

# Ayon Chakraborty

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## Research Interests

Wireless Networked/Mobile Systems, Wireless Sensing, Data-driven Performance Analysis.

## Education

**Stony Brook University**, New York, USA. Aug, 2011 – May, 2017

Ph.D. in Computer Science

Thesis title: Data-driven Performance Optimization in Wireless Networks

Advisor: Samir R. Das

**Jadavpur University**, Kolkata, India. Aug, 2007 – May, 2011

B.E. in Computer Science & Engineering, *Awarded Department Gold Medal*

Thesis title: Energy-efficient Data Gathering in Wireless Sensor Networks

Advisor: Mrinal K. Naskar and Amitabha Mukherjee

## Awards and Honors

- Best Paper Award Nominee in ACM IMC 2014.
- NSF Travel Awards for ACM MobiCom ('13), ACM CoNext ('13, '14, '16), ACM IMC ('14).
- Finalist in ACM Student Research Competition at ACM Mobicom 2013.
- Received University Fellowship (2011–2012), Stony Brook University.
- Awarded Department Gold Medal, Jadavpur University. (spnsr: Tata Consultancy Services Ltd.)
- Recipient of University Grants Commission (Govt. of India) grant, for best undergraduate project.
- Awarded the DAAD WISE fellowship 2010 for internship in Uni. Hannover, Germany.
- Ranked within top 0.1% in state engineering entrance examination (among  $\approx 100,000$  aspirants).
- State government award, secondary school board finals (ranked 29<sup>th</sup> out of  $\approx 0.5$  million students).

## Publications

### Conference

1. [INFOCOM] **Ayon Chakraborty**, Shaifur Rahman, Himanshu Gupta and Samir Das. *SpecSense: Crowdsensing for Efficient Querying of Spectrum Occupancy*, to appear in IEEE INFOCOM 2017.
2. [CONEXT] **Ayon Chakraborty**, Shruti Sanadhya, Samir Das, Dongho Kim and Kyu-Han Kim. *ExBox: Experience Management Middlebox for Wireless Networks*, in ACM SIGCOMM CoNext 2016.
3. [HOT WIRELESS] **Ayon Chakraborty**, Udit Gupta and Samir Das. *Benchmarking Resource Usage for Spectrum Sensing on Commodity Mobile Devices*, in ACM HotWireless 2016.
4. [DCOSS] **Ayon Chakraborty** and Samir Das. *Designing a Cloud-Based Infrastructure for Spectrum Sensing: A Case Study for Indoor Spaces*, in IEEE DCOSS 2016.
5. [INFOCOM] **Ayon Chakraborty**, Luis Ortiz and Samir Das. *Network-side Positioning of Cellular-band Devices with Minimal Effort*, in IEEE INFOCOM 2015.
6. [CONEXT] **Ayon Chakraborty** and Samir Das. *Measurement-Augmented Spectrum Databases for White Space Spectrum*, in ACM SIGCOMM CoNext 2014.
7. [IMC] Fatima Zarinni, **Ayon Chakraborty**, Vyas Sekar, Samir Das and Phillipa Gill. *A First Look at Performance in Mobile Virtual Network Operators*, in ACM SIGCOMM IMC 2014. **Best paper award nominee.**
8. [MOBICOM] **Ayon Chakraborty**, Samir Das and Milind Buddhikot. *Radio Environment Mapping with Mobile Devices in the TV White Space*, ACM MOBICOM 2013 (Extended Abstract). **Finalist in ACM Student Research Competition.**
9. [CELLNET] **Ayon Chakraborty** and Samir Das. *Adapp: An Adaptive Network Selection Framework for Smartphone Applications*, in ACM CellNet 2013 (co-held with ACM MobiSys'13).

10. [ATC] Vasudevan Nagendra, Himanshu Sharma, **Ayon Chakraborty** and Samir Das. *LTE-Xtend: Scalable Support of M2M Devices in Cellular Packet Core*, in ACM All Things Cellular 2016.
11. **Ayon Chakraborty**, Kaushik Lahiri, Subhajit Mandal, Deepankar Patra, Mrinal K. Naskar, and Amitava Mukherjee. *Optimization of service discovery in wireless sensor networks*, In International Conference on Wired/Wireless Internet Communications, pp. 351-362. Springer Berlin Heidelberg, 2010.
12. **Ayon Chakraborty**, Swarup Kumar Mitra, and Mrinal K. Naskar. *An efficient hybrid data-gathering scheme in wireless sensor networks*, In International Conference on Distributed Computing and Internet Technology, pp. 98-103. Springer Berlin Heidelberg, 2010.
13. **Ayon Chakraborty**, Arani Bhattacharyya, Santosh Ghosh and Samir Das. *A First Look at Performance of TV Streaming Sticks*, [Under Review].

### Journal

1. **Ayon Chakraborty**, Rashmi Ranjan Rout, Aweek Chakrabarti, and Soumya K. Ghosh. *On network lifetime expectancy with realistic sensing and traffic generation model in wireless sensor networks*, IEEE Sensors Journal 13, no. 7 (2013): 2771-2779.
2. **Ayon Chakraborty**, Swarup Kumar Mitra, and Mrinal Kanti Naskar. *A Genetic algorithm inspired routing protocol for wireless sensor networks*, International Journal of Computational Intelligence Theory and Practice 6, no. 1 (2011): 1-8.
3. **Ayon Chakraborty**, Kaushik Chakraborty, Swarup Kumar Mitra, and Mrinal K. Naskar. *An energy efficient scheme for data gathering in wireless sensor networks using particle swarm optimization*, Journal of Applied Computer Science 6, no. 3 (2009): 9-13.

### Teaching and Mentoring Experience

#### Graduate Instructor

Fall 2016

*Course: Wireless Signals and its Applications*

I have designed and taught this course. The course focuses on exploring various statistical machine learning tools and algorithms to solve several important and relevant problems in wireless/mobile systems: localization, gesture recognition and modeling quality of experience of mobile applications. The course site is available at <https://sites.google.com/a/cs.stonybrook.edu/cse570-fall16/>

#### Project Mentoring

Fall 2013 – Spring 2017

I have personally mentored six graduate students for their advanced masters project.

#### Teaching Assistant

Fall 2011, Spring 2012

*Undergraduate Courses: Object Oriented Programming, Web Programming*

### Professional Experience

#### WINGS Lab, Stony Brook University

Fall 2011 – Spring 2017

*Doctoral Advisor: Samir R. Das*

I have built new system prototypes, testbeds, measurement infrastructures, designed and deployed networked systems to improve wireless network performance in general. Two focus areas of my research are: (i) Improving spectrum usage for shared spectrum access systems, and (ii) Measurement and modeling Quality of Experience (QoE) of mobile applications running on heterogeneous hardware platforms/network environments.

#### Hewlett-Packard Labs, Palo Alto, CA

Jun, 2015 – May, 2016

*Collaborators: Shruti Sanadhya and Kyu-Han Kim*

I worked on understanding a network's capacity from the perspective of user experience offered by network applications (streaming video, VoIP, browser). I have two patent applications based on this work. Our results are published in ACM SIGCOMM CoNEXT 2016.

**Huawei Technologies, Bridgewater, NJ** Oct, 2013 – Dec, 2014  
*Collaborators: Nandu Gopalakrishnan and Prof. Luis Ortiz (U-Michigan)*  
Infrastructure-side positioning of cellphones using semi-supervised machine learning algorithms (minimizing GPS-tagged data requirement). Our methodology is published in IEEE INFOCOM 2015.

**Bell Labs, Murray Hills, NJ** Jun, 2013 – Aug, 2013  
*Internship Mentor: Milind Buddhikot*  
I performed large scale collection and analysis of spectrum measurements that eventually helped in understanding erroneous nature of spectrum databases (e.g., Google TVWS Database) that are based on propagation models. The results are published in ACM SIGCOMM CoNEXT 2014.

**Leibniz Universität Hannover, Germany** Jun, 2010 – Aug, 2010  
DAAD (*Deutscher Akademischer Austauschdienst*) WISE Fellowship 2010  
*Internship Mentor: Helena Szczerbicka*  
I designed and implemented a **decision tree** based algorithm to identify anomalous sensors in a real sensor network testbed consisting of 10 micaZ/TelosB sensor node modules.

**IIT Kharagpur, West Bengal, India** Jun, 2009 – Aug, 2009  
*Internship Mentor: Soumya Kanti Ghosh*  
Developed a probabilistic model for estimating operating lifetime of a wireless sensor network. The work is published in IEEE Sensor Journal (no. 13, 2013).

## Patents

Ayon Chakraborty, Shruti Sanadhya and Kyu-Han Kim, “Managing Network Traffic Using Experiential Capacity”. (filed with Hewlett-Packard Labs)

Ayon Chakraborty, Shruti Sanadhya and Kyu-Han Kim, “Experiential Capacity for Diverse Mobile Wireless Users”. (filed with Hewlett-Packard Labs)

## Selected Talks

- Data-Driven Techniques Towards Performance Optimization in Wireless Networks  
NEC Labs America, Princeton, NJ. Apr, 2017  
Indian Institute of Technology, Bombay. Mar, 2017  
Indian Institute of Technology, Delhi. Mar 2017  
Indian Institute of Technology, Madras. Mar 2017  
Xerox Research Center India, Bangalore. Feb 2017  
Samsung Research America, Mountainview, CA. Feb 2017
- ExBox: Experience Management Middlebox for Wireless Networks, ACM SIGCOMM CoNext 2016, Irvine, CA.
- Benchmarking Resource Usage for Spectrum Sensing on Commodity Mobile Devices, ACM HotWireless 2016, New York City.
- Designing a Cloud-Based Infrastructure for Spectrum Sensing: A Case Study for Indoor Spaces, IEEE DCOSS 2016, Washington DC.
- Network-side Positioning of Cellular-band Devices with Minimal Effort, IEEE INFOCOM 2015, Hong Kong.
- Measurement-Augmented Spectrum Databases for White Space Spectrum, ACM SIGCOMM CoNext 2014, Sydney, Australia.
- Radio Environment Mapping with Mobile Devices in the TV White Space, ACM MOBICOM 2013, Miami, Florida. (**Finalist in ACM Student Research Competition.**)

## Services

**Reviewer:** IEEE Transactions on Mobile Computing, IEEE Transactions on Wireless Communications, Elsevier Computer Communications

**External Reviewer:** ACM Mobisys'17, ACM CoNext'16, ACM Mobicom'16, ACM Mobicom'15

## Software (Research to Practice)

- Built a measurement infrastructure as a part of my collaboration with HP Labs, to collect Quality of Experience data for mobile applications (video, web, VoIP).
- Localization software developed as a part of my research collaboration with Huawei Technologies (NJ) was successfully tested on 10GB+ scale cellular measurement data from a portion of the city of Beijing containing 10K+ cell towers and 100s of millions of records.
- Developed a distributed system of *mobile spectrum sensors* that essentially monitors the RF spectrum to understand spectrum usage. Such data is pushed from the smartphone based sensors to a cloud based system that exposes data analytics and visualization services.

## References

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