Brian Kohan
Resume

Professional Experience

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JANUARY 2015 - PRESENT

Senior Software Engineer
Raytheon/NASA JPL, Pasadena, CA

On contract with NASA's Jet Propulsion Laboratory (JPL). I consult and execute on a wide range of software projects, often simultaneously; working with teams to translate ambiguous needs into clear vision with concrete objectives. Responsible for the full lifecycle of projects from conception through development, to deployment and continuous operation. Leverage deep expertise in software architecture and agile development to deliver timely products in cooperation with multidisciplinary teams of mathematicians, geodesists, software engineers, and aerospace engineers.

- Led a small team to design and develop a Django based open source web platform for the International GNSS Service (IGS) that manages meta information of GNSS ground stations. Software bridges the gap between a legacy data format and a modern XML Schema while encouraging good data hygiene across sites managed by over 150 different agencies around the world. Developed a network visualization for the IGS network using mapbox in JavaScript.

- Designed and developed the next generation of the Automatic Precise Point Positioning Service (APPS) offered by JPL's Global Differential GPS Group (GDGPS). APPS is a WebService built on Django that offers the general public use of JPL's GipsyX software for precise point positioning of Global Navigation Satellite System (GNSS) data via a web frontend and a RESTful API. The service ingests RINEX data, recorded from GNSS receivers that can be stationary or mobile, in low earth orbit, in the air, or on the ground, and produces time-series or static positioning at 5cm and 5mm accuracy respectively.

- Designed scalable architecture for APPS realized as a federated multi-machine, multi-process collection of user-facing and back-end nodes, where scalability is achieved through the addition of more hardware.

- Designed and developed a C++ implementation of the RTCM bit-packed wire format for Global Navigation Satellite System (GNSS) data streams intended for bandwidth limited environments. The library supports encoding and decoding of RTCM data streams from/to object-oriented message structures. Designed a C++ metaprogramming framework for data field bitpacking that enables message definitions to be defined in a simple declarative syntax.

- Designed and developed a WebService in C++ for distributing real-time GNSS data feeds. This service, referred to as a 'caster' in industry parlance, is an implementation of the Networked Transport of RTCM via Internet Protocol (NTRIP). It multiplexes inputs from various sources to client subscribers using a RESTful API to mediate subscription. Design leverages thread pooled asynchronous I/O model that drastically increases scalability.

Education

2013 – 2015	**PhD [Unfinished]** COMPUTER SCIENCE (ROBOTICS) *University of Southern California*
2010	**MS** ELECTRICAL ENGINEERING *Johns Hopkins University*
2007	**BS** Magna Cum Laude COMPUTER SCIENCE *North Carolina State University*

Nonprofit

2024-Present	**Member, Board of Directors** *Hollywood 4WRD*
2020-Present	**Director, Hollywood Program** *SELAH Neighborhood Homeless Coalition*

Awards

2012	**Recognition Award for Collaboration and Functional Excellence** *JHU/APL Air and Missile Defence Department*

Technical Expertise

Languages & Tools	C/C++, Python, JavaScript, Java, Perl, PHP, XML, HTML/CSS, SQL, Boost, Qt, Matlab, Git, Django, Make, Poetry, LaTeX, POSIX Systems
Disciplines	Real-Time Computing, Parallelism, Modeling & Simulation, Framework & API design, Continuous Integration, Software Lifecycle Management, GUI Development, Full Stack Web Dev, Meta Programming, Embedded Systems, Relational Database Systems, Security, DevOps, Satellite Navigation

- Maintain 24/7 uptime through disciplined DevOps supporting several deployments of the caster, each serving 100s-1000s of simultaneous connections to external and internal partners.

- Worked with scientists at JPL to redesign the Global Environmental and Earth Science System (GENESIS) website. Replaced the old overly complicated stack with a modern Django/DjangoCMS build. Reponsible for ongoing maintenance and security updates.

- Developed a Python platform for driving asynchronous file based near real-time data processing. Applied this system to computing total electron content profiles of the ionosphere from GNSS ground station data. Maintain 24/7 operations and data distribution to Space Force.

- Worked with a team of scientists to design a new web portal (AGAPE) to access satellite GPS occultation data based on geospatial, temporal and other query parameters. Redesigned the GIS relational database structure providing a 10x speed up on geospatial queries. Service serves over 4TB of compressed data split among 45 million files, stretching the Django ORM to its performance limits.

- Worked with the hardware IV&V group to validate hardware on the Psyche mission. Ran daily SCRUM style standups with the team that developed a test suite to prove out the compute element to be flown on the Psyche mission. Testing involved low-level ICD verification of FPGA functions on various boards comprising the VxWorks powered RAD750 compute element.

- Led "trust-but-verify" peer review meetings of testing done on parts of the Psyche compute element.

- Developed an automated test tracking and reporting system (CDH Test Reports). The system built on Django, provides a RESTful API that automatically ingests output from the compute element test software and a web front end for browsing and filtering the data. The system efficiently handles large test data sets and provides filtering capabilities that satisfy both management and engineering workflows.

- Produced documentation and a set of training videos to socialize, and build a shared vision for, the CDH Test Reports system with non-technical management that proved vital in securing long-term buy in on upcoming missions, including Mars Sample Return.

- In all projects I have mentored junior engineers and consider staff development to be a critical part of any team's success.

MAY 2021 - NOVEMBER 2022

Campaign Manager
Louis Abramson for Assembly 2022, Los Angeles, CA

Managed campaign for a California State Assembly office. Oversaw budget of over 300k USD, managed staff, sourced vendors and ran a field operation that marshaled volunteers to knock 36,000 doors. Conducted voter targeting for mail, digital advertising and direct outreach. Our campaign earned 62,647 (>45%) votes despite being outspent 8 to 1.

- Developed a Django system to run our website, canvassing, phone banking and ad targeting directly from county voter data.

PRESENTATIONS & PUBLICATIONS

2024 Point-in-Time Count - Results and Interpretation. Hollywood 4WRD Member Meeting. (2024, July 2nd) ppt.

L. Abramson, B. Kohan, et al. (2021, April 13). *Results of the 2021 Greater Hollywood Volunteer Homeless Count*. Hollywood 4WRD.

L. Abramson, B. Kohan. (2021, April 13). *Unsheltered Homelessness in Hollywood Is Down from January 2020 Levels*. Hollywood 4WRD.

R. Meade, A. Atrash, E. Kaszubski, A. St. Clair, J. Greczek, C. Clabaugh, B. Kohan, M. Matarić. *Building Blocks of Social Intelligence: Enabling Autonomy for Socially Intelligent and Assistive Robots*, In AAAI Fall Symposium on Artificial Intelligence and Human-Robot Interaction (AI-HRI) (Nov 2014)

J. DeSena, S. Martin, J. Clarke, D. Dutrow, B. Kohan, A. Newman; *Decentralized Closed-Loop Collaborative Surveillance and Tracking Performance Sensitivity to Communications Connectivity*, Proc. SPIE 8745, Signal Processing, Sensor Fusion, and Target Recognition XXII (May 2013)

Performance Data Encoding in Web Services. JHU/APL Net Centric Seminar Series (2008)

OPEN SOURCE PROJECTS

igs-slm	A configurable web platform for managing, moderating, publishing and visualizing GNSS ground station meta information.
django-typer	Use Typer (type hints) to define the interface for your Django management commands.
enum-properties	Add properties to Python PEP-435 enumeration values with a simple declarative syntax.
django-enum	Full and natural support for enumerations as Django model fields.
django-routines	Define named sequences of management commands in Django settings files for batched execution.
django-render-static	Use **Django's** template engines to render static files at deployment or package time. Includes transpilers for extending Django's url reversal and enums to JavaScript.

Software Engineer
The Johns Hopkins Applied Physics Laboratory, Laurel, MD

I led teams, developed software, and wrote technical memoranda and documentation for a range of software projects in the areas of modeling and simulation, cyber security, and war gaming. Frequent travel to external partners and military sites to lead design meetings and train engineers from aerospace primes developing contract bids.

- Performed performance analysis of leading data encoding standards for use in a real-time geo-track distribution web service. Recommendations were adopted by the Air and Missile Defense Department at APL.

- Served as a JHU/APL representative on the Open Architecture Simulation Interface Specification (OASIS) joint working group with MIT Lincoln Laboratory (MIT/LL). OASIS and its C++ reference implementation Simitar were a Missile Defense Agency (MDA) initiative to build a common simulation environment for proving out proposed defense systems. Prime contractors bidding on flagship MDA contracts were required to model their systems using Simitar – a discrete event simulation framework targeted at distributed real-time hardware-in-the-loop (HWIL) simulations.

- Wrote and developed language bindings for the middleware portion of the OASIS spec. The middleware section of the spec defined a common interface for data distribution between federated simulation nodes.

- Responsible for dynamic plug-n-play portion of the OASIS spec and developed a Java-style classloader for C++, that removed the need for Simitar (as the simulation executor) to be directly linked against model libraries it was running.

- Developed common truth models in Simitar to equalize the playing field between prime aerospace contractors. Designed approach to run continuous time truth models on top of underlying discrete event architecture.

- Led efforts to identify and acquire a suitable real-time platform for Simitar. Developed configuration guidelines and best practices for the chosen real-time platform, RedHawk OS, to achieve the required level of determinism for HWIL simulations.

- Worked with a Government agency to architect and implement kernel space module and user space daemon for a Linux trusted computing stack. Leveraged the Trusted Platform Module hardware as a secure key store to perform load-time attestation of whitelisted binaries.

- Developed innovative configuration GUI for Navy simulations. Qt based GUI dynamically generated a tree and property editor from XML Schemas.

sphinxcontrib-typer	Auto generate docs for typer and click commands using Typer's rich console formatting.

VOLUNTEER

Assembly District Delegate (Appointed)
California Democratic Party

Appointed by California Assemblymember Jessica Caloza to represent the 52nd District.

Assembly District Delegate (Elected)
California Democratic Party

This is an elected position with voting privileges concerning endorsements, platform and leadership of the party serving 2-year terms. Received 1386 votes to represent the 52nd District.

Organizer
SELAH Neighborhood Homeless Coalition

Program Director	Lead the Hollywood operations of SELAH. This involves volunteer recruitment, management and the leadership of our Sunday program.
Chapters Committee Chair	Lead the body that governs SELAH chapters and how they fit into the larger organizational structure.
Data Group	Organized efforts to identify client and volunteer management software. Continue to provide software and data analysis support as needed.
Hollywood 4WRD Outreach Committee Liaison	Sit as SELAH's representative on this coalition of service providers' outreach committee.
2021 Homeless Count	Organized and co-authored data analysis for this community lead homeless count. Developed the interactive data browser that visualizes this and prior count data.

April 2006 – January 2007

Software Engineering Intern
IBM Software Group, Raleigh, NC

Worked on IBM's WebSphere Portal software suite. Primary tasks included migration of component builds into a new Ant-based build environment. Introduced to principles and practices of large scale software engineering in a professional environment.

Summer 2003, Summer 2004

Technical Assistant
Duke University, Durham NC

Performed technical writing duties including updates to, and maintenance of user manuals. Computer hardware maintenance and troubleshooting including hardware replacement, RAM and disk upgrades.

Volunteer

Spring 2021

Mentor
Justice Through Code, Columbia University

2019-Present

Data Science and Organizing

Developed a Django technology stack for running local grassroots campaigns. Software cuts universes for mail and digital targeting, runs phone banks and paper-based canvassing. Supported the following candidates and organizations using this software:

Tony Gittelson	Neighborhood Council 2024 Hancock Park
Dan Hall	Santa Monica City Council 2024
Genesis Coronado	California State Assembly 2024 52nd District
Jessica Caloza	California State Assembly 2024 52nd District
Louis Abramson	California State Assembly 2022 51st District
Jesse Zwick	Santa Monica City Council 2022
Streets For All	Healthy Streets Ballot Petition Los Angeles 2022
Jamie Tijerina	Los Angeles City Council 2020 14th District
Shawntwane Cannon	Lancaster City Council 2020
Louis Abramson	Neighborhood Council 2019 Central Hollywood