

## William Callaghan

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<http://willcallaghan.ca/>

### OVERVIEW

My research focuses on how input from humans and machine learning algorithms influence the reliability and accuracy of time-series data analysis, particularly in the medical domain. I am also interested in how we can model and analyze systems utilizing graphs.

### EDUCATION

**M.Math Candidate**, Computer Science 2015 - Present  
University of Waterloo, Waterloo, Ontario, Canada  
Advisor: Edith Law

**Honors Bachelor of Science**, Computer Science, Microbiology & Immunology 2015  
University of Western Ontario, London, Ontario, Canada  
Thesis Supervisor: Mark Daley

### WORK EXPERIENCE

**Software Developer (Part-Time)** January 2017 – August 2017  
eSentire Inc., Cambridge, Ontario, Canada

- Provided development support to ongoing analytics projects.
- Network Scan Analytics Lead (May 2017 – August 2017)

**Software Developer Intern**, Data Analytics May 2016 – December 2016  
eSentire Inc., Cambridge, Ontario, Canada

- Built an engine to perform complex queries on large data sets with mission critical response times.
- Created RESTful HTTP APIs to interact with various components of the analytics pipeline.
- Worked with Analytics Lead and other stakeholders to define ongoing projects and infrastructure.
- Technologies: Spark, Cassandra, Kafka, Alluxio, HDFS
- Languages: Python, Scala

**Graduate Research Assistant** 2015 - Present  
University of Waterloo, Waterloo, Ontario, Canada

**Teaching Assistant** 2015 - Present  
University of Waterloo, Waterloo, Ontario, Canada

**Software Developer (Contract)** May 2015 - September 2015  
eSentire Inc., Cambridge, Ontario, Canada

- Worked on tools involved in real-time capture and analysis of raw network traffic.
- Core developer on Targeted Retrospective Analysis Platform, bringing prototype to product.
- Extended eSentire's Deep Packet Inspection tools.

**QA Developer Intern** May 2014 - August 2014  
Pelmorex Media Inc., The Weather Network, Oakville, Ontario, Canada

- Developed web automation framework and tests for web products in Java, using Selenium.

## Technology Manager

May 2013 - August 2013

Engineering Outreach, University of Waterloo, Waterloo, Ontario, Canada

- Managed a group of 20+ people in establishing a technology camp curriculum for multiple age groups.
- Monitored daily technology camp operations.

## TECHNICAL SKILLS

**Programming Languages:** Python, Java, C

**Knowledge/Experience:** Apache Spark, Relational & NoSQL Databases (Cassandra), Apache Kafka, RESTful API Development, Git, SBT, Jenkins, Docker, Web Development, Cloud Services (AWS)

## RESEARCH

### SELECTED PROJECTS

#### **HeartBeat**

Framework to combine machine and human intelligence for the scalable and accurate analysis of human clinical phonocardiograms.

#### **Instance Selection Methods in Machine Learning for EEG Analysis**

Researched, implemented and evaluated active learning and instance reduction strategies for EEG analysis (spindle detection and sleep stage classification) as a part of final projects for ‘Human-In-The-Loop Systems’ and ‘On The Synergy Between Computer Science and Biology’ courses at the University of Waterloo.

#### **Modelling Influence in Social Networks**

Researched and proposed a new model for learning the most influential agent in a social network. This was done as a final project for ‘Advanced Topics in Artificial Intelligence: Trust and Online Social Networks’ course at the University of Waterloo.

#### **Using Kalman Filtering and Lasso Regularization to Generate Brain Networks**

Researched and proposed a new method of constructing functional brain networks as diagnostic markers for neurological disease from fMRI data. This was the topic of my Bachelor’s thesis at the University of Western Ontario.

### WORKSHOP PAPERS

**Resolvable vs. Irresolvable Ambiguity: A New Hybrid Framework for Dealing with Uncertain Ground Truth.** Schaekermann, M., Law, E., Williams, A. C., & Callaghan, W. Workshop on Human-Centered Machine Learning at **CHI’16**. San Jose, CA.

**The Big Picture: Preserving Context in the Decomposition of Complex Expert Tasks.** Williams, A. C., Bradshaw, J., Schaekermann, M., Tse, T., Callaghan, W., & Law, E. Workshop on Microproductivity at **CHI’16**. San Jose, CA.

### INVITED TALKS

**Fighting Cybercrime: A Joint Task Force of Real Time Data and Human Analytics.** Callaghan, W. Databricks Spark Summit East Conference 2017. Boston, MA.