

Dr. Sudhakar Mishra

Assistant Professor
Department of Artificial Intelligence
SVNIT, Surat, 395007



I study how computers and brains can communicate with each other, and how we can read brain signals to understand what people are thinking and feeling. My main tools are devices that measure brain activity—like EEG and MEG machines that pick up electrical signals directly from the brain. I take these brain signals and process them using computer algorithms and artificial intelligence to find patterns that tell us something meaningful about a person's mind. What I care about most is making sure that the systems I build actually work well for the people who use them—they should be easy to understand, pleasant to use, and genuinely helpful. I'm particularly interested in creating an emotionally intelligent autonomous technologies which can help people manage their emotions better and monitoring their psychological well-being.

EDUCATION

Ph.D. IT

Affective Neuroscience — Spatiotemporal Dynamics of Emotions

Indian Institute of Information Technology, Allahabad

Prayagraj, IN

Supervisor: Prof. Uma Shanker Tiwary

Co-Supervisor: Prof. Narayanan Srinivasan, (Head) Dept. Cognitive Science, IIT-Kanpur

Dissertation: Spatiotemporal Dynamics of Emotional Experience on Indian Samples with Film Stimuli

The objective of the thesis is to understand the brain's dynamics of context-situated emotional events on Indian population. In this work a naturalistic affective stimuli dataset was developed to stimulate emotional activity in the lab environment. We also developed the Emotional Event Marker Paradigm (EEMP) to record emotional events while subjects are watching videos. Further spatiotemporal dynamics is evaluated using functional and effective connectivity, machine learning, deep learning, microstate and multifractal analysis. We found importance of the upper beta band in capturing the spatiotemporal dynamics of different emotional experiences.

M.Tech. Information Technology — Human Computer Interaction

Indian Institute of Information Technology, Allahabad

Prayagraj, IN

Supervisor: Prof. Uma Shanker Tiwary

Thesis: Heart Rate Measurement Using Video in Different User States

Using the principle of "Ballistocardiography", I worked on a non-invasive method to measure pulse rate and heart rate variability. Ballistocardiography depicts rhythmic motion in the human head against blood flow due to the ballistic force. A video of the human head was recorded, and feature points using Lucas–Kanade point tracker were tracked. The trajectories of feature points were decomposed into elementary components to find out the component that best described the pulse frequency.

B.Tech. Computer Science & Engineering

Shri Ram Insitute of Technology, Jabalpur

Jabalpur, IN

During my Bachelor's in Computer Science I liked programming particularly C, C++ and python. I also had keen interest in data structure, algorithms, computer networking, computer architecture, theory of computing and operating systems.

RESEARCH EXPERIENCE

PostDoctoral Fellow

November 2023 – October 2025

Department of Cognitive Science, IIT-Kanpur, Kanpur, IN

Project Supervisors: Prof. Marieke Van Vaught (University of Groningen, 9712 CP Groningen, Netherlands)
Prof. Narayanan Srinivasan (Indian Institute of Technology Kanpur, India)

To examine how learning monastic debate for novices changes electrophysiological indicators and brain activity of meditative absorption

To examine how training in monastic debate helps to optimize emotion regulation

To develop a novel task grounded in the debate tradition to assess logic and memory.

Developing affective computing system.

Designing an fMRI experiment

Performing two EEG replication studies on visual attention and perception

Developing a computational modeling framework of Emotions

Project Research Associate

January 2023 – September 2023

Department of Cognitive Science, IIT-Kanpur, Kanpur, IN

Project Supervisors: Prof. Marieke Van Vaught and Prof. Narayanan Srinivasan

I did the analysis on resting state fMRI data, collected during my last employment, using freesurfer, AFNI and SPM. In the analysis, I compared SNR, TSNR and derived statistical parameters of gray matter and regions specific to Posterior Cingulate Cortex and Pre-cuneus at different flip angles. I also compared the change in functional connectivity patterns at different flip angles.

I also continued the EEG based replication studies work. I have performed time synchronization test to measure the time-lag in stimulus presentation. I have recorded the EEG data on 90 participants. I have also written the analysis codes in Matlab to analyse the data. To understand the effect of spontaneous attention we calculated correlation between pre-stimulus phase and global field potential.

Project Research Associate

Aug 2022 – October 2022

Department of Cognitive Science, IIT-Kanpur, Kanpur, IN

Project Supervisors: Prof. Narayanan Srinivasan

In this role, I collected resting state fMRI data. The research aimed to understand whether the activity during the resting state is related to default mode activity or merely activity due to peripheral physiology, for instance, cardiac activity, respiration and so on. For this, resting state activity at different flip angles is recorded, and the data is being analyzed.

I was also assigned to work in two EEG based multilab replication studies. In this multilab study work, multiple labs around the globe collaborated to replicate prominent findings. In these work we were trying to understand brain oscillatory activity during spontaneous attention. During this time I have mostly worked on writing the program for performing the experiment.

TEACHING EXPERIENCE

Assistant Professor at SVNIT, Surat

Oct 14, 2025 - present

Sardar Vallabhbhai National Institute of Technology, Surat

Kanpur, IN

- Fundamentals of Computer Programming
- Computer Organization Architecture

Teaching Assistance

Aug 2014 – Dec 2020

Indian Institute of Information Technology, Allahabad

Prayagraj, IN

- Cognition and Cognitive Process Modeling
- Image and Vision Processing

- Basics of EEG: Taught EEG Preprocessing, ERP Analysis, Connectivity Analysis, Independent Component Analysis, EEG Experiments

RESEARCH CERTIFICATION COURSES

Short-Term Course on Modeling Cerebral Cortex and Plasticity 07.08.2016-16.08.2016

Instructor-1: Prof Mriganka Sur, MIT, Cambridge, MA 02139, United States

Instructor-2: Prof Srinivasa Chakravarthy, IIT-Madras, Madras, India

Instructor-3: Dr Deepanjan Roy, CBCS, Allahabad University, India

Instructor-4: Dr. Harish Karnik, IIT-Kanpur, Kanpur, India

In this course, I learnt about the fundamentals of functions and development of cerebral cortex. In addition, application of tools and techniques in the field of computational neuroscience, computational models of cortex processing and application of deep learning in neuroscience.

Short-Term Course on Complex Networks: Structure and Nonlinear Dynamics 12.09.2016-16.09.2016

Instructor: Dr. Jesus Gomez Gardenes, University of Zaragoza, Spain

In this course, I learnt about the Network Metrics and Measures in Real Networks, Network models, Simple Diffusion Processes and Random Walks in Networks and Multiplex Networks, Epidemic Spreading in Networks, Epidemic Spreading in Metapopulations, Synchronization in Complex and Multiplex Networks and some case studies and assignments.

Short-Term Course on Advances in Neuro-technologies for Building the Brain-Machine Interfaces

25.02.2017-01.03.2017

Instructor: Prof. Nitish V Thakor, JHU, Baltimore, MD 21218, United States

In this course, I learnt about frontiers of neuro-engineering, brain-machine interface, introduction of cochlear and retinal prosthesis, sensory-motor functions and embedded technologies for biomedical applications.

A workshop on Cognitive Neuroimaging using fMRI

24.02.2020-29.02.2020

Instructor: Dr. Shrikanth Padmala, Indian Institute of Science Bengaluru, Bengaluru, India

In this course, I learnt about tools like AFNI, Freesurfer and SPM. We took a simple steady-state visual-evoked potential (SSVEP) paradigm in the workshop to do hands-on practice.

ONLINE COURSE CERTIFICATION

Building Basic Generative Adversarial Networks (GANs)

21.11.2021

Instructor-1: Dr. Sharon Zhou, Stanford University, CA 94305, United States

In this course, I learned about GANs and their applications, developed the intuition behind the fundamental components of GANs. In addition, I explored and implemented multiple GAN architectures.

Build Better Generative Adversarial Networks (GANs)

21.11.2021

Instructor: Dr. Sharon Zhou, Stanford University, CA 94305, United States

In this course, I assessed the challenges of evaluating GANs and compare different generative models. I learned to use the Fréchet Inception Distance (FID) method to evaluate the fidelity and diversity of GANs. I also learned to identify sources of bias and the ways to detect it in GANs

Apply Generative Adversarial Networks (GANs)

21.11.2021

Instructor: Dr. Sharon Zhou, Stanford University, CA 94305, United States

I explored the applications of GANs and examine them wrt data augmentation, privacy, and anonymity. In addition, I learnt to leverage the image-to-image translation framework and identify applications to modalities beyond images. I also implemented Pix2Pix, a paired image-to-image translation GAN, to adapt satellite images into map routes (and vice versa).

TALKS

Training Program on Computational Techniques for AI and Data Science Applications Center for Artificial Intelligence, Banasthali Vidyapith, Rajasthan, India	July 2023 Prayagraj, IN
· Keynote Address on Deep Sequential Modeling of Emotions	
Workshop on Computational Cognitive Science - 2018 Indian Institute of Information Technology Allahabad	Oct 2018 Prayagraj, IN
· Topic : Brain Waves to Cognition	
Faculty Development Program Banasthali University, Jaipur	Jan 2019 Jaipur, IN
· Topic: Spatiotemporal Analysis of Emotional EEG Signals	

GRANTS AND PROPOSALS

- During my PhD, I and my supervisor were applied for the grant and granted institutional funds to buy a 128 channel EEG machine and built a lab infrastructure. (March-2018)
- I and my supervisor wrote proposal to the Government for the "Center of Cognitive Computing" which is now functioning in IIIT-Allahabad. (Jan-2017)

PROFESSIONAL MEMBERSHIPS

- Cognitive Science Society
- Society for Neuroscience

PUBLICATIONS

Peer-Reviewed Journal Papers

- [J1] Sudhakar Mishra, Narayanan Srinivasan, Mohd Asif, and Uma S Tiwary. "Affective Film Dataset from India (AFDI): Creation and Validation with an Indian Sample". In: *Journal of Cultural Cognitive Science* (October 2023). DOI: 10.17605/OSF.IO/M8DWZ [↗](#).
- [J2] Mohammad Asif, Sudhakar Mishra, Majithia Tejas Vinodbhai, and Uma Shanker Tiwary. "Emotion Recognition Using Temporally Localized Emotional Events in EEG With Naturalistic Context: DENS Dataset". In: *IEEE Access* 11 (2023), pp. 39913–39925. DOI: 10.1109/ACCESS.2023.3266804 [↗](#).
- [J3] Sudhakar Mishra, Narayanan Srinivasan, and Uma Shanker Tiwary. "Cardiac–Brain Dynamics Depend on Context Familiarity and Their Interaction Predicts Experience of Emotional Arousal". In: *Brain Sciences* 12.6 (2022), p. 702. DOI: <https://doi.org/10.3390/brainsci12060702> [↗](#).
- [J4] Sudhakar Mishra, Narayanan Srinivasan, and Uma Shanker Tiwary. "Dynamic functional connectivity of emotion processing in beta band with naturalistic emotion stimuli". In: *Brain sciences* 12.8 (2022), p. 1106. DOI: <https://doi.org/10.3390/brainsci12081106> [↗](#).

Peer-Reviewed Conference Proceedings

- [C1] Sudhakar Mishra, Narayanan Srinivasan, and Uma Shanker Tiwary. "A high-dimensional semantic space of emotion representations support circumplex structure". In: *Proceedings of the Annual Meeting of the Cognitive Science Society*. Vol. 46. 2024.

- [C2] Mohammad Asif, Sudhakar Mishra, Jerald Kannath, Tarun Jayadevan, Divakar Singh, Gauttam Goyal, Aalok Bhuyar, and Uma Shanker Tiwary. "Cross Cultural Comparison of Emotional Functional Networks". In: *Intelligent Human Computer Interaction*. Cham: Springer Nature Switzerland, 2024, pp. 106–114. ISBN: 978-3-031-53827-8.
- [C3] Mohammad Asif, Aditya Gupta, Aditya Aditya, Sudhakar Mishra, and Uma Shanker Tiwary. "Brain Multi-Region Information Fusion using Attentional Tranformer for EEG Based Affective Computing". In: *IEEE Indicon* (2023).
- [C4] Sudhakar Mishra, Narayanan Srinivasan, and Uma Shanker Tiwary. "Context-sensitive interaction dominant brain dynamics during emotional experiences in upper beta band". In: *Society for Neuroscience*, 558.19 2022.
- [C5] Vinodbhai M.T., Sudhakar Mishra, Asif Mohammad, and Uma Shanker Tiwary. "Emotion Recognition in VAD space during Emotional Events using CNN-GRU hybrid model on EEG Signals". In: *2022 14th international conference in the Human-Computer Interaction (IHCI)*. Springer LNCS, 2022.
- [C6] Brijraj Singh, Sudhakar Mishra, and Uma Shanker Tiwary. "EEG based biometric identification with reduced number of channels". In: *2015 17th International Conference on Advanced Communication Technology (ICACT)*. IEEE. 2015, pp. 687–691.
- [C7] Sudhakar Mishra and Uma Shanker Tiwary. "Heart rate measurement using video in different user states for online HCI applications". In: *Procedia Computer Science* 39 (2014), pp. 20–27.

Works Submitted (Under Review)

- [UR1] Mohammad Asif, Sudhakar Mishra, Noman Ali, and Uma Shanker Tiwary. "Deep fuzzy framework for emotion recognition using eeg signals and emotion representation in type-2 fuzzy vad space". In: *IEEE Transactions on Affective Computing* (2025).
- [UR2] Sudhakar Mishra, Asif Mohammad, Narayanan Srinivasan, and Uma Shanker Tiwary. "Microstate Transitions Encode Emotional Events". In: *Cognitive Neurodynamics* (2025). DOI: <https://arxiv.org/abs/2210.08588>.
- [UR3] Sudhakar Mishra, Asif Mohammad, Narayanan Srinivasan, and Uma Shanker Tiwary. "Dataset on Emotion with Naturalistic Stimuli (DENS) on Indian Samples". In: *Nature Scientific Data* (2025).
- [UR4] Sudhakar Mishra, Marieke Van Vught, and Narayanan Srinivasan. "Effect of Contemplative Debate Practice (from Gelug Tradition) on Emotion Regulation and Experience". In: *Mindfulness* (2025).
- [UR5] Sudhakar Mishra Ankita Rani Amrendra Singh. "Validation of Neuphony 8-channel EEG flex cap: A comparative study with Biosemi 64-channel EEG system". In: *Frontiers in Human Neuroscience* (2025).

Dataset Created

- [DT1] Sudhakar Mishra, Narayanan Srinivasan, Mohd Asif, and Uma S Tiwary. "Affective Film Dataset from India (AFDI): Creation and Validation with an Indian Sample". In: ().
- [DT2] Sudhakar Mishra, Asif Mohammad, Narayanan Srinivasan, and Uma Shanker Tiwary. *Dataset on Emotion with Naturalistic Stimuli (DENS) on Indian Samples*.
- [DT3] Sudhakar Mishra, Narayanan Srinivasan, and Uma Shanker Tiwary. *An Affective Video Database using Multimedia Content Analysis rated on Indian samples*. 2022. arXiv: 2210.09785 [eess.IV] [↗](#).

Work in Progress

- [W1] Manuela Ruzzoli, Mireia Torralba Cuello, Nicola Molinaro, Sudhakar Mishra, Narayanan Srinivasan, Christopher S.Y. Benwell, Daniel Berkowitz, and Debora Brignani. *To see, not to see or when to see: An EEGManyLabs replication study with a twist*. 2025.
- [W2] Sudhakar Mishra, Ramya Mudumba, Alessia Santoni, Andreas Wutz, Christoph Huber-Huber, Luca Ronconi, F. Mushtaq, Pavlov Y.G., and N Srinivasan. *Spontaneous EEG oscillations reveal periodic sampling of visual attention: A EEGManyLabs replication study*. 2025.

Work Presented (Unpublished)

- [UP1] Sudhakar Mishra, Narayanan Srinivasan, and Marieke Van Vugt. "Effect of Contemplative Debate Practice (from Gelug Tradition) on Emotion Regulation and Experience". In: *Annual Conference of Cognitive Science*. Vol. 12. 2024.
- [UP2] Sudhakar Mishra, Van Vught Marieke, and Narayanan Srinivasan. "The effect of Tibetan Monastic Debate on Emotion Regulation". In: *International Society for Contemplative Research*. 2024.
- [UP3] Sudhakar Mishra, Uma Shanker Tiwary, and Narayanan Srinivasan. "Context-sensitive interaction dominant brain dynamics during emotional experiences in upper beta band". In: *Society for Neuroscience*. 2022.

AWARDS & WELL-DONE

- Secured international travel grant in 2024 from Anusandhan National Research Foundation (ANRF), SERB, India to present my work in the 46th Annual Meeting of the Cognitive Science Society, Netherlands.
- Best paper award in International conference on Intelligent Human Computer Interaction took place in Evry, France (2014) for the paper "Heart Rate Measurement Using Video in Different User States for On-line HCI Applications"
- Received MHRD scholarship during PhD (2014-2019).
- Received MHRD scholarship during M.Tech (2011-2013).

MISCELLANEOUS EXPERIENCE

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| Core Organizing Member | IHCI-2019, IIITA |
| Worked as a core member of organizing committee in 11 th International Conference on Intelligent Human Computer Interaction (IHCI) conducted during 12-14 December 2019. | |
| Core Organizing Member | IHCI-2018, IIITA |
| Worked as a core member of organizing committee in 10 th International Conference on Intelligent Human Computer Interaction (IHCI) conducted during 07-09 December 2018. | |
| Secretary | 2016-17, IEEE-Student Branch, IIIT-A |
| Worked in the capacity of a secretary in IEEE student branch at IIITA to fulfilling the responsibilities such as arranging the general and technical meetings, keeping formal records of the group's process and decisions, the minutes of the meetings, correspondence to the publishing committee. | |
| Chairperson, IEEE-Signal Processing Society | 2016-17, IEEE-Student Branch, IIIT-A |
| As a chairperson of Signal Processing Society, I with my colleagues organized one conference, two workshops and two technical talks. | |
| Host and Core Organizing Committee | GIAN Course - 2016, IIITA |
| Hosted GIAN short term course on Modeling Cerebral Cortex and Plasticity organized in IIIT-Allahabad during Sep 8-16 2016. The course was taken by Prof Mriganka Sur from Massachusetts Institute of Technology, USA. | |

TECHNICAL STRENGTHS & QUALIFICATIONS

Programming Languages	Python, R, Matlab, Bash Shell
SCM tools	Git
Operating Systems	 Linux,  Windows
Tools	EEGLab, AFNI, Freesurfer, SPM

LANGUAGES

· Hindi (<i>Native</i>)	English (<i>Fluent</i>)	Sanskrit (<i>Beginner</i>)
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REFERENCES

· Prof. Narayanan Srinivasan (<i>IIT-K</i>)	nsrini@iitk.ac.in ↗
· Prof. Uma Shanker Tiwary (<i>IIIT-A</i>)	ust@iiita.ac.in ↗
· Dr. Marieke Van Vugt (<i>University of Groningen, Netherlands</i>)	m.k.van.vugt@rug.nl ↗
· Dr. Amrendra Singh (<i>University of Allahabad, Prayagraj</i>)	amrendra.singh@cbcs.ac.in ↗
· Dr. Devpriya Kumar (<i>IIT-K</i>)	devpriya@iitk.ac.in ↗

INTERESTS

· Driving	· Meditation
· Running	