SANKET HOUDE

Pune, Maharashtra, India
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EDUCATION

Indian Institute of Science Education and Research , Bhopal *August 2018 - May 2023*
BS - MS (Biological Sciences)
CPI - 8.77 / 10

SKILLS

Programming Languages	Python, MATLAB(PsychToolbox, EEGLAB), R
Experimental Techniques	Behavioural Psychophysics, Eyetracking, TMS
Electrophysiology	EEG (19, 32 and 64 channels), Electrogastrogram (EGG)
Data Analysis	EEG & EGG signal processing, Statistical modelling
Computational modelling	Machine Learning, Reinforcement Learning (multi and single agent)
Software & Tools	LaTeX, Microsoft Office suite
Language Proficiency	English, Hindi, Marathi, Kannada
Soft Skills	Analytical Thinking, Teamwork & Collaboration, Scientific communication

RESEARCH EXPERIENCE

Research Assistantship *September 2023 - Present*
Translational Neuroscience and Technology Lab
Department of Cognitive Science, Indian Institute of Technology (IIT) Kanpur
PI : Dr. Pragathi Priyadarshini Balasubramani

Project 1 (Completed) : Analyzing simultaneous *electroencephalogram (EEG) and electrogastrogram (EGG)* data collected on Parkinsonian patients with levodopa-induced dyskinesia. Developed *machine learning and statistical models* to establish the importance of brain-gut coupling as a biomarker for Parkinson's disease.
This project has culminated in a conference presentation and a research publication which is under consideration.
Project 2 (Completed) : Collecting *simultaneous EEG-TMS* data in depression patients for testing the change in efficacy of a FDA approved TMS treatment while participants are engaged in cognitive tasks.
This project has culminated in a published conference paper.
Project 3 (Completed) : Developing a multi-agent Reinforcement learning framework to understand the mechanisms underpinning social conformity in decision making using a two person Iowa Gambling Task.
This project has culminated in an accepted conference paper.
Project 4 (Ongoing) : Developing *multi-agent RL-based computational models* to understand the role of brain gut coupling in Parkinsonian patients
Acquired Skills : EEG & EGG signal processing, simultaneous EEG & TMS data acquisition, Statistical modelling, Machine Learning, multi-agent Reinforcement learning

Master's Project *May 2022 - April 2023*
The Cognition, Computation and Behavior Lab
Centre for Neuroscience, Indian Institute of Science (IISc) Bangalore
PI : Dr. Sridharan Devarajan

Project: Responsible for the design and execution of a psychophysics experiment that also incorporated eyetracking to elucidate the mechanisms of contrast and response gain in human volunteers.
Acquired Skills : Experiment design (PsychToolbox), Eyetracking data analysis, Behavioural data analysis

RESEARCH PUBLICATIONS

1. **Sanket Houde**, Mansimran Kaur, Hari Prakash Tiwari, Nandini Priyanka B, Rathore BP, Pragathi P. Balasubramani, *Utility of gut-brain electrophysiological coupling in predicting L-Dopa induced dyskinesia in Parkinson's Disease* (Under consideration in **Nature Scientific Reports**)
2. Sricharan Sunder, **Sanket Houde**, Kruttika Bhat, Devarajan Sridharan, *A Bayesian account of contrast and response gain* (Under consideration in **Nature Human Behaviour**)

CONFERENCE PROCEEDINGS

1. Chirayush Mohanty*, Priya Gole*, **Sanket Houde**, Aadya Umrao, Pragathi Priyadharsini Balasubramani *Investigating the mechanisms underpinning behavioral resilience using an extended Multi-agent Reinforcement learning model that unifies risk, resource and social conformity based decision making in a single framework*
Accepted for the **CNS*2025 conference** at Florence, Italy
2. **Sanket Houde**, Mansimran Kaur, Hari Prakash Tiwari, Nandini Priyanka B, Rathore BP, Pragathi P. Balasubramani, *Utility of gut-brain electrophysiological coupling in predicting L-Dopa induced dyskinesia in Parkinson's Disease*
Accepted and presented at the **11th edition of Annual Conference of Cognitive Sciences, ACCS 2024**
3. Pranjul Verma, **Sanket Houde**, Hari Prakash Tiwari, Jyoti Mishra, Dhakshin Ramanathan, Nandini Priyanka Balasubramani, Alok Bajpai and Pragathi Priyadharsini Balasubramani. *'Towards building cognitive brain computer interfaces for controlling neural variability during repetitive transcranial magnetic stimulation treatment in Depression'*, **2024 International Conference on Brain Computer Interface & Healthcare Technologies (iCon-BCIHT)**

WORKSHOPS ATTENDED/CONDUCTED

Organizer and Presenter

- **Presented signal processing techniques and feature extraction** from biosensor time series data (EEG and EGG) at the 10th & 11th editions of Annual Conference of Cognitive Science (ACCS) at IIT Kanpur & IIT Bombay respectively, a premier event for cognitive science researchers in India.
- **Developed custom MATLAB applets** for participants, facilitating hands-on learning and the application of advanced techniques.
- Link to the workshop : https://sites.google.com/view/oscillator-workshop-accs/

Participant

- Attended the 17-day Computational Approaches to Memory and Plasticity (CAMP) workshop at IISER Pune, **focusing on mathematical and computational tools for neuroscience**.
- Collaborated on and presented **two computational neuroscience projects**, demonstrating proficiency in problem solving and adapting to advanced analytical methodologies.

HIGHLIGHTED CODING PROJECTS

Classifying Factual Articles and Opinion Pieces

- Developed a **web scraper** using the BeautifulSoup package in Python to create a database of factual articles and opinion pieces. .
- Performed **feature engineering** using Part-of-Speech tagging using the NLTK package.
- Developed and trained **machine learning classification models** using the engineered linguistic features from UK articles and validated them on Indian newspaper dataset, achieving a **validation accuracy of 83%**, showcasing expertise in cross-domain model generalization.

Generating Molecules for Psoriasis Treatment

- Collated datasets and developed **machine learning classification models** for solubility, biotoxicity and bioactivity of molecules with **validation accuracies of 87%, 91% and 84% respectively**.
- **Modified the architecture of a Generative Adversarial Network (GAN)** to generate molecules active against the target receptor. The previously developed ML models were used to shortlist **3 novel candidates for potential drug development** which were water-soluble, non-toxic and bioactive.

Sentiment analysis of the Karnataka 2023 Vidhan Sabha elections

- **Created a database of election-related tweets** despite the discontinuation of the Twitter API.
- Performed **sentiment analysis** and developed **data visualizations** using Python, illustrating insights into public opinion and electoral trends.

RELEVANT UNDERGRADUATE COURSEWORK

Biology
Systems Biology, Neurobiology

Mathematics
Linear Algebra, Calculus, Bayesian statistics (audited)

Data Science
Scientific Applications of AI/ML, Computational Linguistics, Data Science & ML, ML for Biopharma

Cognitive Science
Computational Cognitive Science (audited), Intro to Psychophysics (audited)