Nivedya S Nambiar

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https://nivedya-nambiar.github.io/nivedyaweb/

Education

2019-2023 **Bachelor of Technology,** Electrical Engineering — 9.39/10.0
Minor in **Healthcare Informatics**
Indian Institute of Technology Bombay

2017-2019 **Higher Secondary School,** CBSE — 98%
Veda Vyasa Vidyalayam

2007 – 2017 **Secondary School,** CBSE — 10.0/10.0
Devagiri CMI Public School

Awards and Achievements

2020 Conferred with **AP Grade** for exceptional performance in MA 106, an Introductory Course on Linear Algebra, Indian Institute of Technology Bombay

2019 Secured **All India Rank of 697** in JEE Advanced conducted by IIT Roorkee leading to admission into undergraduate studies at IIT Bombay

Attained a **percentile of 100 in Mathematics** and a **total percentile of 99.906** in JEE Mains

2017 Achieved **All India Rank 407** in Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship examination (Stream SA) held by Indian Institute of Science, Bangalore

2018 Achieved **All India Rank 1376** in Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship examination (Stream SX) held by Indian Institute of Science, Bangalore

Secured **International Rank 288** in the SOF International Mathematics Olympiad competition

2016 Qualified **State Level** National Talent Search Examination in Kerala State

Research Positions

Since Jun 2023 **Research Assistant, Cognition Lab**.
Guide: Prof. Sridharan Devarajan, Indian Institute of Science Bangalore

- Received training in and completed data acquisition with functional MRI
- Working on task-based working memory decoding from fMRI, including experimental and computational aspects of the project
- Developed artificial neural networks to decode image data from their encoded representation in fMRI activation patterns as part of a separate project on image reconstruction

Internships

May-Jul 2022 **Verification Engineer,** APT Portfolio Limited.
Designed a module specific plugin in C++ for interfacing between C++ and Python

Research Publications

Conference Proceedings

1. K. K. Anmol Biswas Nivedya S Nambiar and U. Ganguly, "Madapter: A multimodal adapter for liquid state machines configures the input layer for the same reservoir to enable vision and speech classification," in *Proceedings of the 2023 International Joint Conference on Neural Networks (IJCNN)*, Gold Coast, Australia, 2023. URL: https://doi.org/10.1109/IJCNN54540.2023.10191376.

Projects

Since Jun 2023 — **Decoding orientation of grating stimulus from fMRI data**
Guide: Prof. Sridharan Devarajan, Indian Institute of Science Bangalore
- Designed behavioural task using the delayed matching-to-sample procedure to decode orientations of presented square gratings from fMRI data
- Acquired behavioural and fMRI data of human participants performing the task and carried out MRI preprocessing using fMRIprep
- Explored analysis methods using support vector machines to decode stimulus orientation from participants' fMRI data in order to develop understanding of working memory representation in the human cortex

Jan-May 2023 — **Neuron Model for Filtering Noisy Speech,** Bachelor's Thesis Project - 2
Guide: Prof. Udayan Ganguly, Indian Institute of Technology Bombay
- Devised spiking neuron model in Python to filter noisy speech for improving speech classification performance at SNR 20dB
- Achieved gating of noisy speech in time domain by modulating neuronal layer activity based on instantaneous signal energy and presence of voice bar detected by other spiking neurons
- Tested gated version of noisy input for speech classification tasks to achieve improvement in accuracy from 57.4% to 70.1%

Aug-Nov 2022 — **Astrocyte Modulated Synaptic Plasticity in LSMs,**
Bachelor's Thesis Project - 1
Guide: Prof. Udayan Ganguly, Indian Institute of Technology Bombay
- Implemented astrocyte-modulated spike timing dependent plasticity rule for liquid state machines proposed by Ivanov et al.
- Introduced modifications to plasticity rule by including a decay in the potentiation rate to achieve an accuracy of 85.81% in speech classification

Mar-May 2023 — **Eye Blink Artifact Detection in EEG,** R&D Project
Guide: Prof. Kshitij Jadhav, Indian Institute of Technology Bombay
- Implemented an unsupervised model to detect presence of eye blink artifacts in raw EEG data

Oct-Nov 2022 — **Multimodal Neurons in LSMs,**
Course Project, Neuromorphic Engineering
Guide: Prof. Udayan Ganguly, Indian Institute of Technology Bombay
- Developed a spiking neural network model in Python to classify MNIST digits using image and speech data in a group of 3
- Trained the liquid reservoir using spike-timing dependent plasticity to combine speech and image data inputs and achieve classification accuracies of the order of 97%

Projects (continued)

Jan-Apr 2022 **Visible Light Communication,**
Course Project, Electronic Design Lab
Guide: Prof. Joseph John, Indian Institute of Technology Bombay
- Engineered a visible light communication module operating with on-off keying as a member in a group of 3
- Designed PCB module on EAGLE and completed assembly of the circuit on printed circuit board
- Tested the communication module for transmission of pseudo random bit sequences at rates up to 700kHz, and distances up to 30cm

Jan-Apr 2021 **Sweat-Based MEMS Glucose Monitor,**
Course Project, Biomedical Microsystems
Dept. of Biosciences and Bioengineering, IIT Bombay
- Reviewed research papers on non-invasive glucose measurement techniques and their working principles
- Prepared blueprint for a sweat-based MEMS (micro electro-mechanical system) glucose monitor including fabrication flowchart, mask layout and proposal for packaging

Additional Courses

Jul 2023 **Computational Neuroscience Summer Course, Neuromatch Academy**.
- Completed an online interactive three-weeks-long course covering computational methods applied in neuroscience research
- Analysed HCP fMRI data to decode experimental condition and investigated involvement of brain areas in different behavioural tasks as part of the course project

Skills

Languages English, Hindi, Malayalam
Coding Python, MATLAB, C++, VHDL, SystemVerilog, Julia, LaTeX, MySQL
Misc. Git, Arduino, Experience with Gazebo and ROS, AutoCAD, SolidWorks

Extracurriculars

2014-15 Member of Scientia, Students' Science Club at the Regional Science Centre and Planetarium Calicut

2016 Achieved Certificate of Merit in the Grade 5 examination for Piano conducted by Trinity College London

2018 Stood first in Calicut District Finals of Infinitum, the annual Mathematics Quiz for high-schoolers conducted by Club Mathematica, National Institute of Technology, Calicut

2015 Won Third Place in Western Music group competition at the CBSE Kalotsav organized by the Sahodaya Schools Complex Malabar Region