Report - Review Meet 1

NeuroClone

Team Inception

# Team Details

| Name | Roll number | Contact No. | Email ID |
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# Inspiration for your idea *( under 50 words )*

| The main motivation was to help out paralyzed people by giving them a *sense* of entering into a new body that they can control. The plan is to remotely control a robot via EEG signals. Also, whatever the robot sees and hears will be returned to the paralyzed thereby, giving him the sense of moving in a new body. |
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# Description *( in 80-100 words )*

| Whenever we do an action, we first imagine that we have to do the job. Let’s consider simple hand lifting. So, we think to do that, then we start doing the action. The “imagination part” can be done even by paralyzed people who can’t lift their hands. Now, these imaginations are electric signals in the nerves. They can be detected using a set of electrodes placed on the scalp. The plan is to take these “imagination” signals, interpret them and send them to a robot that can do those actions for you. Whatever the robot sees and hears will be returned to the person on a screen, giving him the feel of a new body. |
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# Workload Distribution

| **Module 1**  Om: Basic studying about the brain and EEG**,** MATLABbasics, EEGLAB basics, ML course on Coursera, Collection of datasets, trying Machine learning with available models, a real experiment to get an actual, live dataset.  Akshata: Basic studying about the brain and EEG, Python basics, ML course, PyEEG basics, Trying to train a model on PyEEG, a real experiment to get an actual, live dataset.  Siddhi: Basic studying about the brain and EEG, Python basics, ML course, PyEEG basics, Trying to train a model on PyEEG, a real experiment to get an actual, live dataset. |
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| **Module 2**  Adit: Basic studying about the brain and EEG, Solidworks Modelling for Robot Design, Simulation on Gazebo using ROS.  Vaishnavi: Basic studying about the brain and EEG, Solidworks Modelling for Robot Design, Simulation on Gazebo using ROS |

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# Work Done Till Date

| **Module 1**  **Siddhi**:  Python basics learning: (mentioned in the reference below)  Basics of EEG covered.  Link to the workspace: [Siddhi Gaikwad](https://drive.google.com/drive/folders/1jUimX7C2x9JZzY3xtljyuKY21Hoiwaoy?usp=sharing)  **Akshata**:  Python basics covered  ML course started: SS available in the link below  EEG basics covered.  [Akshata koshti](https://drive.google.com/drive/folders/1-9s7ab1E4Ax0Fx4Gfjf8Zx6jRKP_U9Qz?usp=sharing)  **Om:**  EEG data collected (final datasets available in the link)  Resource sorting  Learnt MATLAB basics(SS available in link)  Learnt EEGLAB basics  Started ML course. (SS available)  [Om Mihani](https://drive.google.com/drive/folders/129psiI7WNFewQNTH_4cT27AwmJJW7uC_?usp=sharing) |
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| **Module 2**:  **Vaishnavi :**  Brain Study  Learned basics of Solid Modeling, ROS, and Turtlebot.  [**Vaishnavi Agnihotri**](https://drive.google.com/drive/folders/18z-O6kQO-dV3mOWoYlSAYZLzoCfeObr-?usp=sharing)  **Adit :**  Brain Study  Learned basics of Solid Modeling, ROS, and TurtleBot3.  Attended workshops of ERC.  [**Adit Agrawal**](https://drive.google.com/drive/folders/1n-bPyiQBJjmkhF0zhTLku1szEWJ0FpNv?usp=sharing) |

# Tools/ Technology used

| **Softwares**  MATLAB with extensions EEGLAB and BIOSIG  Python  PyEEG(Not started yet, but planned to be used later)  ROS  Solidworks  Gazebo 11  Virtual BOX 6.1  Turtlebot3  Since we are still in the learning stage, we didn’t do many innovations yet |
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# Difficulties Faced & Solutions Proposed

| * Making us familiar with the topic and search for usable research papers. Mentors helped us through this and extra efforts were put in. * Searching for relevant, reliable, and reusable EEG Datasets. Took a lot of effort and help from many experts. * It was difficult for our laptops to digest heavy software and for us to learn them in a short span. * Understanding what exactly will be needed to train the system to understand the signal. Valay helped a lot in explaining what ML is. He even suggested relevant courses. * Understanding EEG to a greater extent. Ankit helped a lot in this. * Exact mapping to the electrode to site: ICA, Regularisation * The filters were suggested by many seniors together, especially Shubham and Gagan. * Upcoming issues: How to process live data? We have been doing all work on pre recorded data… |
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# Plan of Action For the next 10 days

| **Module 1**   * Completing ML course * Completing Deep learning and CNN(Till 6th June) * Selection of correct model * Model training using ML: MATLAB and/or PyEEG(Till 15th June) |
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| **Module 2**     * Complete the learning process * Familiarity with Linux interface, for simulation of turtlebot on ROS. ( Since we have been using windows.) * Advanced solid modeling and start working on robot design based on the experience gained. |

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# References

| **Module 1** **Siddhi Gaikwad** -  Python Basics: <https://github.com/wncc/learners-space>  <https://www.youtube.com/watch?v=QXeEoD0pB3E&list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3>  Book - AUTOMATE THE BORING STUFF WITH PYTHON.  EEG basics: [Fundamental\_of\_EEG\_Measurement (1)](https://docs.google.com/document/d/1f8kH8XCpuoQHEmxz3xjL203oz7FpN88oyQoozwq-D_8/edit?usp=sharing)  [iMotions\_EEG\_Guide\_\_2019 (2).pdf](https://drive.google.com/file/d/1CLElAoOAo9-8au4OD5Zm5FPBqX_qIGzw/view?usp=sharing)  **Akshata Koshti** -  Python Basics: <https://github.com/wncc/learners-space>  <https://www.youtube.com/watch?v=QXeEoD0pB3E&list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3>  Book - AUTOMATE THE BORING STUFF WITH PYTHON.  ML course: Coursera  EEG basics: [Fundamental\_of\_EEG\_Measurement (1)](https://docs.google.com/document/d/1f8kH8XCpuoQHEmxz3xjL203oz7FpN88oyQoozwq-D_8/edit?usp=sharing)  [iMotions\_EEG\_Guide\_\_2019 (2).pdf](https://drive.google.com/file/d/1CLElAoOAo9-8au4OD5Zm5FPBqX_qIGzw/view?usp=sharing)  **Om Mihani** -  ML course: Coursera  EEG basics: various research papers: [Resources](https://drive.google.com/drive/folders/1FVvupi4HG7G9Ez3jS53gZzmUlEA4z9HG?usp=sharing)  EEGLAB Tutorial:  [EEGLAB News](https://sccn.ucsd.edu/eeglab/index.php)  Datasets:  [List of datasets](https://docs.google.com/document/d/1LZHiO7OXYTOE35kaswkDvwebgzJTnF3aRyr2hhCLqOc/edit?usp=sharing) |
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| **Module 2**  **Adit Agrawal** -  <http://wiki.ros.org/ROS/Tutorials>  ERC Workshops.  ME119: Lecture 10 - Introduction to Solid Modelling.  [https://www.youtube.com/channel/UC0NX 5l\_sS-y14xc9XtPzsPw](https://www.youtube.com/channel/UC0NX5l_sS-y14xc9XtPzsPw)  **Vaishnavi Agnihotri** -  <http://wiki.ros.org/ROS/Tutorials>  ME119: Lecture 10 - Introduction to Solid Modelling. |

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