SHIVAM CHAUDHARY

+1 (341) 333 8375 ◇ shivamc@berkeley.edu

LinkedIn ◇ www.shivamc.com ◇ GitHub ◇ Google Scholar

INTRODUCTION

I am a Research Engineer at UC Berkeley EECS with Prof. Preeya Khanna. We aim to elucidate the mechanisms by which sensory information affects your motor control of the upper arm. We do this by working on non-human primates using invasive electrophysiological techniques. In the future, I aim to understand how humans learn goal-directed movements, how brain disorders limit movements and possibly devise strategies to overcome these impairments.

EDUCATION

MSc Cognitive Science, Indian Institute of Technology (IIT) Gandhinagar (2021 - 2023)
Relevant Coursework: Computational Neuroscience, Human-Robot Interaction, Artificial Intelligence, Cognitive Psychology, Philosophy of Mind, Introduction to Neuroscience, Natural Language Processing, Research Methods
Grade: 8.97 / 10.00

BSc Information Technology, St. Xavier's College (Autonomous), Mumbai (2017 - 2020)
Relevant Coursework: Programming in C, C++, Python, and Java, Machine Learning, Deep Learning, Website Development, Mobile Application Development, Network Security
Grade: 3.61 / 4.00

RESEARCH AND INDUSTRY EXPERIENCE

Masters Dissertation, IIT Gandhinagar (Aug 2022 - Present)

- Conducted research on EEG-based brain-computer interface for palm open vs. close classification using signal processing and machine learning approaches under the guidance of Prof. Krishna Prasad Miyapuram, IIT Gandhinagar.
- Developed algorithms for EEG spectral feature extraction and classification using Python.
- Achieved above-chance within-subject classification performance for palm open vs. close movements.
- Contributed to the development of a pipeline for real-time control of a virtual or 3D-printed prosthetic hand.

Independent Project, IIT Gandhinagar (Aug 2022 - Nov 2022)

- Designed and built a cable-driven upper-limb wearable exoskeleton and developed control algorithms under the guidance of Prof. Vineet Vashishta at the Human-centered Robotics Lab, IIT Gandhinagar.
- The project involved integrating mechanical engineering principles with cognitive and brain sciences to create a functional prototype that could assist people with upper limb impairments.

Natural Language Processing Course Project, IIT Gandhinagar (Sep 2021 - Nov 2021)

- Collaborated with a team of four members to split and rephrase complex sentences into simpler ones using cutting-edge Natural Language Processing (NLP) techniques such as Transformers and LSTMs.
- Leveraged my expertise in PyTorch and TensorFlow to implement these solutions alongside Dr. Mayank Singh, Assistant Professor in the Department of Computer Science and Engineering at IIT Gandhinagar

ICOI Webapp, Prodio Designworks Mumbai (Apr 2020 - Sep 2020)

- Collaborated with a team of four to design and develop an internal website for the International Congress of Oral Implantologists (ICOI) using ReactJS/Redux for the front end and NodeJS for the back end.
- The site streamlined staff members' daily activities, including member management, payment scheduling, and credentialing.

Bachelor's Dissertation, St. Xavier's College (Autonomous), Mumbai (Oct 2019 - Apr 2020)

- Collaborated in a team of two to develop a novel approach to classify human emotions from EEG signals. Under the guidance of Professor Lydia Fernandes, Assistant Professor in the Department of Information Technology at St. Xavier's College (Autonomous), Mumbai.
- We employed advanced techniques such as Wavelet Transform, Principal Component Analysis (PCA), and Support Vector Machines (SVM). Our work culminated in a successful undergraduate dissertation project.

ACHIEVEMENTS

- Secured A+ (11 out of 10) grade in the course "Computational Neuroscience" at IIT Gandhinagar.
- Secured funding of Rs. 1.2L (Rs. 120,000) from the IIT Gandhinagar to present a research paper at the **University of Padova, Italy**.
- Qualified Graduate Aptitude Test in Engineering (GATE) 2023 in Computer Science & Information Technology.

PUBLICATIONS

Selected

1. S. Soni, **S. Chaudhary**, and K. P. Miyapuram, "Enhancing EEG-Based Motor Imagery Decoding with LSTM for BCIs." (CODS COMADS 2024)

Peer-Reviewed Conferences (Full Paper)

1. **S. Chaudhary**, K. P. Miyapuram, and D. Lomas, "Predicting drum beats from high-density Brain Rhythms," in Proceedings of the 6th Joint International Conference on Data Science & Management of Data (10th ACM IKDD CODS and 28th COMAD) (CODS-COMAD '23), Association for Computing Machinery, New York, NY, USA, 2023, pp. 291-292, https://doi.org/10.1145/3570991.3571029 — PDF.
2. V. Rohira, **S. Chaudhary**, S. Das, and K. P. Miyapuram, "Automatic Epilepsy Detection from EEG signals," in Proceedings of the 6th Joint International Conference on Data Science & Management of Data (10th ACM IKDD CODS and 28th COMAD) (CODS-COMAD '23), Association for Computing Machinery, New York, NY, USA, 2023, pp. 272-273, https://doi.org/10.1145/3570991.3570995 — PDF.
3. **S. Chaudhary**, P. Pandey, K. P. Miyapuram and D. Lomas, "Classifying EEG signals of mind-wandering across different styles of meditation," in Brain Informatics, vol. 4, no. 1, pp. 152-163, Mar. 2022, doi: 10.1007/978-3-031-15037-1_13. Presentation at University of Padova, Italy, July 2022 — PDF
4. P. Pandey, P. Gupta, **S. Chaudhary**, K. P. Miyapuram and D. Lomas, "Real-time Sensing and Neurofeedback for Practicing Meditation Using Simultaneous EEG and Eye Tracking," 2022 IEEE Region 10 Symposium (TENSYMP), 2022, pp. 1-6, doi: 10.1109/TENSYMP54529.2022.9864414. Poster presentation at IIT Bombay, Mumbai, July 2022 — PDF
5. S. Singh, P. Pandey, **S. Chaudhary**, K. P. Miyapuram, and J. Lomas, "Towards the Development of Personalized and Generalized Interfaces for Brain Signals across Different Styles of Meditation," in Proceedings of the Thirteenth Indian Conference on Computer Vision, Graphics and Image Processing, Gandhinagar, India, 2022, pp. 54-62, doi: 10.1145/3571600.3571656. – PDF

Abstracts

1. **S. Chaudhary** and K. P. Miyapuram, "Brain-computer interfaces for hand grasp," presented at the 32nd Annual Convention of National Academy of Psychology (NAOP 2023), Ahmedabad University, 2023. — PDF
2. **S. Chaudhary** and K. P. Miyapuram, "Brain-computer interface for grasp motion control," presented at the Next-Gen AI: Inspiration from Brain Science (NAiBS 2023), IIT Jodhpur, 2023. — PDF
3. **S. Chaudhary**, K. P. Miyapuram, and D. Lomas, "Stimulus-response correlation between EEG and drum beats," presented at the 9th Annual Conference of Cognitive Science (ACCS9), IIT Delhi, 2022. — PDF

Dataset

1. **S. Chaudhary**, P. Pandey, S. Saini, N. Ahmad, K. P. Miyapuram, and D. Lomas, "Electroencephalography (EEG) recordings while listening to drumbeats," 23-Feb-2023. [Online]. Available: osf.io/j9qhb.
2. **S. Chaudhary** and K. P. Miyapuram, "ManusBCI: A Simultaneous EEG Motor Movement and Hand Posture Video Dataset," 14-Jun-2023. [Online]. Available: osf.io/dqmnk.

WORK EXPERIENCE AND INTERNSHIPS

Research and Development Engineer, UC Berkeley EECS (Sep 2023 - Present)
Working on invasive brain-computer interfaces on non-human primates to understand influence of proprioceptive and haptic feedback on motor control and brain-computer interface performance.

[Internship] Stimulus-Response Correlation between Drum Beats and EEG (May 2022 - Jul 2022)
Collaborated with Prof. Derek Lomas and Prof. Krishna P. Miyapuram to investigate the relationship between electroencephalography (EEG) signals and drumbeats. Conducted data analysis and implemented signal processing techniques to identify stimulus-response correlations. Presented findings at the 6th Joint International Conference on Data Science & Management of Data (CODS-COMAD' 23).

Full Stack Developer at Prodio Designworks, Mumbai (Apr 2020 - Sep 2020)
Worked as a MERN (Mongo, Express, React, Node) stack web developer with teams in an agile manner and assisted by cloud services such as Jira, Trello, Bitbucket, and Invision

[Internship] Android Backend Developer at Kadamba Kanan Pvt Ltd (Apr 2019 - May 2019)
Worked on connecting milk vendors with customers and delivery executives across the city of Mumbai to automate the process of daily delivery and payment using a mobile app created on Android Studio and with Firebase backend

[Internship] Machine Learning Internship at AITechno Labs (Apr 2018 - Jul 2018)
License Plate Detection using supervised machine learning approaches. Worked on Face Recognition Bio-metric System to improve the overall security of electronic devices

TEACHING AND MENTORING EXPERIENCE

Lead Teaching Assistant, "Computational Neuroscience", Neuromatch Academy (Jul 2023)

Teaching Assistant, "Computational Neuroscience," IIT Gandhinagar (Jan 2022 - May 2022)
Assisted course instructor in guiding students with projects related to music, meditation, and brain-computer interfaces. Checked assignments, provided guidance on course projects, and conducted presentations. I also took lectures on EEG signal processing and classification, followed by a live demo.

Teaching Assistant, "Computation and Cognition," IIT Gandhinagar (Aug 2022 - Nov 2022)
As a TA for Computation and Cognition, I guided students in programming and problem-solving from a cognitive science perspective, connecting theory to real-world applications. I also gave a lecture on analyzing event-related potential (ERP) signals.

Volunteered at Door Step School(NGO), Mumbai (Dec 2017 - Jun 2018)
Taught Social Science, Life Skills, and English to students from backward families. Assisted them in improving their academic performance and developing crucial life skills.

Independent and Course Project Supervision:

- **Saher Soni (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Decoding of Motor Imagery Signal from EEG data using LSTM. Manuscript accepted at CODS COMADS 2024.
- **Subhanarayan Mishra (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Classification of music-evoked EEG responses using Machine Learning.
- **Smriti Saini (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Classifying Hand Postures while reaching, twisting, and grasping from surface EMG signals.
  Current Status: Doctoral candidate at **MIT Brain and Cognitive Sciences**
- **Bagmish Sabhapondit (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Predicting drum beats from high-density brain rhythms: Stimulus-Response correlation of EEG responses recorded during drumbeat listening.
- **Riddhi Johri (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Classifying imagined speech signals of EEG using machine learning and deep learning approaches.
  Current Status: Software Engineer @ NXP
- **Dheemant Jallepalli (Undergraduate Student, IIT Jodhpur)** (Jan 2023 - July 2023)
  Distinguishing between EEG signals of winning or losing a gamble after accepting or rejecting it.
  Current Status: MITACS intern at **University of Manitoba, Canada**
- **Anupam Sharma (Masters Student, IIT Gandhinagar)** (Jan 2023 - May 2023)
  Brain to text: Predicting MNIST digits seen by a person using EEG signals processing and machine learning.

ACADEMIC SERVICE

A lecture on EEG signal processing and classification (March 2023)
I was invited by Prof. Krishna Prasad Miyapuram to talk about my experience in EEG signal processing, analysis and classification to the class. This was followed by a demonstration of Lab Streaming Layer and NeuroPype and live demo of the classification process.

A lecture on Introduction to Event-Related Potentials (Nov 2022)
Interacted and provided a brief overview of the event-related potentials seen in EEG signals at IIT Gandhinagar.

Introduction to Brain-Computer Interfaces (Nov 2022)
I was invited by the EETI Foundation to give a talk on brain-computer interfaces online, which was attended by around 100 participants.

Reviewer, ICONIP 2022 (Aug 2022)
Reviewed research papers for the International Conference for Neural Information Processing (ICONIP 2022), contributing to the selection of high-quality papers for presentation and publication. Provided critical feedback to authors, ensuring the scientific rigor and clarity of their work.

POSITIONS OF RESPONSIBILITY

Website Lead G20-Ignite, IIT Gandhinagar (Mar 2023 - Apr 2023)
Led a team of designers and developers to build the website for G20 sponsored Ignite - A sci-tech fair. The position involved collaborating with the multiple stakeholders of the festival to create a wonderful experience for school children and to show them what technology is all about.

Website and Application Manager - Technical Council, IIT Gandhinagar (May 2022 - Jul 2023)
Led a team of developers and designers to modernize and improve the existing technology infrastructure that the student body uses for their day-to-day activities and work.

BlithchronFest App, IIT Gandhinagar (Aug 2021 - Mar 2022)
Led a team of 4 developers to create a mobile app using React Native, Redux, and Firebase to aid in the activities of campus ambassadors. The app is hosted and is live on the Google Play Store.

Organiser-in-Charge, Computers Department - Malhar Fest (Apr 2019 - Aug 2019)
Led a team of 12 members to create a website, an Android app, and an iOS app. Managed the production and computer hardware.

IndianMusicGroup Website, St. Xavier's College (Autonomous), Mumbai (Jul 2019 - Aug 2020)
Led a team of 4 members to create a website for the Indian Music Group used by its members worldwide.

SKILLS

Technical Skills	Javascript, Python, Java, C, C++, Octave, R, C#, React, Node.js, Web Dev, Lab Streaming Layer (LSL), NeuroPype, PsychoPy, LaTex, PCB Design
Soft Skills	Problem-solving, leadership, teamwork, adaptability, practical communication skills, research paper writing, presentation
Cloud Platforms	Firebase, Amazon Web Services, MongoDB
Equipment	VICON Motion Capture, EGI 64 channel EEG system, TMSi EMG system, Tobii Eye-tracker TX300

CERTIFICATIONS

Building Transformer-based NLP Applications by NVIDIA DLI — **Certificate** (Oct 2021)

TensorFlow Developer Professional Certification by deeplearning.ai — **Certificate** (May - Jun 2021)

Deep Learning Specialization by deeplearning.ai — **Certificate** (May 2020 - Apr 2021)

Machine Learning in Octave by deeplearning.ai — Certificate (Jan 2020 - Mar 2020)

WORKSHOPS AND SPECIAL COURSE PARTICIPATION

1. **Brain, Computation, and Learning** workshop held at the **Indian Institute of Science** in January 2023. I interacted with eminent faculties in the areas of invasive BCI, such as Prof. Rajesh PN Rao.
2. A 2-day-workshop on **Redundantly actuated robots and their human-centered application** at the IIT Gandhinagar.
3. A two-day **IoT workshop** with hands-on experience with Arduino and various associated modules.
4. A 5-day course on **Measurement and analysis of human locomotion** by Dr. Kamiar Aminian, EPFL
5. The BCI & NeuroTechnology Spring School 2021, GTEC.
6. Computational Neuroscience, Neuromatch Academy, 2021.

REFERENCES

Prof. Preeya Khanna
Assistant Professor, EECS & HWNI
University of California Berkeley, CA
pkhanna@berkeley.edu

Prof. Krishna Prasad Miyapuram
Associate Professor, Computer Science and Engineering jointly with Centre for Cognitive & Brain Sciences
Indian Institute of Technology Gandhinagar, India
kprasad@iitgn.ac.in

Prof. Derek Lomas
Assistant Professor, Department of Human Centered Design & Engineering
Delft University of Technology, Netherlands
j.d.lomas@tudelft.nl

Prof. Vineet Vashista
Associate Professor, Mechanical Engineering jointly with Centre for Cognitive & Brain Sciences
Indian Institute of Technology Gandhinagar, India
vineet.vashista@iitgn.ac.in