

# The Beauty and Joy of Computing



Michael Ball

## Lecture #9 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/](http://embodied.mpi-inf.mpg.de/research/iskin/)

# Global Impact of Computing

*bjc*

# Global Impact of Computing

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



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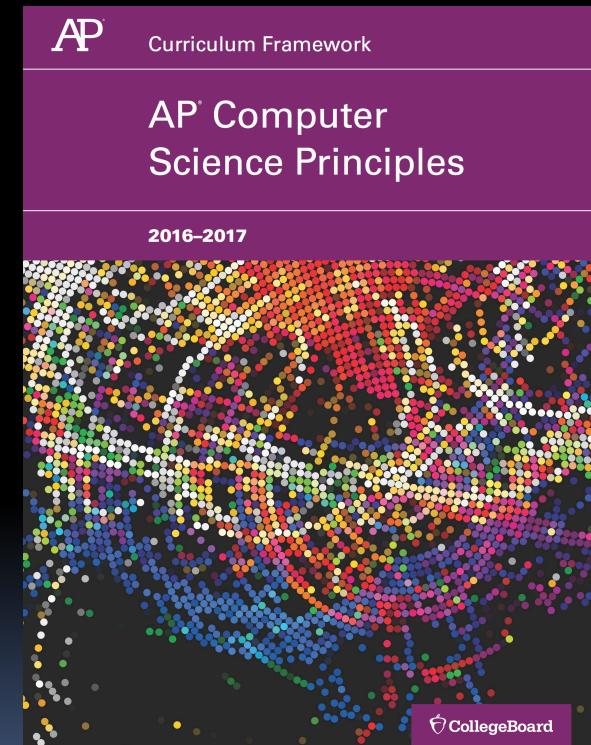
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# *bjc* **(AP) Computer Science Principles**



## 7 Big Ideas

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



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# 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



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*Telepresence System* by Fuelrefuel (Wikipedia)



*Netflix Prize*

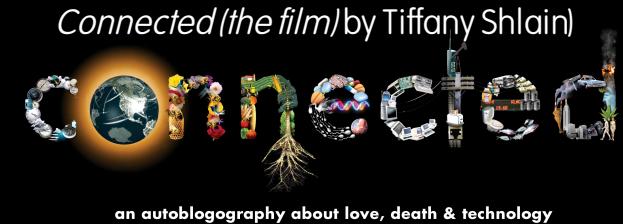


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# Communication, Interaction & Cognition II

- 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



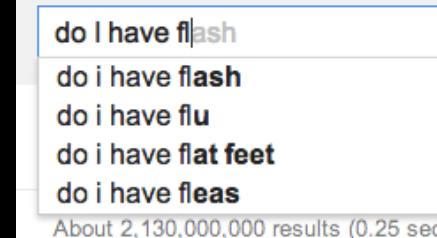
*Teenage Girl Texting* by Olybrius (Wikipedia)



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# Search Trends Are Predictors!

[en.wikipedia.org/wiki/Google\\_Trends](http://en.wikipedia.org/wiki/Google_Trends)  
[google.com/trends](http://google.com/trends)



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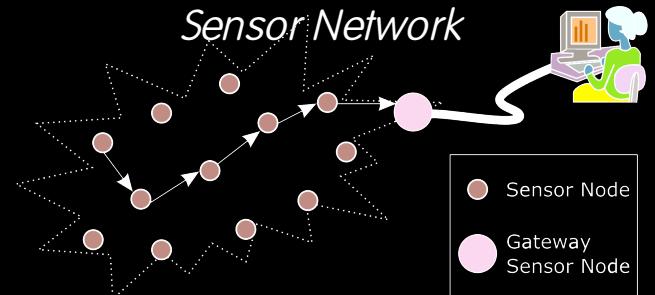


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# Hardware Support

- 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)



# Most significant assistive technology

- a) Augmented reality
- b) Virtual reality
- c) Hearing aids
- d) Self-driving cars
- e) Wheelchairs



# Citizen Participation

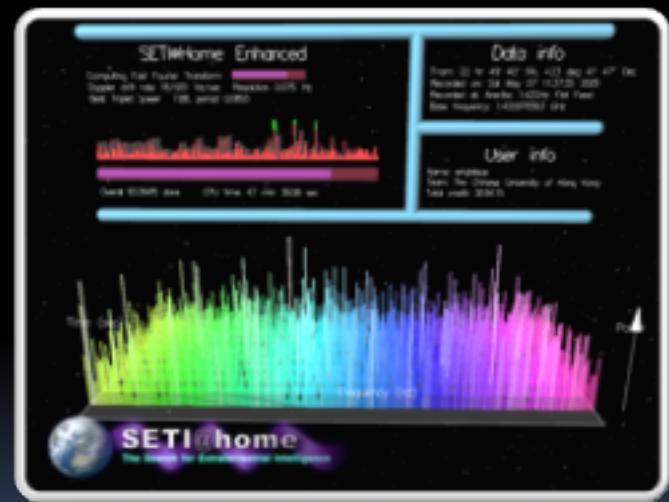
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# Citizen Participation I

[youtu.be/aIJV5aQR68](http://youtu.be/aIJV5aQR68)  
[setiathome.ssl.berkeley.edu](http://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)



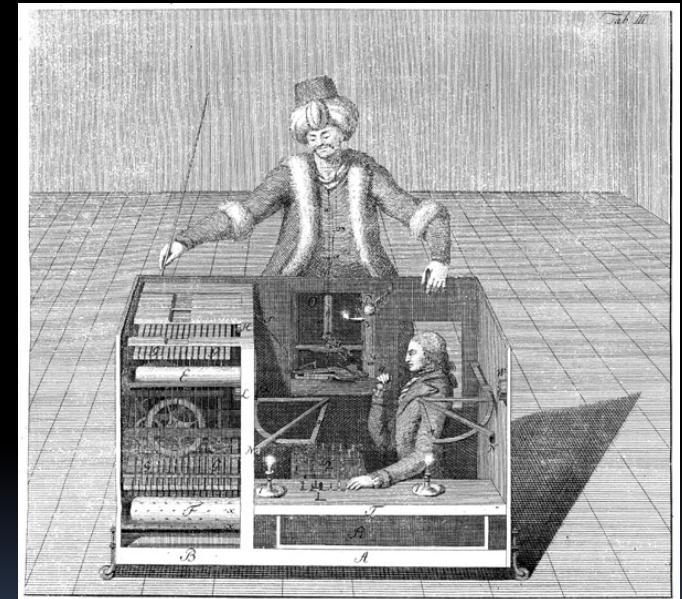
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# The Turk (1770)

- 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...

[en.wikipedia.org/wiki/The\\_Turk](http://en.wikipedia.org/wiki/The_Turk)

## The Mechanical Turk (1770)



*bjc*

# Citizen Participation II

[en.wikipedia.org/wiki/Amazon\\_Mechanical\\_Turk](http://en.wikipedia.org/wiki/Amazon_Mechanical_Turk)  
[www.thesheepmarket.com](http://www.thesheepmarket.com)  
[thesinglelanesuperhighway.com](http://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)



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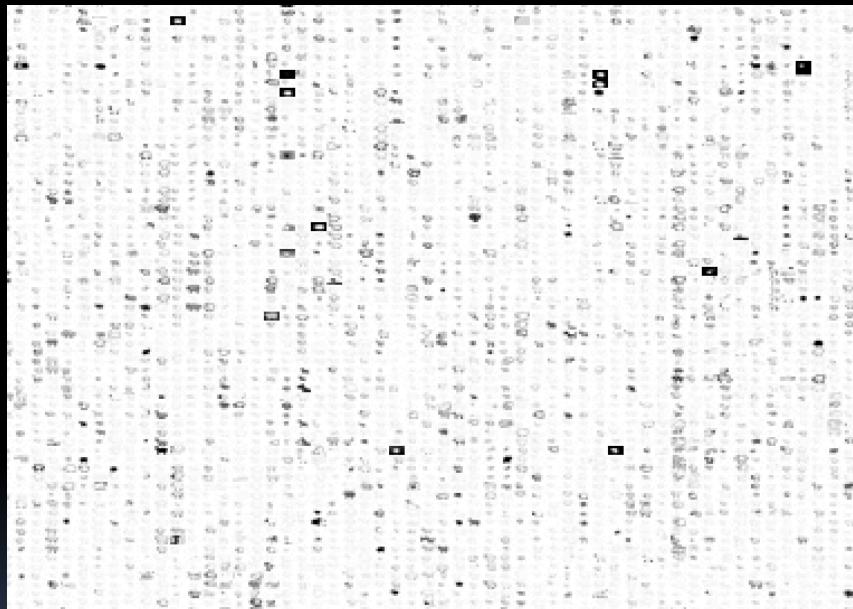
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# Hourly rate for drawing sheep?

- a) \$0.02/hr
- b) \$0.19/hr
- c) \$0.58/hr
- d) \$1.97/hr
- e) \$5.00/hr

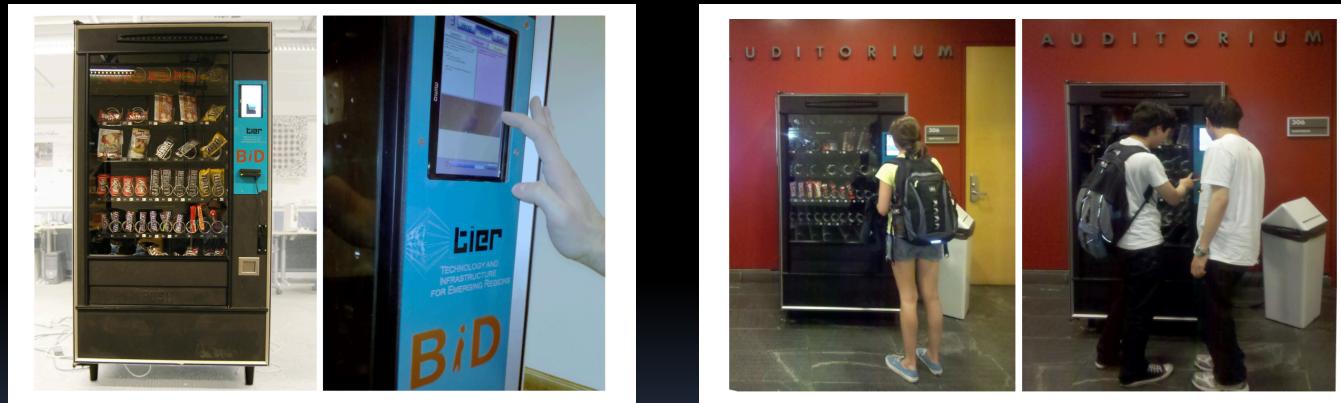
(source: [thesheepmarket.com](http://thesheepmarket.com))



*bjc*

# Grading Papers → Candy?

<https://bid.berkeley.edu/files/papers/heimerl-umati-chi2012.pdf>



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# Computers and Education

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# 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



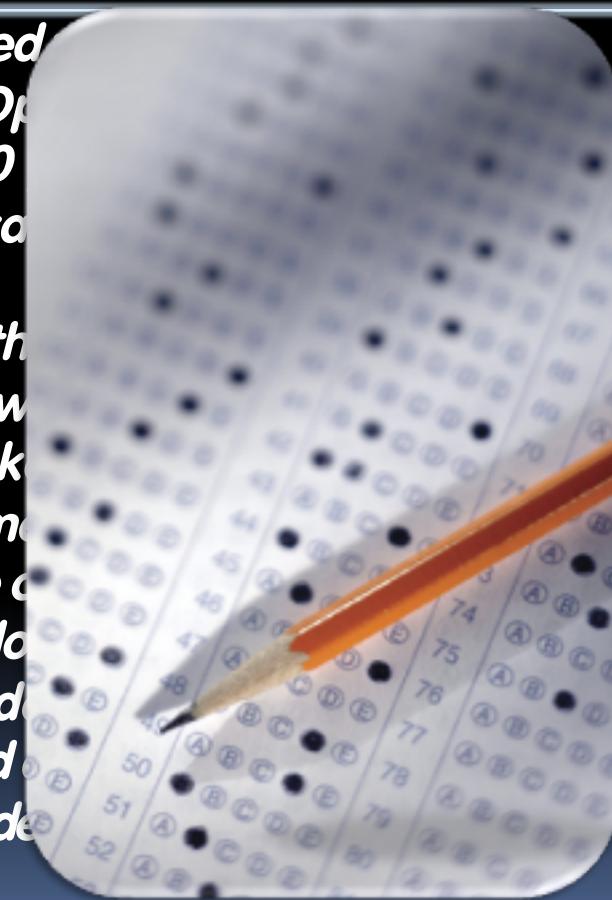


# Answer

*"Multiple choice tests have changed counts as knowledge in schools. Open ended questions were the norm 30 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 someplace 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 change what knowledge means! (unintended consequence)" – Brian Harvey*



UC Berkeley "The Beauty and Joy of Computing" : Social Implication I (18)



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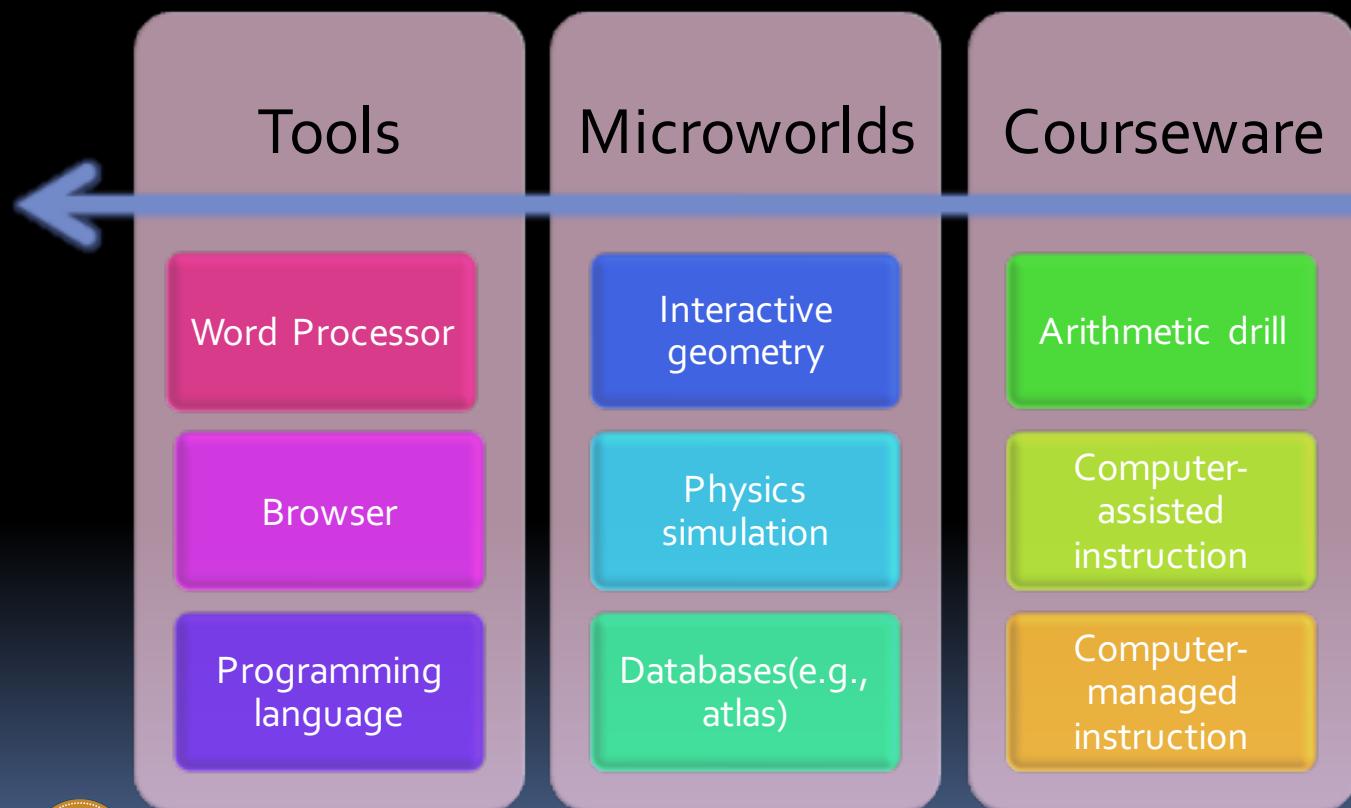


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# Computers in Education

[www.youtube.com/watch?v=NZNTqqlPbUA](http://www.youtube.com/watch?v=NZNTqqlPbUA)

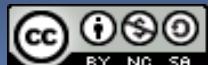
Judah Schwartz



ASSIST movie

UC Berkeley "The Beauty and Joy of Computing" : Social Implications I (19)

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# 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.





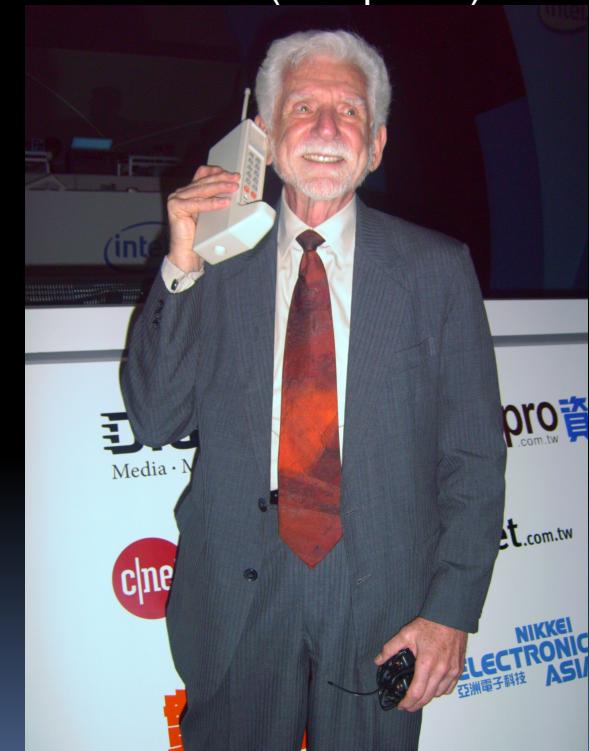
# Summary

- 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



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*First Cell Call Re-enactment* by BrockF5 (Wikipedia)



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