technology today

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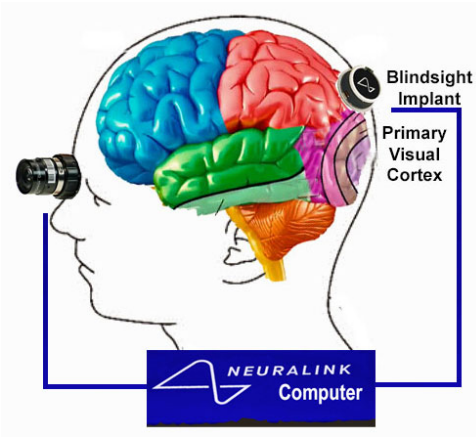
Blindsight

A Brain Implant to Restore Sight to the Blind

In September of 2024 the new Neuralink Implant Blindsight received FDA approval for human trials. To receive FDA approval Neuralink provides the necessary medical data that showed that their Blindsight brain implant was able to safely restore some sight in blind monkeys.

Under prior human trial approval, Neuralink has already performed successful surgeries to a different area of the human brain that gave quadriplegics the ability to control computers mentally. The human trials will determine if a Neuralink implant/computer system can go from interpreting brain electrical signals to converting camera images into electrical signals that the human brain can convert into sight. See image 1.



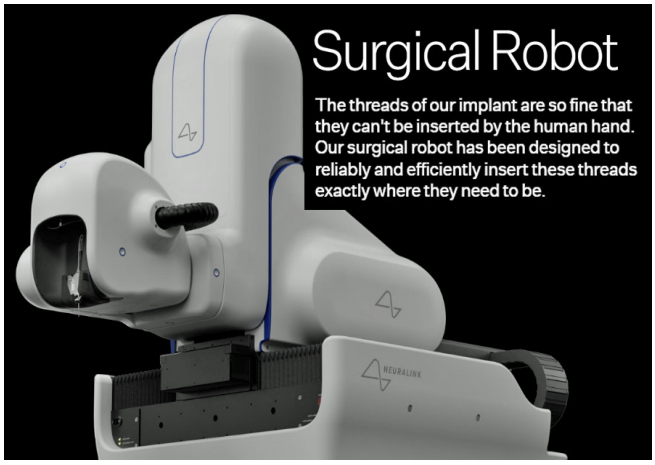
What's the difference between the biological hardware in our head that provides sight and the hardware in your smartphone that records and plays back videos? This analogy is appropriate since Blindsight is designed to send images captured by a camera and processed by a computer directly to the part of the human brain that creates our vision.

Biological sight: Light is focused by the lenses in the eyes onto the retina. The cells in the retina convert this light into electrical signals. These electrical signals are transmitted to the optic nerve and this nerve carries these electrical signals to the brain's visual cortex. The visual cortex processes these electrical signals into the images that we see.

Camera Video Recording: Light enters through the lens of the camera and is focused onto an image sensor (CCD or CMOS). The sensor converts the light into electrical signals. The electrical signals from the image sensor are processed by the systems microchips and circuitry. This includes adjusting exposure, white balance, and other settings. The processed image data is digitized and stored in the camera's memory or on an external storage device.

Neuralink will use a camera and computer processor to create the electrical signals that Blindsight will transmit directly to the brain's visual cortex. The human eye doesn't record images in the same way a camera does. Our brains create a continuous perception of the world around us, but this perception isn't stored as a static image or video. Animal study successes indicated the restoration of some level of sight. Only a human participant can inform the significance of that restitution.

The Neuralink robot, image 2, is actually designed to perform the total insertion operation automatically after the medical team sets up the patient for the surgery. During the surgery the robot will implant a microelectrode array into the visual cortex of the recipient's brain. Each lead is much thinner than a human hair and their individual placement could easily determine the positive or negative sight restoration of the surgery. One can assume the more places stimulated in the visual cortex, by the leads, the better chance that useable sight will achieved. The goal set as the company gets ready to begin human trials is to at least restore low level sight. Musk, the founder of Neuralink indicated his expectations as "Resolution will be low at first, like early Nintendo graphics, but ultimately may exceed normal human vision".



Taking it a Step Further

Working in small groups of 3 to 4 students:

- What surgeries today are being performed by a human surgeon with the assistance of an autonomous or semi-autonomous robotic surgeon?
- Assignment method and presentation is up to your teacher.

Alan Pierce, EdD, CSIT is a technology education consultant. Visit www.technologytoday.us for past columns and teaching resources