Centre for Air Power Studies (CAPS)
Forum for National Security Studies (FNSS)
35/17

FACEBOOK'S FORAY INTO AUGMENTED REALITY AND BRAIN-COMPUTER INTERFACE: BEYOND THE HYPE AND HEADLINES

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Research in neuroscience and neuro-technology, fueled by advances in technology, has reached a point of inflection. Understanding of functioning, interactional relationship with others entities and responses to stimuli of brain, nervous system and nerve pathways is no longer considered an esoteric discipline with subjective interpretations only. Advances made in neuro-imaging, neuro-genetics, neuro-physiology and neuro-pharmacology have paved the way for new understanding, diagnosis and management of neurological disorders, injuries and neuropsychiatric disorders and have expanded the realm of neurological care and neuro-rehabilitation for people with congenital or acquired neurological conditions. These techniques are being used far beyond the treatment of conventional neurological disorders: they are increasingly being used to emotionally and psychologically manipulate humans by predicting, modifying and controlling their cognitive schemas, emotional responses and behavioural traits.

With so much insight gained on the functioning of brain, it is just a matter of time before social media companies merge the understanding of brain function with ICT technology and come up with products capable of offering users a whole new level of experience and interactivity. In cyberspace, the virtual, augmented and mixed reality has already made deep inroads and has muddled the reality of its users so much, that its pursuit in unadulterated form has become a challenge. On a regular basis, we are exposed to the mixed reality technology stimulating our cognitive apparatus and affecting our visual, aural, olfactory and cutaneous senses. While virtual reality (VR) creates an interactive

virtual environment, augmented reality (AR) is a real-world environment whose elements are augmented by computer generated sensory input. The main objective of VR is to dominate the senses, taking its users to a place totally disconnected from the real world and plunge them into immersive artificial world. Augmented Reality allows the user to see the reality of the environment, as well as the synthesis of virtual objects in the real environment superimposed or contrasted with virtual reality.

It therefore did not come not as a big surprise when on April 18, 2017 Facebook CEO Mark Zuckerberg unveiled Facebook's augmented reality system and stopped the rumour mill going into overdrive, by declaring that Facebook is developing a 'mind control' brain interface. During the firm's annual F8 developer conference at San Jose, California, he confirmed the ongoing work on development of a new platform to allow developers to build AR and termed it as the 'second act' in Facebook's camera strategy.[1] He further added that that Facebook was experimenting with technology that would allow users to communicate using only their minds. The technology will use implantable chips, which once put inside the brain of users will create a brain-computer interface (BCI).[2] Zuckerberg confirmed that BCI was one of four technologies (in addition to augmented reality, drones, and cameras), in which the tech giant is focusing its Research and Development (R&D) efforts in a big way. BCI applications will also enable people to control augmented and virtual reality interfaces using only their thoughts.

It is not the first time that Facebook has forayed into the field of brain interface. In 2014, Facebook tried to manipulate the information on 689,000 users' home pages to gauge their emotional responses through a process of "emotional contagion". [3] For this experiment of Facebook in mass emotional manipulation, a host of negative epithets were used by experts ranging from disturbing, scandalous to outright spooky. A senior British MP, even called for a parliamentary investigation into how Facebook and other social networks manipulated emotional and psychological responses of users by editing information supplied to them.[4]The Facebook spokesperson said that this was part of the plan to understand how people respond to different types of content. But many were skeptical of the whole process which, they urged could be used for political purpose during elections or make people hooked to Facebook for it would stimulate happy emotions thereby boosting Facebook' s revenues.

Brain-Computer Interfaces

The greater knowledge of the functioning of brain and easy availability of powerful processors capable of matching the complexity and real time analysis of brain activities has led the quest to develop a brain-computer interface, capable of exchange of information from the

brain to a computer and vice versa. While the brain's normal communication and control capabilities depend on nerves and muscles, the existence of easily recordable brain signals has given impetus to the possibility of establishing non-muscular communication and control based on brain–computer interfaces (BCIs).[5] In one of the most poignant and powerful demonstration of BCIs, 29 years old Juliano Pinto with complete paralysis of the lower trunk, donning a mind-controlled robotic exoskeleton, performed the symbolic first kick-off of the 2014 World Cup in São Paulo in Brazil. His robotic exoskeleton was created by a team of more than 150 researchers led by Brazilian neuroscientist Dr. Miguel Nicolelis. The exoskeleton used a cap placed on the patient's head, picked up brain signals and relayed them to a computer in the exoskeleton's backpack. The signal was then decoded and transmitted to the exoskeleton to execute the action.[6] It has been reported that under a DARPA project in U.S., a paralyzed woman was successfully able use her thoughts to control an F-35 and a single-engine Cessna in a flight simulator.[7]

The research in this field is adding to the repertoire of knowledge beyond the perfunctory functioning of brain and making deep inroads into our collective understanding of cognitional, emotional, behavioural, motivational and attitudinal functions: in determining human response to various known and unknown stimuli. Today, implantable neural interfaces are being used for neural recording and stimulation. Brain–machine interfaces (BMIs) or brain–computer interfaces offer a ray of hope for those with severe motor impairment and a host of other neurological disorders. Algorithms have been designed to decode/ simulate neurons and synapses. The understanding of anatomical structure and 'physiological function' of the brain by'Brain mapping' through: imaging, molecular and cellular biology molecular, stem-cell manifestations, electrical and biomedical technologies, neurophysiology and nanotechnology, is deepening and expanding. The definitive and ameliorating treatments for a variety of psychiatric disorders would be available for bringing in quantifiable improvements in quality of life of patients. The possibilities and spin-offs of mapping and decoding the brainare virtually endless and constantly evolving. However, neuro-technology is a dual-use technology fraught with existential danger of being misused. The issues which need to be tackled in wake of acquisition and use of neuro-technological capabilities have strong and integrated linkages across a wide range of moral, ethical and legal of concerns.

Conclusion

The deep insights gained from exploration of brain and its functioning and enormous breakthroughs made in the field of neuroscience have raised a spate of challenges unprecedented and unmatched in modern times. The usage of

such capabilities by social media companies such as Facebook can manifest in complex and unpredictable ways having far reaching and irreversible consequences. Any breakthrough technological development in the field of ICT is welcomed but needs to comply with the existing social and moral jurisprudence and should not be used for emotional and psychological manipulations of human beings.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes

[1]Mark Prigg," Facebook goes virtual: Firm unveils VR and AR software as Mark Zuckerberg confirms it IS developing a 'mind reading' brain interface", Daily Mail, April 18, 2017 http://www.dailymail.co.uk/science tech/article-4422436/Mark-Zuckerberg-confirms-Facebook-s-brain-interface.html, accessed May 04, 2017.

[2]Jake Anderson, Facebook Announces Mind-Controlled Computer Technology, *Activist Post*, April 19, 2017, http://www.activistpost.com/2017/04/facebook-announces-mind-controlled-computer-technology.html, accessed May 04, 2017.

[3] Robert Booth, Facebook reveals news feed experiment to control emotions, *The Guardian*, June 30 June, 2014, https://www.theguardian.com/technology/2014/jun/29/facebook-users-emotions-news-feeds, accessed May 04, 2017.

[4]Ibid.

[5]Encyclopedia of Neuroscience , 2004 ed., s.v., "Brain Implants"

[6] Alejandra Martins and Paul Rincon, Paraplegic in robotic suit kicks off World Cup, *BBC News*, June 12, 2014, http://www.bbc.com/news/science-environment-27812218, accessed May 01, 2017.

[7] Abby Phillip, A paralyzed woman flew an F-35 fighter jet in a simulator— using only her mind, The Washington Post, March 03, 2015, https://www.washingtonpost.com/news/speaking-of-science/wp/2015/03/03/a-paralyzed-woman-flew-a-f-35-fighter-jet-in-a-simulator-using-only-her-mind/, accessed May 01, 2017.