

CU in CS

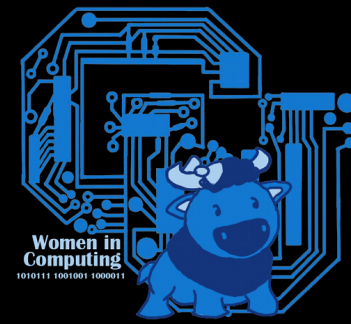
Organized by CU ACM-W Chapter of Women in Computing (CUWIC)

April 22nd, 2012

University of Colorado Boulder

Boulder, CO

Welcome



Dola Saha

PhD Student
Department of Computer
Science

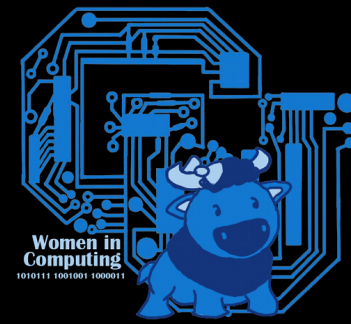
University of Colorado Boulder
Graduate Chair of
CU Women in Computing

Program



Time	Agenda
11:00A.M. – 11:15A.M.	Opening Remarks
11:15A.M. – 12:15P.M.	Panel on “Opportunities in CS”
12:15P.M. – 1:15P.M.	Lunch
1:15P.M. – 2:45P.M.	Hands-on activity
2:45P.M. – 3:00P.M.	Break and Photo
3:00P.M. – 4:00P.M.	Short Computing Presentations
4:00P.M. – 4:30P.M.	Closing Remarks & Award Ceremony & Raffle

Why Computer Science?



- Jobs
- Happiness
- Innovation
- Collaborative / Interactive / Fun
- Wide Variety of Applications

Why Computer Science?

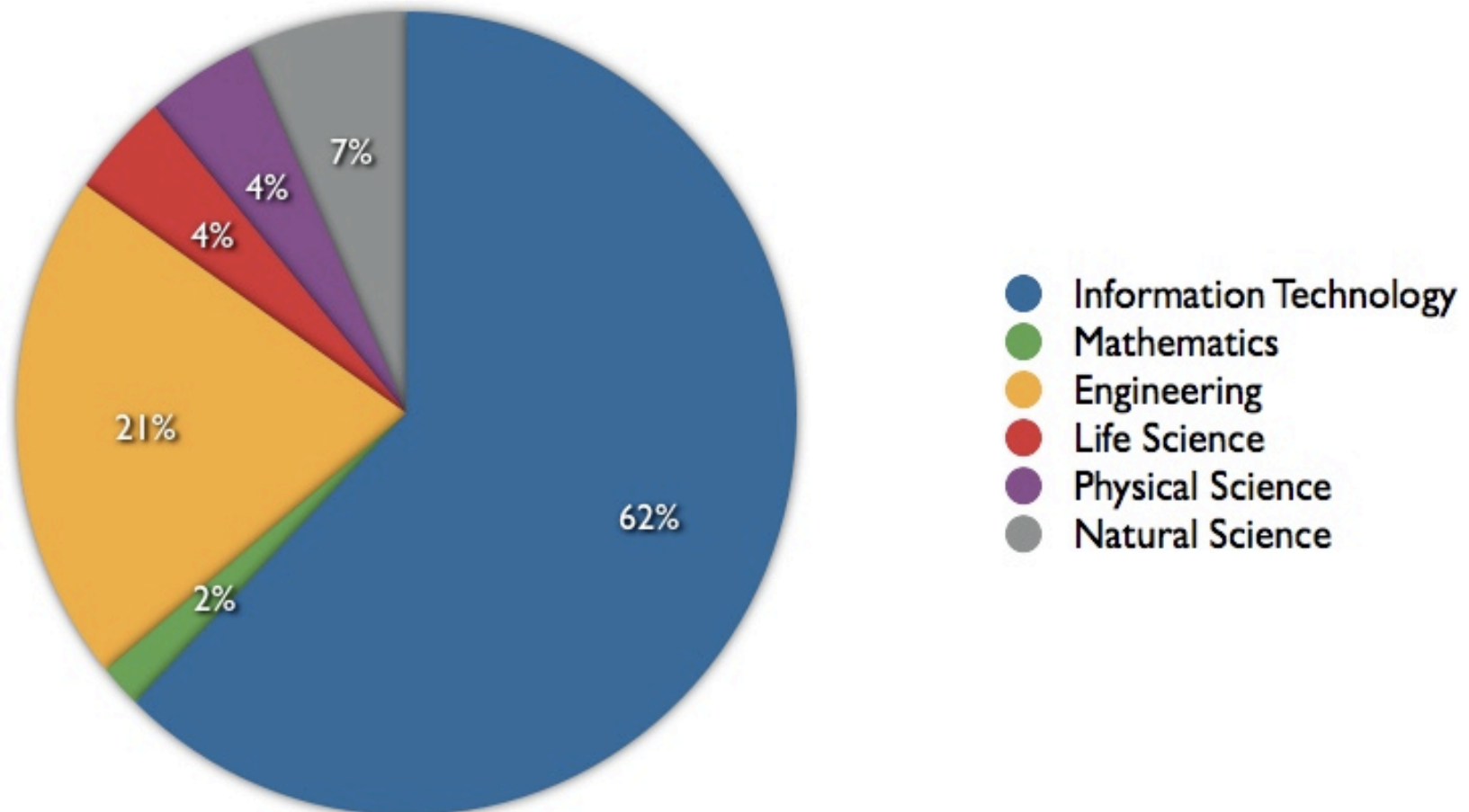


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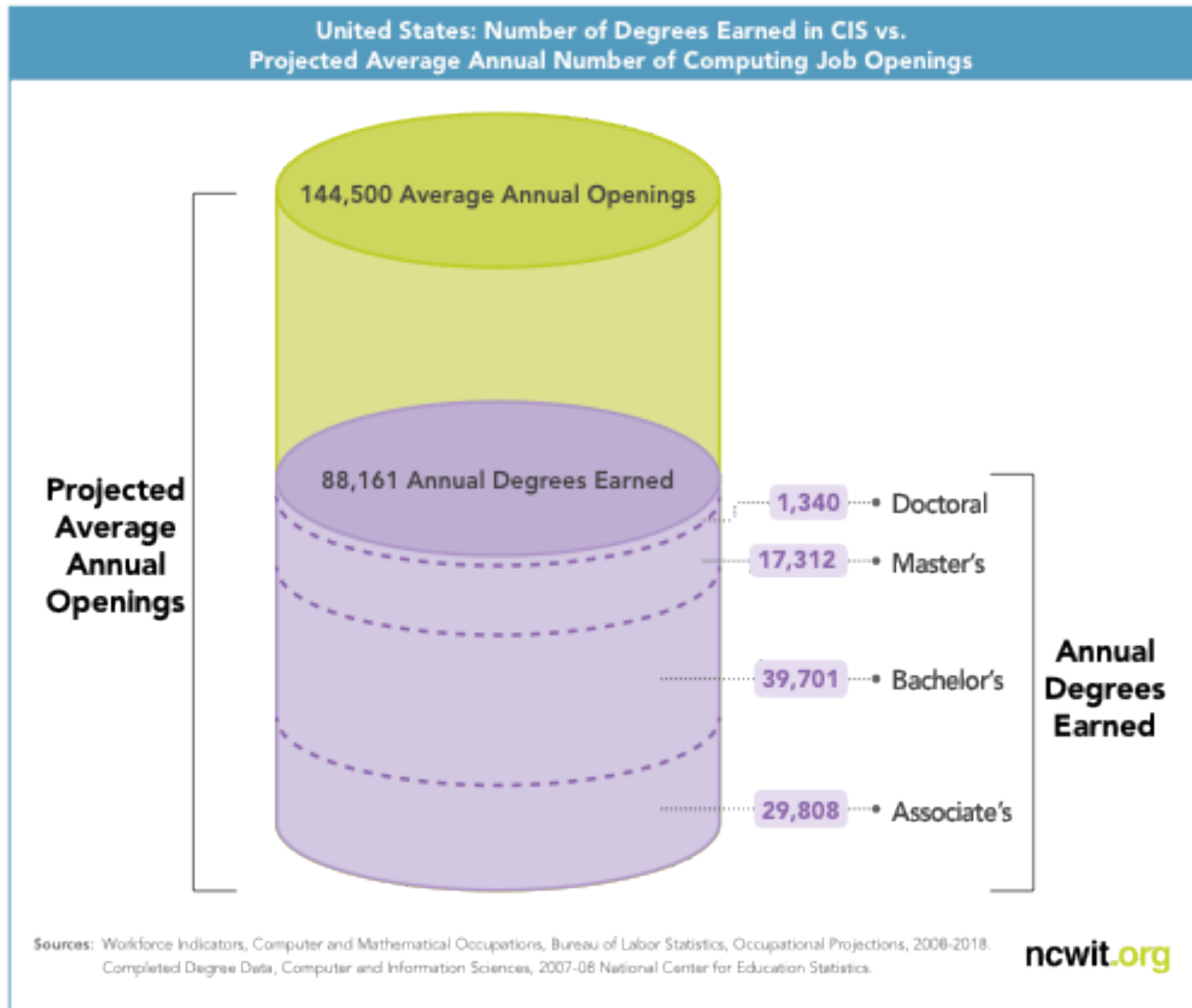
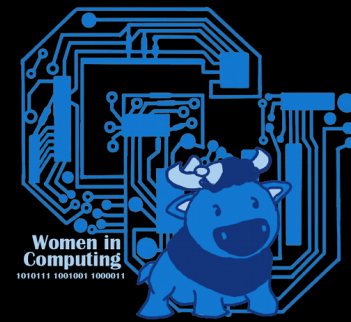
Jobs



Distribution of Projected S&E Job Openings (new jobs plus net replacements) 2006-2016



More Jobs than People Trained



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Great Pay / Growth Prospects



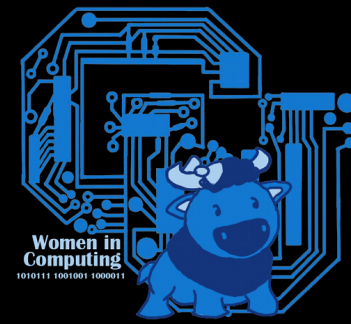
Money Magazine

100 Best Jobs in America (November 2010)
great pay and growth prospects

- #1: software architect
- #7: database administrator
- etc.

approximately 25% in IT

Quality of Life



Money Magazine

10 Best Jobs in America (November 2010)
quality of life, low stress

- #4: web developer
- #5: geographic information systems analyst
- #7: test software development engineer

Working Environment



Wall Street Journal Article

10 Best Jobs (per CareerCast.com)
income, working environment, stress
physical demands, and job outlook

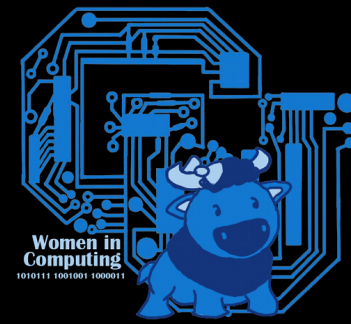
- #1: software engineer
- #4: computer systems analyst

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Top 30 Innovations of the Last 30 years



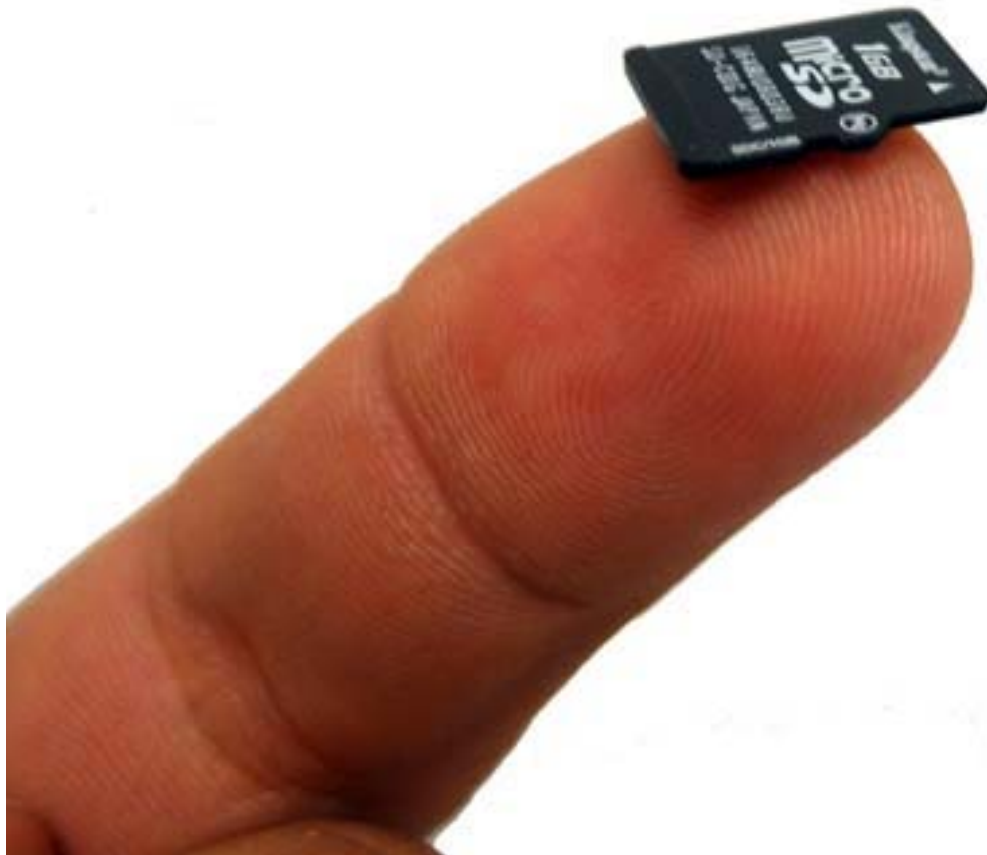
courtesy of
www.pbs.org

Anti-Retroviral Treatment for AIDS



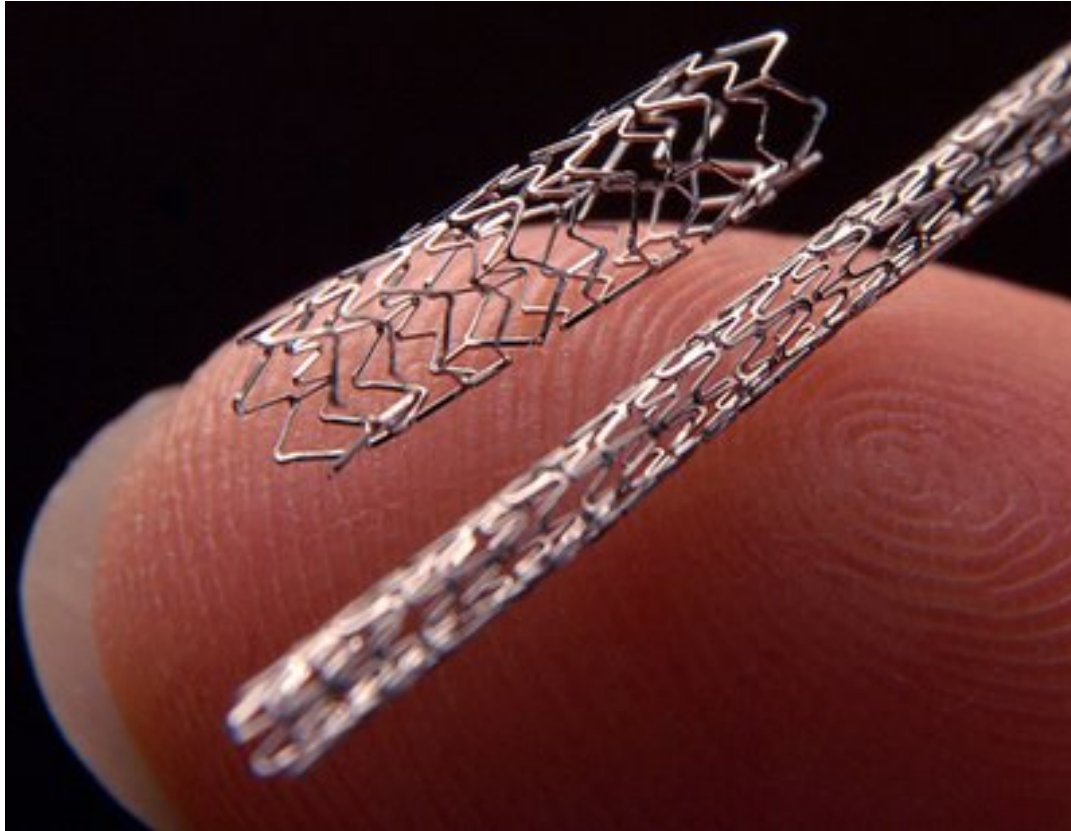
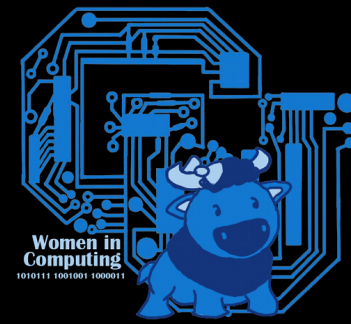
- 1984: retrovirus that causes AIDS is isolated
- Cancer drug Zidovudine renamed AZT
- 1987: AZT becomes 1st anti-retroviral drug approved by the U.S. FDA

SRAM/Flash memory



- 1970: Dynamic and Static Random Access Memory (D/SRAM) are invented
- SRAM is simpler/faster than DRAM, and therefore better suited for cache memory functions
- 1980: Flash memory is invented
- 1996: 1st USB flash drive goes on the market, revolutionizing storage/transfer of data.

Stents



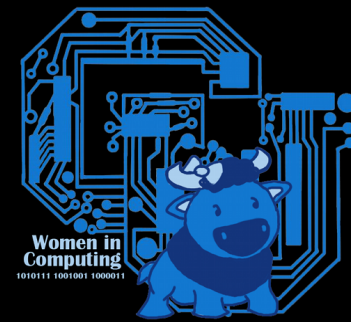
- Inspiration: angioplasty failures
- Method needed for permanently opening arteries
- 1986: 1st stent placed in human coronary artery
- 1994: Stents approved for use in the U.S.

ATMs



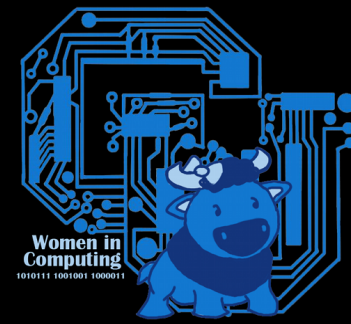
- 1960's: Early Automatic Teller Machines appear
- 1960's: ATMs are non-networking and dispense predetermined amounts
- 1970's: Magnetic stripe card is introduced; machines are networked to computers and use expands
- ATMs make it possible for people to do their banking with little to no human contact

Bar Codes and Scanners



- 1950's: 1st Barcode/reader invented
- 1960's: Commercial use
- 1970's: UPC barcode standard is developed, commercial use expands
- Marsh's in Troy, Ohio is 1st supermarket to install scanner
- Bar codes now a standard in retail settings

Biofuels



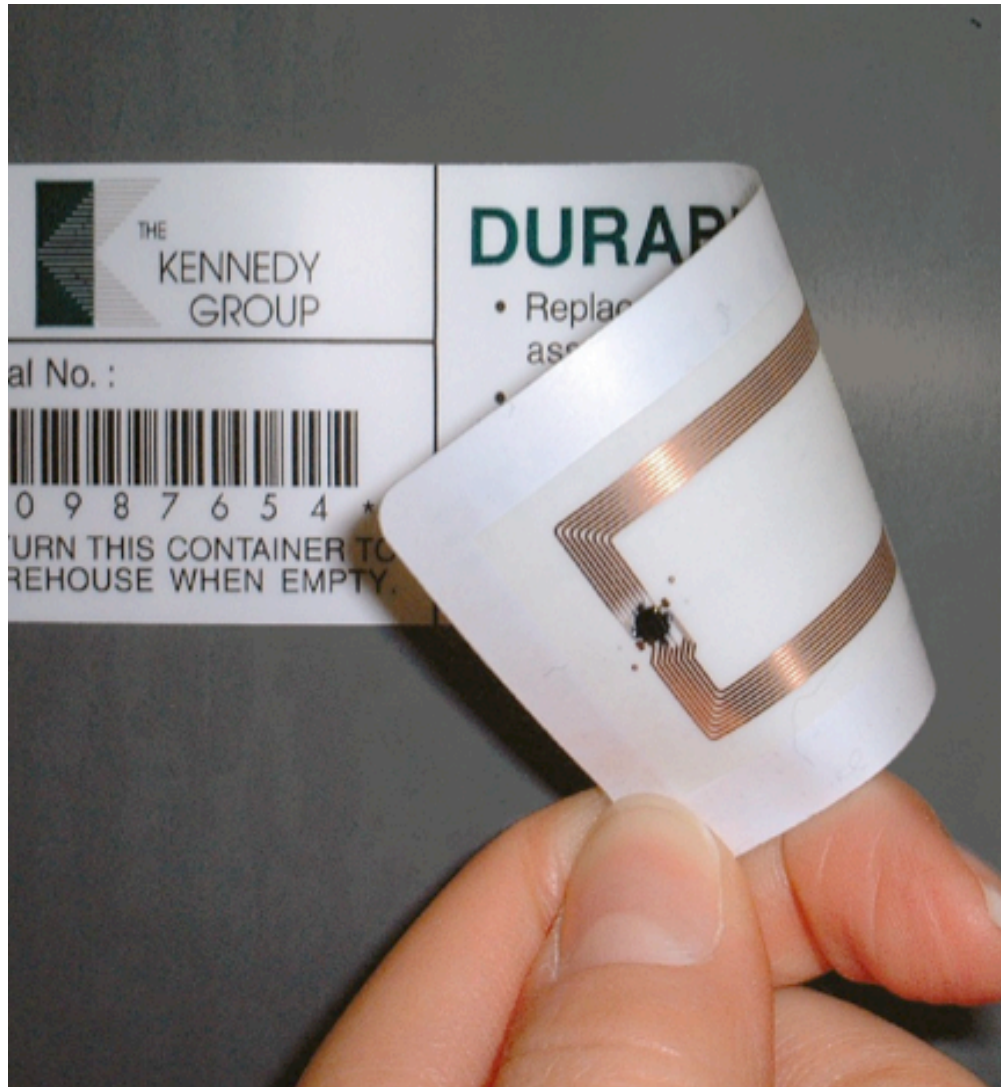
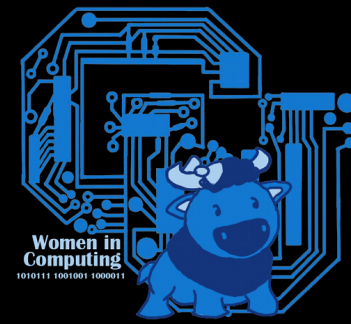
- Rudolf Diesel's first engines ran on biofuels (peanut oil)
- 1908: Henry Ford builds Model T, runs on ethanol
- Diesel & Ford found petroleum to be a more efficient fuel source
- 1970's: Energy crisis and U.S. Clean Air Act boost interest in biofuels
- Energy/environmental issues continue to boost market

Genetically Modified Plants



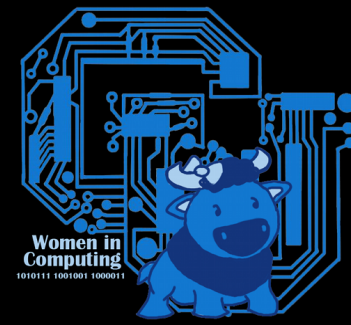
- Stem from the work of Gregor Mendel (1800's) and the discovery of DNA structure (1953)
- 1994: 1st genetically modified plant goes to market (California tomatoes)
- Make them resistant to diseases
- Make them better able to tolerate pesticides

RFID and Applications



- Radio Frequency Identification
Motivation: Identify aircraft during WWII
- 1970's: 1st patents for RFID tags issued
- 1980's: Commercialization: used to develop automated toll payment system
- Retail: use RFIDs to track inventory

Digital Photography/ Videography



- 1970: 1st solid-state video camera
- 1980's: Developments make digital photography and videography commercially viable
- Digital market overtakes film market

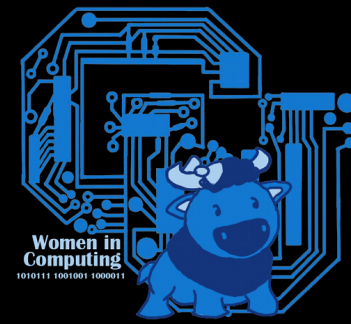
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Graphical User Interface (GUI)



- 1968: Douglas Englebart invented the first GUI
- Late 1970's, early 1980's: GUIs advance with development of on screen windows and icons
- Preferred method of human-machine interaction

Social Networking via Internet



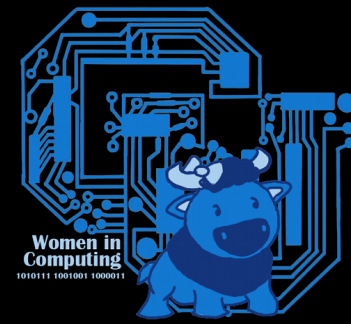
- 1997: Earliest example: SixDegrees.com
- 2003: MySpace launched
- 2004: Facebook launched
- 2006: Twitter launched
- Profiles, friends lists and other features have changed the way people connect and interact

Large Scale Wind Turbines



- 200 BC: 1st windmills appear
- 1970's: Modern wind energy movement starts in response to oil embargo/energy crisis
- US leads in total wind power generation
- Denmark leads in percentage of wind power as part of total energy output

Photovoltaic Solar Energy



- 1839: Photovoltaic effect is discovered
- 1970's: Modern solar energy movement starts in response to oil embargo/energy crisis
- Solar power used for heating and returning energy to the electric grid

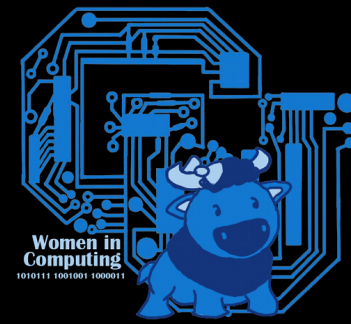
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Microfinance



- Definition: Bringing financial services to poor or low-income individuals
- Goal: to give people a means to overcome poverty
- 1980's: Muhammad Yunus founds Grameen Bank; microfinance becomes a movement

Media file compression



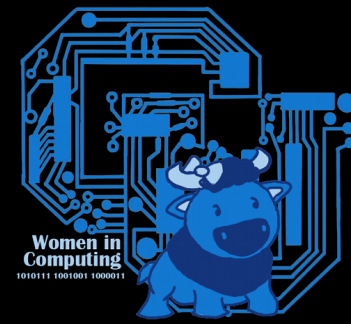
- Natural extension of data compression developed in the 1970's
- 1980's: Experts create compression standards JPEG, MPEG
- Enables transmission of images, audio, and video

E-Commerce



- Online transactions, shopping, auctions, etc.
- Grew out of Electronic Data Interchange used in the 1960's and 1970's
- 1980's: “Electronic Mall” created by CompuServe; non-user-friendly
- 1990's: Invention of World Wide Web, browsers prompts e-commerce explosion

Global Positioning System (GPS)



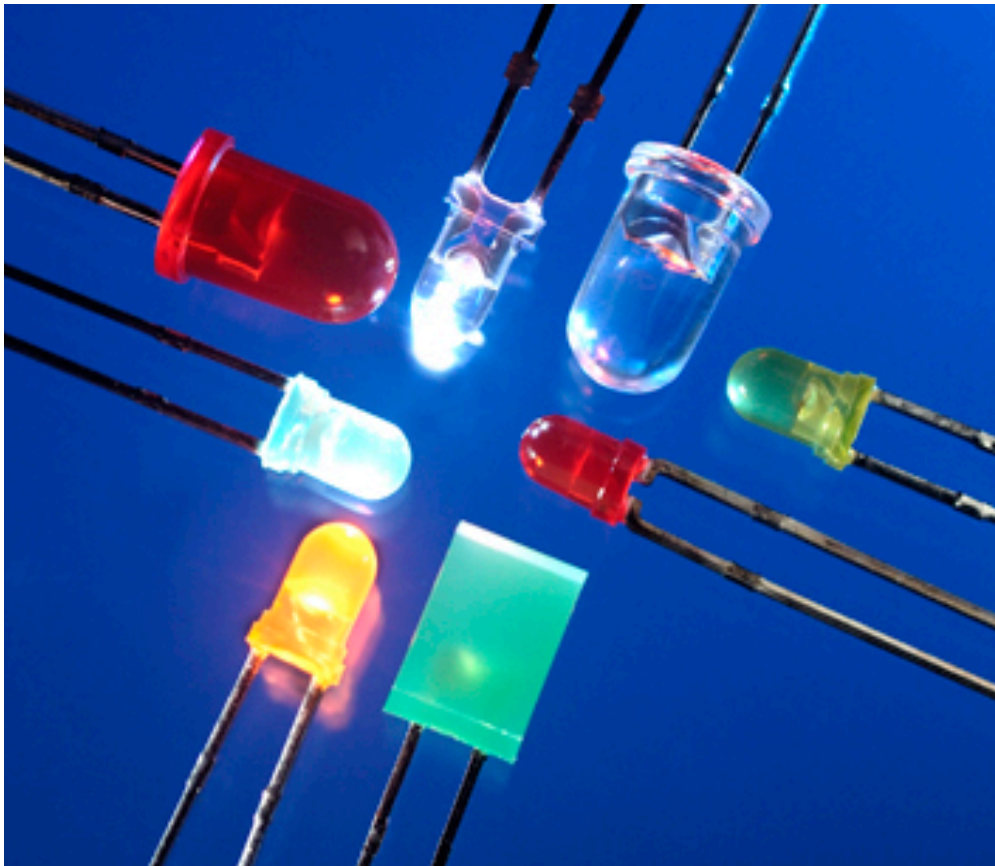
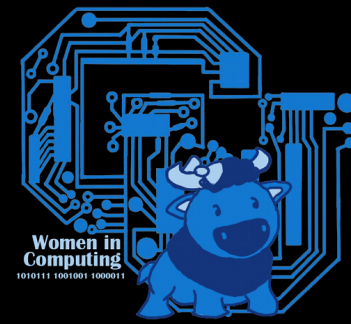
- Network of satellites used to pinpoint locations on Earth
- 1993: US Department of Defense brings GPS online
- From military applications to a civilian navigation aid
- GPS devices in cars, mobile phones, watches, even people (VeriChip/Digital Angel)

Liquid Crystal Displays (LCDs)



- Late 1800's: Liquid crystals first discovered
- 1960's: Electricity is used to create intricate patterns with the crystals
- 1970's: 1st LCDs begin to appear
- Today LCDs are in clocks, computers, televisions, automobiles, and many other products

Light Emitting Diodes (LED)



- Small, cool-running, low power light source
- Early 1900's: LEDs invented, experimented with
- 1960' s became practical
- Incorporated into many products: appliances, automobiles, consumer electronics

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Open Source Software

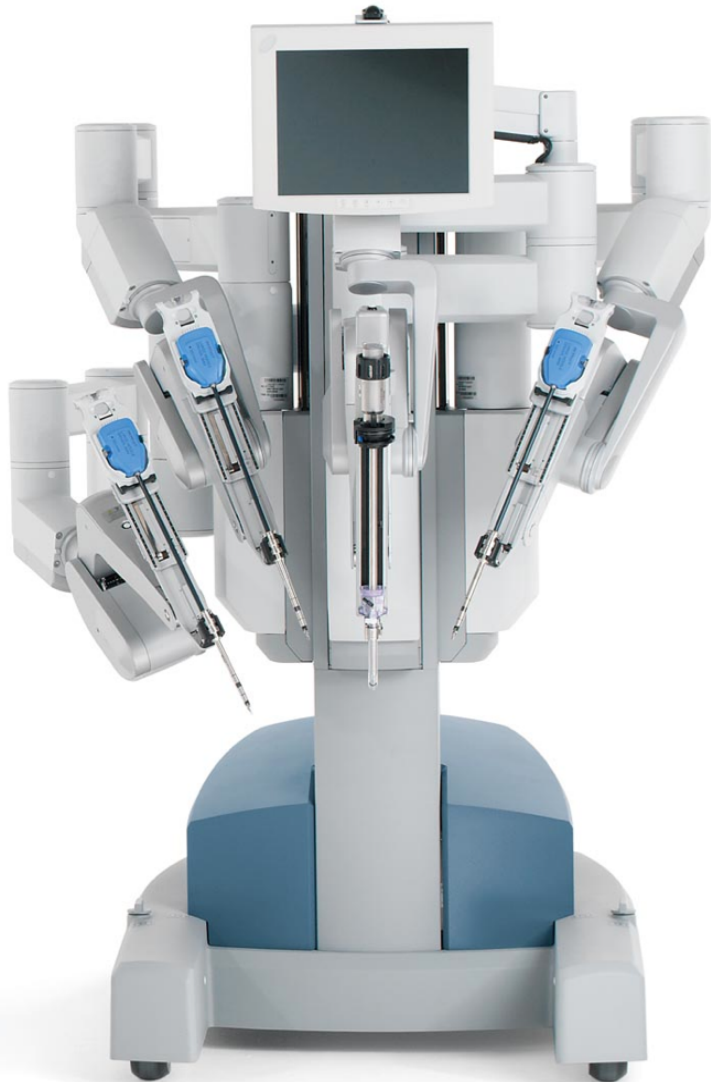
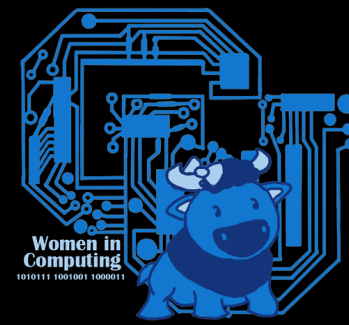


WIKIPEDIA
The Free Encyclopedia

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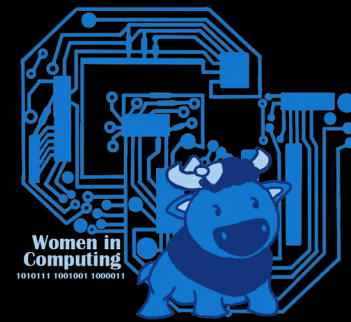
- Motivated from frustrations with copyright restrictions
- New type of software license created: General Public License (GPL)
- Linux, OpenOffice, Firefox, Wikipedia, many many others

Non-Invasive Laser/Robotic Surgery

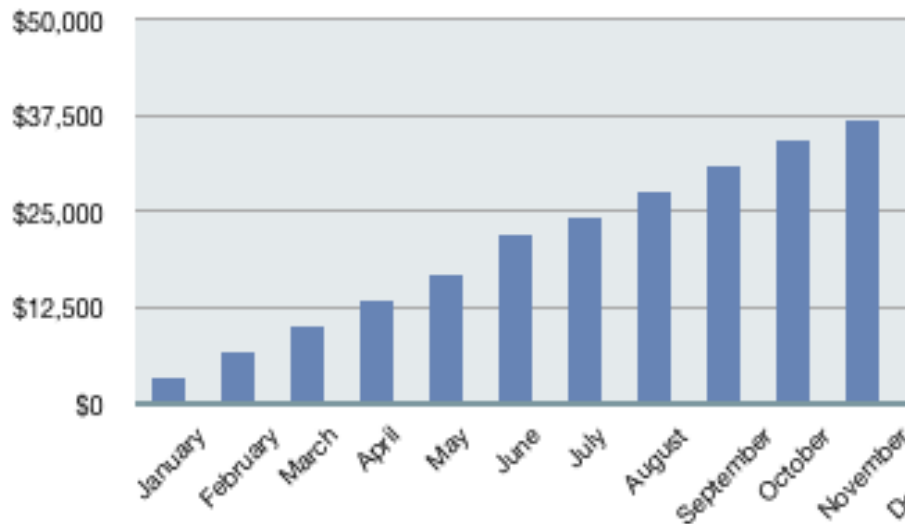


- Huge advancement in surgery
- Bringing more precise operations, greater patient safety, and quicker recovery times
- 1985 - First operation performed with robotics
- 1987 - First operation performed with a laser

Office Software



Savings



July	August	September	October	November	December
\$21,830	\$24,255	\$27,560	\$30,865	\$34,170	\$37,475
\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
\$0	\$0	\$0	\$0	\$0	\$3,695
\$3,695	\$3,695	\$3,695	\$3,695	\$3,695	\$3,695

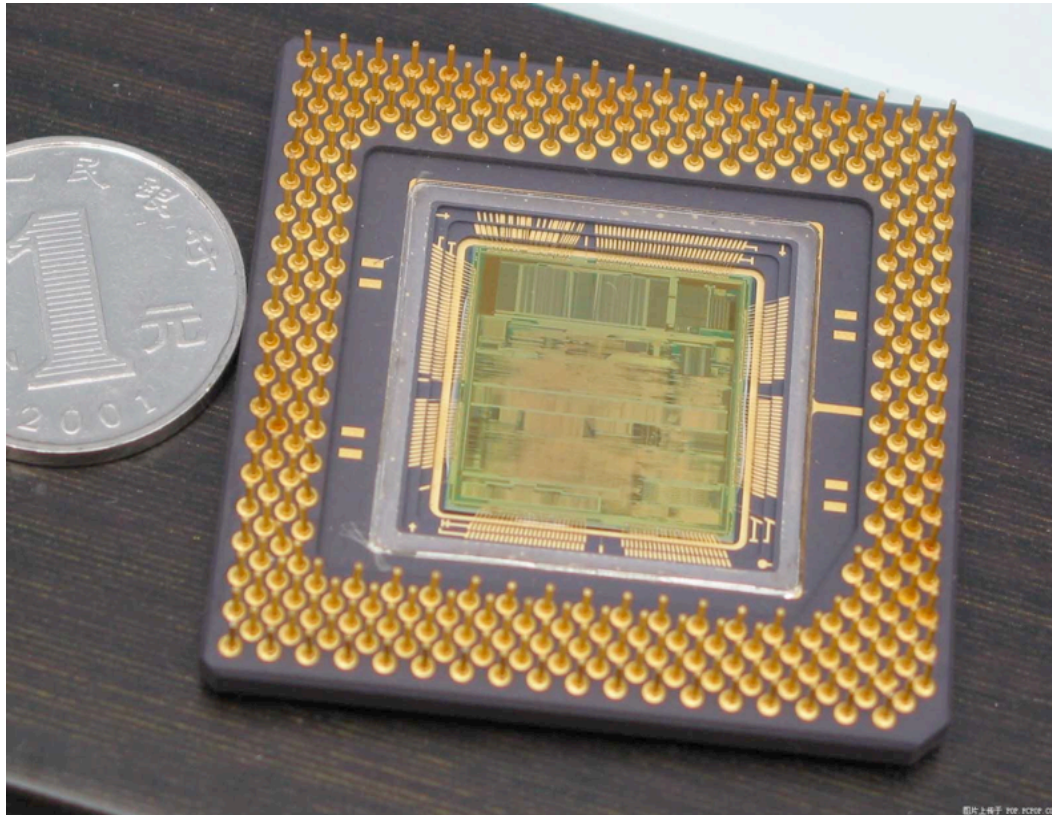
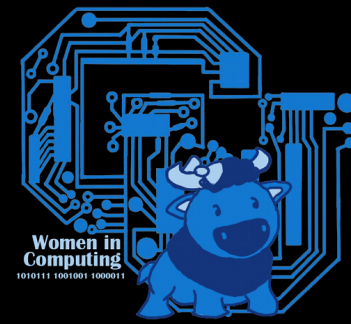
- Word processing and database programs
- Changed the way business is conducted
- First evolution appeared on the market in the 1970s
- Visicalc, WordStar, MS Office, OpenOffice, etc.

Fiber Optics



- Wide use started in the 1970s
- Preferred medium of communication
- Networking, Telecommunication
- Support data rates over 100 gigabytes per second

Microprocessor



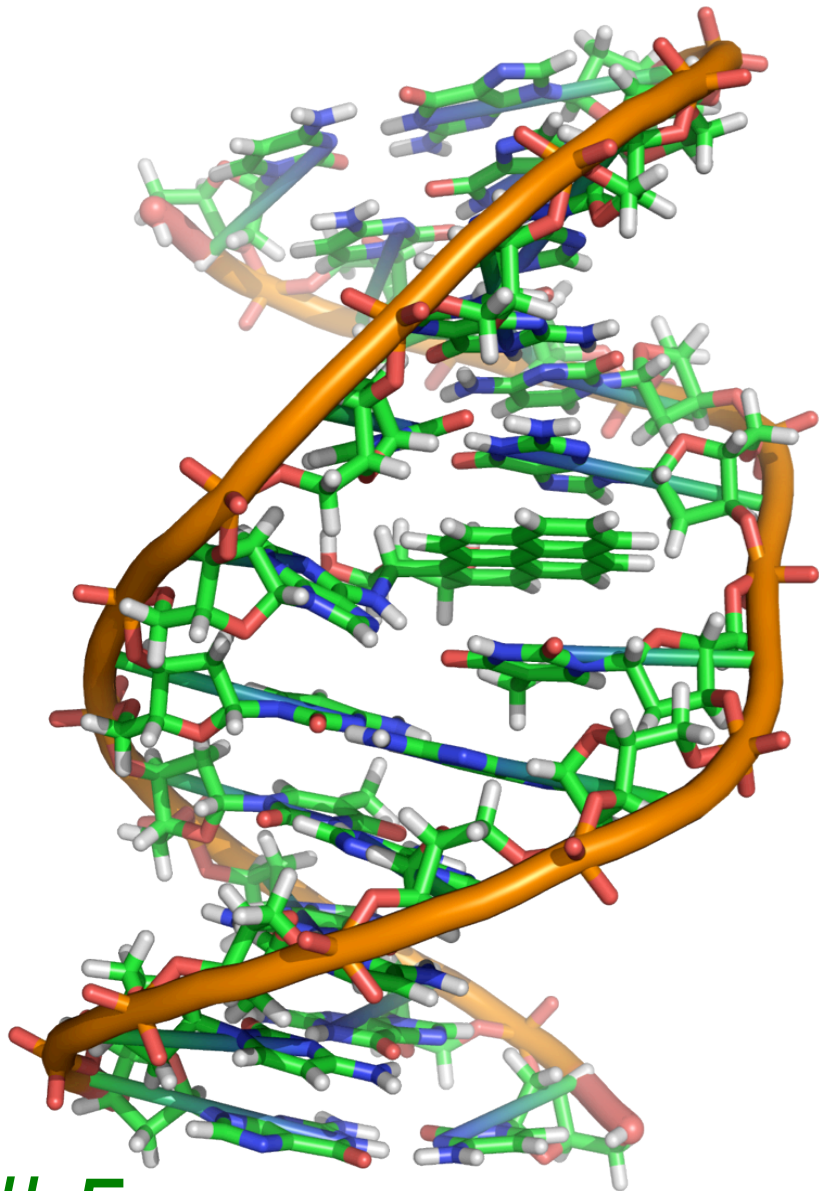
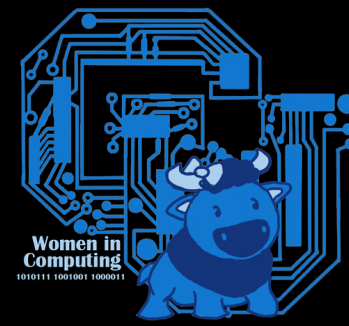
- Developed in 1970s for calculators
- Lead the development of the personal computer since the late 1970s
- Complexity and computational capacity growing exponentially

Magnetic Resonance Imaging (MRI)



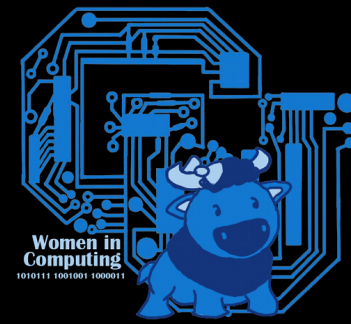
- Able to image tissue for signs of disease and abnormalities
- 1970' s - scientists began using magnetic resonance to produce images
- 1977 - first MRI full body scan performed
- 1990' s - Technology adopted and widely used through society

DNA Sequencing & Human Genome Mapping



- DNA structure discovered in 1953 by Watson and Crick
- Humans have between 20,000 and 25,000 genes
- Effort to map the entire human genome started in 1990 and finished in 2003
- Led to advancements in research and treatment of genetic diseases

E-Mail



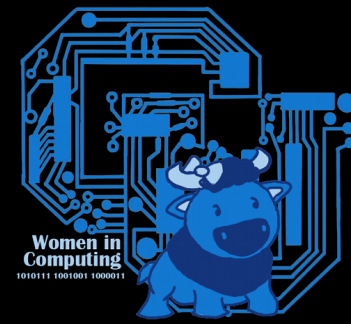
- Has changed the way people communicate
- Invented in 1960's at MIT
- Public access became available in late 1980's
- Today, e-mail is a staple of business and personal communication

Mobile Phones



- A revolution in how we communicate
- Motorola in 1973 made the first mobile phone
- Weighed more than 4 lbs!
- 1990: 12.4 million people own and use cell phones
- 2009: 4.6 billion people own and use cell phones!

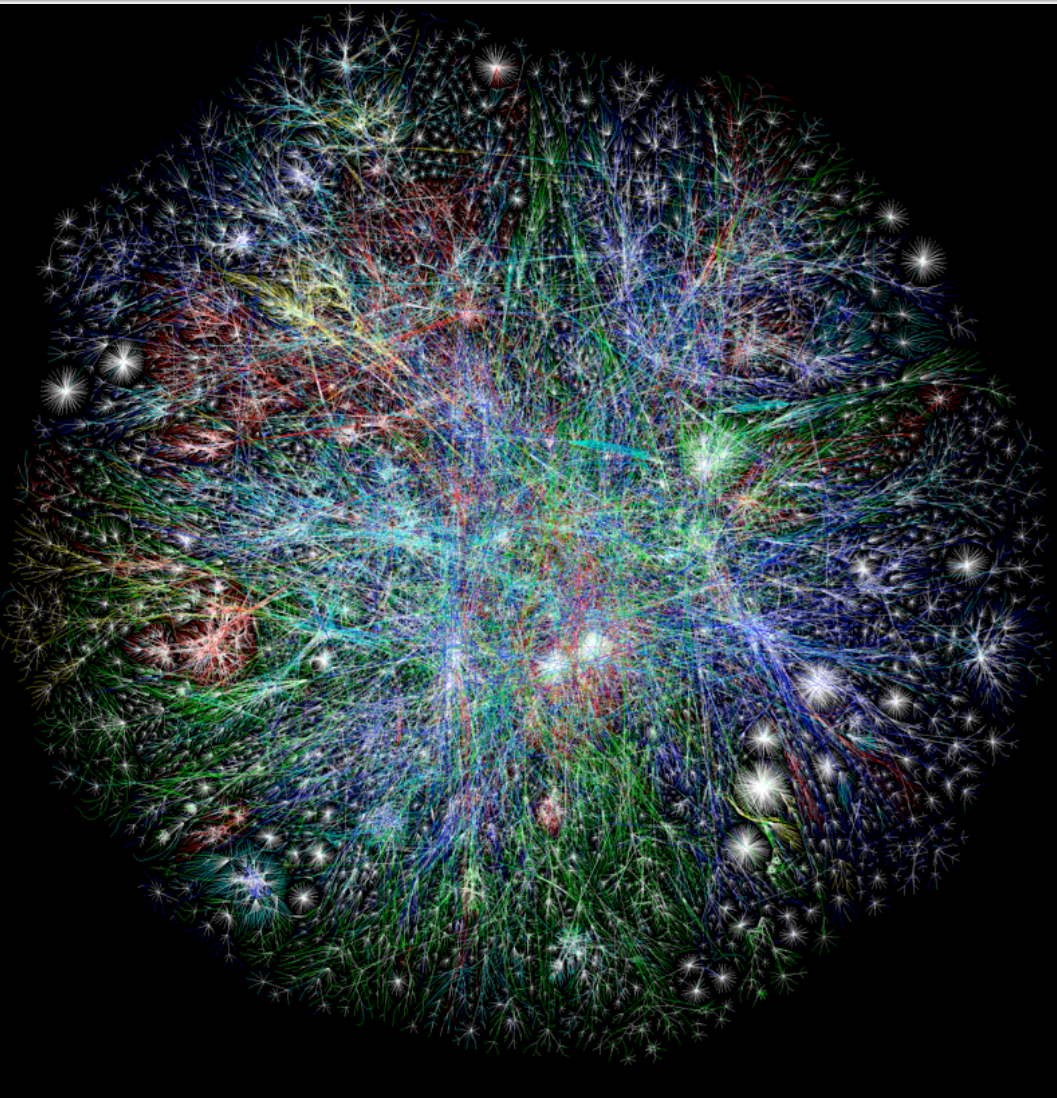
PC & Laptop Computers



- IBM coined the term PC in 1981
- First laptop marketed to public in 1981
- Weighed more than 20 lbs!
- A ubiquitous part of modern life

2

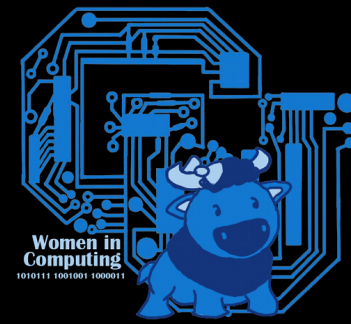
The Internet



- A network of networks
- It is the infrastructure that we send e-mail on and shop with
- Came to life around 1979
- Bloomed into the internet we know today in the late 1990' s

1

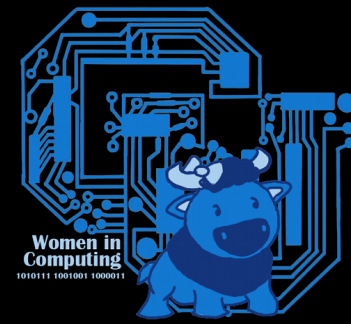
Top 30 Innovations of the Last 30 years



courtesy of
www.pbs.org

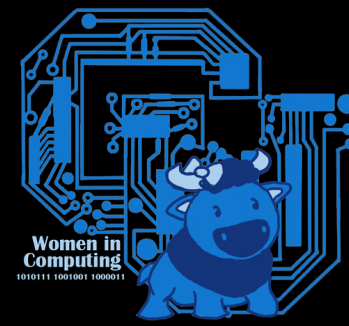
YOU can change the World

Why Computer Science?

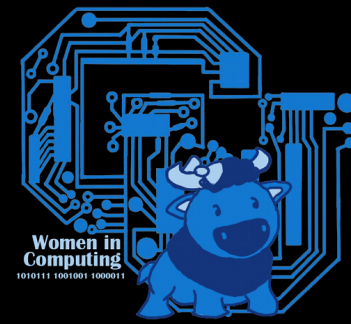


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Collaborative / Interactive / Fun



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Explore your Interests



- Think about your interests

Health!
Biology!

Art!
Music!

Sports!
Recreation!

- Match your interests with CS/IT

Health Informatics!
Bioinformatics!

Graphic Design!
Audio Engineering!

Sports /
Recreation
Informatics!

- New opportunities, new avenues, more jobs

CUWIC Officers



Dola Saha
Grad Chair



Allison Brown
Grad Vice Chair



Madeline Leary
Undergrad Chair



Noelle Beaujon
Undergrad
Vice Chair



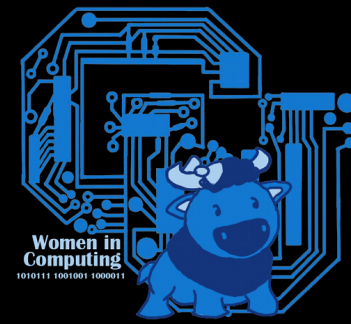
Pooneh
Mortazavi
Secretary/
Treasurer



Prof. Katie Siek
Faculty Sponsor

Walk to C₄C with
CUWIC Officers for Lunch

Sponsors



Google



Opportunities in CS



Kelly McDuffie
Google



Noelle Beaujon
CS Undergrad



Kathy Keating
Envysion

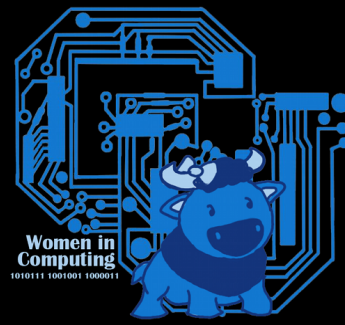


Allison Brown
CS PhD Student

LUNCH

12:15 P.M. – 1:15 P.M.

Lilypad E-Sewing Kit

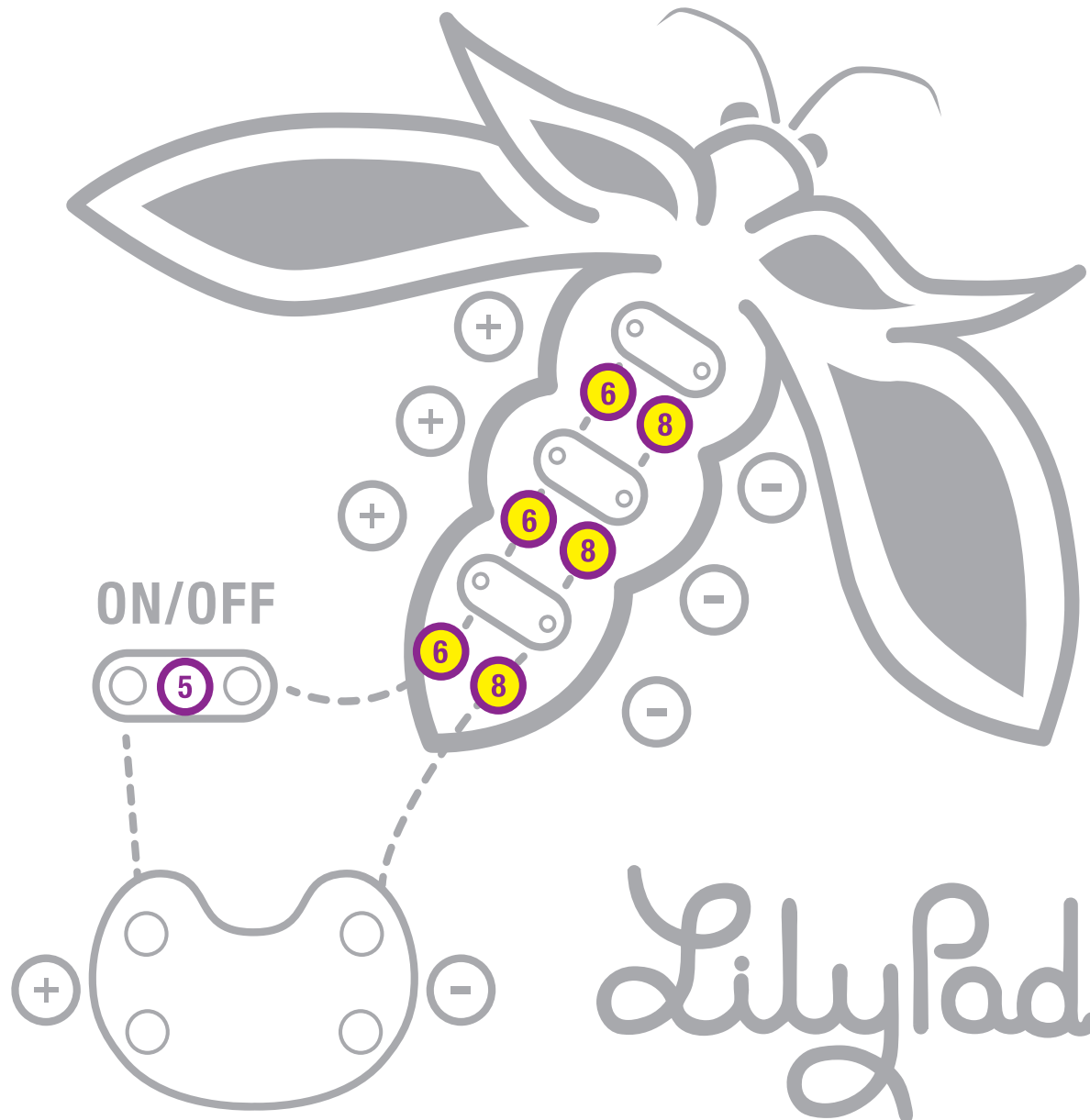
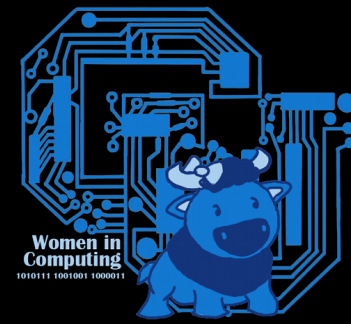


Prof. Leah Buechley

Assistant Professor of
Media & Sciences at MIT

MS and PhD in CS from
University of Colorado
Boulder

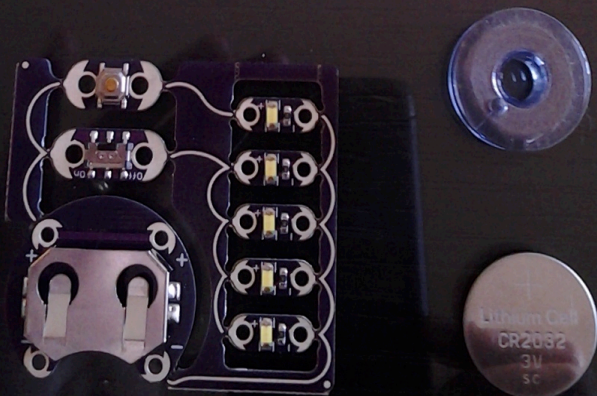
Make a circuit



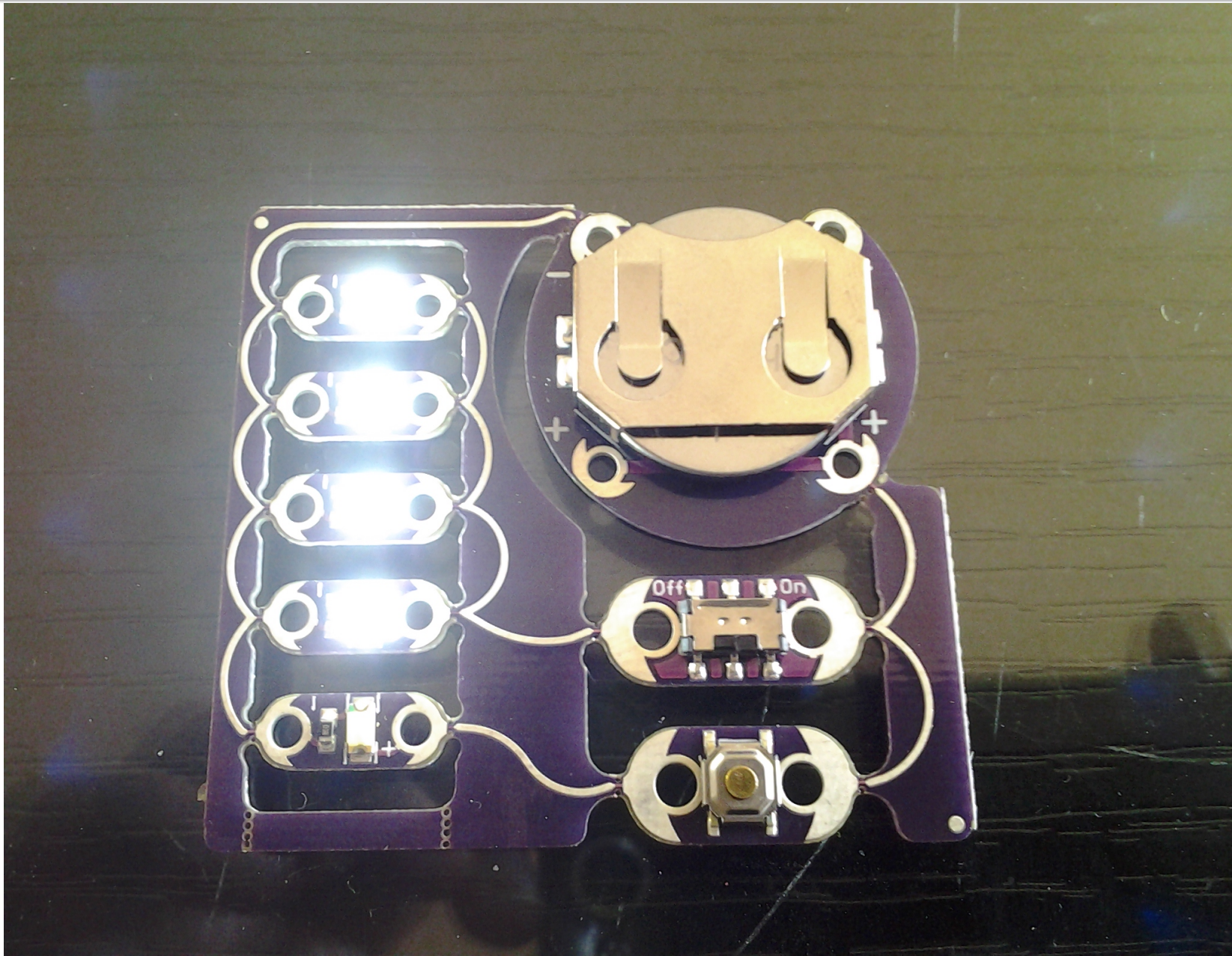
What you received



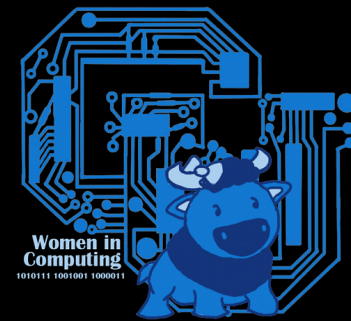
- Cloth
- Conducting Thread
- Battery
- 1 Battery Holder, 6 LEDs, 1 Button, 1 ON/OFF Switch
- Needles
- Instruction Set



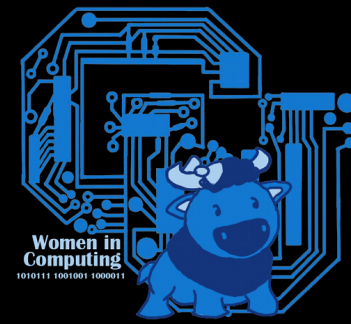
Insert Battery & Turn on Switch



Which goes where



Points to be noted

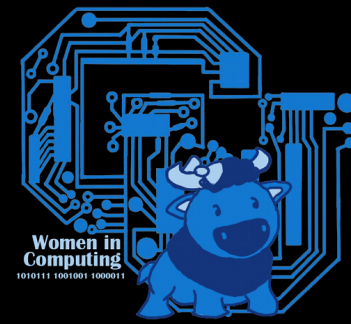


- Polarity (Positive and Negative) matters
- Battery holder and LEDs have positive & negative ends
- The ON/OFF Switch & Button does not have any polarity
- Do not connect Positive ends to Negative ends
- Cut the thread ends in the back as short as possible to avoid a short circuit
- Be careful working with needles

Back side after completion

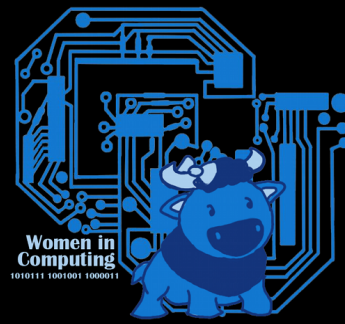


Steps



- Complete each step
- Tie a knot in the back
- Cut the thread
- Rethread and start next step

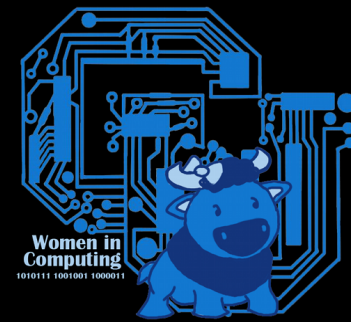
Step 1



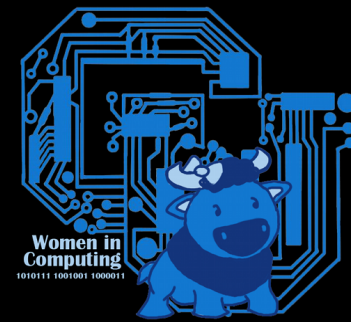
Step 3



Halfway Through



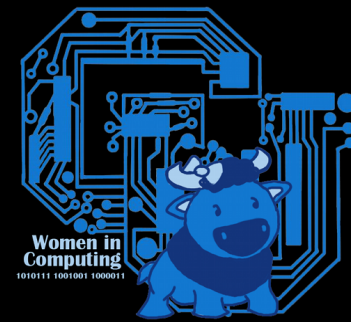
Step 4



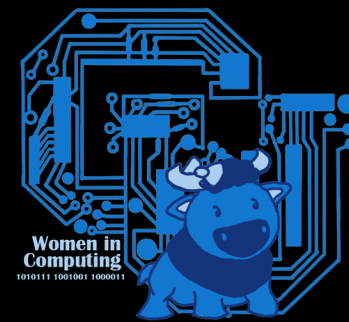
Step 6



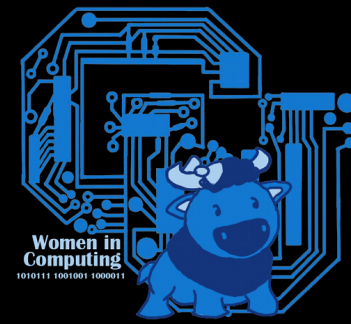
Press the Button to connect the circuit



Completed!!!



What's Next?



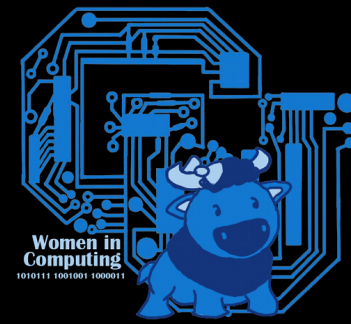
- Lilypad Homepage -
<http://web.media.mit.edu/~leah/LilyPad/index.html>
- Turn Signal Biking Jacket -
http://web.media.mit.edu/~leah/LilyPad/build/turn_signal_jacket.html

Example Code to Blink LED



```
/*  
  Blink  
  Turns on an LED on for one second, then off for one second, repeatedly.  
  
  This example code is in the public domain.  
*/  
  
// Pin 13 has an LED connected on most Arduino boards.  
// give it a name:  
int led = 13;  
  
// the setup routine runs once when you press reset:  
void setup() {  
  // initialize the digital pin as an output.  
  pinMode(led, OUTPUT);  
}  
  
// the loop routine runs over and over again forever:  
void loop() {  
  digitalWrite(led, HIGH);    // turn the LED on (HIGH is the voltage level)  
  delay(1000);                // wait for a second  
  digitalWrite(led, LOW);    // turn the LED off by making the voltage LOW  
  delay(1000);                // wait for a second  
}
```

Other Projects



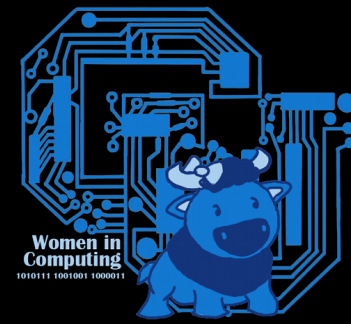
- Projects of High Low Tech Group @ MIT -
<http://hlt.media.mit.edu/?cat=5>
- Electronic Popables -
http://www.youtube.com/watch?feature=player_embedded&v=AI-6wMlaVTc
- Learn more & DIY from Sparkfun -
<http://learn.sparkfun.com/curriculum>

Short Computing Presentations



1. Robotic Arm Manipulation, Dave Coleman
2. Computer Animation Making Imagination Reality, Joseph Paul Kubala
3. Visualizing Physical Therapy with Electroluminescence Wire, Alice Chien
4. Leveraging Crowds and Clouds, Jeffery Hoehl
5. Implications of Cloud Computing for Residential Supports and Services, Jeffery Hoehl
6. Boulder Food Rescue, Rhonda Hoenigman
7. MeYouBook, Houman Farokhzad
8. Topical Trends, Ogheneovo Dibie
9. Designing a Sociotechnological Intervention to Improve Snacking in Low Socioeconomic Families, Danish U. Khan
10. Curing Writer's Block with Bayesian Statistics, Robert Lindsey

Closing Remarks



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