

Ayon Chakraborty

Assistant Professor, IIT Madras

BSB 307, Department of CSE,
IIT Madras, Chennai – 600036.
✉ ayon@cse.iitm.ac.in

Research Interests

I am broadly interested in designing mobile systems that interact with and interpret (*sense*) the physical world, spanning both algorithm design as well as system prototyping.

Education

- 2011 – 2017 ■ **Ph.D. in Computer Science**, *Stony Brook University*, New York, USA.
Thesis: *Data-driven Performance Optimization in Wireless Networks*
Advisor: Samir R. Das
- 2007 – 2011 ■ **B.E. in Computer Science & Engineering**, *Jadavpur University*, Kolkata, India.
Thesis: *Energy Efficient Protocol Design for Wireless Sensor Networks*
- 1992 – 2007 ■ **Secondary and Higher Secondary**, *South Point (High) School*, Kolkata, India.

Professional Experience

- Sep 2020 - present ■ **Assistant Professor, IIT Madras**, *Chennai, India*.
Department of Computer Science and Engineering
- Aug 2017 - Jun 2020 ■ **Researcher, NEC Laboratories America**, *Princeton, New Jersey*.
Mobile Communication and Networking Department
My primary responsibilities include working on solutions related to wireless sensing applications. I built systems that help provide on-demand communication and localization for emergency responders in disaster scenarios.
- 2011 – 2017 ■ **Research Assistant, Stony Brook University**, *Stony Brook, New York*.
Department of Computer Science
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 were: (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.

Internship Experience

- Summer 2015 **Hewlett-Packard Laboratories**, *Palo Alto, California*.
Mentors: *Shruti Sanadhya and Kyu-Han Kim*
Topic – *Experience capacity of enterprise wireless networks*.
- Summer 2014 **Huawei (Futurewei) Technologies**, *Bridgewater, New Jersey*.
Mentors: *Nandu Gopalakrishnan and Luis Ortiz (U-Michigan)*
Topic – *Infrastructure side localization of cellular devices*.
- Summer 2013 **Bell Laboratories**, *Murray Hills, New Jersey*.
Mentor: *Milind Buddhikot*
Topic – *Dynamic spectrum access technologies, Modeling spectrum databases*
- Summer 2010 **Leibniz Universität Hannover**, *Hannover, Germany*.
Mentor: *Helena Szczerbicka*, DAAD WISE Fellowship 2010.
Topic – *Anomaly detection in wireless sensor networks*.
- Summer 2009 **IIT Kharagpur**, *Kharagpur, West Bengal, India*.
Mentor: *Soumya Kanti Ghosh*
Topic – *Estimating lifetime of a wireless sensor network*.

Selected Publications

- [NSDI] Ashutosh Dhekne, **Ayon Chakraborty**, Karthik Sundaresan, Sampath Rangarajan. *TrackIO: Tracking First Responders Inside-Out*, in USENIX NSDI 2019.
- [TCCN] Arani Bhattacharya, **Ayon Chakraborty**, Samir Das, Himanshu Gupta, and Petar M. Djuric. *Spectrum Patrolling with Crowdsourced Spectrum Sensors*, in IEEE Transactions on Cognitive Communications and Networking (2019).
- [WCNC] Md Shaifur Rahman, Himanshu Gupta, **Ayon Chakraborty**, Samir Das *Creating Spatio-Temporal Spectrum Maps from Sparse Crowdsensed Data*, IEEE Wireless Communications and Networking Conference (2019).
- [CoNEXT] **Ayon Chakraborty**, Eugene Chai, Karthik Sundaresan, Amir Khojastepour, Sampath Rangarajan. *SkyRAN: A Self-Organizing LTE RAN in the Sky*, in ACM SIGCOMM CoNEXT 2018.
- [INFOCOM] **Ayon Chakraborty**, Arani Bhattacharya, Snigdha Kamal, Samir Das, Himanshu Gupta and Petar Djuric. *Spectrum Patrolling with Crowdsourced Spectrum Sensors*, in IEEE INFOCOM 2018.
- [INFOCOM] **Ayon Chakraborty**, Shaifur Rahman, Himanshu Gupta and Samir Das. *SpecSense: Crowdsensing for Efficient Querying of Spectrum Occupancy*, in IEEE INFOCOM 2017.
- [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.
- [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.
- [HOT WIRELESS] **Ayon Chakraborty**, Udit Gupta and Samir Das. *Benchmarking Resource Usage for Spectrum Sensing on Commodity Mobile Devices*, in ACM HotWireless 2016.
- [DCOSS] **Ayon Chakraborty** and Samir Das. *Designing a Cloud-Based Infrastructure for Spectrum Sensing: A Case Study for Indoor Spaces*, in IEEE DCOSS 2016.
- [INFOCOM] **Ayon Chakraborty**, Luis Ortiz and Samir Das. *Network-side Positioning of Cellular-band Devices with Minimal Effort*, in IEEE INFOCOM 2015.
- [CONEXT] **Ayon Chakraborty** and Samir Das. *Measurement-Augmented Spectrum Databases for White Space Spectrum*, in ACM SIGCOMM CoNEXT 2014.
- [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.**
- [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.**
- [SENSORS] **Ayon Chakraborty**, Rashmi R. Rout, Aveek Chakrabarti and Soumya K. Ghosh. *On Network Lifetime Expectancy with Realistic Sensing and Traffic Generation Model in Wireless Sensor Networks*, IEEE Sensors Journal, 2013(7).
- [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).

Patents & Invention Disclosures

1. **Determining whether a flow is to be added to a network**, Ayon Chakraborty, Shruti Sanadhya, Kyu-Han Kim, (Hewlett-Packard Laboratories) *Granted*, US20160286427A1
2. **Managing network traffic using experiential capacity**, Ayon Chakraborty, Shruti Sanadhya, Kyu-Han Kim, (Hewlett-Packard Laboratories) *Granted*, PCT/US2016/015192
3. **Implementing Wireless Communication Networks using Unmanned Aerial Vehicles**, Karthikeyan Sundaresan Eugene Chai, Ayon Chakraborty, Sampath Rangarajan (NEC Laboratories America) *Granted*, US20190044608
4. **Self-configuring LTE Radio Access Network on Unmanned Autonomous Vehicles**, Karthikeyan Sundaresan, Eugene Chai, Sampath Rangarajan, Mohammad Khojastepour, Ayon Chakraborty (NEC Laboratories America) *Filed, Published*, US20190278302
5. **System and Method for Providing LTE Connectivity through Low-altitude UAV Networks**, Eugene Chai, Ayon Chakraborty, Karthikeyan Sundaresan and Sampath Rangarajan (NEC Laboratories America) *Filed*
6. **Tracking Indoor Objects from an Unmanned Aerial Vehicle (UAV)**, Ayon Chakraborty, Ashutosh Dhekne, Karthikeyan Sundaresan, and Sampath Rangarajan (NEC Laboratories America) *Filed*

Awards and Honors

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

Teaching/Mentoring and Grant Writing Experience

Course Instructor

Smart Sensing for Internet of Things (Graduate, IIT Madras)

Spring 2021

Wireless Signals and its Applications (Graduate, Stony Brook)

Fall 2016

Student Mentoring

Fall 2013 – Spring 2017

- o **Stony Brook:** I have personally mentored six students for their master's thesis/projects. Several of such research efforts led to publications at reputed systems/networking venues.
- o **NEC Labs:** Mentored graduate student interns. May 2018 – Present
 - Ashutosh Dhekne (PhD student at *UIUC*, currently faculty at *Georgia Tech*)
 - Avinash Kalyanaraman (PhD student at *University of Virginia*)
 - Md. Shaifur Rahman (PhD student at *Stony Brook University*)
 - Mallesham Dasari (PhD student at *Stony Brook University*)

Grant Writing Experience

I was actively involved with my doctoral advisor in writing two successfully funded research proposals to the National Science Foundation, that spans my entire dissertation work on dynamic spectrum sharing.

- o Measurement-Augmented Spectrum Databases for White Spaces, USD 344,946 (Sep'14 – Aug'17).
- o SpecSense: Bringing Spectrum Sensing to the Masses, USD 800,000 (Oct'16 – Sep'19)

Selected Talks

- **Drones as On-Demand Infrastructure for Next-Generation Wireless Networks** (Feb'20)
 - Indian Institute of Technology, Madras.
 - Indian Institute of Technology, Delhi.
 - Indian Institute of Technology, Kanpur.
 - Indian Institute of Technology, Kharagpur.
- **TrackIO: Tracking First Responders Inside-Out**, USENIX NSDI 2019, Boston, Massachusetts.
- **SkyRAN: A Self-Organizing LTE RAN in the Sky**, ACM CoNEXT 2018, Heraklion, Greece.
- **SkyLiTE: End-to-End Design of Low-altitude UAV Networks for Providing LTE Connectivity**, 39th IEEE Sarnoff Symposium 2018, Newark, New Jersey.
- **Data-Driven Techniques Towards Performance Optimization in Wireless Networks** (Feb/Mar'17)
 - NEC Laboratories, Princeton, NJ.
 - Samsung Research America, Mountain View, California.
 - Xerox Research Center India, Bangalore.
 - Indian Institute of Technology, Delhi.
 - Indian Institute of Technology, Madras.
 - Indian Institute of Technology, Bombay.
- **ExBox: Experience Management Middlebox for Wireless Networks**, ACM CoNEXT 2016, Irvine, California.
- **Benchmarking Resource Usage for Spectrum Sensing on Commodity Mobile Devices**, ACM HotWireless 2016 (ACM MobiCom), 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 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.)

Professional Services

■ **Program Committee Member:** COMSNETS'21, ICDCS'21, ICDCS'19, ICDCS'18

■ **Session Chair:** COMSNETS'21, CoNEXT'18

■ **Journal Reviewer:**

IEEE Transactions on Mobile Computing (2017, 2018, 2019, 2020, 2021)

IEEE Transactions on Wireless Communications (2017, 2018, 2019)

IEEE Communications Magazine (2019)

IEEE Transactions on Networking (2019)

Elsevier Computer Communications (2018)

■ **External Reviewer:** IEEE WCNC'18, ACM CoNext'17, ACM Mobicom'17, ACM Mobisys'17, ACM CoNext'16, ACM Mobicom'16, ACM Mobicom'15