GUJARAT TECHNOLOGICAL UNIVERSITY

CHANDKHEDA, AHMEDABAD

AFFILIATED

SARVAJANIK COLLEGE OF ENGINEERING AND TECHNOLOGY

A Project Report on

"INTERNET OF BRAIN"

PROJECT TYPE: UDP

B.E. IV, SEMESTER-VIII, COMPUTER-(SHIFT-1)

SUBMITTED BY:

GROUP NO:1_s1

No	Name	Enrollment No
1	KARTIK GONDALIYA	170420107015
2	SAHIL SHINGALA	170420107051
3	BHUMI CHAVDA	180423107001
4	DHWANI DESAI	180423107002
5	DHRUMI KANSARA	180423107005

Prof. (Dr.) Keyur Rana
(Internal Guide)

Prof. (Dr.) Pariza Kamboj
(Head of the Department)

“INTERNET OF BRAIN”

PROJECT REPORT

Submitted by

KARTIK K. GONDALIYA (170420107015)

SAHIL G. SHINGALA (170420107051)

BHUMI R. CHAVDA (180423107001)

DHWANI Y. DESAI (180423107002)

DHRUMI M KANSARA (180423107005)

In fulfillment of the award of the degree

Of

BACHELOR OF ENGINEERING

In

COMPUTER ENGINEERING

Sarvajanik College of Engineering and Technology,

Surat.

Gujarat Technological University, Ahmadabad.

2020-2021

SARVAJANIK COLLEGE OF ENGINEERING AND TECHNOLOGY
Dr. R.K. DESAI MARG, ATHWALINES,
SURAT-395001

DEPARTMENT OF COMPUTER ENGINEERING

CERTIFICATE

This is to certify that the project entitled *INTERNET OF BRAIN* has been carried out by KARTIK K. GONDALIYA (170420107015), SAHIL G. SHINGALA (170420107051), BHUMI R. CHAVDA (180423107001), DHWANI Y. DESAI (180423107002), DHRUMI M KANSARA (180423107005)students of B.E.IV (CO), Semester-VIII, under my guidance in fulfillment of the degree of Bachelor of Engineering in Computer Engineering of Gujarat Technological University, Ahmadabad for the academic year 2020-2021.

Signature of Guide

---------- Dr. Keyur Rana

Signature of Head of the Department

---------- Dr. Pariza Kamboj

Signature of Jury Members

---------- , ---------- , ----------

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2020-2021

Date of certificate generation : 16 April 2021 (17:26:18)

This is to certify that, ***Gondaliya Kartik Kamleshbhai*** (Enrolment Number - 170420107015) working on project entitled with ***INTERNET OF BRAIN*** from ***Computer Engineering*** department of ***SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : G o n d a l i y a K a r t i k Kamleshbhai

Name of Guide : Dr. Keyur Mahesh Rana

Signature of Student : _____

*Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

*Guide has to sign the certificate, Only if all above activities has been Completed.

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2020-2021

Date of certificate generation : 16 April 2021 (17:28:15)

This is to certify that, ***Shingala Sahil Ghanashyambhai*** (Enrolment Number - 170420107051) working on project entitled with ***INTERNET OF BRAIN*** from ***Computer Engineering*** department of ***SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : S h i n g a l a S a h i l Ghanashyambhai

Name of Guide : Dr. Keyur Mahesh Rana

Signature of Student : _____

*Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

*Guide has to sign the certificate, Only if all above activities has been Completed.

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2020-2021

Date of certificate generation : 16 April 2021 (17:24:59)

This is to certify that, ***Chavda Bhumiben Raysinhbhai*** (Enrolment Number - 180423107001) working on project entitled with ***INTERNET OF BRAIN*** from ***Computer Engineering*** department of ***SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : C h a v d a B h u m i b e n Raysinhbhai

Name of Guide : Dr. Keyur Mahesh Rana

Signature of Student : _____

*Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

*Guide has to sign the certificate, Only if all above activities has been Completed.

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2020-2021

Date of certificate generation : 16 April 2021 (17:50:06)

This is to certify that, ***Desai Dhwani Yatinkumar*** (Enrolment Number - 180423107002) working on project entitled with ***INTERNET OF BRAIN*** from ***Computer Engineering*** department of ***SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : Desai Dhwani Yatinkumar Name of Guide : Dr. Keyur Mahesh Rana

Signature of Student : _____ *Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

*Guide has to sign the certificate, Only if all above activities has been Completed.

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2020-2021

Date of certificate generation : 16 April 2021 (17:29:29)

This is to certify that, ***Kansara Dhrumi Mehul*** (Enrolment Number - 180423107005) working on project entitled with ***INTERNET OF BRAIN*** from ***Computer Engineering*** department of ***SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : Kansara Dhrumi Mehul Name of Guide : Dr. Keyur Mahesh Rana

Signature of Student : _____ *Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

*Guide has to sign the certificate, Only if all above activities has been Completed.

ACKNOWLEDGMENT

We would like to acknowledge the valuable guidance, constant motivation, and support that we have received throughout our project from our guide Prof. (Dr.) Keyur Rana.

We thank all our faculty members of the Computer Department, SCET who have supported and imparted their knowledge which has helped us in our project.

Regards,

Kartik Gondaliya

Sahil Shingala

Bhumi Chavada

Dhwani Desai

Dhrumi Kansara

Abstract

There are billions of neurons interconnected in the human brain. Human thoughts and their emotional states affect the interactions between these neurons. Every interaction between these neurons creates an electric discharge that cannot be measured using current technology. However, the activity created by thousands of concurrent electric discharges aggregates into waves which can be measured. The sequences of interactions between these neurons are a result of different brain states. These patterns of interaction produce waves of different amplitudes and frequencies. These wave patterns can be used to determine the state of the brain. The project is about the study of the Brain waves with it normalized from EEG and after understanding, it used it for various real-life applications like Home automation, Machine learning, and Robot training. It's a kind of interface that controls thinking.

Table of Contents

Table of Figures

Table of Tables

1. Introduction

1.1 General Idea

Cells within the nervous system, called neurons, communicate with each other in unique ways. The neuron is the basic working unit of the brain, a specialized cell designed to transmit information to other nerve cells, muscle, or gland cells. The brain is what it is because of the structural and functional properties of interconnected neurons.

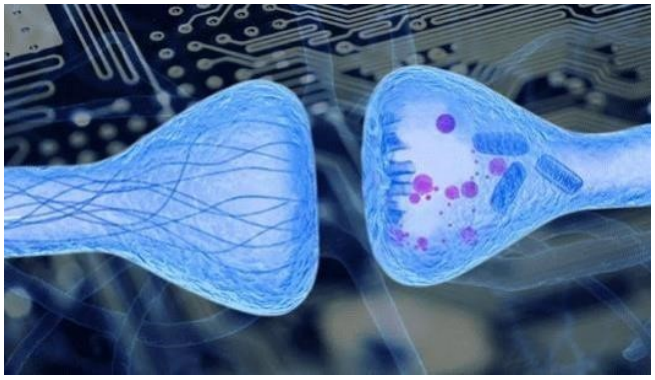


Figure 1: Neurons

- ### What is the inside brain?

An adult brain contains about **100 billion nerve cells**. At times during brain development, **250,000 neurons** are added every **minute**! At birth, a person's brain will have almost all the **neurons** that it will ever have. There are **500 trillion** Connections in the brain. **100,000** neurons at **268 MPH (in miles per hour)**.

- ### Electrons:

The electricity in the brain is not produced by electrons flowing the way they do through a household electrical wire. Instead, the brain's electricity is caused by the movements of electrically charged molecules through the neurons' membranes.

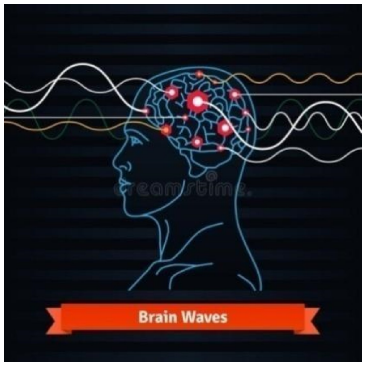


Figure 2: Electrons

1.2 What is EEG Electroencephalogram?

The term 'biosignal' is deemed as any signal measured and monitored from a biological being, although it is commonly used to refer to an electrical biosignal. Electrical biosignal (bio-electrical signals) are the electrical currents generated by electrical potential differences across a tissue, organ, or cell system like the nervous system.

Typical bio-electrical signals are ECG (Electrocardiogram), EMG (Electromyogram), EEG (Electroencephalogram) and EOG (Electrooculogram). GSR (Galvanic skin response) and HRV (Heart rate variability) are also thought of as bio-electrical signals, although they are not measured directly from electrical potential differences.

An electroencephalogram (EEG) is a test used to evaluate the electrical activity in the brain. Brain cells communicate with each other through electrical impulses. An EEG can be used to help detect potential problems associated with this activity. An EEG tracks and records brain wave patterns.

Figure 3: EEG (Electroencephalogram)

- **Human Brain Wave**

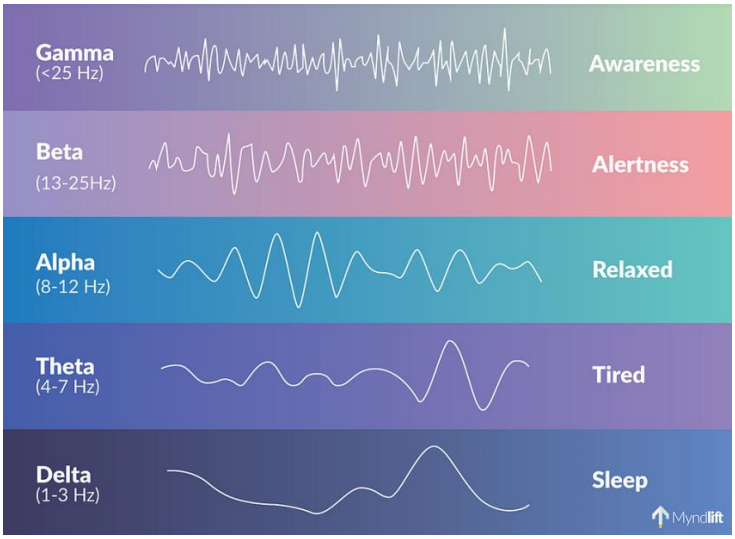


Figure 4: Human Brain Wave

1.3 Brain-computer interface (BCI)

BCI stands for Brain-Computer Interface; it is a synonym of BMI, which is a Brain-Machine Interface. The meaning is the same: some interface that lets the human brain communicate with an external device, as a computer.

If you want a famous movie example, you can think about Matrix: the plug into your head is a BCI that you can use to enter the virtual world of The Matrix.

Figure 5: Brain-computer interface (BCI)

1.4 EEG Headset

Electroencephalography (EEG) is a monitoring method to record the electrical activity of the brain. Wearable EEG headsets position noninvasive electrodes along the scalp. The clinical definition of EEG is the recording of brain activity over some time. EEG electrodes pick up on and record the electrical activity in your brain. The collected signals are amplified and digitized then sent to a computer or mobile device for storage and data processing.[1]

An EEG headset is a wearable device for electroencephalography, a monitoring method to record the electrical activity of the brain. EEG sensors in headsets place electrodes along the scalp to detect brain activity. Analyzing EEG data supports the study of cognitive processes. Doctors can use EEG to diagnose medical issues, researchers can use this method to understand brain processes, and individuals can use EEG to improve their productivity and wellness via monitoring their moods and emotions, developers can use EEG for BCI to execute direct mental commands in app development and many other use cases.[1]

1.5 How do EEG Headsets Work?

Electroencephalography (EEG) headsets detect brain activity through electrodes placed in an array along the user or research subject's scalp. There are a few different types of EEG headsets. Comparison is often drawn between dry electrode EEG headsets and wet electrode arrays. Wet electrodes use a conductive gel, saline fluid, or other material to improve signal

quality. This ensures the EEG device captures high-quality data. Most dry EEG headsets provide good quality readings, so the conductive gel is not normally required unless high-quality data is required for specific clinical reasons or high accuracy.[1]

1.6 What are EEG Headsets Used For?

Electroencephalography (EEG) headsets are used for medical research, understanding mental states, and diagnosing certain medical conditions, such as epilepsy and sleep disorders. EEG headsets can also be used for brain-computer interfaces. Wireless EEG headsets are those which do not require wires to send the data capture to a computer for analysis. This portable EEG headset format is ideal in everyday situations outside of a laboratory or in research labs hoping to expand the number of research subjects. It is also used for computer-brain interfaces, such as EEG headset gaming. EEG ADHD training programs use neurofeedback to "exercise" the brain. Subjects wear an EEG VR headset while playing video games specially designed to enhance cognitive skills or control physical objects. Open source EEG applications are barely starting to break the surface of possibility. Developers are increasingly using EEG SDKs to find new and amazing possibilities for EEG headset gaming.[1]

1.7 Explore the BCI Devices

- **Different EEG Device:**[2]
  1. NeuroScan
  2. Brain Products
  3. BioSemi
  4. EGI
  5. Emotiv
  6. NeuroSky Mindwave Mobile 2
  7. Advanced Brain Monitoring
  8. G tec
  9. ANT Neuro
  10. Neuroelectrics
  11. Muse
  12. OpenBCI
  13. Cognionics
  14. mBrainTrain

Figure 6 : Different EEG Device

1.8 NeuroSky

NeuroSky, Inc. is a manufacturer of Brain-Computer Interface (BCI) technologies for consumer product applications, which was founded in 2004 in Silicon Valley, California. The company adapts electroencephalography (EEG) and electromyography (EMG) technology to fit a consumer market within several fields such as entertainment (toys and games), education, automotive, and health.[3]

NeuroSky MindWave Mobile 2 is an EEG headset that safely measures and transfers the power spectrum (alpha waves, beta waves, etc.) data via Bluetooth Low Energy (BLE) or Bluetooth Classic to wirelessly communicate with your computer, iOS, or Android device. Simply slip this headset on to see your brainwaves change in real-time. With the MindWave Mobile 2, you can monitor your levels of attention and relaxation and even learn about how your brain responds to your favorite music. This headset is an excellent introduction to the world of brain-computer interface.[4]

Figure 7: NeuroSky

1.9 Explore the Application of NeuroSky Mindwave Mobile 2

1. **Little Buddha - meditation with EEG neuro-headsets: Gaming Application:**[5]

The application was created for the regular practice of meditation and attention with Bluetooth EEG neuro headsets of NeuroSky Mindwave Mobile 2, Brain link.

Figure 8: Little Buddha_Application of NeuroSky Mindwave Mobile 2

2. **Math Trainer: Education Application:**[5]

Train your arithmetic skills to be more precise and efficient.

3. **BrainExpress: Wellness Application:**[5]

BrainExpress – Technology for you! Improve your mental abilities permanently with our dedicated training. BrainExpress is a new and expanded app that is based on our successful Brain Starter App. Improve, record, and analyze your brain's activity in any way you like – individual training, preset training, raw data recording, and export, all this and more are possible with BrainExpress!

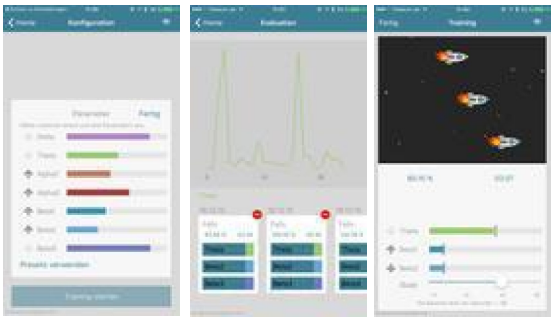


Figure 9: BrainExpress_Application of NeuroSky Mindwave Mobile 2

4. Research Tools: Research Tool Application:[5]

The Research Tools includes NeuroView and NeuroSky Mindwave Mobile 2Lab, two specialized applications to study and understand the behaviors of brainwaves

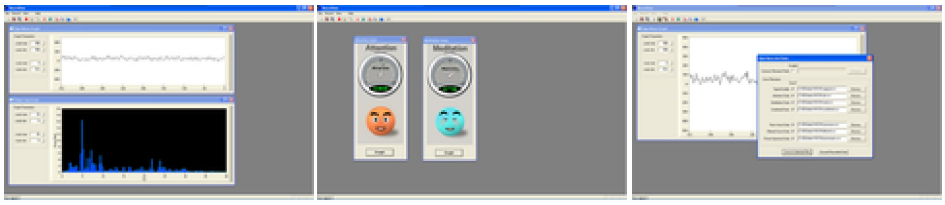


Figure 10: Research Tool_Application of NeuroSky Mindwave Mobile 2

5. Windows Developer Tools 3.2: Development Tool:[5]

Create and publish your brain-powered PC game or application with NeuroSky Mindwave Mobile 2'sMindWave and MindWave Mobile 2.

Figure 11: Development Tool_Application of NeuroSky Mindwave Mobile 2

1.10 Understand the EEG Data Format and Signal received from NeuroSky Mindwave Mobile 2

NeuroSky Mindwave Mobile 2 has developed a dry sensor system for consumer applications of EEG technology. The NeuroSky Mindwave Mobile 2 system consists of dry electrodes and a specially designed electronic circuit for the dry electrodes.

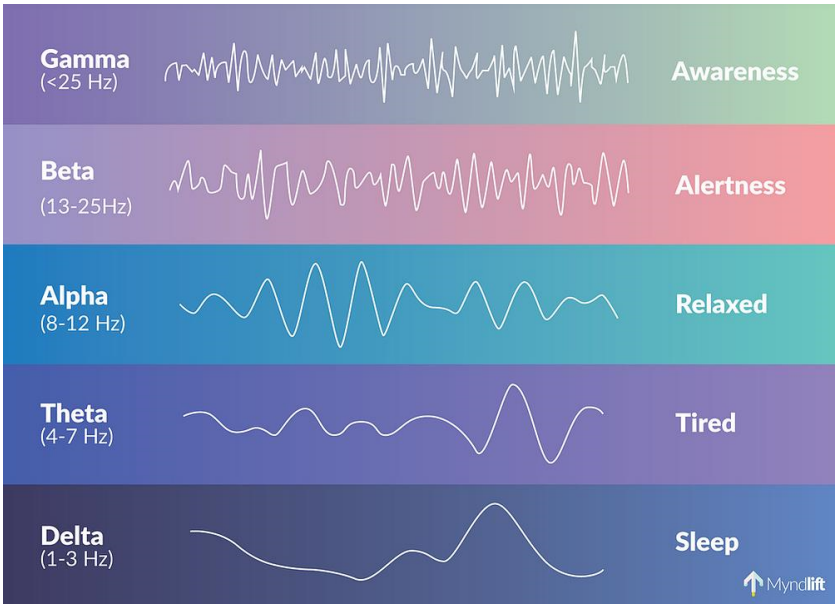


Figure 12: Brain Wave

1. **TGAM (ThinkGearAM):** ThinkGear is the technology inside every NeuroSky product or partner product that enables a device to interface with the user's brainwaves. ThinkGear includes the sensor that touches the forehead, the contact and reference points located on the ear pad, and the onboard chip that processes all of the data and provides this data to software and applications in digital form. Both the raw brainwaves and the eSense Meters (Attention and Meditation) are calculated on the ThinkGear chip.

2. **POOR_SIGNAL Quality:** This unsigned one-byte integer value describes how poor the signal measured by the ThinkGear is. It ranges in value from 0 to 200. Any non-zero value indicates that some sort of noise contamination is detected. The higher the number, the more noise is detected. A value of 200 has a special meaning, especially that the ThinkGear contacts are not touching the user's skin.

   This value is typically output every second and indicates the poorness of the most recent measurements.

A poor signal may be caused by several different things. In order of severity, they are:

- Sensor, ground, or reference contacts not being on a person's head (i.e. when nobody is wearing the ThinkGear).
- Poor contact of the sensor, ground, or reference contacts to a person's skin (i.e. hair in the way, or a headset that does not properly fit a person's head, or headset not properly placed on the head).
- Excessive motion of the wearer (i.e. moving head or body excessively, jostling the headset).
- Excessive environmental electrostatic noise (some environments have strong electric signals or static electricity buildup in the person wearing the sensor).
- Excessive non-EEG biometric noise (i.e. EMG, EKG/ECG, EOG, etc.)

3. **eSense™ Meters**: For all the different types of eSenses (i.e. Attention, Meditation), the meter value is reported on a relative eSense scale of 1 to 100. On this scale, a value between 40 to 60 at any given moment in time is considered "neutral", and is similar in notion to "baselines" that are established in conventional EEG measurement techniques

   A value from 60 to 80 is considered "slightly elevated", and may be interpreted as levels being possibly higher than normal (levels of Attention or Meditation that may be higher than normal for a given person). Values from 80 to 100 are considered "elevated", meaning they are strongly indicative of heightened levels of that eSense.

   Similarly, on the other end of the scale, a value between 20 to 40 indicates "reduced" levels of the eSense, while a value between 1 to 20 indicates "strongly lowered" levels of the eSense. These levels may indicate states of distraction, agitation, or abnormality, according to the opposite of each eSense.

   - **ATTENTION eSense**: This unsigned one-byte value reports the current eSense Attention meter of the user, which indicates the intensity of a user's level of mental "focus" or "attention", such as that which occurs during intense concentration and directed (but stable) mental activity. Its value ranges from 0 to 100. Distractions, wandering thoughts, lack of focus, or anxiety may lower the Attention meter levels.

   - **MEDITATION eSense:** This unsigned one-byte value reports the current eSense Meditation meter of the user, which indicates the level of a user's mental "calmness" or "relaxation". Its value ranges from 0 to 100. Note that Meditation is a measure of a person's mental levels, not physical

levels, so simply relaxing all the muscles of the body may not immediately result in a heightened Meditation level. However, for most people in most normal circumstances, relaxing the body often helps the mind to relax as well. Meditation is related to reduced activity by the active mental processes in the brain, and it has long been an observed effect that closing one's eyes turns off the mental activities that process images from the eyes, so closing the eyes is often an effective method for increasing the Meditation meter level. Distractions, wandering thoughts, anxiety, agitation, and sensory stimuli may lower the Meditation meter levels. See "eSense Meters" above for details about interpreting eSense levels in general.

4. **The signal received from NeuroSky Mindwave Mobile 2:**

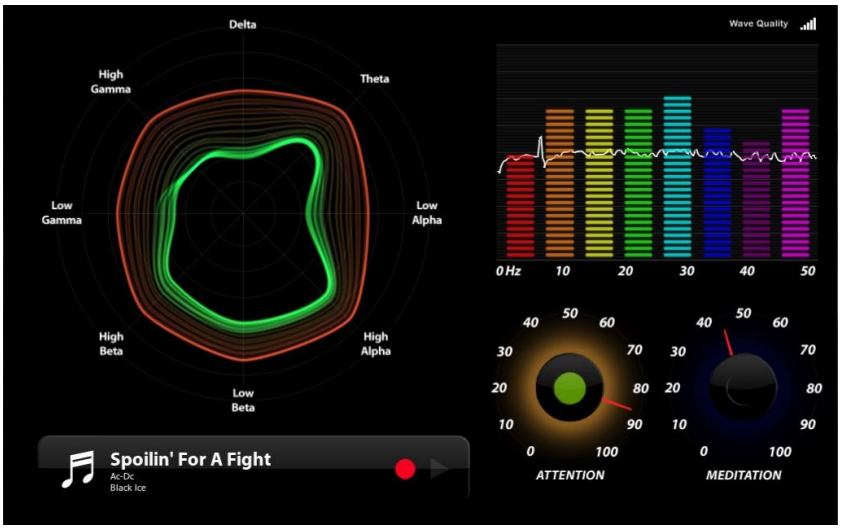


Figure 13: Signal received from NeuroSky Mindwave Mobile 2

1.11 Modules of our Project :

1. Web portal
    A. Automatic play and pause
    B. Meditation session
    C. Screenshot using eye blink
    D. Graph-based analysis

2. Device automation using eye blink

2. An Automated System

Nowadays, everyone is moving towards E-Learning for providing an education in a better way. An automated system provides a one-stop website as a platform of E-Learning for teachers and students. If students did not learn the lecture or video by concentration, She/he cannot catch-up the things in a good manner. So, in this system, if a student's concentration is below the threshold amount then the video lecture will get a pause automatically.

The system will provide 45 minutes for online lecture conduction and 10 minutes will be for meditation. So, meditation will help to prevent student's eye issues from watching for 45 minutes, and they will concentrate on another lecture also.

If students find that the screen will be important then they will take a screenshot using eye blink.

The proposed automated system would consist of the following components:

1. **Database:** At the onset, an automated analysis system consists of an important task of collecting and maintaining a large-scale database of videos, Student records, teacher's records, and viewer's records. Such a database is important for the various automated search mechanisms (explained next). Moreover, such a database can also serve as a comprehensive repository for other purposes such as geo-tagging, population studies, data analytics, etc in the future.

   The data collection for this purpose would be carried out in the following ways:

   A. Student-sourcing of data from teachers. A part of it can be through the web portal that is discussed below, as one of the components of this project.
   B. A Teacher can also know what is a problem with their teaching skills that most students are not able to understand the topic by generating a student's concentration graph.

2. **Recognition and Search (Retrieval):** This is the primary module of the proposed system, which consists of BCI-based online study, how much time duration, in which learners can much concentrate while watching the video. It consists of the following sub-modules which would be integrated with a web portal. This is particularly targeted from the perspective of serving the student, parents, as well as teachers who may require help in the online study through the brain signals, time-based study, mediation, analysis chart.

   A. BCI-based search: Searching for brain signals from the dataset, based on the EEG signals information of a brain signal. Such a recognition task would be carried out via the EEG algorithm for processing brain signals.

B. Concentration-based search: Search for the EEG signal from the dataset, based on the concentration of the human brain signal. Such a recognition task would be carried out via an attention eSense algorithm for processing concentration.
C. Meditation-based search: Searching for EEG signals from the dataset, based on a meditation of human brain signal. Such a recognition task would be carried out via Meditation eSense algorithms processing on meditation data.
D. Analysis-based search: Considering a teacher, can find how many students concertedly attend the lecture. Furthermore, knowledge such as how many time learner videos will be a pause, mediation can solve Lerner's eyes. If such information is also available, as a part of the chart, we can factor it in improving the recognition and retrieval task.
E. Screenshot-based search: Searching for lecture's screenshot from the database. Such recognition tasks would be carried out via eye blink algorithm processing on learner's take screenshot using eye blink.

3. **Locating videos using BCI:** While this task serves as a precursor to the above-mentioned recognition systems, it can also be considered as a stand-alone application, which can greatly help in reducing the learner's health issues.

4. **Large scale data, Cloud-based processing, Interactive web-portal:** As indicated earlier, one of the traits of such a system is to handle large-scale and continuously growing data (in terms of searching across tens of thousands or lacks samples). Thus, we propose a cloud-based platform for sophisticated BCI approaches.

   For applications involving recognition and search, a part of the project would also involve developing a user-friendly web portal and which will cater to:

   A. Learner's user, interested in finding brain signals based on the automated search mechanisms discussed above.
   B. Teacher or parent users, who can help a learner if he/she trouble while watching videos

3. Problem summary

In this pandemic situation, when we are not able to go and study at school/colleges. So, the education sector provides an alternative way to educate a student on an online platform. Every coin has two sides. has like advanced technology provides an advantage to the student but it has disadvantages also.

There are main two disadvantages:

1. **Concentration:** For the student, Concentration is the key to success. If they did not learn the lecture or video by concentration, She/he cannot catch up the things in a good manner.
- where for the teacher's side if the student has not concentrated the lecture there is not worthy of the lecture.
2. **The problem is in Eyes:** Due to this E-learning, there is a possibility for problem cause in students' eyes.
- The next thing is the Relax session is also an important part of the efficient work.

Currently, due to some advancements made in BCI, it is possible to perform brain waves classification using an EEG device [NeuroSky Mindwave Mobile 2], and observe the brain activity that determines concentration, meditation, and eye blink level. Of course, the problem is way too complex than what is mentioned.

The NeuroSky Mindwave Mobile 2 not only provides this brain wave but sometimes it also provides noise in a dataset and if the NeuroSky Mindwave Mobile 2 will not place properly the quality will lose. In some cases, the student will concrete property but if he/she will think about this topic only but the concrete level also decreases a great challenge in itself.

4. Aim and Objective

4.1 Aim

Due to this COVID pandemic situation, the Education sector has a drastic shift in the learning culture. E-learning is one of the preferable and accepted ways across the globe for educational activities. But these changes bring many problems as well. We aim to enhance the online learning experience along with overcoming the hurdles of the new problem.

Our main goal is to develop one web-based platform which can overcome mainly 4 problems which we classify by the experiences of students.

- **Surrounding distractions :**

  During a lecture, there are a lot of factors which can distract students because the surrounding is home. Other distractions also play a role like social media, games, etc. So we focus on overcoming this hurdle in our solution.

- **Decrease construction :**

  Because of the whole day of learning, the student faces the problem of lack of the same attention throughout the day. so we will focus on the enhancement of the construction in our platform.

- **Teachers doesn't get proper insights into their teaching :**

  Because of distance learning, teachers can only focus on fewer students and cannot build the responsive environment they have in school. That's why we are planning to provide some analytics that helps them to get insights into their lecture.

- **Smart Featured enable platform :**

Our platform will have some smart features which can enable a student to control their surroundings. Some smart features will also help them during lectures like maintaining notes at a particular point.

4.2 Objectives

The objective of this project is to provide a web platform collaborated with the Internet of Brain technologies which can address all the problems and fulfill the goals. we will divide our solutions into different modules according to the problems.

- **Overcome the problem of distraction during learning :**

  We are focusing on the new growing technology called a Brain Computer Interface(BCI). As we know that our brain has billions of neurons and when communication between neurons is initiated, the electric pulse will generate. So, We will use a BCI device that can capture that pulse signal from the mind. We will use that captured signal to develop our solutions. After getting data from the BCI device, we will classify that data for machine learning and calculate the concentration. and that concentration values will be used to control the video like play or pause video automatically according to the level of concentration of the brain.

- **To improve concentration level and reduce the boredom of learning :**

  As per the research, Brain needs 5 min of a break after 45 min of learning. So we will build a feature that pops up break alert after 45 min of continuous learning and also enable relaxation music to improve focus again and along with that we continuously collect that data to provide a graph for the user about their calmness

- **Analysis for teacher :**

  To provide better insight of lecture, we will use data which gather from each student and will provide graph based analysis of lecture. So teachers can easily get proper ideas about less engaged portions of their lecture.

- **Smart feature :**

  We plan for the system which can take screenshots just by using blink's student can take screenshots which will help then to prepare notes after lecture

  We will also extend our application toward providing the access of their surroundings like control of their rooms devices during lecture. and that will also operate by blink. So one can control his room's light and fan by his blink only.

5. Brief literature review

5.1 Brain-computer interface:

Brain-computer interfaces (BCI) are systems that provide communications between human beings and machines. BCI's can be used, for example, by individuals to control an external device such as a wheelchair. A major goal of brain-computer interfaces (BCI) is to decode intent from the brain activity of an individual, and signals representing the decoded intent are then used in various ways to communicate with an external device.[6]

5.2 Wearable and mobile brain-computer interface (BCI) device and method:

This invention can be embodied in a wearable and mobile Brain-Computer Interface (BCI) device and a method for measuring electromagnetic energy from a person's brain. The ability to measure electromagnetic brain activity (such as electroencephalographic EEG activity) with a wearable and mobile Brain-Computer Interface (BCI) device allows such measurement while a person is ambulatory. With wearable and mobile devices, a person is free to do their normal activities.[7]

5.3 Electroencephalogram acquisition and wireless transmission device:

TGAM module, this TGAM module adopts NeuroSky Mindwave Mobile 2 god to read the brain wave acquisition module of science andtechnology.

For being attached to the forehead electrode of the forehead, it exports and connects the TGAM module; This forehead electrode is the dry electrode of silver chloride adopting NeuroSky Mindwave Mobile 2 god to read science and technology. Bluetooth sending module, its input connects TGAM module;

Bluetooth receptions module is connected with Bluetooth sending module radio communication.[8]

5.4 BCI input interface system and method for the serious game:

The present invention, a BCI input interface system for a functional game measures minute brain wave signals generated from nerve cells of the brain by a plurality of detection electrodes on the surface of the wearer's brain, (Less than 4 Hz), theta wave (4 to 7.99 Hz), and the alpha wave (8 to 12.99 Hz) by FFT transforming the amplified EEG signal and filtering it by frequency band by a filter. , a beta wave (13 to 29.99 Hz) and a gamma wave (30 to 50 Hz), A / D converting the classified EEG signal, and converting the BCI signal (EEG signal).[9]

5.5 Intelligent wheelchair control method based on brain-computer interface and automatic driving technology:

The present invention relates to the application research of brain-computer interfaces and the field of artificial intelligence, in particular to an intelligent wheelchair control method based on a brain-computer interface and an automatic driving technology.[10]

5.6 EEG collection-based method and system for monitoring the classroom teaching process:

The invention provides an EEG collection-based method and a system for monitoring the classroom teaching process, particularly for monitoring the fluctuation condition of students' brain waves during the classroom teaching process. The collection terminals of the system collect the brain wave data of students via brain wave sensors. After being processed and framed, the brain wave data of students are transmitted to a server from a wireless local area network through a WIFI module. The monitoring terminal of the system acquires data from the database of the server via the local area network and then displays the brain wave data of all the collection terminals. In this way, the individual fluctuation information and the overall fluctuation information of the collected brain wave data of students can be displayed in real-time.[11]

5.7 Teaching System for Improving Information Retention Based on Brain-State Monitoring:

The present invention significantly increases the effectiveness of computer-based education by adjusting the presentation of CBE material according to a monitored brain state of the student. In one embodiment, EEG sensing is used to identify changes in engagement or attention by the student and to trigger attention-promoting interventions based on a dynamic engagement threshold. More specifically, in one embodiment the present invention provides a computer-based education system having a brain activity monitor providing monitoring of brain activity of the student. An electronic computer communicating with the brain activity monitor presents an educational program to the student while it receives a signal from the brain activity monitor indicating a brain activity of the student to provide an engagement signal indicating student attention. The engagement signal is compared to a dynamic threshold to identify a plurality of points demarcating periods of declining attention and the presentation of the educational program is modified to promote student attention at times of the identified points.[12]

It is thus a feature of at least one embodiment of the invention to practically identify points of declining engagement applicable to a wide range of students and educational materials. The creation of a dynamic threshold accommodates differences in individuals to successfully initiate attention-enhancing stimulation for those individuals.[12]

6. Requirement Analysis and Design

6.1 Class diagram

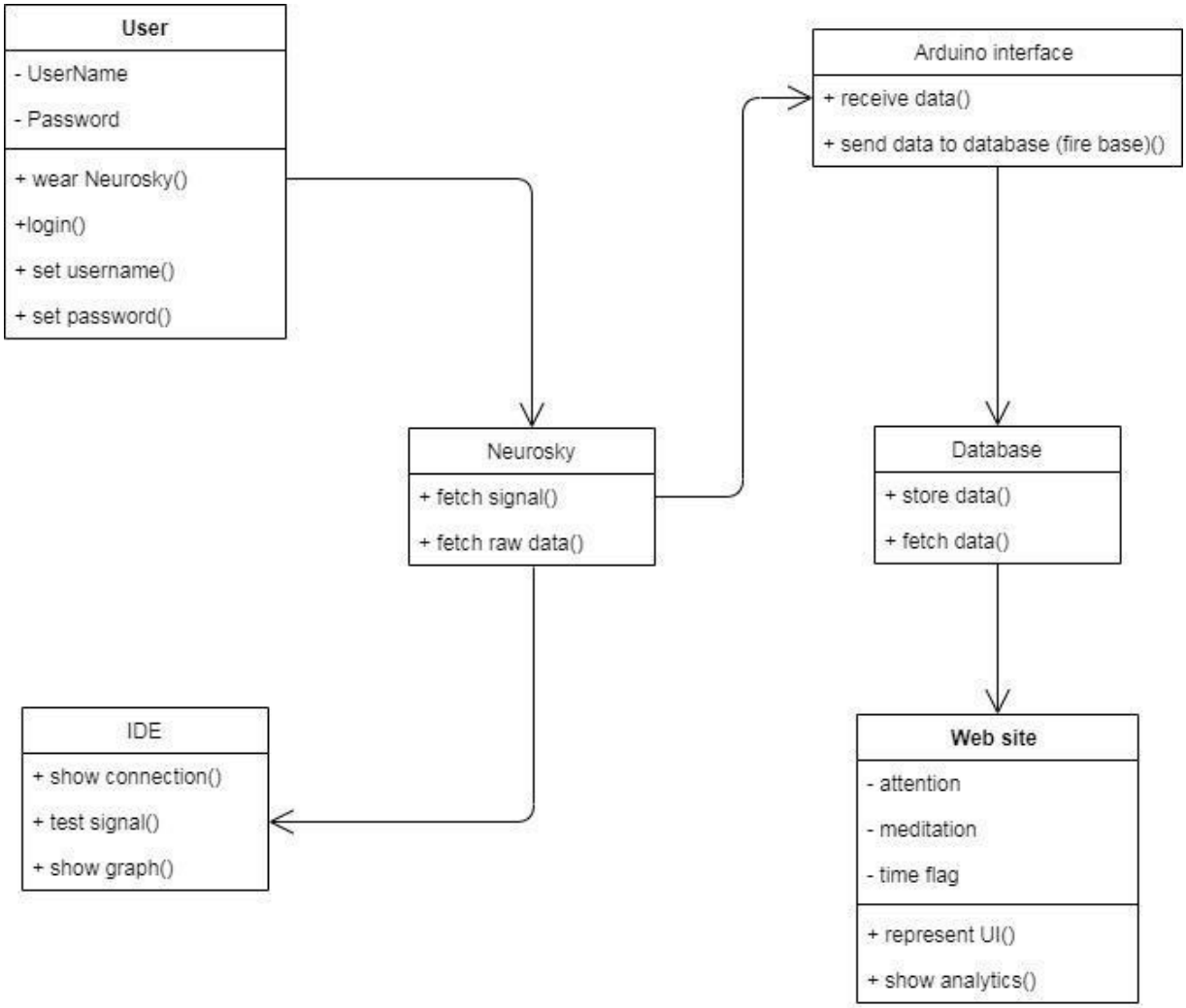


Figure 14 : Class diagram

6.2E-R Diagram

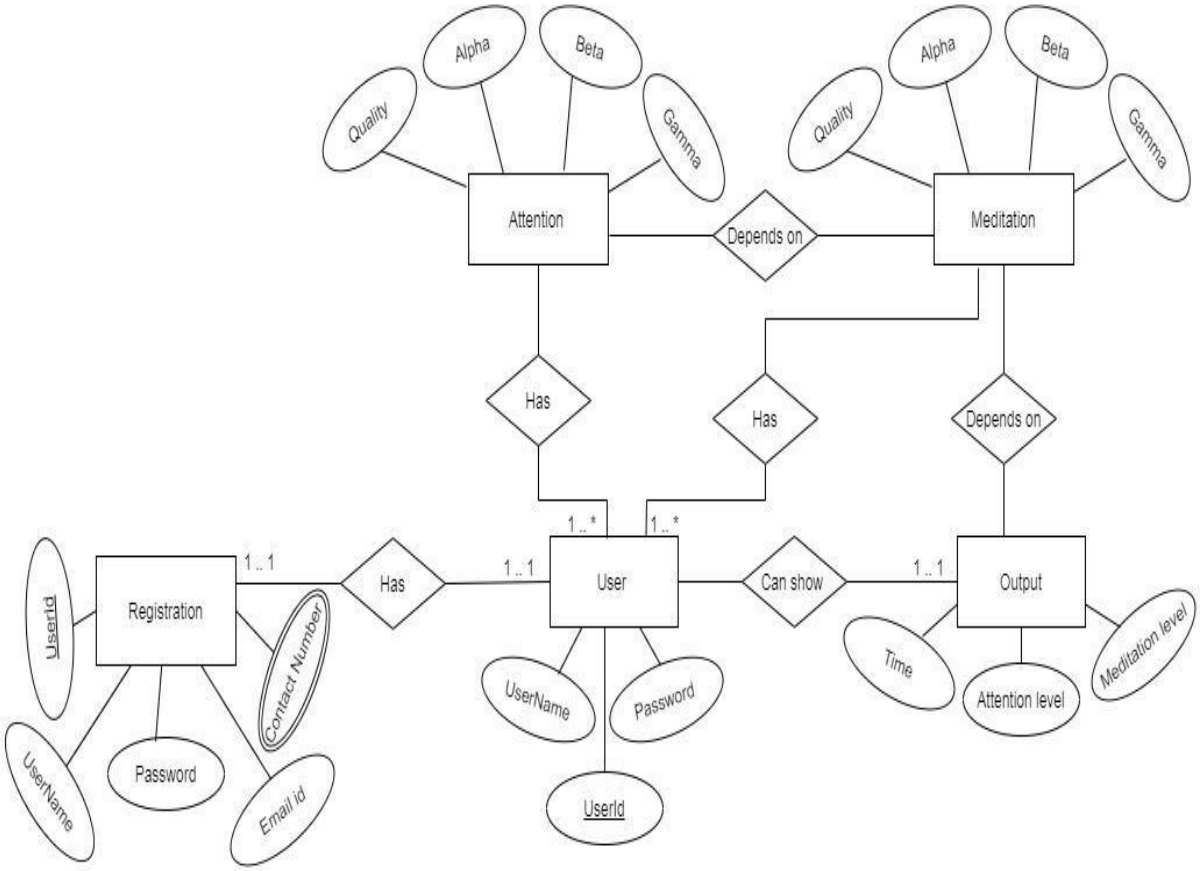


Figure 15: E-R Diagram

6.3Activity Diagram (NeuroSky Mindwave Mobile 2 to IDE)

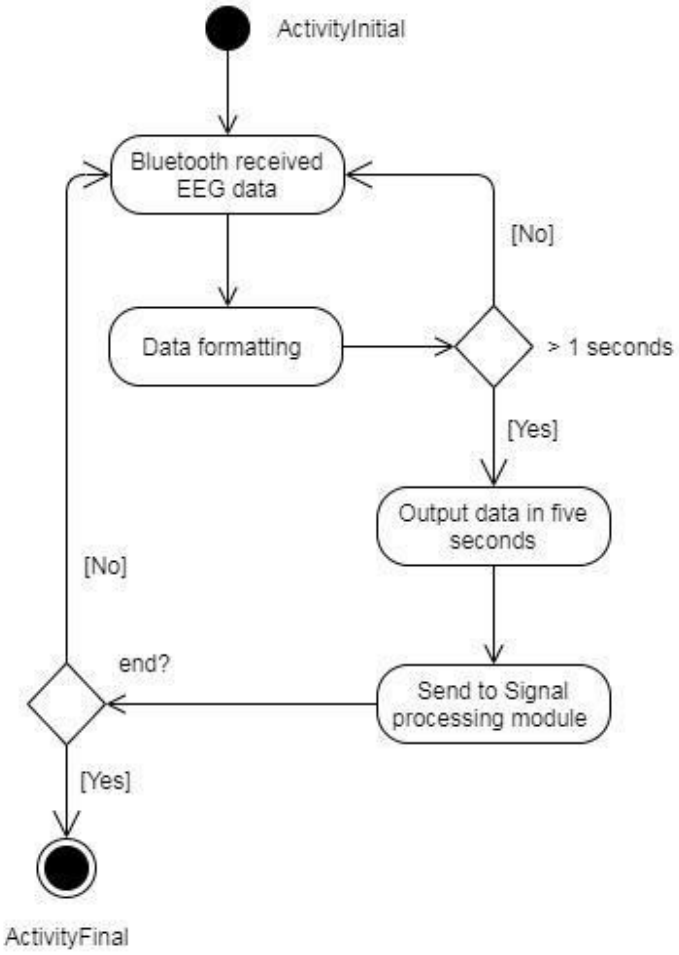


Figure 16: Activity Diagram (NeuroSky Mindwave Mobile 2 to IDE)

6.4Activity Diagram (NeuroSky Mindwave Mobile 2 to Database)

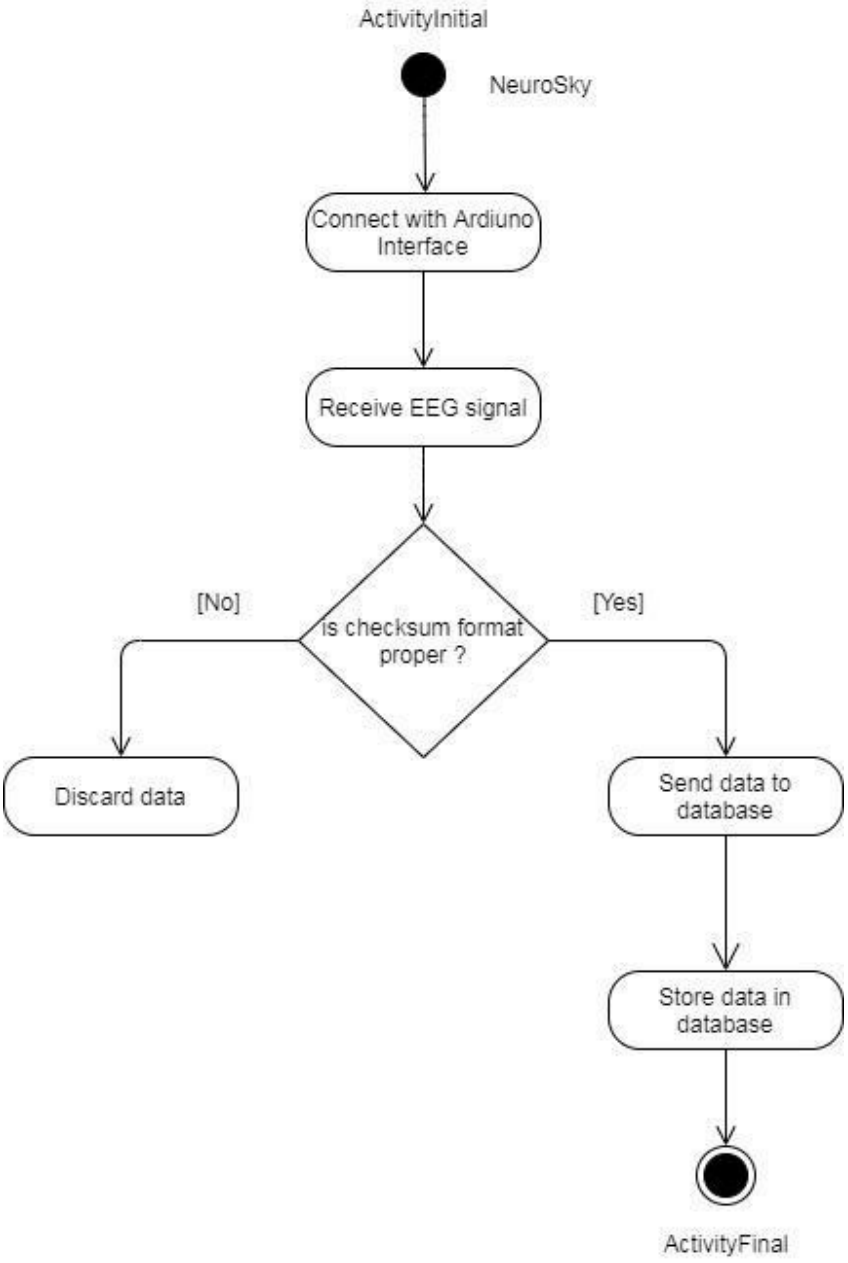


Figure 17: Activity Diagram (NeuroSky Mindwave Mobile 2 to Database)

6.5 Sequence Diagram

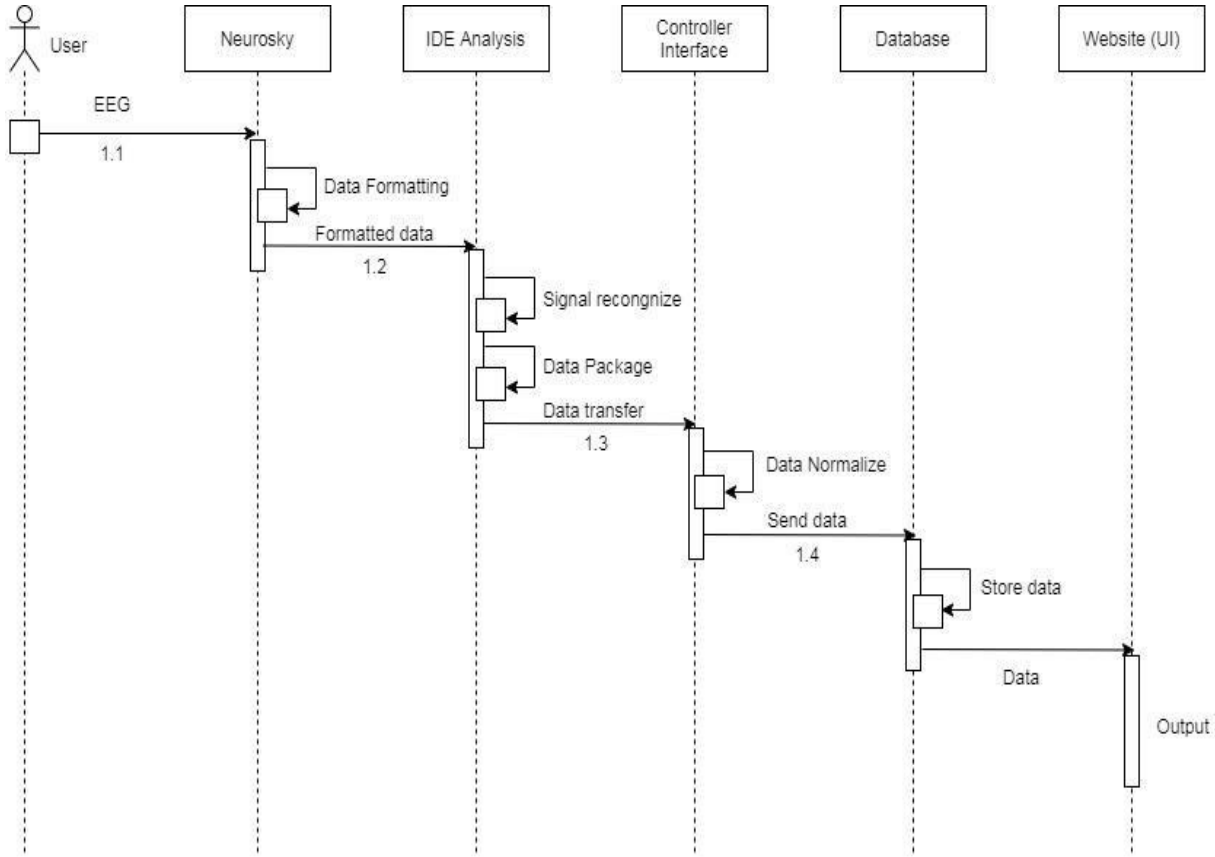


Figure 18: Sequence Diagram

6.6Use case Diagram

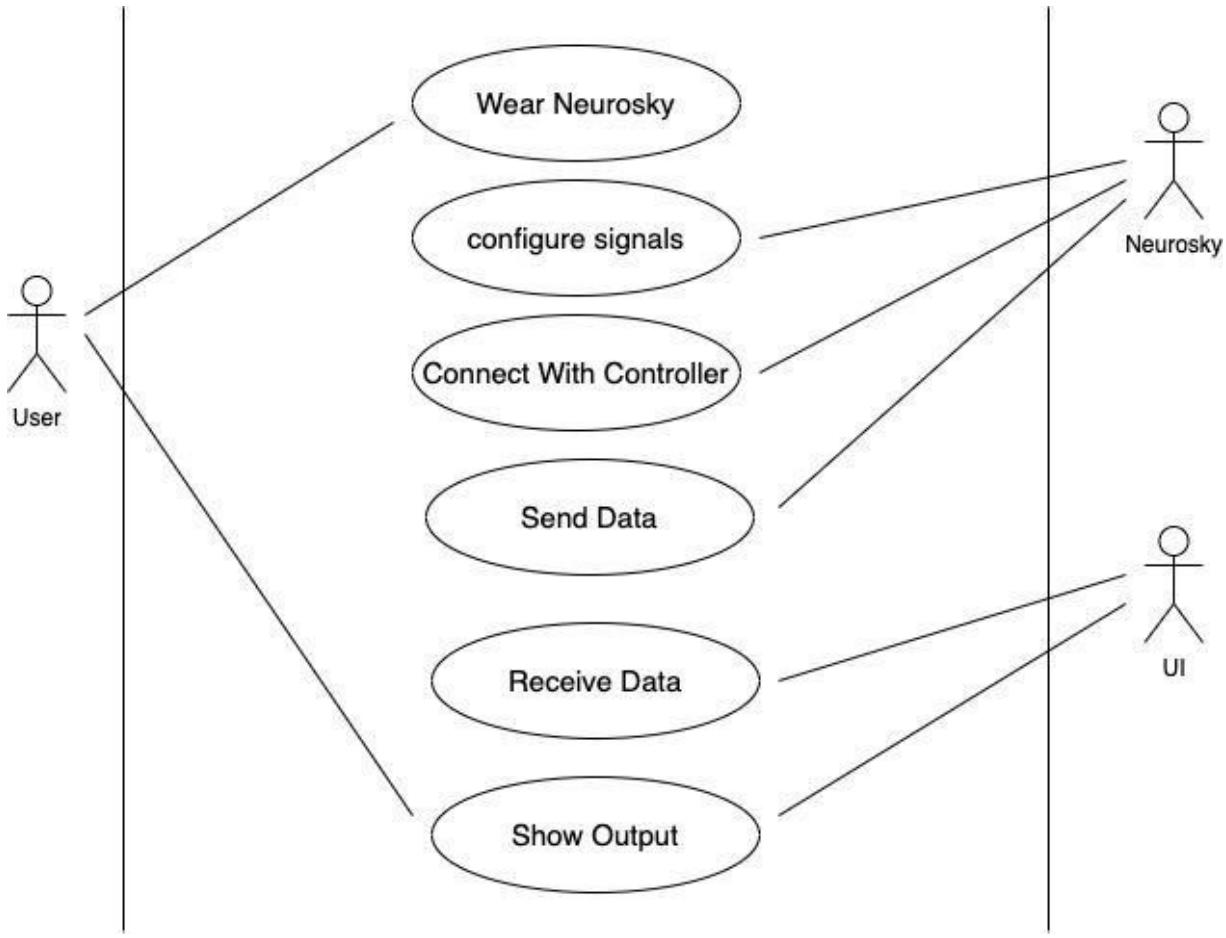


Figure 19: Use case Diagram

7. Materials and methods used

7.1 Hardware:

Table 1: Hardware Used

Name	Quantity	Price (Rs.)	Q x P
NeuroSky MindWave Mobile 2	1	15000	15000
Arduino Uno	1	320	320
Bluetooth HC-05	1	180	180
Miscellaneous	1	500	500
Total			**16000**

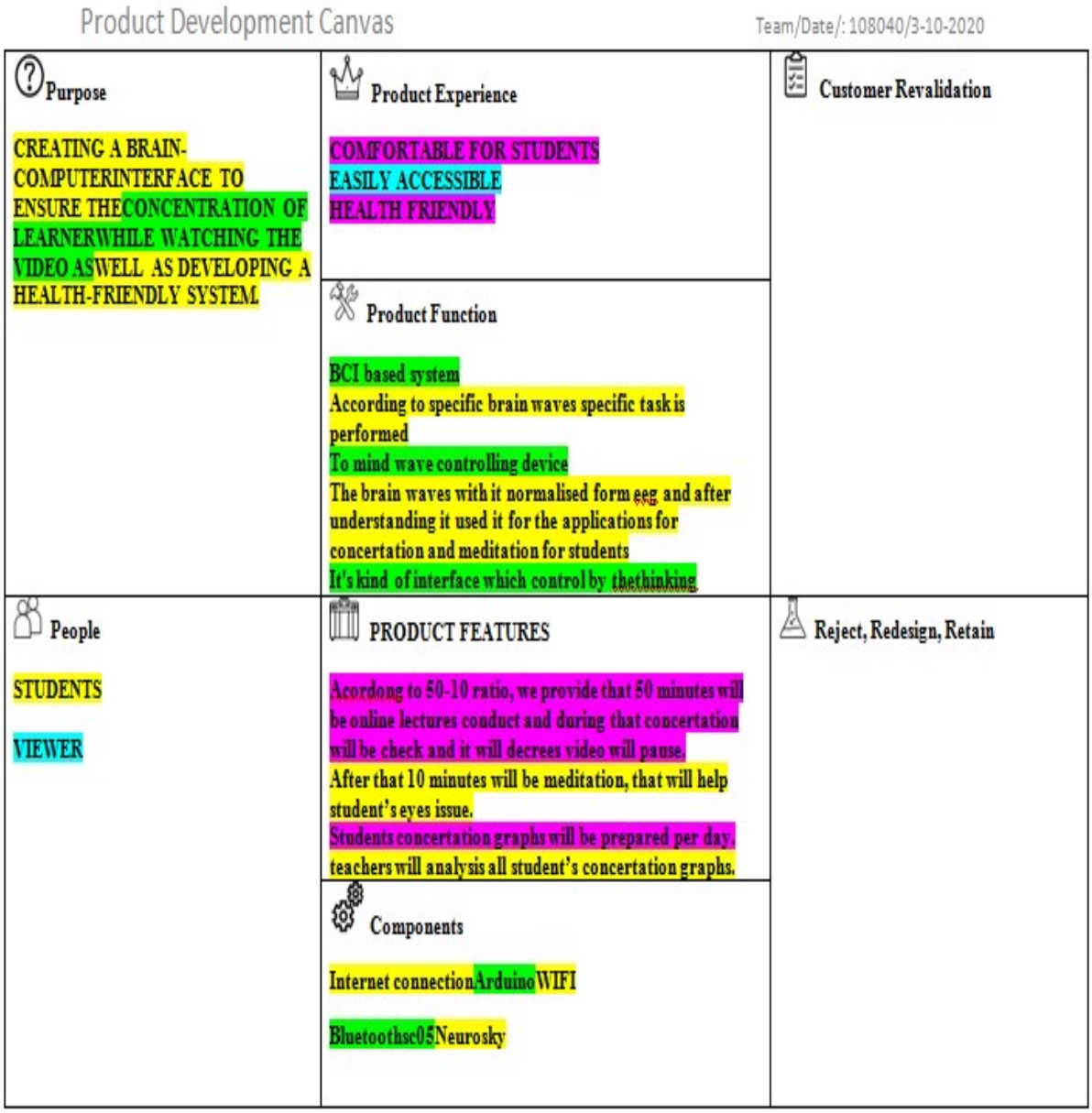
7.2 Software:

Table 2: Software Used

Name
Arduino IDE
PySerial
NeuroSky Communication Protocol
Firebase
Nodejs
Reactjs

8. Implementation methodology of design-driven innovation through various Canvas exercise

8.1 PDC Canvas



Product Development Canvas

Team/Date/: 108040/3-10-2020

Purpose

CREATING A BRAIN-COMPUTERINTERFACE TO ENSURE THECONCENTRATION OF LEARNERWHILE WATCHING THE VIDEO ASWELL AS DEVELOPING A HEALTH-FRIENDLY SYSTEM

Product Experience

COMFORTABLE FOR STUDENTS
EASILY ACCESSIBLE
HEALTH FRIENDLY

Product Function

BCI based system
According to specific brain waves specific task is performed
To mind wave controlling device
The brain waves with it normalised form eeg and after understanding it used it for the applications for concertation and meditation for students
It's kind of interface which control by thethinking

Customer Revalidation

People

STUDENTS

VIEWER

PRODUCT FEATURES

Acordong to 50-10 ratio, we provide that 50 minutes will be online lectures conduct and during that concertation will be check and it will decrees video will pause.
After that 10 minutes will be meditation, that will help student's eyes issue.
Students concertation graphs will be prepared per day, teachers will analysis all student's concertation graphs.

Components

Internet connectionArduino WIFI

Bluetoothsc05Neurosky

Reject, Redesign, Retain

Figure 20: PDC Canvas

8.2 AEIOU Summary

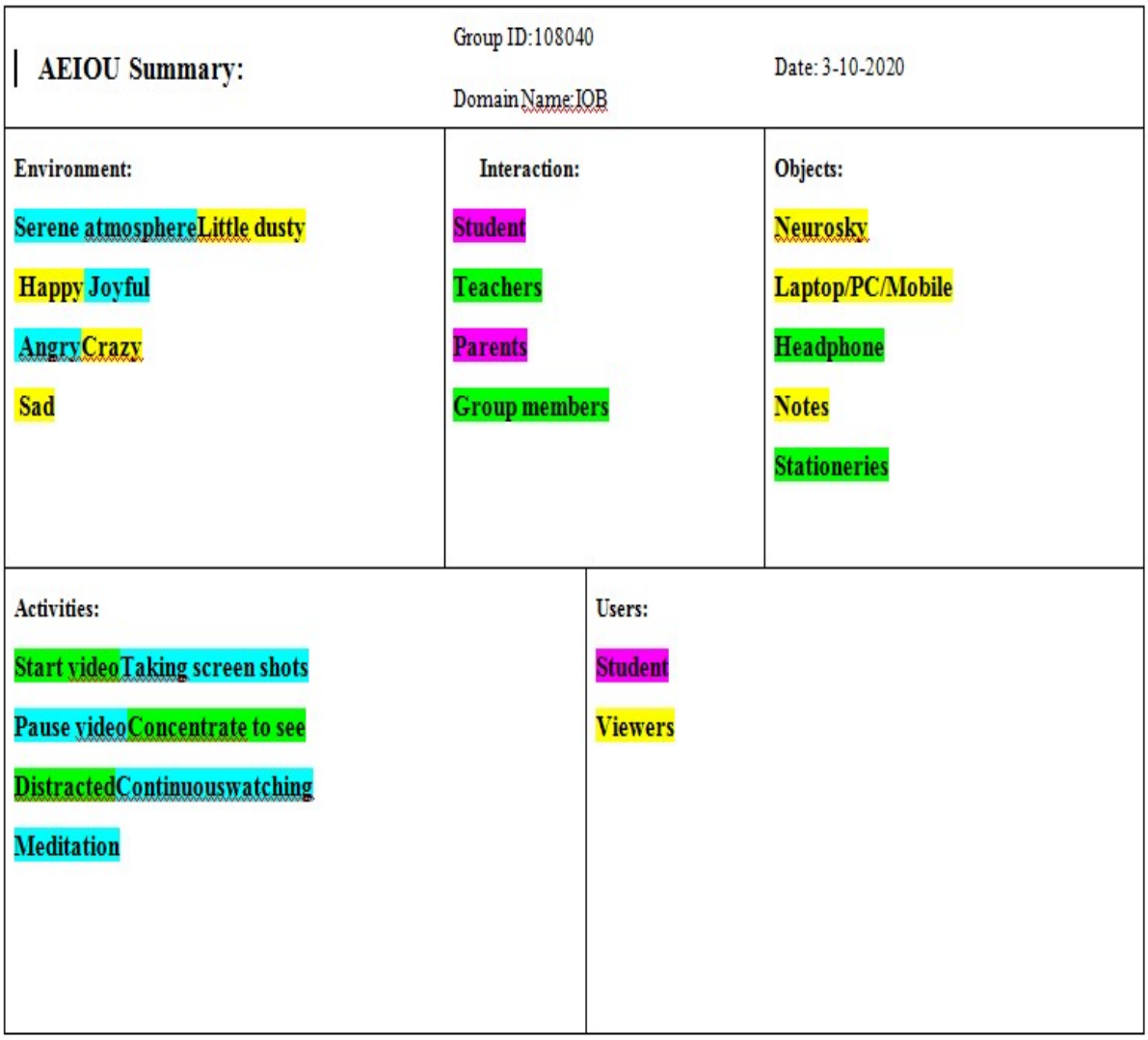


Figure 21: AEIOU Summary

8.3 Empathy Canvas

USER	STAKEHOLDERS
StudentsViewers	TeacherParent
ACTIVITIES Start videoTaking screen shots Pause videoConcentrate to see DistractedContinuous watching Meditation	
STORY BOARDING HAPPY STUDENT WATCH WITH GOOD CONCERTATION DURING LECTURE AND CLEARLY UNDERSTAND EVERYTHING SO IT WILL HELP HE/SHE TO GET GOOD SCORE IN THE EXAMS.	
HAPPY DURING LECTURE IF THERE IS SMALL BREAK STUDENT CAN RELAX THERE SELF BY DOING THERE FAVOURITES THING AND AFTER THAT THEY CAN DO MORE EFFECIENLY WORK.	
SAD STUDENTS HAVE CONTINUE WATCHING ONLINE LECTURES, IF LET IT HAS 4 HOURS PER DAY, SOTHEIRWILL BE CAUSE EFFECTS ON STUDENTTS EYE LIKE DRY EYES SYNDRONE, BURNING SENSATION OF EYES.	
SAD STUDENTS FIND SOME IMPORTANT TOPIC DURING LECTURE AND THAT IS NOT EASY AS WELL AS IF THEY WILL TAKE A SCREEN SHOTS ALSOIT WILL TAKE MORE EFFECTS AND IF THE SCREEN WILL CHANGE?	

Figure 22 : Empathy Canvas

8.4 Ideation Canvas

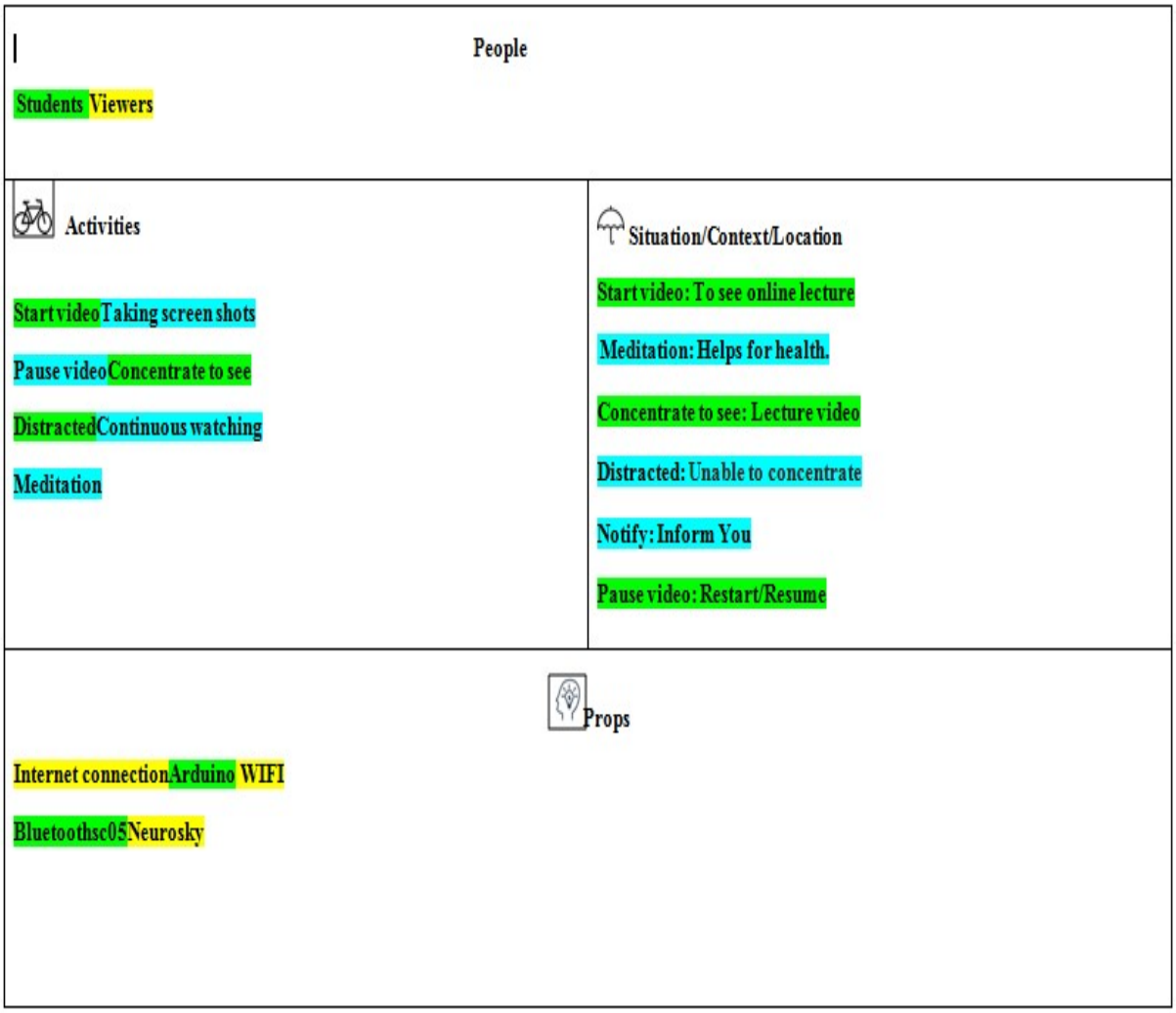


Figure 23 : Ideation Canvas

9. Gantt Chart

	Task	Week	Work Done	Month 1				Month 2				Month 3				Month 4			
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Analysis	Submission of Project Proposal	2	100%																
	Study the available device in the market	1	100%																
	Testing the Neurosky MM2	1	100%																
	Research and Patent Study	8	100%																
	Learn Mindset Communication protocol & Implementation	4	100%																
	Checking Available Solution	3	50%																
	Finalize application	3	50%																
Design	Making DE canvases	2	100%																
	SRS Diagram	3	100%																
	System UI Design	2	75%																
	Cost Estimation	1	50%																
Documentation	PSAR	2	100%																
	Report Making 1	4	100%																
	Report Making 2	4	0%																
Development	Coding Arduino	2	100%																
	Data Collection	4	100%																
	ML on Row Data	2	100%																
	Final Data Collection	2	100%																
	Train the machine	2	100%																
	Neurosky to Firebase Communication	2	100%																
	Prototype on Video	3	100%																

	Web UI	3	100%																				
	Web-based Platform	4	100%																				
Testing	Perform System testing and follow up	4	100%																				
Launch	Launch the System	1	100%																				
	Total	32																					

Table 3 : Gantt Chart

10. Outcome and discussion

10.1 Automatic play and pause the video

Here our team member is wearing NeuroSky MindWave Mobile 2 and he is trying to concentrate on a particular video. If the concentration level is below the threshold level, the video will get automatically paused.

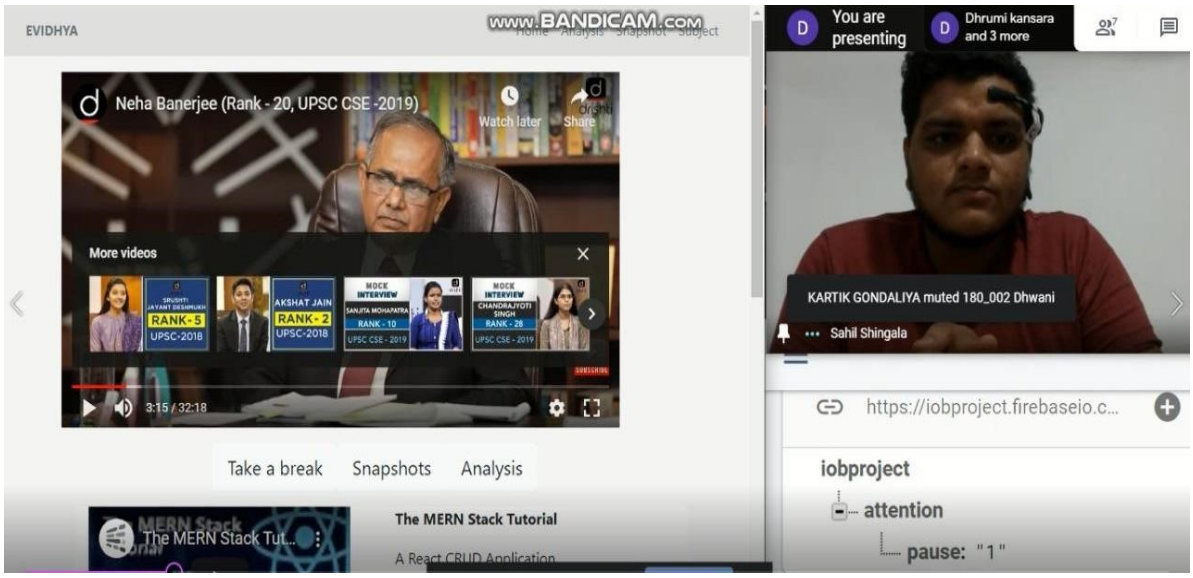


Figure 24 : Pause the video

If he is again concentrating on that particular video. That video will play again automatically.

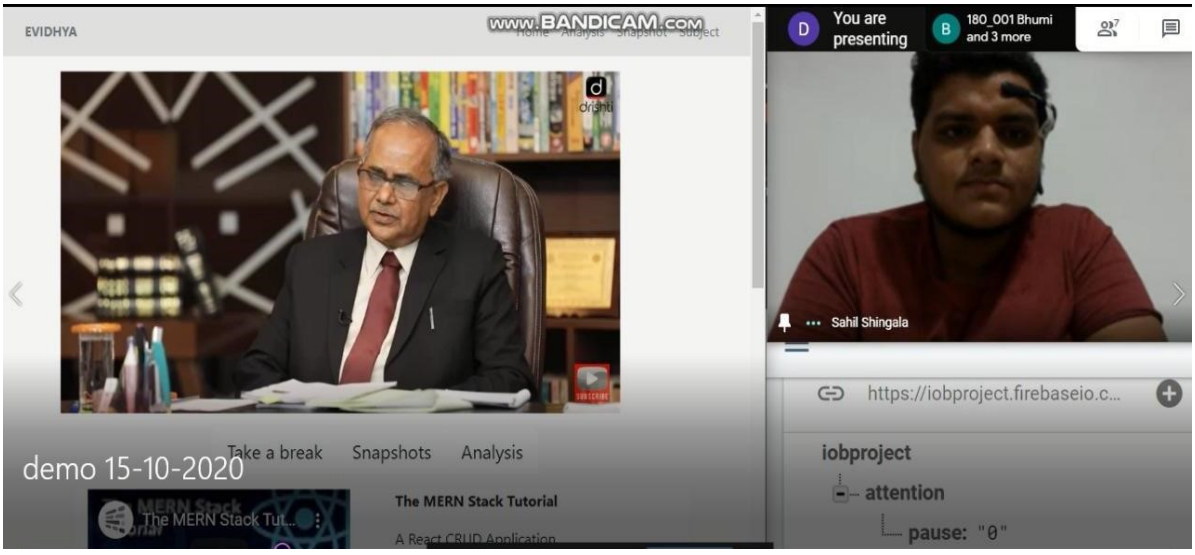


Figure 25: Play the video

10.2 Meditation Session

To recover from the monotony of continuity or boredom, based on research we put the meditation session after 45 minutes of continuous study. so students may take a relaxing session break and that helps them to focus again in the lecture.

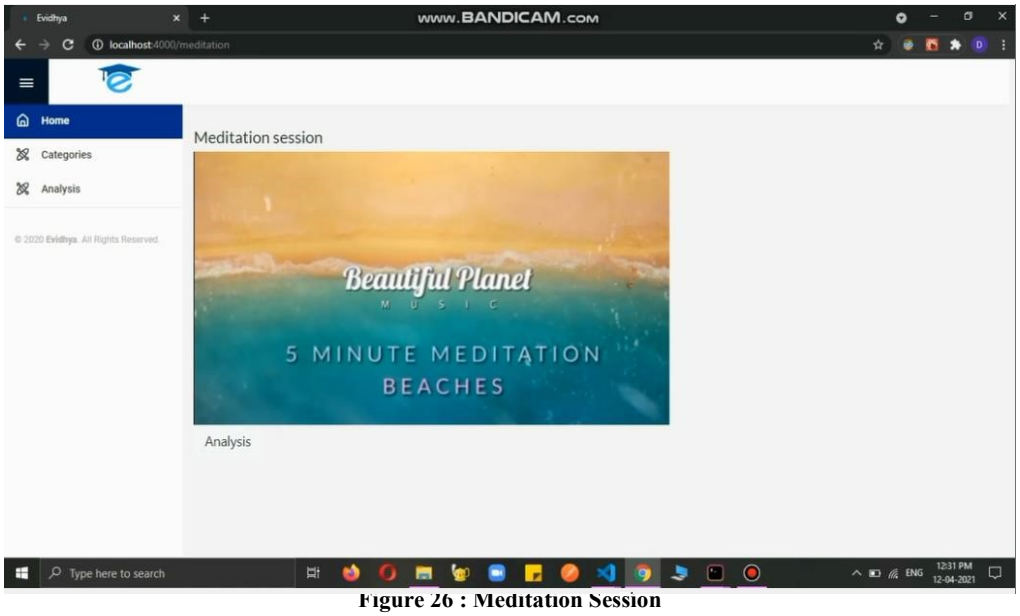


Figure 26 : Meditation Session

10.3 Screenshot using eye blink

Students can easily take a screenshot of a particular screen at a time using just their blink.

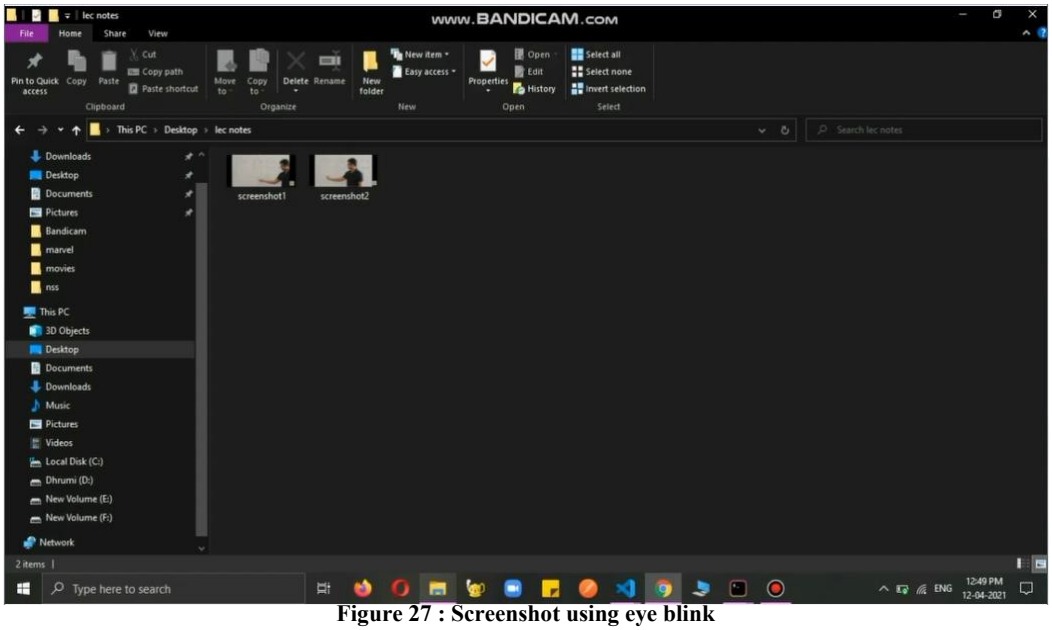


Figure 27 : Screenshot using eye blink

10.4 Analysis

It's a special feature for teachers. We provide a unique graph-based analysis, in which the analysis graph provides information about a particular time in which a student or the majority of students lose their concentration. By clicking on any point, Educator can get at which topic concentration was a lapse.

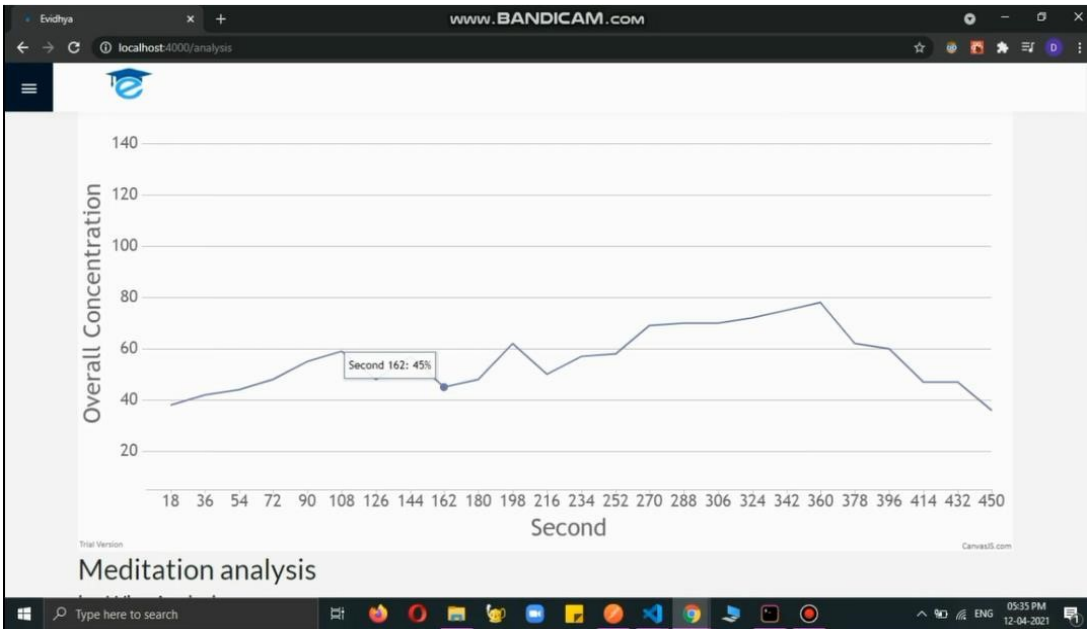


Figure 28 : Attention Graph

The educator gets a slot of the lecture where concentration was a lapse.

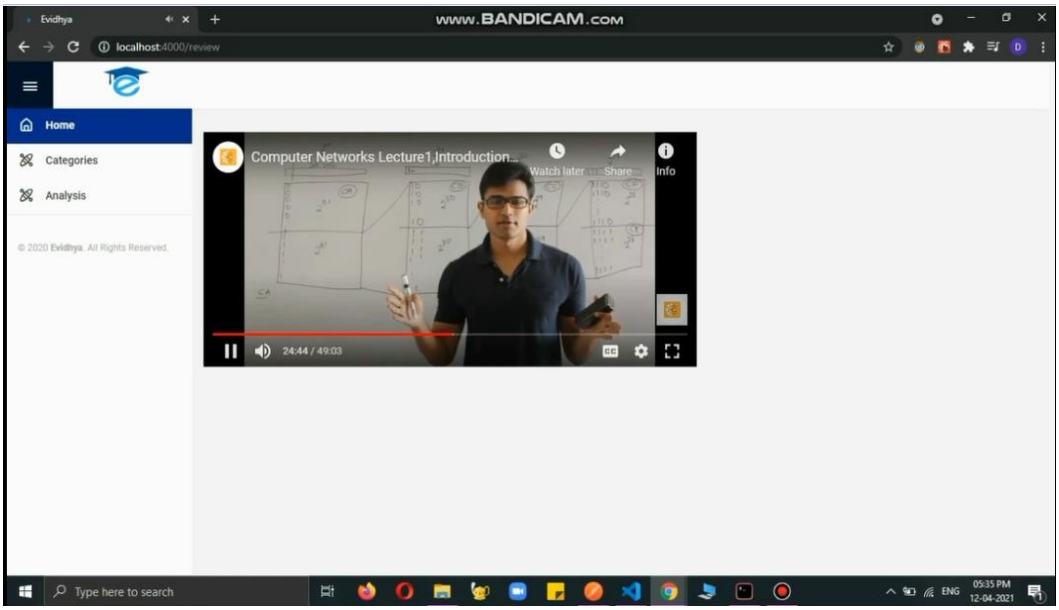


Figure 29 : Play video where students laps their concentration

10.5 Device Automation

By applying machine learning we successfully separated both right and left blinks. It enables a student to control their surrounding devices by just using their left or right blinks.

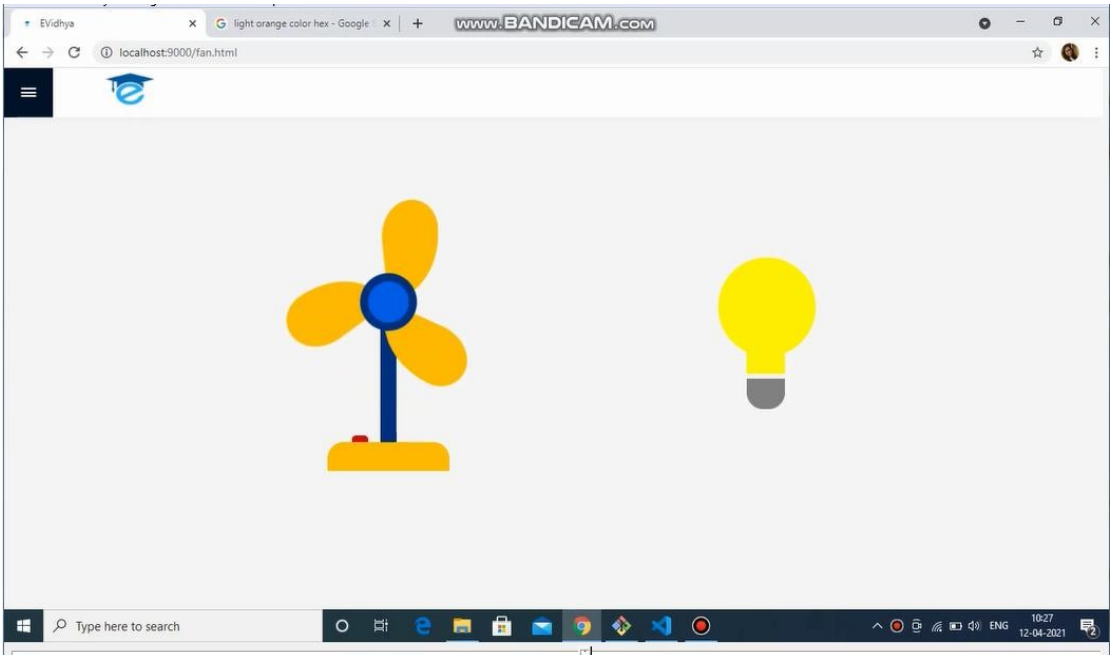


Figure 30: Turn on devices using blinks

Left blink is used to turn on the fan and the right blink is used to turn on the blub and the same blinks are used to turn off the device.

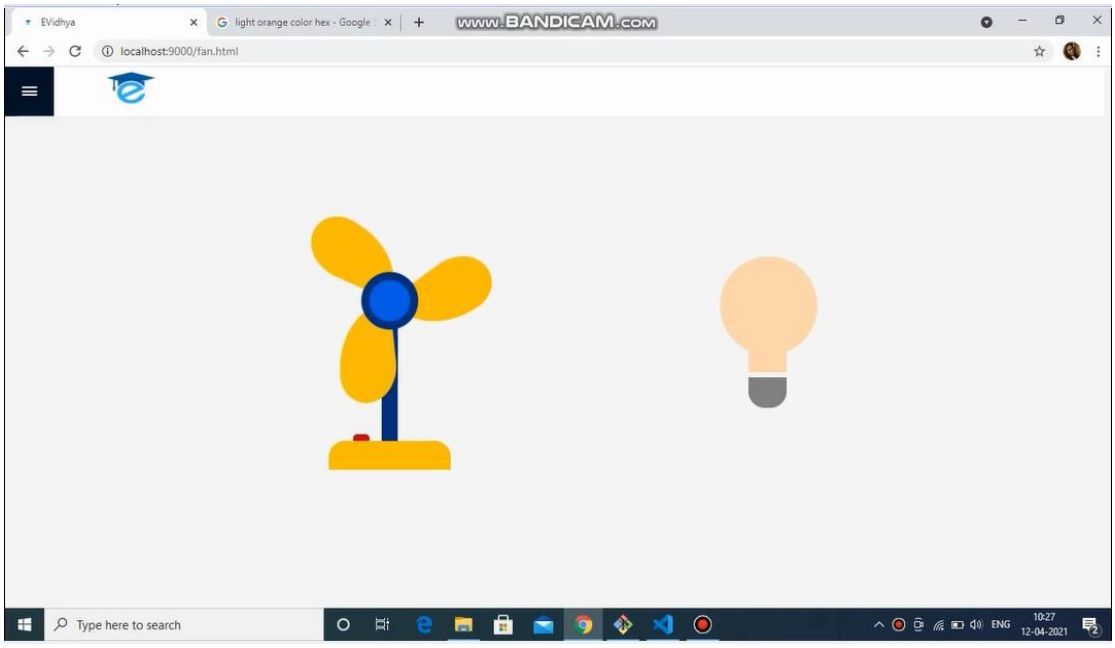


Figure 31: Turn off devices using blinks

11. Conclusion

It can be inferred from the proposed experiment that real-time attention-based learning can be used to improve the average attention levels of the users. The application can be used as an E-learning utility tool by the users to monitor their attention levels and meditation level on an individual level and improve it over some time. The meditation exercise helps to relax in between the long study and the various tools include enhancement for the study activity. Further studies on this field lead to more and more accurate results for the applications and extend this in various fields as well.

12. References

1. https://www.emotiv.com/glossary/eeg-headset/

2. https://imotions.com/blog/top-14-eeg-hardware-companies-ranked/

3. https://en.wikipedia.org/wiki/NeuroSky

4.https://www.rhydolabz.com/sensors-other-sensors-c-137_148/neurosky-mindwave-mobile-2-p-2605.html

5. https://store.neurosky.com/collections/apps

6. http://www.freepatentsonline.com/y2005/0131311.html

7.https://patents.google.com/patent/US10234942B2/en?q=EEG+based+BCI+headset&oq=EEG+based+BCI+headset

8.https://patents.google.com/patent/CN105078448A/en?q=TGAM+module&oq=TGAM+module#legalEvents

9. https://patents.google.com/patent/KR101517007B1/en?q=BCI+headset&oq=BCI+headset

10.https://patents.google.com/patent/US20170095383A1/en?q=brain+computer+interface&oq=brain+computer+interface+

11. https://patents.google.com/patent/CN105139695A/en?oq=learning++with+brain+waves

12. https://www.freepatentsonline.com/y2013/0260361.html

Appendix: A

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Gondaliya Kartik Kamleshbhai
EnrollmentNo : 170420107015 Department : Computer Engineering
MobileNo : 9106360330 Discipline : BE
Email : Kartikgondaliya755@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

We researched finding relevant literature survey for the project and also discussed feasibility and scalability. Made a detailed of all the submodules with the team Did extensive prior art search for all the submodules Had a telephonic session with the internal guide Did Research on Brain wave and Blinked, Brain Controlled Hue Light via Octoblu wheel chair, Brain to light on/off and control car.

2. What challenge you have faced ?

One of the challenges that | faced was this topic has limited amount of data and according to survey it was difficult to implement it.

3. What support you need ?

A road map for learning different brain waves and understand the working theory of Neurosky .

4. Which literature you have referred ?

https://www.youtube.com/watch?v=iF BhTHG XcMQ&list=LLGQW mpRFPh2Cacyr | fW W9-w&index=7&t=0s https://www.hackster.io/andrewstein/brain-controlled-hue-light-via-octoblu-daa2 15 https://youtu.be/mPbtR4vorgY

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Gondaliya Kartik Kamleshbhai
EnrollmentNo : 170420107015 Department : Computer Engineering
MobileNo : 9106360330 Discipline : BE
Email : Kartikgondaliya755@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

I started exploring alternate device that used to read brain waves rather than Neurosky and other BCI project to understand how brain waves works? and survey about EEG signals like delta,theta alfa, beta, gamma signals, so we learned how to operated Neurosky, EEG signals like belta,theta alfa, beta, gamma signals and other devices and its connection by ourselves using the literature survey and videos. Had a telephonic session with the internal guide.

2. What challenge you have faced ?

Working with Neurosky and brain waves signals was a challenge that which signal is useful. How to connect Neurosky with Arduino and to display the result.

3. What support you need ?

I need support for establishment communication protocol for BCI.

4. Which literature you have referred ?

| .Other EEG devices and how it works: https://www.youtube.com/watch?v=8Hyhljng9Z4 2.EEG Signal to Words: https://towardsdatascience.com/using-machine-learning-to-categorise-eeg-signals-from-the-brain-to-words-728aba93b2b3 3.Systems and methods for controlling brain activity:https://worldwide.espacenet.com/patent/search? q=pn%3DWO2017223430A1 4.Intelligent wheel chair control method based on brain computer interface and automatic driving technology:https://patents.google.com/patent/US20170095383A |/enq=brain+computer+interface&oq=brain+computer+interfact+ §.Multi-Channel EEG (BCI) Devices: http://neurosky.com/2015/07/multi-channel-ceg-bei-devices/

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Gondaliya Kartik Kamleshbhai
EnrollmentNo : 170420107015 Department : Computer Engineering
MobileNo : 9106360330 Discipline : BE
Email : Kartikgondaliya755@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

After establishment of communication protocol , we had done signal preprocessing and feature extraction. After this we had started worked on Attention eSense algorithm and Meditation eSense algorithm , we had taken Rawdata of 24 bit at every 2 milli seconds and POWER_EEG of 16 bit at every | sec of interval.

2. What challenge you have faced ?

First there is only one channel in Neurosky Mindwave Mobile 2 to get data from brain so what accuracy of data is getting is lower in Rawdata and POWER_EEG. As well as selecting proper POWER_EEG is difficult.

3. What support you need ?

While using Neurosky Mindwave Mobile 2, by identifying strength of device and way forwarding with this strength.

4. Which literature you have referred ?

|.How to control someone elses arm using brain: https://youtu.be/rSQNi5sAwuc 2.Other EEG devices and how it works: https://www. youtube.com/watch?v=8 Hyhljng9Z4 3.Health manager with Mind Waves: https://www.pantechsolutions.net/interfacing-mindwave-mobile-with-arduino

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Gondaliya Kartik Kamleshbhai
EnrollmentNo : 170420107015 Department : Computer Engineering
MobileNo : 9106360330 Discipline : BE
Email : Kartikgondaliya755@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Finalised the new application for the explore the usage of BCI in Education, So we fetch the data from neurosky and Normalise it and send back to the Computer and use to track the attention and meditation during the video/ lecture is running .That will gives the statistics for Concentration on particular topic as well as on particular time . Also there is relaxation time using meditation value to make sure in decreasing the eyes problems in students.

2. What challenge you have faced ?

How to Direct transfer data from neurosky to computer

3. What support you need ?

To finalise the actual product from the given application

4. Which literature you have referred ?

Matlab code to read attention using Neurosky mindwave Mobile : https://www.youtube.com/watch v=IRaG5vkuJMA&feature=youtu.be

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Shingala Sahil Ghanashyambhai
EnrollmentNo : 170420107051 Department : Computer Engineering
MobileNo : 9925829140 Discipline : BE
Email : sahilshingala66@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

We researched finding relevant literature survey for the project and also discussed feasibility and scalability. Made a detailed of all the sub modules with the team Did extensive prior art search for all the sub modules Had a telephonic session with the internal guide.

2. What challenge you have faced ?

One of the challenges that I faced was in doing the prior art search for my module that Basically, this idea is all about right now at starting phase so we faced lots of difficulty to find the data regarding our topic.

3. What support you need ?

A road map for learning machine learning fundamentals Assistance in the survey on the use case of our product.

4. Which literature you have referred ?

Some of the early papers of https://www.youtube.com/watch? v=iFBhTHGXcMQ&list=LLGQW mpRFPh2Cacyr1fWW9-w&index=7&t=0s https://www.hackster.io/andrewstein/brain-controlled-hue-light-via-octoblu-daa215 https://youtu.be/mPbtR4vorg Y

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Shingala Sahil Ghanashyambhai
EnrollmentNo : 170420107051 Department : Computer Engineering
MobileNo : 9925829140 Discipline : BE
Email : sahilshingala66@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

I started studying the fundamentals of machine learning. And other BCI project to understand how to train a machine by ourselves using the literature survey and videos. Had a telephonic session with the internal guide

2. What challenge you have faced ?

Researching the right algorithm for to learn the machine. In designing an e?cient model for the project.

3. What support you need ?

I needed to know which model used by tech companies.

4. Which literature you have referred ?

Other EEG devices and how it work: https://www. youtube.com/watch?v=8Hyhljnq9Z4 EEG Signal to Words:https://towardsdatascience.com/using-machine-learning-to-categorise-eeg-signals- from-the-brain-to-words-728aba93b2b3 Systemsand methods for controlling brain activity:https://worldwide.espacenet.com/patent/search?q=pn%3DWO2017223430A1 Intelligent wheel chair control method based on brain computer interface and automatic driving technology:https://patents.google.com/patent/US20170095383A 1/en?q=brain+computer+interface&oq=brain+computer+interface+ Multi-Channel EEG (BCT) Devices: http://neurosky.com/2015/07/multi-channel-eeg-bci-devices/

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Shingala Sahil Ghanashyambhai
EnrollmentNo : 170420107051 Department : Computer Engineering
MobileNo : 9925829140 Discipline : BE
Email : sahilshingala66@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Worked on studying machinelearning,deep learning and how signals where process. Researched on how to train machine using brain data. Had a telephonic session with the internal guide.

2. What challenge you have faced ?

In implementing CVC file that receive for neurosky that is brain datawhich model have been used to achieve accrues result.

3. What support you need ?

I needed support to predicts acquires results and train machine according to that.

4. Which literature you have referred ?

how to control someone elses arm using brain: https://youtu.be/rSQNi5sAwuc Other EEG devices and how it works:https://www.youtube.com/watch?v=8Hyhljnq9Z4 Health manager with Mind Waves:https://www.pantechsolutions.net/interfacing-mindwave-mobile-with-arduino

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Shingala Sahil Ghanashyambhai
EnrollmentNo : 170420107051 Department : Computer Engineering
MobileNo : 9925829140 Discipline : BE
Email : sahilshingala66@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Finalised the new application for the explore the usage of BCI in Education, So we fetch the data from neurosky and Normalise it and send back to the Computer and use to track the attention and meditation.That will gives the statastic for consntration on particular topic

2. What challenge you have faced ?

how to Direct transfer data from neurosky to computer

3. What support you need ?

To finalize the actual product from the given application

4. Which literature you have referred ?

Matlab code to read attention using Neurosky mindwave Mobile https://www.youtube.com/watch?v=IRaG5vkuJMA&feature=youtu.b Matlab code to read attention using Neurosky mindwave Mobile https://www.youtube.com/watch? v=IRaG5vkuJMA&feature=youtu.b

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Chavda Bhumiben Raysinhbhai
EnrollmentNo : 180423107001 Department : Computer Engineering
MobileNo : 9913159860 Discipline : BE
Email : bhumichavda68@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

We researched finding relevant literature survey for the project and also discussed feasibility and scalability. Did extensive prior art search for all the submodules Prepared the first draft of AEIOU Canvas Prepared the first draft of Empathy Canvas Submitted PSAR | & 2 Studied General idea regrading to what is BCI? How it's works?

2. What challenge you have faced ?

Researching the right data set for the project.

3. What support you need ?

A road map for learning different brain waves and neurosky fundamentals Assistance in the survey on the use case of our product.

4. Which literature you have referred ?

Some of the early papers of https://www.youtube.com/watch? v=iFBhTHGXcMQ&list=LLGQW mpRFPh2Cacyr1fWW9-w&index=7&t=0s https://www.hackster.io/andrewstein/brain-controlled-hue-light-via-octoblu-daa215 https://youtu.be/mPbtR4vorg Y

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Chavda Bhumiben Raysinhbhai
EnrollmentNo : 180423107001 Department : Computer Engineering
MobileNo : 9913159860 Discipline : BE
Email : bhumichavda68@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Made a detailed draft of all the sub modules with the team Did pattern search regrading for all thesub modules Had a telephonic session with the internal guide.

2. What challenge you have faced ?

Research about BCI and other EEG signals and the usage of that signals.

3. What support you need ?

There is not much amount of pattern available for this topic so difficult to find patterns.

4. Which literature you have referred ?

Other EEG devices and how it work: https://www. youtube.com/watch?v=8Hyhljnq9Z4 EEG Signal to Words:https://towardsdatascience.com/using-machine-learning-to-categorise-eeg-signals- from-the-brain-to-words-728aba93b2b3 Systems and methods for controlling brain activity: https://worldwide.espacenet.com/patent/search?q=pn%3DWO2017223430A 1 Intelligent wheel chair control method based on brain computer interface and automatic driving technology:https://patents.google.com/patent/US20170095383A 1/en?q=brain+computer+interface&oq=brain+computer+interface+ Multi-Channel EEG (BCT) Devices: http://neurosky.com/2015/07/multi-channel-eeg-bci-devices/

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Chavda Bhumiben Raysinhbhai
EnrollmentNo : 180423107001 Department : Computer Engineering
MobileNo : 9913159860 Discipline : BE
Email : bhumichavda68@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Research other EEG devices and how it's works?Had a telephonic session with the external guide Prepared the second draft of Ideation Canvas Prepared the ?rst draft of Product Development Canvas Submitted PSAR 3 & 4

2. What challenge you have faced ?

Research regrading to EEG signals and its devices that used to process on brain data.

3. What support you need ?

In garnering trivia data for different species

4. Which literature you have referred ?

how to control someone elses arm using brain: https://youtu.be/rSQNi5sAwuc Other EEG devices and how it works:https://www.youtube.com/watch?v=8Hyhljnq9Z4 Health manager with Mind Waves:https://www.pantechsolutions.net/interfacing-mindwave-mobile-with-arduino

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Chavda Bhumiben Raysinhbhai
EnrollmentNo : 180423107001 Department : Computer Engineering
MobileNo : 9913159860 Discipline : BE
Email : bhumichavda68@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Do prior art search about the new Idea and collect the blog, video and Post for that application, Describe the problem statement and then create different Diagram and road map for the application implementation.

2. What challenge you have faced ?

Less resources and information available so novel topic for research

3. What support you need ?

evaluation and finalize the documentation part

4. Which literature you have referred ?

https://www.inderscienceonline.com/doi/abs/10.1504/IJLT.2019.101848

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Desai Dhwani Yatinkumar
EnrollmentNo : 180423107002 Department : Computer Engineering
MobileNo : 7623968110 Discipline : BE
Email : dhwanidesai37@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

we have done our literature survey-like: Which type of project build using brain waves and how it will work? E.g. Brain wave and Blinked, Brain to light on/off and control car and many more, which type of waves/signals will be produce by brain and which waves will be help in our project. We till now listed the requirements of project experimentation.

2. What challenge you have faced ?

One of the challenges that I faced was in doing prior art search for my topic because this topic is now at researching phase.

3. What support you need ?

A road map for learning brain, neurons fundamentals Assistance in survey on use case of our topic.

4. Which literature you have referred ?

Some of the early papers of https://www.youtube.com/watch? v=i1FBhTHGXcMQ&list=LLGQ WmpRFPh2Cacyr1fW W9-w&index=7&t=0s https://www.hackster.io/andrewstein/brain-controlled-hue-light-via-octoblu-daa215 https://youtu.be/mPbtR4vorg Y

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Desai Dhwani Yatinkumar
EnrollmentNo : 180423107002 Department : Computer Engineering
MobileNo : 7623968110 Discipline : BE
Email : dhwanidesai37@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

we run our set up in neaurosky mindwave mobile 2, Had a telephonic session with the external guide, Assisted in visualizing UI/UX for the application

2. What challenge you have faced ?

In creating a seamless prediction by machine.In implementing questionaries dataset.

3. What support you need ?

An expert take on our prediction In garnering trivia data for different species

4. Which literature you have referred ?

how to control someone elses arm using brain: https://youtu.be/rSQNi5sAwuc Other EEG devices and how it works:https://www.youtube.com/watch?v=8Hyhljnq9Z4 Health manager with Mind Waves:https://www.pantechsolutions.net/interfacing-mindwave-mobile-with- arduino

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Desai Dhwani Yatinkumar
EnrollmentNo : 180423107002 Department : Computer Engineering
MobileNo : 7623968110 Discipline : BE
Email : dhwanidesai37@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Worked on studying the fundamentals of BCI and EEG Signals. Had a telephonic session with the external guide.

2. What challenge you have faced ?

Researching the right data set for the project that will useful for us for better understanding.

3. What support you need ?

Research for neurosky

4. Which literature you have referred ?

Other EEG devices and how it work: https://www. youtube.com/watch?v=8Hyhljnq9Z4 EEG Signal to Words:https://towardsdatascience.com/using-machine-learning-to-categorise-eeg-signals- from-the-brain-to-words-728aba93b2b3 Systems and methods for controlling brain activity: https://worldwide.espacenet.com/patent/search?q=pn%3DWO2017223430A1 Intelligent wheel chair control method based on brain computer interface and automatic driving technology:https://patents.google.com/patent/US20170095383A 1/en?q=brain+computer+interface&oq=brain+computer+interface+ Multi-Channel EEG (BCT) Devices: http://neurosky.com/2015/07/multi-channel-eeg-bci-devices/

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Desai Dhwani Yatinkumar
EnrollmentNo : 180423107002 Department : Computer Engineering
MobileNo : 7623968110 Discipline : BE
Email : dhwanidesai37@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Do search about the new Idea and collect the blog, video and Post for that application, Describe the problem statement and then create different Diagram and road map for the application implimentation.

2. What challenge you have faced ?

Less resources and information available so novel topic for research

3. What support you need ?

evaluation and finalize the documentation part

4. Which literature you have referred ?

https://www.inderscienceonline.com/doi/abs/10.1504/IJLT.2019.101848

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Kansara Dhrumi Mehul
EnrollmentNo : 180423107005 Department : Computer Engineering
MobileNo : 9409511010 Discipline : BE
Email : dhrumi2018@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Did research in finding relevant use cases for the project.

2. What challenge you have faced ?

One of the challenges that we faced was in doing a prior art search for my topic.

3. What support you need ?

A road map for learning brain, neurons fundamentals Assistance in survey on use case of our topic.

4. Which literature you have referred ?

ome of the early papers of https://www.youtube.com/watch? v=iFBhTHGXcMQ&list=LLGQW mpRFPh2Cacyr1fWW9-w&index=7&t=0s https://www.hackster.io/andrewstein/brain-controlled-hue-light-via-octoblu-daa215 https://youtu.be/mPbtR4vorg Y

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Kansara Dhrumi Mehul
EnrollmentNo : 180423107005 Department : Computer Engineering
MobileNo : 9409511010 Discipline : BE
Email : dhrumi2018@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Had a telephonic session with the external guide

2. What challenge you have faced ?

Researching the right data set for the project

3. What support you need ?

Android application tasks

4. Which literature you have referred ?

https://www.youtube.com/watch?v=iFBhTHGXcMQ&list=LLGQW mpRFPh2Cacyr1fW W9-w&index=7 &t=0s

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Kansara Dhrumi Mehul
EnrollmentNo : 180423107005 Department : Computer Engineering
MobileNo : 9409511010 Discipline : BE
Email : dhrumi2018@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?
Project?Submitted PSAR | & 2

2. What challenge you have faced ?
In creating a seamless Application.

3. What support you need ?
An expert takes on our application’s UI/UX

4. Which literature you have referred ?
https://play.google.com/store/apps/details ?id=com.hoa.brainexpress&hl=en

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

Print Back

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
StudentName : Kansara Dhrumi Mehul
EnrollmentNo : 180423107005 Department : Computer Engineering
MobileNo : 9409511010 Discipline : BE
Email : dhrumi2018@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : INTERNET OF BRAIN

Status : Submitted

1. What Progress you have made in the Project ?

Created page of website that display results.

2. What challenge you have faced ?

In understanding, analyzing and researching the need and business goals of our website in order to provide the perfect user experience

3. What support you need ?

Assistance in finding out alternate ways to create an efficient flow diagram for website UI

4. Which literature you have referred ?

Took course on Udemy on Web Devploment https://www.udemy.com/course/the-complete-web-development-bootcamp/

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners

Web Developer

Hardware Expert

Key Activities

Automatic play pause

Meditation session

Screenshot by eyewink

Attention and meditation graph

Key Resources

EEG device

Web site

Value Propositions

Reliability

Efficiency

One-stop website

Customer Relationships

Automated Services

Channels

Advertisement

Social Media

Customer Segments

Students

Parents

Teachers

Cost Structure

NeuroSky MindWave Mobile 2

Revenue Streams

Maintenance and Service Cost

“INTERNET OF BRAIN”

PROJECT REPORT

Submitted by

KARTIK K. GONDALIYA (170420107015)

SAHIL G. SHINGALA (170420107051)

BHUMI R. CHAVDA (180423107001)

DHWANI Y. DESAI (180423107002)

DHRUMI M KANSARA (180423107005)

In fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

In

COMPUTER ENGINEERING

Sarvajanik College of Engineering and Technology,

Surat.

Gujarat Technological University, Ahmadabad.

2021

ACKNOWLEDGEMET

We would like to acknowledgement the valuable guidance, constant motivation and support which we have received throughout the course of our project from our guide Prof. (Dr.) Keyur Rana.

We thank all our faculty members of Computer Department, SCET who have supported and imparted their knowledge which have helped us in our project.

Regards,

Kartik Gondaliya

Sahil Shingala

Bhumi Chavada

Dhwani Desai

Dhrumi Kansara

Abstract

There are billions of neurons interconnected in the human brain. Human thoughts and their emotional states affect the interactions between these neurons. Every interaction between these neurons creates an electric discharge which cannot be measured using current technology. However, the activity created by thousands of concurrent electric discharges aggregates into waves which can be measured. The sequences of interactions between these neurons are a result of different brain states. These patterns of interaction produce waves of different amplitudes and frequencies. These wave patterns can be used to determine the state of the brain. The project is about the study the Brain waves with it normalized form EEG and after understanding it used it for the various real life applications like Home automation, Machine learning and Robot training. It's kind of interface which control by the thinking.

Table of Contents

1. Introduction

Thus business model canvas can be used to visualize such customer expectations and market problems. This exercise will increase the market strategy and implementation of technology. This will make them more effective in market.

This exercise brings discussions on viability and cost effectiveness into picture with their impact. This exercise will enable us to have knowledge on the steps required to ensure that a solution they develop via project should have a user who can afford it with desired needs. This exercise helps us to understand the true value of the proposed solution.

Business Model Canvas is used to validate the market significance of products and services which will be of technology nature in this case. Technology projects are often solutions or processes that solve a technical problem. However the market implementation of such solutions also require that the problem solution is designed to overcome not just the technical barriers but also market and business related barriers of costs, customer reach and collaborations and those that pertain to the practical nature of limited initial capacities within the team.

2. Contents

2.1 Key Partners

In this we can do partnership with different companies according to our product. By doing this we can get the idea about what is market scenario, optimization in product and cost can be achieved, from where we can get the raw material of our product.

- Web Developer
- Hardware Expert

2.2 Key Activities

In this we are made aware about how will they represent their product to customers. They can use the following for marketing of the product.

- Automatic play pause
- Meditation session
- Screenshot by eyewink
- Attention and meditation graph

2.3 Value Proposition

In this one can directly come in contact with customer requirement. In this they will aware the customer about their product. How it is usable and beneficial over the conventional product and which kind of services they will provide to customers.

- Reliability
- Efficiency
- One-stop website

2.4 Key Resources

In this section we can get idea about, from which kind of industries, they will purchase raw material for their product.

- EEG device
- Web site

2.5 Customer Relationships

In this section we get to know about how they will manage the relationship with customer by giving them lucrative services.

- Automated Services

2.6 Customer Segments

In this section, customers are bifurcate according to their product usage & to which kind of customer they can sell their product.

- Students
- Parents
- Teachers

2.7 Channel

In this we got to know about how they will approach customers, which media they should select for the marketing of their product.

- Advertisement
- Social Media

2.8 Cost Structure

They can attract customers towards their product by giving them lucrative offers in cost. In which department, they should have to invest most.

- NeuroSky MindWave Mobile 2

2.9 Revenue Streams

It is a building block representing the case accompany generates from each customer segments. They have different pricing mechanism which are listed below**.**

- Maintenance and Service Cost

3. Conclusion

It can be inferred from the proposed experiment that a real-time attention-based learning can because to improve the average attention levels of the users. The application can be used as an E-learning utility tool by the users to monitor their attention levels and meditation level on an individual level and improve it over a period of time. The meditation exercise helps to relax in between the long study and the various tools include enhancement for the study activity. Further studies on this field leads to more and more accurate results for the applications and also extend this in various fields as well.

College : SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT
Department : Computer Engineering
Discipline : BE
Semester : Semester 8
Project Name : INTERNET OF BRAIN
Team ID : 127743

Form 1 – APPLICATION FOR GRANT OF PATENT

Applicants :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
1	Gondaliya Kartik Kamleshbhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9106360330	Kartikgondaliya755@gmail.com
2	Shingala Sahil Ghanashyambhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9925829140	sahilshingala66@gmail.com
3	Chavda Bhumiben Raysinhbhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9913159860	bhumichavda68@gmail.com
4	Desai Dhwani Yatinkumar	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat	7623968110	dhwanidesai37@gmail.com

			Technologycal University.		
5	Kansara Dhrumi Mehul	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9409511010	dhrumi2018@gmail.com

Inventors :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
1	Gondaliya Kartik Kamleshbhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9106360330	Kartikgondaliya755@gmail.com
2	Shingala Sahil Ghanashyambhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9925829140	sahilshingala66@gmail.com
3	Chavda Bhumiben Raysinhbhai	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9913159860	bhumichavda68@gmail.com
4	Desai Dhwani Yatinkumar	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT ,	7623968110	dhwanidesai37@gmail.com

			Gujarat Technologycal University.		
5	Kansara Dhrumi Mehul	Indian	Computer Engineering , SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY, SURAT , Gujarat Technologycal University.	9409511010	dhrumi2018@gmail.com

I/We, the applicant(s) hereby declare(s) that:

Following are the attachments with the applications :

Form 2 - PROVISIONAL/COMPLETE SPECIFICATION

1 . Title of the project/invention :
INTERNET OF BRAIN

2. Preamble to the description :
Provisional

3. Description
a) Field of Project / Invention / Application :
NeuroSky MindWave Mobile 2

b) Prior Art / Background of the Project / Invention :
In this pandemic situation, when we are not able to go and study at school/colleges. So, the education sector provides an alternative way to educate a student on an online platform. Every coin has two sides. has like advanced technology provides an advantage to the student but it has disadvantages also.
There are main two disadvantages:
1.Concentration: For the student, Concentration is the key to success. If they did not learn the lecture or video by concentration, She/he cannot catch-up the things in a good manner.
•where for the teachers side if the student has not concentrated the lecture there is not worthy of the lecture.
2.The problem causes in Eyes: Due to this E-learning, there is a possibility for problem cause in students eyes.
•The next thing is the Relax session is also an important part of the efficient work.

Currently, due to some advancement made in BCI, it is possible to perform brain waves classification using an EEG device [NeuroSky Mindwave Mobile 2], and observe the brain activity that how much concentration, meditation, and eye blink level. Of course, the problem is way too complex than what is aforementioned.

c) Summary of the Project / Invention :
It can be inferred from the proposed experiment that a real-time attention-based learning can because to improve the average attention levels of the users. The application can be used as an E-learning utility tool by the users to monitor their attention levels and meditation level on an individual level and improve it over a period of time. The meditation exercise helps to relax in between the long study and the various tools include enhancement for the study activity. Further studies on this field leads to more and more accurate results for the applications and also extend this in various fields as well.

d) Objects of Project / Invention :

1.For Attention identification, our goal is to develop an algorithm for:
A.Learner concentration in lectures.
B.If not satisfied the criteria then pause the video.
2.For Meditation identification, our goal is to develop an algorithm for:
A.Lerner requirement to meditated.
B.Helps to relieve the causes that occur through online study.
3.For Screen short identification, our goal is to develop an algorithm for:
A. Lerner easily takes screen short of screen thought eye-blink.
4. For Device Automation, our goal is to develop an algorithm for:
A.Learner can on/off devices using left and right eye wink

e) Drawings :

f) Description of Project / Invention : (full detail of project) :

Our goal is to adjust in this pandemic situation, we provide a one-stop website for all the students and teachers as well in India.
Leveraging the power of BCI, NeuroSky Mindwave Mobile 2 will detect students brain waves like quality, attention, meditation, theta, low alpha, high alpha, low beta, high beta, low gamma, and mid gamma. By monitoring this wave if the students concentration is below the threshold amount, then the video lecture will get pause automatically.
Normally online lecture has a time limit till 1 hour. According to research done on students for efficient concentration-time, for children, there are 40 minutes and for an adult, there are 50 minutes, the learner will concentrate. So, we provide that 50 minutes will be online lecture conduct and 10 minutes will be for meditation. So, meditation will help to prevent student’s eyes issues for watching continues 50 minutes, and they will concentrate on another lecture also.
If students find that the screen will important then they will take a screenshot using eye blink.

g) Examples :

h) Claims (Not required for Provisional Application) / Unique Features of Project

1. Automatic Play and Pause the video
2. Meditation for 10 min
3. Screenshot using eye wink
4. Graph based analysis
5. Device Automation using left and right eye wink

4. Claims

5. Date and signature

6. Abstract of the project / invention :

There are billions of neurons interconnected in the human brain. Human thoughts and their emotional states affect the interactions between these neurons. Every interaction between these neurons creates an electric discharge which cannot be measured using current technology. However, the activity created by thousands of concurrent electric discharges aggregates into waves which can be measured. The sequences of interactions between these neurons are a result of different brain states. These patterns of interaction produce waves of different amplitudes and frequencies. These wave patterns can be used to determine the state of the brain. The project is about the study the Brain waves with it normalized form EEG and after understanding it used it for the various real life applications like Home automation,Machine learning and Robot training. Its kind of interface which control by the thinking.

Form 3 – STATEMENT AND UNDERTAKING UNDER SECTION 8

Name of the applicant(s) : I/We, Gondaliya Kartik Kamleshbhai ,Shingala Sahil Ghanashyambhai

,Chavda Bhumiben Raysinhbhai ,Desai Dhwani Yatinkumar ,Kansara Dhrumi Mehul

Hereby declare :

Name,Address and Nationality of the joint applicant :

(i) that I/We have not made any application for the same/substantially the same victim invention outside India.

(ii) that the rights in the application(s) has/have been assigned to

Name of the Country	Date of Application	Application Number	Status of the Application	Date of Publication	Date of Grant
N/A	N/A	N/A	N/A	N/A	N/A

(iii)That I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.

Dated this 14 day of April 2021

To be signed by the applicant or his authorised registered patent agent :

Signature.....

Name of the Natural Person who has signed :

Gondaliya Kartik Kamleshbhai ,Shingala Sahil Ghanashyambhai ,Chavda Bhumiben Raysinhbhai ,Desai Dhwani Yatinkumar ,Kansara Dhrumi Mehul

To,
The Controller of Patents,
The Patent Office,
At Mumbai