

# EEG DATA ANALYSIS AND VISUALIZATION

UNDER THE GUIDANCE OF  
PROF. H. OHAL

PREPARED BY  
SUYOG CHAVAN  
RITESH SHENDE  
RUSHIKESH SHINDE  
SANKET POPHALE

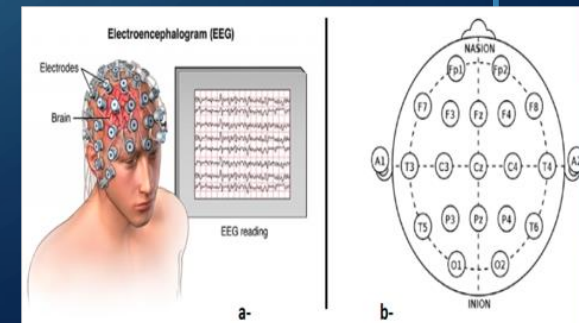
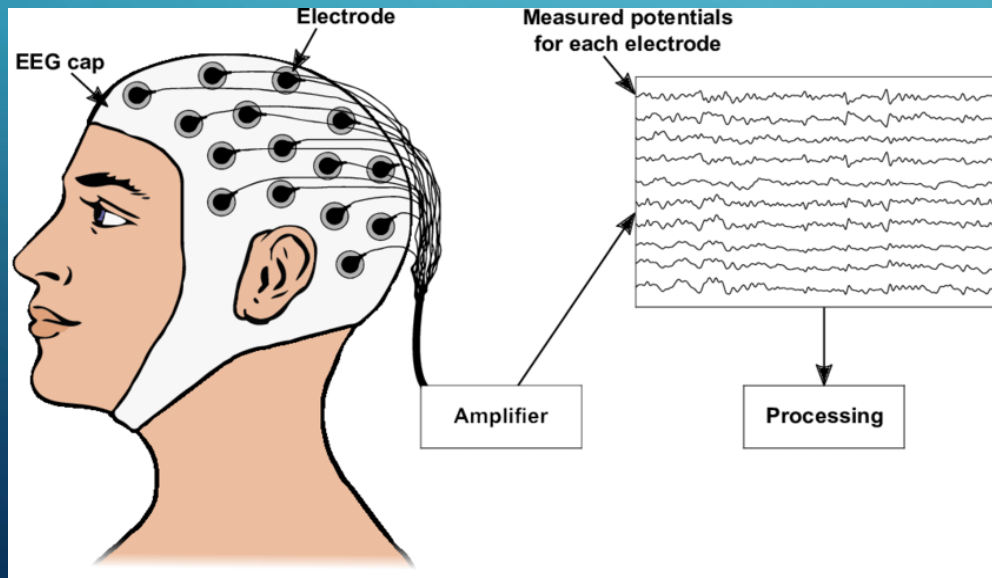
# CONTENTS

- introduction to EEG
- Motivation
- Introduction to Project
- Need of the Project
- Project Architecture
- Literature Survey
- System Requirements
- Conclusion
- References

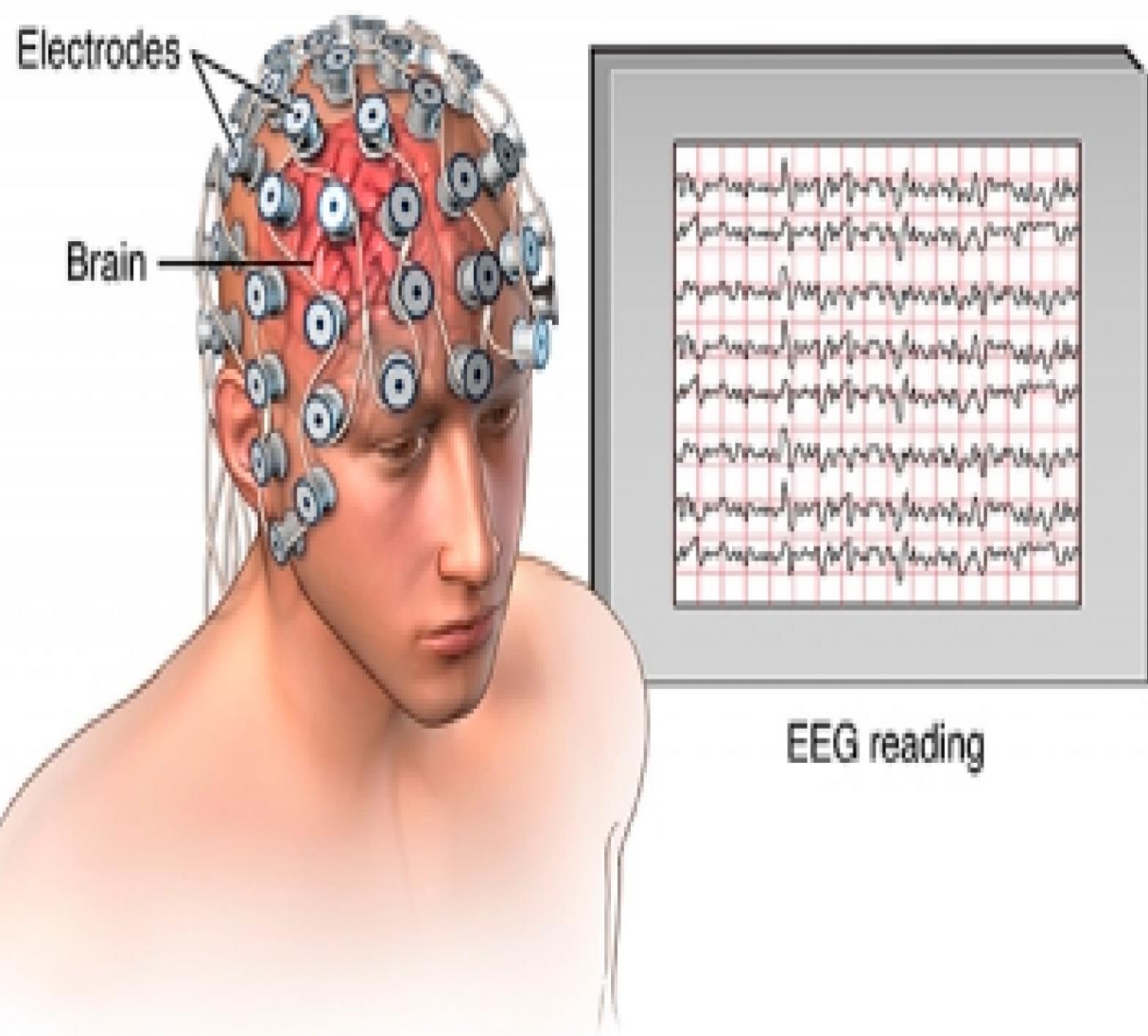


# INTRODUCTION TO EEG

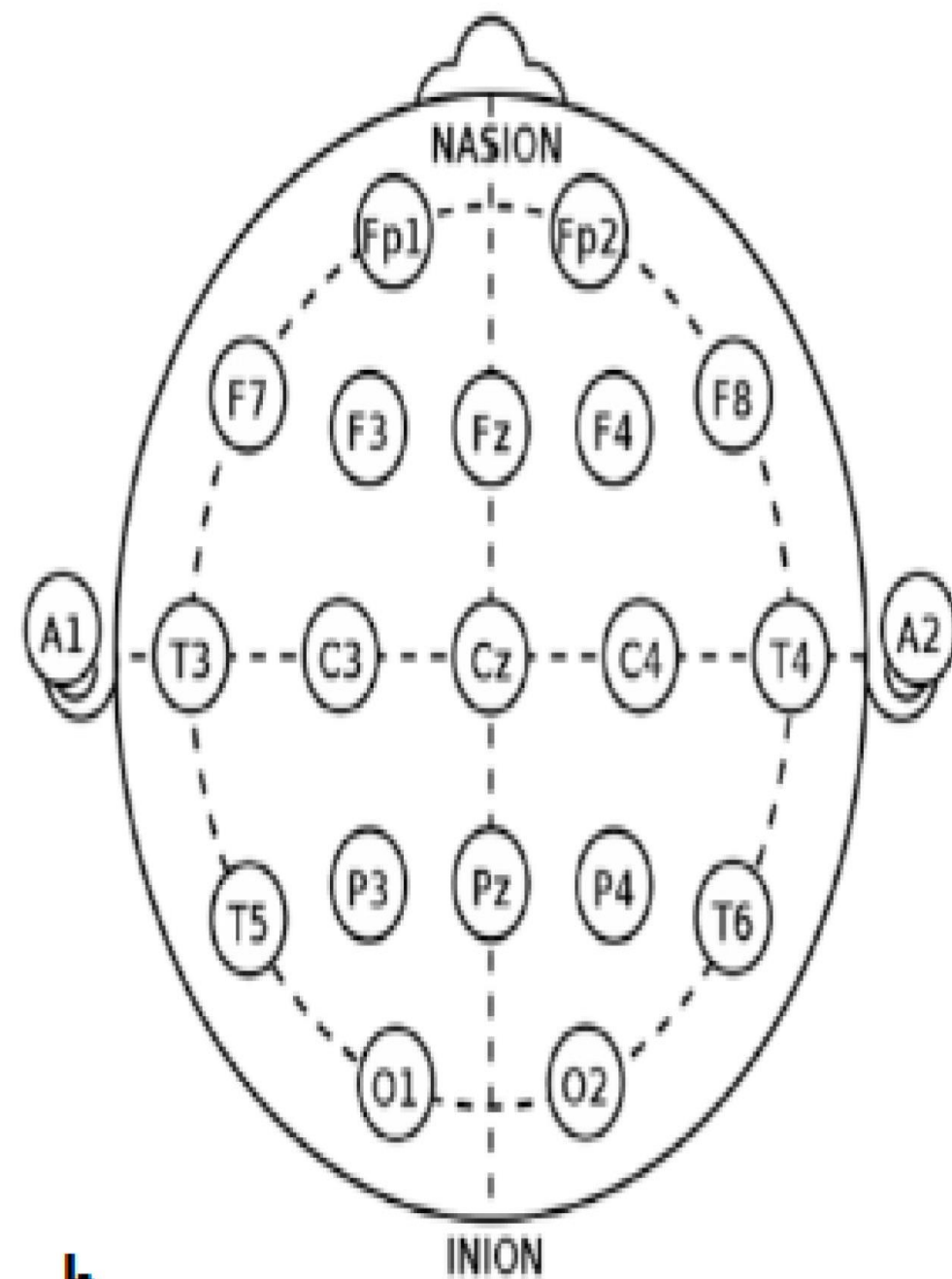
- Electroencephalography (EEG)  
measure the weak electromagnetic  
signals generated by neuronal  
activity in the brain.



## Electroencephalogram (EEG)



**a-**



**b-**

# MOTIVATION

- An electroencephalogram, or EEG, is used to monitor the electrical activity in the brain through electrodes placed on the scalp
- EEG useful in diagnosing brain disorders.
- Manual scanning and interpretation of EEGs is time-consuming since these recordings may last hours or days. It is also an expensive process as it requires highly trained experts.

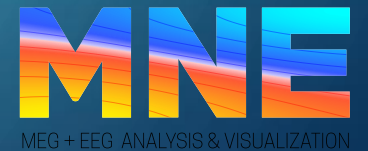


# INTRODUCTION TO PROJECT

- The main aim of this project is to making an EEG data easier to understand and analyze by using some enhanced and advanced 3D graph and diagram plotting technics available in python.
- MNE-Python
- For Scientific computation (NumPy, SciPy)
- For Visualization (Matplotlib, Mayavi)



***NumPy***



**matplotlib**



# PROBLEM DEFINITION

- Develop a project that will help one to analyze an EEG signal data. Develop a program or a way to visualize all this huge data in advanced and enhanced user-friendly view so, people can visualize EEG data in 3D. EEG analysis is widely used in brain-disease diagnosis and assessment. This project shall be helpful for that field also. Analyzing EEG data and represent it in such way that user can interact with it and can see it however they want to see.

# PROPOSED METHODOLOGY

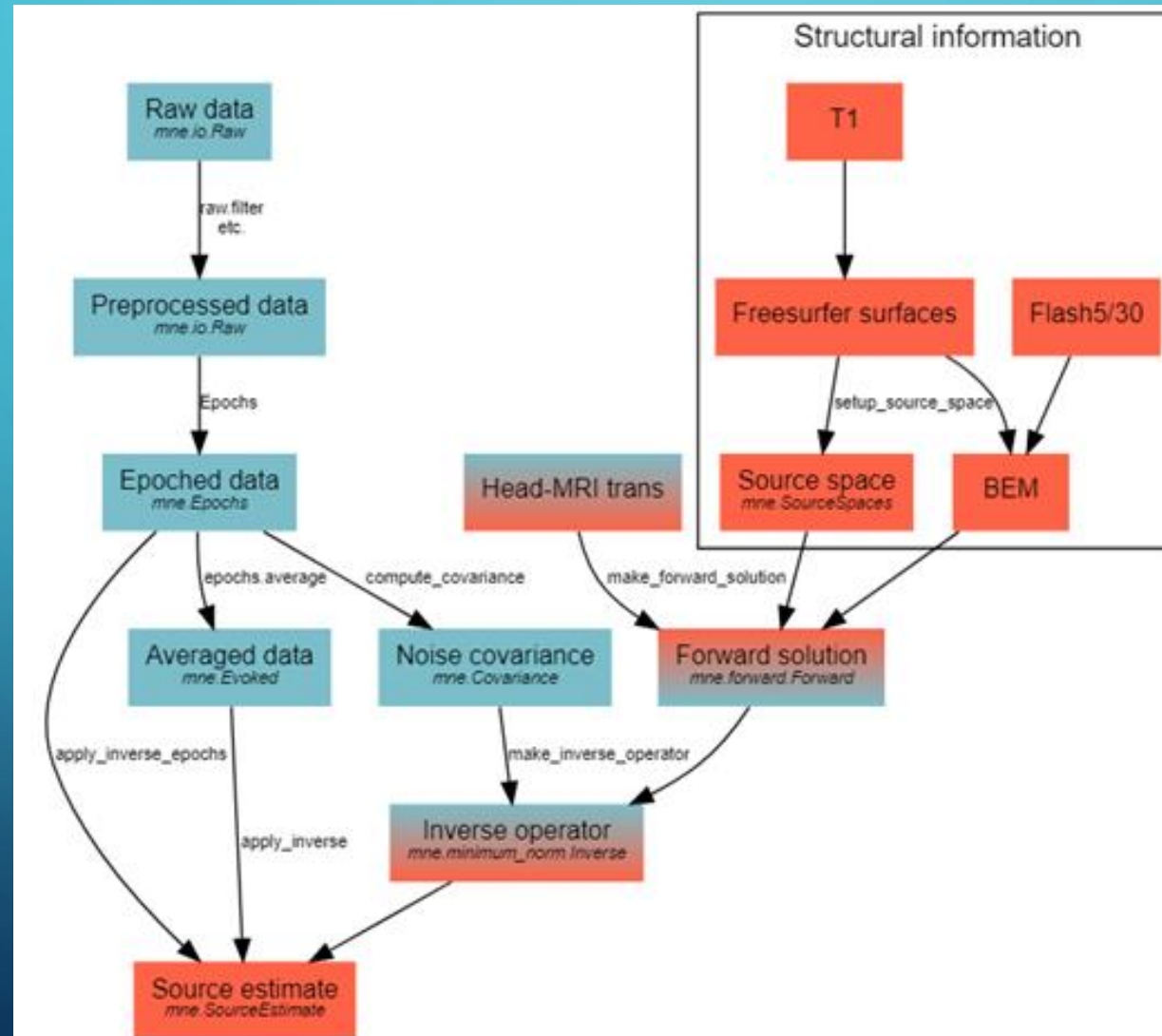
- The targets of EEG analysis are to help researchers gain a better understanding of the brain; assist physicians in diagnosis and treatment choices; and to boost brain-computer interface technology.
- Non-invasive electroencephalogram (EEG)-based brain-computer interfaces can be characterized by the technique used to measure brain activity and by the way that different brain signals are translated into commands that control an effector (e.g., controlling a computer cursor for word processing and accessing the internet).



# SYSTEM ARCHITECTURE



# MNE EEG WORKFLOW DIAGRAM



# LITERATURE REVIEW



- IEEE Xplore, 24 June 2010 → Using Python for Signal Processing and Visualization
- IEEE Xplore, 28 January 2016 → Enhanced three-dimensional visualization of EEG signals
- IEEE Xplore, 04 November 2013 → Classification and visualization for EEG data
- IEEE Xplore, 09 February 2017 → Enhanced visualizations for improved real-time EEG monitoring



**MAEER's**  
**MIT Polytechnic,**  
**Pune**

Sr. No.	Paper Title	Authors	Year of publication	Outcome
1.	Using Python for Signal Processing and Visualization	Erik W. Anderson, Gilbert A. Preston, and Claudio T. Silva	2010	This paper proposes why and how python is best for signal processing and visualisation.
2.	Enhanced three-dimensional visualization of EEG signals	Satya Prakash Singh, Meenu	2016	This paper proposes how we can enhance our traditional 2D graphs and diagrams to modern 3-Dimensional Visualization of EEG signals.
3.	Classification and visualization for EEG data	Pei Ling Lai1 Jin Liang Yang	2013	This paper proposes the methods and some algorithms to classify two datasets in varies ways.
4.	Enhanced visualizations for improved real-time EEG monitoring	M. Thiess, E. Krome, M. Golmohammadi, I. Obeid and J. Picone	2017	Proposed Methodology of representation of EEG data, sensor position correlation.

# RESOURCES REQUIRED

Sr. no.	Resources Required	Resources name	Specification	Quantity
1.	Softwares Resources	Python	Latest Version	1
2.		MNE	Latest Version	1
3.		Jupyter Notebook	Latest Version	1
4.		Visual studio code	Latest Version	1
5.		Browser	Latest Version	1
6.	Hardware resources	Desktop computer/ Laptop	Ram min 4 GB	1



## REFERENCES

- Using Python for Signal Processing and Visualization (by Eric W)
- Enhanced three-dimensional visualization of EEG signals (by Satya Prakash)
- Classification and visualization for EEG data ( by Pei Ling )
- Enhanced visualizations for improved real-time EEG monitoring (by M. Thais )

THANK YOU