupalli, and S. Ganapathy. "LEAP Submission for the Third DIHARD Diarization Challenge." in Interspeech 2021.
- N. Ryant, **P. Singh**, V. Krishnamohan, R. Varma, K. Church, C. Cieri, J. Du, S. Ganapathy, and M. Liberman. "The Third DIHARD Diarization Challenge." arXiv:2012.01477 (2020).
- **P. Singh** and S. Ganapathy, "Deep Self-Supervised Hierarchical Clustering for Speaker Diarization", INTERSPEECH 2020.
- S. Ramoji, P. Krishnan, B. Mysore, **P. Singh**, S. Ganapathy, "LEAP System for SRE19 Challenge – Improvements and Error Analysis", Speaker Odyssey Workshop 2020.
- S. Ramoji, P. Krishnan, B. Mysore, **P. Singh**, S. Ganapathy, "Pair-wise Discriminative Neural PLDA for Speaker Verification", arXiv:2001.07034 2020.
- **P. Singh**, Harsha Vardhan MA, S. Ganapathy, A. Kanagasundaram, "LEAP Diarization System for the Second DIHARD Challenge", INTERSPEECH 2019.
- A. Kanagasundaram, S. Sridharan, S. Ganapathy, **P. Singh**, C. Fookes, "A Study of X-vector Based Speaker Recognition on Short Utterances", INTERSPEECH 2019.
- 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.

## WORKSHOPS & CONFERENCES

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- Presented in IISc EECS Symposium April, 2022.
- Presented paper in ASRU 2021.
- Presented in IISc EECS Symposium May, 2021.
- Presented in IEEE-IISc Shannon's Day talk series, April, 2021
- Presented in DIHARD-III challenge workshop 2020
- Women in Research Talk, PyConIndia 2020, Online
- Presented paper in Interspeech 2020.
- Winter School on Speech and Audio Processing (WiSSAP) 2020, IIT Mandi, India
- Presented paper and poster in Interspeech 2019, Graz, Austria
- Summer school on mathematics for data science 2019 organised by IFCAM and IISc
- Winter School on Speech and Audio Processing (WiSSAP) 2019, Trivandrum, India

## TEACHING EXPERIENCE

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- Teaching Assistant  
**Advanced Deep Learning [E9:309]**  
📅 Fall 2020
- Teaching Assistant  
**Deep learning theory and Practice [CCE]**  
📅 Spring 2020
- Teaching Assistant  
**Machine Learning and Signal Processing [E9:205]**  
📅 Fall 2019

## ARTICLES

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- Speech Processing Professional Interview in [theinterviewportal.com](https://theinterviewportal.com).
- Article: Probabilistic Linear Discriminant Analysis Explained in [towardsdatascience.com](https://towardsdatascience.com)

## EXTRA-CURRICULAR

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- Chair, IEEE-IISc, Women in Science and Engineering Affinity Group.
- Member of IISc Notebook Drive to teach government school children.