BCI APPLICATIONS

One of the most exciting areas of BCI research is the development of devices that can be controlled by thoughts. Some of the applications of this technology may seem frivolous, such as the ability to control a video game by thought. If you think a remote control is convenient, imagine changing channels with your mind.

However, there's a bigger picture -- devices that would allow severely disabled people to function independently. For a quadriplegic, something as basic as controlling a computer cursor via mental commands would represent a revolutionary improvement in quality of life. But how do we turn those tiny voltage measurements into the movement of a robotic arm?
Early research used monkeys with implanted electrodes. The monkeys used a joystick to control a robotic arm. Scientists measured the signals coming from the electrodes. Eventually, they changed the controls so that the robotic arm was being controlled only by the signals coming from the electrodes, not the joystick.
A more difficult task is interpreting the brain signals for movement in someone

With a task like that, the subject must "train" to use the device. With an EEG or implant in place, the subject would visualize closing his or her right hand. After many trials, the software can learn the signals associated with the thought of hand-closing. Software connected to a robotic hand is programmed to receive the "close hand" signal and interpret it to mean that the robotic hand should close. At that point, when the subject thinks about closing the hand, the signals are sent and the robotic hand closes.
A similar method is used to manipulate a computer cursor, with the subject thinking about forward, left, right and back movements of the cursor. With enough practice, users can gain enough control over a cursor to draw a circle, access computer programs and control a TV. It could theoretically be expanded to allow users to "type" with their thoughts.
Once the basic mechanism of converting thoughts to computerized or robotic action is perfected, the potential uses for the technology are almost limitless. Instead of a robotic hand, disabled users could have robotic braces attached to their own limbs, allowing them to move and directly interact with the environment. This could even be accomplished without the "robotic" part of the device. Signals could be sent to the appropriate motor control nerves in the hands, bypassing a damaged section of the spinal cord and allowing actual movement of the subject's own hands.

ACHIEVERS OF THE QUARTER

NAME	SEMESTER	EVENTS	PLACE	PRIZE
Stuti garg	VI	TCS Tech Bytes	MVJCE,Bangalore	NA
Pooja C	VI	TCS Tech Bytes	MVJCE,Bangalore	NA
1. Dinesh P 2. Deeksha	III	Tech Quiz	GNEC, Secunderabad	II

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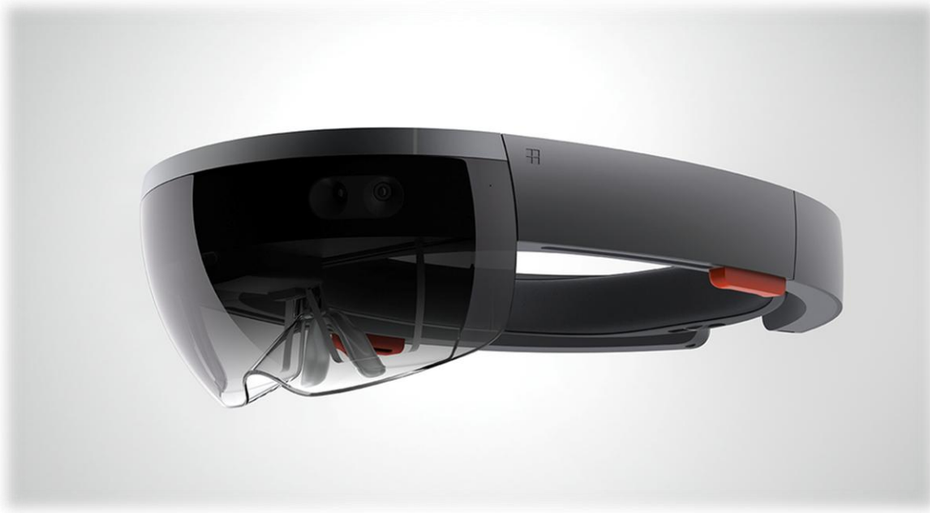


Microsoft's HoloLens Explained:

How It Works?

HOW DOES THE WHOLE HOLOGRAM THING WORK?

The HoloLens comes with semitransparent holographic lenses which 'generate multi-dimensional full-color holograms'. That means it's not going to be projecting images into a room that everyone can see. It's cutting edge stuff, but it's not quite that advanced yet.

In much the same way as Google's ill-fated Glass experiment, the HoloLens will will interject virtual elements onto your vision. That means it's different to virtual reality headsets such as the HTC Vive, Oculus Rift, and PlayStation VR.

WHAT'S POWERING THE HOLOLENS?

Under the hood, Microsoft has packed the HoloLens with a series of sensors, along with a high-end CPU and GPU, which the company claims gives it 'more computing power than the average laptop'.

Specifically, the headset features an inertial measurement unit, an ambient light sensor, one camera for measuring depth, and four 'environment understanding cameras', all of which combine to process information about the environment you're in and how you're interacting with it.

On top of that, a 2-megapixel camera allows you to capture videos and photos of your holographic exploits, while four built-in microphones will register voice commands.

To create an intuitive interaction with holograms, the HoloLens also uses 32-bit Intel architecture and a Holographic Processing Unit (HPU) to smoothly process real-time data captured by the on-board sensors. The custom-built HPU understands gestures, processes where you're looking, and maps the surrounding environment in real time.

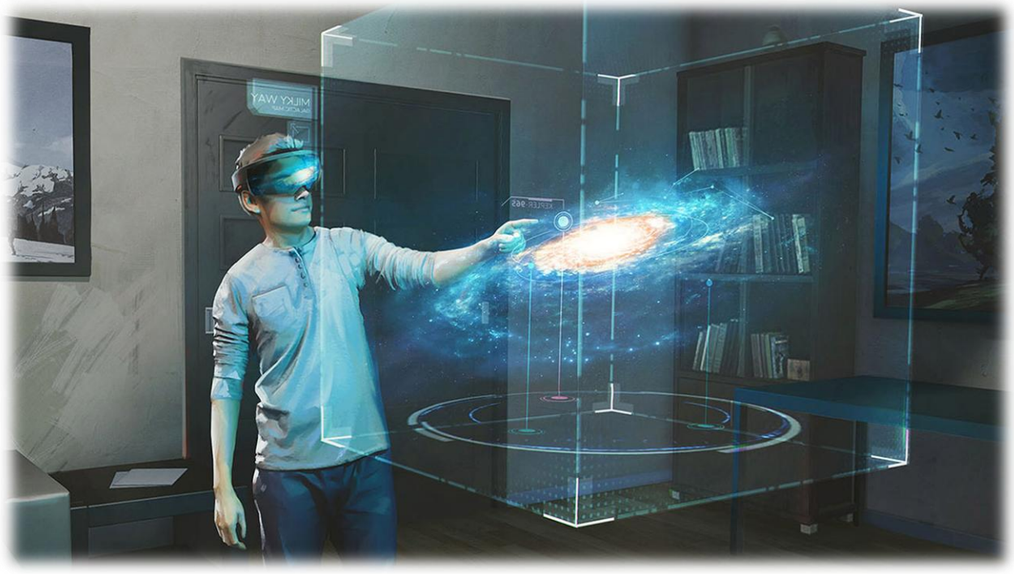
When it comes to power, the HoloLens features a battery that will allow for two to three hours use and up to two weeks of standby time. You'll also be able to use the headset while it's charging over Micro USB

WHAT WILL YOU BE ABLE TO DO WITH HOLOLENS?

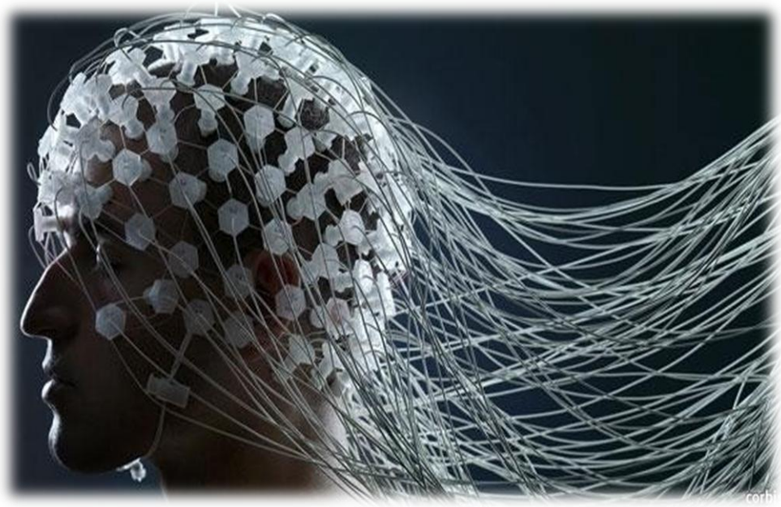
From the sounds of it, quite a lot. Microsoft presented some of the most interesting potential uses in a video, which you can see above. Among the most interesting, HoloLens will be able to let you view and interact with work projects such as assembling 3D models, play games like Minecraft, video chat with hologram versions of Skype contacts, and even watch live content.

An on-stage demonstration further emphasized the ability to create 3D objects, from assembling to choosing the colors, all using simple gestures that looks very Intel RealSense.

One of the most fascinating uses, at least for the folks at NASA, which collaborated with Microsoft in the making of HoloLens, is the potential to control the Mars rover Curiosity via the HoloLens. The headset will give NASA staff the ability to plant virtual flags in the terrain and work as if they're actually on the planet themselves.



Brain-Computer Interface



A brain–computer interface (BCI), sometimes called a mind-machine interface (MMI), direct neural interface (DNI), or brain–machine interface (BMI), is a direct communication pathway between an enhanced or wired brain and an external device. BCIs are often directed at researching, mapping, assisting, augmenting, or repairing human cognitive or sensory-motor functions.

HOW BRAIN-COMPUTER INTERFACES WORK?

As the power of modern computers grows alongside our understanding of the human brain, we move ever closer to making some pretty spectacular science fiction into reality. Imagine transmitting signals directly to someone's brain that would allow

them to see, hear or feel specific sensory inputs. Consider the potential to manipulate computers or machinery with nothing more than a thought. It isn't about convenience -- for severely disabled people, development of a brain-computer interface (BCI) could be the most important technological breakthrough in decades. In this article, we'll learn all about how BCIs work, their limitations and where they could be headed in the future.

The Electric Brain

The reason a BCI works at all is because of the way our brains function. Our brains are filled with neurons, individual nerve cells connected to one another by dendrites and axons. Every time we think, move, feel or remember something, our neurons are at work. That work is carried out by small electric signals that zip from neuron to neuron as fast as 250 mph. The signals are generated by differences in electric potential carried by ions on the membrane of each neuron.

Although the paths the signals take are insulated by something called MYELIN, some of the electric signal escapes. Scientists can detect those signals, interpret what they mean and use them to direct a device of some kind. It can also work the other way around. For example, researchers could figure out what signals are sent to the brain by the optic nerve when someone sees the color red. They could rig a camera that would send those exact signals into someone's brain whenever the camera saw red, allowing a blind person to "see" without eyes.