



Daniel Smullen

Curriculum Vitae

*"Don't have good ideas if you aren't willing to be responsible for them."
—Alan Perlis*

Education

Est. 2021 **Doctor of Philosophy Candidate (Computer Science, Software Engineering)**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania.

Institute for Software Research, Committee: Norman Sadeh (Chair), Lorrie Faith Cranor, Alessandro Acquisti, Rebecca Weiss (External, Mozilla), Yaxing Yao (External, UMBC)



2018 **Master of Science (Software Engineering)**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania.

Institute for Software Research

2014 **Bachelor of Engineering (Software Engineering)**, *University of Ontario Institute of Technology*, Oshawa, Ontario, *Honours with Distinction*.

Academic Work Experience

2014 – Present **PhD Candidate**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Institute for Software Research.

2020 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Institute for Software Research.

17-781/45-887: Mobile and IoT Computing Services

2017 – 2019 **Research Advisor**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Institute for Software Research.

Mentor for 3 undergraduate research programmers and 1 masters student.

2016 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Institute for Software Research.

17-655/17-755: Architectures for Software Systems

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- 2013 – 2014 **Research Associate**, *University of Ontario Institute of Technology*, Oshawa, Ontario.
Software Quality Research Lab, Advisor: Jeremy Bradbury
- Investigated privacy in meta-data unknowingly released through Internet traffic, in an ethics board approved user study.
 - Investigated the software testing coupling effect using mutation testing tools and automation.
 - Research funded by NSERC/CRSNG (Canada).
- 2013 **Undergraduate Researcher**, *University of Ontario Institute of Technology*, Oshawa, Ontario.
Software Engineering Lab, Advisor: Ramiro Liscano
- Studied tinyOS-based wireless sensor networks, applying policy-based programming to create a new development environment (Policy IDE).
 - Developed remote development environments for embedded ubiquitous computing on tinyOS using IPv6.
 - Research funded by NSERC/CRSNG (Canada) Undergraduate Student Research Award.

Industrial Work Experience

- 2015 **334F Affiliate (Radar Science and Instrument Engineering)**, *NASA Jet Propulsion Laboratory*, Pasadena, California.
Supervisor: Razi Ahmed
- Developed a high-performance distributed radar image processing system.
 - Developed an efficient interferometry filtering algorithm; processing time was reduced from weeks to minutes.
 - Developed a portable implementation for heterogeneous computing platforms at NASA Ames high performance compute cluster (Pleiades) and commodity desktop hardware.
 - Deployed interferometry software in production radar applications for UAVSAR program.
- 2012 **Engineer in Training**, *SNC-Lavalin Global Information Technologies*, Toronto, Ontario.
- Conducted a reliability study on mission-critical data center systems.
 - Established new guidelines for disaster recovery and emergency response planning.
 - Conducted an infrastructure improvement planning study.
 - Developed a streamlined workstation staging infrastructure; deployment times reduced from hours to minutes.
 - Developed replacement systems for legacy DOS systems infrastructure.
- 2011 **Support Technician**, *SNC-Lavalin Global Mining and Metallurgy*, Toronto, Ontario.
- Provided dedicated technical support for high-value clients and senior executive management.
 - Conducted seminars on computer and network security, repair, open source software, and computer forensics.
 - Developed automated data recovery systems.
 - Performed high-risk data forensics and recovery on destroyed hardware.
- 2009 **Laboratory Systems Administrator**, *DESSAU, LVM-Technisol*, Toronto, Ontario.
- Managed migration and replacement of legacy laboratory information management systems.
 - Conducted field work in geotechnical engineering, subsurface sampling, concrete and asphalt QA/QC testing.
 - Performed in-situ quality testing on major airport and highway resurfacing projects.
 - Managed migration and integration of networks and computer systems during LVM-JEGEL company merger.

- 2009 **Laboratory Systems Administrator**, *John Emery Geotechnical Engineering Limited (JEGEL)*, Toronto, Ontario.
- Acted as liaison for City of Toronto special projects.
 - Managed 2009 Trans-Canada Highway Rehabilitation geoinformatics.
 - Managed 2009 Toronto Capital Works Program utility location and geotechnical subsurface sampling safety program.
 - Developed ISO 9001 certified laboratory information management software.
 - Performed debugging and repair of legacy pavement analysis embedded systems software.
 - Performed engineering, design and construction of a file storage and database systems datacenter.

Funded Research Projects

- 2020-2021 **Engineering Usable Privacy and Security Affordances For Notice and Choice**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: Defense Advanced Research Projects Agency, US Air Force Research Laboratory (FA8750-15-2-0277), National Science Foundation Secure and Trustworthy Computing program (CNS-15-13957, CNS-1801316, CNS-1914486)
- 2019-2020 **Design and Evaluation of Security and Privacy Nudges**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: National Science Foundation Secure and Trustworthy Computing program (CNS-1330596, SES-1513957, CNS-1801316)
- 2018-2019 **Internet of Things Privacy Infrastructure (Patent Pending)**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: Defense Advanced Research Projects Agency, US Air Force Research Laboratory (FA8750-15-2-0277), National Science Foundation Secure and Trustworthy Computing program (CNS-15-13957, CNS-1801316, CNS-1914486)
- 2017-2019 **DARPA Brandeis: A Privacy Assistant for the Internet of Things**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: Defense Advanced Research Projects Agency, US Air Force Research Laboratory (FA8750-15-2-0277), National Science Foundation Secure and Trustworthy Computing program (CNS-15-13957, CNS-1801316, CNS-1914486)
- 2017-2019 **The Usable Privacy Policy Project**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: National Science Foundation Frontier Grant on Usable Privacy Policies (CNS-1330596, CNS-1330141, CNS-1330214)
- 2017 **Mobile App Privacy Compliance System (Patent Pending)**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Norman Sadeh.
Funded by: National Science Foundation Frontier Grant on Usable Privacy Policies (CNS-1330596, CNS-1330141, CNS-1330214), National Science Foundation XSEDE: Extreme Science and Engineering Discovery Environment (ACI-1548562)
- 2016 **Eddy: A Privacy Requirements Specification Language**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, Advisor: Travis Breaux.
Funded by: National Science Foundation (CNS-1330596), US Office of Naval Research (N002441410028), National Security Agency
- 2015 **Non-local Interferometric Synthetic Aperture Radar Parameter Estimator**, *NASA Jet Propulsion Laboratory*, Pasadena, California, Advisor: Razi Ahmed.
Funded by: National Aeronautics and Space Administration JPL PhD Fellowship
- 2014 **Incident Recognition and Intelligence System (IRIS)**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Shahryar Rahnamayan.
Funded by: University of Toronto Intelligent Transportation Systems Laboratory, University of Ontario Institute of Technology, NSERC/CRSNG (Canada)

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- 2014 **Automated Marking System (AMS)**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Kamran Sartipi.
Funded by: University of Ontario Institute of Technology
- 2013 **Policy IDE**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Ramiro Liscano.
Funded by: NSERC/CRSNG (Canada)
- 2013 **TOSServ**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Ramiro Liscano.
Funded by: NSERC/CRSNG (Canada)
- 2013 **Finger2IPv6**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Ramiro Liscano.
Funded by: NSERC/CRSNG (Canada)
- 2013 **Military Logistics Management System (MLMS)**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Eyhab Al-Masri.
Funded by: University of Ontario Institute of Technology
- 2012 **sneakyFS File System**, *University of Ontario Institute of Technology*, Oshawa, Ontario, Advisor: Kamran Sartipi.
Funded by: University of Ontario Institute of Technology
- 2012 **Datacenter Utilization Research Study**, *SNC-Lavalin Global Information Technologies*, Toronto, Ontario, Advisor: Marc Ross.
Funded by: SNC-Lavalin

Refereed Publications

D. Smullen, Y. Feng, S. A. Zhang, and N. Sadeh, "The best of both worlds: Mitigating trade-offs between accuracy and user burden in capturing mobile app privacy preferences," *Proceedings on Privacy Enhancing Technologies*, vol. 2020, no. 1, pp. 195–215, 2020.

P. Story, D. Smullen, A. Acquisti, L. F. Cranor, N. Sadeh, and F. Schaub, "From intent to action: Nudging users towards secure mobile payments," in *Sixteenth Symposium on Usable Privacy and Security (SOUPS 2020)*, 2020, pp. 379–415.

S. Zimmeck, P. Story, D. Smullen, A. Ravichander, Z. Wang, J. Reidenberg, N. C. Russell, and N. Sadeh, "Maps: Scaling privacy compliance analysis to a million apps," *Proceedings on Privacy Enhancing Technologies*, vol. 2019, no. 3, pp. 66–86, 2019.

P. Story, S. Zimmeck, A. Ravichander, D. Smullen, Z. Wang, J. Reidenberg, N. C. Russell, and N. Sadeh, "Natural language processing for mobile app privacy compliance," in *AAAI Spring Symposium on Privacy-Enhancing Artificial Intelligence and Language Technologies*, 2019.

S. Wilson, F. Schaub, F. Liu, K. M. Sathyendra, D. Smullen, S. Zimmeck, R. Ramanath, P. Story, F. Liu, N. Sadeh, and N. A. Smith, "Analyzing privacy policies at scale: From crowdsourcing to automated annotations," *ACM Transactions On The Web*, vol. 13, no. 1, Dec. 2018.

A. Das, M. Degeling, D. Smullen, and N. Sadeh, "Personalized privacy assistants for the internet of things: providing users with notice and choice," *IEEE Pervasive Computing*, vol. 17, no. 3, pp. 35–46, 2018.

D. Smullen and T. Breaux, "Improving security in software acquisition with data retention specifications," 2017. [Online]. Available: <https://calhoun.nps.edu/handle/10945/58892>

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D. Smullen and T. Breaux, "Towards rapid re-certification using formal analysis," 2015. [Online]. Available: <https://calhoun.nps.edu/handle/10945/53561>

J. Bhatia, T. Breaux, L. Friedberg, H. Hibshi, and **D. Smullen**, "Privacy risk in cybersecurity data sharing," in *Proceedings of the 2016 ACM on Workshop on Information Sharing and Collaborative Security*, 2016, pp. 57–64.

D. Smullen and T. Breaux, "Modeling, analyzing, and consistency checking privacy requirements using eddy," in *Proceedings of the Symposium and Bootcamp on the Science of Security*, 2016, pp. 118–120.

T. Breaux, **D. Smullen**, and H. Hibshi, "Detecting repurposing and over-collection in multi-party privacy requirements specifications," in *2015 IEEE 23rd international requirements engineering conference (RE)*. IEEE, 2015, pp. 166–175.

D. Smullen, J. Gillett, J. Heron, and S. Rahnamayan, "Genetic algorithm with self-adaptive mutation controlled by chromosome similarity," in *2014 IEEE Congress on Evolutionary Computation (CEC)*. IEEE, 2014, pp. 504–511.

N. Qwasmi, **D. Smullen**, and R. Liscano, "Integrated development environment for debugging policy-based applications in wireless sensor networks," *Procedia Computer Science*, vol. 21, pp. 225–233, 2013.

Speaking and Professional Service

- 2021 **External Program Committee Member**, *Conference on Human Factors in Computing Systems (CHI 2021)*, Online, Conference.
 - Refereed submissions and participated in discussions.
- 2020 **External Program Committee Member**, *Conference on Human Factors in Computing Systems (CHI 2020)*, Honolulu, Hawai'i, Conference.
 - Refereed submissions, and participated in discussions and shepherding in the Late Breaking Works track.
- 2020 **The Best of Both Worlds: Mitigating Trade-offs Between Accuracy and User Burden in Capturing Mobile App Privacy Preferences**, *20th Privacy Enhancing Technologies Symposium (PETS 2020)*, Online, Conference.
 - Presented conference talk for peer reviewed publication and participated in panel discussions.
- 2019 **Digital Data Flows Masterclass: Mobile Apps**, *Future of Privacy Forum*, Online, Conference.
 - Provided lectures and discussion session as featured expert.
- 2018 **Program Committee Member**, *European Conference on Information Systems (ECIS2018)*, Portsmouth, UK, Conference.
 - Refereed submissions, and participated in discussions and shepherding.
- 2018 **Personalized Privacy Assistant Project**, *US Federal Trade Commission PrivacyCon*, Washington D.C., Conference.
 - Presented poster with oral presentation and participated in panel discussions.
- 2017 **Assisting Users in a World Full of Cameras: A Privacy-aware Infrastructure for Computer Vision Applications**, *US Federal Trade Commission PrivacyCon*, Washington D.C., Conference.
 - Presented poster with oral presentation and participated in panel discussions.

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- 2017 **A Privacy Assistant for the Internet of Things**, *13th Symposium On Usable Privacy and Security (SOUPS 2017)*, San Jose, California, Conference.
 - Presented poster with oral presentation and participated in panel discussions.
- 2016 **Program Committee Member**, *International Workshop on Privacy Engineering (IWPE 16)*, San Jose, California.
 - Refereed submissions, and participated in discussions and shepherding.
- 2016 **Toward a Semantics for Data Retention in Eddy**, *National Institute of Standards and Technology (NIST)*, Gaithersburg, Maryland.
 - Delivered an invited research talk, hosted by NIST Applied Cybersecurity Division.
- 2015 **Privacy Engineering Tool Clinic**, *Computing Community Consortium Catalyst, Privacy by Design Workshop*, Pittsburgh, Pennsylvania.
 - Delivered an invited talk with tool demonstration and discussion panel session.
- 2015 **Detecting Repurposing and Over-Collection in Multi-party Privacy Requirements Specifications**, *23rd IEEE International Requirements Engineering Conference*, Ottawa, Ontario, Conference.
 - Presented conference talk for peer reviewed publication and participated in panel discussions.
- 2015 **Towards Rapid Re-Certification Using Formal Analysis**, *United States Navy Postgraduate School 12th Annual Acquisition Research Symposium*, Monterey, California, Conference.
 - Presented conference talk for peer reviewed publication and participated in panel discussions.
- 2015 **Web Chair**, *International Conference on Multicore Software Engineering, Performance, and Tools (MUSEPAT 2014)*, Hong Kong, China, Conference.
 - Organized conference website and coordinated program committee.
- 2014 **Genetic Algorithm with Self-Adaptive Mutation Controlled by Chromosome Similarity**, *IEEE World Congress on Computational Intelligence (WCCI 2014), Evolutionary Computation Conference (CEC 2014)*, Beijing, China, Conference.
 - Presented conference talk for peer reviewed publication and participated in panel discussions.
- 2013 **How Much Do We Reveal Through Metadata? An Assessment of Online Privacy**, *IBM Consortium for Software Engineering Research (CSER 2013)*, Toronto, Ontario, Conference.
 - Presented poster with oral presentation and participated in panel discussions.
- 2013 **Policy IDE... and Lessons Learned Since**, *The 4th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN 2013)*, Niagara Falls, Ontario, Conference.
 - Presented conference talk for peer reviewed publication and participated in panel discussions.
- 2013 **Facilitating the Internet of Things with Policy Programming**, *UOIT Undergraduate Research Showcase*, Oshawa, Ontario, Conference.
 - Presented poster with oral presentation and participated in panel discussions.

Awards

- 2017 **Distinguished Poster Award**, *13th Symposium On Usable Privacy and Security (SOUPS 2017)*, San Jose, California.
- 2017 **Hima and Jive Fellowship in Computer Science for International Students**, *Carnegie Mellon University*, Pittsburgh, Pennsylvania.
- 2015 **Ready-Set-Transfer Award**, *23rd IEEE International Requirements Engineering Conference*, Ottawa, Ontario, "Eddy: A privacy requirements specification language".
 - Awarded first place in competitive industrial panel talks.

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- 2014 **Faculty of Engineering and Applied Science Undergraduate Capstone Design Challenge Winner**, *University of Ontario Institute of Technology*, Oshawa, Ontario, "*Incident Recognition and Intelligence System (IRIS)*".
- o Awarded first place in capstone research project competition, evaluated by a panel of academic and industrial experts.
- 2012–2014 **President's Honours List**, *University of Ontario Institute of Technology*, Oshawa, Ontario.
- o Awarded for exceptional academic achievement, with greater than 3.7 GPA.
- 2013 **National Science and Engineering Research Council (NSERC/CRSNG) Undergraduate Research Award**, *University of Ontario Institute of Technology*, Oshawa, Ontario.
- o Awarded federally funded research grant with competitive review process, funding 1 year of undergraduate research in engineering.
- 2011 **Dean's Honours List**, *University of Ontario Institute of Technology*, Oshawa, Ontario.
- o Awarded for exceptional academic achievement, with greater than 3.5 GPA.
- 2008 **Engineers Without Borders Design Challenge Winner**, *McMaster University*, Hamilton, Ontario.
- o Awarded first place in a software requirements specification competition for distribution of AIDS medication in rural Africa.
- 2007 **DaVinci Engineering Design Challenge Winner**, *University of Toronto*, Toronto, Ontario.
- o Awarded first place in an engineering design challenge for remote controlled electric motorized aquatic vehicles, in Electrical Engineering and Fluid Dynamics competition stream.

Languages

English	Native Proficiency
French	Verbal, Written Proficiency
German	Verbal, Written Proficiency

Professional Memberships

- 2020 **HackPGH Makerspace**, *Member*.
- 2019 **Pitcairn Monroeville Sportsmen's Club**, *Full Member*.
- 2014 **The Corporation of the Seven Wardens**, *Order of the Calling of the Engineer*, Camp 1, Toronto, Ontario.
- 2013 **Institute of Electrical and Electronics Engineers (IEEE)**, *Student Member*.
- o IEEE Communications Society
 - o IEEE Internet of Things
 - o IEEE Sensors Council
 - o IEEE Software Defined Networks
- 2011 **International Red Cross**, *Class C Emergency First Aid, CPR and Defibrillator Certification*.
- 2009 **Burlington Rifle and Revolver Club**, *Range Officer and Instructor*.