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Neurolink - A Review

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Abstract

Neurolink is the work product from Musk in the year 2016, which was about to develop an implantable and high-brain -computer interface (BCI). The treatment for the sensory and motor activities Brain-machine Interface (BMI) is also used for the treatment of neurological problems. The aim of this review is to explore some detailed information regarding the recent advances in Neurolink project - the benefits, merits as well as the demerits it has. This concept that is a project with neuro link was completely a new idea, and the modern world needed equipment like this, to help people with neurological disorders since the turn of the century. This new invention has a three stated goal, the first and most predominant one was for treating any kind of neurological disorders, and the second one is for the people who met with an accident and last and final was to create BMI. For example, a paralyzed person can use a BMI to move a mouse cursor or a robotic arm. Such options let them retain more independence. This idea of developing BMI of Musk was completely a new idea, and it was positive towards people, and cost-effective means of delivering neurosurgical care to underserved areas are the conclusions from the initial experience of this new project. This review is an attempt to update the recent advance of Neurolink project; further research is the need of the hour to know about its complete use for human beings.

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INTRODUCTION

Brain-machine interface (BMI) is very much useful for people with brain-related disorders. Using this technology, researchers were able to control a computer cursor, robotic prosthesis and voice synthesizers using electrodes. Elon Musk, the author and founding father of Neurolink, in his article has described briefly about the neurosurgically developed robot can insert six threads (192 electrodes) per minute and also about the working model of neuro link (Musk, 2019). In previous literature, the authors like Stephanie Naufel and Eran Klein in their article Brain-computer interface (BCI) researcher perspectives on neural data ownership and privacy, 2020, they conducted a web survey of BCI researchers. They got a fascinating result that was found in their study. 58% of the researchers gave the result as access to neural data as the conclusion of their study. New York times took an interview,

and it had been said that within the near future scientists who are working for this Neuralink uses a beam to place the implant through the skull, instead of drilling holes. BCI device uses a lot of wires to grab all the signals within the brain (Kent, 2019).

Over the past years various research was done by our team was on (Choudhari and Thenmozhi, 2016) osteology on the importance of posterior condylar canal (Hafeez and Thenmozhi, 2016), accessory foramenspresent in middle cranial fossa (Kannan and Thenmozhi, 2016), clinical importance of styloid process (Keerthana and Thenmozhi, 2016) Occurance of foramen of Huschke, (Pratha and Thenmozhi, 2016), morphometric analysis of foramen meningo-orbitale (Nandhini *et al.*, 2018), Gerdy's tubercle in Tibia Clinical (Subashri and Thenmozhi, 2016), implication of Occipital emissary formanen stature (Krishna and Babu, 2016), estimation from facial lengths radiation (Sriram *et al.*, 2015), effects of mobile phone on brain (Thejeswar and Thenmozhi, 2015), use of i-pads vs textbook in education (Johnson, 2020) on Mi RNA, on hypertension micro RNA (Sekar, 2019) especially on preeclampsia patients, animal studies (Seppan *et al.*, 2018), and in few other fields like thyroid function and obesity (Menon and Thenmozhi, 2016), and vision impairment in amblyopia (Samuel and Thenmozhi, 2015). There is a lack of much information on the current topic Neurolink, hence the main aim of this review is to explore some detailed information regarding the recent advances in Neurolink project - the benefits, merits as well as its demerits.

MATERIALS AND METHODS

They collected the review topics within the last 20 years that had assessed all the chances of Brain-machine interfaces, neuro link etc. We didn't follow a scientific review or meta-analysis. In seeking to spot the relevant literature from the last 20 years, we accessed the databases that are commonly used as an index for the review of the literature, including PubMed, google scholar. Searches of the reference list from the relevant review were extensively utilized to spot further relevant studies. Search terms included 'artificial intelligence, neuro link '; 'brain-machine interface '; 'neural network '; 'neural implant ', 'brain gate '. Considered research articles were reviewed, the pros and cons were understood and included during this study. If the articles were retracted and if articles are in other languages, then those articles were excluded. Quality of articles used was assessed using Quality assessment tools and graded as strong, moderate and weak. The level of evidence of the reviewed articles was categorized as per the standards of Centre for Evidence-Based Medicine, Oxford, UK and graded as strong, moderate and weak as tabulated in Table 1, (Jeremy, 2011).

Interesting facts about Neuro Link

Neurolink amplifies and sends the signals to a machine; it sets up the neurons which can read all the impulses. The electrodes may help in treating brain-related disorders. Five major steps are being involved which incorporates the creation of threads, reading the signals and cleaning them and stitching of threads into the tissues, transmission of signals to amplifiers, amplification of signals and transmission to the machine (Kulshreshth *et al.*, 2019).

Brain Machine Interface

The main aim of the BCI technology is to assist the individuals with more disability to regulate the reanimated paralyzed limbs and also as an assistive device. It's the potential to enhance the standard of life for people with disability because it may offer a natural and rich control interface for assistive devices, to understand a clinically-viable BCI device include the power to record neural activity with the high spatial and temporal resolution is that the key criteria (Wang, 2013). The limitation of BMI usage in clinics is the shortage of good neuroimaging techniques to provide the report that the high-resolution neural activity requires (Pisarchik *et al.*, 2019).

Connection between Nervous System and Machines

Using advanced algorithms, nowadays the linking of the information from the brain and the computer or electronic devices have become simple so that the messages that have to be encoded or decoded also becomes less complicated in the new modern world. Learning something which is curious to everyone is quantum computing, and by reading that also we get a wonderful idea to link the brain and the electronic devices (Valle, 2019).

Neural Lace

An ideal alternative target to revive any kind of sensation are brainstem dorsal column nuclei (Loutit and Potas, 2020). The results highlight the advantages of using a transmission system with primary care; allowing prompt response to GP enquiries, early initiation of treatment and reducing the number of patients attending hospital clinics (Williams, 2012). Remarkable therapy in the medical field is the Deep brain stimulation is a problem that is faced by any number of people in our country (Brocker and Grill, 2013).

Neural Implant

A lot of advancements nowadays are taking in this

Table 1: Description and quality assessment of included studies

S.N	Author	Year	Type of study	Key points	Quality of study
1.	(Musk, 2019)	2019	Review	Neurolink - a new product launched and also BMI integrated platforms.	Strong
2.	(Kent, 2019)	2019	Review	Separating the fact from fiction	Moderate
3.	(Kulshreshth *et al.*, 2019)	2019	Review	Achieve symbiosis with AI	Moderate
4.	(Wang, 2013)	2013	Review	Electrographic BMI in humans	Strong
5.	(Pisarchik *et al.*, 2019)	2019	Review	From basic techniques to advance technique in neuro link.	Strong
6.	(Valle, 2019)	2019	Review	The connection between the central nervous system and BCI	Strong
7.	(Loutit and Potas, 2020)	2020	Review	Dorsal column nuclei complex	Moderate
8.	(Williams, 2012)	2012	Review	Electronic neurology is connected with neuro link	Moderate
9.	(Brocker and Grill, 2013)	2013	Review	Electrical stimulation of neural tissue.	Strong
10.	(Rezaei, 2016)	2002	Review	110 nW in channel sigma-delta.	Moderate
11.	(Gosselin, 2011)	2011	Review	Neural recording implants	Moderate
12.	(Rehman and Kamboh, 2013)	2013	Review	Neural signal amplification	Moderate
13.	(Jackson and Zimmermann, 2012)	2012	Review	Neural interfaces are made for brain and spinal cord	Strong

fields that are related to the fabrication process, so the development of these implants are easy, Amplifier-based systems and Neural amplifiers are often designed in house, and it is being fabricated easily by researchers. Advancement in wireless companies has employees a new device which will directly interface with the CNS for exciting the neural recordings (Rezaei, 2016).

Recent Researches

Research in neuroscience has accelerated the substantial demand and that are capable of watching large groups of neurons and their activities. The tools revealed an incredible potential for the improvements of data within the development of useful clinical applications and for the brain related researches (Gosselin, 2011). The front-end circuit is low power consumption and chip area are the two most crucial requirements, especially because of the number of channels increases (Rehman and Kamboh, 2013). Motor function is of high priority to patients with spinal cord injury (SCI) it is very important and also the spread of devices related or in connection with the brain or spinal cord (Jackson and Zimmermann, 2012).

RESULTS AND DISCUSSION

Elon Musk has stated that he had started developing fear about the decline in the thinking process of the person's when AI will become capable of all the brain-related functions (Kulshreshth *et al.*, 2019). Neuralink can record about 1,500 or 3,000 electrodes and aims for providing a smaller and safer BMI technology.

Larger and more elaborate research under this subject is required, and when the longer-term studies are administered supported this subject, it's to be elaborate study and actually, it should be available for people's benefit. These are often a number of the restrictions of this particular study. The shortage of understanding of the above concept will give longer for philosophers, policy-makers, and fantasy enthusiasts to plan and to imagine for a future where humans are going to be ready to instantly read each other's thoughts, download knowledge into our brains, and collaborate with Artificial intelligence just using the human mind.

CONCLUSION

This technology is only at the basic stage where many types of research have to be continued, and

it has to be available in regular use only then people which brain-related problems can get an easy solution, and this technology is merit towards our modern medicine. This review is an effort to update the recent advance of Neurolink project; further research is that the need of the hour to understand about its complete use for the citizenry.

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Conflict of Interest

The authors reported the conflict of interest while performing this study to be nil.

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