Women in Computing:
Past, Present, and Future

Dr. Michael S. Kirkpatrick
Department of Computer Science
April 10, 2019
When a user takes a photo, the app should check whether they're in a national park...

Sure, easy GIS lookup, gimme a few hours.

...and check whether the photo is of a bird.

I'll need a research team and five years.

In CS, it can be hard to explain the difference between the easy and the virtually impossible.
What is Computer Science and why should you care?
= Computer Science
\[ \text{if and only if} \]

\[ \text{if and only if} \]

\[ = \text{Computer Science} \]

\[ = \text{Chemistry} \]
Computer Science is...

the systematic study of the feasibility, structure, expression, and automation of the methodical procedures (or algorithms) that underlie the acquisition, representation, processing, storage, communication of, and access to information
Computer Science is...

- study of the automation of processing information
Computer Science is...

1. Mobile application developer
2. Risk management director
3. Landman
4. Product analyst
5. Information assurance analyst
6. Quality assurance coordinator (RN)
7. Clinical applications specialist
8. Hospital administrator
9. Database analyst
10. Director of finance and administration

https://money.cnn.com/pf/best-jobs/
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Computer Science is...

a foundational skill for the 21st century
Remember @hacks4pancakes' suspicion of smart locks & hubs?

She was right. @CharlesDardaman and @INIT_3 have found a way to hack into the smartlock through the hub and open every door that matches this brand.

They even created an autopwn script for it! twitter.com/charlesdardaman…

Chase Dardaman @CharlesDardaman
All your houses are belong to us! @INIT_3 and I have fully owned the smart hub controlling this lock. The lock is just to demonstrate that we can open your door if we get onto your network, or we live in your apartment building. Disclosure and blog post in the works.
Hedi Lamarr's invention made Bluetooth possible.
Radia Perlman invented key parts of the Internet

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Barbara Liskov’s work is the foundation of modern software design.

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- Ada Lovelace wrote the world’s first computer program
- Grace Hopper made optimizing compilers possible
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Rear Admiral Grace M. Hopper

https://en.wikiquote.org/wiki/Grace_Hopper
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Humans are allergic to change. They love to say, “We’ve always done it this way.” I try to fight that. That’s why I have a clock on my wall that runs counter-clockwise.

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In total desperation, I called over to the engineering building, and I said, "Please cut off a nanosecond and send it over to me."

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Scientist Katie Bouman just posted about the moment when "the first image I ever made of a black hole" was processed.

Just to clarify, this was the first image "ANYONE EVER MADE" of a black hole.

#smalldetails  
bit.ly/2G3CUUt  
#EHTBlackHole #BlackHoleDay #BlackHole

Jen Zhu @jenzhuscott  5h

Her name is Katie Bouman, an MIT graduate.

3 years ago she led the creation of a new algorithm to produce the first-ever image of a black hole we are seeing today.

#BlackHole #EventHorizonTelescope
I reject this premise...
Linux developer who took on Linus Torvalds over abuse quits 'toxic' kernel community

"Dreading the potential toxic background radiation of interacting with the kernel community," Linux maintainer Sarah Sharp has called it a day.

By Liam Tung | October 6, 2015 — 09:16 GMT (01:16 PDT) | Topic: Open Source
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Report: Ousted Tinder Cofounder Settled Her Sexual Harassment Lawsuit Against The Company For 'Just Over $1 Million'

Maya Kosoff Nov. 4, 2014, 12:19 PM
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Uber Will Investigate Sexual Harassment Claims By Engineer

February 20, 2017 - 1:43 PM ET
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AMERICA

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Woman Who Accused GitHub Founder Says She Was Forced Out Because She Declined to Sleep With A Male Co-Worker

Jim Edwards | Apr 21, 2014, 7:12 PM
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Not targets
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“This is an **industry filled with sociopaths** who cannot see another individual as a human being.”
“It's difficult to even get a modicum of respect. They talk down to you. They belittle you.”

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“I’m honestly trying to understand why anyone says that females are ‘needed’ in the tech industry. **The tech community works fine without females**, just like any other mostly male industry. Feminists probably just want women making more money.”
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“This is an industry filled with sociopaths who cannot see another individual as a human being.”

“It is not misogyny to tell a sexist joke, or to fail to take a woman seriously…”

“I’m honestly trying to understand why anyone says that females are ‘needed’ in the tech industry. The tech community works fine without females, just like any other mostly male industry. Feminists probably just want women making more money.”
The leaky pipeline:

“The pipeline is leaky and full of acid. The pipeline leads to a sewage treatment plant. The pipeline ends in a meat grinder.”

-Julie Pagano*

*Diversity for Sale (http://juliepagano.com/blog/2015/02/07/diversity-for-sale/)
Percentage of Bachelor's degrees conferred to women in the U.S.A., by major (1970-2012)

- Health Professions
- Public Administration
- Education
- Psychology
- Foreign Languages
- English
- Communications and Journalism
- Art and Performance
- Biology
- Agriculture
- Social Sciences and History
- Business
- Math and Statistics
- Architecture
- Physical Sciences
- Computer Science Engineering

Data source: nces.ed.gov/programs/digest/2013/menus_tables.asp
Author: Randy Olson (ranolsson.com / @randall_olson)
Note: Some majors are missing because the historical data is not available for them

http://ncwit.org/

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Computer Science Bachelors Degrees Granted

Percent of 2012 undergraduate degree recipients who were women
57
Percent of 2012 Computer and Information Sciences undergraduate degree recipients who were women
18
Percent of 2012 Computer Science undergraduate degree recipients at major research universities who were women
12
Percent of 1985 Computer Science undergraduate degree recipients who were women
37
Percent decline in the number of first-year undergraduate women interested in majoring in Computer Science between 2000 and 2012
64

http://ncwit.org/
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Data source: nces.ed.gov/programs/digest/2013menu_tables.asp
Author: Randy Olsen (randyolsen.com) / Grandle, 2010
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1980s: The “Golden Age”
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“Designing a revolutionary concept in software demanded a computer with extraordinary performance. The Tandy 2000 delivered.” — Bill Gates

Chairman of the Board, Microsoft

Bill Gates has been at the leading edge of personal computing from the very beginning of the computer industry. He is co-founder of Microsoft Corporation, the leading producer of microcomputer software.

“Our newest software product, MS/Windows, is an integrated workgroup environment. It will let personal computer users combine individual programs into a powerful, integrated system.

“When we set out to design MS/Windows in 1983, we knew that the Tandy 2000 computer would let us turn an extraordinary product into a work of art. The graphics are sharp and crisp, and give us a degree of productivity that nothing before.

“Our engineers were quite impressed with the processing speed of the Tandy 2000, with impressive power. And while the finished product will allow the Tandy to do more, the software that has helped to develop the design was:

“We’re proud of our work. So when people come to show someone how great the product is, we give them testimonials. On the Tandy 2000.”

Isn’t it time you enjoyed peak performance from a personal computer? Consider MS/Windows for the most sophisticated programming and the latest in high technology. Tandy 2000.

We can choose from the best program assembles their top-notch quality, exclusive Express Offer Software service.

Tandy 2000 operates at $2999 and can be blended for only $149 per month. Comes in today and see what we’ve been waiting.
"Designing a revolutionary concept in software
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The Tandy 2000 delivered." — Bill Gates
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Level playing field?
90s/00s: Y2K, Dot-com boom/bust
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Now: The Third Surge
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YOU DON’T GET TO
500 MILLION FRIENDS
WITHOUT MAKING
A FEW ENEMIES
Now: The Third Surge
“One category of reactions that I receive all the time as a programmer that presents as feminine is: No one believes I am a programmer. I can’t tell you how many people, when meeting me and hearing my profession, tell me that I look like a designer, someone in accounting, someone in marketing, anything but a programmer.”
Girls’ choices are constrained

- **Steered away** by parents, teachers, others
  - “Computing is for boys”
- Underrepresentation is a vicious cycle
  - Lack of role models
- Girls systematically **underestimate** their abilities
  - Accurate feedback is critical
- Girls anticipate **work-family** conflicts
- Discrimination limits opportunities
- **Punished** for exhibiting competence

Misleading hope

Misleading hope

Misleading hope

Fairy tales of gender equality?

Déjà vu, anyone?

a long tradition of workplace self-help

Useful and, also, misleading!

The Cruel Optimism of our current fairy tale

What is cruel optimism?

Undeniable evidence!

The painful truth about women’s ‘success’ in male-dominated professions

Careful what we wish for (and how we pursue it)

There is no “tech industry”
It's important we get over the idea that you were born to be a programmer - Jan Cuny

#SIGCSE2016
Levels completed by age, data until 11/13/2014

- with teacher
- without teacher

Ethnic diversity across Code.org's Code Studio students in U.S. classrooms

- White/Caucasian: 45%
- Hispanic American: 22%
- Black/African American: 15%
- Asian: 8%
- Native American: 2%
- Other: 8%

Studying alone
- 65% Male
- 35% Female

With a classroom teacher
- 54% Male
- 46% Female
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ane @lordvoldemot

@EmWatson my dad says I can't be a engineer 'cause it's a "men profession" what do I do to change that? #Heforshe @HeforShe #Davos
ane @lordvoldemort
@EmWatson my dad says I can't be an engineer 'cause it's a "men profession" what do I do to change that? #Heforshe @HeforShe Davos

Emma Watson @EmWatson
@lordvoldemort @HeforShe Become an engineer.
6:29 AM - 23 Jan 2015
7,957 RETWEETS 12,356 FAVORITES
Thank you!
Where to go for more information

- National Council for Women & Information Technology (http://www.ncwit.org/)
- ACM’s Women in Computing (ACM-W) (http://women.acm.org/)
- CS10K Project (http://cs10kcommunity.org/)
- Code.org (http://code.org/)
- Anita Borg Institute (http://anitaborg.org/)
- Girls Who Code (http://girlwhocode.com/)
- Black Girls Code (http://blackgirlscode.com/)
- Model View Culture (https://modelviewculture.com/)
- Learn to write Python code:
  http://learnpython.org/
Where to go for more information

- Alice (http://alice.org/)
- AppInventor (http://appinventor.mit.edu/)
- Computer Science Unplugged (http://csunplugged.org/)
- Finch Robots (http://finchrobot.com/)
- Lightbot (http://lightbot.com/)
- Scratch (http://scratch.mit.edu/)
- Snap! (Build Your Own Blocks) (http://snap.berkeley.edu/)
- Girl Develop It (https://www.girldevelopit.com/)
- TEALS (https://www.tealsk12.org/)
- Bootstrap (http://www.bootstrapworld.org/)
- Code 2040 (http://www.code2040.org/)
- Code Nation (https://codenation.org/)