

# Shantanu Kangude

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## Summary

### 8+ years as head of engineering and chief architect for various mobile and web application startups

- Hired developers, setup onsite and offshore teams, & project managed for 3 major web and mobile apps
- Led software development as chief architect along with hands-on coding with the development team
- Led DevOps and scaling of major applications, drove performance benchmarking and optimization
- Led Quality Assurance teams with automated & manual testing through regular product release cycles
- Localized apps to multiple languages; architected secure messaging protocols; used Twilio & other APIs

### 13+ years overall experience after Ph. D. with diverse roles and experience in tech leadership

- Taught 2 different graduate courses at Southern Methodist University (SMU) over 7 semesters
- Awarded 20+ US Patents; authored 802.11s international standard; published several conference papers
- Participated for 5 years, and received award for international technical standards development: WiFi/LTE
- Head of Engineering for: 1. *Thankyoubhub.com* 2. *v2pal.com* 3. *Sayfe App (Android/iOS) sayfeapp.com*

## Education

<b>Ph. D.</b>	Computer Networks,	Georgia Tech, Atlanta, GA, USA	(01/01 – 05/04)	GPA 4.0/4.0
<b>MS</b>	Electrical & Computer Engg.,	Georgia Tech, Atlanta, GA, USA	(08/99 – 12/00)	GPA 4.0/4.0
<b>B.Tech</b>	Electrical Engg.,	Indian Institute of Technology (IIT) Kanpur, India	(08/95 – 05/99)	GPA 9.3/10.0

## Employment

MAG Technologies	Dallas, TX, US	Feb 2015 – Present	COO, Head of Engineering
TechElegance LLC	Dallas, TX, US	Oct 2011 – Jan 2015	Principal Software Architect
Gratitude Point, Inc	Dallas, TX, US	Feb 2010 – June 2012	CEO, Software Dev. Manager
Texas Instruments (TI) Inc.	Dallas, TX, US	Jun 2004 – Feb 2010	Member, Research Staff

## Programming, Software, and System Administration Skills

**Server Side:** Ruby, Rails, Java, XMPP, REST, PERL, PHP, Node.js, Express

**Databases:** MySQL, SQLite, Postgres, MongoDB, Redis, MemCached, NoSQL

**Client Side:** Javascript, Backbone.js, AngularJS, JQuery, Bootstrap, Haml, Coffeescript, Android

**Test/Utils:** Git, Svn, RSpec w/ Capybara, Cucumber, Selenium, Appium, CircleCI, New Relic, Capistrano, JMC, JFR, Jasmine

**DevOps:** Amazon Web Services (AWS), Linux Admin, Apache2, Thin, Heroku, MaxCDN, Slinger, Push Notifications and Web Sockets, Rvm, C, Unix Shell, Sockets Programming

## Industry Experience

### COO and Head of Engineering, MAG Technologies @ <https://savfeapp.com> (02/15 – Present)

**Team Setup and Project Management:** Hired and managed the technical team of up to 10 developers in 5 cities across 3 continents. Managed the entire software development process for the Android and iOS secure chat app, Java Openfire XMPP server, Erlang stress testing, AWS deployment, and DevOps.

**Software and Protocol Architecture Design:** Led the design & evolution of the communication protocol between servers (Java Openfire) & clients (Android, iOS) with XMPP as the base protocol. Drove the software architecture in the Android and iOS clients, and the Java Openfire based servers.

**Secure Messaging Protocol Design:** Led the design of a secure group chat messaging protocol that allowed for selective individual revival of expired messages in a group. Both RSA and AES were used.

**DevOps Management:** Led the DevOps, production deployment, and scaling of the server infrastructure on Amazon Web Services (AWS). Used Hazelcast for clustering. Led the automation of deployment and monitoring using Capistrano and custom Linux shell scripts.

**Twilio/Nexmo and other external API / SDK integration:** Led the integration of SMS APIs of Nexmo and Twilio. Other SDKs like Facebook, Google, Localytics, and Tune were also integrated.

**Localization to multiple languages:** Led the transition of the MySQL character set encoding to utf8mb4 from utf8, and then the localization of the Android and iOS apps to Arabic along with English.

**Performance Benchmarking and Optimization:** Led the performance bench-marking & optimization of the app. Drove XMPP stress testing using Erlang/EscaLus/AMOC & MongoDB. Java Mission Control (JMC) & Java Flight Recorder (JFR) used for code optimization. MySQL DB and queries also optimized.

**Product Management and Overall Strategy:** Drove the feature evolution of the app. Advised the marketing team on analytics, advertising campaigns, user-testing, and general strategy.

**Quality Assurance Management:** Led a strong testing-focused QA effort through release cycles for both server and client sides. Appium was used for automated tests along with comprehensive manual tests.

### Principal, TechElegance LLC (Tech Consulting) (07/11 – 01/15 | Full time since 08/2012)

#### Principal Architect, Software DevOps Manager @ <https://v2pal.com> & [version2.me](https://version2.me) (08/12 – 12/14)

**Software Architecture Design and Development:** Architected the V2pal 'lifecoach' Ruby on Rails app with Backbone.js in the front end. Solo developed the webapp, and then led a development team of 4 developers. The App involved self reporting and journaling with advanced tagging and analytics. The app is social with 'circles', likes, and shares. It is gamified with points, badges, and leaderboards (PBL).

**Team Setup and Project Management:** Setup and managed a team of remote engineers continuing the development of the WebApp and an iOS Mobile App.

**Automated testing and Continuous Integration:** Led the setup of continuous integration with CircleCI, with the tests using Rspec with Capybara/Selenium and Jasmine.

**DevOps Management:** Hosting is on Linode Linux VPS with Apache and Thin servers (for load sharing/horizontal scaling). Databases used are MySQL for the main app, and PostGres for the forum using Discourse. Live notifications implemented using Slanger (Pusher type real time server) and Redis.

MaxCDN is the content delivery network, and New Relic, the app performance monitor. Devise and Omniauth are used for native authentication and with auth providers like Facebook, Google etc. ActiveAdmin with PaperTrail are used for site administration and logging.

**iOS App Development:** Managed the development of an IOS mobile app for v2pal. The app uses a json API to read and write data from/to our web app's persistent storage. The app is an additional avenue for v2pal.com users to access the service.

**Other** (Part time: 07/11 - 08/12): Implemented a full featured affiliate referral tracking system like HasOffers.Com; code base extended a CodeIgniter PHP Framework platform. Implemented a web app for a customer to upload and view files from the web like a file system. JQuery File Tree plugin was used.

### **CEO, Software Development Manager, Gratitude Point, Inc. (02/10-07/12)**

Hired and led a team of 3 programmers, 2 graphic artists / designers, and a copywriter. Closed \$20,000 investment for the first stage of the project. THANKYOUHUB.COM is a fully functional social networking webapp for tracking and returning favors through Gratitude Points (Rewards).

**LAMP based Web Software Development:** Led the development of a full featured Social Network website ThankYouHub.Com with the features of friend circles, subscription to tags, classifieds, and points account management. Managed PERL modules for the implementation, including CGI and Session. Managed the MySQL database with more than 30 tables, triggers, and procedures for the site.

**Javascript, JQuery with Plugins, and Ajax:** Managed extensive development with Ajax for uploads, automatic page updates, and user action triggered page updates. Managed browser side scripting with JQuery and numerous JQuery plugins including Timeago, Cycle, Linkify etc.

**Secure website implementation:** Secure website was implemented for monetary transactions with Gratitude Points, the currency on our site.

**Linux Administration, Website Backups and Maintenance:** Responsible for Linux maintenance and administration, and backup of our site ThankYouHub.Com.

**Amazon Web Services (AWS) Implementation:** Led the implementation of Amazon Simple Email Service (SES) and Amazon Simple Storage Service (S3) for our site's email and backups.

**Movable Type Based Blog Publication:** Installed and integrated 3 blogs using the Movable Type platform with our main website. Main blog has published over 150 entries.

**Content Delivery Network (CDN) and other speed optimizations for website:** Implemented pull zones on MaxCDN content delivery network for our site. This and other optimizations such as sprite sheets and optimized queries aided in faster loading of our site.

**Photo / Image / Video upload, editing, and display:** Managed the development of web scripts that create printable formatted certificates with template images and user text using ImageMagick. Also managed the upload and watermarking of videos with FFMpeg for our site.

**Facebook API and Twitter API implementation with OAUTH:** Managed the implementation of Facebook Connect and Twitter API for login on our site using these two.

**Paypal API with Instant Payment Notification (IPN):** Managed the integration of Paypal API with their Instant Payment Notification (IPN) for purchase and redeem of our currency Gratitude Points on the site. We instantly reflect the purchased points in member accounts.

**Member, Research Staff, DSP Solutions R&D Center, Texas Instruments, Inc (06/04-02/10)**

Manager: Ms Xiaolin Lu, Dr. Donald P. Shaver

**WiFi Direct / WFA-p2p (Peer to Peer WiFi), Bluetooth Coexistence, and Ad-hoc Wireless Networks (11/08-02/10):** Represented TI in the standardization of WiFi Direct in WiFi Alliance. Responsible for a major technical proposal in the device discovery area of the standard. Brought the TI implementation team up to speed on the specification, and provided specific proprietary enhancements to the standard for product differentiation. Assisted the implementation team in the Wifi Bluetooth coexistence area. Performed comparative study on Wi-Fi alliance's (WFA) p2p (Wifi Direct), WiFi Protected Setup Extensions (WPSE) technologies and Bluetooth SIG's 'Configuration and Low Power Profile (CLPP)' and 'Alternate MAC/PHY (AMP)' technologies.

**3GPP RAN2 – LTE MAC, RLC, and RRC (03/06-10/08):** The only representative from Texas Instruments in the RAN2 group responsible for the standardization efforts in the area of layer 2 and 3 for the Long Term Evolution of the 3<sup>rd</sup> Generation wireless cellular networks. Responsible for numerous contributions to the Evolved UTRA (E-UTRA) standard in the areas of Random Access Channel (RACH), Mobility, Handover, and system information broadcast. Also the lead architect of Evolved UTRA modeling and simulation effort for the E-UTRA (LTE) system for Texas Instruments.

**IEEE 802.11 Task Group S Wireless LAN Mesh (02/05 – 02/06):** Technical lead for the Texas Instruments' effort in the task group 'S' in IEEE 802.11 group on mesh networking in wireless LANs. Co-founder of the Simple, Efficient, and Extensible Mesh (SEE-Mesh) industry group that brought the winning technical proposal to the standards body. One of the primary authors of the powersave, beaconing-synchronization, and the Mesh Deterministic Access (MDA) mechanisms in the current 802.11 S standard. IEEE Standards Association Award was received for the work.

**IEEE 802.16 d/e Protocol Effort - WIMAX (10/04 – 01/05):** Worked to evaluate the MAC layer/framing overhead in OFDMA based IEEE 802.16e protocol. Overhead reduction and higher efficiency were the principal goals of the standards effort in order to develop a high performance mobile wireless broadband access system.

**IEEE 802.11e/n Simulations (06/04 - 09/04):** Exclusively responsible for the modeling and simulation of the HCCA Quality of Service mode of operation in the IEEE 802.11 protocol. The simulation results were part of the Wwise proposal to the IEEE 802.11n task group responsible for the development of high-speed wireless LANs.

#### **Graduate Research Assistant, Georgia Institute of Technology, Atlanta, GA (01/01 – 05/04)**

Advisor: Dr. John Copeland

**Dissertation Research:** Mathematically analyzed tree based collision resolution mechanisms, including the Home PNA 2.0 MAC. Proposed a QoS MAC framework for contention based medium access in CSMA local networks. The proposed 'implicit scheduling' framework uses a more deterministic channel access method than traditional randomized methods. The determinism is achieved through compact state-keeping of channel access history and by using specific access rules. Our protocol achieves strong hierarchical fairness with efficient channel utilization.

**Network Security Research:** Proposed a novel method for detecting rogue 802.11 WLAN access points by comparing inter-packet temporal spacing in the rogue environment versus that in a normal wired LAN environment.

#### **Network Security Intern, Lancope (<http://www.lancope.com>) – Atlanta, GA (05/02-08/02)**

Advisors: Dr. Hyoung-Kee Choi and Mr. Joseph Gibbs

Worked on the design and development of a computer network attack tool to test the company's intrusion detection system product. Implemented scanning and denial of service attacks, and a network anomalies simulator.

**Research Intern, AT&T Labs – Florham Park, NJ (05/01 – 08/01)**

Advisor: Dr. Matthew Sherman

Modeled the Home Phone-line Networking Alliance (Home PNA) 2.0 protocol in OPNET. Simulated and analyzed the protocol for performance in home networking environments.

**Research Intern, Intel Labs – Intel Architecture Lab, Hillsboro, OR (05/00 – 08/00)**

Advisor: Mr. Evan Green

Worked in simulation subgroup of IEEE 802.11 'E' for QoS MAC enhancements. Fixed bugs in, and enhanced the OPNET model of 802.11 wireless LAN nodes with channel models.

**List of United States Patents Awarded**

Pierre Bertrand, **Shantanu Kangude**, Zukang Shen , “*Preamble group selection in random access of wireless networks*,” US Patent 8792377 awarded July 29, 2014

Pierre Bertrand, **Shantanu Kangude**, “*Uplink synchronization management in wireless networks*,” US Patent 8711765 awarded April 29, 2014

**Shantanu Kangude**, Ariton Xhafa, Yanjun Sun, Harshal, Chhaya, “*Peer-to-peer group owner enhanced power management*,” US Patent 8458504 awarded June 4, 2013

Shu Du, Sandeep Bhadra, **Shantanu Kangude**, Ramanuja Vedantham, “*System and method for managing radio link failures*,” US Patent 8280375 awarded October 2, 2012

**Shantanu Kangude**, Pierre Bertrand, Ariton Xhafa, “*Pre-synchronization method for hard handovers in wireless networks*,” US Patent 8218500 awarded July 10, 2012

Ramanuja Vedantham, **Shantanu Kangude**, “*System and method for providing status reports of transmitted data packets in a data communications system*,” US Patent 8179812 awarded May 15, 2012

Ramanuja Vedantham, Sandeep Bhadra, **Shantanu Kangude**, Seung baek, “*Radio bearer dependent forwarding for handover*,” US Patent 8169969 awarded May 1, 2012

Ramanuja Vedantham, **Shantanu Kangude**, Sandeep Bhadra, “*MIMO with reserved subframes in primary and secondary base stations*,” US Patent 8155023 awarded April 10, 2012

Pierre Bertrand, **Shantanu Kangude**, Zukang Shen , “*Preamble group selection in random access of wireless networks*,” US Patent 8130667 awarded March 6, 2012

Pierre Bertrand, Jing Jiang, **Shantanu Kangude**, Tarik Muharemovic, “*Random access structure for wireless networks*,” US Patent 8098745 awarded January 17, 2012

Ariton Xhafa, Xiaolin Lu, **Shantanu Kangude**, “*Systems and methods for time optimization for silencing wireless devices in coexistence networks*,” US Patent 8068871 awarded November 29, 2011

**Shantanu Kangude**, Pierre Bertrand, Ariton Xhafa, “*Reduction of handover latencies in a wireless communication system*,” US Patent 7962139 awarded June 14, 2011

**Shantanu Kangude**, Harshal Chhaya, “*Locally administered MAC address based method for selectively and efficiently identifying enhanced version nodes of standards*,” US Patent 7889737 awarded February 15, 2011

Ariton Xhafa, Harshal Chhaya, **Shantanu Kangude**, “*Reducing collisions in beamforming wireless systems*,” US Patent 7782822 awarded August 24, 2010

**Shantanu Kangude**, Harshal Chhaya, “*(Wireless LAN) Mesh deterministic access*,” US Patent 7746879 awarded June 29, 2010

Itay Sherman, **Shantanu Kangude** “*Apparatus for and method of synchronization and beaconing in a WLAN mesh network*,” US Patent 7564826 awarded July 21, 2009

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## **Publications: Technical Papers and International Standards**

H. Aoki, ... **Shantanu Kangude**, et. al. “IEEE 802.11s-2011,” *IEEE Standard for Information Technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications Amendment 10: Mesh Networking*

**Shantanu Kangude**, Ariton Xhafa, and Xiaolin Lu, “MAC Efficiency Performance of IEEE 802.16E”, *In the proceedings of IEEE 62nd Semiannual Vehicular Technology Conference*, September 25-28, 2005, Dallas, Texas, USA

**Shantanu Kangude**, Matthew Sherman, and John Copeland, “An Analysis of the Home PNA Collision Resolution Mechanism,” *In Proceedings of IEEE Local Computer Networks 2003*, Bonn-Konigswinter, October 2003.

Raheem Beyah, **Shantanu Kangude**, George Yu, Brian Strickland, and John Copeland, “Rogue Access Point Detection using Temporal Traffic Characteristics,” *In Proceedings of IEEE GLOBECOM 2004*, Dallas, Dec 2004.

## **University Teaching and Student Mentoring Experience**

**Adjunct Professor**, Southern Methodist University, August 2008 – December 2013

Courses: EE 7376 Intro. to Computer Networks - 5 semesters | EETS 8316 Wireless Networks - 2 semesters  
Course evaluations by the students available on request.

**Summer Intern Manager/Mentor**, Texas Instruments, Summer 2005 and 2007

Topics: Cellular networks handover in 3GPP LTE | Routing in 802.11 Wireless LAN Mesh Networks

**Teaching Assistant**, Georgia Institute of Technology, Fall 1999 and Spring 2000

Courses: Intro. to Computer Engg. | Intro. to Hardware Description Languages for Digital System Design