Fullstack Academy

Ethics in Engineering

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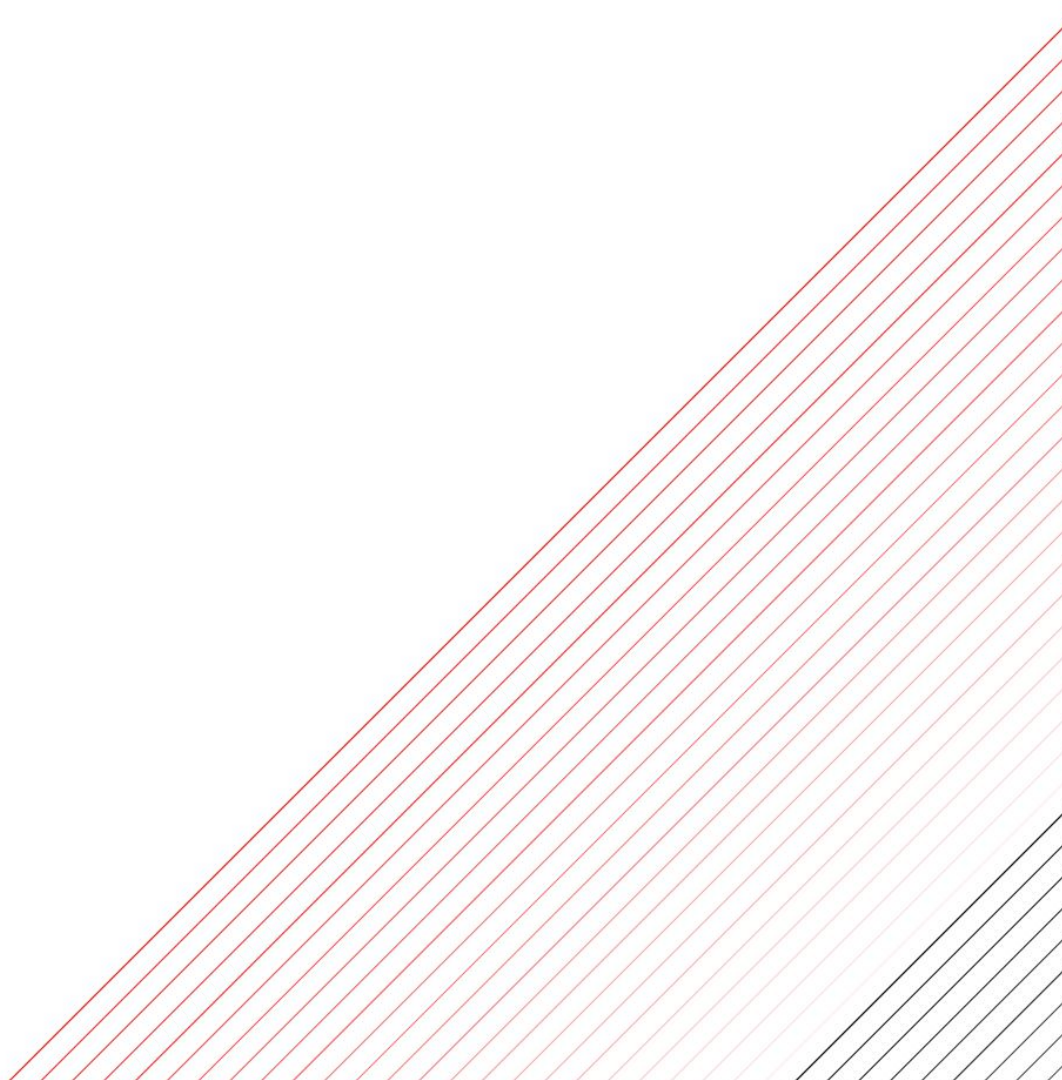


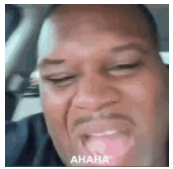
Fullstack Community Norms

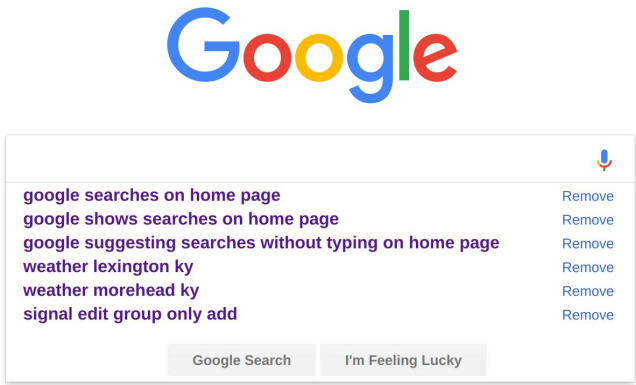
- No NSFW content: When in doubt, leave it out
- No subtle-isms or not-so-subtle-isms
  - Micro/Macroaggressions are ***not*** tolerated at FSA/GH
- Ask questions!!
  - There are no ‘dumb’ ones!
- Be patient with yourself and others
- Trust the process
- Help others
- Teach others

How do Ethics Professors Greet Each Other?

“What’s Good?”

sorry





What is YOUR definition of ethics?

Ethic

- A set of moral principles, especially ones relating to or affirming a specified group, field, or form of conduct.
- Relating to moral principles or the branch of knowledge dealing with these.

Morals vs Ethics

What are the differences?

showHistory();

- First codes of engineering ethics were formally adopted by American Engineering societies in 1912
- In 1946, the National Society of Professional Engineers adopted their first formal *Canons of Ethics.*
- ABET began formally requiring the study of engineering ethics in all accredited programs:
  - “Engineering programs may demonstrate that their graduates have an understanding of professional and ethical responsibility”

Why are we talking about this?

compareProfessions();

- Mechanical/Civil/Electrical engineers build things like cars, rockets, and bridges, full of *human life*.
- Medical or legal professional also just deal with people directly.
- SWEs build lines of code!!
- How can the ethical responsibilities possibly compare?

compareProfessions();

- How many cars or rockets are made today that don't depend of critical software for their operation?
- How can you build a bridge without computer powered simulation software?
  - Its incredible hard to calculate expected load, geophysical strain, material strength etc..
- Failure of any of these critical softwares will result in death or injury just as easily as a missing bolt.

uniqueConsiderations();

- What makes a modern day Software Engineer role unique?
- Software has a short life cycle
  - At fullstack we create 3 massive projects in just 6 short weeks
  - Shortened life cycles result in weakened review processes
- Software Engineers have the incredibly rare ability to deploy code directly to users.
  - I can build a malicious application and send it to thousands of users all on my own
  - Not common, but NPM packages are one way to do this
- Compare this timeline to a civil engineering project
- Creating a new highway can take years or even decades
- My local highway repair has been going on for longer than it took to build the empire state building.

aboutEthics();

- Ethical obligations can be split into two dimensions
  - Personal
  - Professional
- Personal
  - Makes sure we take full responsibility for our moral choices and their consequences
- Professional
  - When serving the public, a personal code is not enough.
  - Professional ethics are where you learn about how ethical standards apply to your work
    - Honesty, Integrity, Compassion, Fairness

askQuestions();

- To whom are SWEs obligated to by their professional ethics?
- NSPE's paramountcy clause asks that engineers recognize their primary duty is to "hold paramount the safety, health, and welfare of the public".
  - Who exactly is this public? It can't simply be 'everyone'
- How do we work responsibly as an engineer in the public interest?
- Each group has its own unique wants, needs, and will be impacted by things in completely different ways.
- We may have special responsibility to certain members of the public that exist parallel to the more general obligations to the world around us.

showStakeholders();

- Ethicists often use a concept to clarify public obligations by defining a specific set of stakeholders
- Stakeholders are people that are potentially impacted by a set of actions
- Some stakeholders will have more investment than others
- EX:
  - I'm a SWE working on code for a pacemaker.
  - Obviously the person using the device is the primary stakeholder as it controls their very lives.
  - This stake is so ethically significant that it is hard to see how other stakeholders interests could supercede.

showStakeholders();

- In *most* situations, there are a variety of stakeholders that are potentially impacted
- Often, interests will not always align.
  - Employer may be interested in cost cutting and on-time delivery
  - Others may be more interested in having a high quality and reliable product
- These may not always align, but often there is more nuance.
  - Consumers want a high quality and affordable product, overlapping with the desires of both stakeholders
  - Employer wants a reputation for product excellence, which costs more and takes more time to produce.

caseOne();

- On June 9th 2011, the Google Doodle honored guitar legend Les Paul.
- Users found this doodle particularly exciting
- A third-party org, RescueTime, estimated that 5.3 Million hours were spent playing this game across all users.
- 5.3 Million hours is equivalent to roughly eight ***lifetimes***
- What could you do with 8 full lives? How much power would that bring? What responsibilities do you have when taking that much time from a person's life?

caseOneQuestions();

- Who are the stakeholders that are impacted by this?
- Did this doodle make a positive contribution to the world?
  - How can we make this determination?
- Is this designed for inclusivity?
- Do we cross any cultural barriers/issues?
- Do Google engineers have the obligation to consider these before releasing the feature?

caseTwo();

- Rachel is a young lawyer with an extremely stressful schedule.
- She needs an application that can help her organize her time better and found Errand Whiz.
- This app will tell Rachel what route to follow based on time and distance between each store to accomplish her errands in the least amount of time.
- Her data, including her home address and the stores she shops from, are stored in a server.
- The app also encourages Rachel that she needs to log in through Facebook and they have made a deal to use this information to third-party advertisers to target Facebook ads.

caseTwoQuestions();

- Who are the stakeholders that are impacted by this?
- What ways could Rachel, or any user, potentially be harmed by this application?
  - Can you think of a scenario?
- From your list of harms, what are the ethical failings on the part of the individuals that developed Errand Whiz?
- How could the developers prevent these harms?
  - Are they obligated to prevent them?

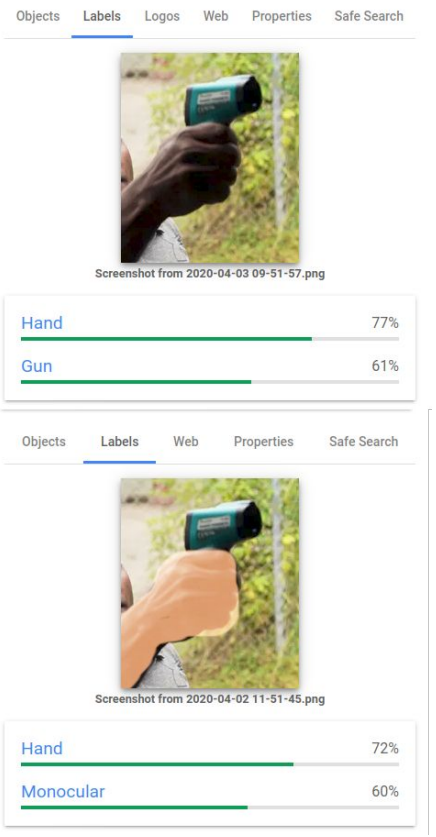
caseThree();

- Google Vision is a pre-trained AI that detects photos of human features, items, understand texts, and more.

Google Cloud Vision

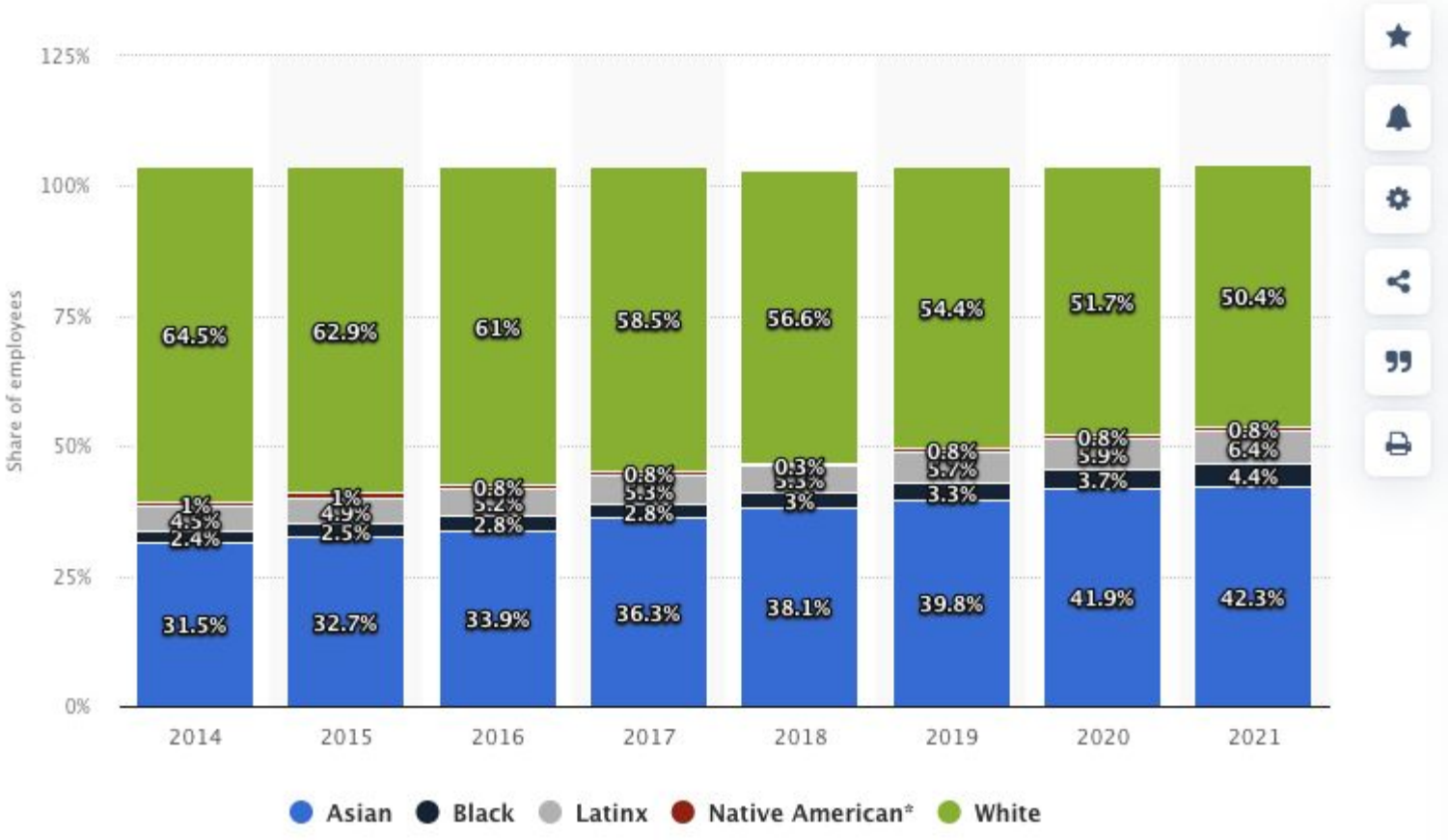
caseThree();

- Recently in April 2020, Algorithm Watch showed the AI two images, a dark-skinned individual holding a thermometer to read someone's temperature and another with the same image but with the hand painted to be light-skinned.
  - Instead of classifying the first image as "hand" and "monocular" like the second image, it classified the image as "hand" and "gun".



caseThreeQuestions();

- Who are the stakeholders that are impacted by this?
- What are the real-world consequences of AI?
- How could've Google, or any company, prevented this issue from happening while in development?



askYourself();

- How will you reconcile your ethical values with a company that doesn't?
  - How will it impact the world around you?
- The salary, benefits, and the people you work with all sound great, but does the company go against what you believe in as a human being?
- What are some ways you could solve an ethical problem?

practiceHabits();

1. Self-Reflection and Examination
2. Look for Moral Exemplars
3. Exercise Moral Imaginations
4. Acknowledge Your Own Moral Strengths
5. Seeking Company of Other Moral Persons

furtherReading();

- Reading
  - I'm harvesting credit card numbers and passwords on your site
  - An Introduction to Software Engineering Ethics
  - Engineering Ethics Case Study - Challenger Disaster
  - Nicomachean Ethics - Aristotle
- Video
  - John Oliver - Facial Recognition
  - Ethics in the Age of Technology - Juan Enriquez - TEDxBerlin
  - The Three Big Ethical Concerns with Artificial Intelligence

resources();

SCU Reading

Algorithm Watch

TED Talk