

## Interests

- Data privacy, security, user experience, accountability, causality, applied machine learning, HCI
- Broadly interested in technology-related opportunities with high user impact. Background in privacy from technical, policy and user-centric perspectives, worked at intersection of fields

## Education

- Sep 2015 **Carnegie Mellon University** (CMU), Pittsburgh, PA  
Ph.D./M.S., Electrical and Computer Engineering  
Thesis: *Interaction-aware Actual Causation: A Building Block for Accountability in Security Protocols*  
Advisor: Prof. Anupam Datta
- May 2009 **PEC University of Technology** (formerly Punjab Engineering College), India  
B.E., Electronics and Electrical Communication Engineering  
Graduated with Honors, amongst top 5 in the department (out of 60)

## Research and Industry Experience

- Feb 2017 – **Google**, Mountain View, CA  
Present Privacy Engineer
- Working with teams to find and solve technical and product privacy problems
  - Designing and building new infrastructure to make existing systems better and building privacy-related product features, shared libraries. Generalizing privacy solutions for scale
- Sep 2015 – **Thomson Reuters**, New York, NY  
Feb 2017 Technology Associate – Research and Technology Strategy  
The Technology Associate Program is a highly selective program for recent PhDs, focused on developing innovation and technology leadership within the company, and to influence technology leadership in making strategic decisions.
- *Technology Strategy/ Data Governance:*  
Leading the 'Privacy by Design' initiative for the entire company:
    - Organized workshop on best practices for 'privacy by design' for company's Privacy, Security and Information Architecture teams
    - Developed appropriate guidance for internal technical and business processes
    - Developed learning modules for product owners, developers and other technical roles
  - *Research and Development:*  
Leveraging big data analytics from social media for business units such as finance, news, legal:
    - Utilized machine learning algorithms to analyze large streams of Twitter data – user profiles, tweets, network information for 130,000 users
    - Developed domain classifier for Twitter verified accounts. Submitted work to top-tier conference in the field
    - Collaborated with multiple business units to develop feasible use-cases
  - Contributing to diversity and inclusion initiatives via internal and external collaborations/ events
- Aug 2009 – **Carnegie Mellon University**, Pittsburgh, PA  
Sep 2015 Graduate Research Assistant, Cylab, Department of Electrical and Computer Engineering
- Project: Accountability/ blame assignment for security violations*
- Formalized definition to find causes of violations in interacting systems
  - Analyzed failures of public key authentication protocols which use certificates
  - Combined viewpoints on causation from theoretical, philosophical, security and privacy-centric perspectives
- Project: Linking attacks*
- Identified background information and database characteristics that enable de-anonymization
  - Determined provable mathematical bounds showing extent of possible de-anonymization
  - Verified theoretical assumptions empirically on 'anonymized' Netflix database (~500,000 users)
- Project: Privacy of online records*
- Demonstrated empirically that cost of information retrieval is significantly lower online (for court records) as compared to physical records. Identified factors which contribute to differences
  - Evaluated the level of privacy protection provided by removal of 'Search by name' feature in Allegheny property assessment database through user studies

- Summer 2014 **Microsoft Research**, Cambridge, UK, Research Intern  
 ○ Demonstrated *information leakage* when multiple MapReduce cloud computations are performed on real datasets, e.g., census dataset with 2.5 million records. Developed a solution that mitigates composition attacks
- Summer 2013 **Symantec Research Labs**, Mountain View, CA, Research Intern
- Fall 2008 **D-ITET, ETH Zurich**, Switzerland, Guest Researcher

## Selected Honors and Awards

- 2015 – Present **Certified Information Privacy Technologist (CIPT)**, International Association of Privacy Professionals (IAPP)  
 Aug 2013 **Winner**, Symantec Graduate Intern showcase event
- 2009 – 2010 **Dean Tuition Fellowship**, awarded by Carnegie Institute of Technology, CMU
- 2005 – 2009 **Merit Scholarship** (full tuition waiver), PEC University of Technology, India. Awarded for academic excellence

## Refereed Publications (selected)

- Oct 2015 *Observing and Preventing Leakage in MapReduce*, with Olya Ohrimenko, Cedric Fournet, Manuel Costa, Christos Gkantsidis, Markulf Kohlweiss, in 22nd ACM Conference on Computer and Communications Security (**CCS**)
- Jul 2015 *Program Actions as Actual Causes: A Building Block for Accountability*, with Anupam Datta, Deepak Garg, Dilsun Kaynar, Arunesh Sinha, in Proceedings of 28th IEEE Computer Security Foundations Symposium (**CSF**)
- Jul 2014 *Actual Causes of Security Violations* (Extended Abstract), with Anupam Datta, Dilsun Kaynar, Arunesh Sinha, in Joint Workshop on Foundations of Computer Security and Formal and Computational Cryptography (**FCS-FCC**), affiliated with Computer Security Foundations (CSF)
- Jul 2012 *Sustaining Privacy and Open Justice in the Transition to Online Court Records: A Multidisciplinary Inquiry*, with Amanda Conley, Anupam Datta, Helen Nissenbaum, in 71 Md. L. Rev. 772 (**Maryland Law Review Journal**)
- Mar 2012 *Provable De-anonymization of Large Datasets with Sparse Dimensions*, with Anupam Datta, Arunesh Sinha, in ETAPS First Conference on Principles of Security and Trust (**POST**)
- Oct 2011 *I Know Where You Live: Analyzing Privacy Protection in Public Databases*, with Manya Sleeper, Lorrie Faith Cranor, in Workshop on Privacy in the Electronic Society (**WPES**) [Technical report: CMU-CyLab-11-015]

## Patents

- Aug 2015 *Data center privacy*, with Olya Ohrimenko, Cedric Fournet, Manuel Costa, Christos Gkantsidis, Markulf Kohlweiss (filed) (pending)

## Technical skills

Programming languages Python, Java, C (Prior experience)

Relevant courses Foundations of Security and Privacy, Cryptography, Designing Human Centered Systems, Privacy Policy/ Law/ Technology, Logic, Formal Languages

Tools Eclipse, IntelliJ, Version control (SVN, Git, Mercurial), L<sup>A</sup>T<sub>E</sub>X

## Professional Activities and Responsibilities (selected)

- Scholarship Review Committee, Grace Hopper Conference for Women in Computing, Mar 2017
- Program committee member, Tiny Transactions on Computer Science (Vol III, IV), 2015, 2016
- Reviewer, Journal of Computer Security, 2015
- External Reviewer for conferences in security and privacy (selected): CCS 2013 – 2014, IEEE Symposium on Security and Privacy 2013 – 2014, WPES 2012 – 2013, CSF 2012
- Research talks at top-tier security conferences (selected): CSF '15, FCS - FCC '14, ETAPS '12
- Research talks at MIT BigData@CSAIL Data Privacy series, Symantec Research Labs, Microsoft Research

## Leadership Positions and Extra-curricular Activities (selected)

- 2016 – Present **Technology diversity champion/ mentoring**, Thomson Reuters, NY: Organizing internal and external events to increase diversity in STEM fields. Mentor, CoderDojo
- 2015 – Present **Improv** training, Indian classical **dance** training
- 2013 **Vice President**, Indian Graduate Student Association, Carnegie Mellon University
- 2012 – 2013 **Organizer/ dance director**, Cultural event for Indian Graduate Student Association, Carnegie Mellon University
- Fall 2008 **President**, Les Amis, non-profit organization. Worked in several project teams and organized a multitude of events for college and school students in Chandigarh, India