Introductions

• Name, background
• Interest in security
• What you hope to learn, or better understand, at the end of this module
Today’s Class

1. Module introduction
2. Presentation and discussion: *Reflections on Trusting Trust*
3. Video and discussion: *Chip and PIN is broken*
4. Presentation and discussion: *Experimental Security Analysis of a Modern Automobile*
5. Brief summary of next week: Usable security
Welcome!

• *Seminar-style* research readings module
• **R209: Computer Security: Principles and Foundations** (Michaelmas)
  – History, discourse, methodology, and themes
  – Topics include adversarial reasoning, access control, usability, inference control, …
• **R254: Cybercrime** (Lent)
  – Interdisciplinary perspective
  – Focus on key debates, research and policy
  – What cybercrime is, how it is regulated, policed, detected, and prevented
• Ambitious scope, limited time
Prerequisites

Goal: Transition from *simplistic factual* understanding to *research engagement* with core debates, intellectual history, methodology, and evolution of the field

- Undergraduate degree in computer science
  - Or similar education/experience
  - Basic background in computer security
  - Also beneficial: OS, networking, programming languages…

- Some topics familiar, but cast as *research* not *fact*
- Other topics will not [yet] be widely taught
Brushing up on computer security


Seminar-style teaching

• Preparation for research and development
  – Trace intellectual history
  – Study evolving vocabulary, discourse, and methodology
  – Discuss, learn from, and challenge methodological and narrative aspects of the research
  – Appreciate (+critique) research as published -- and various styles of academic analysis and presentation
  – Consider contemporary implications; contrast with original research context
  – Discuss future research directions
• 6x sessions: Student-led presentation + discussion
• 1x session: Small-group discussions of the essays
• In-person, with remote attendance via Zoom possible for anyone isolating. No recordings.
Presentation weeks (6x)

Each presentation week you will:

1. Critically read three original papers/reports

2. Submit synthesis essays across all readings (unless presenting)  
   - or -  
2. Present and lead discussion on a specific reading

3. Participate in classroom discussion of the readings

(Guest PhD students, postdocs in the class will present papers but not submit essays)
Class structure (presentation weeks)

- Weeks 3-8
- 3x 15–to–20-minute student presentations (do not run shorter/longer!)
- 3x 15–to–20-minute student-led discussions
- Discussions are cumulative: pull ideas forward as we look at later papers
Essay discussion weeks (1x)

In week 2 you will:

1. Critically read three original papers/reports

2. Submit synthesis essays across all readings

3. Participate in classroom discussion of the readings and essays, first as smaller groups, and then as a single large group
Class structure (essay discussions)

- Week 2 only
- Introductions to the week; distribute essays to others
- Read the essays from others in group
- Group discussion at 14:45
- Reconvene at 15:25 as a large group for discussion
- Closing remarks
Assessment

• One presentation or essay a week
  – R209: Seven total (none today)

• Marking
  – 10 marks per assessed essay or presentation
  – Lowest mark each term will be dropped (usually the first)
  – Remaining scores scaled to a total out of 100

• Department heavily penalizes late submissions
  – Instructors cannot grant extensions
  – Contact the graduate education office as early as possible
WEEKLY ESSAY
Synthesis Essays

- **Synthesis writing** reports, organizes, and interprets the works of others
  - Not an original research paper!
  - More a series of short answers than an actual essay
- Your essays **will** have the following section headings:
  1. Summaries of readings (1-2 para/reading)
  2. Three key themes spanning papers (1 para/theme)
  3. Ideas in our contemporary context (2 para)
  4. Brief literature review (2 para)
- All essays **must** include a bibliography
- Word limit (1,250) enforced (excl. bibliography)
- See Assessment page on module website
Notes on essay marking

• 10 divided equally across four sections plus 2 marks for overall delivery (quality of writing, …):

  0   failed to submit
  1-4  seriously lacking
  5-6  poor or (minimally) adequate
  7-8  good
  9-10 strong or exceptional

• First essay will likely have a lower mark than you hope
• If so, it will probably be dropped as the lowest
Essay Submission

• Deadline 12:00 on the Friday before we meet
• Submit via Moodle
• Bring discussion questions to class and be prepared to ask (and answer) them
• Marks/comments returned via Moodle
• We attempt to return essays to you within two weeks, but sometimes this is not possible
Weekly Presentations

• 6 sessions, 3 talks/session, **15-20 minutes each**
  – You will present at least once per term
  – No essay due for classes where you present
  – Do not run much shorter or longer than 17 minutes!
  – 10 marks per presentation; similar criteria to essays

• Initial presentation schedule has been e-mailed
  – If you like, you can exchange presentation slots…
  – Both students must agree; let us know in advance
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Paper</th>
<th>Presenter</th>
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<tr>
<td>24 Oct</td>
<td>Access Control</td>
<td>Bell &amp; LaPadula (1973)</td>
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<td>Wagner &amp; Tribble (2002)</td>
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<td>Watson (2013)</td>
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<td>Klein et al. (2009)</td>
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<td>Bessey et al. (2010)</td>
<td>rm2084</td>
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<td>31 Oct</td>
<td>Correctness v. Mitigation</td>
<td>Davis et al. (2019)</td>
<td>ots28v</td>
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<tr>
<td>7 Nov</td>
<td>Inference Control</td>
<td>Adams &amp; Wortmann (1989)</td>
<td>zw420</td>
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<td>Dwork et al. (2006)</td>
<td>qz312</td>
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<td>Narayanan &amp; Shmatikov (2007)</td>
<td>dgk27</td>
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<tr>
<td>14 Nov</td>
<td>Adversarial Reasoning II</td>
<td>Razavi et al. (2016)</td>
<td>dg612</td>
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<td>Bond et al. (2014)</td>
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<td>Kocher et al. (2019)</td>
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<td>van Eeten et al. (2010)</td>
<td>at2008</td>
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<td>Vasek &amp; Moore (2015)</td>
<td>jp862</td>
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<td>28 Nov</td>
<td>Passwords</td>
<td>Morris &amp; Thompson (1979)</td>
<td>psjm3</td>
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<td>Adams &amp; Sasse (1999)</td>
<td>zyj20</td>
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<td>Bonneau et al. (2012)</td>
<td>mcf61</td>
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Presentation Structure

• Prepare a teaching- or research-style presentation
  → What motivated the work?
  → What are the key ideas?
  → How were scientific ideas evaluated?
  → Critique the argument/evaluation
  → Compare to related research – especially other readings
  → Consider current-day research and applications
  → Prepare for adversarial Q&A – defend the work

• Don’t just follow paper outline
• Slides without pictures (e.g., this one) are uninspiring!
Your Presentations

• You will present with slides
  – Slides will be in PDF format – no fancy animations
• Submit slides no later than 12:00 on the Monday:
  – Submit slides via Moodle
  – Failure to prepare or submit will be heavily penalized due to disruption it will cause
• Usually presented in syllabus order
Class Discussion

• Presentation weeks: Roughly half of each two-hour class is set aside for discussion
• Essay discussion week: All discussion

• Bring discussion questions to class and be prepared to ask (and answer) them
• No explicit marks for participation…
  – … but presenters are rewarded for interesting discussion, so mutual benefit to participating!
READING
About the Readings

• Original research papers or early surveys
  – Highly cited and/or first appearance of key ideas
• Questions to consider (in advance)
  – Why have the authors done this work?
  – Has it aged well? Are the ideas used today?
  – How would we attack the system they propose?
  – What methodology do the papers use: Science? Engineering? Mathematics? How does this affect the style, evaluation, etc.?
  – Why did we pick this paper and not another?
  – Is there a retrospective piece?
How to Read (a Lot)

• Read strategically
  – Plan ahead for the time it takes to read and digest papers
  – Skim in the first pass to decide what is important
  – Take notes in moderation
  – With practice, you will get much faster at reading papers

• As you read, highlight ideas that answer key questions:
  – Framing/motivation of the paper
  – Key ideas that influenced the paper / related work
  – Key contributions of the paper – and their implications
  – Evaluation approach, limitations
  – Common themes and ideas across the papers

• See Keshav’s “How to Read a Paper”, CCR 2007
ADMIN THINGS
Module E-mail and ‘Hangers On’

• We will e-mail reading and schedule updates, clarifications, room changes, etc. there!
  – We will use your CRSid (via a class mailing list)
  – If you are not registered, but are sitting in, please e-mail alice.hutchings@cl.cam.ac.uk

• Recurring guests (e.g., PhD students, RAs) will be asked to present 1-2 times during the term
Module Website

• Reading list, marking criteria, etc. found here: https://www.cl.cam.ac.uk/teaching/2223/R209/

• Look at the ‘Materials’, ‘Assessment’ pages
# R209 Weekly Meetings

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<tr>
<th>Date</th>
<th>Topic</th>
<th>Convener(s)</th>
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<tbody>
<tr>
<td>10 Oct</td>
<td>Adversarial Reasoning</td>
<td>Anderson, Watson, Hutchings</td>
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<td>17 Oct</td>
<td>Usable Security</td>
<td>Hutchings</td>
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<tr>
<td>24 Oct</td>
<td>Access Control</td>
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<td>Inference Control</td>
<td>Anderson</td>
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<tr>
<td>14 Nov</td>
<td>Adversarial Reasoning II</td>
<td>Anderson</td>
</tr>
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<td>21 Nov</td>
<td>Security Economics</td>
<td>Anderson</td>
</tr>
<tr>
<td>28 Nov</td>
<td>Passwords</td>
<td>Hutchings</td>
</tr>
</tbody>
</table>
How to Reach Us

ross.anderson@cl.cam.ac.uk
robert.watson@cl.cam.ac.uk
alice.hutchings@cl.cam.ac.uk
Security Group Seminars & Meetings

• Seminars every Tuesday at 2pm
  https://www.cl.cam.ac.uk/research/security/seminars/

• Security group meetings every Friday at 4pm
  https://www.cl.cam.ac.uk/research/security/meetings/
QUESTIONS
TODAY’S READINGS