Neural Engineering
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Please vote for office hours and grading

Lecture 2, 080131

More details:

• I'd like you to take notes, but I will also give you mine. My notes won't be as detailed as what I write during class.

• Homework, new syllabus and notes are available here:
http://complex.gmu.edu/people/peixoto

• If you have problems downloading files write to me!
npeixoto@gmu.edu

The Braingate paper

• Did the videos help?
• What did you think? Too hard/too easy?

The basics (chapter 1)

• Sensory and motor prosthesis
• What's with receptors in postsynaptic neurons?
• Neurons and glia
• EPSPs, IPSPs, APs
• Block diagram of a generic implant
• Design criteria
• Interfaces with the nervous system
• Bottlenecks
Cerebral cortex

Multi-brain histology

Electrode – electrolyte interface

Selecting a project

• Previous projects:
  – Deep brain stimulation
  – Epiretinal implants
  – Carbon nanotubes for single cell analysis
  – Microarrays with Si-pyramids
  – Electrophoretic manipulation of cells
  – MRI for IQ determination in children
  – Control of prosthetic devices

Case Study

• Deep brain stimulation is used for treating several diseases.
  • It is not well characterized.
  • Main problems: positioning of the electrodes, understanding of the mechanical and electrical (primary and secondary) effects.
  • Example: morbid obesity.
Definition of morbid obesity (severe chronic obesity)

- Adults with a BMI greater than 30 are considered obese.
- Anyone more than 100 pounds overweight or with a BMI greater than 40 is considered morbidly obese.

Options (morbid obesity): gastric bypass, bariatric surgery

**Bariatric surgery** (bear-ee-AH-TR-ic) Also known as gastrointestinal surgery. Surgery on the stomach and/or intestines to help patients with extreme obesity to lose weight. Bariatric surgery is a weight-loss method used for people who have a body mass index (BMI) above 40. Surgery may also be an option for people with a BMI between 35 and 40 who have health problems like heart disease or type 2 diabetes.

Discussion next class – be prepared