

# Scott K. Ralph, Ph.D.

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## Objective

To significantly contribute to and shape development of software at a progressive and forward-thinking company. 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.

## Experience Summary

In my roles of a contractor to Fortune 500 companies, and as a Senior Architect/Principal Scientist, I have experience that spans the software lifecycle, including business development, program management, software architecture, team leader, and developer.

**Platforms:** Windows 8, Windows 2007, Unix, Linux (RedHat, Ubuntu, Solaris, HPUX, SunOS,)

**Methodologies:** Agile, Design Pattern, Service-Oriented Architectures, UML, Test-Driven Development, Extreme Programming, Pair Programming,

**BigData Ecosystems:** Hadoop, MapReduce, HDFS, HBase, Zookeeper, Pig, Hive, Sqoop (coursework through Coursera Big Data Specialization courses – see Certifications section)

**Windows/Dot Net:** .NET Framework 4.5, NUnit, WPF, LINQ, OpenGL, IIS, Web Services, Visual Studio 2013, ReSharper, WCF, C#, MoQ, Team Foundation Server, Git, Dapper, MS SQL Server

**Messaging:** RabbitMQ, Google Protocol buffers

**Languages:** C#, C++, C, Java, Javascript, Gosu, Scala, Python

**Scripting:** Bash, Python, PHP, Javascript, HTML, Python, Korn Shell

**Databases:** MS SQL Server, MySQL, HBase

**Application Servers:** MS IIS, Apache Tomcat 7, Jetty

**Tools:** VisualStudio, Eclipse, IntelliJ, Team Foundation Server, Subversion, Git, ReSharper, Enterprise Architect

I have consistently used industry best practices for software including:

- Agile Development,
- Service-Oriented Architecture for Enterprise Software,
- Inversion of Control (IOC) Containers,
- Dependency Injection,
- Test-Driven Development,
- Specification by Example,
- Use of fluent interfaces,
- Component interface mocking (Moq et al.),
- Disciplined use of Source Control Management (TFS, Git, ClearCase, Subversion, etc.) tailored to effective release engineering management techniques,
- Class design using Design Patterns and Effective C++ (e.g. Scott Meyers),
- Extensive Standard Template Library (STL) use,
- Doxygen documentation, and XML-based technologies.

## Certifications

- Specialization in Big Data, University of San Diego Supercomputing Center, (Coursera)
  - Introduction to Big Data, completed, Oct. 2015
  - Hadoop Platform and Application Framework, Nov. 2015  
Hadoop stack, HDFS, MapReduce, Spark
  - Introduction to Big Data Analytics, Dec. 2015
  - Machine Learning for Big Data, Jan. 2016

## Experience

### Medavail Technologies

Feb. 2013 - present Mississauga, ON, Senior Architect  
Canada

#### Note

MedAvail was established from PharmaTrust through recapitalization after bankruptcy.

#### Role

As a Senior Architect, it is 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 re-use are also among my efforts. I report directly to, and work closely with the Chief Architect, and both provide oversight to the other development teams, as well as being very active in the code development, spending at least half of my time developing code as a member of various feature teams.

#### 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 involving audio/video link. Inside the kiosk is a dispensing robot that is responsible for choosing the correct package(s), labeling the medication, displaying imagery to the pharmacist to ensure quality control and safety requirements, printing the drug leaflets and other material, collecting payment, and finally releasing the package(s). Additionally there is a large enterprise software infrastructure for the administration of a collection of kiosks for large pharmacy chain clients.

Jun. 2012 - Feb.  
2013

Guidewire.com (NYSE:  
GWRE)  
Mississauga, ON, Canada

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, Ajile, Pair Programming, JUnit, JBehave, Java, XML, XPath, XSD Schema design, XSLT processing, Functional Programming, Web Services, Database entity design, Test-driven development, Specification by Example.

Jul. 2011 – Jun 2012  
(bankruptcy)

PharmaTrust  
Inc.  
Oakville, ON,  
Canada

Sr. Developer / Implementation 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

Mar. 2011 – Jul 2011 Philadelphia, PA

Software Architect

#### Synopsis:

My role at Kulicke and Soffa was to re-architect the existing UI of their wire-bonder products from WxWindows port of their Motif framework, to a Qt based implementation. Additionally the Qt/C++ implementation required 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.

Jan. 2010 – Mar. 2011      [Algorithmics, Inc](#)      Senior Software Engineer  
Toronto, ON

**Synopsis:**

Development of UI and financial modeling components for RiskWatch, a financial modeling application that assess the risk associated with portfolios of financial instruments by shocking them with sets of stress scenarios, measuring the value at risk, and probabilistically valuating the future positions. Much of the GUI development involves updating the legacy Motif application to use cross-platform Qt widgets.

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

Feb. 2009 – Jan. 2010      [Arcestra, Inc](#)      Senior Software Engineer  
Toronto, ON

**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.

Oct. 2008 – Feb. 2009      [ALT Software](#)      Consultant, Technical Lead  
Toronto, ON

**Synopsis:**

I was technical lead, reporting to vice president of software engineering, of 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.

**Development Environment**

Eclipse (IDE), Subversion (SCM), Log4CXX (logging), CXXTest (unit testing), Agile programming techniques.

Jan. 2008 – Oct. 2008      [RAD International](#)      Consultant  
Mississauga, ON

**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 Parsing.

Aug. 2007 – Jan. 2008  
(resigned to emigrate to Canada)      [Scientific Systems Inc](#)      Principal Scientist  
Woburn, MA

**Business Development:**

Authored two research proposals for the 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.

Jul. 2002 – Aug.  
2007

Charles River Analytics,  
Inc.  
Cambridge, MA

Senior Scientist

### Business Development

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.

### 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.

#### SAFER

A fast and accurate target identification system based on local curvature features. Analysis involved data clustering, PCA analysis, and feature set development for robust target identification.

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

#### 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.

### 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.

Jan 2002 – Jun  
2002

Giesecke & Devrient, Inc.  
Acton, MA

Computer Vision Consultant

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 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.

Aug 2002 – Dec 2002      [Energid Technologies Inc.](#)      Consultant  
Cambridge, MA

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 analysis.

May 2002 – July 2002      [Teradyne, Inc.](#)      Sr. Software Engineer  
Jan 2002 – Mar 2002      Boston, MA      Consultant

- Developed supervisory control algorithms for 10 DOF material handling robot using C++/COM
- Development of diagnostic VB client and user interface front end
- Development of computer-vision C++/COM+ objects for Teradyne panel-testing robot. This includes the high-speed measurement of physical properties of the component(s) under test.
- Design and 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 development, Microsoft SourceSafe

Jun 1999 – Oct 2001      [Cognex Inc.](#)      Sr. Software Engineer  
([NASDAQ: CGNX](#))  
Natick, MA

- Developed Probe-mark inspection software for wafer inspection machines
- Development of an automated image database test framework for verification of Probe Mark Inspection software
- Development of MFC based image database algorithm verification tool
- Development of multi-threaded real-time embedded support for image acquisition software for various frame-grabbers
- Designed and implemented custom hardware and software for a system that generated synthetic images and tested frame-grabbers. The system systematically issued hardware triggers to the frame grabber at precise video-timing positions and verified the frame-grabber's response.
- 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 1997 – Oct 1997      [Oak Ridge National Laboratories](#)      Graduate Student Research Internship  
Oak Ridge, TN

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

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

Apr 1989 – Sept 1989  
(full-time)

Apr 1988 – Sept 1988      [Nortel Networks](#)      Software Engineer  
(co-op)      Ottawa, ON

Apr 1987 – Sept 1987  
(co-op)

- 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

## Skills Summary

- Extensive C#, Java, C++ experience in Unix and Microsoft Visual C++ environments, as well as COM+.
- Objected-oriented design techniques; use of UML; techniques for highly-reusable software such as design patterns
- Multilevel-experience spanning low-level hardware interface, library-level development (OEM consumable class libraries with API), and application-level development
- Very experienced with multi-threaded real-time system development
- Experience with Rational tools, including ClearCase and others
- Solid analytical and problem-solving skills
- Strong teamwork skills
- Excellent writing and communication skills
- Embedded/real-time analysis, design and development
- Familiar with a number of mathematical packages including Matlab, Mathematica, etc.
- Data visualization using OpenGL on SGI workstations

## Awards

- 1991 Natural Sciences & Engineering Research Council of Canada Doctoral Scholarship
- 1989,1990 Natural Sciences and Engineering Research Council of Canada 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

## Publications

- Scott K. Ralph , Mark R. Stevens, Magnús Snorrason, and John Irvine, "Evaluation Testbed for ATD Performance Prediction (ETAPP)", Proceedings SPIE Defense & Security, Orlando, FL (April, 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 (April, 2006).
- Scott K. Ralph, Magnús Snorrason and Camille Monnier, "Model-based target detection and recognition with ladar imagery", Proceedings SPIE Defence & Security, Orlando, FL (April, 2006).
- Irvine, J. M., Ralph, S., Stevens, M. R., Marvel, J., Snorrason, M., and Gwilt, D. (2005) "START for Evaluation of Target Detection and Tracking," Proceedings SPIE Defence & Security, vol 5807. Orlando.
- Ralph, S., Irvine, J., Snorrason, M., Stevens, M. and Vanstone, S., "An Image Metric-Based ATR Performance Prediction Testbed", Proceedings of the Applied Imagery and Pattern Recognition Workshop, Washington, DC (October, 2005).
- Ralph, S., Irvine, J., Stevens, M. R., and Snorrason, M. "START: A Tool for Rapidly Generating Image-Truth and Evaluating ATR Performance," Proceedings of WACV. Breckenridge, CO (January), (2005).
- "Video Surveillance at Night," Stevens, M. R., Pollak, J., Ralph, S., and Snorrason, M., Proceedings SPIE Defence & Security, vol 5810. Orlando, FL (April), 2005.
- "START for Evaluation of Target Detection and Tracking," Irvine, J. M., Ralph, S., Stevens, M. R., Marvel, J., Snorrason, M., and Gwilt, D.", 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 (October, 2004).
- "A Scoring, Truthing, and Registration Toolkit for Evaluation of Target Detection and Tracking," Irvine, J., Ralph, S. K., Stevens, M. R., Kenyon, S., Anderson, D. Snorrason, M., and Gwilt, D, Proceedings SPIE Defence & Security, Vol. 5426, Orlando, FL (April), 2004.
- "Assessing the Performance of an Automated Video Ground Truthing Application," Ralph, S. K., Irvine, J., Stevens, M. R., Snorrason, M., and Gwilt, D. Proceedings of Applied Imagery Pattern Recognition, Washington DC (October), 2004.
- "Interactive Truthing Tools for Moving Platforms and Moving Targets," Stevens, M. R., Ralph, S. K., and Snorrason, M. (2004), Automatic Target Recognition Working Group, Eglin, FL, February 2004.
- "Computing Fault Tolerant Motions for a Robot Manipulator," Scott K. Ralph and Dinesh K. Pai, IEEE Conference on Robotics and Automation, 1999.
- Stevens, M. R., Ralph, S. K., and Snorrason, M. (2004) "Interactive Truthing Tools for Moving Platforms and Moving Targets," Automatic Target Recognition Working Group, 2004, Eglin, FL (February).

- "Fault Tolerant Locomotion for Walking Robots," Scott K. Ralph and Dinesh K. Pai, IEEE International Symposium on Computational Intelligence in Robotics and Automation, 1997, pp. 130-137.
- "Detection and localization of un-modeled manipulator collisions," Scott K. Ralph and Dinesh K. Pai, IEEE International Conference on Intelligent Robots and Systems, 1995, Vol. 2, p 504-509.
- "Platonic Beasts: Spherically Symmetric Multilimbed Robots," Autonomous Robots, 1995, Vol. 2, No. 3, pp 191-201.
- "Design and Programming of Symmetric Platonic Beast Robots," Experimental Robotics-IV, Springer-Verlag, 1995.
- "Platonic Beasts: A New Family of Multilimbed Robots," IEEE International Conference on Robotics and Automation, 1994, p 1019-1025.
- "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.
- "Estimating the Phylogenetic Relevance of rRNA Sequence Characters Using Probabilistic Methods," BSc. Thesis, Scott K. Ralph, Memorial University Press, 1988.

## Education

1999	Ph.D., Computer Science Specialization: Robotics	The University of British Columbia Vancouver, Canada
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### Area of Interest

Fault tolerant path planning, simulation, verification, and visualization.

### Dissertation:

"A Constraint Based Approach for Computing Fault Tolerant Robot Programs"

1991	MSc., Computer Science Specialization: Computer Vision, AI, Machine Learning	The University of British Columbia Vancouver, Canada
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### Area of Interest

Computer vision, machine learning, neural networks.

### Dissertation:

"A Neural Network Implementation for Integrating Discontinuity and Displacement Information"

1989	BSc. (honours), Computer Science	Memorial University
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### Honours Thesis

"Estimating the Phylogenetic Relevance of rRNA Sequence Characters Using Probabilistic Methods".