Ravikanth S. Pappu, Ph.D.

CONTACT INFORMATION

email: pappu@alum.mit.edu
web: http://linkedin.com/in/ravipappu

SUMMARY

I am a versatile, full-stack technology entrepreneur and executive with proven track-record in all aspects of technology management. I am currently CTO at InQTel, where I work long-term technology strategy and roadmaps, tools to systematically understand technology innovation, and diligence for deep tech investments. I am also a technology advisor to the Woods Hole Oceanographic Institution on an ambitious project to bring a scalable approach to ocean exploration. As a platform architect at Trimble Navigation, I designed, prototyped, and led the implementation of a high-performance distributed sensing and big-data analytics platform. Prior to this, I co-founded ThingMagic, a venture-backed pioneering leader in the RFID/IoT space. ThingMagic was acquired by Trimble Navigation. As a scientist (Ph.D., MIT 2001), I have made original, peer-reviewed, and influential contributions to several fields. I am a science/technology/mathematics omnivore and really enjoy bringing my skills and capabilities to bear on solving challenging problems at the intersection of science, technology, and product development. I am equally comfortable synthesizing and defining a technology/product vision as I am executing it.

EXPERTISE

- Modern web-scale big-data architectures and machine learning
- Successful track record of leading (*i.e.*, designing, scoping, planning, executing) the delivery of several innovative RFID and sensor products
- Developing and managing technology roadmaps and strategic plans
- Mathematical modeling, algorithms, cryptography, discrete mathematics and statistics, holography, optical engineering
- Track record of building, mentoring, and motivating talented teams

SKILLS

Python • AWS • Elasticsearch • Apache Storm • Apache Kafka • Apache Spark • Logstash • Kibana • Neo4j • Monitoring systems • Dashboards • MongoDB • REST APIs • Machine Learning • ...

PROFESSIONAL EXPERIENCE

Woods Hole Oceanographic Institution, MA, USA.
Technology Advisor **2017 - present**
Advising on an ambitious new project to enable scalable exploration of oceans.

In-Q-Tel, Arlington, VA, USA.
Chief Technology Officer **2015 - present**
Working on long-term technology strategy and roadmaps, technology architectures, tools to systematically understand technology innovation, and diligence for deep tech investments.

Field Service Management, Trimble Navigation, Cambridge, MA USA.
Platform Architect **2012 - 2015**
Working on the core architecture and leading the implementation of a web-scale distributed sensing, computing, and analytics platform to streamline the collection and use of sensor data from hundreds of thousands of sensors. Responsibilities include technology architecture and selection, standards development, individual contributions to core pieces of the system, and platform evangelism. I have designed with, prototyped, and deployed several modern technologies including Amazon Web Services (AWS), NoSQL (Mongo, Redis, ElasticSearch) and Graph databases (Neo4j), queueing systems (Kafka), Stream Processing (Spark, Storm), and REST API services. This platform requires coordination of developers' efforts worldwide and has had a transformative impact on our division. It was launched in 2014 (http://www.trimble.com/FSM/Horizon.aspx). Selected projects include:

- Owner of the data model and architecture which includes temporal, geospatial, physical, and logical entities. Also responsible for mapping data from a legacy system to this platform and ensuring the the real-time data conversion utility works as designed.
- Design of the ORB, a combination of a document and graph database to support flexible data storage as well as fast lookups of complex relationships. I conceived the idea, selected technologies, built a realistic prototype, performance tested it, and approved the implementation of the system.
- Investigated CAP theorem tradeoffs for our various distributed systems to determine the risk of data loss and develop strategies to mitigate it.
- Led the implementation of our platform on AWS. Primary accomplishments were to evangelize the use of AWS, transfer knowledge about AWS to developers and operations, design a multi-zone highly available stack, prototype it using CloudFormation, and demonstrate its resiliency.
- Designed the data processing and analytics methodology for our telematics platform. This includes an implementation of the *Lambda Architecture* using Apache Kafka for queueing, Apache Storm for real-time, exactly-once processing, and persisting our data in the ORB as well as Elasticsearch. This architecture supports long term persistence and compatibility with several data warehousing schemes for batch processing, as well as real-time analytics of data.
- Designed and prototyped a complete logging and metrics system with Logstash, Elasticsearch, StatsD, and Graphite on AWS.
- Designed and prototyped a *symptom detection* system using real-time processing and graph databases to assist our support team in proactively identifying and possibly fixing sensors in the field that are on the verge of failing.
- Currently working on replacing an expensive ETL system consisting of Informatica and Microstrategy with a data warehousing and analysis system based on Apache Spark.

Dept. Of Biomedical Engineering, MIT.
Visiting Scientist **2009 – 2011**
Worked on a novel signal transduction scheme for DARPA's RealNose Project. The goal of the RealNose program is to model, design, and develop a novel sensor inspired by the canines olfactory system to include: air/odor intake, a detector layer (which includes olfactory receptors), a rapid (within seconds) signal transduction methodology, and a signal processing/statistical pattern recognition methodology for identifying odors and odor classes. Primary responsibilities included:

- Complete design of the optical system including component selection and acquisition
- Building the software system based on Matlab to allow anyone to run experiments on the system
- Designed a system to allow experiment results to be available to stakeholders (globally distributed) immediately after experiments
- Participated in a 2-week *smell-off* organized by the Applied Physics Lab at Johns Hopkins University

ThingMagic Inc, Cambridge, MA, USA.
Founder, Board Member, VP of Adv. Dev. **2000 – 2012**
Co-founded ThingMagic in 2000 as an R&D consulting company. Worked in several roles to grow the company through self-funding to 65 employees. Raised $26M in venture capital. Negotiated several multi-million dollar deals with Fortune 500 companies. Sold to Trimble Navigation in 2010. Most recently ran ThingMagic's Advanced Development Group with responsibilities that include RFID system engineering, designing and implementing RFID-based systems in real-world environments, and working on new technology introduction into ThingMagic's future products. Selected *technical* projects include:

- Key technical architect and customer relationship manager on several projects for the US Intelligence Community via In-Q-Tel, who was a strategic investor in ThingMagic. Projects included opportunistic sensing of RFID systems, pushing the limits of standoff distance for RFID reading, a battery-operated system to read RFID tags unattended for long durations, and a machine-learning system to identify RFID tags based solely on the physical layer of communication.
- Early research and prototyping for Disney's Magic Band. This was a 2-year long effort worth $2M+ to ThingMagic.
- Design and architecture of a cloud-based construction worker tracking system
- Design and implementation of Tool Link, an asset-monitoring system for Ford pickup trucks and vans
- Design and development of a fast self–jammer cancellation circuit in our RFID products
- Design and characterization of efficient anti-collision algorithms for Generation 2 RFID protocols; design and performance characterization of a multistatic antenna system for RFID
- Design of two systems for preserving privacy in RFID systems
- Design, implementation, and deployment of several complex, distributed, real-world RFID systems.

Mitsubishi Electric Research Lab, Cambridge, MA, USA.
Summer Intern **1997**
Implemented a computer-vision system to classify the focus of attention of a subject who is switching his or her attention between a number of surrounding objects. The specific application is to use this system as the engine for an automobile collision avoidance system.

TRAINING

AWS Architecture Course (3-day course @ AWS)
AWS Operations Course (3-day course @ AWS)
MongoDB Essentials (3-day course @ 10Gen)
Neo4j Tutorial (1-day course @ Neo4j)
Core Elasticsearch (2-day course @ ElasticSearch)
Data Science with Apache Spark (1-day course @ Spark Summit East 2015)

PATENTS

US Patent US20130311519 A1, *Object recognition and localization service using RFID*
Application US US20130314210 A1, *Multi-modal entity tracking and display*
Application US 20120062366 A1, *RFID Tiles*
Application US 20120075072 A, *Co-located RFID Fields*
Application 12/333,988, *Radio Devices and Communications*
Application 12/595,109, *Methods and Apparatus For Self-Jamming Suppression In A Radio Frequency (RFID) Identification Reader*
Application US 2008/0181398 A1, *Methods and apparatus for enhancing privacy of objects associated with radio-frequency identification tags*, 2008
US Patent 7999658,*Method and apparatus for operating a radio device*
US Patent 7961078, *Method and apparatus for operating a radio device*
US Patent 7898391, *Multi-reader coordination in RFID systems*, 2007.
US Patent 7075412, *Method and apparatus for operating a radio device*, 2006.
US Patent 6584214, *Identification and verification using 3D features*, 2003.
US Patent 6211848, *Dynamic Holographic Video With Haptic Interaction*, 2001.

EDUCATION

Massachusetts Institute of Technology
Ph.D., MIT Media Lab, February 2001

M.S., MIT Media Lab, May 1995

Villanova University
M.S.E.E., Department of Electrical and Computer Engineering, May 1993

Osmania University, Hyderabad, India
B. Eng., Department of Electronics and Communication Engineering, May 1991

HONORS

Beth Israel Deaconess Medical Center, Board of Overseers, 2009
Boston Business Journal's 40 under 40, 2008
Fellow, World Technology Network, 2006
Carl T. Humphrey Memorial Award for Contributions to the Engineering Profession, Villanova University, 2004
MIT Technology Review's TR100 list of top 100 innovators under the age of 35, 2003
IBM Research Fellowship at MIT 1999, 2000, 2001
Mitsubishi Electric Research Laboratories Fellowship at MIT 1999
Elected Associate Member of Sigma Xi 1993
J. N. Tata Scholarship for the Higher Education of Indians, 1991
Nizam Trust Scholarship for Travel to the United States, 1991
Jawaharlal Nehru Summer Research Fellowship, 1991
Member of state team at the First Indian National Mathematical Olympiad, 1987