

Mostafa Uddin
Network System Researcher
Bell Labs (Nokia)
Crawford Hill, NJ, USA

Contact
mostafa.uddin@nokia.com
(414)379-5199
<http://www.cs.odu.edu/~muddin>

Objective Pursue a successful research career in Networking System.

Research Interest My research interest spans in various areas of **Mobile Computing, Wireless Network, Internet of Things, Data Center Network, Software Defined Network, and Network Security**. I am specially interested in developing algorithms and building real-world systems that involves with Smart devices, Wireless communication, Sensing technology, Signal processing, Software Defined Networking and Applied Machine learning techniques. In developing such systems and applications, I address research challenges in the direction of energy efficiency, bandwidth improvement, ensuring E2E QoS, scalability, mobility, network security etc.

Education Old Dominion University (ODU), Norfolk, VA, USA
PhD in Computer Science (2011 - 2016)
Completed: 05/06/2016, Degree Received: 08/26/2016
Advisor: Dr. Tamer Nadeem (nadeem@cs.odu.edu)
Dissertation Topic: Toward Open and Programmable Wireless Network Edge [Defended on May 10]
Dissertation Committee: Dr. Kurt Maly (CS, ODU), Dr. Michele Weigle (CS, ODU), Dr. ChunSheng Xinand (ECE, ODU), Prof. Mahadev Satyanarayanan (CMU)
CGPA 3.98/4.0

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
B.S. in Computer Science and Engineering, 2006
Completed: June, 2006, Degree Received: 11/18/2006
CGPA 3.72/4.0

Current Position **Network System Researcher**, Bell Labs (Nokia-US), Holmdel, NJ **06/06/2016 - Present**

- Drive and carry out groundbreaking and innovative research in networking systems.
- Build and prototype systems to demonstrate research innovations and technology impact
- Propose, investigate and publish research in premier conferences and journals world-wide
- Partner with Nokia's business units to ensure the successful transfer and commercialization of research assets
- Create and maintain strong collaborative associations with university-based researchers, other leading research organizations
- Supervising Graduate Students for their summer internship projects

Awards and Honors

- Request from the editors to review for IEEE Internet of Things Journal (IoT), IEEE Transaction on Mobile Computing (TMC) and ACM/IEEE Transactions on Networking (ToN). These are top journals in the respective area.
- ACM SIGMOBILE Travel grant for attending HotMobile 2015.

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- Microsoft Research "ACM SRC" Grant Recipient for MobiCom 2013, Miami, FL.
- NSF Student Travel Grant Recipient for MobiCom 2013, Miami, FL.
- NSF Travel grant for attending IEEE PerCom 2013.
- ACM SIGMOBILE Travel grant for attending HotMobile 2013.
- **Outstanding RA (fall 2012) - Computer Science Department, ODU.** Annual Award for Research by the Department of Computer Science. Given to 2 students among about 65 graduate students.
- Travel grant for attending HoMobile 2012, INFOCOM 2012, and UbiComp2012(from CS Department of ODU).
- **Dominion Graduate Scholar offered by College of Sciences, ODU.** Programs in the College of Sciences offer a number of very competitive awards for graduate students newly admitted into Ph.D. programs.
- Dean's List Scholarship during undergraduate studies at Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh. Two consecutive academic years for maintaining GPA higher than 3.75
- Placed in top 1% in Higher Secondary Exam (A-level) in Bangladesh.
- Placed in top 1% in Secondary School Exam (O-level) in Bangladesh.

Research Experiences

Network System Researcher, Bell Labs (Nokia-US), Holmdel, NJ **06/06/2016 - Present**

- **IoT Network Infrastructure with SDN capability:** In this project, our objective is to build a SDN-based network infrastructure of IoT devices for enterprise deployment.
- **High Availability Distributed Server:** Develop a high availability distributed server system that can seamlessly migrate client request flow from primary server to secondary servers during the failure of the primary server.
- **Indoor tracking system for BLE-based peripheral devices:** Using signal processing and machine learning technique to localize BLE peripheral devices at finer granularity.
- **Fingerprinting IoT device:** Fingerprinting BLE-based IoT devices leveraging their traffic patterns.

Research Assistant, Computer Science, ODU, Norfolk, VA **08/27/2011 - 05/06/2016**

Advisor: **Dr. Tamer Nadeem**, Assistant Professor

- **Ensuring end-to-end QoE for video streaming applications:** In this project, our objective is to ensure end-to-end QoE for running different types of video streaming application in smart devices. In order to do that we leverage the SDN control capability at the smart devices to smartly manage the resource allocation for the video streaming applications.

- **TrafficVision:** In this project, we design and develop modules that extend the SDN's layer architecture to have fine-grained and real-time traffic-awareness at the network edge. We extend the SDN's data layer and Southbound-API to extract new traffic flow feature, that allow us to develop tool (e.g. *Traffic Vision*) in the control layer to have scalable, economic and flexible solutions of classifying the network traffic flows based on novel Machine-Learning (ML) technique. This is a collaboration research project with HP Labs, Palo Alto, CA.
- **CHKD:** In this project, we use accelerometer, gyroscope, and compass sensors of the smartphone to build an automatic tool to create spaghetti diagrams of movements of personnel in a non-intrusive way.
- **meSDN:** In this project, we extend the SDN framework to the client devices to provide services such as WLAN virtualization with end-to-end QoS. This is a collaboration research project with HP Labs, Palo Alto, CA.
- **Audio-WiFi:** In this project, we build a novel framework that integrate the Audio interface (mic, speaker, and sound driver) with the Wi-Fi Interface to develop a more efficient Wi-Fi network communication for smart devices.
- **MagnoTricorder:** In this project, we leverage the effect of Electro Magnetic Interference (EMI) generated by the AC current in the main power-line at home to identifying and detecting the running devices. In this project we use magnetic field sensor of the smartphone, signal processing, and machine learning technique to build the system.
- **EnergySniffer:** In this project we use the acoustic sensors of the smartphone to identify the running machines at home. We use signal processing and machine learning technique to build such system.
- **ParkZoom:** This is an infrastructure aided smartphone sensing based parking localization system. This is a collaboration project with Siemens Corporate Research to develop smart parking system.

Bell Lab Researcher - intern, Bell Labs, Murray Hill, NJ
08/07/2015

06/01/2015 -

Advisor: **Randeem Bhatia**

- Evaluating different techniques of network flow sampling in Open vSwitch (e.g. sFlow, NetFlow, mirroring) based on CPU utilization and bandwidth reductions.
- Developing adaptive and efficient flow sampling actions in the OVS Datapath.
- Developing algorithm for detecting any network anomalies or attacks using the sampled network flow statistics.

Research Associate Intern, HP Labs, Palo Alto, CA **07/01/2014 - 08/14/2014**

Mentor: **Kyu-Han KIM**, Senior Researcher and Research Manager

- Leveraging both the cellular (i.e. LTE) and the WiFi interface of the smartphone for improving the performance of the peer-to-peer real-time interactive applications such as Skype video chat, Google Hangout, Viber voice call etc.
- Hack the network stack of the Nexus 7 tablet (LTE) to implement the Multi-Path UDP (MPUDP) in the transportation layer of the android kernel.
- Experimental evaluation of our system using 2 Nexus 7 tablet (android device) using AT&T vendors

Research Associate Intern, HP Labs, Palo Alto, CA **05/13/2013 - 08/23/2013**

Mentor: **Jeongkeun Lee**, Senior Research Scientist

- Extending the SDN framework to the wireless end devices.
- WLAN virtualization with performance guarantee.
- Implementing customized Qdisc for Linux Network stack.
- Implementing required interaction between WiFi driver and Linux Qdisc.
- Deploying open vSwitch in Android platform using cross-platform compiling.

Academic Experiences

Teaching Assistant, Computer Science, Old Dominion University, Norfolk, VA **Fall 2011-Spring 2016**

I helped the students, and graded their class assignments/projects for following courses

- CS300 - Computer in Society, Fall 2011.
- CS250 - Programming and Problem Solving II, Spring 2012.
- CS495/595 - App Development for Smart Devices, Fall 2012.
- CS495/595 - App Development for Smart Devices, Fall 2013.

Teaching Assistant, Electrical and Computer Engineering, Marquette University, Milwaukee, WI **Fall 2008-Spring 2010**

I helped the students, and graded their class assignments/projects for following courses

- EECE 2010. Electric Circuits 1
- EECE 2015. Circuits Laboratory 1
- EECE 1610. Introduction to Computer Programming

Students I have mentored,

- Tianbo Gu (UC Davis), Summer 2017
- Bashima Islam (University of North Carolina at Chapel Hill), Summer 2017
- Maryam Arab (MS Student at Old Dominion University)

Industrial Experiences (in Bangladesh)

Software Engineer, KAZ (www.kaz.com.bd), Dhaka, Bangladesh **Feb '08-Dec '09**

- Research and Development in ITE Enterprise project, an international tax management tool.
- Developing an installer and auto updating mechanism using InstallShield 2008 for the ITE Enterprise product.
- Programming in C#, WCF and WPF.

Software Engineer, SDSL(www.sdslbd.com), Dhaka, Bangladesh **Nov '06-Feb '08**

- GPS based Real-Time Navigation system for Mobile devices using Symbian C++/S60.
- Instant Mobile Messenger Application for Mobile devices in Symbian OS.
- Developing Mobile Map(<http://maps.afregis.co.za/mobi/splash.html>), a J2ME mobile application.
- Developing GRID(<http://www.thegrid.co.za/about>), a J2ME mobile application.

Software Engineer Intern Vertex Limited, Dhaka, Bangladesh **Dec '05 - May '06**

- Developing software for the RTA-600 Time attendance device. (Java)

Computer Skills

Programming Skill: C/C++, Java, Python, C#, SQL, JavaScript/CSS/D3, nesC

Technical Skill Android Programming, Linux Kernel Programming, Open vSwitch (user-space and kernel space), P4 switch, ONOS SDN network controller, Linux Network Stack (IP, Qdisc, Bridge, Core, mac80211 etc.) hacking, Wireless Driver Hacking(Qualcomm, Broadcom, TI etc.) Audio Driver Hacking (ALSA), Signal Processing, Machine learning, Smartphone Power Monitoring(Monsoon), BlueZ, Bluetooth Network stack, Bluetooth Low Energy, MyNewt, Ubertooth, Hacking BLE traffic, Hacking BLE firmware, IPv6 network programming, Quagga, Criu, USRP and GNU Radio, MATLAB, Octave, Weka-Data mining tool, TinyOS- TelosB Sensor

**Peer-Reviewed
Papers:**

- Acoustic-WiFi: Audio Channel Assisted Wi-Fi Network for Smart Devices (in review at IEEE TMC)
Mostafa Uddin, and Tamer Nadeem.
- SDN-based Service Automation for IoT
Mostafa Uddin, Sarit Mukherjee, Hyunseok Chang and T.V. Lakshman
IEEE ICNP 2017 (acceptance rate 18.6% = 39/209)
- BLESS: Bluetooth Low Energy Service Switching using SDN
Mostafa Uddin, Sarit Mukherjee, Hyunseok Chang and T.V. Lakshman.
IEEE SmartCity 2017
- TrafficVision: A Case Scenario of Pushing SDN to Wireless Edges
Mostafa Uddin, Gowtham Bellala, Jeongkeun Lee, and Tamer Nadeem
IEEE MASS 2016
- Understanding the Intermittent Traffic Pattern of HTTP Video Streaming over Wireless Networks
Ibrahim Ben Mustafa, Mostafa Uddin, and Tamer Nadeem
IEEE WINMEE 2016 (with IEEE WiOpt 2016)
- Wearable Sensing Framework for Human Activity Monitoring
Mostafa Uddin, Ahmed Salem, Ilho Nam, and Tamer Nadeem
ACM WearSys'15
- Harmony: Content Resolution using Acoustic Channel (acceptance rate 19% = 316/1640)
Mostafa Uddin, and Tamer Nadeem
IEEE INFOCOM 2015 (acceptance rate 19% = 316/1640)
- meSDN: mobile extension of SDN
Jeongkeun Lee, Mostafa Uddin, JeanTourrilhes, Souvik Sen, Sujata Banerjee, Manfred Arndt, Kyu-Han Kim, Tamer Nadeem
ACM MCS 2014 (with MobiSys 2014).
- SpyLoc: A Light Weight Localization System for Smartphones.(acceptance rate 19.8% = 68/342)
Mostafa Uddin and Tamer Nadeem
IEEE SECON 2014.
- SmartSpaghetti: Accurate and Robust Tracking of Human's Location
Mostafa Uddin, Ajay Gupta, Kurt Maly, Tamer Nadeem, Sandip Godambe, Arno Zaritsky
IEEE-EMBS International Conferences on Biomedical and Health Informatics, 2014
- SmartSpaghetti: Use of Smart Devices to Solve Health Care Problems (Full Paper acceptance rate=18%)
Mostafa Uddin, Ajay Gupta, Kurt Maly, Tamer Nadeem, Sandip Godambe, and Arno Zaritsky
International Workshop on Biomedical and Health Informatics, BIBM 2013
- RF-Beep: A light ranging scheme for smart devices (acceptance rate 11.2% = 19/170(full paper))
Mostafa Uddin and Tamer Nadeem
IEEE PerCom 2013.
- A2PSM: Audio Assisted Wi-Fi Power Saving Mechanism for Smart Devices(acceptance rate 31.5%)
Mostafa Uddin and Tamer Nadeem
ACM HotMobile 2013.
- MagnoTricorder: What You Need To Do Before Leaving Home
Mostafa Uddin and Tamer Nadeem
ACM HomeSys, UbiComp 2012

- EnergySniffer: Home Energy Monitoring System using Smart Phones
Mostafa Uddin and Tamer Nadeem
IEEE IWCMC, 2012.

**Peer-Reviewed
Articles:**

- Report of HotMobile 2012
Igor Pernek, Mostafa Uddin and Jack Fernando Bravo Torres
IEEE Pervasive Computing.
- HotMobile 2012 Poster: MachineSense: Detecting and Monitoring Active Machines using Smart Phone
Mostafa Uddin and Tamer Nadeem
ACM SIGMOBILE MC2R.
- HotMobile 2012 Poster: Audio-WiFi: Audio Channel Assisted WiFi Network for Smart Phones
Mostafa Uddin and Tamer Nadeem
ACM SIGMOBILE MC2R.

**Peer-Reviewed
Demos/Posters:**

- Poster: SafeWLAN: A WLAN-based SDN Approach for Securing WLAN Traffic
Mostafa Uddin, Ashish Kshirsagar and Tamer Nadeem
ACM HotMobile 2015
- Poster: Extending SDN for mobile device
Jeongkeun Lee, Mostafa Uddin, Jean Tourrilhes, Souvik Sen, Sujata Banerjee, Manfred Arndt and Tamer Nadeem
ACM HotMobile 2014
- SpyLoc: a Light Weight Localization System for Smartphones [Poster][SRC Presentation]
Mostafa Uddin and Tamer Nadeem
In Proceedings of MobiCom'13
- Audio-WiFi: Audio Channel Assisted WiFi Network for Smart Phones[Demo]
Mostafa Uddin and Tamer Nadeem
IEEE INFOCOM, 2012 .
- EnergySniffer: Home Energy Monitoring System using Smart Phones[Poster]
Mostafa Uddin and Tamer Nadeem
IEEE INFOCOM, 2012 .
- MachineSense: Detecting and Monitoring Active Machines using Smart Phones[Poster]
Mostafa Uddin and Tamer Nadeem
ACM HotMobile, 2012 .

Technical Reports

- BLESS: Bluetooth Low Energy Service Switching using SDN
Mostafa Uddin, Sarit Mukherjee, and T.V. Lakshman. Bell Labs Technical Report (ITD-16-56909H, 10/20/2016).

**Patents and
Invention
Disclosures**

- Jung Gun Lee, Mostafa Abdulla Zahid Uddin, Jean Tourrilhes, Souvik Sen, Manfred R Arndt. "Wireless Software-Defined Networking", Publication number WO2015065422 A1, Publication date May 7, 2015.
- Mostafa Uddin, Tamer Nadeem. "SMILE – Towards Smarter Network Edges for Next Generation Networks", Submission Date Oct, 2015.
- Mostafa Uddin, Sarit Mukherjee , and T.V. Lakshman. "BLESS: Bluetooth Low Energy Service Switching using SDN", Patent Application Filled date April 07, 2017.

**DBLP & Google
Scholar**

DBLP Profile
Google Scholar Profile

News/Media	Researchers develop sound way to improve smartphone battery life(V3 online Magazine)
Professional Services	TPC member in IEEE INFOCOM 2018, IEEE SmartEdge 2017. Invited Reviewer IEEE Internet of Things Journal (IoT), IEEE Transaction on Mobile Computing (TMC), ACM/IEEE Transactions on Networking (ToN) Web Chairs VNA 2015. Student Volunteer in MobiCom'2013, HotMobile'2013, HotMobile'2014, DriveSense'2014 Reviewer through Advisor: IEEE INFOCOM 2016, IEEE LCN 2015, ACM HotMobile 2015, IEEE SECON 2015, IEEE ICC 2014, IEEE PerCom'2014, IEEE Globecom' 2013, IEEE IWCMC'2013.
Membership & Activities	ACM SIGMOBILE Student Member ACM Student Member ODU Bangladeshi Student Association, President (2014-2016)