# Debarpan Bhattacharya

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## EDUCATION

**Indian Institute of Science (IISc), Bangalore**
*M.Tech.(Research), Electrical Engineering* *Oct 2020 – Jan 2023*

- Cumulative GPA – **9.12/10**

**Jadavpur University, Kolkata**
*B.E., Electrical Engineering* *May 2016 – Jun 2020*

- Cumulative GPA – **9.2/10** (Rank – **7/111**)

## RESEARCH ARTICLES

### Conferences

- (Oral presentation) D. Dutta, **D. Bhattacharya**, A. Poorjam, D. Mittal, M. Singh and S. Ganapathy. Acoustic Representation Learning on Breathing and Speech Signals for COVID-19 Detection.[link]
  *INTERSPEECH, 2022*
- **D. Bhattacharya**, D. Dutta, N. K. Sharma, S. R. Chetupalli, P. Mote, S. Ganapathy, C. Chandrakiran, S. Nori, K. Suhail, S. Gonuguntla, M. Alagesan. Analyzing the impact of SARS-CoV-2 variants on respiratory sound signals.[link]
  *INTERSPEECH, 2022*
- **D. Bhattacharya**, D. Dutta, N. K. Sharma, S. R. Chetupalli, P. Mote, S. Ganapathy, C. Chandrakiran, S. Nori, K. Suhail, S. Gonuguntla, M. Alagesan. Coswara: A website application enabling COVID-19 screening by analysing respiratory sound samples and health symptoms.[link]
  *INTERSPEECH, 2022: Show And Tell Track*
- N. K. Sharma, S. R. Chetupalli, **D. Bhattacharya**, D. Dutta, P. Mote, and S. Ganapathy. The Second Dicova Challenge: Dataset and performance analysis for COVID-19 diagnosis using acoustics.[link]
  *IEEE ICASSP, 2022.*
- (Best Paper Award) **D. Bhattacharya**. Huffman Coding based ECG Processing For Compression-Distortion Tradeoff.[link]
  *IEEE India Council International Conference (INDICON), 2021.*
- P. P. Chandra, **D. Bhattacharya** B. Bhattacharyya, S. Munshi. Pulse Train Modulation And ANN Based Temperature Sensor With Semi-automatic Calibration.[link]
  *IEEE India Council International Conference (INDICON), 2021.*
- **D. Bhattacharya**, P. P. Chandra, B. Bhattacharyya, S. Munshi. Optimized Thermocouple Temperature Sensor using 555 Timer and ANN Based Linearization.[link]
  *IEEE Calcutta Conference (CALCON), 2020.*

### Journals

- **D. Bhattacharya**, D. Dutta, N. K. Sharma, S. R. Chetupalli, P. Mote, S. Ganapathy, C. Chandrakiran, S. Nori, K. Suhail, S. Gonuguntla, M. Alagesan. Screening for COVID-19 using respiratory acoustics - Dataset, Classifiers and Bias Analysis. [code]
  *Under Review*
- **D. Bhattacharya**, S. Misra, N. Pathak, A. Mukherjee. IDeA: IoT-based autonomous aerial demarcation and path planning for precision agriculture with UAVs.[link]
  *ACM Transactions on Internet of Things, 2020.*

### Preprints

- D. Mittal, A. Poorjam, D. Dutta, **D. Bhattacharya**, Z. Yu, S. Ganapathy and M. Singh. Svadhyaya system for the Second Diagnosing COVID-19 using Acoustics Challenge 2021.[link]
  *Arxiv pre-print*

## SELECTED PROJECTS

- **[Master's thesis] Machine learning for COVID-19 diagnosis from acoustics** Aug, 2021 - Present
  *Prof. Sriram Ganapathy*
  As a part of the COSWARA team, designed transformer and Bi-LSTM classifiers, filter-bank learning with supervised/unsupervised pre-training for COVID-19 diagnosis from respiratory sounds. Also, curated COSWARA dataset and made it public to encourage further work. Recently, bias analysis proved fairness of the classifier. [paper1][paper2][paper3]
- **Big Bird: Transformers for longer Sequences in NLP tasks** Oct, 2021 - Nov, 2021
  *Deep learning for NLP course project*
  Read and reproduced results reported in the paper[link] on Google's Big Bird transformer model.
- **Model agnostic mask learning for attribution map based explainability** Feb, 2022 - Present
  *Prof. Sriram Ganapathy*
  We propose a new model agnostic explainability method that can learn an attribution map automatically for a given local input.
- **BiGRU and transformer based sarcasm detection on SARC dataset** Aug, 2021 - Sep, 2021
  *Prof. Sriram Ganapathy, Advanced Deep Learning course project*
  Reproduced results in the paper[link]. Also, observed that transformer networks perform well for sarcasm detection task on SARC dataset.
- **Deep learning for bird song classification** Feb, 2021 - June, 2021
  *Prof. Chandra Sekhar Seelamanthula, Time-frequency Analysis course project*
  Deep learning based bird identification from bird songs. Potentially can have transformative impact on global biodiversity monitoring.[report]
- **Microstrip patch antenna design for biomedical applications** May, 2019 - July, 2019
  *Prof. Jayanta Mukherjee, IIT Bombay*
  Learned to design microstrip patch antenna to be embedded in portable biomedical devices.
- **[Bachelor's thesis] Signal conditioning for temperature transducers** May, 2018 - Jun, 2020
  *Prof. Sugata Munshi, Jadavpur University*
  Designed hybrid signal conditioning system involving 555 timer IC and neural network based regression for non-linear temperature transducers.[paper1][paper2]
- **Image processing and CNN based SUDOKU solver for magazine images** Nov, 2020 - Jan, 2021
  *Prof. Rajiv Soundararajan, Digital Image Processing course project*
  Designed a SUDOKU solver that takes an SUDOKU snapshot from a newspaper/magazine as input and returns the solved SUDOKU.

## SELECTED COURSES

Advanced Deep Learning(A+)
Speech Information Processing(A)
Time-frequency Analysis(A+)
Matrix Theory(A)
Machine Learning for Signal Processing(A+)
Digital Image Processing(A+)
Deep Learning for Natural Language Processing(B+)
Stochastic Models and Applications(A)

## AWARDS AND ACHIEVEMENTS

- **IEEE-HKN Mu Xi**: Selected through IEEE-IISc student branch 2022
- **Best Paper Award**: For the paper [link] at IEEE INDICON 2021 2021
- **B N Paul Memorial Silver Medal**: Highest marks in "Electric Drives" among 111 students 2020
- **ISCA travel grant**: Paper presentation in INTERSPEECH 2022 in South Korea 2022
- **Summer Research Fellowship(SRF), Indian Academy of Science(IAS)**: Total 110 were shortlisted throughout India 2019
- **Graduate Aptitude Test in Engineering (GATE)**: Ranked 195 out of 93526 Candidates 2020
- **MHRD Scholarship**: Given to $\sim 18\%$ of candidates appearing for GATE examination 2020
- **Research Week with Google**: Selected for the 1 week event by Google Research 2022
- **DiCOVA-II Global Challenge**[link]: Global ranks 3 (among 13), 6 (among 18), 3 (among 13) and 5 (among 10) in tracks 1,2,3 and 4 respectively 2021
- **GARP travel grant**: Paper presentation in ICASSP 2022 in Singapore 2022

## TALKS

- **AI-ML Systems Conference**: Will present MTech thesis work in the doctoral symposium 2022
- **EE Summer School, IISc**: Presented my findings from the COSWARA project 2022
- **EE Summer School, IISc Bangalore**: Addressed more than 100 participating Bachelor's students through student talk titled "Project COSWARA: Diagnosis of COVID-19 using acoustics".

## SERVICES

- **Head Teaching Assistant**: For "E9:205: Machine Learning for Signal Processing", at IISc 2022
- **Teaching Assistant**: For "AI for Digital Health and Imaging", at IISc 2022
- **Chair**: IEEE Signal Processing Society Students' Chapter at IISc 2022
- **Member, Notebook Drive**: Provides food and education to poor school children 2022
- **Lead Organiser**: For paper presentation event in technical fest at Jadavpur University 2019