

BRAIN CHIP INTERFACE(BCHI)

TIVIATIS

The European Future Technologies Conference and Exhibition 2011
Brain-Chip Interfaces: The Present and The Future

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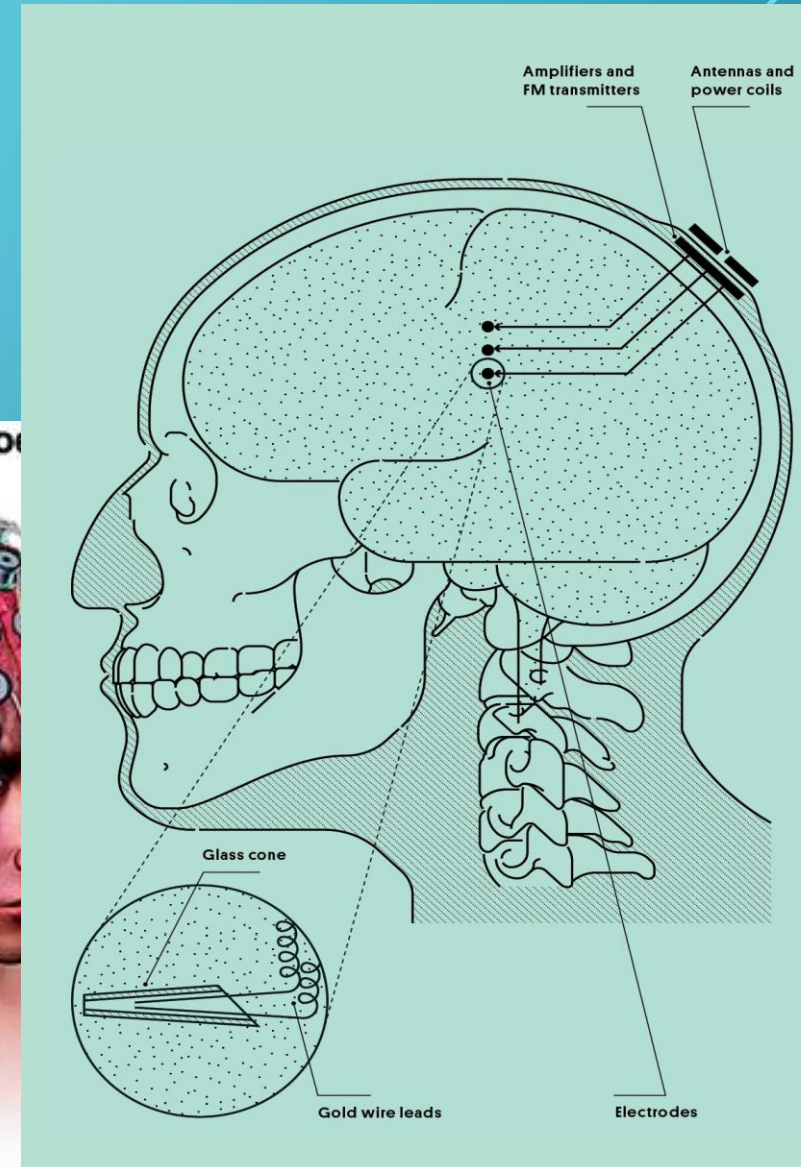
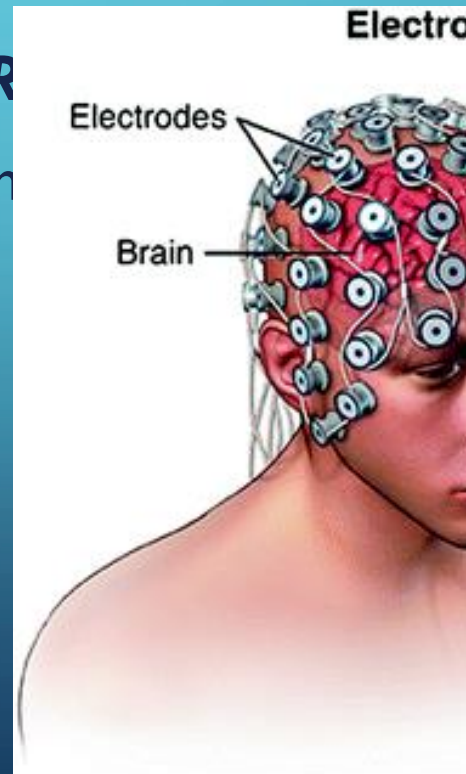
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RESEARCH ARTICLE

- Coins the term BCHI for brain chips
- BCHI represents Brain-Chip interface
- Goes in-depth about the process and the hardware involved

HISTORY OF BRAIN-CHIP INTERFACE

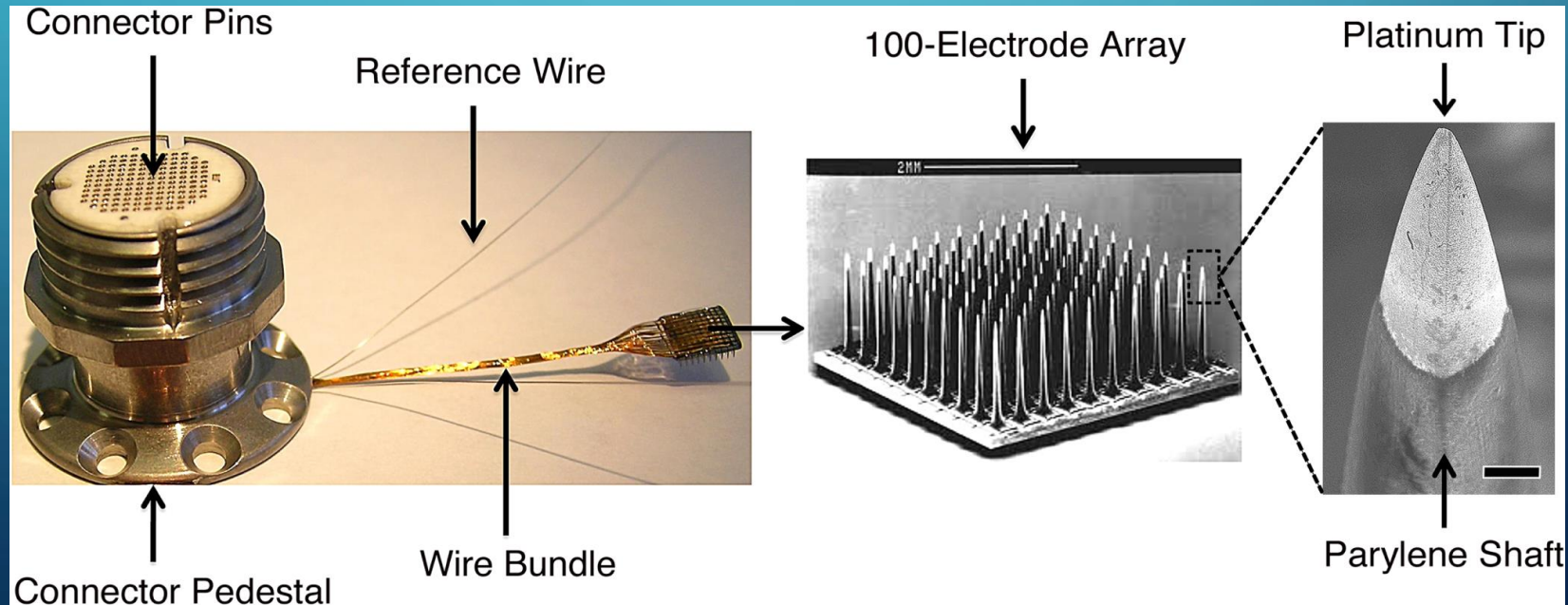
- Subset of Brain Computer Interface (BCI)
- Uses Electroencephalography (EEG) technology
- First BCHI used was by **Dr. José Manuel R Delgado**. He experimented on patients in survived.



HOW THE INTERFACE WORKS

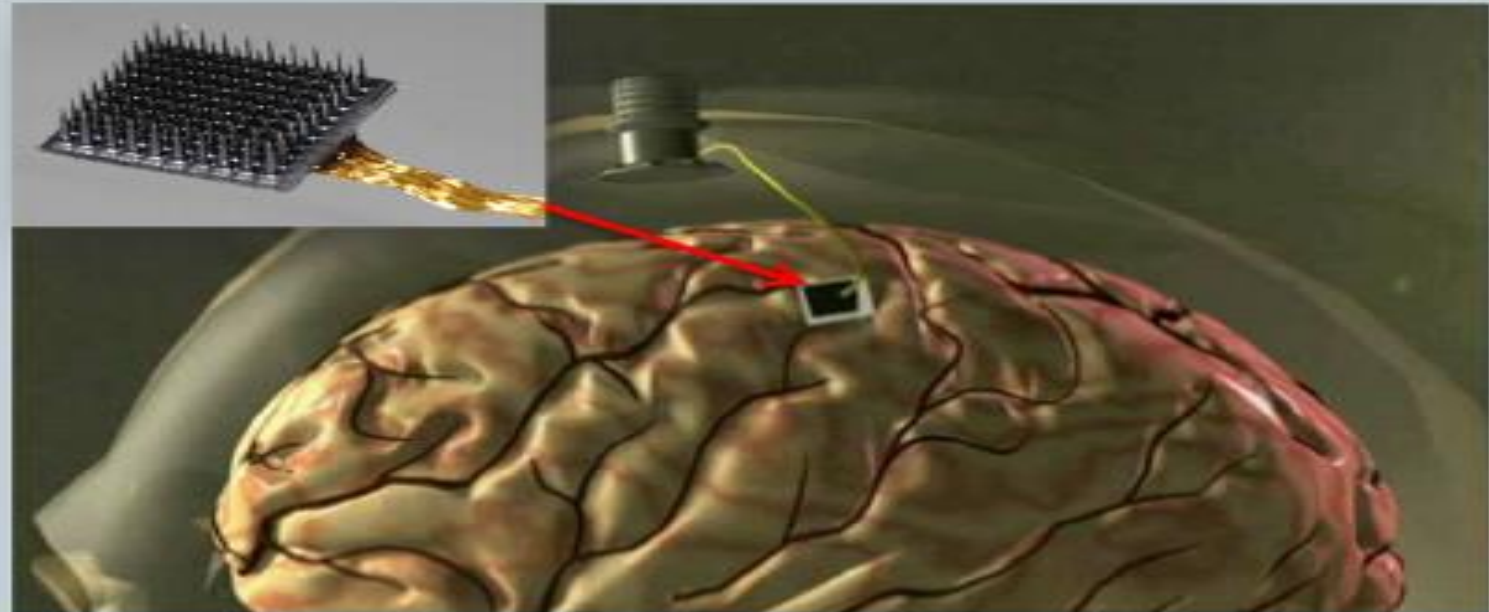
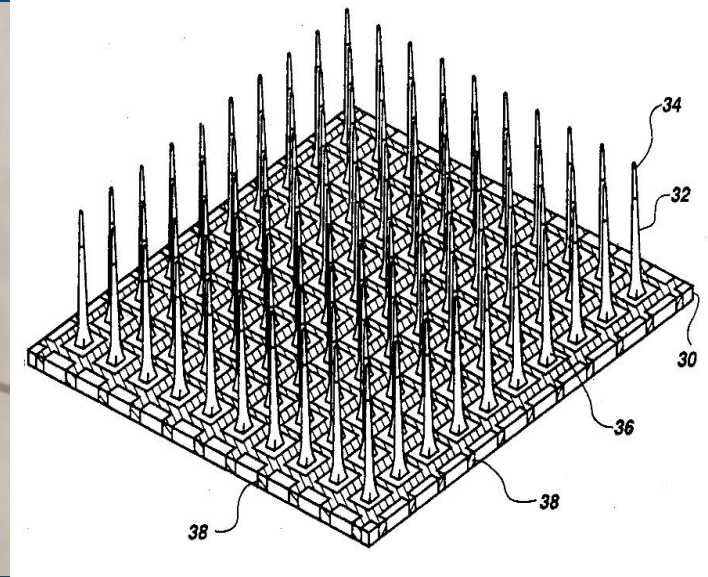
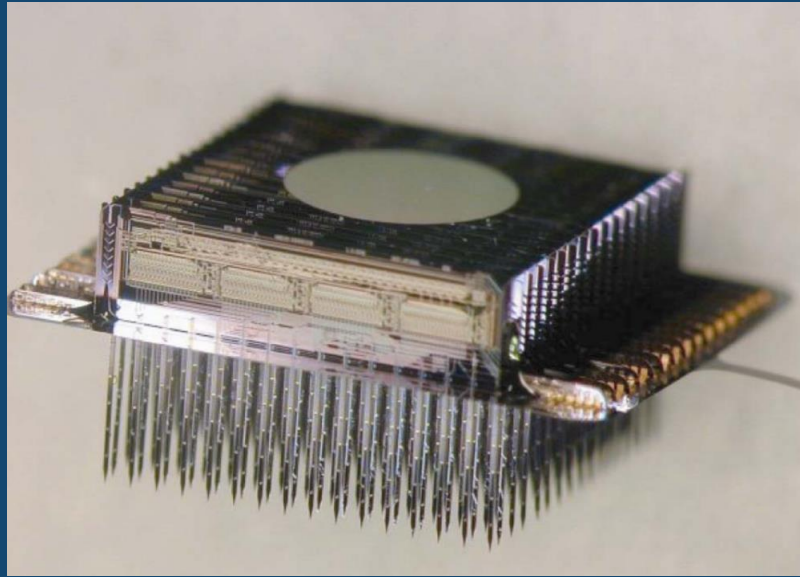
The primary parts of modern BCI include:

- 1) A Pedestal with a Chip—for recording electrical pulses
- 2) Fiber Optic Cable—to send signals
- 3) Neural Signal Interpreter—converts signals
- 4) The Computer—receive digital signals

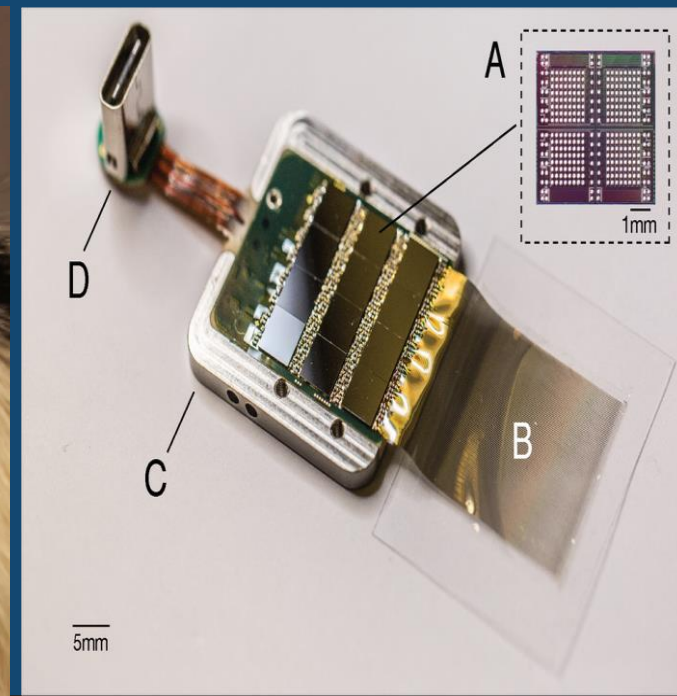


Microelectrode Arrays (MEAs)

1) A PEDESTAL WITH A CHIP

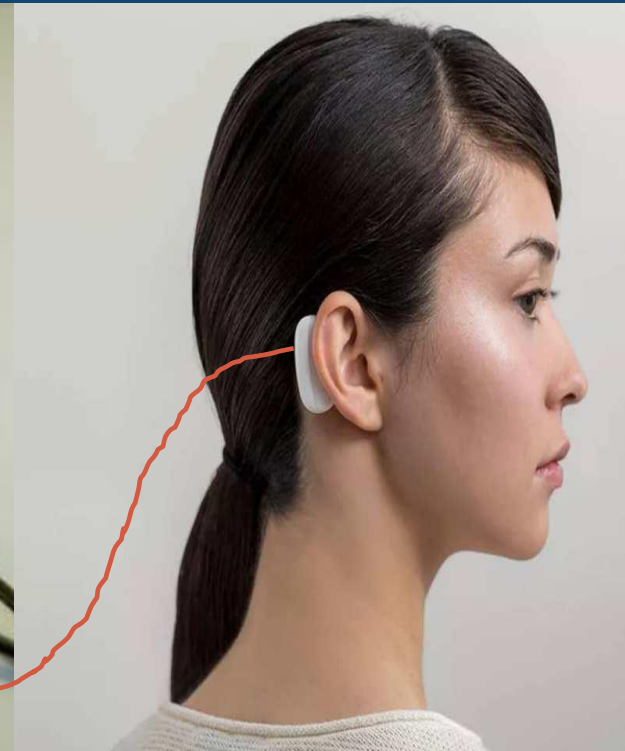


2) FIBER OPTIC CABLE

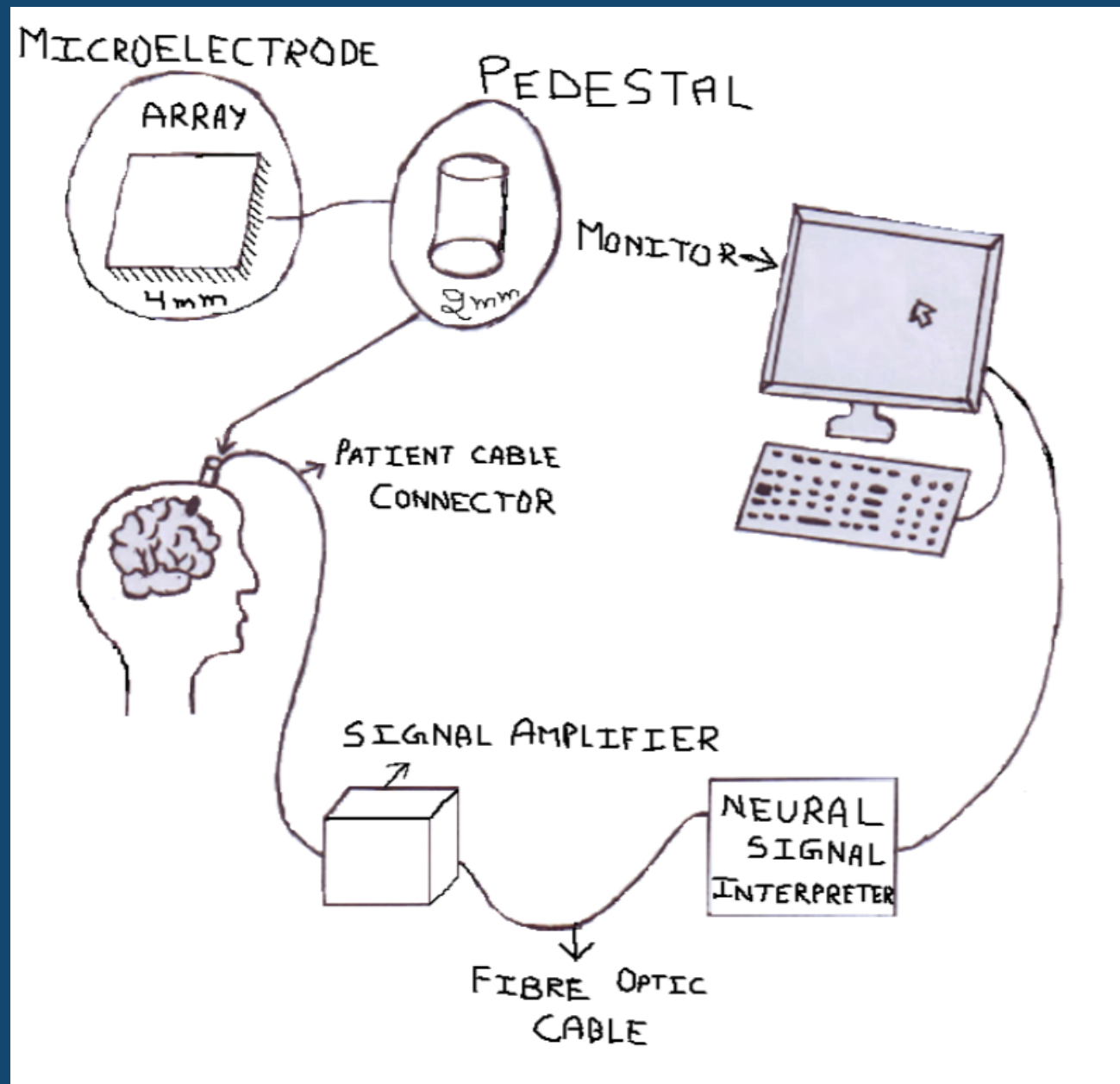


3) NEURAL SIGNAL INTERPRETER

- Converts brain signals to digital signals, vice versa.

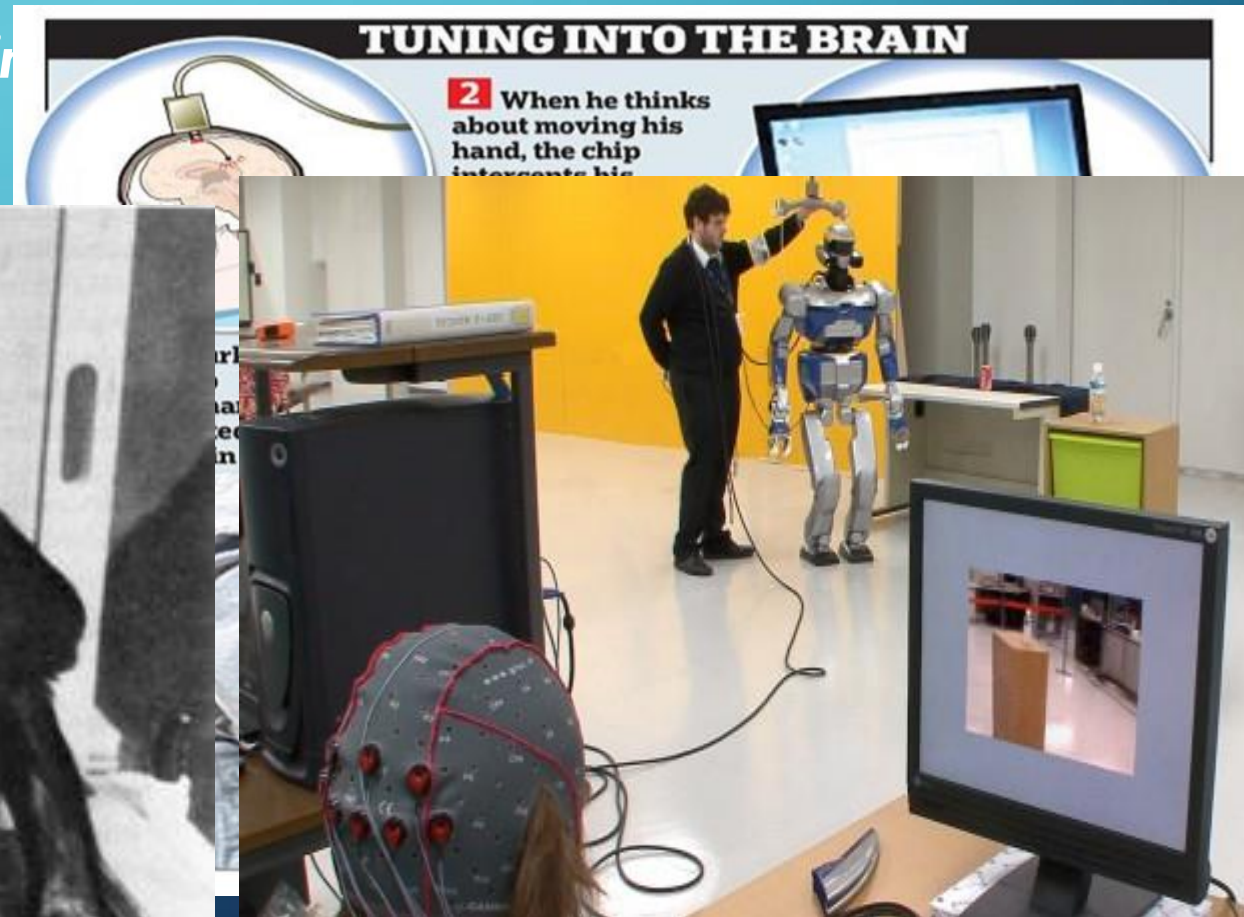
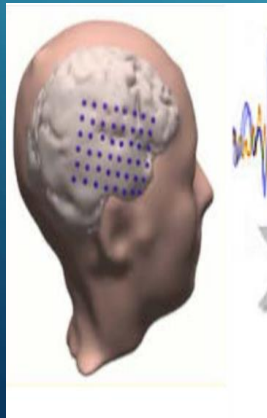


4) THE COMPUTER



APPLICATION AND SIGNIFICANCE

- *Aiding movement of paralyzed patients*
- *Remote rescue through control of animals*
- *Homo sapiens 2.0?*
- *Controlling*



Bionic renaissance?

Arms race ?

ETHICAL CONCERNS??

Controlled by malicious third parties?

Hackers???



WITH GREAT
POWER COMES
GREAT
RESPONSIBILITY

VOLTAIRE

BIBLIOGRAPHY

- Anthony, S. (2014, August 13). IBM cracks open a new era of computing with brain-like chip: 4096 cores, 1 million neurons, 5.4 billion transistors. Retrieved from <https://www.extremetech.com/extreme/187612-ibm-cracks-open-a-new-era-of-computing-with-brain-like-chip-4096-cores-1-million-neurons-5-4-billion-transistors>.
- Dept. Mourns Loss of Brain-stimulation Research Pioneer. (n.d.). Retrieved from <https://medicine.yale.edu/psychiatry/newsandevents/delgado/>.
- Nurse, E., Mashford, B. S., Yepes, A. J., Kiral-Kornek, I., Harrer, S., & Freestone, D. R. (2016). Decoding EEG and LFP signals using deep learning. Proceedings of the ACM International Conference on Computing Frontiers - CF 16. doi: 10.1145/2903150.2903159
- Perlman, D. (2012, January 30). The many uses of cybernetic rats / Pentagon wants paralysis-research rodents trained as tiny soldiers. Retrieved from <https://www.sfgate.com/science/article/The-many-uses-of-cybernetic-rats-Pentagon-wants-2842408.php#item-85307-tbla-2>.
- Peters, B. (2019, June 24). What It's Like to Have an Electroencephalogram (EEG). Retrieved from <https://www.verywellhealth.com/what-is-an-eeeg-test-and-what-is-it-used-for-3014879>.
- Waldert, S. (2016). Invasive vs. Non-Invasive Neuronal Signals for Brain-Machine Interfaces: Will One Prevail? Frontiers in Neuroscience, 10. doi: 10.3389/fnins.2016.00295