PMRF-ISSS Teaching Programme

Prime Minister Research Fellowship students' teaching requirement facilitated by the Institute of Smart Structures and Systems

Module PMRF-ISSS108/2024

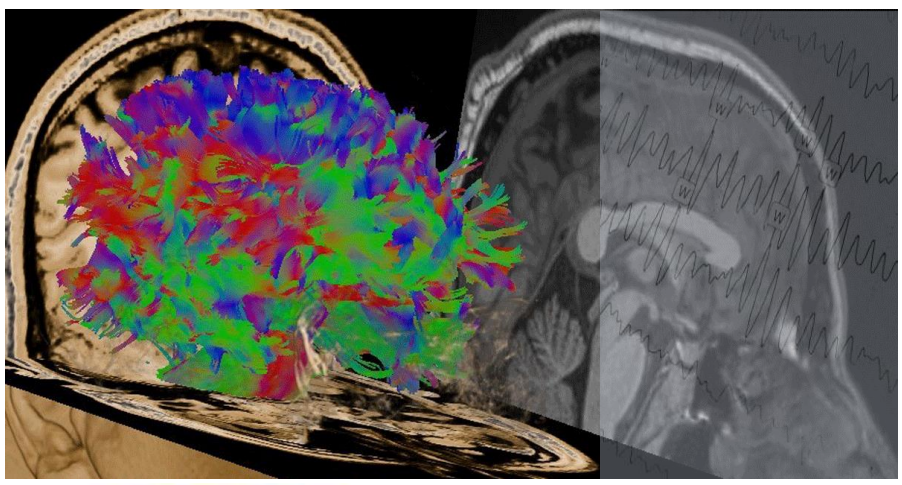
Neuroinformatics-1

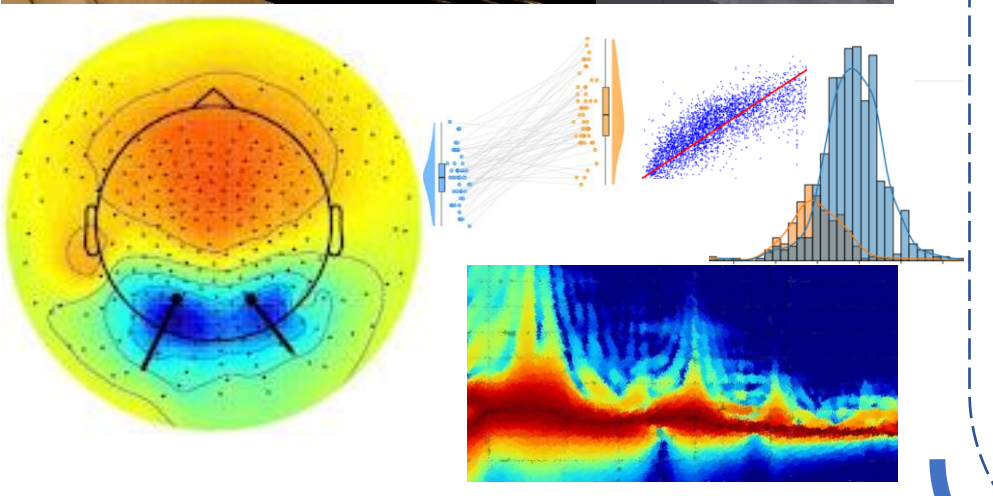
Name of the PMRF student

Deepak Raya

Required background of the students taught

- A fundamental exposure to **Fourier analysis, Linear Algebra & probability/statistics** is helpful.
- Self-motivated interest in neuroscience is highly recommended.





Details of the content of the module

1. **Macroscale non-invasive neuroimaging data**
   - **EEG**
     - Sources of EEG, Acquisition
     - Data structure and file formats
     - Basic pipeline of working with EEG data
   - **fMRI**
     - Working principle of MRI acquisition
     - K-space to image construction
     - Tissue contrasts, BOLD signal and Parameters.
     - fMRI data structure and file formats.
2. **Signal Processing for Neuroscience**
   - Fundamentals of signals and systems.
   - Time & frequency domain, Fourier transform.
   - Multi-taper spectral analysis.
   - Spectrograms & Wavelet Transform.
   - Coherence & Phase locking, Hilbert transform.
   - Empirical mode decomposition.
3. **Neural data science**
   - Regression, multiple regression and GLMs.
   - Dimensionality reduction.
   - Maximum likelihood & Bayesian inference.
   - Discriminant analysis, Support Vector machines.
   - K means clustering/distance-based unsupervised classification.
   - A glimpse into the world of neural decoding.

Schedule of the module

Start Date: **4th February 2025**

End Date: **25th April 2025**

Schedule: Every

Tuesday: 6:00 – 7:30pm

Friday: 6:00 pm – 7:30 pm

Meeting link : Will be shared later

Contact email ID: isss.forum@gmail.com

Registration link: https://forms.gle/kZVD6HzQdEy9aL4j8