

Integrating Responsibility Into Computing

1st December 2021
Oliver BONHAM-CARTER
Computer Science
Integrative Informatics



ALLEGHENY
COLLEGE

Developing Tools



How to build this?





Completing a Task



How to get this?





ALLEGHENY
COLLEGE

Push It In?





ALLEGHENY
COLLEGE

Maybe a Shoe?





ALLEGHENY
COLLEGE

Maybe a Rock?





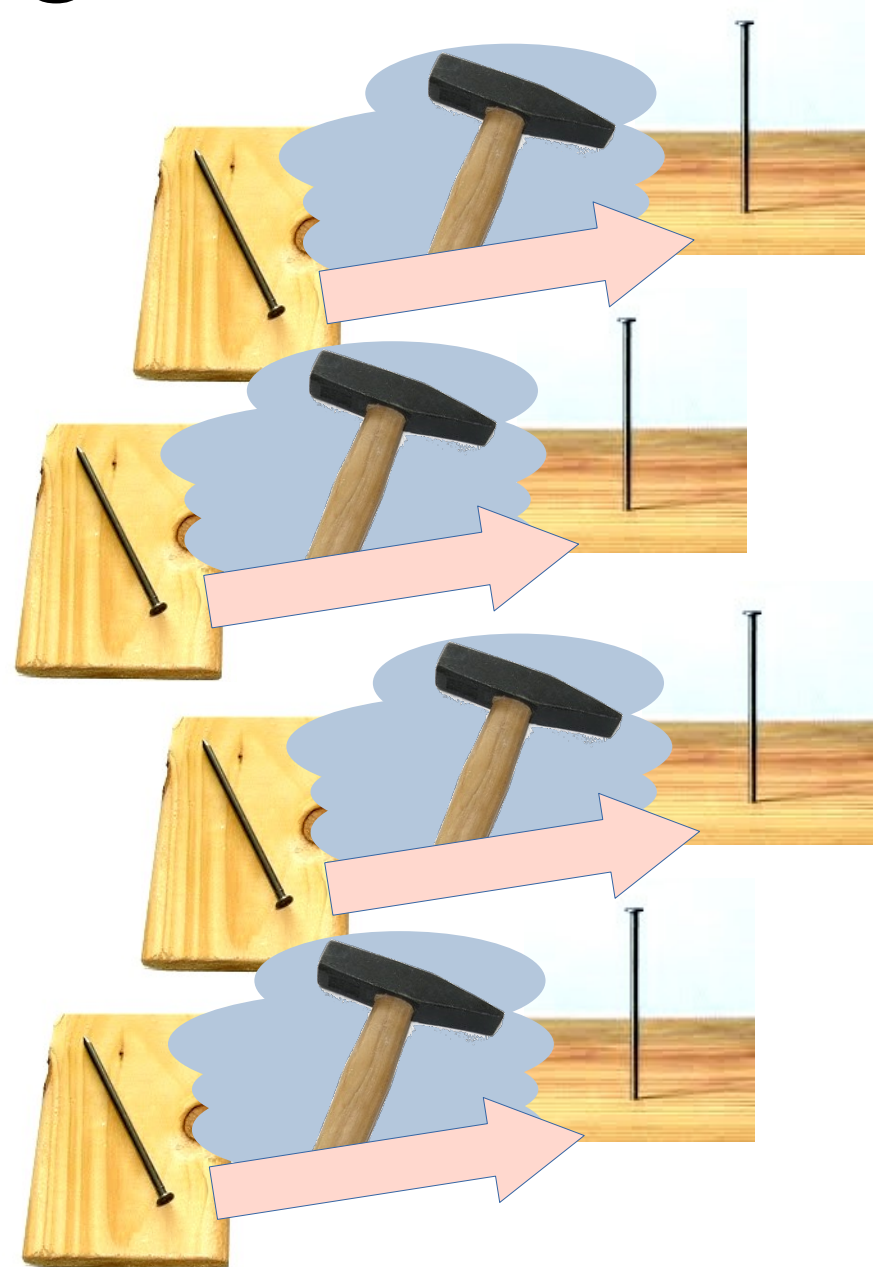
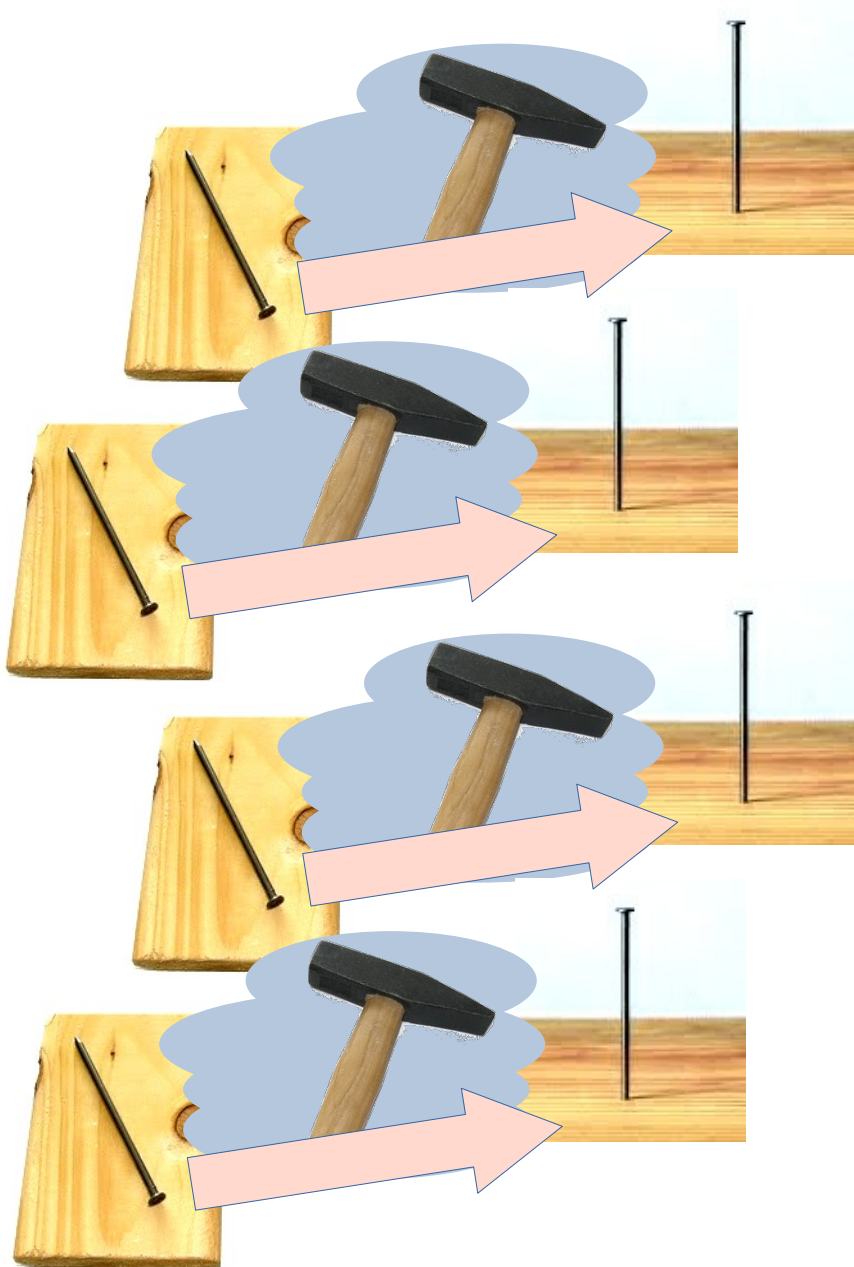
ALLEGHENY
COLLEGE

Maybe a Hammer?





Automating a Task





ALLEGHENY
COLLEGE

An Even Better *Tool*



An automatic hammer!

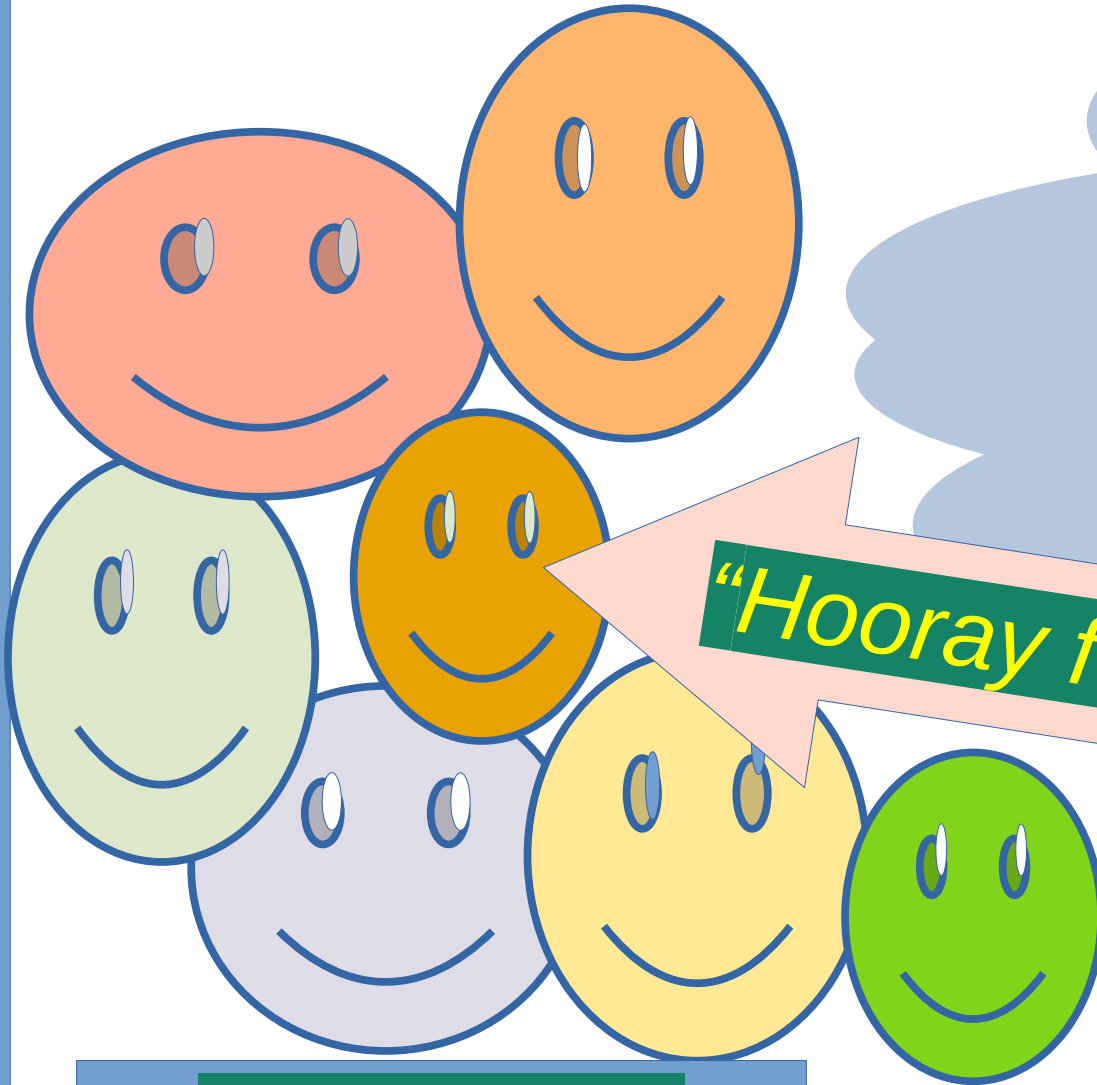


ALLEGHENY
COLLEGE

Hammers Always Help!



"Hooray for Hammers!"



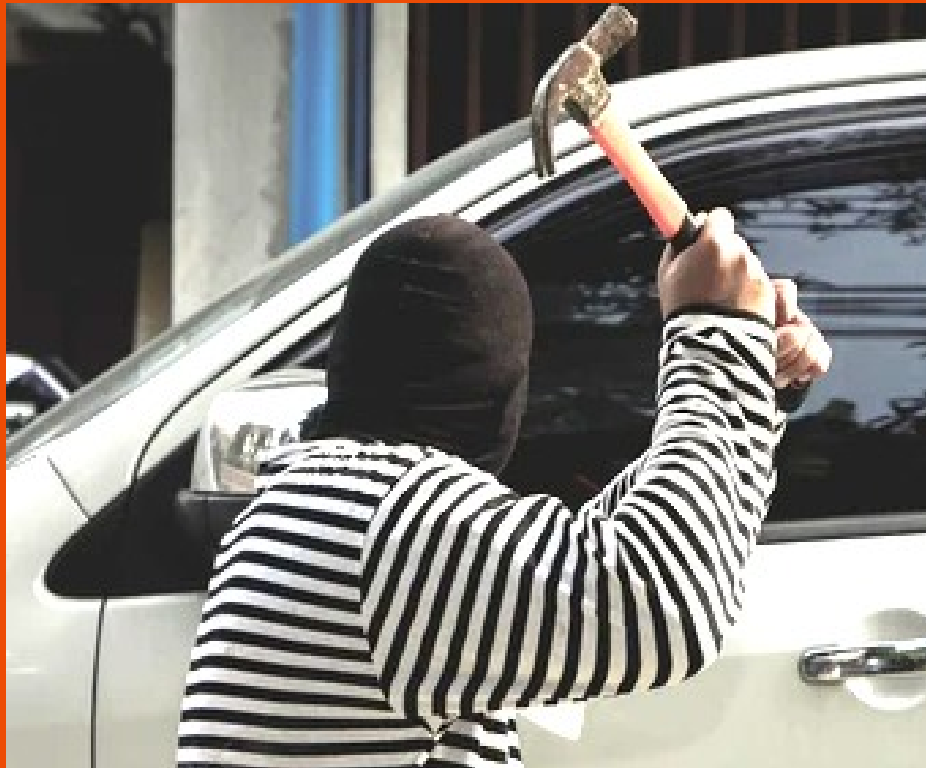
Community





ALLEGHENY
COLLEGE

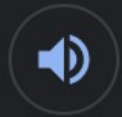
Always Helpful!?



Unfinished business with the first hammer design?



Let's Talk Technology



tech·nol·o·gy

/tek'näləjē/

noun

the application of scientific knowledge for practical purposes, especially in industry.
"advances in computer technology"

- machinery and equipment developed from the application of scientific knowledge.
"it will reduce the industry's ability to spend money on new technology"
- the branch of knowledge dealing with engineering or applied sciences.

Definitions from Oxford Languages



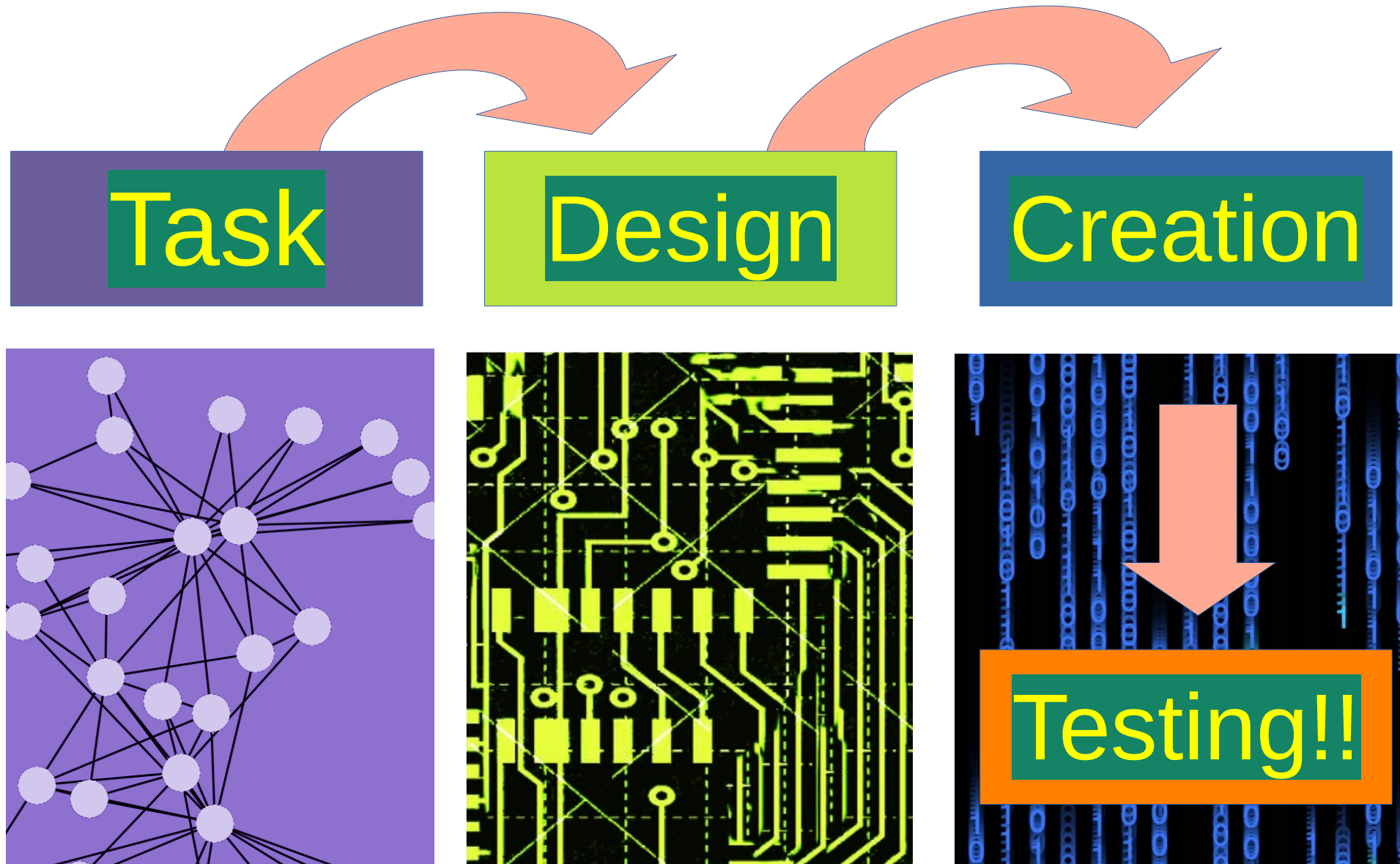


Let's Talk Technology

What could
possibly go *wrong*?



Design of Technology





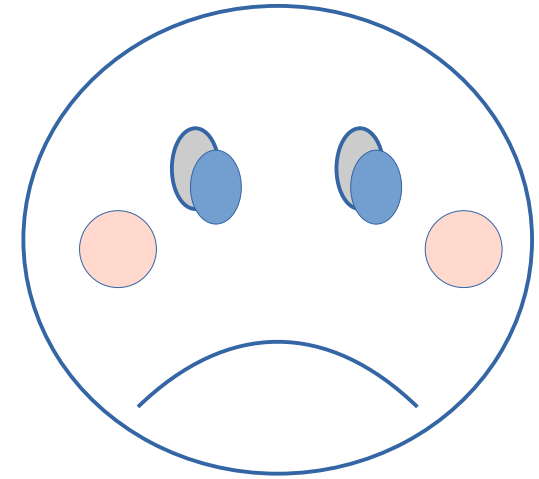
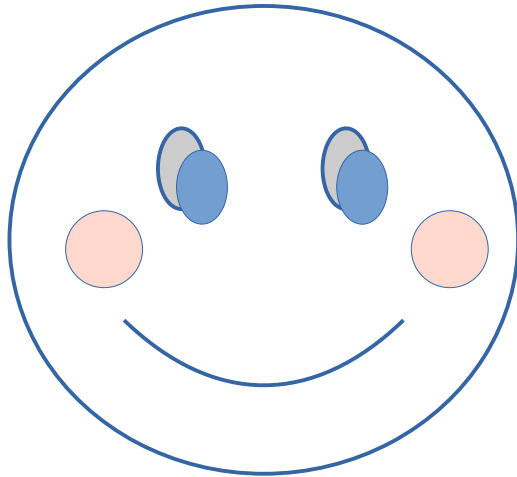
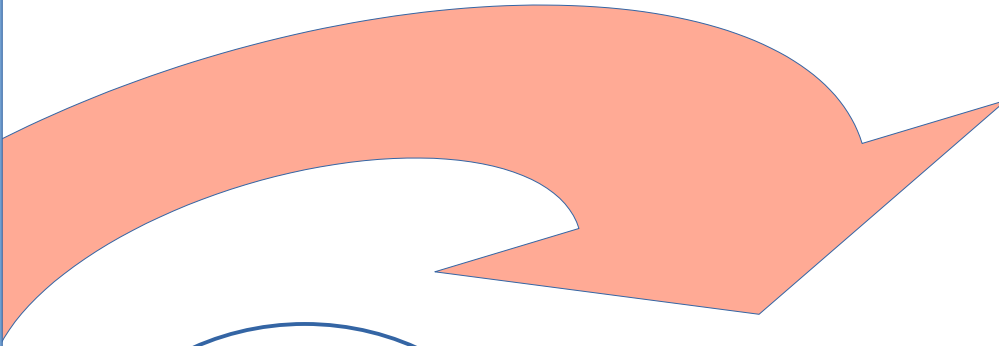
ALLEGHENY
COLLEGE

Software Solutions (At Last!)





Unintended Consequences



(Use / Misuse?)

Technology in the News

More parents using GPS to track children but experts warn there could be consequences

By [Melanie Vujkovic](#)

Posted 3 Apr 2019, updated 3 Apr 2019

EDUCATION

Privacy Experts Say The Trade-Offs Of Tech To Track Kids In School Aren't Worth It

August 26, 2019 · 4:22 PM ET
Heard on [All Things Considered](#)

TEEN MONITORING

The Best Teen Monitoring Apps Every Parent Needs

🕒 JANUARY 13, 2020 👤 ALEXANDRU TANASE

The New York Times

Is Snooping on Teenagers Ever O.K.?





ALLEGHENY
COLLEGE

Technology in the News

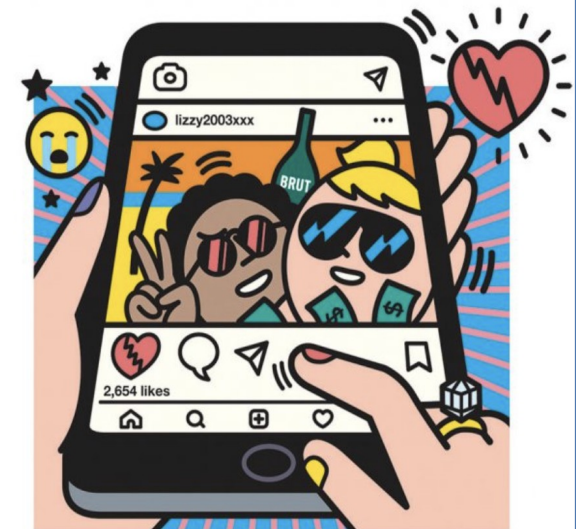
Artificial Intelligence Mar 4

China's social credit system stopped millions of people from buying travel tickets



L.A. Kids and Instagram Anxiety: "Social Media Is Destroying Our Lives"

9:45 AM PDT 8/18/2017 by Stephanie Chan



POLICY / US & WORLD / TECH

EU should ban AI-powered citizen scoring and mass surveillance, say experts

New recommendations have also been criticized as lacking enforceability

By James Vincent | Jun 26, 2019, 7:30am EDT



Responsible Computing

*It is not enough to simply know what software can do.
We must also know what software should and should **not** do.*

Privacy
concerns?

How
developed?

Principles,
practices,
conduct?

Who
designs?

Who
uses?

How
used?



Developing Tech Responsibly

Consider this ...

What implications on society and specific types of populations (bias)?

Long-term impacts?

How to develop tech for others to help?

What types of regulation of technology to pursue?

When to rethink and redesign old tech?

What else am I missing?!



Responsible Computing?

Dr. Timnit Gebru



- AI computer scientist

Fired from Google in 2020 for research implying bias appears in AI from its training data

Many within the scientific community question the ethics of conducting research with big technology companies.

Applications and
deployment

Design, Development,
And Training

Developer Belief
System and Bias

Chaos Prevention Dept

Education with Care



How to forge
responsible
developers
and safer
computer
use?



Mozilla Foundation



*The internet is a global public resource that
must remain open and accessible*

THE MOZILLA MANIFESTO

<https://foundation.mozilla.org>

moz://a



ALLEGHENY
COLLEGE

Responsible Computer Science Challenge

Responsible Computer Science Challenge

With Great Code Comes Great Responsibility

a partnership of



OMIDYAR NETWORK



SCHMIDT FUTURES

Craig Newmark Philanthropies

*“Responsible technology follows
from lessons of responsibility
in CS pedagogy.”*



General Goals for CS Undergraduate Pedagogy

Conceptualization,
development,
and piloting of
curricula with
CS ethics

Integrating ethics
with undergraduate
CS training



Develop engineers who bring holistic
thinking into the design of technology products.



Resp CS Challenge First Stage





ALLEGHENY
COLLEGE

Resp CS Challenge Partners

Allegheny College
Bemidji State University
Bowdoin College
Columbia University
Georgetown University
Georgia Institute of Technology
Harvard University
Miami Dade College
Northeastern University

Santa Clara University
University of California, Berkeley
University of California, Davis
University at Buffalo
University of Colorado, Boulder
University of Maryland, Baltimore County
University of Utah
Washington University



Resp CS Challenge Resources



- **Global Community of Practice**
- An expanding global community of academics, researchers, industrial practitioners and more
- Focus on integrating social responsibility and ethics into CS pedagogy with the aim to support a cross disciplinary group of people



- **Teaching Responsible Computing Playbook**
- On the execution of integrating ethics in computing pedagogy at different institutions
- Content: getting started, convincing academic leadership, partnering with other faculty members, hiring and supporting a teaching team, grading, and more

Allegheny College

Two Stages

Stage 1

- **PI:** Oliver Bonham-Carter
- Janyl Jumadinova
- Greg Kapfhammer

Stage 2

- **PI:** Oliver Bonham-Carter
- Janyl Jumadinova
- Greg Kapfhammer
- Doug Luman
- Maria Kim





Main Efforts: Stage 1

Application Courses

- Data Analytics
- Web Development
- Bioinformatics
- Artificial Intelligence
- Robotic Agents
- Database Systems

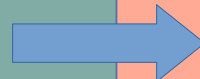


Pedagogy

- Syllabi
- Class activities
- Labs with responsible themes
- Readings, discussions

Open Source Software

- Coding
- Algorithm study



GitHub repository

17 publicly released projects for pedagogy

<https://github.com/Allegheny-Ethical-CS>

(Click me to see more!)



Examples of Themes and Topics

Machine Learning

- Facial recognition bias – gender and race
- Fake news detection – Twitter feed analysis
- Predictive wellness – health and fitness data

Data Analytics

- Vaccine efficacy analysis – Mumps and measles
- Inferences of user behavior– handedness prediction
- Misinformation analysis – mutations of information

Bioinformatics

- Privacy – personal gene materials
- Escape 2020 – Simulation of Covid-19 spread

Database Systems

- Data security – Hacking into database
- Medical data privacy – designing secure databases
- Data storage – What type of data to store in DBs

Robotics

- Ethical robots – engineering ethics into a robot design
- Human assistive robotics – implications of data gathering for AI



RSE Feedback

Concerning ethics in classes ...

- *“I like that the professor always makes us think about the ethical aspects of our products in every lab. ”*
- *“I really like how we were introduced to ideas about ethics related to our data analytics work.”*
- *“I never thought about the implications of my programming and the tools I developed before taking this class. A totally awesome and eye opening moment for me!”*



Towards Building Culture and Proactivity in Programming

- **Student involvement**
 - About 20 students
 - TLs: Technical leaders
 - (E)TLs: TLs who help with ethics programming projects to teach responsible use
- **Feedback from all students**
 - Climate surveys: How to make a more inclusive learning environment?
 - Code of conduct: Principles for interactions in courses
- **Conscientious development**
 - Correct, efficient, documented software
 - Proactive programming by Dr. Kapfhammer



<https://proactiveprogrammers.com/>



Teaching Software for Evaluation

GatorMiner

A visualized text
mining and
analysis tool for
reflection
documents.

Welcome to TextMining!

Choose the data retrieving method

Local file system

Enter path(s) to documents (separate by comma)

resources/combined/lab1, resources,

Select assignments below:

assignment-01 X

assignment-02 X

Choose the analysis mode

Frequency Analysis

Home

Frequency Analysis

Sentiment Analysis

Document Similarity

Summary

Topic Modeling

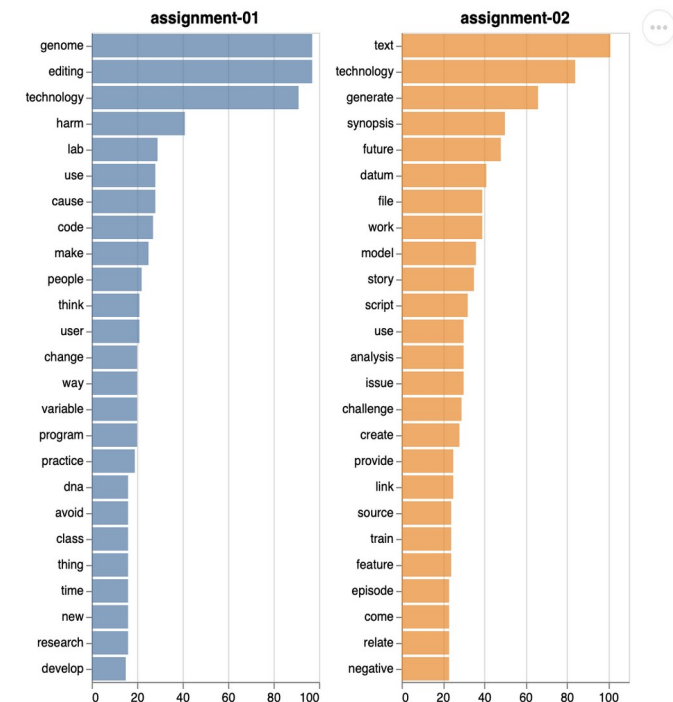
Interactive

Select the number of plots per row

3

Frequency Analysis

Overall most frequent words in **assignment-01**
assignment-02





ALLEGHENY
COLLEGE

Allegheny College

Stage 2 (in progress until May 2022)

To spread and scale the Allegheny Ethics CS Initiative beyond our College

Main goals

- To expand our curriculum of ethics in CS beyond our application courses (Intro courses starting in Fall 2021, Maria Kim, Doug Luman and Greg Kapfhammer)
- To expand and distribute our code of conduct exercises and the course climate surveys to create a more inclusive learning environment
- To create publicly accessible media to enhance our developed course material
- To develop targeted media strategies to disseminate our content to a wider community.



ALLEGHENY
COLLEGE

Allegheny College

Stage 2 (in progress until May 2022)

*To **spread** and **scale** the Allegheny
Ethics CS Initiative beyond our College*

Upcoming events (Spring 2022)

- Live streaming on social media such as YouTube
- GLCA collaborations to engage with our work
- Mozilla Foundation's MOZ-Fest participation
- Release of YouTube videos and podcasts



ALLEGHENY
COLLEGE

Reaching Out

If you would like to learn more
or work with us, let's talk!

Email: obonhamcarter@allegheny.edu

Web: oliverbonhamcarter.com

Questions?