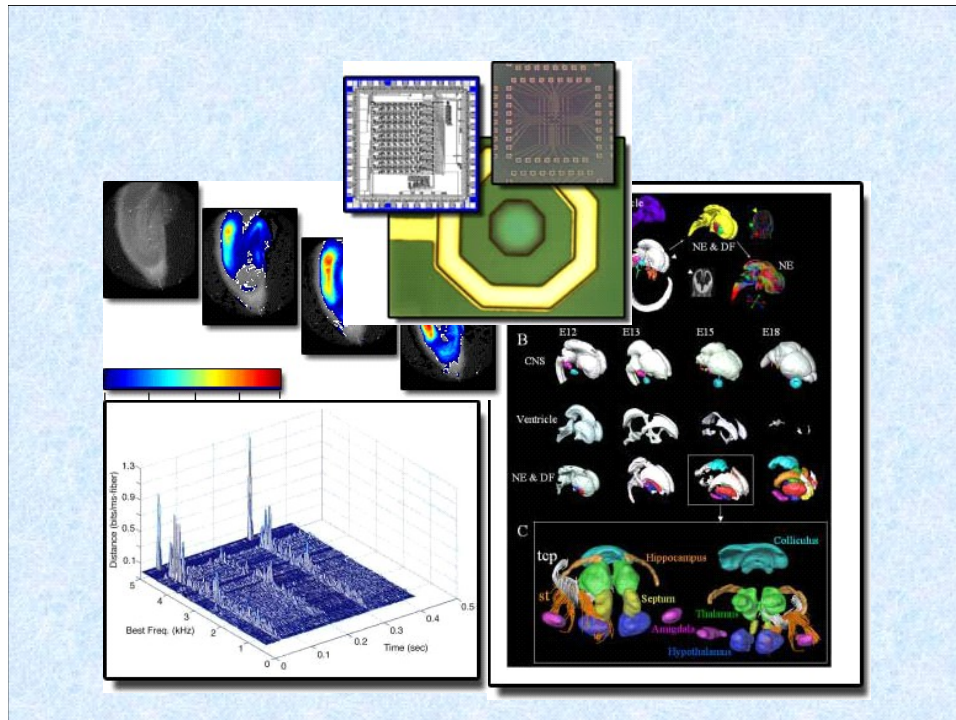


Neuroengineering Essay Contest



Sponsored by:
The Neuroengineering Training Initiative
of
Johns Hopkins University

Contest form: <http://neuroengineering.bme.jhu.edu/essay-contest>

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What is neuroengineering?

Neuroengineering concepts have been featured in science fiction stories and Hollywood movies. Some examples:

- In *Spider-Man 2*, the villain Dr. Octavius creates four mechanical arms, which he can control with his mind (an advanced neuroengineering prosthetic).
- In *The Matrix* series, people can connect computers directly to their brains in order to view thoughts and quickly “upload” new skills and knowledge (an advanced brain-machine interface).
- In *Men in Black*, the agents use “neuralizers” to alter the memories of individuals that have seen aliens (an advanced deep brain stimulator).

Neuroengineering is an exciting new field combining the disciplines of engineering and neuroscience. Neuroengineering is about developing technology to interact with the brain, spinal cord and/or peripheral nervous system.

Neuroengineers are on the cutting edge, creating new devices to:

- (1) Understand the basic properties of the nervous system
- (2) Help people with medical problems related to the nervous system

In recent years, researchers in this field have developed groundbreaking advancements, such as diffusion tensor magnetic resonance imaging, which allows us to see how different parts of the brain are connected without making a single incision, and cochlear implants, which help deaf people regain some hearing. As neuroengineering continues to grow, ideas that once seemed far-fetched may soon become a reality. (See end of contest form for a few articles about real-life neuroengineering.)

Write an essay addressing one of the following prompts:

Essay 1) Take any of the mentioned (or other) “Hollywood” or real neuroengineering concepts and build upon them to create a futuristic idea that could be in the next Hollywood blockbuster or even become reality one day.

Potential applications include, but are not limited to: helping disabled patients, assisting national security, and improving human abilities.

Essay 2) Spinal cord injury resulting from a fall or collision can lead to paralysis and lifelong disability. Describe an emerging or futuristic technology that might lead to healing of the injured spinal cord.

Essay 3) Scientists invent a method to stimulate the brain to “control” brain function. This technology can help with implementing brain control of prostheses and rehabilitation, but what dilemmas does this “brain control” pose?

Awards:

-**All students** that submit essays will be invited to tour neuroengineering research facilities at Johns Hopkins University.

-A **first prize** of \$100 and a **second prize** of \$50 will be awarded for each prompt.

-Additionally, pending a follow-up interview, **contest winners** will be able to conduct research for a summer in a Johns Hopkins University neuroengineering research lab.

Essays 1 and 2 will be judged on creativity, plausibility, and scope of application. Essay 3 will be judged on creativity, discussion of precedent, and personal reflection.

Requirements:

- Junior or Senior in high school.
- No previous knowledge of neuroengineering is required to participate.
- The essay should be typed, double spaced, length 750-1250 words (not including reference list).
- Attach a reference list of material that was consulted in order to write the essay.

For information on citation format see:

http://www.dianahacker.com/resdoc/p04_c09_o.html

A complete entry must include:

- Official **Contest Application Form** (attached)
- Official or unofficial high school transcript

Submission information:

- **Essays and application form** may be submitted electronically as attachments with an email to **neticontest@gmail.com** or mailed to the address below.

- **Transcripts** must be mailed to:
NeuroEngineering Essay Contest
c/o Nasir Bhanpuri
Kennedy Krieger Institute
Motion Analysis Laboratory, Room G-04
707 N. Broadway St.
Baltimore, MD 21205

All three items (essay, application form, and transcript) are required for participation in the contest.

All emailed items must be received by Tuesday, June 30, 2009.

All mailed items must be postmarked by Tuesday, June 30, 2009.

All participants will be notified of contest results no later than July 30, 2009.

For additional copies of the application visit:

<http://neuroengineering.bme.jhu.edu/essay-contest>

Questions? Email: **neticontest@gmail.com**

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Some examples of Neuroengineering in the news:

Is surfing the Internet altering your brain?

The Internet is not just changing the way people live but altering the way our brains work with a neuroscientist arguing this is an evolutionary change which will put the tech-savvy at the top of the new social order. Gary Small, a neuroscientist at UCLA in California who specializes in brain function, has found through studies that Internet searching and text messaging has made brains more adept at filtering information and making snap decisions.

http://news.zdnet.com/2100-9595_22-243997.html

In New Procedure, Artificial Arm Listens to Brain

Amanda Kitts lost her left arm in a car accident three years ago, but these days she plays football with her 12-year-old son, and changes diapers. She does this all with a new kind of artificial arm that moves more easily than other devices and that she can control by using only her thoughts.

"It's dramatically impacted the field," said Stuart Harshbarger, a biomedical engineer at Johns Hopkins University.

<http://www.nytimes.com/2009/02/11/health/research/11arm.html?hp>

The Army's Remote-Controlled Beetle

A giant flower beetle with implanted electrodes and a radio receiver on its back can be wirelessly controlled, according to research presented this week. Scientists at the University of California developed a tiny rig that receives control signals from a nearby computer. Electrical signals delivered via the electrodes command the insect to take off, turn left or right, or hover in midflight.

<http://www.technologyreview.com/computing/22039/?a=f>

These articles have been provided to give some examples of neuroengineering, but by no means do they cover all that is happening in the field. In fact, it would be difficult to summarize all the different aspects of neuroengineering, as the field is continuously growing.



Neuroengineering Essay Contest Application Form

Name (Last)	Name (First)
Mailing Address (Number, Street, Apt #)	
Mailing Address (City, State, ZIP Code)	
High School Name	
High School Address (Number, Street)	
High School Address (City, State, ZIP Code)	
Year in school (Junior or Senior)	
Email Address	
Home phone number including area code	
Preferred form of contact (email, phone, mail)	

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