UC Berkeley EECS
Sr Lecturer SOE
Dan Garcia

The Beauty and Joy of Computing

Lecture #11
Global Impact of Computing I

Flexible Sensors turn skin into input!

Researchers at CMU and Saarland University have developed "iSkin" touch-sensitive flexible sensors attached to simple medical adhesive (like a band-aid) that allows you to control your mobile device discreetly!

embodied.mpi-inf.mpg.de/research/iskin/

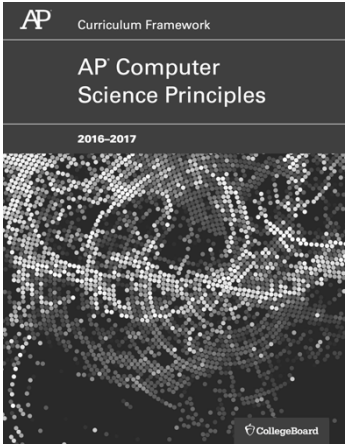
Global Impact of Computing

- **This course is NOT just about programming!**
  - Videos
    - Big ideas
    - Coding Demos
  - Reading
    - Big Ideas
  - Labs
    - Programming
  - Activities
    - Everything

(AP) Computer Science Principles

7 Big Ideas

- Creativity
- Abstraction
- Data and Information
- Algorithms
- Programming
- The Internet
- Global Impact



Communication, Interaction & Cognition I

- New ways to communicate and collaborate!
  - Internet and Web
  - Email, SMS, Chat
  - Video conferencing, video chat
  - Cloud computing
  - Social media, and it's evolving
- Widespread access to information facilitates identification of problems, development of solutions (esp w/public data), and dissemination of results
  - Social media (e.g., blogs, Twitter) helps w/dissemination

Telepresence System by Fuelrefuel (Wikipedia)

Netflix Prize

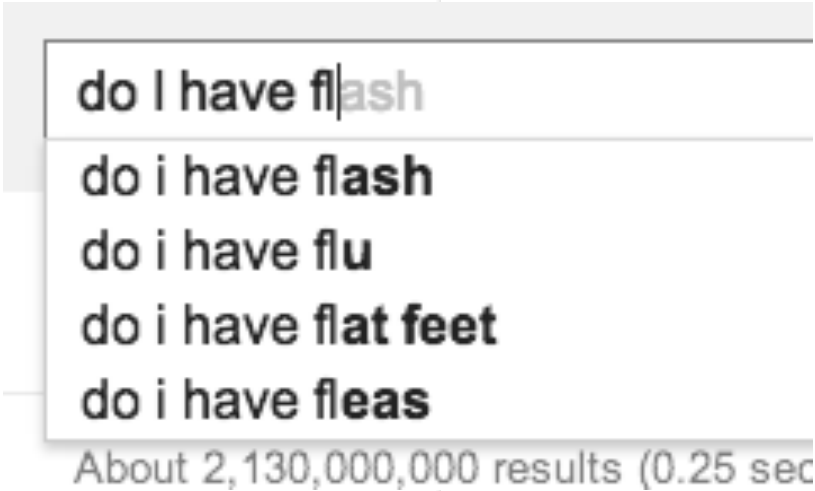
Communication, Interaction & Cognition II

- Human capabilities are enhanced by digitally enabled collaboration
- The Internet & the Web have
  - changed many areas, including e-commerce, health care, access to information and entertainment, and online learning
  - impacted productivity, positively and negatively, in many areas

Connected (the film) by Tiffany Shlain)

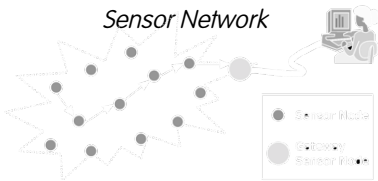
Teenage Girl Texting by Olybrius (Wikipedia)

Search Trends Are Predictors!



Hardware Support

- The desktop-to-(always-on)-mobile computers shift is leading to new applications
- Global Positioning System (GPS) and related technologies have changed how humans travel, navigate, and find information related to geolocation
- Sensor networks facilitate new ways of interacting with the environment and with physical systems
- Smart grids, smart buildings, and smart transportation are changing and facilitating human capabilities
- Computing contributes to many assistive technologies that enhance human capabilities



Voting on a touchscreen by Joebeone (wikipedia)

Citizen Participation I

youtu.be/_aIJV5aQR68
setiathome.ssl.berkeley.edu

- People participate in a problem-solving process that scales
- Distributed solutions must scale to solve some problems.
- Science has been impacted by using scale and "citizen science" to solve scientific problems using home computers in scientific research.

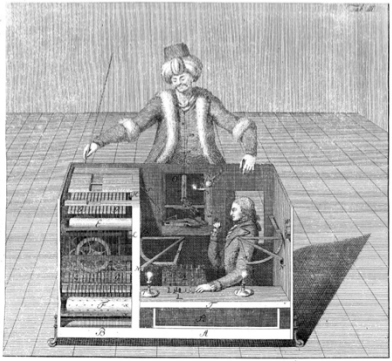
SETI @ Home by Wrightbus (Wikipedia)

The Turk (1770)

en.wikipedia.org/wiki/The_Turk

- A Hoax!
- Built by Wolfgang von Kempelen
  - to impress the Empress
- Could play a strong game of Chess
  - Thanks to Master inside
- Toured Europe
  - Defeated Benjamin Franklin & Napoleon!
- Burned in an 1854 fire
  - Chessboard saved…

The Mechanical Turk (1770)



Citizen Participation II

en.wikipedia.org/wiki/Amazon_Mechanical_Turk
www.thesheepmarket.com
thesinglelanesuperhighway.com

- Human computation harnesses contributions from many humans to solve problems related to digital data + Web
  - E.g., Missing Person Searches, Transcription / Translation, Social Science Experiments, Art research
- Some online services use the contributions of many people to benefit individuals and society
- Crowdsourcing offers new models for collaboration, such as connecting people with jobs and businesses with funding

Amazon Web Services Icon by Amazon (Wikipedia)

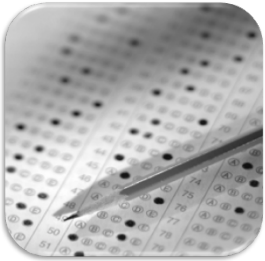
Question (thanks to BH)

The most important use of computers in education so far…

a) Web search
b) Arithmetic drill programs
c) Word processing
d) iclicker-like technologies
e) Social networking

Answer

"Multiple choice tests have changed what counts as knowledge in schools. Open-ended questions were the norm 30 years ago. The kind of knowledge you can report on multiple-choice tests is unimportant in the big scheme of things, and what's really important is not what you already know, but how you can take what you already know and apply it something you've never seen before. Multiple choice tests make that hard. Teaching follows tests! The folks who invented Standardized Testing didn't foresee how it would affect what knowledge means! (unintended consequence)" – Brian Harvey



Computers in Education

Judah Schwartz

Tools	Microworlds	Courseware
Word Processor	Interactive geometry	Arithmetic drill
Browser	Physics simulation	Computer-assisted instruction
Programming language	Databases(e.g., atlas)	Computer-managed instruction

ASSIST movie

Then what about MOOCs?

- MOOC: Massive Open Online Course

- Pro:
  - Way better than nothing for people stuck in Podunk.
  - Learn from the best lecturers.
  - Encourage learning for its own sake (vs. credentialling).
- Con:
  - Overemphasis on lectures (and maybe homework) over discussion and a community of learners.
  - Encourage universities to think of courses as cash cows.
  - Not so good at credentialling.

Summary

- Computing has global impact.
- Computation has changed the way people think, work, live, and play.
- Our methods for communicating, collaborating, problem solving, and doing business have changed and are changing due to innovations enabled by computing

First Cell Call Re-enactment by BrockF5 (Wikipedia)