

Tao Jin

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Education

NORTHEASTERN UNIVERSITY Boston, MA

Ph.D. in Computer Science, College of Computer and Information Science, 2006-2013
Advisor: Prof. Guevara Noubir

PEKING UNIVERSITY Beijing, China

B.S. in Computer Science, 2001-2005

Summary

- I enjoy coding idea into the up and running system that can make people's life better.
- Strong expertise in networking, wireless networks, and embedded system.
- A blend of experiences in both agile product development and applied research.
- Hands-on experience in software, firmware and full stack development.
- Proven track record of designing, developing and deploying production-ready system.
- Strong interest in working on cutting edge networking technologies, internet-of-things and robotics.

Project Experience

2013/8-present **Senior Software Engineer** Qualcomm Research Center

Snapdragon Drone Project:

<https://www.qualcomm.com/news/releases/2015/09/10/qualcomm-announces-reference-platform-high-end-performance-capabilities>

Key contributor to the design and development of Qualcomm Snapdragon Drone Reference Platform. Mainly in charge of

- PX4 flight control stack development and integration on Qualcomm Snapdragon DSP using C and C++
- designed and implemented sensor drivers on Snapdragon DSP, including RC, InvenSense MPU9x50 IMU, barometer, ESC, etc.
- designed and developed SDK for peripheral bus and file system access
- implemented debugging tools
- made significant contributions to the first platform bring-up and provided external customers with critical support to meet their deadlines

Snapdragon Transport Accelerator (STA):

<https://www.qualcomm.com/invention/research/projects/dash>

Key contributor to the development of the Snapdragon Transport Accelerator, an Android HTTP engine to accelerate HTTP bulk data transfer.

- this project requires in-depth understanding of HTTP protocol, bulk transfer acceleration algorithm, TCP/IP protocol, Chromium network stack, Google Test Framework

- software architecture design, low level design and development using C++
- collaborated with algorithm team to enhance the algorithm
- automated testing framework design and implementation
- went beyond the call to propose and implement a new design for a critical module which was blocking the project from next stage development and large scale testing.
- managed collaborative relationship with another team based oversea.

Connectivity Engine(CnE):

<https://www.qualcomm.com/news/onq/2013/07/02/qualcomms-cne-bringing-smarts-3g4g-wi-fi-seamless-interworking>

CnE is integrated into Android OS, estimates the Wi-Fi quality and makes seamless connectivity switching between WiFi and 3G/LTE. Mainly in charge of:

- developed a C++ prototype to seamlessly switch VoIP call between Wi-Fi and 3G/LTE
- developed a matlab tool to visualize real time network throughput
- this project requires extensive experience in C++, Android network framework and Linux network stack

2012/9-2013/1

Research Intern

HP Labs

Atlas: designed and implemented a framework for fine-grained and accurate machine learning based mobile traffic classification. Proposed a novel crowd-sourcing ground truth consolidation process which enables automated refinement of classifier at server end. Compared to previous work, Atlas significantly minimizes the manual effort required to maintain and scale the application classification solution and increases the classification accuracy in particular for encrypted traffic. Atlas is prototyped on HP Labs wireless networks and achieves 94% accuracy. To our best knowledge, Atlas is the first work to demonstrate fine-grained mobile application detection. Atlas was published in ACM SIGCOMM 2013.

- developed an Android service for mobile traffic signature collection and obfuscation.
- implemented a network traffic sniffer on gateway and developed a C pcap parser
- developed a C data mining tool with C5.0 machine learning algorithm integrated
- built a framework for automated classifier model validation and upgrade on network gateway

2005-2008

Research Assistant

Northeastern University

See <http://www.ccs.neu.edu/home/noubir/projects/openinfrastructure/index.html> for project details

BaPu: designed and implemented BaPu, a protocol running on Wi-Fi access point to allow mobile devices to communicate with multiple WiFi access points and aggregate their backhaul links in a completely transparent way.

- implemented BaPu, a C based user space middleware running on OpenWRT powered Wi-Fi Access Point.
- conducted a large scale measurement in Boston and show the significant network throughput gain achieved by BaPu.

Open Infrastructure: founded and led the Open Infrastructure project at Northeastern University. Proposed the Open Infrastructure framework and implemented the test bed, consisting of 30 customized home Wi-Fi access points deployed in Boston and Houston, serving over 200 users. Over 70 million residential network usage statistics records were collected over 2 years. This large scale and long term measurement revealed the real world residential network traffic pattern.

- implemented OpenWRT based Wi-Fi AP firmware featuring dual SSID, guest network, traffic shaping and prioritization, remote management, etc.
- developed AP end software to monitor and report network traffic statistics
- developed server end tools for data processing on daily basis and AJAX web application to visualize the real time AP status and analytics
- developed a tool suite for remote AP firmware upgrade and package management

Boston Urban WiFi Study:

- designed and implemented a Wardriving (WiFi detection and geo-mapping) system with embedded carPC.
- conducted over 100 hours of driving in 4 residential areas in Boston. Over 26K WiFi access points were geo-tagged and instrumented with network performance measurement.
- used the measurement result to characterize the urban WiFi performance

SNEAP: designed a ***Social Network enabled EAP Authentication Method*** (SNEAP). SNEAP integrates the authentication services of online social networks, such as Facebook, into the EAP framework. SNEAP is mainly designed for the carrier WiFi hotspots authentication. SNEAP is prototyped with wpa-supplicant, hostapd on OpenWRT and a python server as authentication proxy.

WiZi-Cloud: a system to enable ultra low power ZigBee wireless communication between smart phone and access points. WiZi-Cloud uses ZigBee link to carry certain types of network traffic and reduces the mobile phone energy consumption by 70%. WiZi-Cloud is the first system that integrates ultra low power ZigBee technology into commercial smart phones for Internet access.

- designed and developed modem firmware on TI CC2430 to transfer IP packet fragments at high throughput
- implemented software stack on mobile phone including serial driver to CC2430, IP/ZigBee adapter, IP traffic analyzer
- implemented software stack on AP side including IP traffic multiplexer using netfilter, manager component to maintain the status, mode and session information for all WiZi mobile clients.

2008/6-2008/8 **Research Intern** Nokia Research Center

SMS-Based Web Service Protocol: designed and implemented a web service protocol based on SMS which allows the population in under-developed countries to use the web services without 3G infrastructure.

2007/5-2007/8 **Research Intern** Nokia Research Center

TCP NAT Traversal Protocol: designed and implemented a TCP NAT traversal solution to allow mobile devices to establish direct connection through network firewalls, thus enabling more efficient and scalable data transfer for peer-to-peer applications such as Skype or P2P storage system.

Honors and Awards

- 2011 CCIS Outstanding Research Award, Northeastern University
- 2008 Google Android Developer Challenge Round 1 (ADC 1) Top 20 Award, winning \$125K
https://developers.google.com/android/adc/adc_gallery/
 Developed the Android mobile application, ***PebbleBox***, and won Top 20 Award, out of the participants from over 70 countries and a total of 1,788 entries.

Start-up Experience

2007-2010 Co-founder of "Pets Next Door" <http://www.petsnextdoor.com> and the software lead for the web version application. We acquired over 100K users over 3 months, and was selected to interview with the top startup incubator and accelerator, *Y Combinator*.

Patent

- [1] "MANAGEMENT OF CLASSIFICATION FRAMEWORKS TO IDENTIFY APPLICATIONS", Patent Pub. No. US2014/031290 A1, Oct. 30, 2014.

Highlighted Publications

- [2] Tao Jin, Triet Vo Huu, Erik-Oliver Blass, Guevara Noubir. BaPu: Efficient and Practical Bunching of Access Point Uplinks. In *Proceedings of the International Conference on Networked Systems (NETYS)*, 2015.
- [3] Zafar Ayyub Qazi, Jeongkeun Lee, Tao Jin, Gowtham Bellalaand, Manfred Arndt, Guevara Noubir. Application-awareness in SDN. In *Proceedings of the ACM International Conference of the Special Interest Group on Data Communication (SIGCOMM)*, 2013.
- [4] Tao Jin, Guevara Noubir, Bo Sheng. WiZi-Cloud: Application-Transparent Dual ZigBee-WiFi Radios for Low Power Internet Access. In *Proceedings of the 30th IEEE International Conference on Computer Communications (INFOCOM)*, 2011.
- [5] Aldo Cassola, Tao Jin, Harsh Kumar, Guevara Noubir, Kamal Sharma. Demo: SNEAP: A Social Network-enabled EAP Method - No More Open Hotspots. In *Proceedings of the 9th International Conference on Mobile Systems, Applications, and Services (MobiSys)*, 2011.

Thesis

- [6] Tao Jin. Open Networking Infrastructure: Boosting Wireless Networks in the Era of Cloud. PhD Thesis. *Northeastern University*, 2013.