Edward J. Segall, PhD

Systems and Software Engineering Consultant

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SYNOPSIS

Systems Engineer, **Software Architect, Software Engineer**, **Performance Engineer. Experienced Problem Solver/Troubleshooter.**

Record of significant improvements to the accuracy, speed, reliability, functionality and maintainability of complex, highly concurrent mission-critical systems and applications.

Independent consultant experienced in Wireless **geolocation** (**5 patents**), Optical location, Battery monitoring, Railcar rollability **modeling** and **parameter estimation**, **Video surveillance**, **Global banking**, **Video-on-demand**, **Cable television**, **Air quality modeling**, **Medical instrumentation**.

PROFESSIONAL HISTORY

TotalTrax, Inc, Newport, DE *June 2016–Oct 2017*

Senior Research Engineer

Product SkyTrax Location Tracking

- **Investigated new indoor location technologies**, acted as technical liaison to vendors / potential partners, evaluated capabilities, identified integration requirements.
- **Led 3rd-party POC integration project:** identified tasks/milestones, specified API, developed integrated system, identified vendor issues, negotiated improvements, evaluated performance.

Products SX200 Telematics Server, VX Vehicle interface, Battery Monitor System

- Troubleshot software and system issues, identified root causes, proposed solution options and workarounds, and implemented solutions.
- Improved **system robustness** and **data persistence** for a wide range of failure conditions.
- Specified functional requirements and developed test procedures.
- Implemented and/or enhanced ReSTful APIs for data services, monitoring and reporting.
- Successfully advocated for adoption of branch-on-release versioning policy.
- Worked with field engineers to support beta trial installations at customer sites.

Used Java (J2EE), JPA, Go (golang), JavaScript, RabbitMQ, Cassandra, MySQL, ROS, Linux, embedded Linux, Subversion, Glassfish / Payara, IntelliJ IDEA.

Edge Technical Associates LLC—R&D Consultant *Jun 2002–Jun 2016, Oct 2017-Present*

Client PS Technology, Inc (part of **Union Pacific Corp**), *2013–2015*
Yard Systems Group

Software Engineer / Data Scientist / Systems Engineer / Database Architect

Product Star III Hump Process Control System (HPCS) for rail freight classification yards

Yard Tuning Tool ("Tuning Service")

- Designed, implemented and brought to successful production use this all-new system that estimates control parameters from operational data.
- Became a Subject Matter Expert in freight car rollability and rolling resistance modeling.
- Adapted design to support new use cases that arose in production operation.

- Developed operational procedures and novel strategies and methods.
- Trained and collaborated with other Union Pacific teams.

HPCS Database and Data Service
- Robust RESTful web service used by HPCS to persist operational data for Tuning Service, KPI/dashboard/reporting, and for post-incident analysis.
- Designed schema to support all anticipated yard topologies and tuning workflows.
- Conceived of, designed, implemented, and brought it to successful production use.

Data Acquisition Mode
- Conceived of, advocated for, and assisted in development and testing of new HPCS feature that makes it possible to tune a yard before attempting to control it.

Performance Analysis tools
- Developed queries and spreadsheets to monitor yard tuning performance, identify trends and isolate issues. Used these tools to inform management and guide operational decisions.

Rolling Resistance model improvements
- Investigated systematic errors in physical model; discovered opportunities to improve model and to improve yard performance over a wide range of conditions. Formulated analytic criterion for determining the useful temperature range of a given set of control parameters.

Used Java, Apache Commons Math, Apache Axis 2, gSoap, SQL, Hibernate, JPA, MySQL, Tomcat, Eclipse, Java VisualVM, Ant, Excel, Git, Squish.

Client CCAD (joint venture between **Arris** (formerly Motorola/Google) and Comcast) *2011–2012*

DevOps engineer, Configuration Management Team

Designed and implemented new features for company-wide build/release management:

Projects
- Dependency management system for Bamboo continuous integration tool
- Jira plugin (OSGI) to manage storage of oversize attachments
- Automated cloning of sets of related Bamboo build plans
- Automated deletion of obsolete artifacts from Sonatype Nexus repository
- Many custom scripts and tasks

Used Bash, Java, Groovy, awk, grep, cURL, wget, MySQL, JSON, Xml Starlet, XPath, Nexus, Sonar, Apache httpd, log4j, Tomcat, subversion, Git, Maven, SuSE Linux, VMWare, Eclipse.

Client SRI International (was David Sarnoff Research Center) *2010*

Machine Vision engineer

Project NOVA—Data-Parallel, Real-Time, Multiple-Target Wide Area Aerial Surveillance (WAAS) Tracking

NOVA system - Highly Parallel Machine Vision
- Found, fixed bugs in NOVA's tracklet generation and track/frame alignment.
- Addressed issues related to builds, concurrency, memory, and other factors.

Multi-object tracking performance evaluation
- Developed tool to generate track-oriented Video Performance Evaluation Resource (ViPER) XML from NOVA's tracklet-oriented XML.
- Developed methods and workflows for using ViPER-GT ground-truth authoring tool and NIST's F4DE (Framework for Detection Evaluations) to evaluate tracking performance.
- Improved road marking methods and workflow; wrote guide for other team members.

Field Exercise Support
- Invented and demonstrated novel method for scene-based Non-Uniformity Correction of extinction artifacts in a shutterless, segmented image sensor.

Used C++, STL, BOOST, MATLAB, ViPER, ViPER-GT, F4DE, MSXML, awk, Ubuntu, Windows, MPI.

Client TruePosition *2004–2009*

Software Engineer / Systems Engineer / R&D Consultant (CTO Science team)

Product U-TDOA Location Processing

Accuracy improvements

- Improved 95th percentile accuracy of TruePosition's core location technology by 10%.
- Awarded TruePosition's 2008 **Invention of the Year award** and **two patents** for this work.

Simulation/Modeling, Performance Tuning: Auto-Configuration tools

- Increased speed of Accuracy Prediction tool **50X; halved** memory footprint; made server farm obsolete. This tool has been used to **engineer nationwide networks** and has brought in **new business** through proposal support.
- Made numerous stability improvements, bug fixes and feature enhancements.
- Served as system engineer and subject matter expert / internal consultant.

Receiver Selection Algorithms

- Developed algorithms for selecting reference collection and timing cooperation receivers for Distributed Antenna Systems (DAS).
- Invented and developed algorithms for selecting signal demodulation and timing cooperation receivers for air interfaces that use macro diversity with selection combining (e.g. *soft handover* in UMTS). Awarded **three patents** for this work.
- Resolved long-standing inconsistencies among results from Solaris, Linux, Windows builds.

Real-time resource scheduling

- Invented and developed a novel scheduling method for Location Measurement Units that improved accuracy and system availability under high demand.

U-TDOA Reference Selection

- Led resolution of anomalous GSM reference selection metric values found in testing.

Product CGI+TA and E-CID location processing

- System engineering, software design and implementation for multiple features and updates.

Standards

Contributed to 3GPP UMTS standard **TS 25.111** *"Location Measurement Unit (LMU) performance specification; User Equipment (UE) positioning in UTRAN"* via RAN4 work items.

Configuration/build/release management

- Improved internal release process for cross-platform library code; performed release builds of internal tools, coordinated branch/merge planning and implementation with CM lead.

Used C, C++, STL, Boost, Intel Math Kernel Library, Intel VTune Performance Analyzer, valgrind, Visual Studio, Visual Studio Profiling Tools, gcc, make, Sun Workshop, Cygwin, Java, JNI, JSP, Perl, RedHat Enterprise Linux, MATLAB, MapInfo, Rational ClearQuest, UCM, Base ClearCase.

Client Scientific Computing Associates: Developed distribution-ready Microsoft Visual Studio port of Unix TCP Linda parallel/distributed coordination language (in C) from Cygwin)/MKS prototype.

Client SevenEcho: Designed, developed, and delivered core system architecture and initial implementation and brought it through successful technical due diligence review.

Client IntelliTrans (originally August Design): Led multi-organization team in converting STARR legacy railroad ERP system from iSeries RPG to workflow-centric, web-based (Java + JSP) interface.

Liberate Technologies (originally MoreCom), Horsham, PA *Apr 2000–Feb 2002*

Senior Software Engineer, Video-On-Demand (VOD) Server Products

- Led video clip server development for Vidéotron Health project.
- Led integration of 3rd-party VOD servers with Liberate's Connect Suite product line.
- Researched Java Virtual Machines for embedded systems and taught internal short course.
- Actively participated in Interactive Services Architecture (ISA) standards working group.
- Mentored junior members of engineering staff.

Used C, Visual C++, CORBA, Sun Workshop, Java, Perl, Oracle, Perforce, Scientific Atlanta PowerTV.

Edge Technical Associates—R&D Consultant *Aug 1999–Apr 2000*

Client **MoreCom** (became **Liberate Technologies**), Horsham, PA

- Redesigned and enhanced layout engine of set-top box web browser (C/C++). Improved layout of images, tables, and text and brought into compliance with HTML 4.01 standards.

Sanchez Computer Associates (now FIS), Malvern, PA *Aug 1998–Aug 1999*

Senior Software Engineer, Greystone Group

Database internals for proprietary GT.M parallel database engine:

- Analyzed new replication and failover features for potential impact to system performance and **business continuity**, resulting in several design and implementation refinements.
- Designed and implemented ACID-safe, **hard real-time transaction timeouts** to enable controlled failover during long transactions.
- Improved system performance, reliability and behavior during exceptional operating conditions.
- Identified and eliminated concurrency hazards including race conditions, livelock, etc.
- Designed and implemented crash/recovery tests. These led to understanding and resolving several long-standing bugs, which **significantly improved database recoverability** after failures.

Used C, C++, Assembly language (HP (DEC) Alpha, HP RISC, IBM RS6000/PowerPC, Sun SPARC), IBM AIX, HP (Compaq/DEC) Tru64 UNIX, Cygwin, X-Windows, emacs, vi.

Villanova University, Villanova, PA *Aug 1996–Aug 1998*

Assistant Professor, Department of Computing Sciences and
Consultant, NSF I/UCRC Center for Advanced Communication

- Taught undergraduate Algorithms and Data Structures courses in C and in Java.
- Revised, taught graduate Distributed Systems and Object-Oriented Design (in Java).
- Led class-wide Rapid Application Development projects.
- Closely supervised many M.S. independent projects.

University of Delaware, Newark, DE *Sep 1995–May 1996*

Visiting Assistant Professor, CIS Department

- Revised and taught graduate Discrete-Event Simulation and Programming Languages courses.
- Taught undergraduate Algorithms and Data Structures in C and in C++.

Carnegie Mellon University, Pittsburgh, PA *Jun 1992–Sep 1995*

System Scientist, School of Computer Science

Research project: "Distributed Computational System for Environmental Modeling", an NSF High-Performance Computing and Communications (HPCC) initiative Grand Challenge project:

- Converted the Urban-to-Regional Multiscale Airshed air quality model to a high performance computing (HPC) model using task and data parallelism, message passing (PVM), and network-optimized communication and I/O.
- Ported model to vector supercomputers, massively parallel processors (MPP) and server clusters at the Pittsburgh Supercomputing Center and to wide-area heterogeneous combinations of these systems.
- Designed verification methods that led to quick identification and resolution of errors.
- Achieved highest speed regional air quality model execution ever reported as of that time.
- Supervised porting the model to the Fx task-and-data-parallel FORTRAN language.
- Developed the Airshed component of the CMU Task Parallel Program Suite.
- Supervised staff and undergraduate programmers and managed tight schedules.

Used C, FORTRAN, Parallel Virtual Machine (PVM), High-Performance FORTRAN (HPF, F90), gcc, make, awk, CVS, mach, Solaris, Andrew File System, Cray C90/T90/T3E supercomputers, emacs.

PRIOR EXPERIENCE

Software, firmware, and analog & digital hardware design, including real-time signal processing, medical instrumentation, robotics, and real-time optical measurement systems.

EDUCATION

Rutgers University, New Brunswick, NJ

PhD, Electrical and Computer Engineering

Dissertation: *Tuple Space Operations: Multiple-Key Search, On-Line Matching and Wait-Free Synchronization*

Improved scalability of the Linda Tuple Space distributed key-value store, fault-tolerant synchronization and programming language support for dynamic parallel systems.

Verified performance claims using Yale's Intel iPSC/2 Hypercube. Prototyped algorithms in Smalltalk-80 with visualization using the Model-View-Controller (MVC) user interface paradigm.

MS, Computer Science

University of Pennsylvania, Philadelphia, PA

BSE, Electrical Engineering

Senior Design Project: Designed, implemented and programmed a novel real-time digital filter architecture using microprogrammed TTL Schottky logic.

Summer project (Physics department, Selove lab): Found, diagnosed and resolved a design flaw in a new scintillation detector amplifier that was developed for a Fermilab experiment.

PATENTS, AWARDS, PUBLICATIONS, PRESENTATIONS

Presentation: "Methods for determining the location of mobile devices in real time", to IEEE Philadelphia Consultants Network, December 4, 2012.

US Patents **8738010**, **8442538**, **8290496**, "Cooperating Receiver Selection for UMTS Wireless Location", Edward Joseph Segall, Simon Issakov and Rashidus S. Mia.

US Patents **8138976**, **7956808**, "Method for Position Estimation Using Generalized Error Distributions", Pete A. Boyer, Rashidus S. Mia, and Edward J. Segall

TruePosition 2008 **Invention of the Year Award**

TruePosition 3GPP RAN Working Group 4 contribution R4-070478, "Simulation Proposal for UTDOA LMU Performance", Kobe Japan, May 2007, with Pete Boyer, Rashidus Mia, Ron Lefever.

TruePosition 3GPP RAN Working Group 4 contribution R4-070490, "Simulation Results for UTDOA LMU Performance", Kobe Japan, May 2007, with Pete Boyer and Rashidus Mia.

For earlier publications, please see http://www.edge-technical.com/esegall-publist.html

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