

ASHISH PATRO

(608) 572-9285 • patro.ashish@gmail.com • <http://pages.cs.wisc.edu/~patro/>

EDUCATION

University of Wisconsin Madison

[September 2009 – August 2015]

Ph.D., Computer Sciences

Advisor: Prof. Suman Banerjee

Microsoft Research PhD Fellow 2012-14

Indian Institute of Technology Guwahati

[July 2005 – May 2009]

B. Tech, Computer Science and Engineering

Department Rank: 3/53

INTERESTS

- Mobile computing and analytics.
- Machine learning for mobile applications.
- Algorithm/protocol/application development for networked systems.
- Embedded systems and Internet of Things.

EXPERIENCE

iOS Power Analytics Engineer, Apple Inc. - Cupertino, USA

[August 2015 - now]

- Research and development on methods to improve iOS battery life.

Research Intern, Microsoft Research - Redmond, USA

[June-September 2013]

(With Dr. Srikanth Kandula)

- Built a vehicular analytics platform using WP8 smartphones and a cloud-backend.
- Ran an 8-month deployment across several drivers for 8 months and > 4,000 miles.

Software Engineering Intern, Google - Mountain View, USA

[May-August 2010]

(With Dr. Arunesh Mishra)

- Worked on Wi-Fi based localization algorithms for Google location services.

Research Intern, Max Planck Institute for Software Systems - Germany

[May-July 2008]

(With Prof. Rodrigo Rodrigues)

- Incorporated Network Coding algorithms into a popular BitTorrent network simulator.

SKILLS

- **Programming Languages:** C, C++, Python, Java, Android SDK, Objective C, Shell
- **Data Science:** Hadoop, Spark, Hive, Pig, Tableau, R, Weka, Tableau
- **Embedded Platforms and software:** Soekris, Alix, OpenWrt wireless router firmware
- **Kernel Programming:** Linux + Android kernel and driver development (network stack)
- **Others:** SDN frameworks (Floodlight, OpenFlow), web development (JavaScript, SQL, Azure, CouchDB)

AWARDS

- Best paper presentation award at **MobiArch 2014** (co-located with MobiCom 2014).
- Android app for wireless diagnosis, **WiSense featured by Google** on the Play Store.
- Best paper nominee at **CoNEXT 2013** (for Insight project, one of top 4 papers).
- Awarded the **Microsoft Research Ph.D. Fellowship 2012-14**.
- Won the **second prize (\$50,000)** at the **InterDigital Innovation Challenge 2012**.
- First prize at the student research competition at **ACM MobiCom 2011**.
- Full student travel grant for **ACM IMC 2011** conference.

US PATENTS

[1] Method, system and program product for detecting, quantifying and localizing of wireless interferers (US Patent 9,332,454)

Suman Banerjee, Shravan Rayanchu, Ashish Patro

[2] Estimating and predicting fuel usage with smartphone (Application number US 14/529,100)

Paramvir Bahl, Srikanth Kandula, Ashish Patro, Mohammed Shoaib

PUBLICATIONS

Google Scholar Profile:

<https://scholar.google.com/citations?user=g5QwKXwAAAAJ&hl=en>

[1] ParaDrop: An Edge Computing Platform in Home Gateways (Fog for 5G and IoT 2017)

Suman Banerjee, Peng Liu, Ashish Patro, Dale Willis

[2] Inference Remapping for Vehicular Analytics (Microsoft Research Technical Report 2016: MSR-TR-2016-26)

Paramvir Bahl, Srikanth Kandula, Ashish Patro, Mohammed Shoaib

[3] A Wireless Spectrum Analyzer in Your Pocket (ACM HotMobile'15)

Tan Zhang, Ashish Patro, Ning Leng, Suman Banerjee

[4] Outsourcing Coordination and Management of Home Wireless Access Points through an Open API (IEEE INFOCOM'15)

Ashish Patro, Suman Banerjee

[5] COAP: A Software-Defined Approach for Home WLAN Management through an Open API (Mobility in the Evolving Internet Architecture workshop, ACM MobiArch'14)

Ashish Patro, Suman Banerjee (*Best presentation award*)

[6] Capturing Mobile Experience in the Wild: A Tale of Two Apps (ACM CoNEXT'13)

Ashish Patro, Shravan Rayanchu, Michael Griepentrog, Yadi Ma, Suman Banerjee (*Best paper nominee, top 4 papers*)

[7] Observing Home Wireless Experience through WiFi APs (ACM MobiCom'13)

Ashish Patro, Srinivas Govindan, Suman Banerjee

[8] The Anatomy of a Large Mobile Massively Multiplayer Online Game (ACM SIGCOMM Workshop on Mobile Gaming, MobiGames'12)

Ashish Patro, Shravan Rayanchu, Michael Griepentrog, Yadi Ma, Suman Banerjee (*Best paper award*)

[9] Catching Whales and Minnows using WiFiNet: Deconstructing Non-WiFi Interference using WiFi Hardware (USENIX NSDI'12)

Shravan Rayanchu, Ashish Patro, Suman Banerjee

[10] AirTrack: Locating Non-WiFi Interferers using Commodity WiFi Hardware (ACM MobiCom'11 Student Research Competition)

Ashish Patro, Shravan Rayanchu, Suman Banerjee (*Won first prize*)

[11] Airshark: Detecting RF Devices using Commodity WiFi Hardware (ACM IMC'11)

Shravan Rayanchu, Ashish Patro, Suman Banerjee (*Received press coverage from Slashdot and a number of other technical journals*)

[12] A System for Audio Signalling Based NAT Traversal for Mobile Clients (IEEE COMSNETS'11)

Ashish Patro, Yadi Ma, Fatemeh Panahi, Jordan Walker, Suman Banerjee

MAJOR RESEARCH PROJECTS

[1] WiSense: A client based mobile framework for wireless diagnosis (HotMobile'15)

- Developed an Android based platform, WiSense, to perform a comprehensive set of wireless diagnostics using Nexus smartphones and tablets.
- Provides diagnostic information such as RF heatmap, non-WiFi interference activity, airtime utilization and neighbouring wireless activity using mobile devices.
- Added kernel patches to support wireless diagnostics features and built a smartphone application as part of the project. Kernel patches were also open-sourced.
- **WiSense Android app was featured by Google** on the Play Store.

[2] Airshark: Detecting non-WiFi interference using commodity WiFi hardware (IMC'11)

- Airshark identifies non-WiFi interferers (e.g., cordless phones, microwave ovens) in real-time using off-the-shelf and cheap (\$10 - \$30) commodity WiFi cards.
- It uses spectrum samples available from the recent generation of WiFi cards, builds non-WiFi device signatures and detects them using machine-learning techniques.
- This project won the \$50,000 **second prize** at the **InterDigital Innovation Challenge 2012**.

[3] WiFiNet: Locate and quantify non-WiFi Interference using commodity WiFi hardware (NSDI'12)

- WiFiNet combines updates from nearby Airshark equipped WiFi APs in enterprise deployments to enable deeper analysis of non-WiFi wireless interference.
- The system can localize non-WiFi devices using commodity WiFi hardware even if multiple devices of the same type (e.g., two cordless phones) operate simultaneously.
- WiFiNet uses fine-grained packet level timing analysis to precisely identify the interference impact of each non-WiFi device on nearby WiFi links.

[4] Insight: Enabling Mobile Application Analytics and Network Measurements (CoNEXT'13, MobiGames'12)

- Designed and implemented Insight, a framework for application developers that collects mobile application analytics as well as performs network measurements.
- Performed a long-term measurement study (**spanning over 3 years**) across more than **1,000,000 users** through two popular mobile apps.
- By coupling network measurements and application analytics, Insight also helped understand how network performance influenced application usage and revenues.

[5] WiSe: Observing Home Wireless Experience through WiFi APs (*MobiCom'13*)

- Designed and deployed a customized off-the-shelf WiFi router platform in over 30 residential apartments (**running over a period of more than 9 months**).
- Developed passive techniques and performance metrics to analyse impact of link quality, co-channel WiFi and non-WiFi interference that affect the performance of dense residential wireless network deployments, such as apartment complexes.
- Collaborated with Madison-based ISPs to debug their residential WiFi deployments.

[6] COAP: A Software-Defined Approach for Home WLAN Management through an Open API (*INFOCOM'15, MobiArch'14*)

- Designed and implemented COAP, an SDN framework (using OpenFlow and Floodlight) to enable centralized management of home WiFi APs in dense residential deployments (e.g., multi-tenant apartment buildings).
- Proposed open APIs requiring software only upgrades that can be implemented by Access Point (AP) vendors to enable cooperation and coordination between home APs. COAP leverages a cloud-based controller to manage heterogeneous home APs.
- Implemented COAP based applications for efficient spectrum usage, interference mitigation, context based activity prediction to pro-actively configure home APs.
- Performed a deployment of 12 COAP APs in an apartment building to motivate benefits of the framework.