

Spring 2012 – Section 1

Lectures

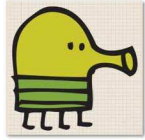
Labs

Grading

- ## Office Hours

Tues/Thurs 1-4 pm by arrangement in Park 250

Computing: Gaming...

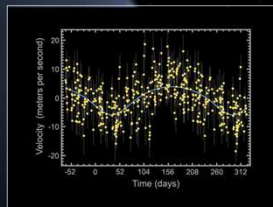
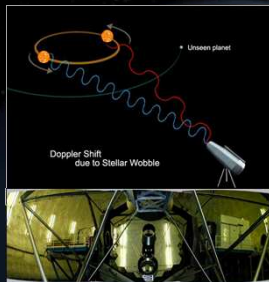


2011 Jeopardy!

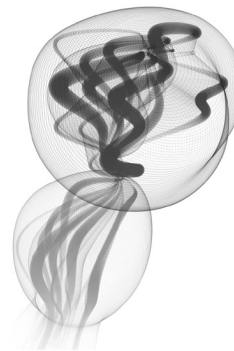


- In February 2011, IBM Watson bested Brad Rutter (biggest all-time money winner) and Ken Jennings (longest winning streak)
- IBM is currently applying Watson's technology to medical diagnosis and legal research

Finding Life-Supporting Planets



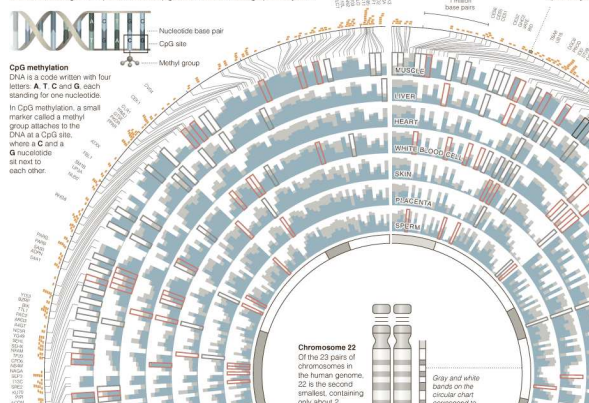
ART



Protobytes
By Ira Greenberg

Mapping the Epigenome

DNA contains the genetic blueprint for all human cells, but the reading and execution of the blueprint inside each cell is controlled in part by chemical markers attached to the DNA. Scientists have begun to map some of these epigenetic markers, including CpG methylation.



“Computer science is no more about computers than astronomy is about telescopes”

- Edsger Dijkstra

Computing is important.

Fastest Growing Occupations

Table 1.3 Fastest growing occupations, 2008 and projected 2018
(Numbers in thousands)

2008 National Employment Matrix title and code	Employment		Change, 2008-18		Median Annual wage quartile, 2008
	2008	2018	Number	Percent	
Network systems and data communications analysts	292.0	447.8	155.8	53.36	VH
Computer software engineers, applications	514.8	689.9	175.1	34.01	VH
Computer software engineers, systems software	394.8	515.0	120.2	30.44	VH

Source: Employment Projections Program, U.S. Department of Labor, U.S. Bureau of Labor Statistics

Occupational Outlook Handbook, 2010-11 Edition, http://www.bls.gov/emp/ep_table_103.htm

THE WALL STREET JOURNAL. Digital Network WSJ.com MarketWatch BARRONS All Things Digital StreetView More » News, Quotes, Companies, Video

Friday, January 7, 2011 As of 9:18 PM EST

THE WALL STREET JOURNAL

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JANUARY 6, 2011

The Best and Worst Jobs

CareerCast rated 200 jobs based on income, working environment, stress, physical demands and job outlook, using data from the Labor Dept. and U.S. Census researchers' own expertise. See which jobs were ranked highest and lowest, and their midlevel income. The highest-ranked jobs are highlighted in yellow. Click a header to sort. See full rankings on CareerCast.com. (More: The Best and Worst Jobs.)

Rank	Title	Midlevel Income
1	software engineer	\$57,000
2	mathematician	\$54,000
3	actuary	\$57,000
4	statistician	\$73,000
5	computer systems analyst	\$77,000
6	meteorologist	\$55,000
7	biologist	\$74,000
8	historian	\$62,000
9	audiologist	\$63,000

http://online.wsj.com/public/resources/documents/st_BESTJOBS0104_20110105.html

Computer science tops list of best major for jobs

BY RACHEL GOTTFRIED

Computer science graduates now get more offers of employment than any other major. This is the first time since 2005 that computer science has topped the list, previously accounting majors had the highest offer rate.

In 2011, 56.2% of computer science majors received job offers, compared to only 50.5% of accounting majors. The offer rate for computer science majors increased 13.9% this year from the previous year.

Computer science and accounting majors are in high demand because both are needed in a wide range of industries.

"There are many different companies that need to hire computer scientists," said Mimi Collins, director of communications at the National Association of Colleges and Employers. "They aren't tied to one particular industry—majors like nursing do not enjoy that benefit."

Although this is good news for computer science grads, it might not be for the computer industry. According to Collins, "One computer science graduate may have 10 offers as opposed to one accounting graduate that's getting five offers." So computer science majors may be getting more offers, but this is only because there is a shortage of people who graduate with such a degree.

According to Collins, companies like to hire recent graduates because they have the latest skills.

"Things change very quickly especially in computer science," said Collins. "Many organizations have a formal track where they want to bring in new college graduates and train them the way they want them to be trained."

Amelie Evans graduated as a computer science major from the University of Southern California in 2008. "When I looked up major, I knew there would be a lack of jobs in a computer science field."

...many different companies ... need to hire computer scientists. They aren't tied to one particular industry.

How many of us are studying CS? United States and Canada

Figure 7. Newly Declared C/S/CE Undergraduate Majors

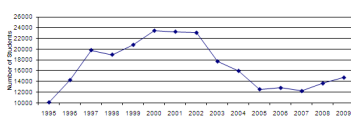
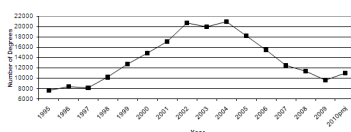


Figure 6. BS Production (CS & CE)



Computing Research News, CRA May 2010 CS=Computer Science, CE=Computer Engineering
<http://www.cra.org/resources/taulbee/>

Secondary Schools

TABLE 1

Secondary schools offering introductory (or pre-AP) Computer Science courses, change from 2005 baseline

	2007	2009
Yes	-6%	-17%

Secondary offering AP Computer Science courses, change from 2005 baseline

	2007	2009
Yes	-20%	-35%

Source: Computer Science Teachers Association survey data of high schools

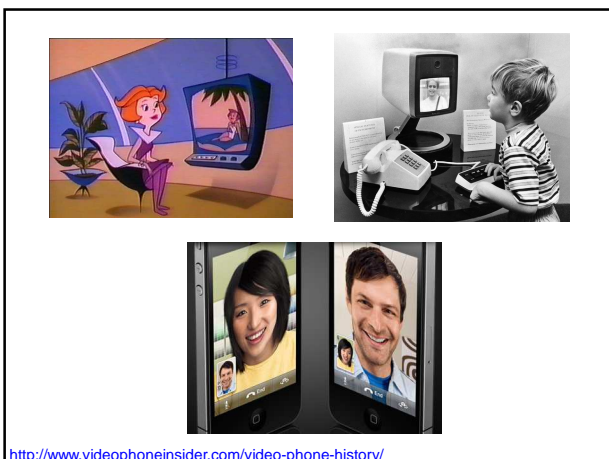
Running On Empty: The Failure to Teach K-12 Computer Science in the Digital Age
<http://www.acm.org/runningonempty/>

We've turned a corner...

- "Stanford University enrollment for in CS106A (CS1) [in 2010/2011] is 1087, which represents a year-on-year growth of 51%"
- Why?
 1. I'm just curious
 2. Increase my potential to land a good job
 3. I love computing
 4. Need to fill a requirement
 5. Other...

<http://computingd.wordpress.com/2011/04/13/guest-post-eric-roberts-on-the-dangers-of-escalating-enrollments/>

What can be programmed?

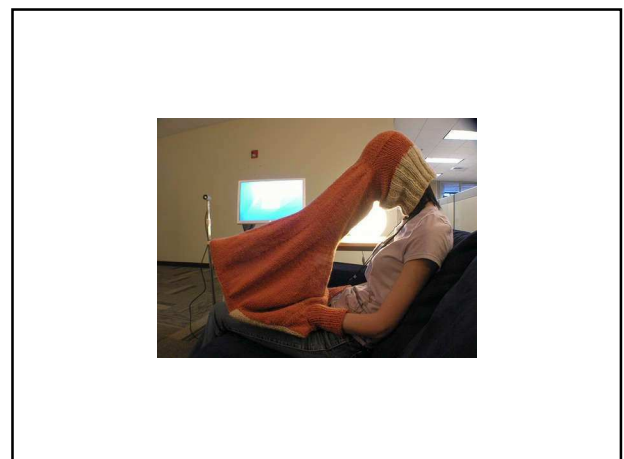
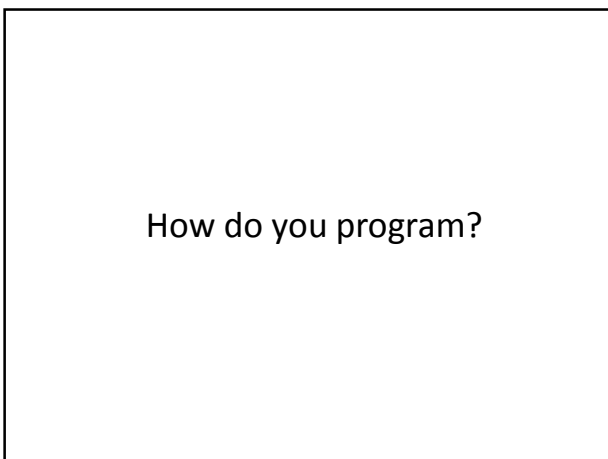
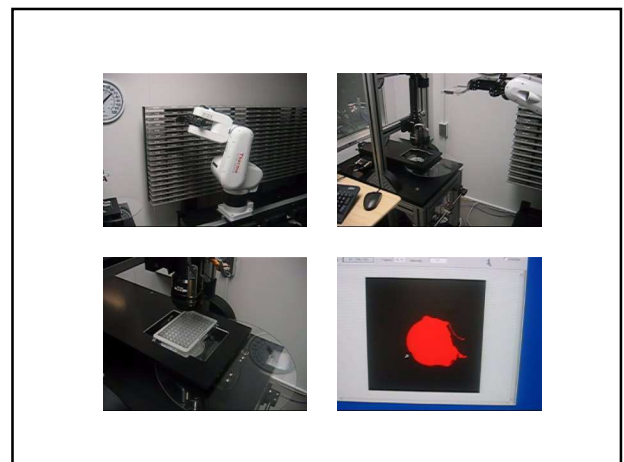
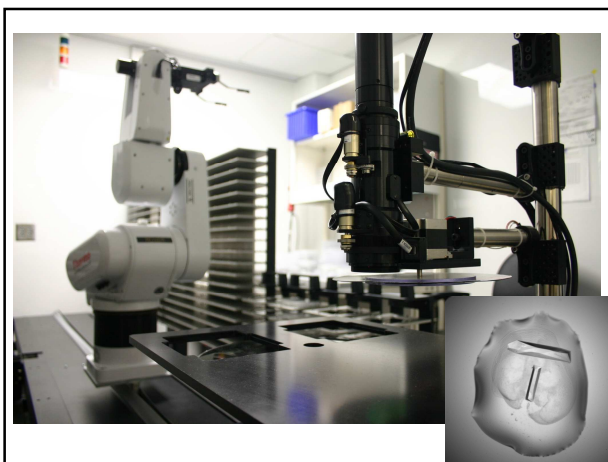
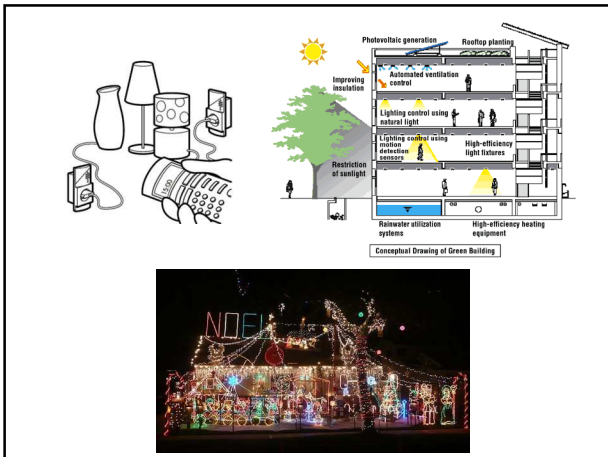


<http://www.videophoneinsider.com/video-phone-history/>

Google's Autonomous Car



- Nevada made it legal for autonomous cars to drive on roads in June 2011

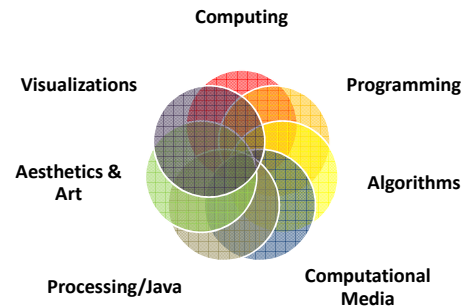


What is a Computer Program?

A collection of human and machine readable statements that can be translated to instructions executable by a computing device.

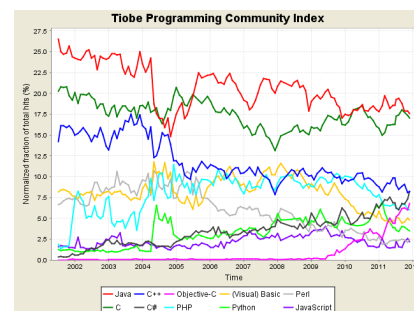
A text file.

Introduction to ^{Creative} Computing



Our Goal

- Use computing to realize works of art
- Explore new metaphors from computing: images, animation, interactivity, visualizations
- Learn the basics of computing
- Have fun doing all of the above!



<http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>

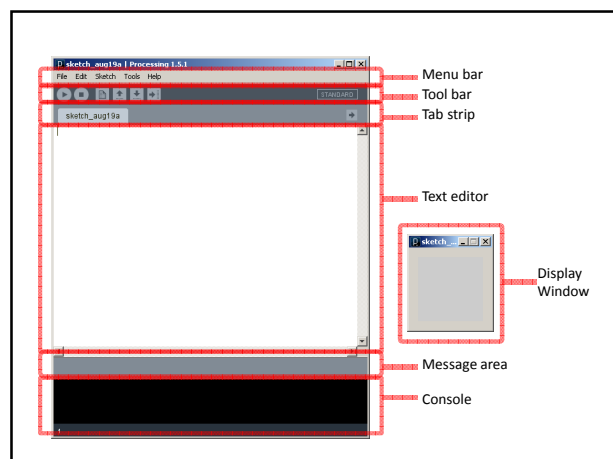
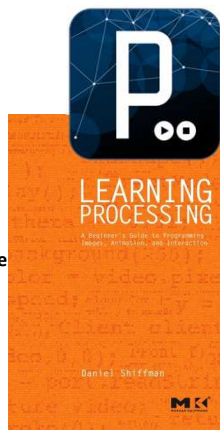
Software

Processing

- Already installed in the CS Lab
- Also available for your own computer @ www.processing.org
- Processing == Java

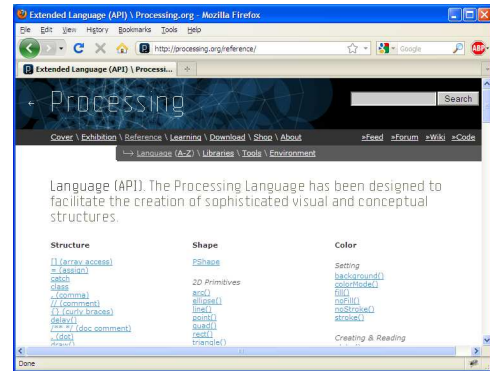
Book

Learning Processing: A Beginner's Guide to Programming Images, Animation, and Interaction by Daniel Shiffman, Morgan Kaufmann Publishers, 2008. Available at the Campus Bookstore. <http://www.learningprocessing.com/>



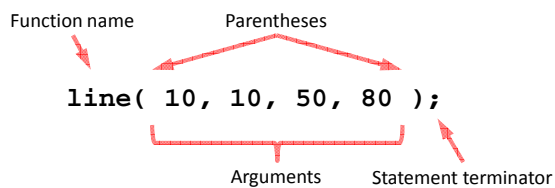
Primitive 2D Shapes

- point
- line
- triangle
- rect (rectangle)
- quad (quadrilateral, four-sided polygon)
- ellipse
- arc (section of an ellipse)
- curve (Catmull-Rom spline)
- bezier (Bezier curve)

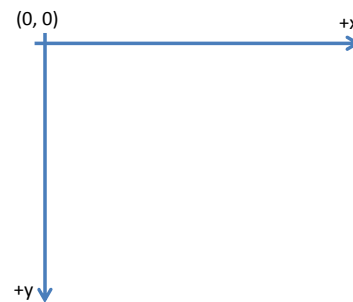


<http://processing.org/reference/>

Anatomy of a Function Call



Coordinate System



coords.pde

Pixels



mag.pde

Processing Canvas

```
size( width, height );
```

Set the size of the canvas.

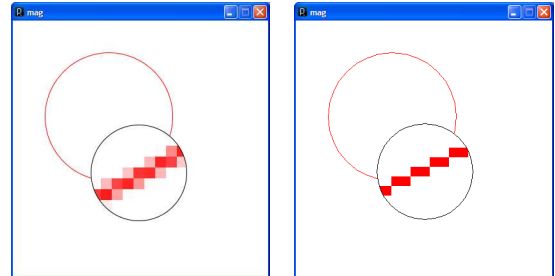
```
background( [0..255] );
```

Set the background grayscale color.

Drawing Primitives

```
point( x, y );  
line( x1, y1, x2, y2 );  
triangle( x1, y1, x2, y2, x3, y3 );  
quad( x1, y1, x2, y2, x3, y3, x4, y4 );  
rect( x, y, width, height );  
ellipse( x, y, width, height );
```

smooth() vs. noSmooth()



Colors

Composed of four elements:

1. Red
2. Green
3. Blue
4. Alpha (Transparency)

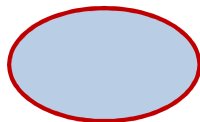
rgba.pde

Why 0 .. 255?

bits.pde

Shape Formatting

1. Fill color
2. Line thickness
3. Line color



*These are properties of your paintbrush,
not of the object you are painting.*



Fill Color

```
fill(gray);  
fill(gray, alpha);  
fill(red, green, blue);  
fill(red, green, blue, alpha);  
  
noFill();
```



Stroke (Line) Color

```
stroke(gray);
stroke(gray, alpha);
stroke(red, green, blue);
stroke(red, green, blue, alpha);

noStroke();
```



strokeCap()



```
smooth();
strokeWeight(12.0);
strokeCap(ROUND);
line(20, 30, 80, 30);
strokeCap(SQUARE);
line(20, 50, 80, 50);
strokeCap(PROJECT);
line(20, 70, 80, 70);
```

strokeWeight()



```
smooth();
strokeWeight(1); // Default
line(20, 20, 80, 20);
strokeWeight(4); // Thicker
line(20, 40, 80, 40);
strokeWeight(10); // Beastly
line(20, 70, 80, 70);
```

http://processing.org/reference/strokeCap_.html
http://processing.org/reference/strokeWeight_.html

ellipseMode



```
ellipseMode(CENTER);
ellipse(35, 35, 50, 50);
ellipseMode(CORNER);
fill(102);
ellipse(35, 35, 50, 50);
```

rectMode



```
rectMode(CENTER);
rect(35, 35, 50, 50);
rectMode(CORNER);
fill(102);
rect(35, 35, 50, 50);
```

http://processing.org/reference/ellipseMode_.html
http://processing.org/reference/rectMode_.html

Dropbox

- <https://www.dropbox.com/>

Processing.JS

- A Javascript implementation of Processing
- Runs in any modern web browser
 - Does not run well in IE8 and under
- Most of Processing is implemented
 - Images are processed slowly
 - No file IO
- <http://processingjs.org>

Studio Sketchpad

- Collaboratively edit, run and chat about a Processing.js program
- <http://sketchpad.cc>
- <http://studio.sketchpad.cc>