TUSHAR TANK

TECHNICAL RESEARCH AND DEVELOPMENT

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Profile

I design, build, and deploy analytic products and services.

Leveraging over twenty years of diverse technical experience across a wide range of domains enables me to engage and build an expertise in strategy, development, and operations. I excel at defining unique solutions via broad partnerships across disparate institutions and work groups and thrive on working in ambiguity to solve complex problems. I am always looking to innovate by bringing together smart, motivated people and engage them in technical challenges.

My technical focus has centered on analytics research, machine learning systems, statistical signal processing, sensor systems, statistical optimization, embedded system design and product development. I have deployed products in both commercial and defense industries spanning multiple disciplines - research, software, firmware, and hardware integration. I have a core expertise in rapid prototyping and technology evaluation.

Skills

Research

Develop and optimize real time algorithms for on-line bidding, machine learning, deep learning and multi-modal sensors systems.

Leadership

Led several cross functional technical teams for product development and rapid proto-typing.

System Development

Managed product groups focused on development, documentation, integration and verification. Emphasized product deployment.

Technical

Python / Pandas / SciPy	C / C++ / Perl / Bash	IDE (Eclipse / MS Dev Studio)
SQL / Hadoop / Spark	Tensorflow	CVS / Subversion / Git
Matlab / Simulink / Assembly	Google Cloud Platform	Windows / Unix / OS X

Technical Experience

Valencell
2016-Present

Raleigh, NC

Principal Data Scientist

I developed the core machine learning algorithm that facilitated the product launch of a unique cuff-less non-invasive blood pressure monitoring system currently pending FDA approval. At the same time, I created a data science infrastructure at Valencell which included designing robust data management tools for our internal biometrics lab and the development of deep learning networks based on TensorFlow and Google Compute Engine. I also explained the potential benefits and limits of machine learning to our management and marketing team which led to applying machine learning techniques to augment our current products with biometric indicators such as: heart rate variability, core temperature, and breathing rate.

Industrial Heat
2015-2016

Morrisville, NC

Principal Data Scientist and Machine Learning Engineer

As a research scientist and manager at a venture funded start up investigating alternative energies, I led an agile engineering team tasked with validating experiments propounding to generate excess energy through fusion reactions. I directed our team in interacting with over a dozen potential industrial and academic groups to validate the accuracy of their claims for our investor base. As we worked with these groups we gained access to their their experimental documentation and data sets. I created a data infrastructure which enabled our team to efficiently manage the petabytes of data that was collected. A key role was to formulate the correct hypothesis to investigate through rigorous data analysis in order to reach concise conclusions. Promising technologies were further vetted through replication attempts. I designed a physical sensor system that would integrate a MySQL database for real-time data collection which our team ran to analyze several system configurations. We further validated our results through heat transfer simulations in OpenFoam and imported CAD models we developed with OnShape. I was responsible for either validating or disqualifying each of these organization based on analysis and understanding of their data and experiments.

Selected Patents Authored (Pending Adjudication)

Palladium and Nickel Isotope Enrichment to Enhance Anomalous Heat Generation
Exothermic Reaction Analysis By Pre-Reaction Sample Retention
Methods and Apparatus for Triggering Exothermic Reactions
Methods for Enhancing Anomalous Heat Generation
Calorimeter for Low Energy Nuclear Reaction Experiments
Calibrating a Reactor Hosting an Exothermic Reaction Based on Active Site Formation Energy
Methods for Improving Loading of Hydrogen (Deuterium) Gas into Transition Metals
Gas Phase Co-Deposition of Hydrogen/Deuterium Loaded Metallic Structures
Triggering Exothermic Reactions Under High Hydrogen Loading Rates
Methods for Increasing Hydrogen Trapping Vacancies in Materials
Methods and Apparatus for Plasma-Based Co-Deposition Heat Generation
Methods for Improving Loading of Hydrogen (Deuterium) Gas into Transition Metals

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Maxpoint Interactive
2014-2015

Morrisville, NC

Technical Lead for Data Science and Research Analytics

Developed product road map of core analytic products to engender growth in customer base which put company in a position to complete initial public offering. Executed this plan by coordinating data science team members in design and implementation of product sub-systems. Oversaw the rapid prototyping of optimization and machine learning sub-systems geared towards purchasing online advertisements in a real time bidding environment. As part of this effort designed a novel optimization algorithm to aggregate multiple audience models via Augmented Lagrangian Particle Swarm Optimization (ALPSO).

Redesigned a critical real time control algorithm to ensure uniform bidding of advertisements over the time span of customer campaigns. Specifically augmented the existing PID control system to a cascade configuration and incorporated measures to gracefully handle integral windup. The refinement of the control sub-system was responsible for a sixty percent increase in revenue in the two quarters leading to the IPO. Implemented an agile development and management infrastructure to grow data science team from eight individuals in one location to twenty-four data scientist spanning three locations.

3 Phoenix Inc / Ultra Electronics

2007-2014

Wake Forest, NC
Technical Director of Research and Development

Adaptive Signal Processing and Machine Learning algorithm design, development, and implementation on multi-modal sensor platforms for detection, classification, and location problems. Business development focus on Small Business Innovation Research (SBIR) grant proposal writing and working with customers to integrate and deploy systems and migrate technology to other commercial applications. Technical management of small algorithm team implementing: super resolution in non-rotational imaging systems, instantaneous 360 degree day/night imaging system, bit accurate early warning radar simulations incorporating compressed sensing, and adaptive kernel based classification and data fusion systems for sonar, radar, and imaging sensors.

Principal Investigator

ONR Phase I / II SBIR N091-066: "In situ learning for underwater object recognition"
SPAWAR Phase I/ II SBIR N101-101: "Densely-packed Target Data Fusion for Naval Missions"
NAVSEA Phase I / II SBIR N103-224: "Adaptive Data Fusion for Real-time Threat Assessment System"
NAVSEA Phase I STTR N11A-015: "Image Feature Extraction for Improved EW Classification"
NAVAIR Phase I SBIR N111-022: "Intelligent Proxies for Automated Mission Planning"
NAVSEA Phase I SBIR N131-043: "Autonomous Classification of Acoustic Signals"
NIH Phase II PA11-096: "An Infrared Camera Tracking System to Develop Posture Control in Children"

Signal Innovations Group / Integrian

2005-2007

Durham, NC
Principlal Research Engineer

Technical lead for an algorithm development team tasked with designing the video analytics of an adaptive video surveillance system capable of intelligence and reconnaissance in general environments. Worked with principal investigator to research and document findings in white papers and brief customer. Developed and integrated prototype analytic system capable of meta-tagging asymmetric threat events in real time video stream.

Technical Lead

AFRL Phase I / II SBIR AF05-219: "Sensor Exploitation by Adaptive/Learning Systems (SEALS)"
ONR Phase I /II C2CS: "Multi Sensor Information Integration and Automatic Understanding"

Samsys / Sirit

2004-2005

Durham, NC
Staff Research Engineer

Algorithm design lead for signal processing sub-system of a universal RFID receiver. Created system level design involving mapping algorithm processing onto DSP and FPGA hardware subsystems. Implemented DSP simulation suite in Matlab and integrated design on ADSP Blackfin processors and Xilink Virtex 4 via Simulink and System Generator Block Set.

MCNC / RTI

2003-2004

Research Triangle Park, NC
Staff Research Engineer

Technical lead of a cross functional team tasked with developing a passive vehicle detection and classification system. Created overall system design, supervised analog front end engineers to create signal conditioning for electromagnetic sensors, and supervised test and integration engineers for field testing of prototype. Feature extraction was accomplished with eigenvector analysis of a linear predictive coding using an ARMA model. Responsible for phenomenology conducted in Matlab, system design conducted in Simulink, and embedded code for prototype developed on TI fixed point DSP (TMS320C55).

Tollgrade Communications
2001-2003

Cheswick, PA
Senior Algorithm Design Engineer

Technical algorithm development lead for telephone (xDSL/POTS) loop qualification system. Improved accuracy of metallic loop impedance measurements by designing and implementing a least squares error minimization algorithm. Developed automated loop identification algorithm using time domain reflectometry with spline curve fitting and neural network backend. Developed proprietary frequency domain reflectometry algorithm for xDSL Loop qualification that demonstrated the capability to qualify loops without metallic access - testing through switch. Implemented algorithms on Analog Devices ADSP 21065L in mixed C and Assembly. Provided hardware modifications and performed comparative study of DSP processors for next generation embedded test head.

Malleable / PMC-Sierra
1999 - 2001

Santa Clara, CA
Senior Algorithm Engineer

Led a cross functional team consisting of hardware, firmware and system engineers to develop an architecture for high density, low power voice over packet (ATM/IP) processor using in-house design and simulation tools. Implemented algorithms in assembly for speech encoders (G.711, G.726, G.729) and echo canceler modules on proprietary VLIW/SIMD network processor. Supervised implementation of G.723.1 (vocoder) and fax relay modules by outside contractors. Worked with marketing and executive groups for product development and completed entire product development cycle - from definition to customer acceptance.

Silicon Wireless / mDiversity
1998 - 1999

Sunnyvale, CA
Algorithm and Firmware Engineer

Designed and developed DSP modules for uplink air interface in base transceiver station (BTS) for a GSM mobile phone system. Development done in mixed C and assembly on TI TMS320C542. Implemented patented algorithms using maximal ratio combining in a distributed BTS architecture to enhance coverage in a GSM cellular network. Performed system level debugging both in laboratory and field. Planned projects to packetize BTS backhaul links for bandwidth reduction. Created migration plan for Edge/GPRS system.

C-Cube Microsystems
1996-1998

Milpitas, CA
Algorithm and Firmware Engineer

Developed and implemented embedded assembly algorithms for proprietary operating system in order to decode and display MPEG1/MPEG2 compressed bitstreams for DVD applications. Designed and implemented error concealment algorithms that would maintain signal integrity in the presence of corrupt data. Developed a software validation test procedure using Perl and ClearCase.

Applied Signal Technology
1994-1996

Sunnyvale, CA
Member Technical Staff

Designed and implemented blind estimation, detection, and classification algorithms in TI TMS320C50 assembly language to analyze dial-up telephone lines and identify various dial-up fax/modems. Developed interface with company proprietary TMS operating system for memory allocation and multiple task switching so that algorithms could be utilized as part of a real-time embedded system controlled by a Motorola processor running VxWorks. Designed an omni-font optical character recognition algorithm to identify fax banner images. Designed multipath propagation channel simulation and measurement system that was used by the US Army Communications-Electronics Command Directorate (CECOM) to quantify propagation channel characteristics.

Partners for Advanced Transit and Highway Group — 1992-1994

Berkeley, CA
Member Research Group

Modeled short range outdoor wireless communication channels and local area networks focused on vehicle to vehicle communication as part of the PATH project to automate highways. Simulated and compared various multiple access protocols (TDMA, CDMA) using Ptolemy. Produced simulations and feasibility studies of wireless networks that was used by PATH as part of their Advanced Vehicle Control System (AVCS) design

Non-Technical Leadership Experience

BAPS / BAPS Charities — 1994-Present

North America
National Coordinator

As chairperson of planning committee created a long-term vision and mission, planned and implemented projects to reinforce this at the grass roots level. Developed a management structure that would enable 100,000 volunteers nationwide to provide humanitarian services. Initiated a communication strategy that engendered work groups to focused on leadership and organizational communication. Field work in organizing large scale volunteer events.

Family Wellness Clinic — 2007 - 2017

Clayton, NC
Operations Manager

Supervised management team in start up and growth of a single physician family practice clinic. Focused efforts on building a corporate brand based on functional medicine.

Education

University of California at Berkeley - Berkeley, CA

Masters of Science Electrical Engineering, 1994

Rutgers University, College of Engineering - Piscataway, NJ

Bachelors of Science Electrical Engineering, 1992

Selected Publications Patents

Jeffers, R.J., Oliver, D., Tank, T. Gallemore, J.B., "Automatic Periscope Recognition Using High Resolution Radar," 66th Automatic Target Recognizer Working Group "ATR for the New Decade", 11-13 May 2010.
Tank, T., Linnartz, J.-P.M.G., "Vehicle-to-vehicle Communication for AVCS Platooning Vehicular Technology Conference", 1994 IEEE 44th, Vol.1, 1994.

Patent: 20080243439 Sensor exploration and management through adaptive sensing framework 10-02-2008