



Curiosity Guide #404

Central Nervous System

Accompanies Curious Crew, Season 4, Episode 4 (#404)

Human to Human Interface

Investigation #7

Description

Two people move like one!

Materials

- 2 friends
- Human-to-Human Interface kit from Backyard Brains,
<https://backyardbrains.com/products/HHI>

Procedure

1. Identify one person as the "Brain" and the second person as the "Hand".
2. Attach two electrodes on the underside of the "Hand's" bare forearm. Place one above the elbow, and the second electrode just above the first, with about a quarter-inch gap between the white circles of the electrode.
3. Connect the red alligator clip lead to the electrode nearest the elbow and the black lead to the upper electrode.
4. The Brain should extend his or her bare arm so that a white electrode circle can be placed on the top of the forearm below the elbow.
5. Place the second electrode two inches above the Brain's wrist on the same bare forearm.

6. The final electrode will stick to the back of the Brain's hand on the same arm. This is the ground electrode.
7. Attach the red lead to the Brain's upper electrode, the black lead to the lower one, and the ground lead to the back of the hand.
8. Ask both people to extend their arms.
9. Turn on the device.
10. Set the threshold level on the interface until the Hand's last three fingers begin to tremble.
11. Have the Brain make a fist and pull it back at the wrist.
12. What happened to the Hand?
13. Did the Hand's fingers move by themselves?
14. What happens if the Brain relaxes his or her hand and you, the tester, wiggle it? Will the Hand's fingers move now? Why or why not?

My Results

Explanation

This device is a great example of how, using electrophysiology, scientists and engineers can develop neuro prosthetics for disabled individuals. As the brain sends out motor nerve signals, the computer stimulates the nerves in designated parts of the body. In this case, the ulnar nerve, running under the elbow and up the base of the forearm, is easy to interrupt because this nerve is so accessible.

Among other things, the ulnar nerve controls the movement of the last three digits of the hand. When the device is turned on, the Brain flexes his muscles and moves the fist up, the electrical signal is detected and sends a signal through the interface relay. This signal stimulates the ulnar nerve in the Hand's arm and contracts her fingers. The Brain is controlling both his own hand and that belonging to the Hand. If the Brain relaxes his hand and someone else moves his wrist, there is no impact on the Hand because no electrical signal was sent from the Brain. So, the Hand doesn't move.

Think about this: The central nervous system in your body has hundreds of billions of neuron cells. Each cell comes in three parts: the cell body, the long axon, and the dendrites on each end. Every second, trillions of nerve impulses fire to coordinate movement, decisions, and emotions; and send signals across the nerves to the spinal cord and brain. A neuron starts closed with a negative charge. When dendrites get a message, the cell membrane opens, and positive charges enter the axon. This action sends the impulse to the next neuron, where the process starts again. The combination of electrical charges and released chemicals make it possible to send signals around the body very quickly!

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