

AFTAB ANWAR

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 [linkedin-profile](#)

OBJECTIVE

Interdisciplinary Research-Driven professional with expertise in Physics, Electronics, and Computational Neuroscience, specializing in neural modeling, large-scale brain dynamics, and EEG analysis. Skilled in Python-based scientific computing, signal processing, and machine learning. Focused on modeling brain state transitions and their relevance to cognition and mental health, with a strong interest in computational psychiatry and interpretable models of neural dynamics.

EXPERIENCE

• Junior Research Fellow

Indian Institute of Technology Jodhpur 

August 2024 – March 2025

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


Indian Institute of Technology (BHU) 

June – July 2023

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

Indian Institute of Technology Hyderabad 

July 2023

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

From Jamia Millia Islamia 

2022 - 2024

New Delhi, India

- Course: MSc (Electronics)
- CGPA: 8.18/10.00, First Division with Distinction

• Graduation

From Jamia Millia Islamia 

2018 - 2021

New Delhi, India

- Course: BSc
- CGPA: 7.95/10.00, First Division

• Intermediate

From Uttar Pradesh Madhyamik Shiksha Parishad (UP Board)

2016

Chandauli, UP, India

• High School

From Uttar Pradesh Madhyamik Shiksha Parishad (UP Board)

2014

Chandauli, UP, India

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 [🔗]

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 Skills:** Python, ML, MATLAB, VHDL, C++
- **Neuroimaging and Data Analysis Skills:** FSL, MRtrix3, ANTs, FreeSurfer, TVB, Diffusion MRI (DTI tractography), Functional MRI (fMRI) analysis
- **Simulation Skills:** Neurolob, NEURON (NMODL Scripting), AMBERTOOLS, NAMAD, PIV Lab, COMSOL Multiphysics
- **Experimental Skills:** Analog and Digital Circuit Design, Signal Processing, PCB Design, Arduino, Raspberry Pi, 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
- **Mathematical Skills:** Differential equations, linear algebra, probability theory, dynamical systems, control theory, real analysis, and statistical analysis
- **Other Skills:** Mathematical Modeling, Neuronal Modeling, Modeling in Soft Matter and Biophysics, Data Analytics

PUBLICATIONS

- **Title:** Decoding Cognitive Performance from EEG using Energy-Based and Biophysical Models
Authors: Aftab Anwar, Dr. Naveid Zafar Rizvi
DOI: https://doi.org/10.31234/osf.io/8yqxp_v1
- **Title:** Optimizing Fabrication Method and Surface Modification of Polyvinyl Acetate-Benzophenone Emission Filters for Complementary Metal-Oxide-Semiconductor Imager Chips towards Biosensing Applications
Authors: Narayan Yadav, Aftab Anwar, Dr. Sanjeev Kumar Mahato et al.
Status: Under communication with the publisher

ACHIEVEMENTS

- Delivered a talk on “Understanding Connectomes through Neuroimaging” at NeuroTech Society, AIDE, IIT Jodhpur. <https://sites.google.com/iitj.ac.in/neurotechsociety/events>
- 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: ★ ★ ★ ★ ☆