

Ethical Computing

By CS 106A SLs: Allison Tielking & Jackson Eilers

Who We Are

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In our first CS courses at Stanford, we were taught that coding could turn anyone into a superhero.



facebook:
bringing the world closer

Our mission

Improve people's
lives with the world's
best transportation.

We believe in
a world where
people belong,
anywhere.

“Google’s mission is to organize the
world’s information and make it
universally accessible and useful.”

Google



But, what many programmers never learn in school:
With great power comes great responsibility, and every product has unintended consequences.

Other disciplines, engineering and otherwise, have strict ethical standards with real consequences

- Aviation
- Medicine/biotech
- Civil engineering

Lawsuits for negligent engineering

Years of testing

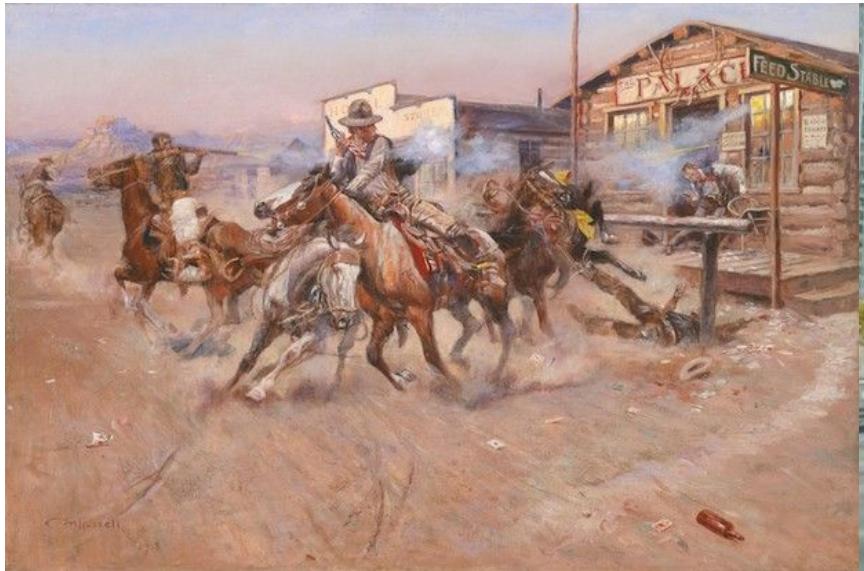
Annual inspections that lead to constant maintenance and alteration

Product recalls

The Hippocratic Oath

In a 🍃:

Software Engineering



Other Engineering Fields

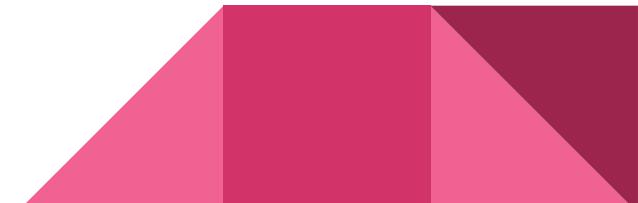


Lecture TLDR:

We must not only frequently reflect on our ever-changing biases and values, but also **stand up for what we believe in**.

Lecture Overview:

- Set the stage
- How did we get here (the wild west)?
- What are the implications?
- How can we shape the future of tech?
- Optional at-home exercises!!





Setting the stage: the Silicon Valley of Today

The Problem Isn't Cambridge Analytica: It's Facebook



Kalev Leetaru Contributor

AI & Big Data

I write about the broad intersection of data and society.

This article is more than 2 years old.

f

Slack Accuses Microsoft of Illegally Crushing Competition

The complaint, filed in Europe, threatens Microsoft's recent ability to avoid regulatory scrutiny.



Uber is under federal investigation for spying on Lyft drivers

It's another day, another woe for the embattled ridesharing company.



Swapna Krishna, @skrishna

September 8, 2017

5

Comments

After Deaths, Amazon Lands on List of Most Dangerous Employers

"It seems Amazon values money way more than life. If they did their job right, I wouldn't have had to bury my little brother."

NATALIE COLEMAN

| OCTOBER 18TH 2019

In September, a 48-year-old Amazon worker named Billy Foister suffered a heart attack in a warehouse outside Columbus, Ohio.

An example that hits close to home:

 The Stanford Daily

Startup vulnerability leaves queer student data exposed

QSpot, a community center that offers a welcoming space for LGBTQ+ ... A security flaw allowed users of Queer Chart, a startup founded by Stanford students to link members of the campus queer community, ... FoHo editor-

Nov 19, 2019



Ethics as a Speciality, Rather than the Foundation

- “I just build things”
- “I’m just an engineer”
- “Once the rockets are up, who cares where they come down?”
- “Ethics is something that someone else does”
- “It’s not my job to identify all relevant ethical implications”



A differing opinion

Implementing A Tenth Strand in the CS Curriculum

“Computer Science Education should not drive a wedge between the social and the technical, but rather link both through the formal and informal curriculum” [5].

“Societal and technical aspects of computing are interdependent. Technical issues are best understood (and most effectively taught) in their social context, and the societal aspects of computing are best understood in the context of the underlying technical detail. Far from detracting from the students’ learning of technical information, including societal aspects in the computer science curriculum can enhance students’ learning, increase their motivation, and deepen their understanding” [10].

C. DIANNE MARTIN,
CHUCK HUFF,
DONALD GOTTERBARN,
AND KEITH MILLER

THERE IS A GROWING AWARENESS THAT ETHICAL PRACTICE AND social responsibility are becoming increasingly important aspects of the computing profession. This is demonstrated by the publication of a number of recent



This “ethics as a specialty” attitude is widespread

“Discussing the social and ethical impact
of computing is not doing computer
science.”

-A CS Department Chair

Why does this attitude exist?

Yes, ethics often plays some part in a university's computing curriculum.

But, the most common approach is a **stand-alone** ethics class, often taught **at the end of a degree program**.

- “**Silo-ing**” ethics
- By teaching ethics outside of a technical context, students often see it as irrelevant to them.

Imagine:

How might attitudes change if, from day one, we taught consideration for ethical and social implications as an integral part of technical practice? What if we taught students when they first learned to write code or build technologies that a fundamental component is thinking through the implications – and that if you don't do that, you've missed a vital step, an error just as damaging as not learning to test or debug your code. When ethics only comes up in classes devoted to it, we reinforce the idea that ethics is an add-on; if we want computing professionals to think about ethics in their technical practice, it should also be part of technical classes.

- Casey Fiesler, CU Boulder Faculty in Information Science

Unlike other fields, you don't need a degree to do harm with code

- Ethics courses are pretty much mandatory for every computer science student in a university programm.
- However, the problem with this is that a huge part of the programming community these days consists of self-taught developers or individuals who attended some “coding bootcamp,” which rarely, if ever, include any ethical training.

So, where did this attitude come from?

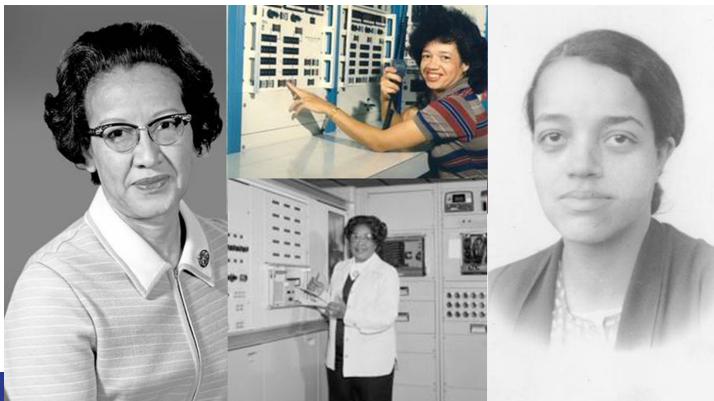
- The “Great Man” Myth
- Lax regulation

The old face of computing

Ada Lovelace, the first coder



'Hidden Figures' Women



A 1967 Cosmopolitan article



The Computer Girls

BY LOIS MANDEL

A trainee gets \$8,000 a year
...a girl "senior systems analyst"
gets \$20,000—and up!

Twenty years ago, a girl could be a secretary, a school teacher . . . maybe a librarian, a social worker or a nurse. If she was really ambitious, she could go into the professions and compete with men . . . usually working harder and longer to earn less pay for the same job.

Now have come the big, dazzling computers—and a whole new kind of work for women: programming. Telling the miracle machines what to do and how to do it. Anything from predicting the

computer can solve a problem, and then instruct the machine to do it."

"It's just like planning a dinner," explains Dr. Grace Hopper, now a staff scientist in systems programming for Univac. (She helped develop the first electronic digital computer, the Eniac, in 1946.) "You have to plan ahead and schedule everything so it's ready when you need it. Programming requires patience and the ability to handle detail. Women are 'naturals' at computer programming."

1984: The Year women were forced out of programming

- Hollywood messaging: **Computers were a male domain.**
- In hit movies like “WarGames,” “Revenge of the Nerds,” “Tron,” and others, the computer nerds were nearly always **young white men.**
- Video games were pitched far more often at boys.



1984: The Year women were forced out of programming

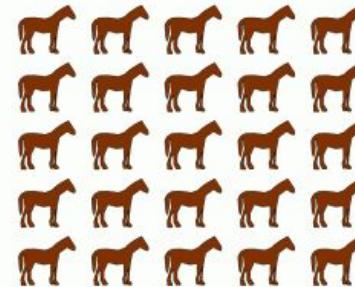
Companies began using **personality tests** to select specifically *for* these sorts of caustic loner qualities typically seen in men.

- “It’s not that women are excluded. It’s that practically everyone is excluded if you’re not a young white or Asian man.”

Whiteboard challenges that don’t resemble actual coding work.

- Resemble classroom work at top universities, familiar to young men doing hiring at companies.

Can You Solve The 25 Horses Puzzle? Google Interview Question



There are 25 horses. What is the minimum number of races needed so you can identify the fastest 3 horses? You can race up to 5 horses at a time, but you do not have a watch.





Powerful narratives
cut women out of
the picture...

This culminated in the “Great Man Myth” in tech



This attitude obscures huge public-sector investment, political support, company employees

Musk's success at Tesla is undergirded by public-sector investment and political support for clean tech.

- Tesla has received \$1.29 billion in tax incentives from Nevada, where it is building a "gigafactory" to produce batteries for cars and consumers.
- Its loans and tax credits, plus rebates for its consumers, total another \$1 billion, according to a recent [series](#) by the *Los Angeles Times*.

Every key technology behind the iPhone was state funded:

- Wireless networks
- Internet
- GPS
- Touch-screen display
- Voice-activated personal assistant Siri

This great-man myth helps excuse (or enable) some truly terrible, unethical behavior from these leaders.

It warps the popular understanding of how technologies develop, threatening to undermine the structure that is actually necessary for future innovations: **diversity**.



Tesla Energy: Elon Musk Reveals His Plan to Change the Way the World Uses Energy

Elon Musk's new batteries for home and businesses store solar power.

By **ALYSSA NEWCOMB**

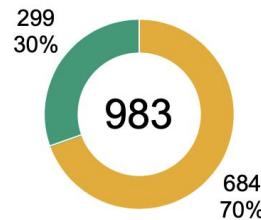
May 1, 2015, 7:43 AM • 5 min read



Diversity @ Stanford Engineering: 2011-12

Headcounts by Sex

Female Male



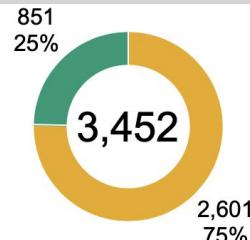
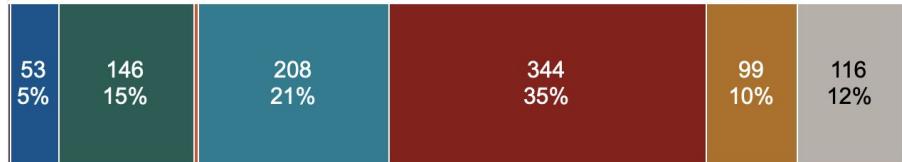
Undergraduate Students

Headcounts by Race/Ethnicity Groups ?

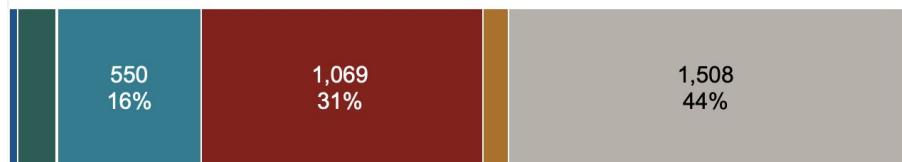
American Indian/Alaska Native
Black/African American
Hispanic/Latino

Native Hawaiian/Oth Pac Island
Asian
White

Two or more
International/Nonresident
Unknown



Graduate Students

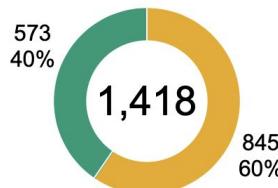


Diversity @ Stanford Engineering: 2019-20



Headcounts by Sex

Female Male



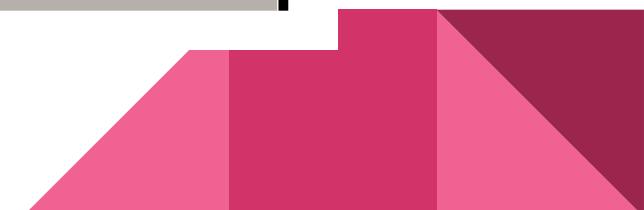
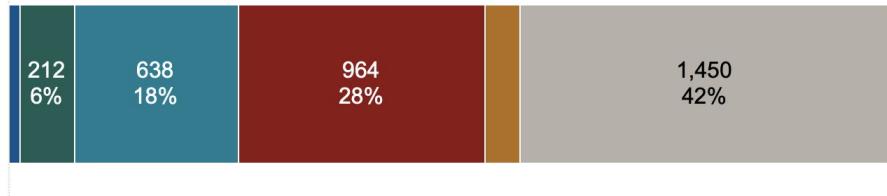
Headcounts by Race/Ethnicity Groups

American Indian/Alaska Native Native Hawaiian/Oth Pac Island Two or more
Black/African American Asian International/Nonresident
Hispanic/Latino White Unknown

Undergraduate Students



Graduate Students



Diversity @ Tech Companies

- Women hover at 4%–15% of all software engineers at most companies.
- More than 30% of women over thirty-five still hold junior positions.
- There are half as many African Americans and Hispanics in tech as in the rest of the private sector
- Attrition rates in tech are highest for Black engineers, followed by Latinx engineers. Lowest for Asian engineers. These high attrition rate offset hiring gains at companies.
 - Nearly one quarter of underrepresented men and women of color experienced stereotyping, twice the rate of White and Asian men and women. Almost one-third of underrepresented women of color were passed over for promotion--more than any other group.
- Tech companies only recently started publishing diversity reports. Many still don't share statistics!

Tech workers of color are out there

FIGURE 2

Tech workers of color are underutilized in the workforce

People ages 45 and under with bachelor's or advanced degrees in computer and mathematical sciences or electrical engineering

■ Share who are unemployed ■ Share who are working in jobs unrelated to their tech degrees

White men



Men of color



Women of color



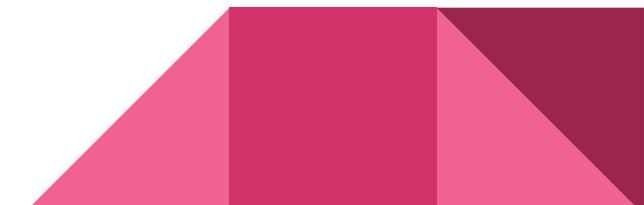
Note: In this instance, the term "people of color" includes black, Hispanic, and Indian Americans.

Source: Author's calculations based on data from the National Science Foundation, "SESTAT: Scientists and Engineers Statistical Data System," available at <http://www.nsf.gov/statistics/sestat/> (last accessed September 2016).



Diverse workforces are crushing the competition!

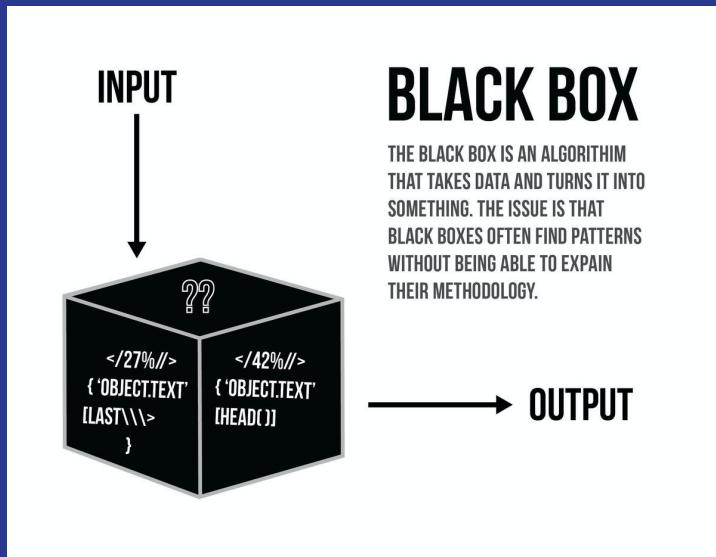
- Companies with diverse management are more likely to introduce new product innovations than are those with homogeneous “top teams”
- Companies in the top quartile of racial/ethnic diversity are 35% more likely to have financial returns above their national industry mean. On the other hand, companies in the bottom quartile for both gender and ethnicity/race were statistically less likely to achieve above-average financial returns than average.
 - Why? Because diversity facilitates friction, which enhances deliberation and upends conformity



In summary: what has the dominant culture of tech been?

- Lone wolf
- Ruthless, individualistic
- A genius coder who's "constantly building"
 - ...but doesn't have enough time to consider implications of the work, or better alternatives
- Spotlight on white male founders, pushes women and underrepresented minorities in tech out of the picture

The Unintended(?) Consequences: Flawed Datasets and Black Boxes



Bias since the beginning of computing

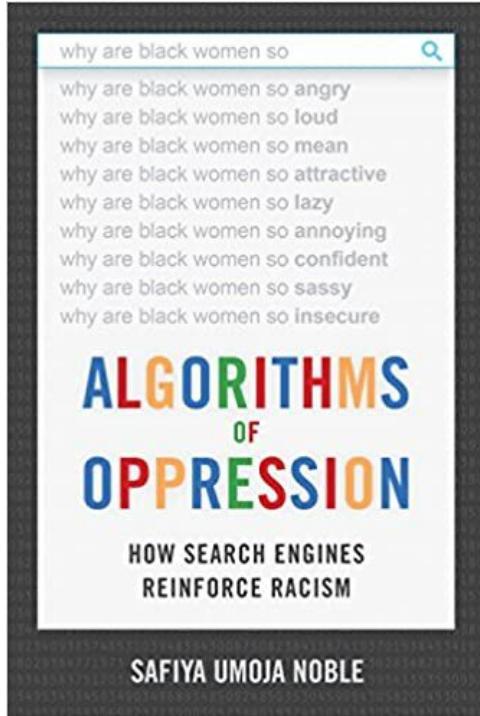
Shirley Cards

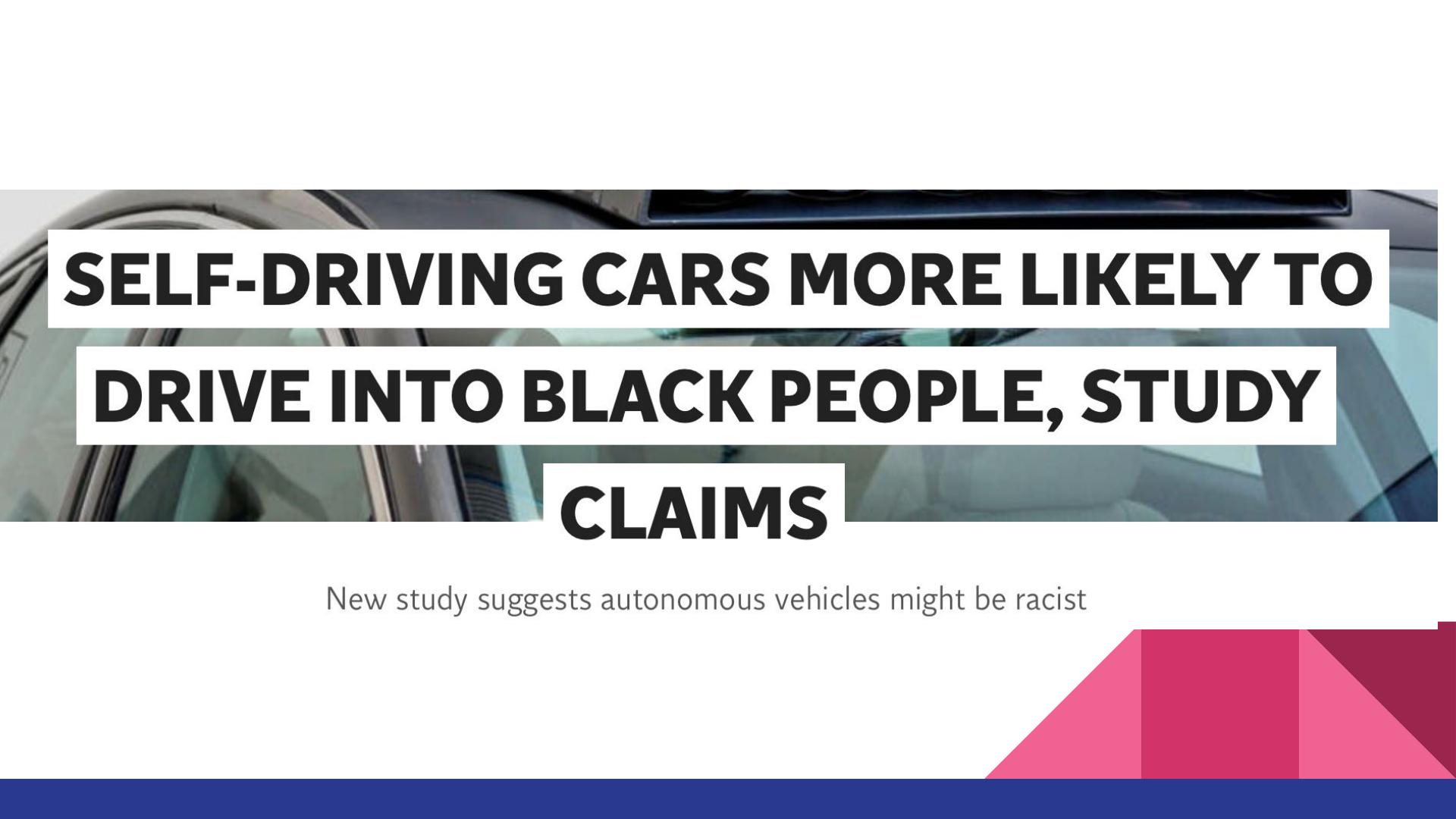


Lenna - Playboy pinup model, used for image recognition



Bias still present in computing today





SELF-DRIVING CARS MORE LIKELY TO DRIVE INTO BLACK PEOPLE, STUDY CLAIMS

New study suggests autonomous vehicles might be racist

HEALTH

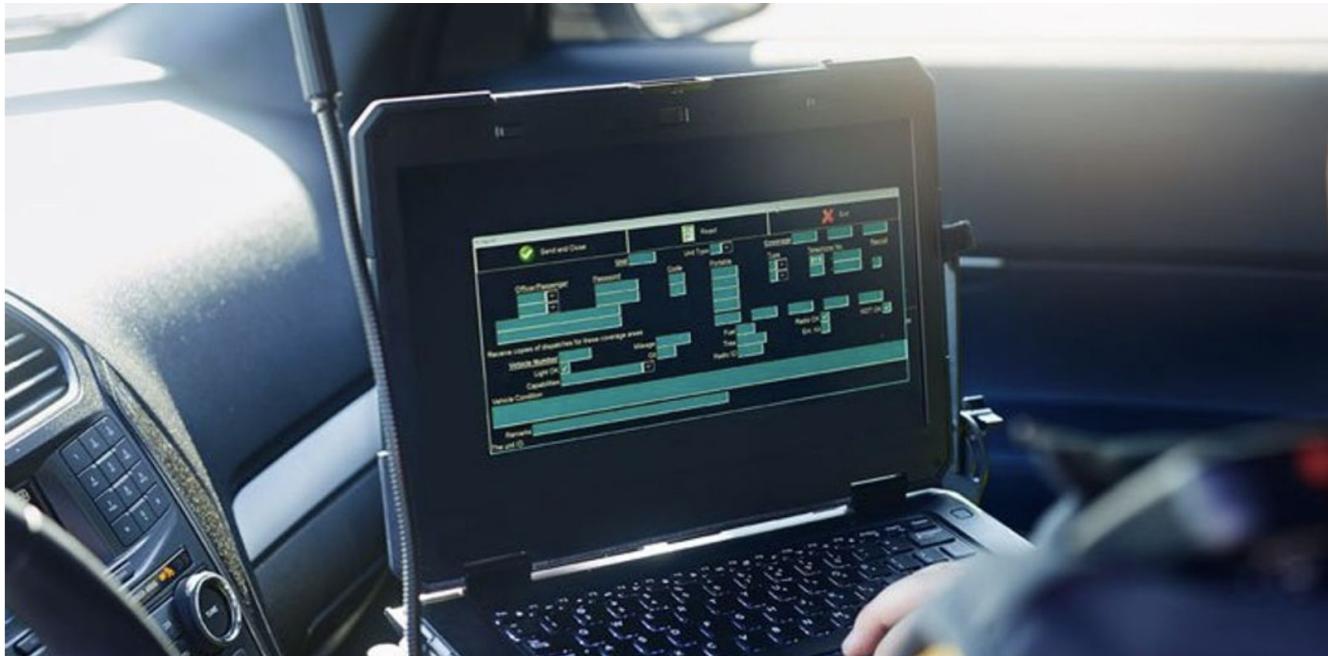
AI-Driven Dermatology Could Leave Dark-Skinned Patients Behind

Machine learning has the potential to save thousands of people from skin cancer each year—while putting others at greater risk.

ANGELA LASHBROOK AUGUST 16, 2018



“If you don’t teach the algorithm with a diverse set of images, then that algorithm won’t work out in the public that is diverse,” says Adamson. “So there’s risk, then, for people with skin of color to fall through the cracks.”



Male police officer using his laptop while out on patrol (Getty Images)

Mathematicians urge peers to stop working on racist "predictive policing" technology

"It is simply too easy to create a 'scientific' veneer for racism," the open letter states

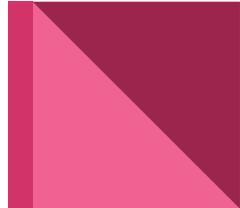
Biased tech can lead to censorship of certain groups

THE PITCH

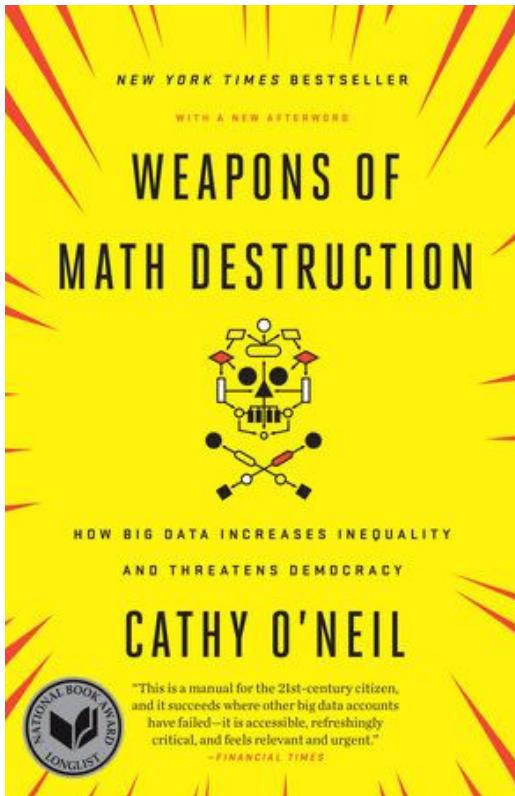
On TikTok, Fighting Racism Requires a Song and Dance

This Researcher's Observation Shows The Uncomfortable Bias Of TikTok's Algorithm

TikTok's recommendation system can create a biased "feedback loop," this researcher said.



The impact of this technology extends into real life



The Danger of a Black Box: Recidivism

Recidivism: the tendency of a convicted criminal to reoffend.

Tech policy / AI Ethics

AI is sending people to jail —and getting it wrong

Using historical data to train risk assessment tools could mean that machines are copying the mistakes of the past.

by **Karen Hao**

January 21, 2019



The Danger of a Black Box: Credit Scores



Popular

Latest

The Atlantic

Sign In

TECHNOLOGY

How Algorithms Can Bring Down Minorities' Credit Scores

Analyzing people's social connections may lead to a new way of discriminating against them.

KAVEH WADDELL DECEMBER 2, 2016



The Danger of a Black Box: Jobs

Amazon scraps secret AI recruiting tool that showed bias against women

Jeffrey Dastin

8 MIN READ





Tech is repeatedly used as a bandaid to cover societal problems.

Case study from book

When your paychecks surge and dive willy-nilly, it is hard to pay bills, make plans, and create a future. The app **Even** came along offering a Silicon Valley–style solution to this problem, in the form of, naturally, a **phone app**. It would **smooth the spiky incomes of working-class people, for a fee**. The initial plan was to sell them a service, costing \$260 a year, that squirreled away some of their money when they made more than the usual, and then in weeks when their pay fell short supplemented it with some of what was squirreled away. Say you made \$500 a week on average, but with considerable swings. In a week when you earned \$650, \$500 would go to your regular bank account and \$150 would be deposited into your virtual Even account. In a week when you earned \$410, \$500 would be placed in your bank account

NATIONAL BEST SELLER

WINNERS TAKE ALL

The ELITE CHARADE of CHANGING the WORLD



ANAND GIRIDHARADAS

“Does its introduction **lessen the pressure for collective action**, either private collective action like unions or public collective action like social movements?”

“It would be a sad irony if a great new Band-Aid headed off the major surgery—**expanded unemployment insurance, paid family leave, unions and new union alternatives, and so on**—that an insecure citizenry so desperately needs.”

- This app fails to address the cause of extremely variable paychecks: Silicon Valley’s gig economy,

The examples go on and on.. 😊

Airbnb leads to median rent increase, promotes gentrification: study

A new study funded by a hotel workers union finds that by taking some housing offline and increasing demand for long-term rentals, Airbnb has directly lead to an increase in the city's median rent

Study: Uber and Lyft Caused U.S. Transit Decline

By Angie Schmitt | Jan 22, 2019 |  121 COMMENTS

The Problem with the “Designification” of Health Care

A wave of service providers and clinics is using catchy branding and interior design to attract patients frustrated with old-guard medical facilities. But is further commodification of health care the answer?

by [Kyle Chayka](#)

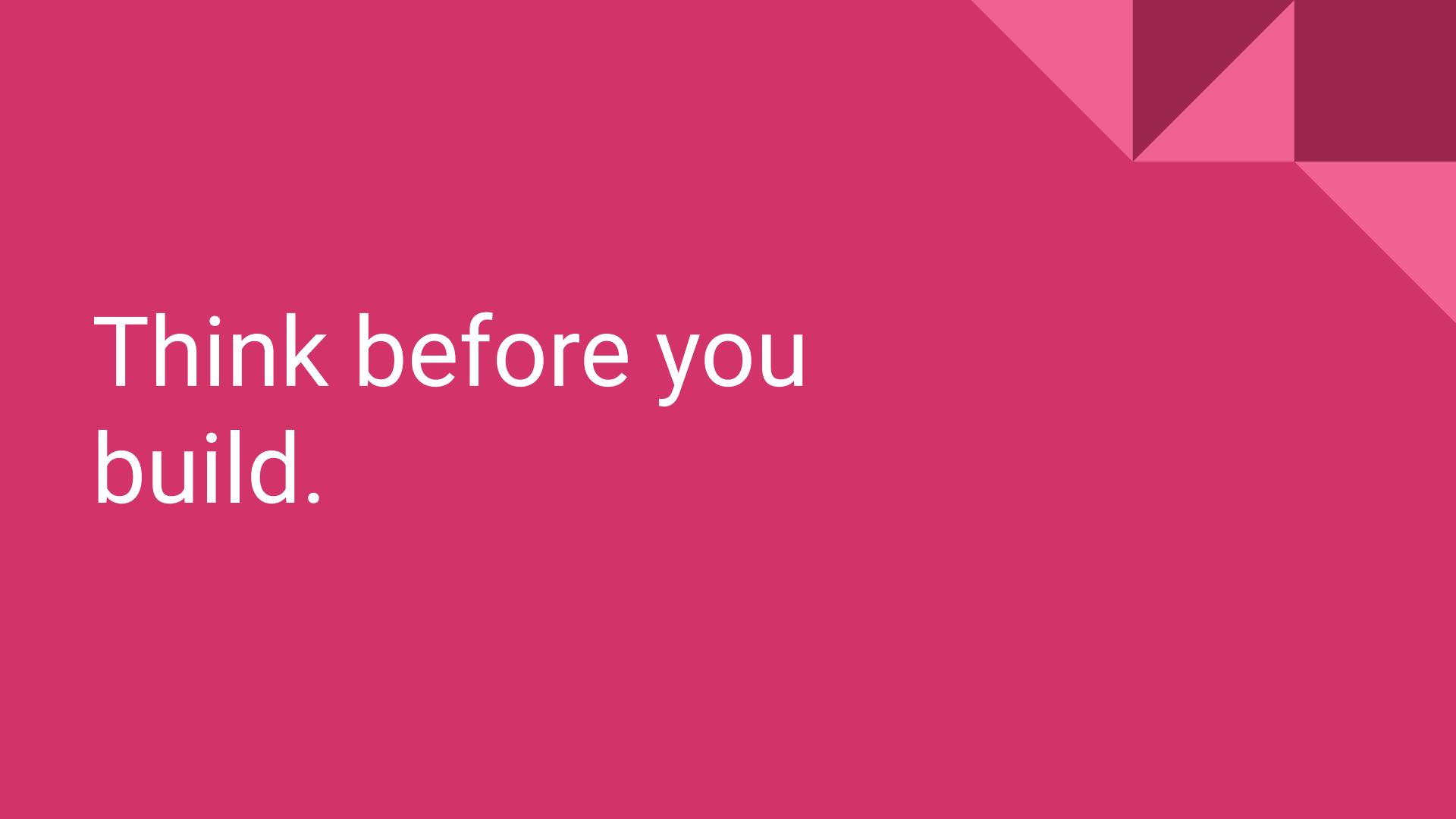
October 15, 2019

Our Role in the Tech of the Future





Safety and ethics are **inherent** to computer science and studying these topics should be *foundational*.



Think before you
build.



Don't be complicit.
Be the change.
Put your values first.

Getting Involved at Stanford: Classes

- CS 109: Introduction to Probability for Computer Scientists
- CS 152: Trust and Safety Engineering
- CS 181(W)/CS 182: Computers, Ethics, and Public Policy

Getting Involved at Stanford: Internships, Fellowships, Alternative Spring Breaks

- Civic Digital Fellowship
- Public Interest Tech Design Lab
- Stanford Computational Policy Lab
- CS+Social Good
- Code the Change
- **ASBs:**
 - Capital or Community? Housing Inequality in the Bay Area
 - Digital Government in California (Allison helped teach this)
- and more!

Examples!

Will be posted to the CS106A website soon! 😓

Questions?

Slides will be shared on course website!

Bias in Tech Recruiting

Grace Hopper

- Events like grace hopper seek to boost representation in the system and **putting a bandaid on the problem**



Resumes/Interviews/Job Listings

<https://blog.interviewing.io/your-ideal-interview/>

<https://medium.com/@rachel29f35431987/what-i-learned-about-hiring-women-when-i-was-hired-into-a-technical-role-1000000>

<https://www.wired.com/2013/03/hiring-women/>

Corporate Performative Activism amidst #BLM

Very small changes in diversity #s

Show linkedin post!



Laura Silva • 2nd
Vice President, Global Tech and Ops - Accessibility Technology UX Design...
1d • Edited • 

To the companies, I am not applauding your [#blacklivesmatter](#) post.

I want to see a picture of your Executive Leadership Team and company board.
[I want to see your HR sanctions against micro-aggressions](#)

Bryce Roberts @bryce • May 30

If you're an investor, founder or manager in tech wondering what you can do to effect change, here's the uncomfortable answer:

Make the hire. Write the check.

Don't host a dinner. Don't weigh in on a panel. Don't change your profile picture.

Make the hire. Write the check.

80 1.6K 5.7K 

Diversity training won't fix it

There are effective diversity initiatives, but Silicon Valley relies heavily on diversity trainings with no proven return on investment. The diversity industry is estimated to be worth \$200 billion, at least \$8 billion of which goes to diversity trainings.¹³ An estimated 43 percent of U.S. organizations report using diversity trainings, and nearly all Fortune 500 companies do so.¹⁴ Yet despite the fervor for these trainings, research indicates that the majority are ineffective or counterproductive. Studies show that they have no significant effects on individual attitudes toward racial or gender groups.¹⁵ As Harvard University and Tel Aviv University professors Frank Dobbin and Alexandra Kalev explain, while in the short term, most people learn to provide politically correct responses to questions about bias, in the long term, they “forget the right answers” and report increased animosity toward other groups following these trainings.¹⁶ Moreover, Dobbin and Kalev found that five years after establishing mandatory diversity trainings for managers, the proportion of white women, black men, and Hispanics in management positions remained stagnant, while the proportion of black women and Asian Americans decreased.

Despite this research, a multitude of companies in Silicon Valley have deployed diversity trainings for their staff because the trainings are, among other things, novel, and often—as in the case of unconscious bias trainings—blameless.¹⁷ Regardless of the mechanism, the results are the same: Tech companies’ expensive diversity trainings to decrease bias do not positively affect the diversity of their workforces. Similarly, providing the training should not bolster a company’s assertions that their recruitment and retention policies are nondiscriminatory in their effects. Money would be better spent investing in programming that has a proven track record of success, such as creating diversity plans and establishing and funding diversity initiatives to be carried out through diversity managers or diversity councils



A **tech savior** complex in the Valley

- Rhetoric of predominantly white VCs: BUILD and DISRUPT. This mindset can impact disadvantaged communities negatively.
- Optimization is a huge theme in software engineering. **But any type of optimization is going to disenfranchise people, because it is optimal to design for the majority.**