To participate in this study, you must:

1. Have limited or no ability to use both hands due to cervical spinal cord injury, or brainstem or spinal stroke.
2. Be age 22-70
3. Be within 2 hours of the University of Pittsburgh or be willing to travel to the University of Pittsburgh for BMI training (housing may be provided).

Additional criteria must also be met in order to participate. We will review all of the criteria with you. Since the study involves temporary placement of arrays to evaluate their effectiveness, there is no direct benefit to you.

Participant using a brain-controlled robotic arm to self-feed a bar of chocolate.

Information learned through this study will support the development of a fully implantable neurally controlled BMI system with motor and sensory capabilities.

Additional Information...

This research study involves risks that are typically associated with any neurosurgical procedure. Please contact the research team for more information and for a description of the risks involved.

Participation is completely voluntary and you may withdraw at any time.

You will be compensated $20-50 per study visit depending on location.

Other research studies

The Human Rehabilitation and Neural Engineering Lab is always looking for volunteers with or without a physical disability to participate in many types of research studies.

If you are interested in participating in a research study, please contact the research team at **412-383-1355** to learn more.

Visit our websites at: **hrnel.pitt.edu** or **upmc.com/bci**.

University of Pittsburgh
Department of Physical Medicine & Rehabilitation
Human Rehabilitation and Neural Engineering Lab (hRNEL)

Brain-Machine Interface (BMI) Research:

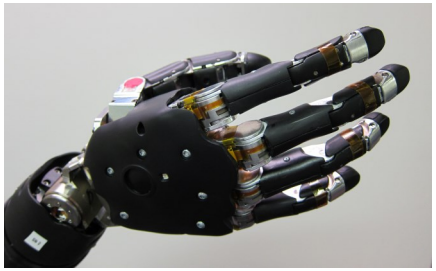
Now Recruiting

For Development of Brain-Controlled Assistive Technology

DARPA

Brain-Machine Interface Research

The Human Rehabilitation and Neural Engineering Laboratory (hRNEL) is conducting a study to investigate the use of Cortical Recording and Stimulating (CRS) Arrays for brain-machine interface (BMI) technology. BMI technology is based on the finding that with intact brain function, neural signals are generated even though they are not sent to the arms, hands and legs.



Brain signals can be used to maneuver a robotic arm.

Two small electrode arrays will be implanted in the area of the brain that controls your movements. Two even smaller electrode arrays will be implanted in the area of the brain that feels sensations of touch. With training you can learn to use your neural signals to control a variety of devices or computer displays.

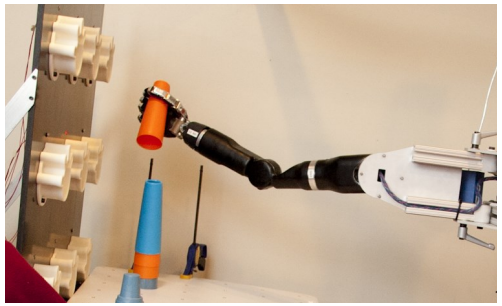
The goal of the study is to demonstrate the safety and efficacy of using multiple arrays for long-term recording of brain activity and sensory stimulation as part of a BMI. A BMI could be useful for controlling computer cursors and assistive technologies that can help people complete activities of daily living.

Study Procedures

We have received approval from the FDA to conduct a research study to implant multiple sensors in the brain for approximately 1 year under an Investigational Device Exemption (IDE). As part of this study, you will undergo two surgical procedures approximately one year apart to place and then remove four small microelectrode arrays on the brain's surface.

Four small arrays each about the size of a pencil eraser will be implanted through an opening in your skull approximately 5x8 cm in size. The wires from the arrays will be attached to two connectors that are fixed to the skull where it can be connected to our computer system.

Both photos were taken with electrode arrays in place. Patient pedestals will protrude through skin but can be covered with hair or a hat.



Maneuvering objects using a brain-controlled robotic arm

While the arrays are implanted, our research team will conduct BMI training sessions multiple days per week, according to your schedule. The goal of training is for you to learn to use your brain activity to control computer cursors, video games and a robotic arm. Also, the sensation of "touch" will be simulated using microstimulation pulses to provide useful feedback for movement control. This is a "first-in-human" feasibility study — study success can not be guaranteed. After approximately 1 year, the arrays will be removed. The total duration of the study will be up to 25 months.

University of Pittsburgh
Dept. of Physical Medicine & Rehabilitation
Human Rehabilitation and Neural Engineering Lab (hRNEL)

If you may be interested in participating, please contact Debbie Harrington, research coordinator:
Phone: 412-383-1355
Email: harringtond2@upmc.edu