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Principal Research SDE

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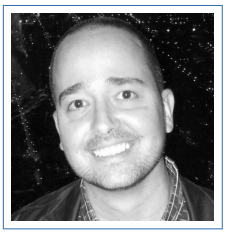

Microsoft Research, 16+ years total

2016–Present **Principal Research SDE**.
Machine learning tools and reactive system infrastructure, with ROS bridge, applied to robotics scenarios. The Platform for Situated Intelligence (aka \psi, aka ψ) project under Eric Horvitz.

Robotics
- Built several robots, including an indoor navigating directions robot, Go playing arm, ...
- Implemented a ROS bridge library between \psi (Windows) and ROS (Linux)
- Delivered "Robotics Day" talks covering past work and \psi
- Demoed \psi team work to executive leadership (Harry Shum, Amy Hood, ...)

Platform
- Built ML feature extraction and training pipeline tooling, including F#-based DSL
- Implemented cross-machine remoting (custom protocol and serialization) for \psi
- Ported runtime to Linux (Jetson TX1 board, Raspberry Pi, ...)
- Build miscellaneous infrastructure pieces: hierarchical FSM, persistence, teleoperation, ...

UIEvolution

2014–2016 **Principal SDE** *Automotive, CloudConnect Services team.*
Developing connected car experiences.

- Built telemetry and analytics system, integrated across all products Typescript, Node, Kinesis, AWS
- Developed geocoding service (forward and reverse) atop Open Street Maps data PostGIS
- Implemented caching and aggregation layer and built dependent app services Typescript, Node, Redis

Brief Robotics, co-founder

2014–Present *We've developed several interesting incubation projects (ask me in person)*, Beyond the Microsoft stack; Ubuntu/OS X, AWS, Python, Node.js, Xamarin/Mono (still F#), C, Forth.

Microsoft Corporation, 15 years - Principal Research SDE

2011–2014 **Robotics, Microsoft Research** *3 years.*
Produced a beautiful hardware platform. Built beyond state-of-the-art Kinect-based mapping and navigation system. Published program synthesis system applied to learning manipulation tasks.

Manipulation
- Presented program synthesis paper at iROS 2014 (lead author)
- Created learning by demonstration system, program synthesis, 3D sim (F#, WPF3D)
- Integrated object detection/recognition, grasp planning (C++, C#)
- Executed tasks using Kuka LBR, UR5 and Mico arms

Navigation
- Indoor localization, mapping and navigation paper accepted to ICRA 2015
- Implemented path planning and tracking for indoor navigation (C#)
- Invented novel skeletonization and path smoothing algorithm
- Worked on SLAM pipeline, IMU odometry, obstacle avoidance, metrics system (C++, C#)
- Built team-wide infrastructure (FSM, UDP chunking, immutable agents) (C++, C#)

Firmware
- Invented Forth-inspired scriptable firmware language and microcontroller VM (C)
- Wrote compiler, interactive REPL, IL translator and wire protocol (F#, IL, C)
- Developed SDK class library; encapsulating firmware while exposing scriptability (C#)

"Max" Robot
- Designed robot dev kit (RDK), API set, integrated MVVM framework (C#, Silverlight)
- Built apps for the robot – Unboxing, Meet, Virtual Visit, Network, ... (C++, C#, Silverlight)
- Prototyped kid's programming language and environment (F#, WPF, ASP.NET)

Eye Gaze
- Built eye gaze driven wheelchair for people with ALS; won company wide Hackathon (C#, Rx)

2008–2011 **Startup Business Group/UPG** *3 years*.

This was a business incubation group; productizing MSR technology and ideas formed within the group. I worked on several projects that "graduated" to Bing, Azure and other groups.

OneApp
- Lead developer on cross-device mobile OneApp SDK team
- Presented workshops and ran partner training
- Worked on server-side JavaScript compiler (C#, JavaScript/ECMAScript)
- Built "App Store" service and database (F#, SQL)
- Worked on Visual Studio integration, background compilation and type inference (C#)

Azure Mobile
- Team lead for Azure Mobile Services
- Invented cross-platform, binary compression protocol (F#, C#/WinMo, Objective-C/iOS, Java/Android)
- Wrote mobile Service Adapter Proxy and client libraries (F#, ASP.NET)
- Integrated Trident engine for server-side tiled rendering (C++)

- Wrote OneFish prototype – DeepFish/SeaDragon for mobile (C++, C#, JavaScript)
- Built Bing Maps OneApp client and proxy – local search, routing (F#, JavaScript)
- Demoed to executives, resulting in graduation of product and team to Bing
- Gave several functional programming and F# talks

2006–2008 **Mobile/Embedded Division** *2.5 years*.

This was mobile in the days of the "SmartPhone" and "PocketPC", before the iPhone even existed. Maps and routing with GPS turn-by-turn directions was quite impressive at the time.

Mobile Search
- Speaker at MEDC 2007 on mobile Compact .NET Framework development
- Shipped, with one other dev, "Live Search for Mobile" in Windows Mobile ROM
- Wrote GPS integration, turn-by-turn prompting and parts of map control (C#, .NETCF)
- Designed UX framework for subsequent Windows Mobile 7 version (C#, XAML)
- Earlier, ported MapPoint engine to mobile; building an offline app (C++, C#)

2003–2006 **Live/Bing Search** *2.5 years*.

I joined in the early days and shipped Search v1. Then, with one other dev, shipped Local Search and Maps v1, along with smaller features such as movies, music and Encarta instant answers.

Local Search
- Invented/patented method for location-based search in an inverted index
- Built local data ingestion, hygiene and indexing pipeline (C++)
- Integrated TerraServer aerial imagery (before Virtual Earth existed) (C++, JavaScript)

Infrastructure
- Worked on core web server – built from scratch using http.sys and netlib (C++)
- Designed and implemented localization infrastructure – 50 languages (C++)

Instant Answers
- Worked on instant answer federation pipeline (C++)
- Built and shipped movies, music and Encarta instant answers (C++)

1999–2003 **MSN Home/My** *4.5 years*.

Here I worked on the rendering engine, editorial tools and Home and MyMSN pages worldwide (including a trip to Japan to ship msn.co.jp). We shipped v7 on a pre-release build of .NET.
- Invented XSLT-based publishing engine for co-branding and localization (XSLT, C#)
- Wrote major portions of the "Granite" rendering engine for static content (C#, XSLT)
- Wrote dynamic client-side modules (stocks, weather, sports, ...) (JavaScript)
- Went to Japan to train staff on publishing tools and helped build and ship msn.co.jp

Intel Corporation, Folsom, CA

1998–1999 **Database Management Group, CDAM** *1.5 years*.

Built company-wide metadata system for managing database and SAP object dependencies. Wrote COM interfaces to legacy systems. (SQL, Oracle, C++, COM)

Previous

1996–1998 **Insights International** *1.5 years*.

I was employee #1 at this Internet startup; handling systems engineering and software development.

1993–1996 **Thoen Publishing** *3 years*.

Revolutionized pagination and image setting processes. Migrated publications to the web.

1992–1993 **Moscow-Pullman Daily News** *1.5 years*.

Migrated aging Hastech typesetting system to Macintoshes, QuarkXPress and image setters.

Publications

2015 **Reliable Kinect-Based Navigation in Large Indoor Environments** *ICRA*.

2014 **Program Synthesis by Examples for Object Repositioning Tasks** *IROS*.

Patents

2014 **Program Synthesis for Robotic Tasks**.
2014 **Robotic Task Demonstration Interface**.
2011 **Night Vision for Robotic RGBD Sensors**.
2011 **Efficient Transformation from XML to JavaScript Objects**.
2010 **Light Weight Data and Media Transformation**.
2009 **Device Independent On-demand Compiling of Mobile Applications**.
2009 **Caching Navigation Content for Intermittently Connected Devices**.
2005 **Geolocal Search in an Inverted Index**.

Certifications

2012 **Functional Programming Principles in Scala** *Coursera*.
1999 **Microsoft Certified Solutions Developer** *Microsoft*.
1997 **Sun Certified Java Developer** *Sun Microsystems*.
1997 **Microsoft Certified Systems Engineer** *Microsoft*.

Side Projects

- Finishing a book, "Forthwright" – covering Forth in detail and Charles Moore's career
- Publishing another book, "Lisp in F#" – began as a blog series: http://bit.ly/lispsharp
- My own language, "Brief" – a fixed arity, normal order, concatenative language
- Environment and curriculum for teaching programming and robotics to kids