

Stephen Makonin, PhD, PEng, smIEEE

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CompSust Lab: <http://compsust.fas.sfu.ca>

Education

2010 – 2014 **Doctor of Philosophy**

Simon Fraser University, School of Computing Science (Burnaby, Canada)
Thesis: Real-Time Embedded Low-Frequency Load Disaggregation
Advisor: Fred Popowich

2007 – 2009 **Bachelor of Technology**

British Columbia Institute of Technology
School of Computing and Academic Studies (Burnaby, Canada)
Major: Computer Systems with a Data Communications Specialization

1993 – 1996 **Diploma in Computer Technology**

Selkirk College (Castlegar, Canada)

2018 **Certificate, Software Carpentry Instructor**

Software Carpentry Foundation (Vancouver, BC)

2009 **Certificate, Electronics Technician**

George Brown College (Toronto, Canada)

Professional Affiliation

2018 – now **Professional Engineer (PEng)**

Engineers and Geoscientists BC (EGBC)
a.k.a. Association of Professional Engineers and Geoscientists of BC (APEGBC)

2014 – now **Member**

Society for Industrial and Applied Mathematics (SIAM)

2013 – now **Senior Member (smIEEE)**

Institute of Electrical and Electronics Engineers (IEEE)
Student Member and Member since 2008.

2010 – 2016 **Information Systems Professional (ISP)**

Canadian Information Processing Society (CIPS)

Research Experience

- 2019 – now* **Senior Software Engineer**
Simon Fraser University, Big Data Hub (Burnaby, Canada)
- 2017 – now* **Adjunct Professor**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
PI of the Computational Sustainability Lab: <http://compsust.fas.sfu.ca>
- 2018* **Visiting Professor**
Indraprastha Institute of Information Technology, Delhi (IIIT-Delhi, India)
- 2016 – 2017* **Postdoctoral Fellow**
University of British Columbia, Electrical and Computer Engineering (Burnaby, Canada)
Advisor: Z. Jane Wang
- 2014 – 2017* **Postdoctoral Fellow & Sessional Instructor**
Simon Fraser University, Engineering Science & Computing Science (Burnaby, Canada)
2015 – 2017 Advisor: Ivan V. Bajic (postdoc)
2014 – 2015 Advisors: Wolfgang Stuerzlinger (postdoc) & Anthony Dixon (instructor)
- 2008 – 2015* **Research Associate**
British Columbia Institute of Technology, Applied Research (Burnaby, Canada)

HQP Supervision

- TBD* **Senior Supervisor of Lior Bragilevsky — PhD Thesis (starting Fall 2020)**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
Thesis: tbd
- 2019 – now* **Senior Supervisor of Richard Jones — MSc Thesis (on going)**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
Awarded a Graduate Dean's Entrance Scholarship (GDES) and NSERC CGS-M
Thesis: tbd
- 2018 – now* **Senior Supervisor of Alejandro Rodriguez-Silva — PhD Thesis (on going)**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
Thesis: tbd
- 2018 – now* **Co-Supervisor of Alon Harell — MSc Thesis (on going)**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
Awarded a NSERC CGS-M, Thesis: tbd
- 2017 – now* **Senior Supervisor of Md. Zulfiqar Ali Bhotto — Postdoctoral Fellow**
Simon Fraser University, School of Engineering Science (Burnaby, Canada)
Research Areas: NILM, smart grid optimization
- 2014 – 2015* **Co-Supervisor of Bradley Ellert — MSc Thesis (defended Aug 17, 2015)**
Simon Fraser University, School of Computing Science (Burnaby, Canada)
Thesis: Leveraging Submetered Electricity Loads to Disaggregate Household Water-Use

Visiting Scholars

- 2019 David Murray — PhD, University of Strathclyde, UK (2 months)
- 2019 Bundit Buddhahai — PhD, KMUTT, Thailand (6 months)
- 2019, 2020 Christoph Klemenjak — PhD, University of Klagenfurt, Austria (6 months)
- 2018 Shikha Singh — PhD, IIIT-Delhi, India (1/2 month)
- 2017 – 2018 Megha Gaur — PhD, IIIT-Delhi, India (6 months)

External Examiner (Viva)

- 2019 Georgia Elafoudi (PhD Electronic and Electrical Engineering)
University of Strathclyde, Glasgow, UK
Thesis: Meaningful Information Extraction from IoT Measurements using Signal Information Processing

Teaching Experience

- Fall 2014, Introduction to the Internet and the World Wide Web (CMPT 165)
- Spring 2015 Simon Fraser University, School of Computing Science
Students each semester: in-class section 200 (90% ESL Mandarin), dist. ed. section 225
TAs/TMs: in-class section 3, dist. ed. section 3

Grants & Funding (PI = Principal Investigator)

- 2020 Co-PI — SSHRC Knowledge Synthesis Grant (\$50,000, 1 year)
Title: Tackling the Carbon Footprint of Streaming Media
- 2019 PI — NSERC Engage Grant (\$25,000, 6 months)
Title: Inferring power grid transformer to meter association using inconsistent geospatial data
- 2019 Investigator — European Commission Horizon2020 Grant (2 years)
Title: SENSors and Intelligence in BuLt Environment (SENSIBLE) project
[indirect moneys to allow for international grad student visits]
- 2019 PI — NSERC Discovery Launch Supplement Award (\$12,500)
- 2018 PI — NSERC Discovery Grant (\$140,000, 5 years)
Title: Non-Intrusive Load Monitoring (NILM)
- 2016 Postdoc — IC-IMPACTS NCE Project Grant (\$133,000, 2 years, 11.2% success rate)
Title: Energy and Water Disaggregation for Non-Intrusive Load Monitoring in Buildings
[I was a main author and organizer of grant but could not be co-PI due to funding rules]
- 2012, 14 PhD Candidate — SFU GSS Professional Development Grant (2 at \$500 each)
- 2013 PI — BCIT School of Energy Research Seed Funding (\$10,000, 4 months)
Title: Branch Circuit Ammeter and Data Logger for Smart Grid/Home Application

Publications (see citation report at end of CV)

BOOKS

Pacheco-Torgal, F., Rasmussen, E., Granqvist, C.-G., Ivanov, V., Kaklauskas, H. A., and **Makonin, S.**, editors (2016). *Start-Up Creation: The Smart Eco-Efficient Built Environment, First Edition*. Woodhead Publishing/Elsevier, ISBN: 978-0-08-100546-0.

Authored: **Makonin, S.** (2015) Chapter 18: App programming and its use in smart buildings.

Bennett, D., **Makonin, S.**, Mayfield, V. W., Neustaedter, T., and Wrenn, M. R. (1996). *Visual C++ 5.0 Developer's Guide*. Sams Publishing, ISBN: 978-0-672-31031-7.

JOURNAL ARTICLES (PEER REVIEWED)

Dinesh, C., **Makonin, S.**, and Bajic, I. V. (2020). Residential Power Forecasting Based on Affinity Aggregation Spectral Clustering. *IEEE Access*, [in-press].

Dinesh, C., **Makonin, S.**, and Bajic, I. V. (2019). Residential Power Forecasting Using Load Identification and Graph Spectral Clustering. *IEEE Trans. on Circuits and Systems II: Express Briefs*, 66(11):1900–1904.

Gaur, M., **Makonin, S.**, Bajic, I. V., and Majumdar, A. (2019). Performance evaluation of techniques for identifying abnormal energy consumption in buildings. *IEEE Access*, 7:62721–62733.

Makonin, S. (2019). HUE: The Hourly Usage of Energy Dataset for Buildings in British Columbia. *Data in Brief*, 23(103744):1–4.

Makonin, S., Wang, Z. J., and Tumpach, C. (2018). RAE: The Rainforest Automation Energy Dataset for Smart Grid Meter Data Analysis. *Data*, 3(1):1–9.

Bhotto, Md. Z. A., **Makonin, S.**, and Bajic, I. V. (2016). Load Disaggregation Based on Aided Linear Integer Programming. *IEEE Trans. on Circuits and Systems II: Express Briefs*, 64(7):792–796.

Makonin, S., Ellert, B., Bajic, I. V., and Popowich, F. (2016). Electricity, water, and natural gas consumption of a residential house in Canada from 2012 to 2014. *Scientific Data*, 3(160037):1–12.

Makonin, S., Popowich, F., Bajic, I. V., Gill, B., and Bartram, L. (2016). Exploiting HMM Sparsity to Perform Online Real-Time Nonintrusive Load Monitoring. *IEEE Trans. on Smart Grid*, 7(6):2575–2585.

Makonin, S. and Popowich, F. (2015). Nonintrusive Load Monitoring (NILM) Performance Evaluation. *Energy Efficiency*, 8(4):809–814.

Makonin, S., Bartram, L., and Popowich, F. (2013). A Smarter Smart Home: Case Studies of Ambient Intelligence. *IEEE Pervasive Computing*, 12(1):58–66.

Makonin, S. and Popowich, F. (2012). Home Occupancy Agent: Occupancy and Sleep Detection. *GSTF Journal on Computing*, 2(1):182–186.

CONFERENCE PROCEEDINGS (PEER REVIEWED)

Jones, R., Rodriguez-Silva, A., and **Makonin, S.** (2020). Increasing the Accuracy and Speed of Universal Non-Intrusive Load Monitoring (UNILM) Using a Novel Real-Time Steady-State Block Filter. In *Proceedings of the 11th Conference on Innovative Smart Grid Technologies (ISGT)*.

Klemenjak, C., **Makonin, S.**, and Elmenreich, W. (2020). Towards Comparability in Non-Intrusive Load Monitoring: On Data and Performance Evaluation. In *Proceedings of the 11th Conference on Innovative Smart Grid Technologies (ISGT)*.

- Rodriguez-Silva, A., and **Makonin, S.** (2019). Universal Non-Intrusive Load Monitoring (UNILM) Using Filter Pipelines, Probabilistic Knapsack, and Labelled Partition Maps. In *Proceedings of the 11th IEEE PES Asia-Pacific Power and Energy Engineering Conference 2019 (APPEEC)*.
- Klemenjak, C., Reinhardt, A., Pereira, L., **Makonin, S.**, Bergés, M., and Elmenreich, W. (2019). Electricity Consumption Data Sets: Pitfalls and Opportunities. In *Proceedings of the 6th ACM International Conference on Systems for Energy-Efficient Built Environments, Cities, and Transportation (BuildSys)*.
- Harell, A., **Makonin, S.**, and Bajic, I. V. (2019). WaveNILM: A Causal Neural Network for Power Disaggregation from the Complex Power Signal. In *Proceedings of the 44th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*.
- Guzman, L., **Makonin, S.**, and Clapp, R. A. (2019). CarbonKit: Designing A Personal Carbon Tracking Platform. In *Proceedings of SocialSense '19: Fourth International Workshop on Social Sensing*.
- Dinesh, C., **Makonin, S.**, and Bajic, I. V. (2017). Incorporating Time-Of-Day Usage Patterns Into Non-Intrusive Load Monitoring. In *Proceedings of the 5th IEEE Global Conference on Signal and Information Processing (GlobalSIP)*.
- Makonin, S.** (2016). Investigating the Switch Continuity Principle Assumed in Non-Intrusive Load Monitoring (NILM). In *Proceedings of the 29th Annual IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*.
- Makonin, S.**, McVeigh, D., Stuerzlinger, W., Tran, K., and Popowich, F. (2016). Mixed-Initiative for Big Data: The Intersection of Human + Visual Analytics + Prediction. In *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS)*, pp. 1427-1436.
- Ellert, B., **Makonin, S.**, and Popowich, F. (2015). Appliance Water Disaggregation via Non-Intrusive Load Monitoring (NILM). In *Proceedings of the EAI International Conference on Big Data and Analytics for Smart Cities (BigDASC)*.
- Wallace, J., Richardson, K., Gill, B., and **Makonin, S.** (2015). Cognitive Radio Technology: System Evolution. In *Proceedings of the 4th International Conference On Wireless Networks and Embedded Systems (WECON)*.
- Makonin, S.**, Bajic, I. V., and Popowich, F. (2014). Efficient Sparse Matrix Processing for Nonintrusive Load Monitoring (NILM). In *Proceedings of the 2nd International Workshop on Non- Intrusive Load Monitoring*.
- Makonin, S.**, Guzman Flores, L., Gill, R., Clapp, R. A., Bartram, L., and Gill, B. (2014). A Consumer Bill of Rights for Energy Conservation. In *Proceedings of the 2014 IEEE Canada International Humanitarian Technology Conference (IHTC)*.
- Filsoof, R., Bodine, A., Gill, B., **Makonin, S.**, and Nicholson, R. (2014). Transmitting Patient Vitals Over a Reliable ZigBee Mesh Network. In *Proceedings of the 2014 IEEE Canada International Humanitarian Technology Conference (IHTC)*.
- Makonin, S.**, Sung, W., Dela Cruz, R., Yarrow, B., Gill, B., Popowich, F., and Bajic, I. V. (2013). Inspiring Energy Conservation Through Open Source Metering Hardware and Embedded Real-Time Load Disaggregation. In *Proceedings of the 5th IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC)*.
- Makonin, S.**, Popowich, F., Bartram, L., Gill, B., and Bajic, I. V. (2013). AMPds: A Public Dataset for Load Disaggregation and Eco-Feedback Research. In *Proceedings of the 2013 IEEE Electrical Power and Energy Conference (EPEC)*.

- Makonin, S.**, Popowich, F., Moon, T., and Gill, B. (2013). Inspiring Energy Conservation Through Open Source Power Monitoring and In-Home Display. In *Proceedings of the 2013 IEEE Power and Energy Society General Meeting*.
- Makonin, S.**, Popowich, F., and Gill, B. (2013). The Cognitive Power Meter: Looking Beyond the Smart Meter. In *Proceedings of the 2013 26th Annual IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*.
- Makonin, S.**, Kashani, M., and Bartram, L. (2012). The Affect of Lifestyle Factors on Eco-Visualization Design. In *Proceedings of Computer Graphics International (CGI)*.
- Makonin, S.**, Pasquier, P., and Bartram, L. (2011). Elements of Consumption: An abstract visualization of household consumption. In *Smart Graphics*, LNCS, 6815:194–198. Springer Berlin Heidelberg.
- Makonin, S.** and Popowich, F. (2011). An intelligent agent for determining home occupancy using power monitors and light sensors. In *Toward Useful Services for Elderly and People with Disabilities*, LNCS, 6719:236–240. Springer Berlin Heidelberg.

POSTER & DEMO SESSIONS

- Harell, A., **Makonin, S.**, and Bajic, I. V. (2018). A Recurrent Neural Network for Multisensory Non-Intrusive Load Monitoring on a Raspberry Pi. In *Proceedings of the IEEE 20th International Workshop on Multimedia Signal Processing (MMSP)*.

TECHNICAL REPORTS

- Makonin, S.** (2012). *Approaches to Non-Intrusive Load Monitoring (NILM) in the Home*. PhD Depth Report, Simon Fraser University, School of Computing Science.

Service To Profession

GENERAL CHAIR & ORGANIZER

- 2019 Advanced Signal Processing for Non-intrusive Load Monitoring Special Session
44th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
Brighton, UK. May 12
- 2018 4th International Workshop on Non-Intrusive Load Monitoring (NILM)
Austin, TX, USA. March 7 – 8
- 2017 The Plenty of Fish (POF) 24hr Hackathon
Burnaby, Canada. October 13 – 14, 24-hours
- 2016 3rd International Workshop on Non-Intrusive Load Monitoring (NILM)
Vancouver, Canada. May 14 – 15
- 2015 IEEE Vancouver Windows 10 Hackathon
Burnaby, Canada. May 16 – 17, 28-hours
- 2014 IEEE Vancouver Kinect and Structure Sensor Hackathon
Burnaby, Canada. November 8 – 9, 28-hours

JOURNAL EDITORSHIP

- 2019 – now Editorial Board Member, *Scientific Data*, Nature

WEBSITE & SOCIAL MEDIA CHAIR

- 2016 14th IEEE International NEW Circuits And Systems (NEWCAS) Conference
Vancouver, Canada. June 26 – 29
- 2016 29th Annual IEEE Canadian Conf. on Electrical and Computer Engineering (CCECE)
Vancouver, Canada. May 15 – 18
- 2014 IEEE 15th Int. Conf. on High Performance Switching and Routing (HPSR)
Vancouver, Canada. July 1 – 4

TECHNICAL PROGRAM COMMITTEE (TPC) MEMBER

- 2020 eSim 2020, International Building Performance Simulation Association (IBPSA-Canada)
- 2019 11th IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC)
- 2017 5th IFIP Conference on Sustainable Internet and ICT for Sustainability (SustainIT)
- 2015 – 2017 IEEE Workshop on Pervasive Energy Services (PerEnergy)
- 2016 Int. Workshop on Computational Energy Management in Smart Grids (CEMiSG)
- 2015 Int. Conf. on Big Data and Analytics for Smart Cities (BigDASC)
- 2011 – 2015 Int. Conf. on Ubiquitous Computing and Ambient Intelligence (UCAmI)
- 2012 IEEE Int. Conf. on Power and Energy (PECON)

MISCELLANEOUS ACTIVITIES

- 2014, 17, 19 **External Grant Reviewer**, Mitacs Accelerate Grant Proposal, Canada
- 2018 **External Grant Reviewer**, EPSRC Grant Proposal, UK
- 2011, 13, 15, 17 **External Paper Reviewer**, Canadian Conference on Artificial Intelligence (AI)

Keynotes, Invited Talks & News/Media Interviews

- 2019 **News Talk Show Interview/Discussion on CarbonKit and Personal Carbon Tracking**
The Danielle Smith Show (Calgary, AB, Canada), 22 min, October 2.
- 2018 **Data, Datasets, and Data Engineering**
The 5th EU Nonintrusive Load Monitoring Workshop (Duisburg, Germany), October 1.
- 2018 **NILM Real-World Testing: An Emulator for NILM and Smart Home Research**
4th International Workshop on Non-Intrusive Load Monitoring (Austin, USA), March 8.
- 2017 **The Expectations of Non-Intrusive Load Monitoring (NILM)**
The International Conference on Application of Demand-Side Management (DSM) and Data Driven Technology in Energy Saving (Taipei, Taiwan), November 22.
- 2017 **NILM Real-World Testing: The Case for an Emulator**
The 4th EU Nonintrusive Load Monitoring Workshop (London, UK), November 7.
- 2015 **From Socioeconomic Concerns to Standardizing Accuracy to Water NILM**
The 2nd EU Nonintrusive Load Monitoring Workshop (London, UK), July 8.

Scholarships & Awards

- 2017 IEEE Signal Processing Society Appreciation Certificate — Leadership & Support
- 2015 IEEE Vancouver Section Leadership and Contribution Award — Initiative
- 2014 SFU Faculty of Applied Science (FAS) Graduate Fellowship (PhD)
- 2012, 14 Ebco/Eppich Graduate Scholarships in Intelligent Systems
- 2013 SFU Travel & Minor Research Award (2 awards won that year)
- 2013 SFU President's PhD Scholarship
- 2012, 13 SFU Graduate Fellowship (PhD)
- 2010 BCIT Vancouver 2010 Olympic Winter Games Legacy Fund Scholarship

Industry Experience (Software Engineering)

- 2014 – now **Co-Founder & Senior Research Scientist** — SweetLightning (Calgary, Canada)
- 1996 – now **Senior Software Developer Consultant**
Oponix Systems Inc. formerly Makonin Consulting Corp. (1996-2010, Burnaby, Canada)
Clients incl. Telus Mobility, Vancouver Coastal Health, Sierra Wireless, Safeway Canada, and Quartech Systems. Recent clients incl. Green Running (UK), and Itron (USA)
- 2017 – 2018 **Senior Software Engineer** — Knowledge Network (Burnaby, Canada)
- 2006 – 2008 **Co-Founder & CTO** — Vvvroom.com (Burnaby, Canada)
- 2006 **Director of Software Development, Vancouver** — AbsolutePoker (Vancouver, Canada)
Reporting staff: 3 Software Developers, 1 QA Manager, 3 QA Testers
Department budget: \$600,000/year

Volunteer Work

- 2017 – now **Yearly Scholarship for Aboriginal Undergraduates** (Donor of), Simon Fraser University
- 2016 – now **Executive Member**, IEEE Vancouver Section
Vice-Chair, Signal Processing Chapter: 2016 – now
Chair, IEEE Vancouver Joint Computing Chapter: 2014 – 2016
Membership Development Chair, IEEE Vancouver Section: 2012 – 2014
- 2018 – 2020 **Director of Communication**, Burnaby Mountain Mantas Swim Club
- 2012 – 2019 **Executive Member**, Westside Montessori Academy PAC
Co-Chair: 2014/15 school year
Treasurer: 2014/15, 2015/16, 2016/17, and 2017/18 school years
Executive-at-Large: 2012/13 and 2018/19 school years

Citation Counts Report

This report was generated by <https://github.com/smakonin/ScholarHacks> and reports [Google Scholar results](#).

Report generated on: 2020-05-25 08:37:24.184111

Citations = 1,037
h-index = 15
i10-index = 23

Paper Title	Citations	Journal IF
AMPds: A public dataset for load disaggregation and eco-feedback re...	234	
Exploiting HMM Sparsity to Perform Online Real-Time Nonintrusive Lo...	157	10.486
Nonintrusive load monitoring (NILM) performance evaluation	99	1.961
Electricity, water, and natural gas consumption of a residential ho...	96	6.776
A Smarter Smart Home: Case Studies of Ambient Intelligence	59	3.022
Load Disaggregation Based on Aided Linear Integer Programming	34	3.250
The cognitive power meter: Looking beyond the smart meter	33	
Visual C++ 5.0 Developer's Guide	32	
Real-time embedded low-frequency load disaggregation	28	
Efficient Sparse Matrix Processing for Nonintrusive Load Monitoring...	27	
RAE: The Rainforest Automation Energy Dataset for Smart Grid Meter ...	22	tbd
The Affect of Lifestyle Factors on Eco-Visualization Design	20	
Investigating the Switch Continuity Principle Assumed in Non-Intrus...	19	
Mixed-Initiative for Big Data: The Intersection of Human + Visual A...	17	
Elements of consumption: an abstract visualization of household con...	16	
WaveNILM: A Causal Neural Network for Power Disaggregation from the...	14	
An intelligent agent for determining home occupancy using power mon...	14	
A consumer bill of rights for energy conservation	13	
Approaches to Non-Intrusive Load Monitoring (NILM) in the Home	13	
Inspiring energy conservation through open source metering hardware...	12	
Appliance Water Disaggregation via Non-Intrusive Load Monitoring (N...	11	
Inspiring energy conservation through open source power monitoring ...	11	
Home Occupancy Agent: Occupancy and Sleep Detection	11	tbd
Electricity consumption data sets: Pitfalls and opportunities	9	
Incorporating Time-Of-Day Usage Patterns Into Non-Intrusive Load Mo...	9	
Towards Comparability in Non-Intrusive Load Monitoring: On Data and...	6	
Start-Up Creation: The Smart Eco-efficient Built Environment	6	
Cognitive Radio Technology: System Evolution	5	
Residential Power Forecasting Using Load Identification and Graph S...	3	3.250
HUE: The Hourly Usage of Energy Dataset for Buildings in British Co...	3	1.430
Transmitting Patient Vitals Over a Reliable ZigBee Mesh Network	2	
Increasing the Accuracy and Speed of Universal Non-Intrusive Load M...	1	
A Recurrent Neural Network for Multisensory Non-Intrusive Load Moni...	1	
Performance evaluation of techniques for identifying abnormal energ...	0	4.098
Peer-Reviewed Conferences:	26 papers	515
Peer-Reviewed Journals:	10 papers	484
Books Co-authored/Co-edited:	2 books	38
Grand Totals:	38 papers	1,037
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Note: Papers without a citation count are not listed above unless they are a journal paper.