

# Scott K. Ralph, PhD

Cloud Architect, Data Scientist, AI/ML Engineer

(905) 467 3346 – [scott.ralph@scottralph.org](mailto:scott.ralph@scottralph.org) – [www.scottralph.org](http://www.scottralph.org)    Citizenship: U.S.A. & Canada

Passionate about architecture facilitating applied A.I./data analytical applications in the cloud. My goal is to efficiently extract business-valuable easily -to-interpret metrics meaningful for the business user. As a Senior Architect/Principal Scientist, I would leverage my diverse analytical background, with my best-of-breed software engineering practices to deliver effective solutions that significantly contribute to the company's core business offerings.

## SUMMARY

<b>Cloud Environments</b>	Google Cloud Platform, AWS, Azure, Hortonworks
<b>Languages</b>	Scala, Kotlin, Python, Java, C#, C++, Javascript
<b>Platforms</b>	Unix (Ubuntu, OS/X, CentOS), Windows .NET Stack
<b>Methodologies</b>	Agile, Scrum, Design Patterns Service-Oriented Architectures, UML, Test-Driven Development, Extreme Programming, Pair Programming
<b>Big Data Ecosystems</b>	Spark, Hadoop, MapReduce, HDFS, Hbase, Hive
<b>Databases</b>	MS SQL Server, MySql, HBase, Postgres, ElasticSearch
<b>Tools</b>	Visual Studio, Eclipse, IntelliJ, Team Foundation Server, Subversion, Git, ReSharper, Enterprise Architect

## CERTIFICATIONS

- Google Cloud Platform Cloud Architect
- Google Cloud Platform Data Engineer (In progress)
- Coursera Specialization in Big Data: Hadoop, HDFS, Spark, Map-Reduce, Big Data Analytics, Machine Learning with Big Data

## AWARDS

1991 NSERC Doctoral Scholarship ♦ 1989, 1990 NSERC PGS-2 Scholarship ♦ 1985 Canadian Association of Physicists Award ♦ 1982 Annual H.S. Mathematics Award ♦ 1989 Digital Equipment Corporation Award of Excellence ♦ 1989, 1988 Atlantic Accord Career Development Award ♦ 1987 Centenary for Responsible Government Award ♦ 1986 Memorial University Endowment Fund Scholarship

## EXPERIENCE

**Bell Canada**  
Jun 2022 – present

### Senior Architect, Data Analytics & Machine Learning

Development of custom cyber security attack detection, classification and remediation tools using machine learning. Apache Spark architectures designed to deal with very large data volumes from manifold sources (e.g. log files, third-party intrusion detection alarms, etc.)

**Keywords:** Python, PySpark, Cloudera, Hue, Hive, OpenShift, Django, GitLab, CI/CD Pipelines, Cloudera Data Science Workbench

**Citigroup**  
**Mississauga, ON**  
Oct 2021 – Jun 2022

### Sr. Data Scientist, ML/AI Engineer

Development of advanced data quality assurance, anomaly detection, fraud detection of data from training platforms within Citigroup. Models are developed with Python, Spark, Airflow, Hue, Hive etc.

Models make use of Scikit-learn, TensorFlow and other machine learning libraries.

**Connected**  
**Toronto**

Aug. 2021 – Oct. 2021

### ML/AI Engineer-Architect (Contract)

Support neuroscience researchers in infant development research using video and audio data collected from a network of sensors throughout their development. I developed the ML pipeline in AWS.

**Keywords:** AWS, Tensor Flow, Python, Docker, Fargate, Microservices, Computer Vision

**Vizit Labs**  
**Boston, MA**  
Jul 2020 – July 2021

### AI/ML Scientist/Engineer and Cloud Architect

Algorithm Development and Data Scientist for initial launch offering.

Custom data analytics pipeline development. Use of GCP AutoML for sentiment analysis.

**Qwinix Technologies Centennial, CO**  
May 2020 – June 2021

### Cloud Architect, Data Scientist

Support for ongoing and growth opportunities for GCP Data Science projects.

Large GCP DataFlow Java project for Fortune 500 auto-parts company migrating their pricing application from Oracle to BigTable. Custom data pipeline for joining, filtering and enriching current pricing data, and updating mechanisms. Extensive use of Python, Java, BigQuery, DataFlow, Cloud Functions.

Large Scala Spark application, for HPE logistics cloud migration.

**Connected**  
**Toronto**

### ML/AI Engineer-Architect (Contract)

Developed a ML architecture and data-analytics pipeline for ingesting acoustic training data from cloud storage, computing reliable features, and training a configurable TensorFlow classifier. Responsible for determining classifier performance metrics,

DEC. 2019 —  
MAY 2020

evaluating them, and publishing them to Comet.ml for further investigation.

Was active in machine vision and radar proof of concept device for a large automotive manufacturing client.

**Technologies:** TensorFlow, Python, Docker, Android, Linux, Java, Kotlin, AWS, Google Cloud Platform components.

**Hewlett  
Packard  
Enterprise**

**Denver, CO**

JUL 2018 —  
NOV 2019

## Big Data Architect, Machine Learning Consultant (Contract)

Big Data Software Architect and Machine Learning Consultant for HPE, re-architecting existing logistics analytics system to produce more accurate and predictive models for their supply chain and coordinated business lines.

**Technologies:** Scala, Java, Spark, HBase, Hive, Hadoop, HDFS, Kafka, Zepplin

**Uncharted  
Software**

**Toronto**

JUN 2016 —  
JUL 2018

## Machine Learning Research Scientist

Worked on several U.S. Department of Defense research contracts involving machine learning, statistical modeling and data visualization.

**Technologies:** Java, Scala, Javascript, Python, Node.js, Apache Spark, ElasticSearch, Docker

**MedAvail  
Technologies**  
**Mississauga,  
ON**

FEB 2013 —  
JUN 2016

(NB: MedAvail is  
PharmaTrust,  
after re-  
capitalization)

## Senior Architect

**Synopsis:** As a Senior Architect, it was my responsibility to design and document architectural and system-level components, their interfaces, analyze use cases, and design database schema for the suite of applications at MedAvail. Establishment of organizational best-practices, designing efficient algorithms, and decomposing roles and responsibilities of software components to reduce overall system complexity, improve system robustness and maximize code reuse are also among my efforts. I reported directly to, and work closely with the Chief Architect, and both provided oversight to the other services for various deployed applications; and the integration of new hardware, especially IP video hardware and streaming technologies.

**Company overview:** MedAvail has developed a kiosk for remote dispensing of prescription drugs to a customer. The pharmacist is remote and interacts with the patient via telepresence. An internal robot performs dispensing tasks, such as labelling and inspecting the medications.

**Technologies:** C#, .Net, Windows Presentation Foundation (WPF), Microsoft Workflow Foundation, C++, Java, Visual Studio, RabbitMQ, Google Protocol Buffers, Mercurial Source Control Management, FogBugz.

**Guidewire Software**  
**Mississauga, ON**

JUN 2012 —  
FEB 2013

## Solutions Developer

**Synopsis:** Developer in small agile team for rapidly developing Insurance packages for new lines of business. Completed Guidewire's Commercial Automobile initial offering with XML rating content integration from Insurance Services Office (ISO) Electronic Rating Content specification.

**Technologies:** Gosu (similar to Scala), Java, Agile, Pair

Programming, JUnit, JBehave, Java, XML, XPath, XSD Schema design, XSLT processing, Functional Programming, Web Services, Database entity design, TDD, Specification by Example.

**Pharmatrust  
Oakville, ON**

JUL 2011 —  
JUN 2012  
(Bankruptcy)

## Senior Architect

**Synopsis:** At PharmaTrust I have been active in many facets of the development of their pharmaceutical kiosks: the design and implementation of the UI components using WPF, C#, and .Net; the design and implementation of RabbitMQ message-bus services for various deployed applications; and the integration of new hardware, especially IP video hardware and streaming technologies.

**Technologies:** Video Streaming technologies, C#, .Net, Windows Presentation Foundation (WPF), Microsoft Workflow Foundation, C++, Java, Visual Studio, RabbitMQ, Google Protocol Buffers, Mercurial Source Control Management, FogBugz.

**Kulicke & Soffa  
Philadelphia, PA**

MAR 2011 —  
JUL 2011

## Software Architect

**Synopsis:** At Kulicke and Soffa I was responsible for re-architecting the existing UI of their wire-bonder products from WxWindows, to a Qt based implementation requiring integration into their Rational Rhapsody UML modeling C++ code-generation framework and build system. Driving design factors were to optimize bandwidth requirements between the VxWorks and UI host to guarantee UI Responsiveness and usability while still guaranteeing operator workflow.

**Technologies:** C++, Qt, Rational Rhapsody, ClearCase, CMake, VxWorks.

**Algorithmics  
Toronto**

JAN 2010 —  
MAR 2011

## Senior Software Engineer

**Synopsis:** Development of UI and financial modeling components for RiskWatch, a financial modeling application that assessing risk of financial portfolios. Much of the GUI development involves updating the legacy Motif application to use cross-platform Qt widgets.

**Technologies:** C++, Qt, Linux, Visual Studio, CVS.

**Arcestra  
Toronto**

FEB 2009 —  
JAN 2010

## Senior Software Engineer

**Synopsis:** Development of a sketch-based architecture modeling tool for rapidly prototyping building spaces for rapid leasing. Part of a rapid-response fast-paced 4 member developer team delivering on aggressive deliverable schedule.

**Technologies:** C++, MS Dev Studio, QMake, Qt, OpenSceneGraph, Agile Programming.

**ALT Software  
Toronto**

OCT 2008 —  
FEB 2009

## Consultant, Technical Lead (Contract)

**Synopsis:** Reporting to vice president of software engineering, on a collaborative project with Optosecurity Inc. to build a next generation x-ray screening machine for detecting/assessing threats, such as firearms and contraband liquids. My responsibilities include the specification and development of algorithms for the geometric analysis of x-ray images to determine object geometries and substance type, and lead 6 person team (ramping up to 10).

**Technologies:** C++, OpenGL, Linux, multithreaded load balancing, custom GPU development, Design Patterns, Boost.

**RAD Intl.  
Mississauga, ON**

JAN 2008 —  
OCT 2008

## Consultant

**Synopsis:** Worked as part of a five-person team of developers, working for Wells Fargo Bank, refactoring and re-architecting a legacy banking application. The single-threaded application was migrated to a client-server application, which involved the separation of business and presentation logic, the use of XML schemas to support socket serialization of objects and the migration from Motif to platform-independent Qt libraries.

**Technologies:** C++, Linux, Unix-Makefile, Qt, XML, XSD, Log4Cxx, client-server, multi-threaded, Design Patterns, STL, Doxygen, Apache, SAX2 XML

**Scientific Systems  
Woburn, MA**

AUG 2007 —  
JAN 2008  
(resigned to emigrate  
to Canada)

## Principal Scientist

**Business Development:** Authored two research proposals for U.S. Air Force and Navy for the Small Business Innovative Research Program (SBIR)

**Technical Lead:** For a \$1M contract for U.S. Air Force for automating the verification of heads-up displays for F-16 Fighter.

**Technologies:** C++, C#, Matlab, Computer Vision, Artificial Intelligence, Signal Processing, Statistical Analysis, Machine Learning.

**Charles River  
Analytics  
Cambridge, MA**

JUL 2003 —  
AUG 2007

## Senior Scientist

### Business Development

I successfully won and managed a series of SBIR/STTR applied research programs, totally more than \$4M for various branches of the DoD.

Wrote 22 Phase-I and II proposals for various DoD SBIR programs, winning 3 two-year and one 9-month contracts totaling \$1.7M. For these efforts I was the technical lead, software architect and program manager overseeing small teams of developers (1-4 engineers), as well as directly developing code.

### Program Management

Responsible for defining problem scope with government sponsor, defining functional specifications, defining tasks and project schedule, managing developer resources, developing and conducting mathematical analyses of various data sets, writing reports summarizing the analysis, and giving presentations.

Analysis involved data clustering, PCA analysis, and feature set development for robust target identification.

**Technologies:** Qt, C++, PCA.

### Software Architect, Product Development, Technical Lead:

- VisionKit:

A general-purpose computer-vision library for developing advanced computer vision applications

**Technologies:** C++, Qt, Windows, custom classifiers, data-clustering, image processing, OpenGL, mathematical simulation).

- Verideo

An automated tool for constructing image truth for ATR algorithm verification, and for computing the performance of the ATR algorithms based on a set of developed metrics. Advanced user-interface design using QT iteratively refined from feedback from user studies conducted at AFRL.

**Technologies:** C++, Qt, XML, SAX, computer-vision, video-tracking.

- ETAPP

A mathematical model for predicting the performance of Automatic Target Recognition algorithms. This work involved the development of image metrics characterizing the intrinsic difficulty of classifying a target in a cluttered environment.

**Technologies:** C++, Matlab, multiple-regression models.

- FAÇADE

A genetic algorithm architecture for advanced ATR algorithms.

**Technologies:** C++, Matlab, MS Dev Studio, g++, Linux, Qt, XML, Apache, SAX2, OpenGL, AccuRev (SCM), Java, HTML.

- SAFER

A fast and accurate target identification system based on local curvature features.

**Technologies:** PCA, unsupervised clustering, signal processing

**Giesecke &  
Devrient  
Acton, MA**

JAN 2003 —  
JUN 2003

## Computer Vision Consultant (Contract)

Responsible for re-architecting and refactoring existing code base of real time computer vision inspection system (to inspect various currency notes) to use object oriented techniques, and was software technical lead for OO-development. Developed a set of inspection algorithms for new security features of new U.S. currency inspection at Federal Reserve, Bank of Canada, and Taiwan currency.

**Technologies:** SunOS, ClearCase, C++, multi-threaded, real-time O/S, signal processing, machine vision.

**Energid Tech.  
Watertown, MA**

AUG 2002 —  
DEC 2002

## Consultant (Contract)

Co-authored SBIR and BAA proposals for Air Force and Homeland Security departments. Developed computer-vision based target tracking algorithms for Energid's computer vision libraries used by the Air Force Research Laboratories.

**Technologies:** C++, XML, computer vision, tracking, CVS, image compression, PCA

**Teradyne  
Boston, MA**

MAY 2002 —  
JUL 2002

## Computer Vision Consultant

**Developed:**

a) Supervisory control algorithms for 10 DOF material handling robot using C++/COM

b) Diagnostic VB client and user interface front end

&

JAN 2002 —  
MAY 2002

c) Computer-vision C++/COM+ objects for Teradyne panel-testing robot for high-speed measurement of electronic components.

d) Prototype development of machine-automation software – a coupling of computer-vision and robot-motion control

**Technologies:** C++, OO-Design, machine-vision development, COM+, Visual Basic GUI

**Cognex  
Natick, MA**

## Senior Software Engineer

### Developed:

a) Probe-mark inspection software for wafer inspection machines

b) Automated image database test framework

for verification of Probe Mark Inspection

c) MFC based image database algorithm verification tool

d) Multi-threaded real-time embedded support for image acquisition software

e) Custom hardware and software for tested frame-grabbers.

A patent resulted in the above. I was the lead engineer collaborating with the patent attorney

**Technologies:** C++, OO-Design, UML, Pharlap RTOS, multi-threaded embedded real-time development, Win2K/NT

JUN 1999 —  
Oct 2001

**Oak Ridge National  
Laboratories  
Oak Ridge, TN**

## Graduate Student Intern

Development of real-time computer vision tracking algorithms for autonomous mobile robots.

**Technologies:** C++, Linux, computer vision, machine learning, robotics

JUN 1997 —  
Oct 1997

**BNR (Nortel)**

## Software Engineer

High level design and analysis of distributed operating system support for high speed fiber optic transport product

Enhancement and maintenance BNR Pascal compiler and assembler for XMS real-time operating system.

APR 1989 —  
SEP 1989 (full-time)

APR 1988 —  
SEP 1988 (co-op)  
APR 1987 —  
SEP 1987 (co-op)



## EDUCATION

**University of  
British  
Columbia**

1989 – 1999

### **PhD, Computer Science, Robotics**

**Area of Interest:** Fault tolerant path planning, simulation, verification, and visualization.

**Dissertation:** ``A Constraint Based Approach for Computing Fault Tolerant Robot Programs''

**University of  
British  
Columbia**

1989 – 1991

### **Msc. Computer Science, Computer Vision, ML**

**Area of Interest:** Computer vision, machine learning, neural networks.

**Dissertation:** ``A Neural Network Implementation for Integrating Discontinuity and Displacement Information'''

**Memorial  
University**

1984 – 1989

### **BSc. (Honours), Computer Science**

Concentration of applied mathematics.

**Dissertation:** "Estimating the Phylogenetic Relevance of rRNA Sequence Characters Using Probabilistic Methods"

## PUBLICATIONS

Harold Soh, Scott Ralph, et al., Jul. 1, 2017, ``An Open Source Adaptive User Interface for Network Monitoring'', IEEE International Conference on Systems, Man, and Cybernetics.

Catherine Inibhunu, Scott Ralph, et al., ``Adapting Level of Detail in User Interfaces for Cybersecurity Operations'', Aug. 16, 2016 , IEEE Conference on Resilient Control Systems.

Scott K. Ralph , Mark R. Stevens, Magnús Snorrason, and John Irvine, "Evaluation Testbed for ATD Performance Prediction (ETAPP)", Proceedings SPIE Defense & Security, Orlando, FL (Apr., 2006).

Scott K. Ralph , Mark R. Stevens, Magnús Snorrason, and John Irvine, "START for evaluation of target detection and tracking", Proceedings SPIE Defense & Security, Orlando, FL (Apr., 2006).

Scott K. Ralph, Magnús Snorrason and Camille Monnier, "Model-buased target detection and recognition with ladar imagery", Proceedings SPIE Defence & Security, Orlando, FL (Apr., 2006)

Irvine, J. M., Ralph, S., Stevens, M. R., Marvel, J., Snorrason, M., and Gwilt, D., "START for Evaluation of Target Detection and Tracking," , Proceedings SPIE Defense & Security, Vol. 5807. Orlando, FL (April), 2005.

S. Ralph, J. Irvine, M. Stevens, M. Snorrason, and D. Gwilt, "Assessing the Performance of an Automated Video Ground Truthing Application", Proceedings of Applied Imagery Pattern Recognition, Washington DC (Octobuer, 2004).

Irvine, J., Ralph, S. K., Stevens, M. R., Kenyon, S., Anderson, D. Snorrason, M., and Gwilt, D., "A Scoring, Truthing, and Registration Toolkit for Evaluation of Target Detection and Tracking," , Proceedings SPIE Defence & Security, Vol. 5426, Orlando, FL (April), 2004

Ralph, S. K., Irvine, J., Stevens, M. R., Snorrason, M., and Gwilt, D., "Assessing the Performance of an Automated Video Ground Truthing Application," Proceedings of Applied Imagery Pattern Recognition, Washington DC (Oct.), 2004.



Stevens, M. R., Ralph, S. K., and Snorrason, M., "Interactive Truthing Tools for Moving Platforms and Moving Targets," Automatic Target Recognition Working Group, Feb. 2004.

Ralph, S., Irvine, J., Snorrasson, M., Stevens, M. and Vanstone, S., "An Image Metric-Based ATR Performance Prediction Testbued", Proc. of the Applied Imagery and Pattern Recognition Workshop, Washington, D.C. (Oct., 2005)

"Fault Tolerant Locomotion for Walking Robots," IEEE International Symposium on Computational Intelligence in Robuotics and Automation, 1997, pp. 130-137.

Scott K. Ralph and Dinesh K. Pai, "Detection and localization of un-modeled manipulator collisions," IEEE International Conference on Intelligent Robuots and Systems, 1995, Vol. 2, p 504-509.

"Platonic Beasts: Spherically Symmetric Multilimbued Robuots," Autonomous Robuots, 1995, Vol. 2, No. 3, pp 191-201.

"Design and Programming of Symmetric Platonic Beast Robuots," Experimental Robuotics-IV, Springer- Verlag, 1995.

Scott K. Ralph and Dinesh K. Pai, "Computing Fault Tolerant Motions for a Robuot Manipulator," IEEE Conference on Robuotics and Automation, 1999.

Scott K. Ralph and Dinesh K. Pai, "Fault ``Platonic Beasts: A New Family of Multilimbued Robuots," IEEE International Conference on Robuotics and Automation, 1994, p 1019-1025.

"Estimating the Phylogenetic Relevance of rRNA Sequence Characters Using Probuabuilistic Methods," BSc. Thesis, Scott K. Ralph, Memorial University Press, 1988.

Approximation Techniques in Complex Reaction Kinetics", D. Summers, J.M.W. Scott, and Scott K. Ralph, International Journal of Chemistry Kinetics, Vol 19(553), 1987.