CURRICULUM VITAE

SHARBA BANDYOPADHYAY
R-206, Dept. of E&ECE,
IIT Kharagpur,
Kharagpur, West Bengal, PIN-721302, India
E-mail: sharba@ece.iitkgp.ac.in Phone: (91)-(3222)-283548 (O) (91)-7586077229 (C)
Lab Website: https://informationprocessinglab.weebly.com/

EXPERIENCE

Current Position:
Assistant Professor (since Jan 2015)
Department of Electronics and Electrical Communication Engineering (E&ECE), Indian Institute of Technology (IIT) Kharagpur.

Past Positions:

Wellcome Trust DBT India Alliance Fellow (since July 2012 - June 2018)
E&ECE, IIT Kharagpur and National Brain Research Centre, India (2012-2014)

University of Maryland - College Park, MD
Assistant Research Scientist (Research Track Faculty), Institute for Systems Research and Department of Biology, Dates: July, 2009- June, 2012.

EDUCATION/TRAINING

University of Maryland - College Park, MD
Research Associate, Institute for Systems Research and Department of Biology, Dates: August, 2007-June, 2009. Supervisors – Drs. Shihab Shamma and Patrick Kanold

Johns Hopkins University School of Medicine – Baltimore, MD
Doctor of Philosophy, in Biomedical Engineering, Date of Graduation: April 2007
Dissertation advisor – Dr. Eric D. Young

Johns Hopkins University School of Engineering – Baltimore, MD
Master of Science in Engineering, in Biomedical Engineering, Date of Graduation: 2001
Thesis advisor- Dr. Eric D. Young

Indian Institute of Technology Kharagpur – Kharagpur, India
Bachelor of Technology (with Honors), in Electronics and Electrical Communication Engineering, Date of Graduation: 1999

RESEARCH

RESEARCH AREAS:

Neural Auditory Processing, Learning and Plasticity, Austism Spectrum Disorders, Speech and Animal Vocalizations, Theoretical Neuroscience, Information Theoretic Analyses of Neural Systems

RESEARCH FUNDING:

(*Approved* December, 2022) DST CSRI for the study of "*Excitation Inhibition Ratio Changes in Autism Spectrum Disorders – Parallels in Human Subjects and Mouse Models- separate role of subtractive and divisive inhibition*". PI: **Sharba Bandyopadhyay**, co-PI: **Rajlakshmi Guha** and co-PI: Prof. **Mallika Banerjee** (CU)

January 2022 – January 2025: SERB CRG for the study of "*Development of Sensory Inputs to the Frontal Cortex in mouse model of Autism Spectrum Disorders*". PI: **Sharba Bandyopadhyay**

October 2020 – October 2023: DST under India-Czech Joint Research Projects for the study of "*Processing of complex acoustical signals including vocalizations in inhibitory circuits of the central auditory system in mice models of autism and different types of sensorineural hearing loss*". PI: **Sharba Bandyopadhyay**; Czech PI: **Prof Josef Syka**

April 2016 – March 2021: IIT Kharagpur Challenge Grant for the study of "*Understanding Vocalization Development Deficits in Mouse Models of Autism Spectrum Disorders-Role of Subplate Neurons*". PI: **Sharba Bandyopadhyay**

April 2015 – March 2020: MHRD SSLS Scheme for the study of "*Audio Visual Integration and Learning – Implications for Dyslexia*". PI: **Sharba Bandyopadhyay**

July 2012 – June 2018: Wellcome Trust DBT India Alliance for the study of "*Connectivity and Role of Inhibitory Neurons in Auditory Perception*". PI: **Sharba Bandyopadhyay**

Jan 2010-Dec 2010: American Hearing Research Foundation for the study of "*Alterations in Neural Processing in the Auditory Cortex with Early Noise Induced Hearing Loss*". PI: **Sharba Bandyopadhyay**.

RESEARCH MENTORSHIP

***Mentees*:**

Doctoral Ongoing:
Amiyangshu De, ATDC IIT Kharagpur, PhD student
Ann Soniya Michael, ATDC IIT Kharagpur, PhD student
Ritwika Purkait, ATDC IIT Kharagpur, PhD student
Arijit Ghosh (Visiting PhD student, Shanghai Jiao Tong University with Prof. Sheng-Tian Li, Bio-X Institute)
Srishti Jain, ATDC IIT Kharagpur, PhD student
Subashini Lakshmanan, ATDC IIT Kharagpur, PhD student (Project)

Doctoral Completed/Submitted:
Adarsh Mukesh, PMRF, ATDC IIT Kharagpur, (*thesis submitted*), to go to Jackson Labs, ME, USA (Postdoc)
Madhur Parashar, PhD, SMST IIT Kharagpur; temporarily at IIT Bombay (Postdoc)
Yuvarani Selvarajan, PhD, BS IIT Kharagpur; temporary time off
Swapna Agarwalla, PhD, E&ECE IIT Kharagpur; to University of Rochester, NY, USA (Postdoc)
Muneshwar Mehra, PhD, ATDC IIT Kharagpur; to Washington University, St. Louis, MO, USA (Postdoc)
Hemant Srivastav, PhD, ATDC IIT Kharagpur; to Baylor College of Medicine, Houston, TX, USA (Postdoc)
Sudha Sharma, PhD, ATDC IIT Kharagpur; to Baylor College of Medicine, Houston, TX, USA (Postdoc)

UG and PG Ongoing:
Archak Raghavendra Kaushik (BTech-MTech Dual Degree student, Mech IIT KGP)

Lakshman Mohan Lanka (BTech-MTech Dual Degree student, E&ECE IIT KGP)

Past Mentees:

UG and PG:
Madhurima Patra (visiting BTech student, Kalyani Government Engineering College)
Debdut Mondal (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Purba Mandal (visiting MSc student, Chemistry, IIT KGP)
Madhu Snigdha Ghosh (visiting student, BTech in Electronics)
Abhirami S. (BTech-MTech Dual Degree student, Mech IIT KGP)
Pranav Joshi (BTech student, E&ECE IIT KGP)
Pankaj Chauhan (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Souvik Roy (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Aditya Verma (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Tanmayika Saha (MSc, BS, IIT KGP)
Upamanyu Chongdar (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Rachamalla Anirudh (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Renukrishna Gutta (BTech-MTech Dual Degree student, E&ECE IIT KGP)
V. Veda Vyshnavi (BTech student, E&ECE IIT KGP)
Manohar Angirekula (BTech-MTech Dual Degree student, EE IIT KGP)
Aman Singh (BTech student, E&ECE IIT Kharagpur)
Nishma Sreeramoju (BTech student, EE, IIT KGP)
Pruthvi Patel (BTech-Mtech Dual Degree student, BT IIT KGP)
Krishnavamsi Ch (BTech student, E&ECE IIT KGP)
Satyabrata Parida (BTech student, EE IIT KGP)
Subhadeep Dutta (BTech student, EE IIT PATNA)
Aquib Jawed (BTech-MTech Dual Degree student, E&ECE, IIT KGP)
Phanindra Josh (BTech-MTech Dual Degree student, E&ECE IIT KGP)
Prudhivi Eswarnath (BTech, E&ECE, IIT KGP)
Yemineni Meghana (BTech, E&ECE, IIT KGP)
Jagan Mohan Reddy (MTech, E&ECE, IIT KGP)
Santhosh Pillalamarry (MTech, E&ECE, IIT KGP)
Arpit Agarwal, Junior Research Fellow, NBRC
Ritu Jain, M.Tech Thesis in Biomedical Engineering
R. Sarvotham, Junior Research Fellow, NBRC
Kamini Sehrawat, Junior Research Fellow, NBRC

RESEARCH COLLABORATORS

Dr. Auroop Ratan Ganguly, Sustainability and Data Sciences Lab, Northeastern University, USA
Dr. Edwin Abel, Director Iowa Neuroscience Institute, University of Iowa, USA
Dr. Josef Syka, IEM, Czech Academy of Sciences, Czech Republic
Dr. Kasturi Saha, Department of Electrical Engineering, IIT Bombay, India
Dr. Mallika Banerjee, Ex-Professor Dept of Psychology, Calcutta University
Dr. ND Pradeep Singh, Department of Chemistry, IIT Kharagpur, India
Dr. Nihar Jana, School of Biosciences, IIT Kharagpur, India
Dr. Rajlakshmi Guha, RCESH, IIT Kharagpur
Dr. Saswat Chakraborty, GS Sanyal School of Telecommunication, IIT Kharagpur, India
Dr. Sourav Banerjee, Molecular Neurobiology, National Brain Research Centre, Manesar, India
Dr. Subhadip Paul, RKMVERI, Belur WB, India

PUBLICATIONS AND CONFERENCE PRESENTATIONS

Publications (submitted/in review preprints):

*Agarwalla S., **Bandyopadhyay S..** Social experience dependent plasticity of mouse song selectivity without that of song components; **bioRxiv** 2021.10.26.466011 doi**:** https://doi.org/10.1101/2021.10.26.466011 - in review*
Sharma S., *Srivastava HK, **Bandyopadhyay S.. Modulation of auditory responses by visual inputs in the mouse auditory cortex. **bioRxiv** 2021.01.22.427870; doi: https://doi.org/10.1101/2021.01.22.427870 (*equal contribution)*

Publications: (*Google Scholar*)

Work from IIT Kharagpur:

Abhirami S., Agarwalla S., Bhattacharya A., **Bandyopadhyay S.**. Contribution of the Ventral Pouch in the production of mouse Ultrasonic Vocalizations, ***Physical Review E***, 21 February 2023, 107(2), 024412, DOI: https://doi.org/10.1103/PhysRevE.107.024412
Also: Selected in APS outreach to Press

Parashar M., Bathla A., Dasika S., Gokhale A., **Bandyopadhyay S.**, and Saha K.. Sub-second Temporal Magnetic Field Microscopy Using Quantum Defects in Diamond, ***Scientific Reports***, May 2022, 12(1) 8743, 1-13, DOI: https://doi.org/10.1038/s41598-022-12609-3

*Mehra M., *Mukesh A. and **Bandyopadhyay S.**. Separate functional subnetworks of excitatory neurons show preference to periodic and random sound structures. ***Journal of Neuroscience***, 13 April 2022, 42(15), 3165-3183. DOI: https://doi.org/10.1523/JNEUROSCI.0333-21.2022, **equal contribution*

Mehra M., Mukesh A., ***Bandyopadhyay S.***. Earliest experience of rare but not frequent sounds cause long term changes in the adult auditory cortex, ***Journal of Neuroscience***, 23 February 2022, 42(8), 1454-1476. DOI: https://doi.org/10.1523/JNEUROSCI.0431-21.2021;
Also see: https://www.telegraphindia.com/india/study-shows-sounds-impact-on-foetal-brain-cells/cid/1859278

Ghorai, S.K., Roy, T., Maji, S., Guha Ray, P., Sarkar, K., Dutta, A., De, A., **Bandyopadhyay S.**, Dhara, S., Chattopadhyay, S.. A judicious approach of exploiting polyurethane-urea based electrospun nanofibrous scaffold for stimulated bone tissue regeneration through functionally nobbled nanohydroxyapatite, ***Chemical Engineering Journal,*** Volume 429, 1 February 2022, 132179

Ghosh, S.M., **Bandyopadhyay, S.**, Mitra, D.. Nonlinear Classification of Emotion from EEG Signal Based on Maximized Mutual Information. ***Expert Systems with Applications***, Volume 185, 15 Dec 2021, 115605
https://doi.org/10.1016/j.eswa.2021.115605

Parashar, M., *Saha, K. & ***Bandyopadhyay, S.**. Axon hillock currents enable single-neuron-resolved 3D reconstruction using diamond nitrogen-vacancy magnetometry. ***Commun Phys* 3,** 174 (2020).
https://doi.org/10.1038/s42005-020-00439-6 (*Joint Correspondence)

Srivastava HK, **Bandyopadhyay S..** Parallel lemniscal and non-lemniscal sources control auditory responses in the orbitofrontal cortex (OFC) [published online ahead of print, 2020 Aug 4]. ***eNeuro*.** 2020;ENEURO.0121-20.2020. doi:10.1523/ENEURO.0121-20.2020

Agarwalla S., Arroyo N. S., Long N. E., O T. W., Abel T. and **Bandyopadhyay S.**. Male-Specific Alterations in Structure of Isolation Call Sequences of Mouse Pups with 16p11.2 Deletion. [published online ahead of print, 2020 Jun 19]. ***Genes Brain Behav*.** 2020;e12681. doi:10.1111/gbb.12681

Sharma S., **Bandyopadhyay S..** Differential rapid plasticity in auditory and visual responses in the primarily multisensory orbitofrontal cortex. ***eNeuro***. 2020;7(3):ENEURO.0061-20.2020. Published 2020 Jun 12. doi:10.1523/ENEURO.0061-20.2020

P Das, S Ganguly, PP Maity, HK Srivastava, M Bose, S Dhara, **S Bandyopadhyay**, AK Das, S Banerjee and NC Das. Converting waste Allium sativum peel to nitrogen and sulphur co-doped photoluminescence carbon dots for solar conversion, cell labeling, and photobleaching diligences: A path from discarded waste to value-added products. ***Journal of Photochemistry and Photobiology: B Biology***, Volume 197, August 2019, 111545

Yarra Venkatesh, Hemant Kumar Srivastava, S. Bhattacharya, Muneshwar Mehra, P. K. Datta, **S. Bandyopadhyay**, and N. D. Pradeep Singh. One and two photon uncaging: carbazole Fused o-Hydroxyxinnamate Platform for Dual Release of Alcohols (Same or Different) with Real-Time Monitoring. ***Organic Letters***, Org. Lett., 2018, 20 (8), pp 2241–2244

Work from previous affiliations:

Muralidharan, S., Dirda, N.D.A., Katz, E.J., Tang. C., **Bandyopadhyay, S.**, Kanold, P.O. and Kao, J.P.Y.. Ncm, a Photolabile Group for Preparation of Caged Molecules: Synthesis and Biological Application. ***PLOS-One***, https://doi.org/10.1371/journal.pone.0163937, October 3, 2016

Winkowski, D.E.*, **Bandyopadhyay, S.***, Shamma, S.A., Kanold, P.O. Frontal cortex activation causes rapid plasticity of auditory cortical processing (*[*]* ***equal contribution***). ***Journal of Neuroscience*** 2013 Nov, 33(46): 18134-18148.

Bandyopadhyay, S. and Young E.D. Nonlinear temporal receptive fields of neurons in the dorsal cochlear nucleus. ***J Neurophysiol*** Nov 2013, 110: 2414-2425.

Viswanathan, S., **Bandyopadhyay, S.**, Kao, J.Y., Kanold, P.O. Changing microcircuits in the subplate of the neonatal cortex. ***Journal of Neuroscience*** 2012 Feb, 32(5):1589-601.

Bandyopadhyay, S., Shamma, S.A. and Kanold P.O. Dichotomy of functional organization in the mouse auditory cortex ***Nature Neuroscience***, Published online: 31 January 2010 | doi:10.1038/nn.2490) – ***Nature Neuroscience, News and Views, Castro JB and Kandler K, Changing tune in auditory cortex 2010 Mar;13(3):271-3.*** doi: 10.1038/nn0310-271

Bandyopadhyay, S., Reiss, L.A.J. and Young, E.D. A receptive field for dorsal cochlear nucleus neurons at multiple sound levels. ***J Neurophysiol***, Dec 2007; 98: 3505 – 3515.

Reiss, L.A.J., **Bandyopadhyay, S.** and Young, E.D. 2007. Spectral contrast and nonlinearity in the dorsal cochlear nucleus neurons. ***J Neurophysiol***, Oct 2007; 98: 2133 – 2143.

Khan, S., **Bandyopadhyay, S**., Ganguly, A.R., Saigal, S., Erickson III, D.J., Protopopescu, V. and Ostrouchov, G. 2007. Evaluation of different mutual information estimation measures in short and noisy time series. ***Physical Review E***, 76, 026209.

Khan, S., Ganguly, A.R., **Bandyopadhyay, S.**, Saigal, S., Erickson III, D.J., Protopopescu, V. and Ostrouchov, G. 2006. Nonlinear statistics reveals stronger ties between ENSO and the tropical hydrological cycle, ***Geophysical Research Letters***, 33, L24402.

Bandyopadhyay, S. and Young E.D. 2004. Discrimination of voiced stop consonants based on auditory nerve discharges, ***Journal of Neuroscience***, 24(2): 531-541.

Conference Papers:

Archita Hore, Sashmita Panda, Ayan Chakraborty, **Sharba Bandyopadhyay** and Saswat Chakrabarti, Effects of Spike Width on Spiking Frequency in a CMOS Neuron Design Following a Subthreshold Approach, ***IEEE, 2nd International Conference on Advanced Communication Technologies and Signal Processing, 2021***, NIT Rourkela, India

Burman, I., Hore, A., Chakraborty, A., **Bandyopadhyay, S.** and Chakrabarti, S., Implementation of a Spiking Neuron in CMOS, ***NCC, 2021***, IIT Kanpur, India (Virtual Meeting)

Parashar, M., Dasika, S., Gokhale, A., Bathla, A., **Bandyopadhyay, S.** and Saha, K. Dynamic-Widefield-Magnetometry using Nitrogen-Vacancy Defects in Diamond, ***CLEO Technical Conference, 2021*** (Virtual Meeting)

Parashar, M., Dasika, S., Gokhale, A., Bathla, A., **Bandyopadhyay, S.** and Saha, K. Per pixel lock in detection based dynamic widefield magnetometry using quantum defects in diamond, ***Bulletin of the American Physical Society, APS March Meeting, 2021*** (Held Online)

Bandyopadhyay, S., Reiss, L.A.J. and Young, E.D. 2007. Spectral edges as optimal stimuli for Dorsal Cochlear Nucleus. In ***Hearing, from Sensory Processing to Perception*** from International Symposium on Hearing, 2006 by B Kollmeier, SpringerLink, published by Springer 2007.

Conference Presentations:

- De, A., Raghavendra, K., Soniya, A. and Bandyopadhyay, S., Differential Effects of Two-Tone Harmonics and Single Tone Tokens on Subsequent Sounds, Association for Research in Otolaryngology, 2023, Orlando, FL
- Raghavendra, K., Mukesh, A. and Bandyopadhyay, S., Recurrent Network of Neurons Can Produce Selectivity to Temporally Separated Sounds as a Whole, Association for Research in Otolaryngology, 2023, Orlando, FL
- Purkait, R., De, A. and Bandyopadhyay, S. Immediate Early Gene (IEG) Expression in the Developing Mouse Auditory Cortical Circuits with Oddball Sound Sequence Exposure, European Molecular Biology Organization Workshop, JNCASR, Bangalore
- De, A., Mandal, D., Mandal, P., Raghavendra, K. and Bandyopadhyay, S. Altered cortical representation of two tone harmonic complex (TTHC) in a mouse model of autism spectrum disorders (ASDs), European Molecular Biology Organization Workshop, JNCASR, Bangalore
- Mandal, P., Agarwalla, S. and Bandyopadhyay, S. Altered vocalization sequence encoding in a mouse model of ASDs, Society for Neuroscience, 2022, San Diego, CA. (Virtual)
- Muneshwar, M., Mukesh, A. and Bandyopadhyay, S. Separate functional subnetworks encode regularity and irregularity of sound sequences within the auditory cortex, Society for Neuroscience, 2022, San Diego, CA. (Virtual)
- De, A., Agarwalla, S. and Bandyopadhyay, S., IEG expression in the mouse auditory cortex shows the importance of natural ordered vocalization sequences over random ones, Association for Research in Otolaryngology, 2022, San Jose, CA.
- De, A., Mandal, D., Agarwalla, S. and Bandyopadhyay, S., Differential nature of harmonic based enhancement and suppression in the mouse auditory cortex, Association for Research in Otolaryngology, 2022, San Jose, CA.
- Abhirami, S., Agarwalla, S., Bhattacharya, A. and Bandyopadhyay, S. Simulation based study of contribution of ventral pouch and alar edge in production of mouse vocalizations, Association for Research in Otolaryngology, 2022, San Jose, CA.
- Mukesh, A., Mehra, M., and Bandyopadhyay, S., Deviant Selectivity within Auditory Cortical Neurons for Stimuli with varying contrast, Association for Research in Otolaryngology, 2022, San Jose, CA.
- Mandal, D., De, A., Agarwalla, S. and Bandyopadhyay, S. Coding of two-tone harmonic complexes by excitatory and inhibitory neurons in the mouse auditory cortex, Society for Neuroscience, 2021, Chicago, IL. (Virtual)
- Srivastava, H., Yuvarani, M.S. and Bandyopadhyay, S. Alterations in connectivity in the deeper layers of the developing motor cortex in an ASD model mouse, Society for Neuroscience, 2021, Chicago, IL. (Virtual)
- Agarwalla, S. and Bandyopadhyay, S. Context Dependent Encoding of Ultrasonic Vocalization Sequences in the Mouse Auditory Cortex, Association for Research in Otolaryngology, 2019, Baltimore, MD.
- Saha, T., Mukherjee, A., A., Muneshwar and Bandyopadhyay, S. Auditory Cortical Detection of Deviant Temporal Modulations in Sequences of Amplitude Modulated Sounds, Association for Research in Otolaryngology, 2019, Baltimore, MD.

- Sharma, S., Chakrabarti, A. and Bandyopadhyay, S. Auditory and Visual Stimulus Interactions in the Orbitofrontal Cortex of the Mouse, Association for Research in Otolaryngology, 2019, Baltimore, MD.

- Parashar, M., Saha, K. and Bandyopadhyay, S. Reconstruction of single neuron resolution spiking activity from simulated diamond nitrogen-vacancy center vector magnetometric maps, Society for Neuroscience, 2018, Nov, San Diego, CA.

- Muneshwar, Parashar, M., Srivastava, H.K., Mukesh, A. and Bandyopadhyay, S. Role of inhibitory interneurons in long time scale adaptation based changes in coding of sound sequences in the mouse auditory cortex (ACX), Society for Neuroscience, 2018, San Diego, CA.

- Mukherjee, A., Patel, P., Mukesh, A., Muneshwar and Bandyopadhyay, S. Spectral shape based adaptation unravels mechanisms underlying spectral contrast coding in the mouse auditory cortex (ACX), Society for Neuroscience, 2018, San Diego, CA.

- Yuvarani, M.S., Agarwalla, S. and Bandyopadhyay, S, Altered progress in developmental structure of pup isolation calls in mouse models of ASDs, Society for Neuroscience, 2018, San Diego, CA.

- Sharma, S., Srivastava, H. and Bandyopadhyay, S. Modulation of auditory responses by visual inputs in the mouse auditory cortex (ACX), Society for Neuroscience, 2018, San Diego, CA.

- Srivastava, H.K. and Bandyopadhyay, S. Both lemniscal and nonlemniscal pathways define auditory respones in the Frontal Cortex, Society for Neuroscience, 2018, San Diego, CA.

- Sharma, S. and Bandyopadhyay, S. Audio-visual associations show differential effects on auditory and visual responses in the mouse OFC, IMRF, 2018, Toronto, Canada.

- Mukesh, A., Muneshwar and Bandyopadhyay, S. Model of developing auditory cortex shows low probability stimuli as drivers of cortical organisation, Association for Research in Otolaryngology, 2018, San Diego, CA.

- Muneshwar and Bandyopadhyay, S. Spectral Contrast Selectivity of Excitatory and Inhibitory Neurons in the Mouse Auditory Cortex, Association for Research in Otolaryngology, 2018, San Diego, CA.

- Agarwalla, S. and Bandyopadhyay, S. Context dependence of ultrasonic vocalizations of mice, Society for Neuroscience, 2017, Washington D.C..

- Bandyopadhyay, S. Role of rare stimuli in development and top-down modification of auditory cortical responses, Molecular and Cellular Cognition Society, Asia, 2017, Singapore (*Invited Talk*)

- Muneshwar and Bandyopadhyay, S. Intra-laminar Auditory Cortical Network Activity Development, Molecular and Cellular Cognition Society, Asia, 2017, Singapore

- Agarwalla, S., Arroyo, N.S., Long, N.E., O'Brien, W.T., Abel, T. and Bandyopadhyay, S. Altered Structure in Isolation Calls of Mouse Pups with 16p11.2 Deletion, Molecular and Cellular Cognition Society, Asia, 2017, Singapore

- Bandyopadhyay, S. and Muneshwar Development of Context Dependence in the Mouse Auditory Cortex, Association for Research in Otolaryngology, 2016, San Diego, CA.

- Muneshwar and Bandyopadhyay, S. Depth Specific Developmental Changes in Neural Noise Correlation Profiles in the Mouse Auditory Cortex, Association for Research in Otolaryngology, 2016, San Diego, CA.
- Srivastava, H.K., Parashar, M., Muneshwar, and Bandyopadhyay, S. Coding of Sound Sequences in the Mouse Frontal Cortex, Association for Research in Otolaryngology, 2016, San Diego, CA.

- Jawed, A. and Bandyopadhyay, S. Theoretical Predictions of Cochlear Nucleus Receptive Fields Based on Auditory Nerve Fiber Responses to Natural Sounds, Association for Research in Otolaryngology, 2016, San Diego, CA.

- Srivastava, H.K., Parashar, M. and Bandyopadhyay, S. Auditory responses in the mouse frontal cortex, Association for Research in Otolaryngology, 2015, Baltimore, MD.

- Srivastava, H.K., Nelson, P.C., Young E.D. and Bandyopadhyay, S. Nonlinear temporal envelope processing in the inferior colliculus. Association for Research in Otolaryngology, 2014, San Diego, CA.

- Sehrawat, K., Jain, R. and Bandyopadhyay, S. Spike time based intensity encoding during dynamic range adaptation in model auditory nerve fibers. Association for Research in Otolaryngology, 2014, San Diego, CA.
- Bandyopadhyay, S., Viswanathan, S., Deng, R.K. and Kanold, P.O. Developmental changes in intra-laminar auditory cortical connectivity. Society for Neuroscience, 2012, New Orleans.

- Bandyopadhyay, S.*, Winkowski, D.E.*, Shamma, S.A. and Kanold, P.O. Increased population coding performance by neural decorrelation following rapid plasticity in the auditory cortex (*equal contribution) Society for Neuroscience, 2011, Washington, DC.

- Bandyopadhyay, S., Shamma, S.A. and Kanold, P.O. Organizational features in the mouse auditory cortex. Association for Research in Otolaryngology, 2011, Baltimore, MD.

- Winkowski, D.E.*, Bandyopadhyay, S.*, Shamma, S.A. and Kanold P.O. Modulation of auditory cortical response properties by orbitofrontal cortex (*equal contribution) Association for Research in Otolaryngology, 2011, Baltimore, MD.

- Winkowski, D.E.*, Bandyopadhyay, S.*, Shamma, S.A. and Kanold P.O. Anatomical and functional connectivity of top-down inputs to the auditory cortex in the mouse. (*equal contribution) Society for Neuroscience, 2009, Chicago, IL.

- Bandyopadhyay, S., Shamma, S.A. and Kanold, P.O. Local and large scale organization of the auditory cortex probed through in vivo Ca2+ imaging. Association for Research in Otolaryngology, 2009, Baltimore, MD.

- Bandyopadhyay, S., Nelson, P.C., Smith, Z.M. and Young, E.D. Temporal envelope coding and decoding in the inferior colliculus. Society for Neuroscience, 2008, Washington, DC.

- Bandyopadhyay, S., Shamma, S.A. and Kanold, P.O. Role of subplate neurons in auditory cortical development. Computational and Systems Neuroscience, 2008, Salt Lake City, UT.

- Bandyopadhyay, S. and Young, E.D. Extraction of temporal envelope information from spike times. Association for Research in Otolaryngology, 2008, Phoenix, AZ.

- Young, E.D., Bandyopadhyay, S. and Reiss, L.A.J. Spectral edges as optimal stimuli for the dorsal cochlear nucleus. International Symposium on Hearing, 2006, Oldenburg, Germany.

- Bandyopadhyay, S. and Young E.D. Temporal processing models of neurons in the dorsal cochlear nucleus. Association for Research in Otolaryngology, 2006, Baltimore, MD.

- Khan, S., Bandyopadhyay, S., Ganguly, A.R. Computing mutual information based nonlinear dependence among noisy and finite geophysical time series. American Geophysical Union, Fall Meeting, 2005, San Francisco, CA.

- Ganguly, A. R., Khan, S., Erickson III, D. J., Katz, R. W., Ostrouchov, G., Protopopescu, V. A., Bandyopadhyay, S., and Saigal, S. Multivariate dependence in complex systems. 5th Understanding Complex Systems Symposium, University of Illinois at Urbana Champagne, 2005.

- Bandyopadhyay, S. and Young E.D. Finding optimal acoustic features. Society for Neuroscience, 2005, DC.

- Bandyopadhyay, S. and Young E.D. Spectral information fields of DCN principal neurons and their optimal spectral features. Computational and Systems Neuroscience, 2005, Salt Lake City, UT.

- Bandyopadhyay, S. and Young E.D. Nonlinear spectral processing models of neurons in the cochlear nucleus. Association for Research in Otolaryngology, 2005, New Orleans, FL.

- Young, E.D., Heinz, M.G., Bandyopadhyay, S., Ji, T., and Bruce, I. What about the consonants? Association for Research in Otolaryngology, 2004. Daytona Beach, FL.

- Bandyopadhyay, S. and Young E.D. Information theoretic measures for discrimination of stop consonants. International Hearing Aid Conference, 2002, Lake Tahoe, CA.

- Kanjilal, P.P., Bandyopadhyay, S. and Bhattacharya, J. An analysis of the periodicity attributes of the photoplethysmograph signal to assess the cardiovascular state. International Conference on Complex Systems, 2000, Nashua, NH.

Invited Talks:

- School of Medical Science and Technology, IIT Kharagpur, July 2012
- IBRO Inter-Regional School on Computational and Theoretical Neuroscience, Hyderabad, India, December 2012
- Maharaja Sayajirao University, Baroda, India, 2012
- University of Hyderabad, DST SERB School of Neuroscience, Hyderabad, India, December 2013
- Hungarian Academy of Science, Institute for Experimental Medicine, February, 2014
- IEEE Signal Processing Society, Student Branch, IIT Kharagpur, 2015
- Molecular and Cellular Cognition Society, Asia, Singapore, 2017
- International Workshop on Science of Intelligence, IIT Jodhpur, January 2020
- Workshop on "Artificial Intelligence in Medicine", JIPMER, Puducherry, India, March, 2022
- European Molecular Biology Organization, JNCASR, Bangalore, October, 2022

- Workshop on "Advances in Brain and Cognition Research", RKMVERI, Belur, India, January, 2023
- National Symposium on "Physiology to Pathology: Finding the Therapeutic Roadmap", AIBNK, Kolkata, India February, 2023

PREVIOUS RESEARCH EXPERIENCE

Post-Doctoral Research:

- Worked on *in vivo* two-photon Ca^{2+} imaging and single unit recording from developing anesthetized/awake mouse auditory cortex aimed at studying organization and developmental plasticity in the auditory cortex. Based on experimental results, worked on a network model for auditory cortical development.
- Worked on deciphering mechanisms of top down control by orbito-frontal cortex in mediating plasticity in neuronal receptive fields in the mouse auditory cortex, using electrical micro-stimulation and imaging tools.
- In-vitro two-photon uncaging of caged glutamate with simultaneous Ca^{2+} imaging to map cortical micro-circuitry and its changes with development.

Doctoral Research*:*

Doctoral Thesis Title: *Spectral and temporal processing in the dorsal cochlear nucleus*
Advisor: Dr. E.D. Young

- Characterized spectral processing by principal neurons in the dorsal cochlear nucleus (DCN) of the cat through nonlinear models. Data obtained through single unit spike train recordings in the decerebrate cat.
- Worked on spectral feature selectivity in the DCN through online spectral shape optimization experiments.
- Characterized temporal envelope processing by DCN principal neurons through adaptive (discharge history dependent) linear models.

Masters Research*:*

Masters Thesis Title: *Discrimination of stop consonants in the cat auditory nerve*
Advisor: Dr. E.D.Young

- Using information theoretic methods, analyzed discrimination of a continuum of voiced stop consonants at different time scales based on responses of auditory nerve fibers.

Collaborative Research Work*:*

- Worked on quantifying nonlinear dependence, using information theory, in noisy and finite geophysical time series. Work was done with collaborators at Oakridge National Laboratory.
- Worked on quantifying nonlinear temporal feature selectivity using information theoretic techniques (information bottleneck and spike distance metrics) in the inferior colliculus neurons of the awake marmoset. Work done in collaboration with Dr. PC Nelson and Dr. ED Young at Johns Hopkins University.

Undergraduate Research*:*

- Nonlinear dynamical analysis relating to detection of determinism in periodicity attributes of human blood pressure signals.

TEACHING EXPERIENCE

- NPTEL course *Cognition and its Computation* (July 2022 – current) with Prof. R. Guha (IIT Kharagpur)
- Primary teaching duties for *Digital Signal Processing* course for BTech 3rd year undergraduate students of E&ECE at IIT Kharagpur, Spring 2021-current
- Shared (40%) teaching duties for *Neurochemistry* course for BTech and MSc/MTech and PhD students of Biosciences, Biotechnology and other Depts at IIT Kharagpur, Autumn 2019 - current

- Primary teaching duties for *Neuronal Coding of Sensory Information* course for MTech, PhD and senior undergraduate students at IIT Kharagpur, Spring 2017-current
- Primary teaching duties for *Computational Neuroscience* course for MTech, PhD and senior undergraduate students at IIT Kharagpur, Autumn 2015-current
- Primary teaching duties for *Signals and Systems* course for BTech 2nd year undergraduate Electronics students at IIT Kharagpur, Spring 2015-2018
- Shared (50%) teaching duties for *Neurophysiology* course for Final Year BTech Biotechnology students at IIT Kharagpur, Spring 2015, 2016
- Primary teaching duties for *Information Theory and Coding* course for MTech, PhD and senior undergraduate Electronics students at IIT Kharagpur, Autumn 2014, 2015, 2018
- Partial teaching duties for *Bioscience* course for 2nd year BTech students at IIT Kharagpur, Autumn and Spring 2014-15.
- Teaching assistant for *Models of Physiological Processes in the Neuron* for undergraduate and graduate students Johns Hopkins University, Fall 2003. Professor: Eric D. Young.
- *Biomedical Signals and Systems* for undergraduate and graduate students Johns Hopkins University, Spring 2004. Professor: Mike Miller and Leslie Tung.
- Teaching assistant for *Physiological Foundations Laboratory Course* 1999-2001. Professor: Dan Berkowitz.

PROFESSIONAL ACTIVITIES

Reviewer of research articles for:

- Autism Research
- Brain Structure and Function
- Frontiers in Neuroscience
- Hearing Research
- IEEE
- Journal of Computational Neuroscience
- Journal of Neurophysiology
- Journal of Neuroscience
- Nature Scientific Reports
- Neural Computation
- Neurobiology of Learning and Memory

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HONORS & AWARDS

- Wellcome Trust DBT India Alliance Intermediate Fellowship, 2012-2017.
- Ramanujan Fellowship awarded from DST Government of India (2011), *surrendered* for Wellcome Trust DBT India Alliance Intermediate Fellowship
- Ramalingaswami Fellowship awarded from DBT Government of India (2012), *surrendered* for Wellcome Trust DBT India Alliance Intermediate Fellowship
- Johns Hopkins University Fellowship, 2001- 2005 (PhD Program)
- Johns Hopkins University Fellowship, 1999 – 2001 (MS Program)

- Student Scholarship in International Hearing Aid Conference 2000 & 2002, Lake Tahoe, CA.
- Encouragement Award from Jagadish Bose National Science Talent Search, 1996. (India)
- National Level Award from Indian Association of Physics Teachers, 1995.
- National Talent Scholarship (Science), Government of India 1993-99.
- Secured an All India Rank of 162 in the Indian Institute of Technology Joint Entrance Examination 1995.
- Secured 7th rank in West Bengal Higher Secondary Board Examinations, 1995.