Brain Implants

Introduction

Assume that you have been appointed to a task force of 5 or 6 computing professionals within your organization. You have been asked to examine the current issue outlined in the article below. Your team has not been asked to make specific recommendations to solve the problem. Rather, you have been asked to make recommendations that will help the Government decide what next steps they should take.

Prompts

1. What is/are the problem/problems here? Is there an underlying fundamental problem?
2. Who are the major stakeholders and what are their perspectives?
3. What are the major ethical, legal, and security aspects associated with the problem?
4. What are the intended and unintended consequences of existing computing solutions? Consider the consequences on individuals, organizations and society within local and global contexts.
5. What recommendations do you propose that may lead to potential solutions?

Imagine a chip in your brain that allows you to see in the dark or that gives you superhuman hearing. Imagine having the ability to remember everything you read or to send someone a text message directly from your brain? These may seem like ideas from a science fiction movie but brain implants are real and are already being used.

Brain implants are tiny computer chips that are surgically inserted into the surface of the brain of people who have some form of neurological disease or dysfunction. No larger than a grain of rice, these chips are being used to improve a paralyzed person's arm and leg movements and recreate their sense of touch. In the UAE, the Al Jalila Foundation in Dubai provides implants for deaf children and has approved the first implant for eyes. The eye implant has 60 electrodes that act as a retina, and that transmit data wirelessly. Neural implants are also being used to repair brain damage, such as memory loss in Alzeimer's disease patients. These implants work by either stimulating a part of the brain or by transmitting brain signals. An electronics package in each implant activates a number of tiny electrodes that interface with healthy neurons in the body. The implant gathers data from one area of the brain, processes this information and then transfers it to another region of the brain, bypassing any damaged tissue.

Elon Musk envisions a future where every one of us will have chips in our brains, which will replace keyboards, mouses, touchscreens, steering wheels and more. Brain implants have the ability to improve the speed of learning, memory processing, language translation, night vision and can even change one's mood. Neurotechnology can, indeed, push the limits of what we do as humans. There are, however, a few challenges that need to be overcome first. One challenge is that putting probes through the skull into the brain can cause infection and bleeding inside the brain. Scientists, doctors and engineers need to work together to find safe and reliable ways of inserting probes into the brain. The brain moves inside the skull and so this poses a mechanical problem to create a probe that can move with the brain. A further biological problem is that the immune system in the body can fight a probe, as a foreign body. The probe also has to be small enough to be inside the brain and has to be recharged and upgraded. CTRL-Labs, which was

bought by Facebook for almost $1 billion in 2019, and NextMind both have developed noninvasive neural interface that can be strapped onto a person's arm or inserted into the back of the head, but these are far less effective than probes inserted into the brain.

The idea of meshing human brains with machine intelligence has received a lot of attention. BrainGate, a US based team of neurologists, neuroscientists, engineers, computer scientists, neurologists, mathematicians and other researchers, has been developing and testing neurotechnology inserted into the human body. The company has hundreds of millions of dollars in funding. Neuralink, owned by Elon Musk, is another company that has been working on implantable wireless brain-computer interface technology. The system is already being tested on monkeys and Musk announced that human trials could begin before the end of 2020. Neuralink has received $158 million in funding. There are smaller smart-ups too, like Paradromics which has so far raised $25 million in funding.

When implants have developed enough, they could be used on healthy people to enhance existing skills and abilities. For instance, parents would have the chance to make a 'superchild' with enhanced memory and concentration. The military could create 'supersoldiers' with exceptional focus, memory and stamina. Knowledge could be downloaded directly into the brain, sidestepping the need for education or training. We could all become black-belt kickboxers in an instant.

There are, however, security and privacy implications surrounding these possible uses of brain implants. One challenge is securing people's personal and private memories if these are accessed and downloaded onto a server. Secondly, it is a moral obligation of science to ensure equality, to make sure the technology is available to everyone. If some people have a brain implant to enhance their brain functions, and other people cannot get or afford one, there is an unfair advantage. If rich countries can afford 'superchildren' and 'supersoldiers' and a population with enhanced memory and concentration, poorer countries will be more disadvantaged. Moreover, there could be legal implications if implants are used for identification purposes, such as tracking minority groups. None of this is probably going to happen overnight or even in the next decade but consider the speed with which technology is advancing. What kind of world will our grandchildren live in?

792 words

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