

# Neeraj Sharma

✉ neerajww@gmail.com | ☎ +1 4127084644 | 📍 Pittsburgh | 🔗 <https://neerajww.github.io/>

## Education

---

### PhD in Electrical Communication Engineering

Bengaluru, India

ADVISOR: T. V. SREENIVAS, INDIAN INSTITUTE OF SCIENCE

June 2018

Thesis title: Information-rich sampling of time-varying signals

### MTech in Electrical Communication Engineering

Bengaluru, India

INDIAN INSTITUTE OF SCIENCE

Dec 2012

### BTech in Instrumentation and Electronics Engineering

Bhubaneswar, India

COLLEGE OF ENGINEERING AND TECHNOLOGY

June 2009

## Academic Experience

---

### Postdoctoral Research Fellow

Pittsburgh, USA

CARNEGIE MELLON UNIVERSITY, USA

July 2017 – Present

- Mentored by **Prof. Lori Holt and Barbara Shinn-Cunningham**
- Research and Development to analyze human brain response to talker changes in audio signals
- Involved in stimulus design, building experiment setup using electro-encephalography, collecting human brain data, data analysis, summarization, and dissemination of findings

### Visiting Postdoctoral Research Fellow

Bengaluru, India

INDIAN INSTITUTE OF SCIENCE, INDIA

Mar – Jun 2017, Feb – Apr 2018, Dec – Jan 2019

- Menotored by **Prof. Sriram Ganapathy**
- Built computational approaches to analyze talker changes in audio signals

### Project Staff

Bengaluru, India

INDIAN INSTITUTE OF SCIENCE, INDIA

Apr 2016 – Dec 2017

- Menotored by **Prof. T. V. Sreenivas**
- Large scale modulation analysis of speech and audio

### Visiting Researcher

Paris, France

ÉCOLE NORMALE SUPÉRIEURE, PARIS

Apr 2014 – Jul 2014

- Menotored by **Prof. Daniel Pressnitzer and Laurent Daudet**
- Designed auditory sketches using 4-D features extracted by spectro-temporal analysis of speech signals

## Interests

---

**Speech Signal Processing, Neuroscience, Machine Learning, and Perception**

## Skills

---

**Coding** Python, MATLAB, HTML, JavaScript

**Documentation** Latex

**Signal processing** Digital signal processing, Speech and audio signal processing

**Psychoacoustics** Behavioral experiment design and statistical analysis

**Machine learning** Theory and implementation of classification and regression models

**Research** Critical thinking, technical writing, and collaboration

## Publications

### Talker Change Detection

2017-Present

#### USING PERCEPTION EXPERIMENT DESIGN, FEATURE EXTRACTION, AND MACHINE LEARNING

IISc, CMU

- Neeraj Sharma, Shobhana Ganesh, Sriram Ganapathy, Lori L. Holt, "Talker Change Detection: A comparison of human and machine performance", *Journal of Acoustic Society of America (JASA)*, 2019. **Selected as a Technical Area Pick for the year (Journal)**.
- Neeraj Sharma, Shobhana Ganesh, Sriram Ganapathy, Lori L. Holt, "Analyzing human reaction time for talker change detection", *IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2019, Brighton, UK.
- Neeraj Sajjan, Shobhana Ganesh, Neeraj Sharma, Sriram Ganapathy, Neville Ryant, "Leveraging LSTM Models for Overlap Detection in Multi-Party Meetings", *IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, April, 2018, Canada.
- F. K. Dick, L. L. Holt, H. Nusbaum, N. Sharma, and B. Shinn-Cunningham, "Dimension-based Attention in Learning and Understanding Spoken Language", 40th Annual Meeting of the Cognitive Science Society, 2018, Wisconsin-Madison, USA.

### Speech signal analysis, manipulation, and synthesis

2016-2018

#### USING SINUSOIDAL MODELING, MODULATION ANALYSIS, AND PARAMETER ESTIMATION

IISc

- Neeraj Sharma, and T. V. Sreenivas, "Time-varying Sinusoidal Demodulation for Non-stationary Modeling of Speech", in *Elsevier Speech Communication*, 2018(**Journal**).
- Neeraj Sharma, Shreepad Potadar, Srikanth Raj Chetupalli and T. V. Sreenivas, "Mel-Scale Sub-band Modelling for Perceptually Improved Time-Scale Modification of Speech and Audio Signals", in *Proc. 23rd National Conference on Communications (NCC)*, March 2017, Madras, India.
- Jitendra Dhiman, Neeraj Sharma and Chandra Sekhar Seelamantula, "Multicomponent 2-D AM-FM Modeling of Speech Spectrograms", *INTERSPEECH*, Sept, 2018, India.

### Signal processing, sampling and reconstruction

2012-2015

#### USING CONVEX OPTIMIZATION, AND COMPRESSED SENSING

IISc

- Neeraj Sharma, and T. V. Sreenivas, "Event-triggered sampling using signal extrema for instantaneous amplitude and instantaneous frequency estimation", in *Elsevier Signal Processing*, 2015(**Journal**).
- Neeraj Sharma, "Time-instant sampling based encoding of time-varying acoustic spectrum", *AIP Conf. Proc. of Intl. Conf. on Mechanics of Hearing*, 2015.
- Neeraj K. Sharma and T. V. Sreenivas, "Event-triggered sampling and reconstruction of sparse trigonometric polynomials", *IEEE Intl. Conf. on Signal Processing and Communications (SPCOM)*, July 2014, Bangalore, India.
- Neeraj Sharma and T. V. Sreenivas, "Sparse signal reconstruction based on non-uniform signal dependent samples", *IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, March 2012, Kyoto, Japan.

## Awards

|            |   |  |
|------------|---|--|
| March 2017 | <b>BrainHub CMU-IISc Postdoctoral Fellowship</b> , Recognized for research accomplishments in PhD and future research ideas                   | CMU  |
| Sept 2017  | <b>IEEE-Eta Kappa Nu (IEEE-HKN) Membership</b> , Recognized for contributions to technical activities in the area of PhD research             | The Honor society of IEEE                                  |
| 2013       | <b>IEEE MV Chauhan Paper Contest First Prize Winner</b> , Recognized for scholarly writing and presentation of research idea                  | IEEE India Council   |
| 2012-13    | <b>IEEE-IISc Student Branch Best Volunteer Award</b> , Recognized for organizing technical activities in and around Bangalore                 | IEEE India Council   |
| 2012-13    | <b>PhD Scholarship</b> , Recognized for pursuing higher education   | Ministry of Human Resource and Development, Govt. of India |
| 2012-13    | <b>Motorola Scholar Program Finalist</b> , Train Informatics System (Undergraduate Project)   | Motorola Corporation, India                                |
| 2005-09    | <b>Undergraduate Merit Scholarship</b> , Recognized for excelling in undergraduate studies  | Govt. of Odisha  |
| 2008       | <b>Winning entry in the UMO Boycott Bad Design Contest</b> , Identifying alternative position for placement of fuel tank in scooters in India | UMO  |
| 2004       | <b>Selected in State Level Chemistry Olympiad</b> ,   | Orissa Chemical Society                                    |

## Travel Grants

|            |   |
|------------|---|
| June 2014  | <b>Mechanics of Hearing (MoH) Student Travel Grant</b> , To attend MoH Workshop held in Athens (Greece) |
| April 2014 | <b>SPIE Officer Travel Grant</b> , To attend Leadership Workshop held in Brussels (Belgium)             |
| March 2012 | <b>IEEE Signal Processing Society Student Travel Grant</b> , To attend ICASSP held in Kyoto (Japan)     |

## Organizational Skills

|         |  |             |
|---------|--|-------------|
| 2019    | <b>Winter School on Speech and Audio Processing (WiSSAP)</b> , Program Committee Member    | <i>ISCA</i> |
| 2013-14 | <b>IEEE-IISc Student Branch</b> , Executive Committee Member                               | <i>IEEE</i> |
| 2015-18 | <b>Open Day</b> , Conceptualized and organized events demonstrating research to public     | <i>IISc</i> |
| 2012-19 | <b>Volunteer</b> , SPCOM and WiSSAP - conference and workshop related to signal processing | <i>IISc</i> |

## Academic Service

---

|                  |   |                  |
|------------------|---|------------------|
| 2013-<br>Present | <b>Reviewer</b> , Nature Scientific Reports, Elsevier Signal Processing, Elsevier Speech Communication, Annual ISCA Interspeech conference, IEEE Signal Processing Letters, IEEE Connect conference, IEEE Signal Processing and Communication (SPCOM) Conference, and Sadhana |                  |
| 2012-19          | <b>Mentoring</b> , Seven undergraduate students working as summer interns   | <i>IISc, CMU</i> |
| 2014-15          | <b>Website maintainer</b> , Dept. of Electrical Communication Engineering   | <i>IISc</i>      |
| 2013-14          | <b>IEEE-IISc Student Branch</b> , Executive Committee Member  | <i>IEEE</i>      |

## Selected Talks

---

|                  |  |
|------------------|--|
| Jan, May<br>2019 | <b>Talker Change Detection: Humans, Machines and the Gap</b> , invited talk at University College London (UK), Indian Institute of Science (India), and Boston University (US) |
| Jun 2018         | <b>Dimension-based Attention in Learning and Understanding Spoken Language</b> , in CogSci 2018, Madison, USA  |
| Jan 2015         | <b>Throwing Light into the Tunnel: auditory models and perception invited talk in</b> , invited talk at Winter School on Speech and Audio Processing (WiSSAP)                  |
| May 2015         | <b>Sound signal analysis: Some knowns and unknowns</b> , invited talk in SIAM-IISc Chapter, Indian Institute of Science (India)  |
| Oct 2013         | <b>Detect and Sample: Questioning uniform Nyquist-rate sampling</b> , invited talk in IEEE Day Celebrations, Oct 2013, Indian Institute of Science (India)                     |

---