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# Introduction

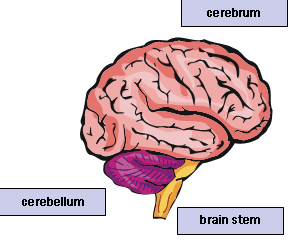
## Human Brain

Human brain is always an interesting subject of research for a very long time. How it works? How it sends commands and controls all other organs? These types of questions always grab interest of humans towards this subject. We all know that this part of humans controls all the working of human body.

### Parts of Brain

(Bailey, 2013)Brain is mainly composed of three parts

* **Cerebrum** this part of the brain controls touch, hearing, vision, speech, reasoning, learning and voluntary movements of the body.
* **Cerebellum** this part of the brain controls muscular movement, posture and balance.
* **Brainstem** this part of the brain controls involuntary movements.



### Brain Commands

When brain receives some message from body or sends any message to the body, it is sent through a network of cells (neurons) in form of electric current. Voltage of this electric current is so small that cannot be felt but can be detected.

## Movement of Objects through Brain

As discussed earlier different parts of brain are responsible for different functions in which cerebrum controls movement. “Different parts of the cerebrum are responsible for moving different body parts. The left side of the brain controls the movements of the right side of the body, and the right side of the brain controls the movements of the left side of the body.”(Brain and Nervous System, no date) As movement of organs is controlled by brain we can also control movement of different mechanical objects through brain commands using waves or signals generated by cells of brain.

## Controlling Movement of Objects through Brain

Beside other research topics “Controlling movement of objects through brain commands” is also a vast topic for research. A lot of research has been done and is going on as well in this regard. (Ferreira *et al.*, 2007) A robotic wheel chair was moved using HMI (Human Machine Interface). At Florida University people flew drones while controlling them with brain.(Mind-controlled drones race to the future - Powering the New Engineer, no date). Similarly a hex bug was controlled with brain waves.(EEG Hacker: Controlling a Hex Bug with my Brain Waves, no date)

## Usage of Controlling Objects through Brain

Handicapped people are those who are paralyzed or have movement disorders. These people face difficulty in doing simple tasks in their daily life. They need alternate ways for movement and control in order to perform daily life duties. To help these people a lot of work has been done. “Brain Computer Interface” is this type of work.

## Communication with Human Brain

We know that a brain sends messages or receive message in form of electric current then how we can communicate with the brain if we want to send any message or receive any message.

One way of communication with human brain is through EEG devices. EEG device is consists of electrodes which record brain signals from scalp in form of electric current. “EEG activity recorded at the scalp consists of voltage changes of tens of microvolts at frequencies ranging from below 1 Hz to about 50 Hz.”(Wolpaw, McFarland and Vaughan, 2000)

## Research Problem

Previously a single object is moved by brain commands. This includes (Mind-controlled drones race to the future - Powering the New Engineer, no date) world’s first race between mind controlled drones in university of Florida. (Ferreira *et al.*, 2007)A robotic wheel chair was moved through brain signals and some other.

If a single object can be moved through EEG devices why not multiple objects? What if a person who is handicapped is alone at home and needs to operate different things in the house? Will he use that many headsets as many things are there in the house? Can we control different objects through one EEG headset?

If a person is playing a strategy game can he control all the players through one EEG head set?

## Proposed Solution

Different Objects can be moved through one EEG headset if we can differentiate between those objects. As we already know how to control movements of an object through brain commands using EEG technology. Based on this previous knowledge we can build an “EEG Based Multiple Object Controller”. Obstacle in this is how we can differentiate multiple objects just by looking at them? i.e. if a person is wearing the headset and controlling the objects and the device gets a command of moving left, how will it differentiate that this command was for which object?

# Literature Review

# Requirements and Analysis

# Prototype Description

Prototype consists of an interface with objects (more than one). These objects could be any shape.

# Conclusion

# Bibliography

Bailey, R. (2013) ‘Anatomy of the Brain - Cerebrum’, *About.com*, pp. 1–6. doi: 10.1288/00005537-191506000-00025.

*Brain and Nervous System* (no date). Available at: http://kidshealth.org/en/teens/brain-nervous-system.html# (Accessed: 28 December 2017).

*EEG Hacker: Controlling a Hex Bug with my Brain Waves* (no date). Available at: http://eeghacker.blogspot.com/2014/06/controlling-hex-bug-with-my-brain-waves.html (Accessed: 28 December 2017).

Ferreira, A. *et al.* (2007) ‘Human-machine interface based on muscular and brain signals applied to a robotic wheelchair’, *Journal of Physics: Conference Series*, 90(1). doi: 10.1088/1742-6596/90/1/012094.

*Mind-controlled drones race to the future - Powering the New Engineer* (no date). Available at: https://www.eng.ufl.edu/newengineer/news/mind-controlled-drones-race-to-the-future/ (Accessed: 28 December 2017).

Wolpaw, J. R., McFarland, D. J. and Vaughan, T. M. (2000) ‘Brain-computer interface research at the Wadsworth Center’, *IEEE Transactions on Rehabilitation Engineering*, 8(2), pp. 222–226. doi: 10.1109/86.847823.