Sumit Maheshwari

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Education

2016–2020 (expected) **WINLAB, Rutgers University**, *PhD*, CGPA: 4.0/4.0, *Computer Engg*.

2016–2018 **WINLAB, Rutgers University**, *MS*, CGPA: 4.0/4.0, *Computer Engg*.

2009–2012 **IIT Kharagpur, India**, *MS*, CGPA: 9.22/10, *Electronics & Electrical Communication Engg*.

2005–2009 **Dr. MGR Univ., India**, *B.Tech*, CGPA: 9.89/10, *Electronics & Communication Engg*.

Technical Skills

Programming	Python, C, C++, HTML5, CSS3, JS, SQL, Ruby, Data Structures & Algorithms
System	Networking, Socket Programming (TCP/IP), ONAP
Tools	Eclipse, NetBeans, Click, Matlab, VM, LXD, Docker, ns3
Framework	Fabric.js, Three.js, Anaglyph.js, Node.js
OS	Linux, Windows
Collaboration	Git

Work Experience

Aug. 2016 – Current **Research Assistant**, WINLAB.
Design, develop and evaluate distributed Mobile Edge Computing (MEC) architecture to support low-latency applications by: modeling and analysis a city-scale model to improve overall system capacity, named-object based simple and scalable virtual network with application specific routing, dynamic service migration using containers, and control plane protocol for resource sharing.

Jul. 2015 – Jun. 2016 **Assistant Professor**, CMR Institute of Technology, Bangalore, India.
Teach Wireless Communication and Analog Electronics Circuits to 200+ students (Theory and Labs). Guide bachelors and masters research projects.

Jul. 2012 – Jun. 2015 **Lead Engineer**, Samsung R&D, Bangalore, India.
Create authoring & presentation engine for Note3 using fabric.js (patent). Develop context prediction engine for Webkit based Blink browser. Propose and publish solutions for Circuit Switched Fallback in LTE. Attend global operators' meet, understand network problems and align LTE solutions to their needs.

Internship Experience

Jun. 2019 – Aug. 2019 **Technical Research Intern**, Nokia Bell Labs, NJ, USA.
Enabling low-latency deterministic networking for the Industry 4.0 standards.

Jun. 2018 – Aug. 2018 **Technical Research Intern**, AT&T Labs, NJ, USA.
Develop an end-to-end system for faster disaster recovery during disasters by determining UE locations.

Research Projects

Apr. 2019 – Current **Mobile Edge Cloud Performance in the COSMOS Testbed**, WINLAB.
Develop and deploy augmented reality (AR) applications in the large-scale outdoor COSMOS testbed to evaluate latency performance using techniques such as application specific routing, dynamic rerouting, service migration and resource sharing algorithms.

Mar. 2019 – Current **Content Distribution in Mobile Edge Cloud**, WINLAB.
Build an end-to-end efficient content placement and retrieval system to improve the user Quality of Experience (QoE) during fluctuating load and mobility
Evaluate content distribution performance across the MEC layer using named-object networking and network coding

Sep. 2018 – Aug. 2019 **Distributed Control Plane Protocol for Mobile Edge Computing**, WINLAB.
Specify lightweight overlay control plane protocol for distributed edge computing resources
Evaluate protocol overhead and achievable system performance with cooperation between edge clouds
Design cooperative resource sharing scenarios (e.g., service chaining) enabled by the protocol
Evaluate end-to-end latency for specific real-time applications

Jun. 2019 – Aug. 2019 **Low-latency Deterministic Networking**, Nokia Bell Labs.
Configure TSN (Time Sensitive Networking) switches for periodic deterministic traffic.
Provide optimization avenues to achieve bounded latency and jitter using 802.1Qbv standard.

Jun. 2018 – Aug. 2018 **Faster Network Recovery during Disasters**, AT&T.
Place mobile small cells at the optimal locations during disaster for faster network recovery.
Collect 3GPP physical layer measurements between a mobile eNB and UEs enriching with MME/HSS logs.
Develop system for drone based measurements using portable eNB, MME and HSS [Patent].

Sep. 2017 – May. 2018 **Edge Cloud Modeling and Migration**, WINLAB.
Develop a city-scale simulation framework to study networking for an edge-cloud system in terms of latency, bandwidth and server load [SEC2018].
Analyze the impact of various metrics of cloud applications, including the number of pending requests in the cloud queue, system latency, processing latency, missed edge requests, and missed deadlines.
Prototype and experiment impact of predictive server migration on service quality and container technology for static as well as mobile users for fixed/variable load [ANTS2018].

Aug. 2017 – Dec. 2017 **Satellite Content Delivery Network**, WINLAB.
Build a satellite based asymmetric content distribution network using MobilityFirst (MF) architecture and multiple client locations (Rutgers, Woodbine and Princeton). Use multicast-aware routing and proactive caching to deliver content and satisfy different geographical needs using satellite's multi-beam feature.

Sep. 2016 – Jul. 2017 **Named Object Based Virtual Networks using MobilityFirst**, WINLAB.
Design, prototype and experiment named-object based scalable virtual networks using MF architecture, inherently handling link and node failures.
Integrate application specific routing (ASR) with virtual network to route traffic to the best available network resource based upon network load and latency considerations using Click modular router [ICDCN2019].

Jul. 2014 – Jun. 2015 **LTE Network Optimization**, SAMSUNG.
Attend global operator's meet, gather RFP information, translate to technical design and provide research solutions catering their needs.
Create tools to efficiently analyze LTE traffic traces and seek optimization spots. Improve CSFB (Circuit Switched Fallback) performance by tweaking signaling and proposing intuitive switching techniques.

Jan. 2014 – Jun. 2014 **Hardware Accelerated Software Technology**, SAMSUNG.
Develop a Webkit-browser based predictive engine for content pre-fetching by tapping Chromium data before rendering.
Design a ranking based algorithm for selective content caching using real-time cursor movement, browsing history data and Google's ngram database.

Jul. 2012 – Dec. 2013 **Authoring, Rendering and Presentation Engine for Note Device**, SAMSUNG.
Develop an infinitively zoomable, end-to-end authoring, rendering and presentation engine using HTML5 Canvas and fabric.js.
Design and develop a collaboration framework using Node.js web server [patent].
Implement a 3D engine using Three.js converting 2D presentations to a 3D scene. Integrate anaglyph.js to view 3D presentation using anaglyph glasses to improve user experience.

Jun. 2009 – Apr. 2012 **Measurement, Modeling and Forecasting of Traffic in NGWI**, IIT-Vodafone.
Develop traffic models for applications to foresee wireless Internet traffic. Implement TCP and UDP based tools to measure traffic on a mobile device with packet size & inter-packet delay as settable parameters.
Study convergence of heterogeneous wireless networks and propose a vertical handover technique using fuzzy logic [patent].

Graduate Coursework | Select

• Communication Networks I and II (Teaching Assistant) • Wireless Communication Techniques • Mobile Communications and Fading • Modern Digital Communication • Design of Internet Services • Information Theory and Coding • Error Control Coding • Convex Optimization

Publications | Select

Patents

• An energy and QoS aware methodology for vertical handover among heterogeneous wireless networks.
• Method and system for real time collaboration on a canvas (USA, India and S.Korea).
• Method and system for identifying intent of a plurality of editors in a collaborative environment.
• Method and system for partial lockless real time collaboration on a canvas

Journals

• NOVN: A Named-Object Based Virtual Network Architecture to Support Advanced Mobile Edge Computing Services (review).
• GMAP: A Hierarchically Global Name Resolution for Large-Scale IoT Service (under submission).
• ShareOn: Shared Resource Dynamic Container Migration Framework for Real-time Support in Mobile Edge Clouds (under submission).
• A joint parametric prediction model for wireless Internet traffic using Hidden Markov Model (Springer Journal).
• QoS-aware fuzzy rule-based vertical handoff decision algorithm incorporating a new evaluation model for wireless heterogeneous networks (Eurasip Journal).
• Energy and quality of service aware FUZZY-technique for order preference by similarity to ideal solution based vertical handover decision algorithm for heterogeneous wireless networks (IET Networks Journal).
(conference publications available)

Awards | Select

2019 NSF travel grant for SEC 2019 ($0.8k)
2019 Research assistant fellowship at Rutgers University (WINLAB)
2019 Bell Labs continuing collaboration award
2019 Rutgers outstanding Master's student award
2019 School of graduate studies conference travel award
2019 NSF Infocom travel award ($1.25k)
2019 Finalist - 3MT (3 Minute Thesis) Rutgers
2019 First place winner at the Juniper Comcast SDN Throwdown event
2018 Best paper award at the IEEE International Conference on Advanced Networks and Telecommunications Systems
2018 AT&T VURI (Virtual University Research Initiative) fellowship ($20k)
2018 NSF travel grant for SEC 2018 ($1k)
2018 Research assistant fellowship at Rutgers University (WINLAB)
2018 Recipient of Rutgers professional development fund 2018
2017 Best TA of the year award (ECE, Rutgers University)
2017 Best poster award at ECE Research Day (Rutgers University)
2017 Teaching and research assistant fellowship at Rutgers University (ECE/WINLAB)
2016 Teaching and research assistant fellowship at Rutgers University (ECE/WINLAB)
2013 Best idea in Creative Lab and Innovation (C-LAB) Contest at Samsung (~1300 submissions)
2011 Best paper award at IEEE CSQRWC China
2009 Gold Medal and University Topper B.Tech (ECE)