CSE 303
Concepts and Tools for Software Development

Magdalena Balazinska
Winter 2010 - Lecture 14
Societal Implications of Computing
Impact of Computer Engineering Solutions

Midterm Logistics

- Next Friday, February 12th, in class

- Closed books, closed laptops
- But you can bring the Linux Pocket Guide
- And 1 piece of paper (letter size) with notes
  - You can write on both sides

- Practice midterms
  - Are posted on the class website
  - Skip last question on each midterm

Content for Our Midterm

- **Lectures 1 through 13** except lecture 11 (svn)

- Overall, midterm will be similar in style to the practice midterms
  - But specific questions may be of a different style

- Expect questions on linux commands, shell scripts, utilities, regular expressions, and C

Societal Implications of Computing

- Why are we studying this?

- Educated computer scientists must think about broader implications of what they do
  - Because it affects other people's lives
  - Because it affects their lives

Three High-Level Topics

- Impact of computer engineering solutions
  - Gain broad education necessary to understand the impact of computer engineering solutions in global, economic, environmental and societal contexts
- Ethics
  - Identify ehtical issues
  - Discuss possible courses of action
- Knowledge of contemporary issues
  - Discuss various contemporary issues related to the societal implications of computing

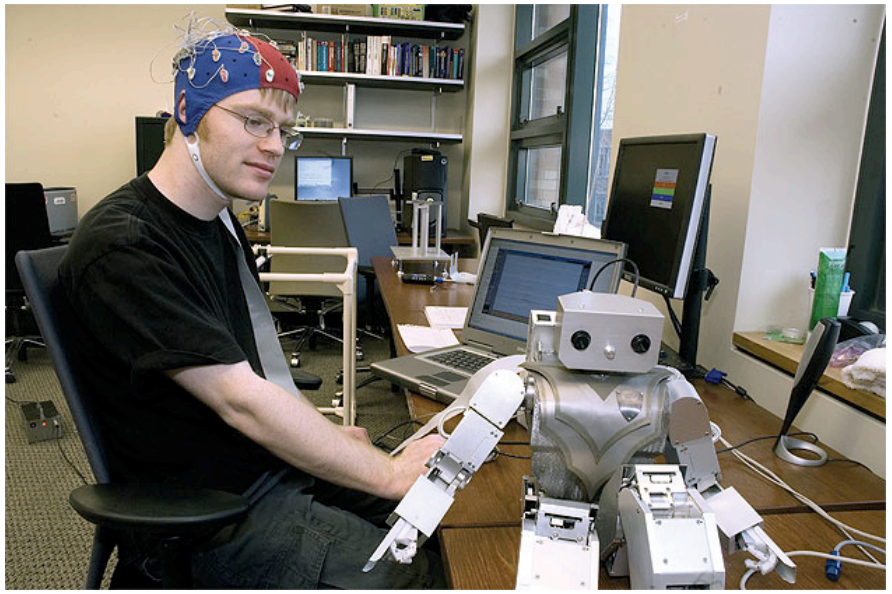
Evaluation

- We wll have 4 in-class discussions
- 10% of your grade: 3-page paper
  - There will be three questions
  - One question per high-level topic
  - Please write between 0.6 and 1 page for each question
    - 10 pt font, single-spaced, 1" margins

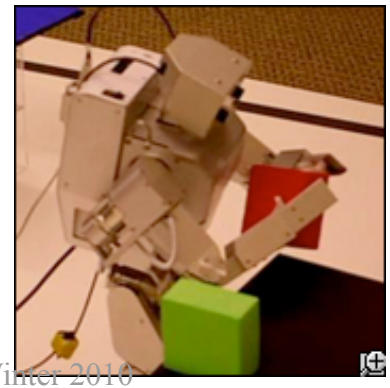
Today's Topic

Brain-controlled computers/robots

http://www.cnn.com/2010/TECH/02/04/wired.olympics.mind.control.lights/index.html



http://www.popularmechanics.com/science/robotics/4215924.html



Overview

- Use brain-waves as a new type of input device
- Use non-invasive techniques to detect them
  - This means no surgery
  - User wears a headset or cap

Application 1: Entertainment

- InteraXon – A canadian company
  - "largest thought-controlled computing installation."
  - Visitors to the Olympics use their brainwaves to control the lights at three major landmarks in Canada: Toronto's CN Tower, Ottawa's Parliament Buildings and Niagara Falls
- User wears a headset with external probe
  - Probe touches forehead to measure baseline brain activity
  - Headset measures brain's electrical output and reacts to alpha waves, associated with relaxation, and beta waves, which indicate concentration
- Computer adjusts lights based on this output

Application 2: Disabled

- Researchers at UW – CSE
  - Prof. Raj Rao and graduate students
- Brain-controlled robot – Morpheus
- User wears a cap filled with gel + 32 electrodes
  - Nerve impulses in the brain create electrical signals
  - These signals can be detected on the scalp
  - P300 response
    - "P" is for positive
    - 300 for the number of msec it takes neurons to produce the reaction
    - Same response as when you lose and then find your car keys

Application 2: Disabled

- Setup
  - Person focuses on an object displayed on a monitor
  - Computer flashes boundaries of random objects one at a time
  - When selected flashes, P300 response is triggered
  - 10 minutes of training
  - After that, it takes 5 – 10 seconds to “read a thought”

- 94 percent success rate
- Apps: household robot? Help paralyzed/disabled?

Questions

- Is this technology useful? Or is it just for fun?
- What are some possible
  - Positive implications of this technology?
  - Negative ones?
- How about new types of input devices in general?
  - Eye tracker?
  - Speech?