Daniel Smullen

Curriculum Vitae

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"If you don't know anything about computers, just remember that they are machines that do exactly what you tell them but often surprise you in the result."
-Richard Dawkins

Education

2014 – Present **Ph.D. (Software Engineering)**, *Carnegie Mellon University*, Pittsburgh, *in progress*.
Institute for Software Research, co-advised by Travis D. Breaux and David Garlan

2009/9 – 2014/5 **B.Eng. (Software Engineering)**, *University of Ontario Institute of Technology*, Oshawa, *graduated summa cum laude*.

Experience

Academic

2014 – Present **Graduate Research Assistant**, *Carnegie Mellon University*, Pittsburgh.
Institute for Software Research
- Studying the hoisting of non-functional requirements (such as privacy and security) into software architectures by leveraging formalized specification of legal policies. Actively working on the development of the Eddy requirements specification language toolset.
- Advised by Travis D. Breaux and David Garlan.

2013/9 – 2014/5 **Researcher**, *University of Ontario Institute of Technology*, Oshawa.
Software Quality Research Lab
- Investigated user privacy in metadata released unknowingly through Internet traffic and perceptions thereof, in an ethics board approved user study;
- Conducted a novel investigation of the Software Testing Coupling Effect using a variety of mutation testing tools and automation.
- Advised by Jeremy Bradbury.

2013/4 – 2013/9 **Researcher**, *University of Ontario Institute of Technology*, Oshawa.
Software Engineering Lab
Detailed achievements:
- Studied tinyOS based wireless sensor networks, applying policy-based programming to create a new development environment (Policy IDE);
- Developed server-based and console-based variants using IPv6 running on tinyOS based embedded systems:
  - Published and presented work at EUSPN-2013;
  - Presented research at UOIT Student Research Showcase 2013;
  - Developed into TOSServ and Finger2IPv6 projects on Github;
- Research funded by NSERC Undergraduate Student Research Award.
- Advised by Ramrio Liscano.

Industrial

2015/5 – 2015/8 **334F Affiliate**, *NASA - Jet Propulsion Laboratory*, Pasadena.
Non-local statistical denoising for radar interferometry imagery project
Detailed achievements:
- Developed a resolution-preserving image processing pipeline;
- Engineered a cross-platform Python/C11 application:
  - Reduced processing time from weeks to minutes;
  - Incorporated multithreading using OpenMP and multiprocessing using MPI;
  - Portable implementation for desktop workstations, servers, and clusters;
- Used in production with the UAVSAR project in radar science and instrument engineering.
- Advised by Razi Ahmed.

2012/4 – 2012/9 **Engineer in Training**, *SNC-Lavalin*, Toronto.
Global Information Technologies
Detailed achievements:
- Conducted research study on mission-critical datacenter systems;
- Analyzed network traffic and distributed file system logs:
  - Established guidelines for improved disaster recovery;
  - Generated quantitative data for infrastructure improvement planning;
- Developed a novel workstation staging system:
  - Reduced time for new workstation deployments from 160 minutes to 20 minutes;
  - Removed dependency on DOS-based second stage bootloader.

2011/4 – 2011/9 **Support Technician**, *SNC-Lavalin*, Toronto.
Mining and Metallurgy Division
Detailed achievements:
- Provided dedicated technical support for high-value clients and senior management;
- Conducted seminars on computer and network security, repair:
  - Educated staff members on open source software;
  - Developed automated solutions for common manual data recovery activities;
- Performed computer forensics and data recovery on damaged workstations and laptops.

2009/6 – 2009/12 **Systems Administrator**, *DESSAU*, Toronto.
LVM-Technisol Division
Detailed achievements:
- Reimplemented information systems developed for JEGEL, managing sample logging and lab process queuing;
- Gained comprehensive field experience in geotechnical and QA testing for concrete and asphalt:
  - Managed geotechnical probehole drilling and underground utility location program;
  - Performed in-situ QA testing on major airport and highway resurfacing projects;
- Managed integration of computer systems during the LVM-JEGEL company merger.

2009/4 – 2009/6 **Systems Administrator**, *JEGEL*, Toronto.
Information Technology Division
Detailed achievements:
- Worked with City of Toronto civil engineering on special projects:
  - Developed Trans-Canada Highway Rehabilitation geoinformatics;
  - Toronto 2009 Capital Works Program;
- Performed collaborative development on an ISO-9001 certified laboratory sample management software:
  - Designed and built a datacenter servicing the Toronto engineering team;
  - Performed reimplementation of legacy code scavenged from singleton tools;
- Performed debugging and troubleshooting of legacy pavement analysis systems running embedded software.

Refereed Conference Proceedings

T. D. Breaux, D. Smullen, and H. Hibshi, "Detecting repurposing and over-collection in multi-party privacy requirements specifications," in *Proceedings of 23rd IEEE International Requirements Engineering Conference*. IEEE, 2015, pp. 166–175.

D. Smullen and T. D. Breaux, "Towards rapid recertification using formal analysis," *Proceedings of the US Navy Postgraduate School 12th Annual Acquisition Research Symposium*, 2015. [Online]. Available: http://www.acquisitionresearch.net/files/FY2015/SYM-AM-15-104.pdf

D. Smullen, J. Gillett, J. Heron, and S. Rahnamayan, "Genetic algorithm with self-adaptive mutation controlled by chromosome similarity," in *Evolutionary Computation (CEC), 2014 IEEE Congress on*, July 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, the 4th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN-2013) and the 3rd International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare (ICTH). [Online]. Available: http://www.sciencedirect.com/science/article/pii/S1877050913008235

Invited Talks

August 2015 **Privacy Engineering Tool Clinic**, *Computing Community Consortium Catalyst, Privacy by Design*, Pittsburgh, Workshop.
- Presented invited talk, with tool feedback and question session.

Presentations

August 2015 **Detecting Repurposing and Over-Collection in Multi-party Privacy Requirements Specifications**, *23rd IEEE International Requirements Engineering Conference*, Ottawa, Conference Talk.
- Presented conference talk for peer reviewed publication, with feedback and question session.

May 2015 **Towards Rapid Re-Certification Using Formal Analysis**, *US Navy Postgraduate School 12th Annual Acquisition Research Symposium*, Monterey, Conference Talk.
- Presented conference talk for peer reviewed publication, with feedback and question session.

November 2014 **Conference Organization**, *International Conference on Multicore Software Engineering, Performance, and Tools (MUSEPAT 2014)*, Hong Kong, Web Chair.
- Developed the conference website and assisted with organizing committees.

August 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, Conference Talk.
- Presented conference talk for peer reviewed publication, with feedback and question session.

November 2013 **How Much Do We Reveal Through Metadata? An Assessment of Online Privacy**, *IBM Consortium for Software Engineering Research (CSER 2013)*, Toronto, Poster and Panel Session.
- Presented poster for preliminary study findings and research methodology, with feedback and panel session.

October 2013 **Policy IDE... and lessons learned since**, *The 4th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN-2013)*, Niagara Falls, Conference Talk.
- Presented conference talk for peer reviewed publication, with feedback and question session.

October 2013 **Facilitating the Internet of Things with Policy Programming**, *UOIT Undergraduate Research Showcase*, Oshawa, Poster and Panel Session.
- Presented poster for peer reviewed publication, with feedback and competitive panel session.

Projects

Summer 2015 **Non-Local Interferometric SAR Parameter Estimator**, *NASA - Jet Propulsion Laboratory*, Pasadena.
- Supervised by Razi Ahmed.

Summer 2015 **NL-InSAR with Gaussian-Laplacian Pyramids**, *NASA - Jet Propulsion Laboratory*, Pasadena.
- Supervised by Razi Ahmed.

Winter 2014 **Incident Recognition and Intelligence System (IRIS)**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Shahryar Rahnamayan.
- Funding and collaboration provided by Baher Abdulhai, Asmus Georgi, at University of Toronto.
- Won distinction for first place in EECS Undergraduate Capstone Design Challenge.

Winter 2014 **Automated Marking System (AMS)**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Kamran Sartipi.

Summer 2013 **Policy IDE**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Ramiro Liscano.
- Funded by National Science and Engineering Research Council (NSERC) Undergraduate Research Award.

Summer 2013 **TOSServ**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Ramiro Liscano.
- Funded by National Science and Engineering Research Council (NSERC) Undergraduate Research Award.

Summer 2013 **Finger2IPv6**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Ramiro Liscano.
- Funded by National Science and Engineering Research Council (NSERC) Undergraduate Research Award.

Spring 2013 **Military Logistics Management System (MLMS)**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Eyhab Al-Masri.

Winter 2012 **sneakyFS File System Design and Implementation**, *University of Ontario Institute of Technology*, Oshawa.
- Supervised by Kamran Sartipi.
- Won distinction as best project in the UOIT ENGR 3950 (Operating Systems) course competitive evaluation.

Summer 2012 **Datacenter Utilization Research Study**, *SNC-Lavalin*, Toronto.
- Supervised by Marc Ross.

Summer 2009 **Trans-Canada Highway Rehabilitation Geoinformatics**, *JEGEL*, Toronto.
- Supervised by Alain Duclos.

Spring 2009 **Laboratory Information Management System (LIMS)**, *JEGEL*, Toronto.
- Supervised by John Emery.

Awards

August 2015 **Ready-Set-Transfer Award**, *23rd IEEE International Requirements Engineering Conference*, Ottawa, *"Eddy: A privacy requirements specification language"*.
- Award for 1st place in competitive industrial panel talks.

May 2014 **EECS Undergraduate Capstone Design Challenge Winner - 1st Place**, *University of Ontario Institute of Technology*, Oshawa, *"Incident Recognition and Intelligence System (IRIS)"*.
- Capstone research project which underwent competitive evaluation by a panel of academic and industrial experts.

2012–2014 **President's Honors List**, *University of Ontario Institute of Technology*, Oshawa.
- Award for exceptional academic achievement, with greater than 3.7 grade point average.

2013 **National Science and Engineering Research Council (NSERC) Undergraduate Research Award**, Canada.
- Federally funded research award undergoing competitive review process, funding 1 year of undergraduate research in engineering.

2011 **Dean's Honors List**, *University of Ontario Institute of Technology*, Oshawa.
- Award for exceptional academic achievement, with greater than 3.5 grade point average.

2008 **Winner, Engineers Without Borders Design Challenge**, *McMaster University*, Hamilton.
- Award for first place in competitive software requirements specification competition for distribution of AIDS medication in sub-Saharan Africa project.

2007 **Winner, DaVinci Engineering Design Challenge**, *University of Toronto*, Toronto.
- Award for 1st place in competitive engineering design challenge for remote controlled electric motorized aquatic vehicle design, Electrical Engineering and Fluid Dynamics streams.

Languages

English	Native Speaker	
French	Verbal, Written Proficiency	*High-school level training as part of Ontario curriculum.*
German	Verbal, Written Proficiency	*University level training (McMaster University, Hamilton).*

Professional Memberships

Joined 2013	Institute of Electrical and Electronics Engineers	*Student Member*
Joined 2011	International Red Cross	*Emergency First Aid, CPR and Defibrillator Certification*
Joined 2009	Burlington Rifle and Revolver Club	*Range Officer and Instructor, Full Membership*