



**Schaefer School of  
Engineering & Science**

# CS 485: Societal Impacts of Information Technology

Fall 2018  
Prof. Eric Koskinen



# About Me

- Associate Professor of Computer Science
- Previously worked at Yale and NYU
- PhD in C.S. from University of Cambridge (UK)
- Software Engineer at [amazon.com](#) / IMDb
- Worked at Microsoft Research, IBM TJ Watson Research



# My Research

- Software Correctness/Reliability
  - Automatically check that software is correct
- Software Security
  - No side-channels
- Formal Methods - Logic, Proof, Semantics
- Programming Languages
- Concurrency



# Search

are is correct

- Theorem 4.1.** If  $\Gamma \vdash e : \sigma$ , then  $e \in \llbracket \rho(\Gamma) \vdash \rho(\sigma) \rrbracket$  for any predicate substitution  $\rho$  with  $\text{dom}(\rho) = \text{fpv}(\Gamma) \cup \text{fpv}(\sigma)$ .
- Formal Methods
  - Programming Languages
  - Concurrency

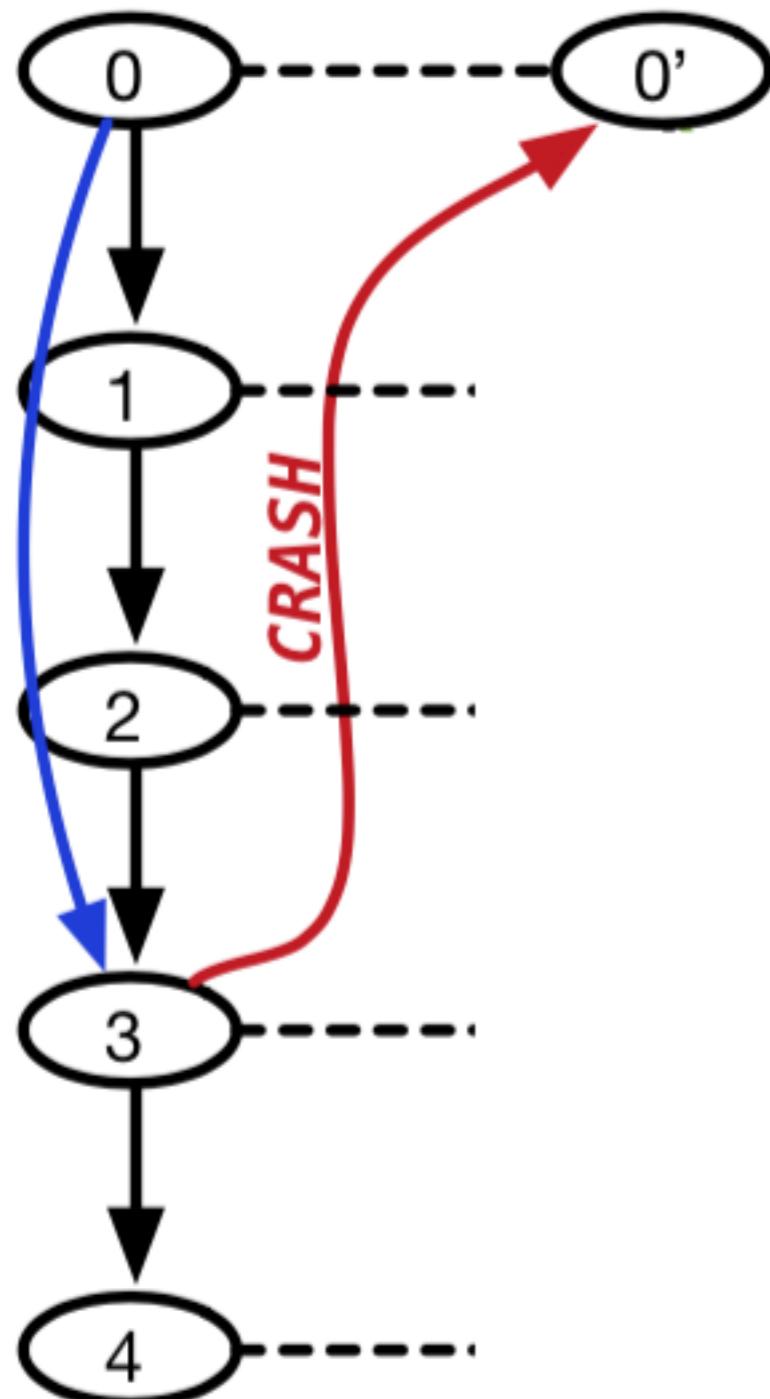
$$\frac{\psi = \psi}{\vdash \psi} \text{ Fp-VALID}$$
$$\frac{\vdash \psi' \Rightarrow [(\lambda \tilde{x}.\psi')|X]\psi \Rightarrow \psi' \quad \vdash C^-[[\tilde{t}/\tilde{x}]\psi']}{\vdash C^-[(\mu X(\tilde{x}).\psi)(\tilde{t})]} \text{ Fp-LFP}^-$$
$$\frac{\vdash \psi' \Rightarrow [(\lambda \tilde{x}.\psi')|X]\psi \quad \vdash C^+[[\tilde{t}/\tilde{x}]\psi']}{\vdash C^+[(\nu X(\tilde{x}).\psi)(\tilde{t})]} \text{ Fp-GFP}^+$$
$$\frac{\vdash \psi' \Rightarrow [(\lambda \tilde{x}.\psi')|X]\psi \quad \vdash C^+[(\mu X(\tilde{x}).\psi)(\tilde{t})] \quad \vdash \text{WF}(p_1) \quad \vdash \text{WF}(p_2)}{\vdash C^+[\neg p_1(\tilde{t})] \quad \vdash \text{WF}(p_2)} \text{ Fp-LFP}^+$$
$$\frac{c(\psi) \quad \vdash C^-[\neg p_1(\tilde{t})]}{\vdash (\neg \tilde{x}).\psi(\tilde{t})} \text{ Fp-GFP}^-$$



rch

# are is correct

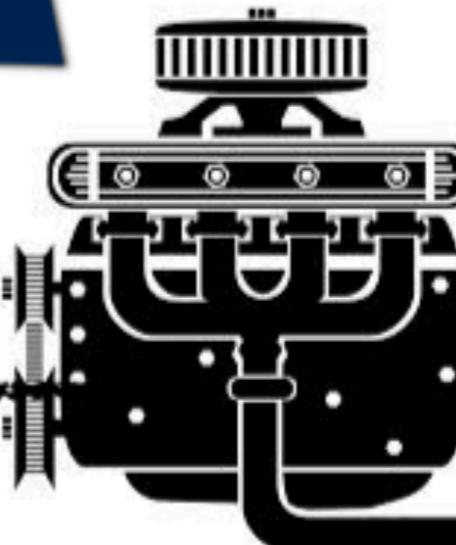
then  $e \in \llbracket \rho(\Gamma) \vdash \rho(\sigma) \rrbracket$  for any predicate  
 $= fpv(\Gamma) \cup fpv(\sigma)$ .



- A diagram consisting of a vertical line on the left with three black dots above it. To the right of the line is a downward-pointing arrow. Below the arrow is an oval containing the number 4. A dashed line extends from the right side of the oval to the right edge of the slide.

```
int cur = open("passwd");
char *buf = read(cur, MAX_BUF);
close(cur);
if(¬strnstr(buf,newUser,length(newUser)) {
    // add newUser
    int new = creat("passwd.new");
    ...
    copy(cur,new);
    write(new,newUser);
    write(new,newPassword);
    close(new);
    fsync(new);
    unlink("passwd");
    rename("passwd.new","passwd");
}
cur = open ("passwd");
buf = read(cur, MAX_BUF) .
```

Eleven  
**82**



counter-  
example





# CS 485

- **Societal**
  - *relating to society or social relations.*
- **Information Technology**
  - *the study or use of systems (especially computers and telecommunications) for storing, retrieving, and sending information.*







A cartoon illustration of a man with brown hair and a light blue button-down shirt, looking thoughtful with his hand on his chin. He is positioned in front of a dark background containing several computer monitor icons. One monitor on the left shows a red screen with a large white exclamation mark inside a circle and the text "UNIDENTIFIED NEWS SOURCE". Another monitor to the right shows a brown screen with a large gray question mark. In the foreground, there is a small black monitor icon with a gray exclamation mark inside a circle.

UNIDENTIFIED  
NEWS SOURCE

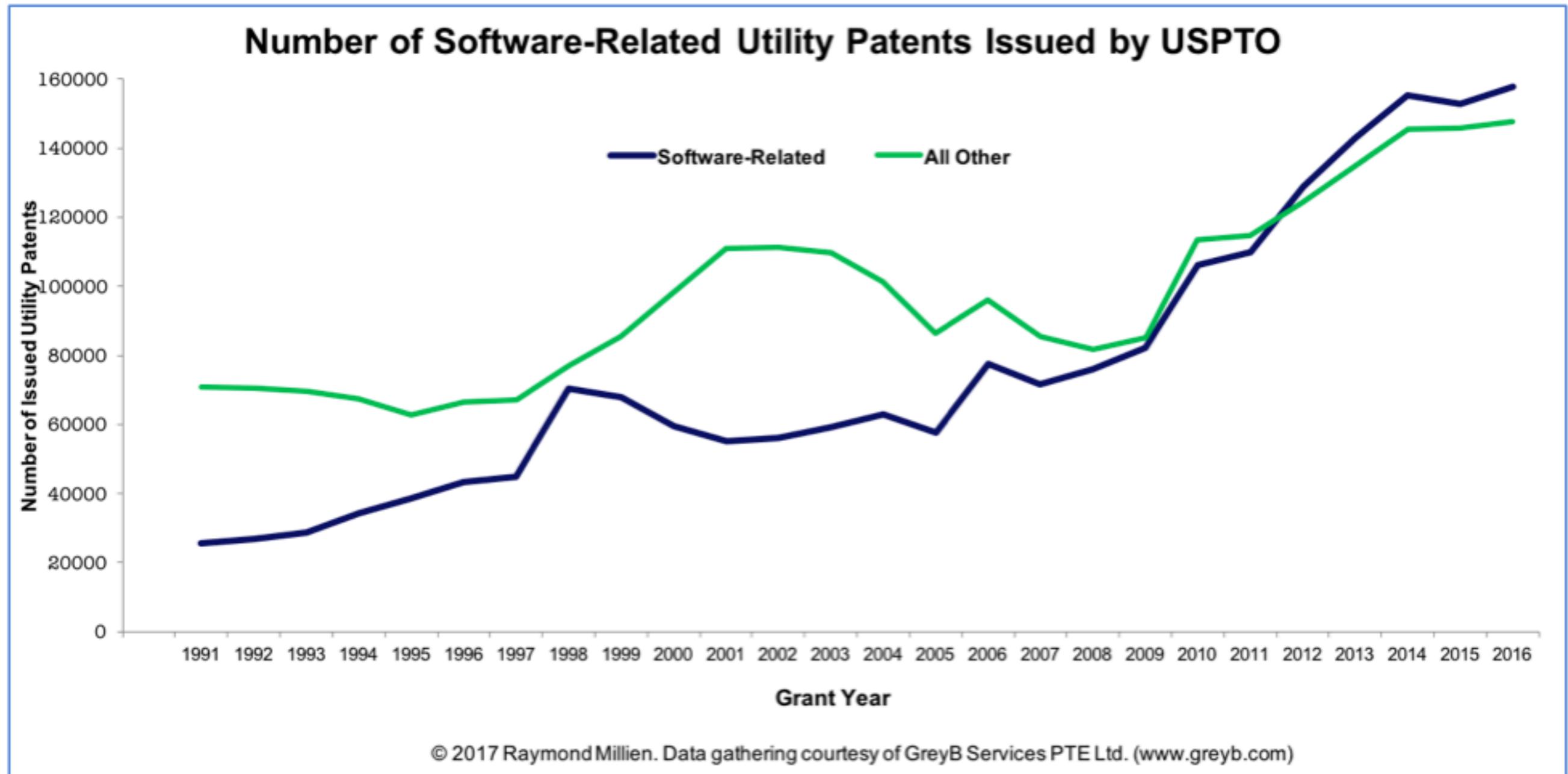






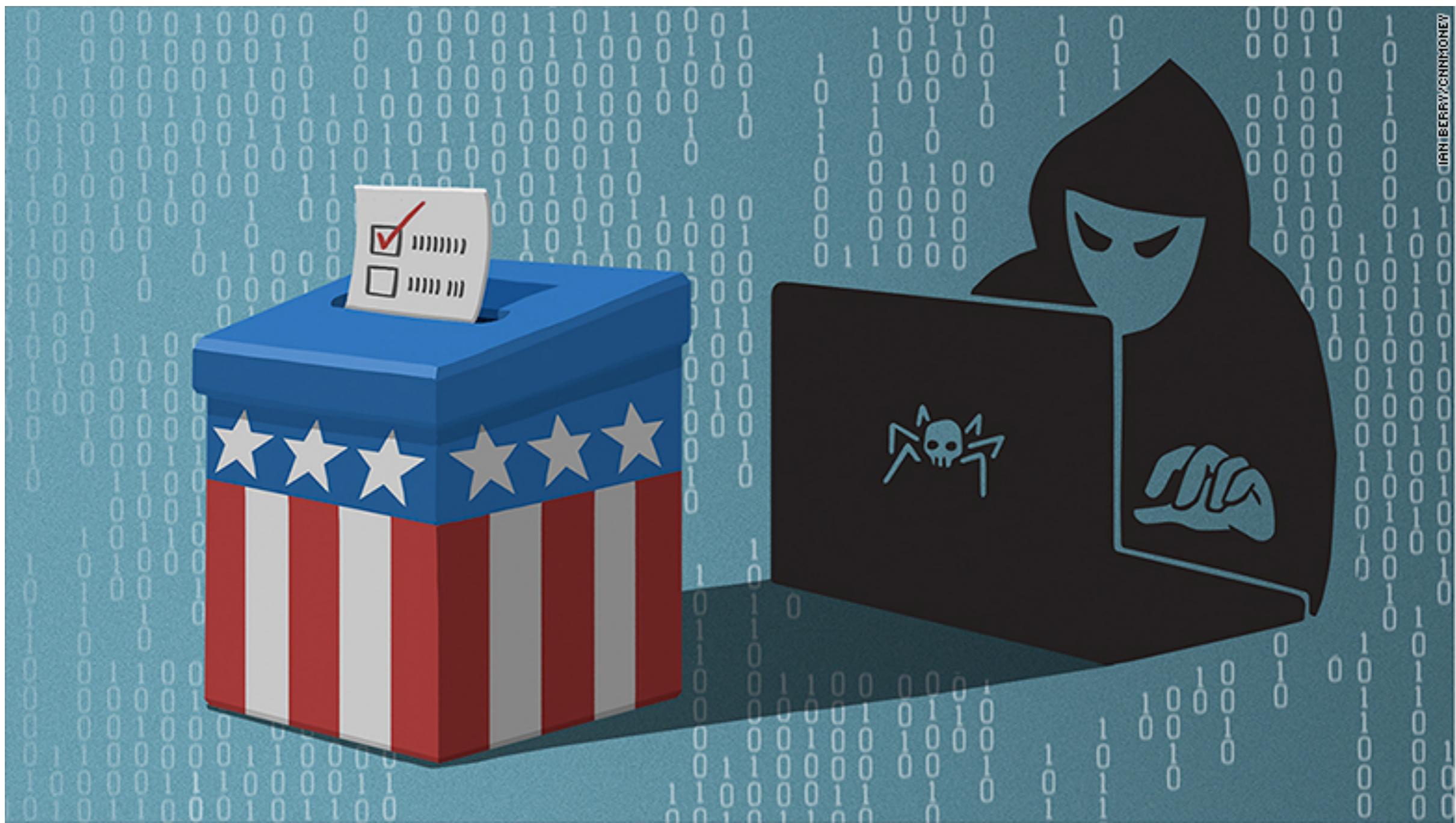


# Software Patents



<https://www.ipwatchdog.com/2017/05/21/alice-over-half-u-s-utility-patents-issued-annually-software/id=83367/>





JANIE BERRY/CNN/MONEY



# Not planning to work on voting machines?



# NEWS

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## VW engineer jailed for emissions scandal

⌚ 25 August 2017 | [Business](#)

     Share

A former Volkswagen engineer who helped develop a device that enabled cars to evade US pollution rules has been sentenced to more than three years in prison and ordered to pay \$200,000.

James Liang, 63, was the first person prosecuted in the emissions scandal.

The US investigation has led to charges against seven others in the US and sparked probes in other countries.

Volkswagen has admitted guilt, agreeing to spend as much as \$25bn to address US claims.

Liang co-operated with prosecutors, who argued that his help with the investigation warranted a reduction in the possible punishment to three years in prison and a \$20,000 fine.

But US District Court Judge Sean Cox opted for a harsher penalty of 40 months and a \$200,000 penalty, saying he wanted to send a message to others in the car industry.



# More Sample Topics

- Biometric readers
- The sharing economy
- When is it OK to take people's pictures?
- Unexpected effects of social media
- Unexpected effects from the ease with which information can spread
- Mission and activities of the Electronic Frontier
- Retail electronic payment systems
- Economic models for information and information-based services
- Online anonymity
- Should Internet access be a fundamental human right?

# Still More Sample Topics



- Software patents
- Software licensing
- Internet governance
- Internet culture clash
- Privacy implications of mining big data
- High frequency trading
- Video game streaming
- Telemedicine
- GPS spoofing
- The Turing test
- Internet shaming
- Uber surge pricing
- The right to be forgotten.

# Even More Sample Topics



*Governments blocking communication apps*

*Digital Rights Management and W3C decision*

*TOR and Anonymous Web Browsing*

*Equifax Security Breach*

*Drive-by mining*

*Facial Recognition for Surveillance*

*Self-Driving Trucks and the Trucking Industry*

*Facebook Manipulation of User Feed*

*Image Recognition and Sexuality*

*Net Neutrality*

*Self Driving Cars and Accidents*

*Federal regulation of cryptocurrencies*

*Biases that are consciously or unconsciously built in to AI and Algorithms*

*Data Privacy across International Borders*

*Medical Technology & Privacy*

*Artificial Super-intelligence*

*Facial Recognition at Airports and Immigration*

*SESTA Act and Policing the Internet*



# I Want You to Succeed

- How should we organize this class?
- Here's a possible syllabus.
- At end of class, propose alterations, etc.
- Ratify.



# Syllabus



# Final Essay Due Date

- Changed to November 28.
- (As requested by the Office of Undergraduate Academics)



# Example Presentation

For next week:

1. Read: [https://www.bbc.com/news/  
business-41053740](https://www.bbc.com/news/business-41053740)
2. Prepare ***one question*** to ask in class  
about the article.



# Groups

Date	Group	Topic	Article
Aug 30		Welcome, Syllabus, Groups	
Sep 6		VW Emissions Scandal and S.W.E.	<a href="#">BBC</a>
Sep 13	1		
Sep 20	2		
Sep 27	3		
Oct 4	4		
Oct 11	5		
Oct 18	6		
Oct 25	7		
Nov 1	8		
Nov 8	9		
Nov 15	10		
Nov 22		No class - Thanksgiving	
Nov 29	11		
Dec 6	12		



# Groups

- Raise your hands to see each other.
- Say your name, say something about yourself.
  - Awesome summer activity/event?
  - How many steps you took yesterday?
  - Favorite meal to cook or eat?
  - Dream job? Dream hobby?



## ▼ Presentation Group B1

4 students

Jennifer Cafiero	⋮
Daniel Salerno	⋮

⋮	⋮	⋮
⋮	⋮	⋮

⋮	⋮	⋮
⋮	⋮	⋮

## ▼ Presentation Group B2

3 students

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

## ▼ Presentation Group B3

3 students

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

## ▼ Presentation Group B4

3 students

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

## ▼ Presentation Group B5

3 students

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

## ▼ Presentation Group B6

3 students

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

⋮	⋮
⋮	⋮

ate	Group
Aug 30	
Sep 6	
Sep 13	1
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Oct 25	7
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Nov 8	9
Nov 15	10
Nov 22	
Nov 29	11
Dec 6	12



## ▼ Presentation Group B7

3 students

Graham Howard

David Ovsiew

Philip Vitale

## ▼ Presentation Group B8

3 students

Evan Bedser

Ryan Edelstein

Min Park

## ▼ Presentation Group B9

3 students

Harkirat Kang

Edward McFarlin IV

Brianne Tollo

## ▼ Presentation Group B10

3 students

Jeffrey McGirr

Louis Rozencwajg-Hays

Chenyu Zhao

## ▼ Presentation Group B11

3 students

Robert Herley IV

Isaac Hirschfeld

Mitra Modi

## ▼ Presentation Group B12

3 students

Benjamin Iofel

Jacob Manzelmann

Qiuan Wu

e	Group
Aug 30	
Sep 6	
Sep 13	1
Sep 20	2
Sep 27	3
Oct 4	4
Oct 11	5
Oct 18	6
Oct 25	7
Nov 1	8
Nov 8	9
Nov 15	10
Nov 22	
Nov 29	11
Dec 6	12



# Next Steps

- **Everyone.** Read VW article. Prepare question.
- **Group 1.** Pick an article today/tomorrow and meet with me Thursday.
- **Group 2.** Start picking an article and planning to meet me next Tuesday.
- **Other groups.** Start to think about articles.



# Contact

- Meet everyone during group meetings
- [eric.koskinen@stevens.edu](mailto:eric.koskinen@stevens.edu)
- Typically don't check my email on the weekend.
- Respond in about 24/48 hours
- Office Hours - See Canvas
- Before/After class



# End