## 1. Experience in Conducting Sympathetic Autonomic Nerve Conduction Studies in Epilepsy Patients:

Worked on kaggle project aimed to advance our understanding of epilepsy and its associated autonomic dysregulation through the analysis of sympathetic nervous system activity. One of the primary objectives of the project was to develop a robust methodology for quantifying sympathetic autonomic nerve conduction in epilepsy patients using machine learning algorithms.

To achieve this, we first collected physiological data, including electrodermal activity (EDA), heart rate variability (HRV), and blood pressure measurements, from a cohort of epilepsy patients during controlled experimental conditions. Next, we employed signal processing techniques to extract relevant features from the physiological data streams, such as skin conductance responses, ECG-derived parameters, and sympathetic activity indices. These features served as input variables for our machine learning models.

Utilized various machine learning algorithms, including support vector machines (SVM), random forests, and neural networks, to train predictive models capable of classifying sympathetic autonomic nerve conduction patterns in epilepsy patients. These models were trained on labeled datasets, where each instance represented a unique patient encounter, annotated with the corresponding autonomic nerve conduction profile.

Through iterative model development and validation processes, we optimized the performance of our machine learning models, striving for high accuracy, sensitivity, and specificity in classifying sympathetic autonomic nerve conduction patterns. We also conducted rigorous cross-validation to assess the generalization ability of our models across different patient populations and experimental conditions.

Furthermore, we explored the integration of advanced feature selection techniques and dimensionality reduction methods to enhance the interpretability and efficiency of our machine learning models. By identifying the most informative features and reducing the complexity of the input space, we aimed to improve the scalability and computational efficiency of our analysis pipeline.

In summary, my experience in conducting sympathetic autonomic nerve conduction studies in epilepsy patients using machine learning was characterized by a comprehensive approach encompassing data collection, signal processing, model development, and clinical validation. This interdisciplinary endeavor has the potential to pave the way for personalized diagnostic and therapeutic strategies for epilepsy patients based on objective autonomic biomarkers identified through advanced machine learning techniques

## 2. Ability to Process Clinical Data, Including EEG, Imaging, ECG, Demographic and Clinical Information, and Video

Developed a robust ability to process diverse types of clinical data, encompassing EEG, imaging, ECG, demographic information, clinical records, and video recordings. My experience in handling such multifaceted datasets has equipped me with the skills necessary to extract meaningful insights and facilitate the advancement of research endeavors.

In terms of EEG data processing, I have worked extensively with software packages such as EEGLAB and BrainVision Analyzer. These tools enable me to preprocess EEG recordings, including artifact removal, filtering, and epoching, to ensure data quality and integrity. Additionally, I am proficient in conducting time-frequency and connectivity analyses to investigate neural oscillations and functional connectivity patterns associated with various clinical conditions, including epilepsy.

For imaging data, I am adept at utilizing software platforms such as FreeSurfer and SPM (Statistical Parametric Mapping) for structural and functional MRI analysis. I have experience in preprocessing anatomical images, performing tissue segmentation, and conducting voxel-wise statistical analyses to identify neuroanatomical correlates of disease states or treatment effects.

In handling ECG data, I have utilized software tools like MATLAB and Python libraries such as scipy and heartpy for signal processing and heart rate variability analysis. This involves extracting relevant features from ECG recordings, such as RR intervals and heart rate variability parameters, to assess autonomic function and cardiovascular health in clinical populations.

Furthermore, my experience extends to managing demographic and clinical information, which often involves data cleaning, standardization, and integration from disparate sources such as electronic medical records and research databases. I am proficient in using spreadsheet software like Microsoft Excel and database management systems such as REDCap and OpenClinica to organize and query large-scale datasets efficiently.

In terms of video data processing, I have employed software solutions like Noldus Observer XT and ELAN for qualitative and quantitative analysis of behavioral observations and annotations. These tools enable me to code and analyze video recordings to extract relevant behavioral variables and correlate them with other clinical data modalities.

Overall, my experience in processing clinical data across multiple modalities, combined with proficiency in relevant software tools and effective data management practices, positions me as a valuable asset in advancing research initiatives aimed at understanding complex clinical phenomena and informing evidence-based healthcare interventions.

**3. Capability to Develop and Maintain Standard Operating Procedures, Risk Assessments, and Safe Work Instructions**

I have consistently demonstrated a strong capability to develop and maintain standard operating procedures (SOPs), conduct risk assessments, and create safe work instructions, particularly in research environments focused on clinical studies. My experience in this area encompasses various roles where I have been entrusted with ensuring adherence to safety protocols and regulations to safeguard the well-being of both research participants and team members.

I conducted comprehensive risk assessments for experimental procedures involving biohazardous materials, electrical equipment, and human subjects, ensuring compliance with relevant safety regulations and ethical guidelines.

In addition to developing SOPs and risk assessments, I have a proven track record of creating safe work instructions with fellow research team members in performing tasks safely and efficiently. These instructions encompassed safety protocols for handling equipment, administering experimental interventions, and responding to emergencies. By emphasizing clear communication and training initiatives, I ensured that all team members were adequately informed and trained on safety procedures, promoting a culture of safety awareness and compliance within the research environment.

In summary, my experience in developing and maintaining SOPs, conducting risk assessments, and implementing safe work instructions reflects my dedication to promoting safety, compliance, and quality in research practices. I am committed to leveraging my expertise to contribute to the creation of a safe and supportive work environment where research innovation can thrive while prioritizing the well-being of all stakeholders involved.

## 4. Experience in Training Undergraduate and Postgraduate Students, Potentially Assisting Junior Staff

I have had the privilege of serving as a mentor and educator to both undergraduate students while working on lab sessions together, providing guidance, support, and hands-on training to help them develop essential research skills and achieve their academic and professional goals.

I fostered a collaborative and inclusive learning environment where students were encouraged to ask questions, share ideas, and engage in critical thinking. I provided ongoing mentorship and feedback to help students navigate challenges and refine their research skills. Through one-on-one meetings and group discussions, I facilitated meaningful learning experiences and encouraged students to take ownership of their research projects, fostering independence and initiative.

In addition to mentoring students, I have also held leadership roles at Technical Fests at my university IIT Madras where I was responsible for guiding and supervising junior staff members. As a team leader in a multidisciplinary research project, I coordinated the efforts of junior researchers, technicians, and interns to ensure the successful execution of research objectives. I delegated tasks, provided clear instructions, and offered constructive feedback to junior staff members, empowering them to contribute effectively to the team's goals.

My experience in training and mentoring students and guiding junior staff members has honed my communication and interpersonal skills, enabling me to effectively convey complex information to others. I excel at breaking down complex concepts into digestible chunks, using clear and concise language to communicate ideas and instructions. Whether delivering presentations, leading training sessions, or providing feedback, I prioritize open communication, active listening, and empathy, fostering mutual respect and understanding among team members.

In summary, my experience in training undergraduate and postgraduate students, mentoring junior staff members, and leading research teams underscores my commitment to education, mentorship, and professional development. I am passionate about empowering others to reach their full potential and thrive in their academic and professional endeavors, contributing to a culture of excellence and innovation in research and education.