AFTAB ANWAR

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linkedin-profile

OBJECTIVE

I am enthusiastic about pursuing research at the intersection of computational neuroscience and brain-machine interfacing, with a strong interest in understanding how neural population dynamics support motor adaptation and learning. My academic training in Physics, Electronics, and Computational Neuroscience has equipped me with a solid foundation in dynamical modeling, signal processing, EEG analysis, and machine learning for brain data.

EXPERIENCE

- **Junior Research Fellow** *August 2024 – March 2025*
  Indian Institute of Technology Jodhpur [🌐] Jodhpur, India

  Project Name: Development of an oscillator network model of the brain that will enable hypothesis-driven perturbation response experiments for early detection of neurodegenerative disorders.
  My Role: Implementation of a TMS (Transcranial Magnetic Stimulation) model into the Wilson-Cowan neural population framework to investigate how external perturbations influence cortical dynamics and network-level activity patterns. Processing connectomes from diffusion-weighted images.

  - Modeled large-scale brain networks using the Wilson-Cowan framework.
  - Simulated brain perturbations by integrating Transcranial Magnetic Stimulation (TMS) into network models to study perturbation response behavior.
  - Hands-on experience with EEG and TMS, including preprocessing, analysis, and interpretation of neural signals in computational frameworks.
  - Processed and analyzed diffusion-weighted imaging (DWI) data for generating structural connectomes used in whole brain simulations.
  - Gained hands-on experience with advanced neuroimaging tools like MRtrix3 and FSL for structural connectivity analysis.

- **Research Intern** *June – July 2023*
  Indian Institute of Technology (BHU) [🌐] Varanasi, India
  - Made a biosensor using CMOS Sensor.
  - Gained hands-on experience with a variety of laboratory equipment, cultivating practical skills in experimental techniques.
  - Contributed to ongoing research efforts, applying theoretical knowledge to real-world problems.

- **Workshop Participant** *July 2023*
  Indian Institute of Technology Hyderabad [🌐] Hyderabad, India
  - Participated in a workshop on Mathematical Modeling in Biophysics and Simulation at IIT Hyderabad.
  - Gained insights into using mathematical approaches to analyze biological systems.
  - Acquired practical experience in simulation techniques relevant to interdisciplinary neuroscience research.
  - Enhanced problem-solving abilities through applied modeling exercises.

EDUCATION

- **Post Graduation** *2022 - 2024*
  From Jamia Millia Islamia[🌐] New Delhi, India
  - Course: MSc (Electronics)
  - CGPA: 8.18/10.00, First Division with Distinction

- **Graduation** *2018 - 2021*
  From Jamia Millia Islamia[🌐] New Delhi, India
  - Course: BSc
  - CGPA: 7.95/10.00, First Division

- **Intermediate** *2016*
  From Uttar Pradesh Madhyamik Shiksha Parishad (UP Board) Chandauli, UP, India
- **High School** *2014*
  From Uttar Pradesh Madhyamik Shiksha Parishad (UP Board) Chandauli, UP, Inda

Projects

- **Master's Degree Project** *January 2024 - May 2024*

  Project Supervisor: Dr. Mukesh Prartap Singh, D/O Applied Sciences and Humanities, Jamia Millia Islamia [👤]

  Project Name: Optogenetic Modulation of Neural Activity in Alzheimer's Disease Using Channelrhodopsin-2 [GitHub]

  Description:
  This project aimed to simulate and analyze the effects of optogenetic stimulation on Alzheimer's-affected neural circuits using the light-sensitive ion channel, Channelrhodopsin-2 (ChR2). By integrating the ChR2 model into a Hodgkin-Huxley-based neuron model, we investigated how targeted light pulses could modulate neural firing patterns disrupted by Alzheimer's pathology. The study explored the restoration of healthy activity through precise optical control, offering insights into potential therapeutic strategies.

  - Successfully modulated neural activity using the Channelrhodopsin-2 (ChR2) ion channel.
  - Demonstrated precise control over neuronal functioning in Alzheimer's Disease using optogenetic techniques.
  - Tools: Python, NEURON, HH model, ChR2 model

- **Master's Minor Project** *June 2023 - July 2023*

  Project Supervisor: Dr. Sanjeev Kumar Mahto, School of Biomedical Engineering, IIT (BHU) [👤]

  Project Name: Optimizing Fabrication Method and Surface Modification of Polyvinyl Acetate-Benzophenone Emission Filters for Complementary Metal-Oxide-Semiconductor Imager Chips towards Biosensing Applications

  - Conducted a minor project focused on optimizing the fabrication method and surface modification of Polyvinyl Acetate-Benzophenone emission filters for complementary metal-oxide-semiconductor (CMOS) imager chips, aimed at enhancing biosensing applications.
  - Developed and refined fabrication techniques to improve filter efficiency and performance in biosensing environments.
  - Implemented surface modification strategies to enhance the interaction between the emission filters and target biomolecules, increasing sensitivity and specificity.
  - Analyzed the performance of modified filters in laboratory settings, providing valuable insights for future biosensing applications.

Skills

- **Programming Languages:** Python, ML, MATLAB, VHDL, Basic C++
- **Neuroimaging and Data Analysis Skills:** FSL, MRtrix3, ANTs, FreeSurfer, TVB, Neurolib, Diffusion MRI (DTI tractography), Functional MRI (fMRI) analysis
- **Simulation Skills:** NEURON (NMODL Scripting), AMBERTOOLs, NAMAD, PIV Lab, COMSOL Multiphysics
- **Experimental Skills:** Analog and Digital Circuit Design, PCB Design, Thin-film Fabrication, Nano-fiber Fabrication, Nano-material Fabrication using CVD and Sol-gel Method, Fluorescence Microscopy, Hemocytometer, Ultrasonicator, Rheometer, Microwave Plasma Cleaner, PDMS Device Fabrication, 3D Bio-printing
- **Other Skills:** Mathematical Modeling, Modeling in Soft Matter and Biophysics, Data Analytics, Circuit Design, Signal Processing

Publications

- **Title:** Optimizing Fabrication Method and Surface Modification of Polyvinyl Acetate-Benzophenone Emission Filters for Complementary Metal-Oxide-Semiconductor Imager Chips towards Biosensing Applications
- **Status:** Under communication with the publisher

Achievements

- 2024 GATE Qualified Successfully qualified for the Graduate Aptitude Test in Engineering.
- Class Representative Served as the Class Representative for the BSc class, facilitating communication between faculty and students.
- Faculty Student's Placement Coordinator Coordinated placement activities and opportunities for students, collaborating with faculty and industry representatives.

Extracurricular Activities

Athletics, Singing

Language Spoken

English: ★ ★ ★ ★ ★
Hindi: ★ ★ ★ ★ ★
Urdu: ★ ★ ★ ★ ☆