

Beauty and Joy of Computing

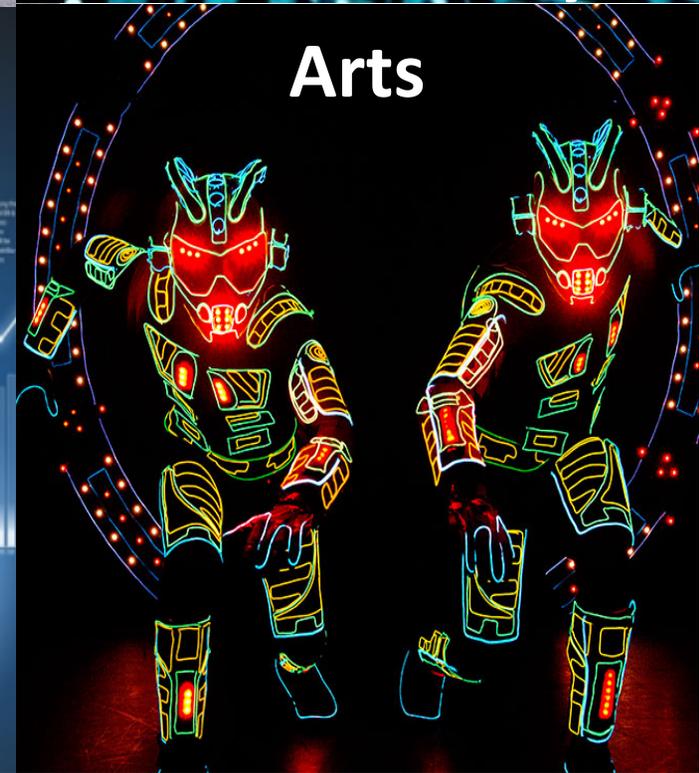
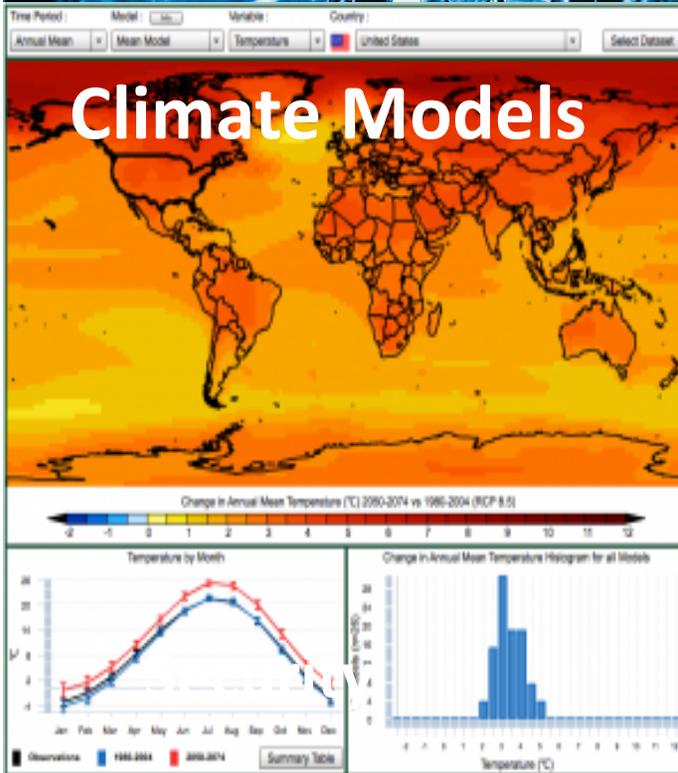
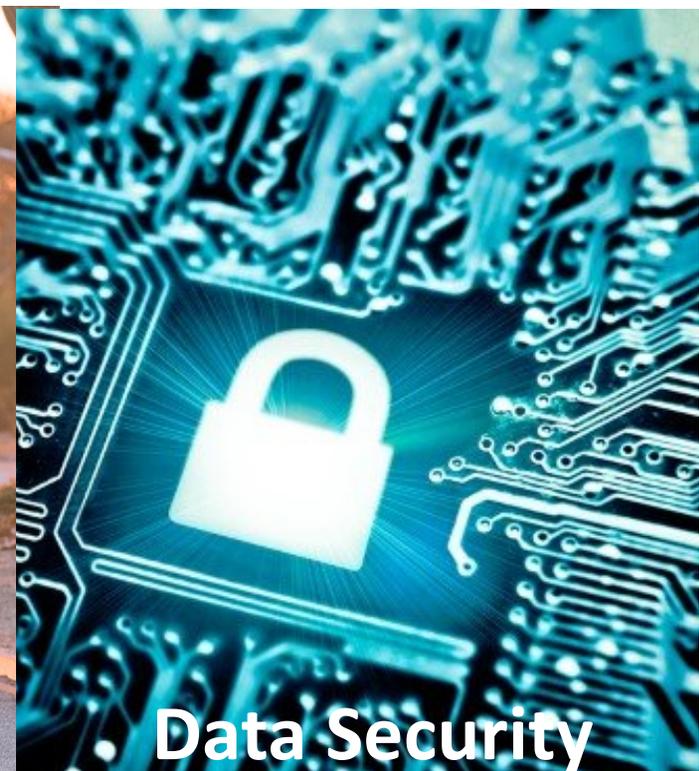
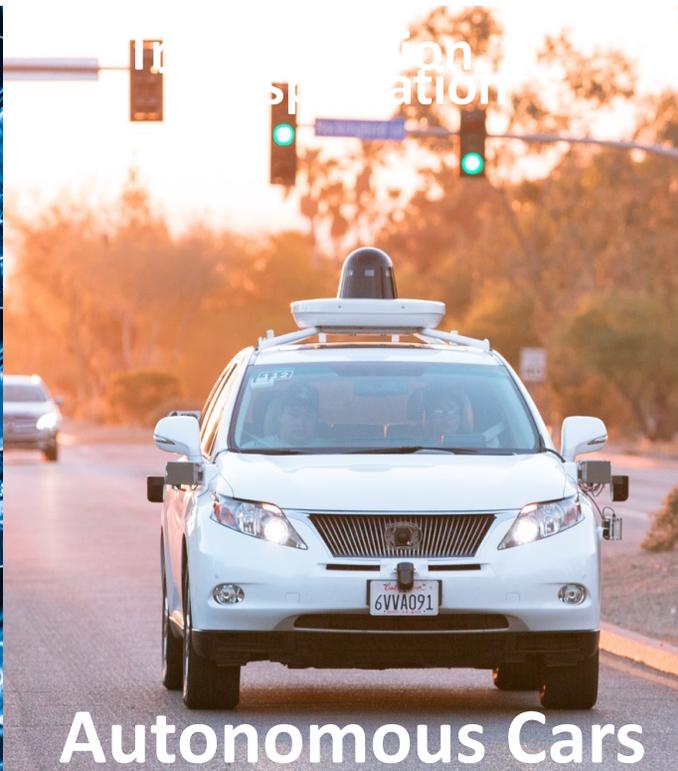
Future Female Techmakers Conference
March 4, 2017

Prof. Jo Atlee
Computer Science
University of Waterloo



careers in computing





software is changing the world



e-health



robots



3D printing



social activism



meaningful careers in computing

educational support software

e-learning software

CS education

electronic health records

medical devices/equipment

medical imaging

telemedicine

medical diagnostic systems

consulting services

data analytics

science modelling

energy-optimizing devices

digital forensics

fraud detection

cyber security

protecting personal data

government digital services

accessibility of Web services

e-activism

arts



25 best jobs for work-life balance

1. Data Scientist
2. SEO Manager
3. Talent Acquisition Specialist
4. Social Media Manager
5. Substitute Teacher
6. Recruiting Coordinator
7. UX Designer
8. Digital Marketing Manager
9. Marketing Assistant
10. Web Developer
11. Risk Analyst
12. Civil Engineer
13. Client Manager
14. Instructional Designer
15. Marketing Analyst
16. Software QA Engineer
17. Web Designer
18. Research Technician
19. Program Analyst
20. Data Analyst
21. Content Manager
22. Solutions Engineer
23. Lab Assistant
24. Software Developer
25. Front End Developer

<https://www.glassdoor.com/blog/25-jobs-worklife-balance-2015/>



computing is a team activity



programmers



women in the tech industry

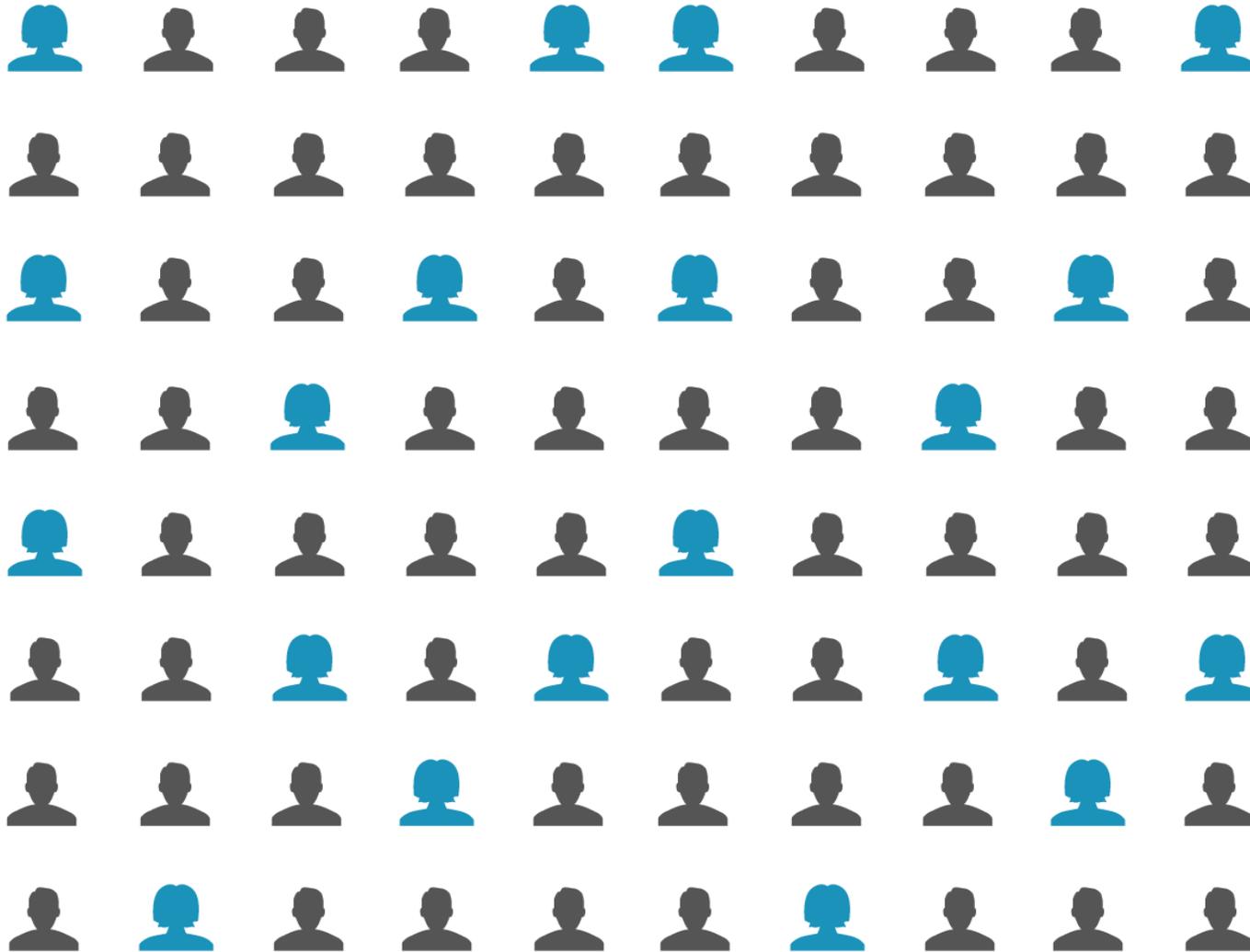
<https://github.com/triketora/women-in-software-eng> (February 2016)

Google	18%	Etsy	13%	Activision	3%
Apple	22%	Zendesk	18%	Tapad	3%
Facebook	16%	POPSUGAR	17%	Shoplocal	16%
Twitter	13%	Slack	18%	Venmo	16%
Microsoft	17%	SurveyMonkey	17%	Udacity	13%
Yahoo	15%	Capsher Technology	7%	Snapchat	15%
LinkedIn	18%	Elemental Technologies	11%	Inkling	7%
Airbnb	3%	Quora	11%	Codecademy	11%
Pinterest	9%	SubSp	12%	flickr	9%
Dropbox	10%	uSwitch, London	3%	Khan Academy	26%
Mozilla	8%	SalesforceIQ	5%	Eventbrite	19%
Qualcomm	5%	Rhapsody	18%	HootSuite	15%
Yelp	8%	Wikimedia Foundation	11%	Delphix	5%
Paypal	7%	foursquare	7%	Redfin	18%
Automattic	8%	Gilt	10%	Edmodo	2%
GitHub	14%	Quantcast	13%	thoughtbot	11%
New Relic	20%	Guidewire Software	17%		
ThoughtWorks	24%				

18.70%



female students in CS at Waterloo (20%)



why so few women?

~~Men are innately better programmers than women are?~~

~~Women are much less interested than men in computing?~~

“no gender differences in quantitative measures of students’ abilities and performances”

Singh et al. “Women in Computer-Related Majors: A Critical Synthesis of Research and Theory From 1994 to 2005” Review of Educational Research, 2007.



early female “computers”

early female computers performed astronomical calculations



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WICS
WOMEN IN COMPUTER SCIENCE

wie
women in
engineering

“computers” in World War II

women were recruited in WWII to compute bomb trajectories



“computers” in World War II

75% of the codebreakers at Bletchley Park were women



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wie
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“computers” at NASA

NASA human computers processed flight and wind-tunnel data to assess and improve the performance of airplanes and rockets.

Female computers were deemed faster and more accurate than males.



“computers” at NASA



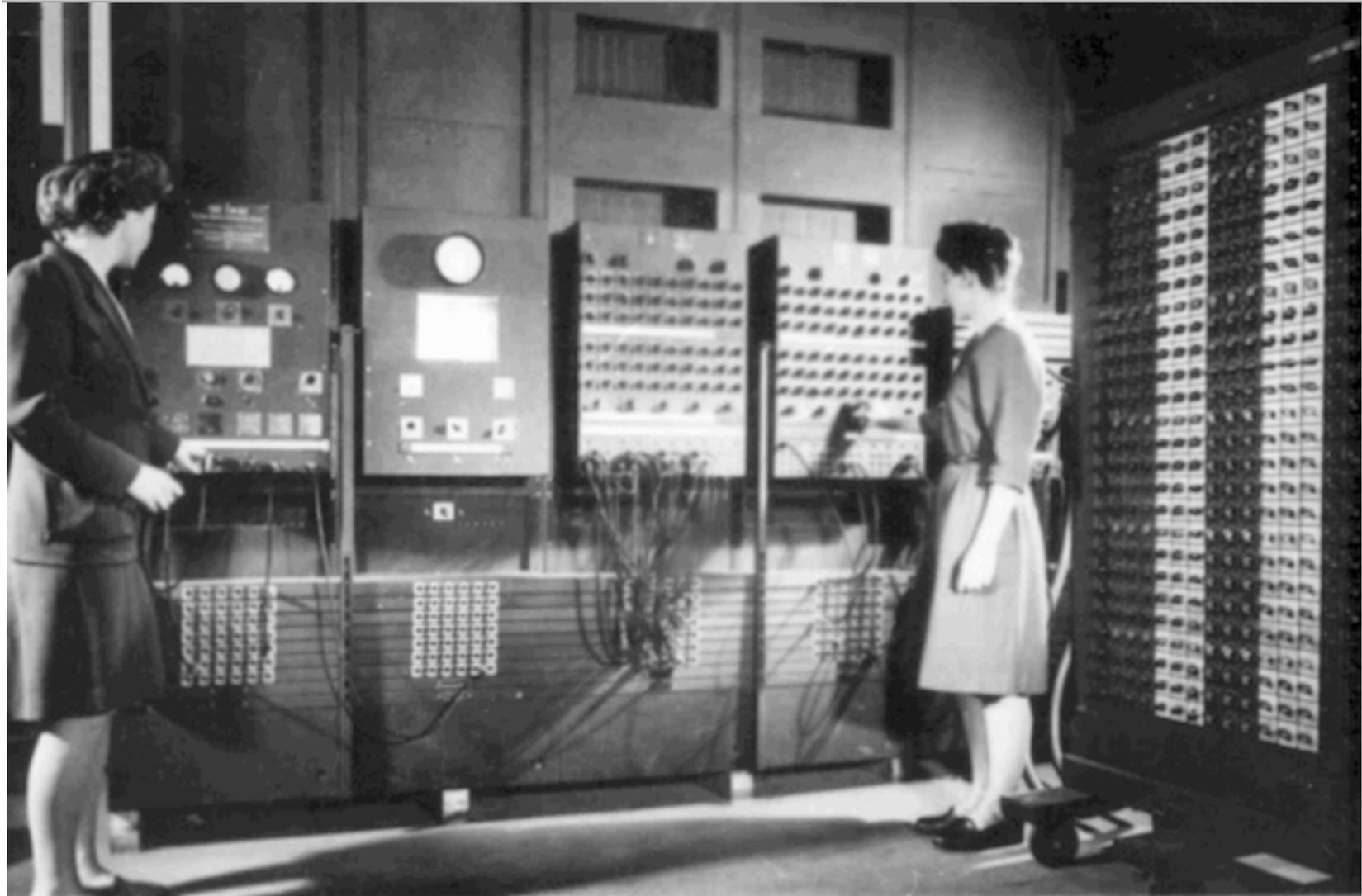
Mary Jackson

Katherine Johnson

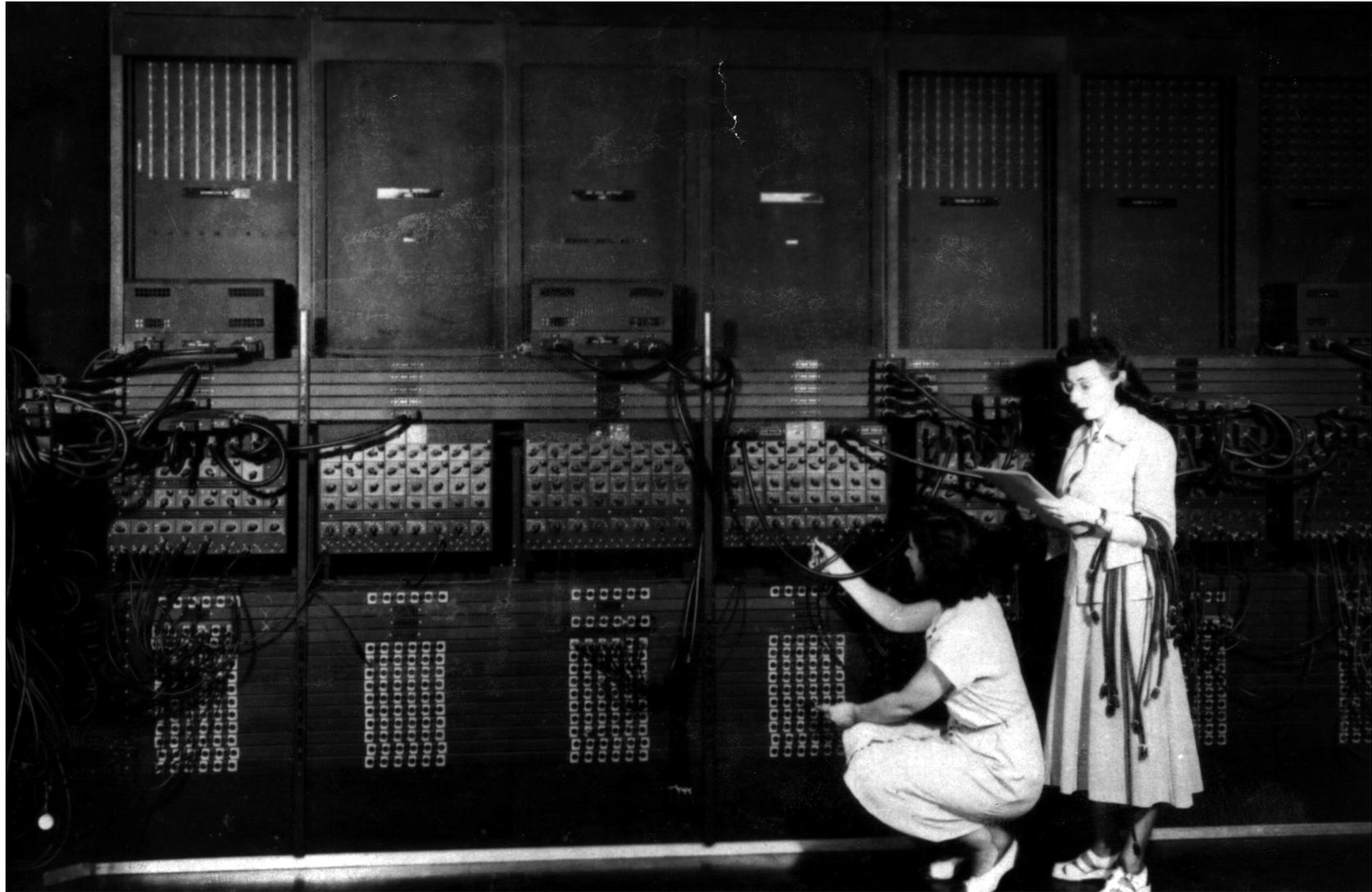
Dorothy Vaughan



the first programmers were women



the first programmers were women



programmers at NASA



Admiral Grace Hopper



“Women are naturals at computer programming.”

Programming requires planning, patience, and attention to detail.

Adm. Grace Hopper



15,000 @ Grace Hopper Celebration



Future Female Techmakers Conference



15,000 @ Grace Hopper Celebration



Future Female Techmakers Conference

WICS
WOMEN IN COMPUTER SCIENCE

wie
women in
engineering

men's and women's
experiences are different



gap in pre-university CS experience

- Female students (on average) start university with less programming experience
- Report nearly equal mastery of programming concepts in intro courses
- Have equal GPAs



gap in pre-university CS experience



playing songs

VS.

The image shows a detailed music theory reference chart for guitar, organized by key and scale. It includes:

- Key Scales:** Lists major and minor scales for keys from G#m to G.
- 12-note Chromatic Scale:** A diagram showing the 12 notes of the chromatic scale across the fretboard.
- Chord Patterns:** A circular diagram showing the 12 chords and their patterns.
- Key Chord Charts:** Tables listing chords for each key.
- Pattern Diagrams:** Fretboard diagrams for various patterns (Pattern #1 to #5) and a Minor Pentatonic Extended scale.
- Scale Diagrams:** Fretboard diagrams for various scales, including the 12-note chromatic scale.

formal music lessons



want computing experience?

Waterloo offers free computer science online courseware:

- Python from scratch
- Language-independent programming lessons
- Web basics
- Web programming

<http://courseware.cemc.uwaterloo.ca>



self-confidence gap (imposter syndrome)



azilliondollarscomics.com

Fraser
Hart



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WICS
WOMEN IN COMPUTER SCIENCE

wie
women in
engineering

micro-aggressions

social exchange in which a member of a dominant culture says or does something, **usually without intended malice**, that belittles and alienates a member of a marginalized group

Women just aren't interested in CS.

Really? You don't look like a CS major.

WHY DO YOU WANT TO HANG OUT WITH GEEKS?

Why would you want to study CS?
The guys will be better than you.

You only got into UW CS because you are a girl.

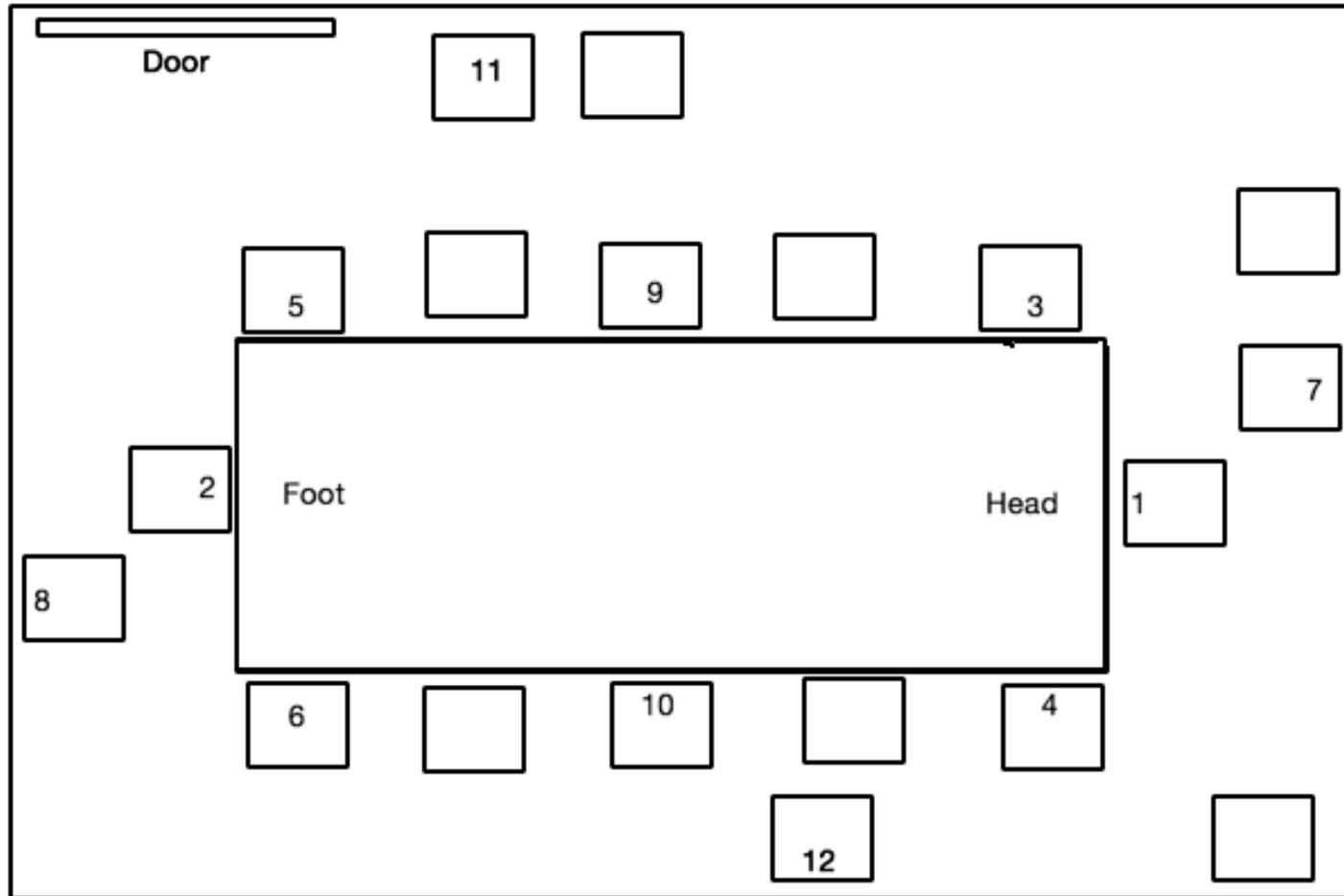
Want me to help you with your CS homework?



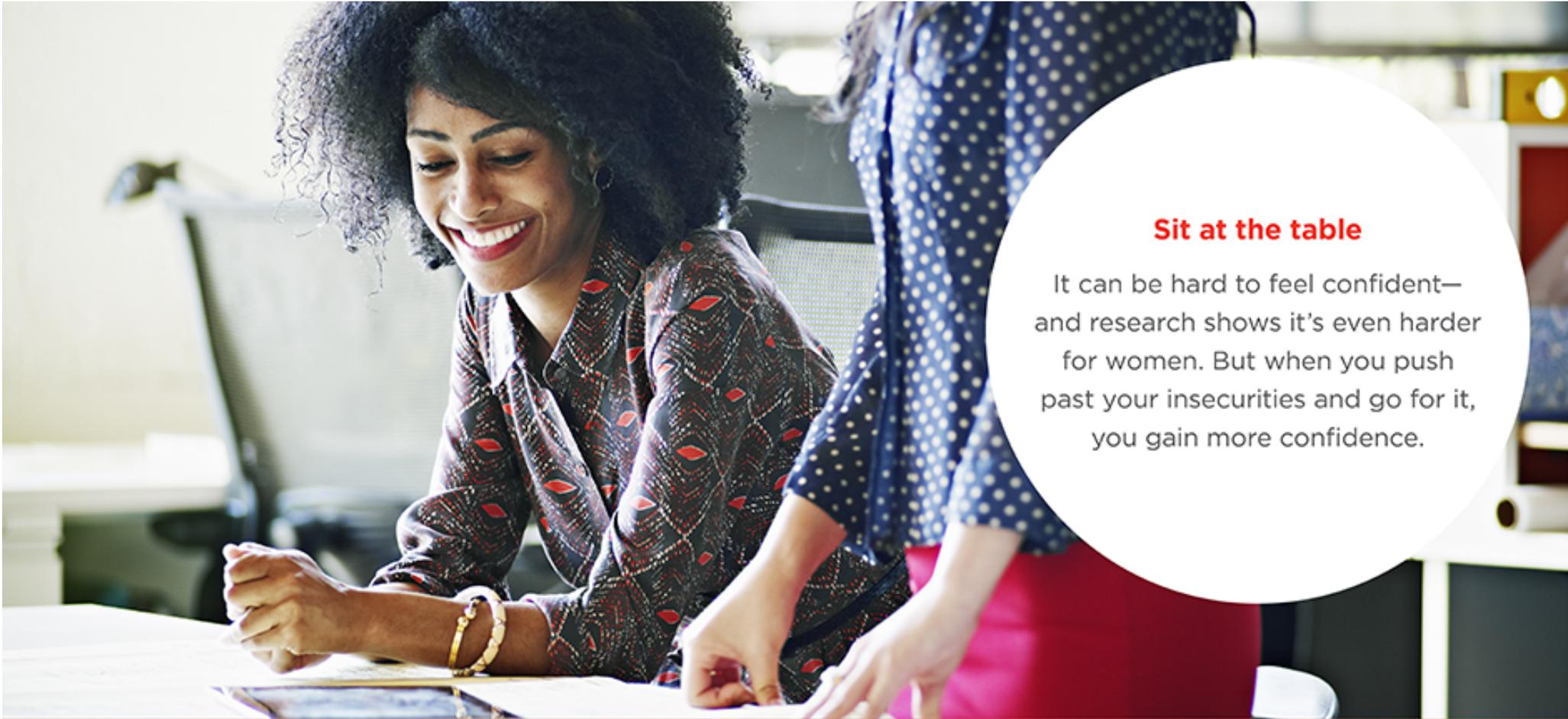
some advice



where would you sit?



#1 sit at the table



Sit at the table

It can be hard to feel confident—and research shows it's even harder for women. But when you push past your insecurities and go for it, you gain more confidence.

leanin.org/grads

LEAN IN



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#2 dream big



#3 don't beat yourself up if you fail

"Failure doesn't even really exist. If something doesn't go the way you planned, and you learn from it, that's just called learning. That's not really failure.

Failure is if you keep doing the same wrong things over and over; then you're not really making progress.

Otherwise, it's just learning –
And learning is good!

So, if your goal is to learn as much as possible, rather than not to fail, then you can keep going, going, going."



Hank Leber
CEO, GonnaBe



#4 technical girlfriends

Cultivate a network of technical girlfriends

- UW CS guys are great
 - They will be your best friends, study partners, project partners
 - But their experience is not the same as yours
- Girlfriends (who aren't in STEM) are great
 - But their experience is not the same as yours



#5 self-promotion

It's not what you know, and
it's not who you know.
It's who knows what you know.

Nora Denzel, former SVP at Intuit, HP, EMC



parting words

- Don't be discouraged by micro-aggressions. They reflect weaknesses in the speaker, not in you.
- Nurture your own social network of technical women.
- Be yourself. You are what a computer scientist looks like!

