Alan W. Esenther

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Senior software engineer experienced with end-to-end software product development who enjoys exploring new technologies and finding or creating the right tool for the job. Expertise in many programming environments and on projects requiring front-end, UI/UX, and database development. Special focus on interactive data visualization (e.g. D3.js, GIS).

# Professional Experience

## CIRCLE TWELVE INC., Framingham, MA -present

**Chief Software Architect**

Head of software development for a startup that was spun out of a research lab to productize DiamondTouch multi-user touch tables. Before and after the spin out, primarily in charge of the DiamondTouch SDK, which includes application, demo and utility software with code modules for C, Java, C#/VB.NET, D3.js, Flash, JavaScript. As needed, acted as consultant, international speaker, field engineer, instructor, release engineer, technical writer, and software maintenance guru.

* + Developed multi-user touch interactive data visualizations to showcase product used for GIS (maps), games, and demos.
  + Invented elegant precision-hover gesture capability (not available in current tablets and touchscreens) that allows touchers to precisely target single pixels on the touch display. Many user experience tasks such as this required many iterations to achieve the desired effect.
  + Created comprehensive “DTCollaborate for ESRI ArcGIS” ArcMap extension to bring collaborative capabilities to the GIS (digital maps) community, including unique layer-aware interaction-history.
  + Developed WebSockets-based distributed touch capability for video conferencing system to connect remote tables for immersive simultaneous interaction.

## MITSUBISHI ELECTRIC RESEARCH LABS, Cambridge, MA 2001-2014 Principal Research Scientist, Data Analytics Group ()

Key contributor on dozens of projects. Primarily handled data visualization, software engineering, database, architecture, and demo aspects for many projects using many software technologies. Selected highlights:

* + Data Visualization Projects  
    ► Created multi-dimensional charts and map animations to compare algorithm performance for a power load-flow analysis project; ► created multi-surface map application to present at the ESRI International User Conference (GIS) as "Multi-Touch Gestures for Controlling Synchronized Map Views” (C#, embedded browser, KML, ArcGIS); ► ported MATLAB algorithm code to Java and wrote Swing (JFreeChart) demo for Power Theft Detection project and a 3D data visualization of unusual findings; ► transformed 250GB telematics database for use with a demo that visually compares 3 route proposal algorithms using Google Earth animations; ► took over Java (Prefuse) metadata visualization tool development to meet deliverable deadline; ► directed integration of a train voltage optimization demo with existing Qt code.
  + Database Development  
    Over 6 billion raw GPS and CAN-bus data items collected for an automotive HMI project (to predict and propose driver actions) required a database and extensive cleanup.
    - Architected a database including a 600-column table for feature generation. Extensive PL/pgSQL and Python coding to perform data cleansing and address out-of-memory problems (with Python, WEKA, PostgreSQL/PostGIS, and connectors). Project was completed on time and promoted as "Ultra-simple Predictive HMI" in 2014.
    - Developed algorithms for area familiarity, trip segmentation, coalescing data.
    - Developed web-based trip data visualizations to impress stakeholders and find problems (Google Earth & Maps).
  + Project Lead  
    Principal Investigator and sole implementer for a two-year Automatic Schema Matching (ASM) project to automatically merge database schemas. Major components included the ASM framework API, object design, process modules, dozens of matchers (e.g. lexical, structure, composite), utility programs for similarity matrices aggregation (combine matcher results) and alignment extraction (choose matches from similarity matrices), and a complete Python regression system. Developed in Java and Python on Windows, then ported to Linux.
    - Succeeded in achieving ambitious 90.1% matching accuracy goal.
    - Developed a 3D scatterplot tool to interactively compare two schemas using various matchers (Java Swing/jogl/jzy3d), and another tool to interactively explore scatterplot decision surfaces (C# Forms).
    - Two-year project successfully completed on-time and was incorporated into a larger data integration platform.
  + Web Integration  
    Sponsor needed a way to programmatically interact with arbitrary websites (e.g. for ordering parts) that are designed only for mouse/keyboard interaction. Developed a Mozilla Firefox plugin as part of an SOA (Service-Oriented Architecture) Integration solution. (Experimented with SWT and Eclipse RCP; developed plugin with XUL, WSDL, RDF, ActiveX support)
    - Determined that the best solution would be a browser plugin to capture all mouse/keyboard interactions with an existing website. The plugin automatically generated an intelligent web service wrapper (WSDL/RDF), which allowed the website to be accessed entirely programmatically. Project successfully completed and delivered on time.
    - Demonstrated the final system by writing a multi-component data visualization that dynamically retrieved electricity cost information from an NSTAR website to create color-coded 3D bar charts of energy costs on an interactive 3D view of Massachusetts (C#, embedded web browser, JavaScript, HTML, CSS, generated KML).
  + Software Engineering Highlight  
    An elevator scheduling algorithm had to be tested using industry-standard elevator traffic analysis and simulation software (Elevate) to get realistic performance numbers. Over 50,000 simulation jobs were required, but Elevate was designed to be run by an interactive user (not batch).
    - Developed C#.NET WCF-based Distributed Computing Framework (web services, LINQ, XML) regression system for remotely launching and monitoring 52,000 Elevate GUI simulation jobs on a battery of test machines.
    - Worked with Elevate creator to add hooks for multi-car and for pseudo-batch operation (C/C++). Several contributions from this collaboration appeared in the next world-wide release of Elevate.
    - Created an interactive visualization of a multi-shaft, double-car elevator scheduling algorithm using first Flash/AS3/Flex then D3.js. Extensive regression testing revealed significant congestion problems with very high traffic loads. Elevator visualization also revealed a "frozen lift" situation that would not have been caught otherwise.
    - Wrote an alternative C++ double-car scheduling algorithm as an Elevate extension to reduce Average Waiting Times from 65 seconds to 15 seconds.
  + Software Engineering Projects  
    ► Wrote .NET utility to scrape 3 million face images from web search results (used to train a classifier for a face recognition project); ► implemented a complex optimal scheduling algorithm in MATLAB; ► took over floundering DPWS (Devices Profile for Web Services) project in the last month to insure deliverable that allowed remotely controlling devices from Japan.
  + Project Proposal Investigations  
    ► Big Data/Apache Hadoop configuration and suitability assessment; ► Semantic Web/Ontologies for application to Automatic Schema Matching; ► BIM and AutoDesk Revit API for building analysis.

## Principal Software Engineer, Mitsubishi Technology Lab (2008)

Numerous HCI/HMI projects and presentations. Frequent participation in tech conferences (UIST, ACM, ESRI).

* + ► Developed Collaborative Web Browsing (lightweight, real-time, collaborative co-browsing) shown at 2002 International WWW Conference (HTML, JavaScript, Java Servlets); ► Developed serial image presentation techniques for searching video streams (incorporated in the TimeShuttle feature of high-end Mitsubishi TV). (Visual Basic 6); ► Invented the Tablecloth app that was used in the 2012 Apple vs Samsung trial to dispute the originality of Apple’s bounce-back effect.

## HORIZON SYSTEMS LABORATORY, ITA, Waltham, MA 2001 Principal Technical Staff

* + In charge of C libraries, volume daemon integration, and utilities for hugely successful Veritas VxVM Network Replication project. Three-person effort generated over $10 million in mostly licensing revenue.
  + Front-end development of the Concordia Mobile Agents architecture for an Enterprise Application Integration system (Java, HTML, JavaScript, servlets)

# Education and Training

## MS Computer Engineering (MSCE), Boston University, 1993

## BS Electrical & Computer Engineering, Computer Science Option (BSEE), University of Wisconsin-Madison

## Certificates of Professional Achievement, Northeastern University, Boston, MA: Windows Programming (1998), Unix (1997), Data Communications Technology (1995)

## Training Courses: ~8 ESRI GIS; UML/OOA&D w/Java; ~10 Microsoft programming; AutoDesk/Revit

# Affiliations

* Meetup groups: Data Visualization in MetroWest Boston; Boston D3.js; Boston Front End Developers; Boston Java; Cambridge Semantic Web; Big Data Analytics, Discovery & Visualization; Big Data Boston; Data Scientist; Boston AWS; Boston Data Mining; Boston Ember.js. Also MIT CSAIL talks.
* Won Collaborative Data Award in 2014 doing work for the Mass. D.O.T. and MAPC in the “37 Billion Mile Data Challenge”. Contributed the Boston Car Data Explorer interactive data visualization tool (D3.js, crossfilter, dc.js).
* Reviewed papers for CHI (ACM Conference on Human Factors in Computing Systems).
* Member of Society for Conservation GIS; ESRI Developer Network, IEEE Computer Society, IEEE Standards Association. Presented and exhibited at multiple ESRI conferences on geospatial technology.
* Participant in Smart Grid IEEE P2030 Task Force 2 (Information Technology) Architecture and Modeling sub-groups, and Ballot Resolution Committee.

# Technical Skills

**Languages:** JavaScript, Java, C#.NET, VB.NET, Python, Flash/AS2/AS3/Flex/AIR, C/C++, MATLAB, VB6, bash   
**Libraries/APIs:** D3.js, jQuery, Windows Forms, Swing, WPF, Google Earth API, Google Maps API, WebSockets4Net, ArcObjects, Java EE, WCF, MS Office VBA, XUL, SWT, Eclipse RCP, ActiveX, MFC, Acrobat API, Elevate API, Revit API  
**Software:** PostgreSQL, PostGIS, ogr2ogr, ESRI ArcGIS, Apache Tomcat/Axis2, ActiveX, Adobe CS (PhotoShop, Flash Professional, DreamWeaver), Excel, SQL Server, enterprise tools, WEKA, Git, SVN, Mercurial/Hg, CVS  
**Technologies:** GUI, HMI, HCI, UI, UX, Semantic Web/Linked Data, WebSockets, Internet technologies, distributed computing, OO, OOP, Windows drivers  
**Operating Systems:** Windows, Unix, MacOS  
**Standards:** HTML5, KML, SVG, CSS, GPS, GPX, SOA, WSDL, RDF, TCP  
Growing interest in Big Data, Hadoop, cloud computing (attending Meetups).

# IP

8 Patents & Applications; 20+ Publications

# Patents & Applications

1. “Enterprise Integration System”, Walsh, Young, DiCelie, Wong, Esenther, Granted U.S. Patent 6,810,429
2. “System and method for presenting and browsing images serially”, Wittenburg, Lanning, Forlines, Esenther, Granted U.S. Patent 7,139,006
3. “Spatio-Temporal Graphical User Interface for Querying Videos” Ryall, Li, Esenther, Granted U.S. Patent 7,598,977
4. "Method and System for Emulating a Mouse on a Multi-Touch Sensitive Surface", U.S. Patent Application
5. "Method for Extracting Data from Web Pages", U.S. Patent Application
6. "Method and System for Displaying Multiple Synchronized Images", U.S. Patent Application
7. "Method and system for adapting a single-client, single-user application to a multi-user, multi-client environment", U.S. Patent Application
8. "Collaborative web browsing", U.S. Patent Application

# Publications

<In citations below, “TR-20xx-xxx” refers to merl.com Technical Report number>  
  
Book – wrote “Better Mouse Support” section of “Collaborative Tabletop Research and Evaluation – Interfaces and Interactions for Direct-Touch Horizontal Surfaces” chapter in “Interactive Artifacts and Furniture Supporting Collaborative Work and Learning” ISBN-10: 0387772332

Nikovski, D., Esenther, A., Ye, X., Shiba, M., Takayama, S., "Matcher Composition Methods for Automatic Schema Matching", Enterprise Information Systems, December 2013. TR2013-103

Nikovski, D.; Wang, Z.; Esenther, A.; Sun, H.; Sugiura, K.; Muso, T.; Tsuru, K., “Smart Meter Data Analysis for Power Theft Detection”, 9th International Conference on Machine Learning and Data Mining in Pattern Recognition (MLDM), July 19-25, 2013, New York, NY. (http://dl.acm.org/citatin.cfm?/id=2529220 , TR2013-065)

Sugiura, K.; Muso, T.; Tsuni, K.; Nikovski, D.; Esenther, A.; Sun, H., “Development of a System for Power Theft Detection Using Smart Meters”, National Convention of the Information Proecessing Society of Japan (IPSJ), March 2013 (http://www.computer.org/portal/documents/3621345/5117753/2013-03-25-yamada-75th-ipsj-5th-heritage-ceremony.pdf , TR2013-014)

Nikovski, D.; Esenther, A.; Ye, X.; Shiba, M.; Takayama, S., “Bayesian Networks for Matcher Composition in Automatic Schema Matching”, International Conference on Enterprise Information Systems (ICEIS), Vol. 1, pp. 48-55, June 2012 (ICEIS 2012 , TR2012-050)

Nikovski, D.; Esenther, A., “Construction of Embedded Markov Decision Processes for Optimal Control of Non-Linear Systems with Continuous State Spaces”, 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC), DOI: 10.1109/CDC.2011.6161310, pp. 7944-7949, December 2011 (IEEE Xplore , TR2011-081)

Nikovski, D.; Esenther, A.; Baba, A., “Semi-Supervised Information Extraction from Variable-Length Web-Page Lists”, International Conference on Enterprise Information Systems (ICEIS), May 2009 (ICEIS 2009 , TR2009-031)

Wigdor, D.; Penn, G.; Ryall, K.; Esenther, A.; Shen, C., “Living with a Tabletop: Analysis and Observations of Long Term Office Use of a Multi-Touch Table”, IEEE International Workshop on Horizontal Interactive Human-Computer Systems (TableTop), ISBN: 978-0-7695-2013-1, October 2007 (IEEE Xplore , TR2007-076)

Forlines, C.; Esenther, A.; Shen, C.; Wigdor, D.; Ryall, K., “Multi-User, Multi-Display Interaction with a Single-User, Single-Display Geospatial Application”, ACM Symposium on User Interface Software and Technology (UIST), ISBN: 1-59593-313-1, pp. 273-276, October 2006 (ACM Press , TR2006-083)

Ryall, K.; Esenther, A.; Forlines, C.; Shen, C.; Shipman, S.; Morris, M.R.; Everitt, K.; Vernier, F.D., “Identity-Differentiating Widgets for Multiuser Interactive Surfaces”, IEEE Computer Graphics and Applications, ISSN: 0272-1716, Vol. 26, Issue 5, pp. 56-64, September 2006 (IEEE Xplore )

Shen, C.; Ryall, K.; Forlines, C.; Esenther, A.; Vernier, F.D.; Everitt, K.; Wu, M.; Wigdor, D.; Morris, M.R.; Hancock, M.; Tse, E., “Informing the Design of Direct-Touch Tabletops”, IEEE Computer Graphics and Applications, ISSN: 0272-1716, Vol. 26, Issue 5, pp. 36-46, September 2006 (IEEE Xplore , TR2006-086)

Esenther, A.; Ryall, K., “RemoteDT: Support for Multi-Site Table Collaboration”, International Conference on Collaboration Technologies (CollabTech), July 2006 (CollabTech 2006 ,TR2006-084)

Esenther, A.; Ryall, K., “Fluid DTMouse: Better Mouse Support for Touch-Based Interactions”, International Working Conference on Advanced Visual Interfaces (AVI), May 2006 (AVI 2006 , TR2006-001)

Shen, C.; Esenther, A.; Forlines, C.; Ryall, K., “Three Modes of Multi-Surface Interaction and Visualization”, ACM Conference on Human Factors in Computing Systems (CHI), April 2006 (CHI 2006 , TR2006-025)

Esenther, A.; Wittenburg, K., “Multi-User Multi-Touch Games on DiamondTouch with the FTFlash Toolkit”, Intelligent Technologies for Interactive Entertainment (INTETAIN), November 2005 (INTETAIN 2005 , TR2005-105)

Ryall, K.; Esenther, A.; Everitt, K.; Forlines, C.; Ringel Morris, M.; Shen, C.; Shipman, S.; Vernier, F., “iDwidgets: Parameterizing Widgets by User Identity”, IFIP TC13 International Conference on Human-Computer Interaction (INTERACT), September 2005 (INTERACT 2005 , TR2005-055)

Ryall, K.; Li, Q.; Esenther, A., “Temporal Magic Lens: Combined Spatial and Temporal Query and Presentation”, IFIP TC13 International Conference on Human-Computer Interaction (INTERACT), September 2005 (INTERACT 2005 , TR2005-031)

Furuichi, M.; Mihori, Y.; Muraoka, F.; Esenther, A.; Ryall, K., “DTMap Demo: Interactive Tabletop Maps for ubiquitous Computing”, ACM International Conference on Ubiquitous Computing (UbiComp), September 2005 (UbiComp 2005 , TR2005-091)

Wittenburg, K.B.; Forlines, C.; Lanning, T.; Esenther, A.W.; Harada, S.; Miyachi, T., “Rapid Serial Visual Presentation Techniques for Consumer Digital Video Devices”, ACM Symposium on User Interface Software and Technology (UIST), ISBN: 1-58113-636-6, pp. 115-124, November 2003 (ACM Press , TR2003-019)

Raskar, R.; van Baar, J.; Beardsley, P.A.; Forlines, C.; Dietz, P.H.; Esenther, A.W.; Leigh, D.L.; Ryall, K.; Shen, C.; Shipman, S.E.; Yerazunis, W.S., “Intelligent Clusters and Collaborative Projector-based Displays”, NSF Workshop on Collaborative Virtual Reality and Visualization (CVRV), October 2003 (NSF Workshop on Collaborative Virtual Reality and Visualization , TR2003-086)

Wittenburg, K.; Lanning, T.; Forlines, C.; Esenther, A., “Rapid Serial Visual Presentation Techniques for Visualizing a 3rd Data Dimension”, International Conference on Human-Computer Interaction (HCI), June 2003 (HCI International 2003 , TR2003-020)

Esenther, A.; Forlines, C.; Ryall, K.; Shipman, S., “DiamondTouch SDK: Support for Multi-User, Multi-Touch Applications”, ACM Conference on Computer Supported Cooperative Work (CSCW), November 2002 (CSCW 2002 , TR2002-048)