

Invite your friends to take CS10 next sem!

# The Beauty and Joy of Computing

Calendar? **Lecture #25 Summary & Farewell** Slip days



**UC Berkeley EECS Sr Lecturer SOE Dan Garcia**

Lab this week is Survey (0:20), online final (1:30)

Register iclicker, then turn in during lab or dis

**BJC Art or Poem**  
Submit this at final for extra credit!

## GOOGLE GLASSES, NEXT "IT"?

Google's "Project Glass" hopes to bring all services from Android to a display you carry with you on your glasses. Next big thing?



You can make a video for extra credit next week, but it's due **Saturday!**

Discussion this week is important – course feedback + summary

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## Administrivia: Become active!

- With-BYOB Exam details**
  - No exam handed out unless you've filled in both HKN + our survey
  - No "study sheets" needed / allowed since you have access to BYOB
- Final Exam details**
  - Only bring pen(cil)s, three 8.5"x11" handwritten sheets (writing on both sides).
  - Leave backpacks, books, calculators, cells & pagers home!
  - Everyone must take ALL of the final!
  - Bring your "Beauty and Joy of Computing" Art/Poem for extra credit!
- If you did well in CS10 and want to be on staff?**
  - Usual path: **Lab Assistant** ⇒ **Reader** ⇒ **TA**
  - LA: sign up w/Jenny Jones ([jenny@eeecs.berkeley.edu](mailto:jenny@eeecs.berkeley.edu)) anytime
  - I strongly encourage anyone who gets an B or above in the class to follow this path...

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## Exciting Future Implications

- In computing, need to revisit chronic unsolved problem**
  - Easy parallel programming
- Implications for apps:**
  - HUGE Computing power available in cell phone, car
    - On-body health monitoring
    - Google + library of congress
- As devices shrink...**
  - The need for great HCI (human-computer interfaces) critical as ever! (voice, gesture)
- Natural language processing?
- Interact by motion!
- 3D displays?
- Personal Robotics?
- Self-driving cars?
- 3D Printing?
- Optical/quantum computing?
- Personal air vehicle?
- Space travel?
- Computer displays in glasses?
- Flexible displays?
- Brain-machine interfaces?
- Energy!

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## Taking advantage of Cal Opportunities

- "The Godfather answers all of life's questions" – Heard in "You've got Mail"**
  - So said the 2004 ranking from the "Times Higher Education Supplement"
- Why were we the „Univ in the WORLD?**
  - Research, reseach, research!
  - Whether you want to go to grad school or industry, you need someone to vouch for you!
    - ...as is the case with the Mob
- Techniques**
  - Find out what you like, do lots of web research (read published papers), hit OH of Prof, show enthusiasm & initiative
- <http://research.berkeley.edu/>
- <http://researchmatch.heroku.com/>

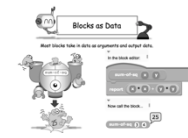
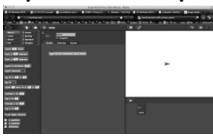

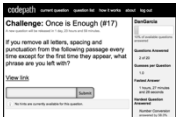
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## Opportunities Next Semester

- CS61A (1<sup>st</sup> course in CS major)**
  - Structure and Interpretation of Computer Programs
- CS9 series (learn a second language)**
  - I would recommend Python next, CS9H
- GamesCrafters (Game Theory R & D)**
  - Develop SW, analysis on 2-person games of no chance. (e.g., go, chess, connect-4, nim, etc.)
  - Req: Game Theory / SW Interest
- MS-DOS X (Mac Student Developers)**
  - Learn to program Macintoshes.
  - Req: Interest. Owning a mac helps, not required.
  - Taught as a DeCal by MS-DOS X veterans
- UCBUGG (Recreational Graphics)**
  - Develop computer-generated images, animations.
  - Req: 3D interest
  - Taught as a DeCal by UCBUGG veterans

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## Dan's Research Projects

- CS Illustrated**

- Improve CS10/Snap!**

- Ensemble**

- Improve codepath**


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**Ok, I'm hooked! Where do I go next?**

- **CS Major / Minor**
  - You are here → CS10
- **CS61A**
  - In Python, one big idea every week. Awesome!
- **CS61B**
  - In Java, data structures, algorithms and software engineering (life)
- **CS61C**
  - In C and MIPS, Great ideas in computer architecture (parallelism) ... I teach this!

CS10  
 CS61A  
 CS61B  
 CS61C

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**Review: 5 components of any Computer**

In the future, what'll be the most important computer component?

**Computer**

- Processor
  - Control ("brain")
  - Datapath ("brawn")
- Memory
- Devices
  - Input
  - Output


a) Control  
 b) Datapath  
 c) Memory  
 d) Input  
 e) Output

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**Peer Instruction Opinion**

**"Forget cloning. Forget TVs on your wrist watch. The biggest invention of the next 100 years will be the ability to directly connect your brain to a machine, aka wet computing."** – Dan Garcia

- A macaque monkey at Duke University can already control a robotic arm with thought.
- DARPA interested for mind-control robots & flying
- Virtual Reality achieved with proper I/O interfacing...

 **Jose Carmena**, UCB EECS Prof  
 Research: Brain-Machine Interface  
[www.eecs.berkeley.edu/~carmena/](http://www.eecs.berkeley.edu/~carmena/)

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**Things to remember from CS10**

- **...From "Program or Be Programmed"**
  - Technology has an explicit and implicit agenda, understanding it is important.
  - Learning to program is empowering!
- **...From Blown to Bits**
  - Technology has social implications (privacy, energy, copyright, etc); try to see the big picture
  - It also often has unintended consequences!
- **Abstraction**
  - The key idea underpinning all computer science
  - ...and (in CS10) functions, HOFs

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**Penultimate slide: Thanks to the staff!**

- (see the course website for listing & photos)

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**The Future for Future Cal Alumni**

- **What's The Future?**
- **New Millennium**
  - Always-on internet connectivity
  - AI breakthroughs
  - HCI breakthroughs
  - Post-PC Era (power is in cloud, interface in pocket)

**"The best way to predict the future is to invent it"**  
 – Alan Kay

**The Future is up to you!**

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