

TEKNOFEST

AEROSPACE AND TECHNOLOGY FESTIVAL

TECHNOLOGY FOR HUMANITY COMPETITION

PROJECT DETAIL REPORT

PROJECT NAME: SMART WHEELCHAIR

TEAM NAME: AFGHAN-TURK ROBOTICS

CATEGORY: SOCIAL INNOVATION

TEAM ID: 360451

TEAM LEVEL: HIGH SCHOOL

TEAM MEMBERS: MOHAMMAD YASIR OSMANI

ADVISOR NAME: MOHAMMAD ZUBAIR FROTAN

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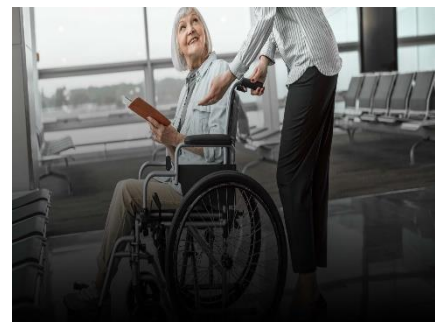
Project Detail Report

1. Project Summary:

As we mentioned in pre-evaluation report or pre-assessment report our project is called smart wheelchair and it has been designed for paralyzed people and those one who have lost some parts of their bodies and our project helps those people to control their wheelchairs by their mind using of EEG waves of their brain actually this project is really effective for those persons because it solves most of those problems that I am going to mention in the problem part of this report.

2. Defining the Problem Situation:

If we consider in general we have two kinds of paralyzed people the first group is those one who naturally became paralyzed and the second one is those one who are paralyzed because of the war, any illness or any other problems and accidents or they have lost some parts of their body if we see those people cannot move from one place to another; As a result, they use their wheelchairs but they need a human beside of wheelchair as well in order to redirect or move their wheelchairs but it brings out a huge problem because the another person which helps the patient should be always busy with the patient I mean he should go everywhere with him/her and even he should be always with the patient in order to move his/her wheelchair but question is there that whether that person has its own life or not? The answer is yes because he/she should take care of his/her life and do the tasks of his/her life style instead of moving the wheelchair of patient so it is the another aspect of this problem that with paralyzed person there should be always a helper person and for this problem we have an existed solution as well if we analyze that solution it is the self-controlled wheelchairs I mean those wheelchairs that involves a remote control in one of its part and it is designed that the patient can control his/her wheelchair by him/her self using of remote but it is insufficient solution for this problem because there are some paralyzed people that they cannot move their hands as well beside of their legs or there are some patients that they cannot move whole of their body so what they will do; therefore, we should find a solution that be able to help all of the paralyzed people to control their wheelchair by their mind.



3. Solution

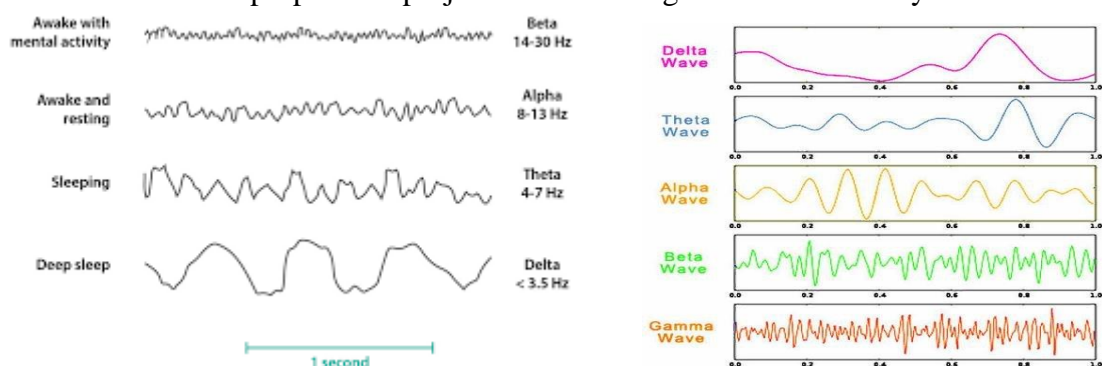
The best solution for the mentioned problem is using of their mind's waves in my point of view this can be the best solution for this problem if we see our mind has some waves called EEG and our system controls the wheelchair by those waves and this solution will be easy for the patient as well I mean he/she will not need any other person for help and it will have some social benefits as well because as I mentioned in the problem part(chapter 2) there should be an extra person always with the patient and by using of our system that person can get rid of the patient and stop wasting of his/her time and can think about his/her life it can be the social benefit of this project that the patient won't need any other person for help because if we see everyone should think about his/her life and should do some tasks and jobs but with paralyzed patient they should be always with the patient in order to control the wheelchair and the person who helps will be back warded in his/her life and another social benefit of this project is that the patient person will be self-satisfied and he won't need any other person's help and this can be a honor and proud for a patient of paralysis or those who are using wheelchairs that they can control their wheelchairs by their self and it can be also a social benefit of our project.

In design information part of this project, I should mention that in wheelchair part we are just using a simple chair with two motors and wheels, and it is the primary shape of the wheelchair the actual purpose of this project is the controlling of the motors with the mind's waves.

4. Method

In the method part we are using the brain's waves if we see our mind has some waves called EEG waves of Human's brain it involves neurons and those neurons have some waves called EEG waves and these waves have some costs like gamma, beta, alpha, theta, delta that every of these costs present something like: gamma presents the level of our concentration, beta presents (busy and active mind), alpha presents (reflective, restful) theta presents (Drowsiness), Delta presents (sleep, Dreaming) our system is able to get those waves from human's brain once the waves are received the system will analyze those waves and after that motors of wheelchair will move according to those emotional which have been already created in the humans brains and we are going to make a guideline for our system like: if you want to move your wheelchair forward you should increase the level of your imagination I mean you should imagine and dream after that the level of delta wave will increase once this delta level is increased our system will know that you want to move the wheelchair forward and this is the system and pattern that our project follows.

And it is also necessary that I should mention that the shape of wheelchair for the competition is not like real and big shape wheelchair it is just a small chair, and it is the primary shape of wheelchair because the real purpose of project is controlling of wheelchairs by the brain's waves.



5. Innovative Aspect

If we see nowadays in market we have some of the wheelchairs that they can be controlled by remote but in our case our wheelchair is able to be controlled by the brain's waves and this makes our project especial from others because there are some paralyzed or disabled people that they cannot move whole of their body so therefore they can't use those wheelchairs that are existed in market so they need something new; Therefore, Our project will be the best option for them the original aspect of the project are: controlling of motors using of the brain's EEG waves and about the hardware and software part we have used Mind flex EEG sensor actually it is a toy but what we need is just its main sensor and some motors and a motor driver for the wheelchair and we also need an Arduino for the main board of our project and in software parts what we need is Arduino IDE for the programming of our project and about innovative aspects if we see controlling of motors by EEG waves can be the best innovative aspect because there was not such kind of technology in the past and there are some innovative aspects in the programming or code of this project as well.

By analyzing similar products, information should be given about the innovative aspect of the project, and it should be stated what are the features that distinguish the project from similar products available on the market.

6. Applicability

This project idea is the best option for the paralyzed people and they can use from this kind of project instead of their ordinary wheelchairs and this project can be converted and changed to a commercial product in the markets whenever both wheelchairs are available in the market people will select and prefer the wheelchair with more options and this project can help people more than another products which are available in the market and about the risks of this project I can say that the sensor that we are using has no side effects and if you search about EEG test it is the safest and painless analyze and it is quite simple but sometime it may cause some headache because it is clear for everyone that everything has a limit of usage and it should not be used too much actually using too much of our mobile phones also causes some of the problems and it is the general problem but according to side effects or adverse effect's risks there will not be any risk with using of this system I am going to mention some results of my researches and their resources about risks of this project in the resources part as well.

7. Estimated Cost and Project Scheduling

Table of components with their prices and costs

List of Products	Prices
Mind Flex EEG	100 \$
Aruino	10 \$
Motors	5 \$
Motor Driver	5 \$
Other Components	15 \$

Project Timing according to new timing of TEKNOFEST Competition

List of Tasks	January	Feberuary	March	April	May	June	July	Agust
Research	X	X	X					
Preparing the parts				X				
Connecting of Parts					X			
Sketch and codes						X		
Testing							X	X

The Products are: Mind Flex EEG sensor, Arduino, Motors, Motor Driver, Jumpers(wires), Some extra parts for making of primary shape of wheelchair.

8. Target Group of the Project Idea (Users):

This project will be used by paralyzed people, disabled people and those people that they have lost some parts of their bodies and now they are using the wheelchairs and the target of this project is those people won't need any other person for helping with using of this project.

9. Risks

Actually, there are some risks that make the progress of our project slow and these risks are finding the value of the EEG waves as well as the sketch or coding of our project these are the general risks that may slow down the progress of our project.

And while we are implementing the project the sensor that we are using and it will be connected to brain has no side effect but using too much of this sensor might cause some headaches every technological device has a usage limit that the users should not cross the limit and it should not be used too much by the users because it will cause some problems and it is the general risk in every technological device.

And for the solution of this risk, we will find some limit of time for the using of this system that not cause the headaches for its users.

10. Resources

From: wikipedia information: Electroencephalography

Link: <https://en.wikipedia.org/wiki/Electroencephalography>

From: wikipedia information: Mindflex sensor

Link: <https://en.wikipedia.org/wiki/Mindflex>

From: Health line information: Risks of EEG

Link: <https://www.healthline.com/health/eeg#summary>

Article written by: Nienke van Atteveldt, Tieme W. P. Janssen and Ido Davidesco

Article About: EEG signals measurement

Address of access:

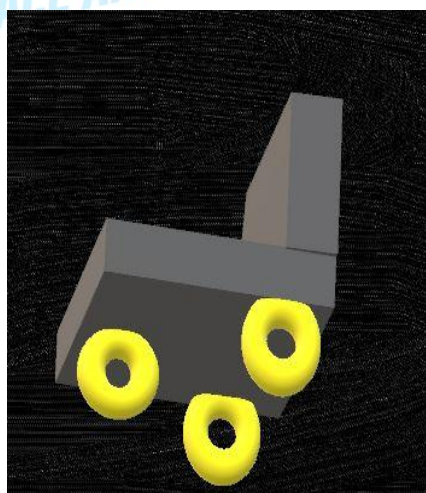
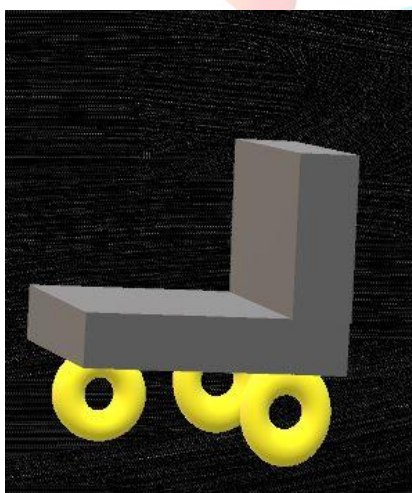
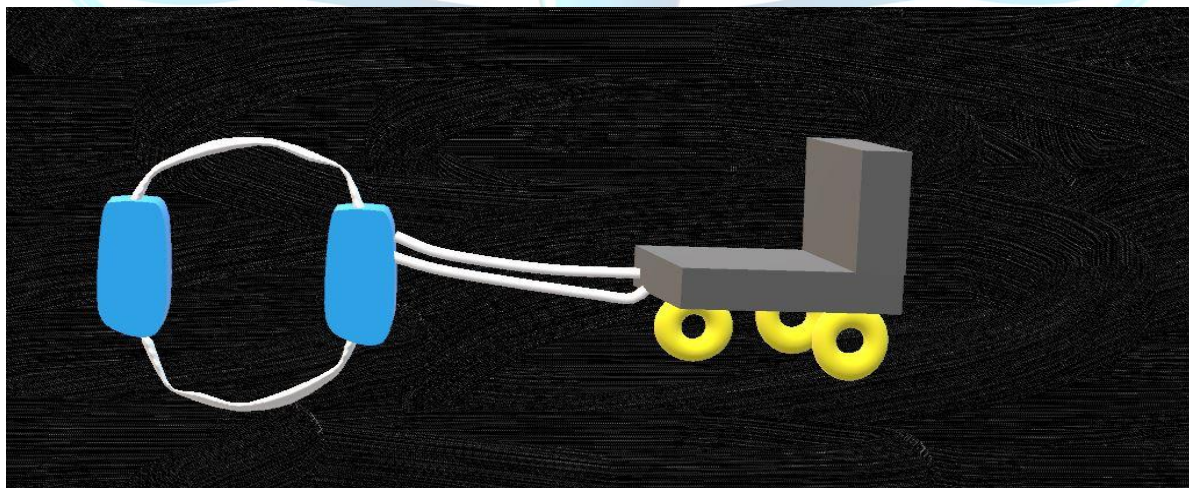
<https://www.frontiersin.org/articles/515216#:~:text=EEG%3A%20Measuring%20Electrical%20Activity%20in%20the%20Brain&text=These%20signals%20go%20up%20and,a%20person's%20head%20%5B1%5D.>

The report should include the resources section.

In the resources heading, detailed information should be given about all the resources you use to make your project. (Website address, Book Name, Page Number, etc.)

11. Visuals

The 3D Maps of the project:



Mind Flex Toy:



Mind flex Headset or sensor:



EEG signals:

