

Nitinder Mohan

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Ph.D. Scholar in Computer Science
Marie Curie Fellow

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Education

- 2015 – **Ph.D. Scholar** **University of Helsinki**
– Supervised by *Prof. Dr. Jussi Kangasharju* Finland
– Collaborative Networking (CoNe) research group
- 2013 – 2015 **M.Tech. Computer Science & Engineering** **IIT Delhi**
– Specialization in *Mobile Computing* India
– CGPA: 8.5/10
– Nominated for **Best Thesis Award**
- 2009 – 2013 **B.Tech. Computer Engineering** **Punjabi University**
– First Division *with Distinction* India
– Ranked amongst **Top-10 batch performers**

Skills

- Research Interests **Edge clouds, Cloud computing, Internet-of-Things, Multipath TCP, Information-Center Networks, Distributed Systems**
- Programming **Python, Java, HTML5, C, C++, BASH, L^AT_EX**
- Tools & Technologies **Linux kernel programming, Network Simulator (NS-3), MATLAB, SPARK, Docker, GRAPHLAB, TENSORFLOW**
- Languages **English** **Expert** **Hindi** **Expert** **Punjabi** **Expert** **Finnish** **Beginner**

Research Experience

- Ph.D. **University of Helsinki** **Helsinki, Finland**
Supervisor: *Prof. Dr. Jussi Kangasharju*
Sept 2015 – Oct 2019 (expected)
– Research in operation, deployment & networking in edge clouds
– Jointly funded by EU FP7 project - CleanSky ITN & Finnish Academy of Sciences project - AIDA
- Visiting Researcher **University of Göttingen** **Göttingen, Germany**
Host: *Prof. Dr. Xiaoming Fu*
Jan – May 2018
– Research in optimal placement of edge servers and virtualized service functions
– Funded by EU FP7 project - CleanSky ITN

Research Experience (continued)

	<ul style="list-style-type: none"> ■ NEC research labs, Europe Host: <i>Dr. Fabian Schneider</i> – Research in deploying network functions in edge clouds – Funded by EU FP7 project – CleanSky ITN 	Heidelberg, Germany Nov 2016 – Mar 2017
Project Scientist	<ul style="list-style-type: none"> ■ Indian Inst. of Technology (IIT) Supervisor: <i>Dr. Vinay Ribeiro</i> – Research & Development in "Structured sharing of resources in a Device-to-Device (D2D) Network" – Funded by Intel Labs, USA 	New Delhi, India June – Aug 2015
M.Tech. (with Thesis)	<ul style="list-style-type: none"> ■ Indraprastha Inst. of Information Tech. (IIIT) Supervisor: <i>Dr. Pushpendra Singh</i> – Research in checkpointing user-applications in Information-centric networks – Awarded GATE scholarship by Govt. of India 	New Delhi, India 2013 – 2015
Research Intern	<ul style="list-style-type: none"> ■ Central Scientific Instruments Org. (CSIO) Supervisor: <i>Dr. Sudesh K. Mittal</i> – Research in landslide prediction model using image processing and interpolation – Collaboration with Indian Space Research Org. (ISRO) 	Chandigarh, India Jan – July 2013

Teaching Experience

Teaching Assistant	<ul style="list-style-type: none"> ■ Distributed Data & Infrastructures – University of Helsinki ■ Distributed Systems – University of Helsinki ■ Cellular Data Networks – IIIT Delhi 	<div style="display: flex; justify-content: space-between; width: 100px;"> 2017 2018 </div> <div style="display: flex; justify-content: space-between; width: 100px; margin-top: 10px;"> 2016 2015 </div>
Guest Instructor	<ul style="list-style-type: none"> ■ Cloud & Edge Computing – University of Helsinki ■ Introduction to Data Science – University of Helsinki 	<div style="display: flex; justify-content: space-between; width: 100px; margin-top: 10px;"> 2019 2018 </div>

Service

Reviewer	<ul style="list-style-type: none"> ■ IEEE Transactions on Network Science and Engineering ■ IEEE Internet of Things Journal ■ Elsevier Pervasive and Mobile Computing ■ ACM AIChallengeIoT ■ IEEE ICC NGNI Symposium ■ ACM Information Centeric Networking Conference (ICN) 	<div style="display: flex; justify-content: space-between; width: 100px;"> 2019 2019 2019 2019 2019 2017 </div>
Shadow PC	<ul style="list-style-type: none"> ■ ACM Internet Measurement Conference (IMC) 	<div style="display: flex; justify-content: space-between; width: 100px;"> 2019 </div>
Jury	<ul style="list-style-type: none"> ■ HackEdge hackathon organized by CEACS 	<div style="display: flex; justify-content: space-between; width: 100px;"> 2017 </div>
Organizer	<ul style="list-style-type: none"> ■ 3rd International CleanSky Conference 	<div style="display: flex; justify-content: space-between; width: 100px;"> 2017 </div>

Service (continued)

	■ 2 nd International CleanSky Summer School	2016
Web-Admin	■ 2 nd International CleanSky Summer School	2016
Head	■ Design Team of IIITD Research Showcase	2015
Representative	■ M.Tech. 2013–15 batch at IIIT Delhi	2013 2014
	■ Post-Graduate Disciplinary Action Committee at IIIT Delhi	2013 2014

Awards & Achievements



- 1 Awarded [SIGCOMM travel grant](#) to attend IMC 2019 to held in Amsterdam, NL
- 2 Awarded [SIGCOMM travel grant](#) to attend IMC 2019 Shadow PC meeting held in London, UK
- 3 Awarded [Microsoft Research travel grant](#) for ACM MOBICOM 2018 held in New Delhi, India
- 4 Awarded EU FP7 [Marie Curie Initial Training Network \(ITN\)](#) funding to support Ph.D. studies
- 5 Invited to attend [South Asia Workshop On Research Frontiers In Computing](#) with full-fellowship held at National University of Singapore (NUS), Singapore in May, 2014
- 6 [All-India percentile 98.57](#) in Graduate Aptitude Test Examination (GATE) – 2014 amongst ~2 million candidates
- 7 Awarded [GATE scholarship](#) by Govt. of India from 2013 – 2015
- 8 [Recognition Award](#) by Director, IIIT Delhi for exceptional service to Institute from 2013 – 2015
- 9 Graduated Bachelors with [1st Division with Distinction](#) and ranked amongst top 10 students
- 10 Awarded [Certificate of Merit](#) by Govt. of India for being [All-India Topper](#) in Mathematics in All-India Secondary School Examination in 2007

Research Projects

AIDA	■ Adaptive and Intelligent Data – Objective : Introducing learning and intelligence in networks – PI : Prof. Dr. Jussi Kangasharju (Univ. of Helsinki) Prof. Dr. Aristides Gionis (Aalto Univ.)	Academy of Finland 2018–2021
BCDC	■ Bright Clouds Dark Clouds www.bcdcenergia.fi – Objective : Digitalizing utilization of renewable energy via Cloud – PI : Prof. Dr. Rauli Svento (Univ. of Oulu)	Academy of Finland 2016–2020
CleanSky	■ CleanSky Initial Training Network www.cleansky-itn.eu – Marie Curie Framework Program (FP) 7 Project – Objective : Innovation in several areas of cloud and edge computing – Collaboration : Nine university and industry partners in Europe, USA & China – PI : Prof. Dr. Xiaoming Fu (Univ. of Göttingen)	European Union 2014–2018

Research Contribution

Journal Publications

- 2018  Placing it right!: Optimizing Energy, Processing, & Transport in Edge-Fog clouds 
N. Mohan & J. Kangasharju
International Journal on *Annals of Telecommunication*, Springer, 2018
Paper: <https://doi.org/10.1007/s12243-018-0649-0>

Conference & Workshop Publications



- 2020  [*Manuscript*] A Scheduler Approach to Improve MPTCP over dual-LTE 
N. Mohan, T. Shreedhar, A. Zavodovski, J. Kangasharju & S.K. Kaul
ACM SIGCOMM 2020
- 2019  [*In Review*] Pruning Edge Research with Latency Shears 
N. Mohan, A. Zavodovski, W. Wong, P. Zhou & J. Kangasharju
18th ACM Workshop on *Hot Topics in Networks*
-  Open Infrastructure for Edge: A Distributed Ledger Outlook 
A. Zavodovski, N. Mohan, W. Wong & J. Kangasharju
USENIX ATC workshop on *Hot Topics in Edge Computing*
Slides: <http://bit.ly/2OgjvH6>
-  DeCloud: Truthful Decentralized Double Auction for Edge Clouds 
A. Zavodovski, S. Bayhan, N. Mohan, P. Zhou, W. Wong & J. Kangasharju
39th *International Conference on Distributed Computing Systems*
Slides: <http://bit.ly/2y62hBe>
-  ExEC: Elastic Extensible Edge Cloud 
A. Zavodovski, N. Mohan, S. Bayhan, W. Wong & J. Kangasharju
ACM EuroSys workshop on *Edge Systems, Analytics & Networking*
Paper: <https://doi.org/10.1145/3301418.3313941>
Slides: <http://bit.ly/2YGZ3jD>
- 2018  ICON: Intelligent Container Overlays 
A. Zavodovski, N. Mohan, S. Bayhan, W. Wong & J. Kangasharju
17th ACM Workshop on *Hot Topics in Networks*
Paper: <https://doi.org/10.1145/3286062.3286065>
Slides: <https://bit.ly/2UMcAUE> Video: <https://youtu.be/BNmF0gTV1R4>
-  Anveshak: Placing Edge Servers In The Wild 
N. Mohan, A. Zavodovski, P. Zhou & J. Kangasharju
ACM SIGCOMM workshop on *Mobile Edge Communications*
Paper: <https://doi.org/10.1145/3229556.3229560>
Slides: <https://bit.ly/2W9JWx3> Video: <https://youtu.be/8wYjQr80iwI>

Research Contribution (continued)




- QAware: A Cross-Layer Approach to MPTCP Scheduling IFIP Networking '18
T. Shreedhar, N. Mohan, S.K. Kaul & J. Kangasharju
IFIP Networking Conference, Zürich. May 2018
Paper: <https://doi.org/10.23919/IFIPNetworking.2018.8696843>
Open Source: <https://bit.ly/2Jod1Du>
- MUTE: Multi-Tier Edge networks CrossCloud '18
*A. Silvestro**, N. Mohan*, J. Kangasharju, F. Schneider & X. Fu [*joint authors]
ACM EuroSys workshop on *CrossCloud Infrastructures & Platforms*
Paper: <https://doi.org/10.1145/3195870.3195871>
Slides: <https://bit.ly/2CxCjct>
- 2017 ■ Managing Data in Computational Edge Clouds MECOMM '17
N. Mohan, P. Zhou, K. Govindaraj & J. Kangasharju
ACM SIGCOMM workshop on *Mobile Edge Communications*
Paper: <https://doi.org/10.1145/3098208.3098212>
Slides: <https://bit.ly/2HJB5yn> Video: <https://youtu.be/akJtWokhrj4>
- 2016 ■ Edge-Fog Cloud: A Distributed Cloud for Internet of Things Computations CloT '16
N. Mohan & J. Kangasharju
IEEE conference on *Cloudification of the Internet of Things*
Paper: <https://doi.org/10.1109/CIOT.2016.7872914>
Slides: <https://bit.ly/2Hwdrpz>
- ### Posters & Demos
- 2018 ■ Redesigning MPTCP for Edge Clouds MobiCom '18
N. Mohan, T. Shreedhar, A. Zavodovski, O. Waltari, J. Kangasharju & S.K. Kaul
ACM conference on *Mobile Computing and Networking*
Paper: <https://doi.org/10.1145/3241539.3267738>
Poster: <https://bit.ly/2TNfUCB> SRC slides: <https://bit.ly/2Fg1iSk>
- 2017 ■ Grouping Computational Data in Resource Caches of Edge-Fog Cloud CrossCloud '17
N. Mohan, P.Zhou, K. Govindaraj, & J. Kangasharju
ACM EuroSys workshop on *CrossCloud Infrastructures & Platforms*
Paper: <https://doi.org/10.1145/3069383.3069391>
Poster: <https://bit.ly/20h2qsJ>
- 2014 ■ CCNCheck: Enabling Efficient Checkpointed Applications in Content Centric Networks CCNxCon '14
N. Mohan & P. Singh
PARC International *Content Centric Networking conference*
Paper: <https://bit.ly/2CtWqIy>

Research Contribution (continued)

Thesis

- 2019  [\[To be defended\]](#) Edge Computing Platforms & Protocols Ph.D.
N. Mohan
Submitted at: *University of Helsinki, Finland. June 2019*
Reviewers: *Dr. Dirk Kutscher & Dr. Satyajayant Misra*
- 2015  Enabling Sender-initiated Distributed Applications and Checkpointing in Content Centric Networks M.Tech.
Best Thesis Nominee
N. Mohan
Submitted at: *IIT Delhi, India. May 2015*
Examiner: *Dr. Vinay Ribeiro (IIT Delhi) & Dr. Vikram Goyal (IIT Delhi)*
Paper: <https://bit.ly/2TWykAd>

Talks

- 2018  Big Data Frameworks: A primer on MapReduce & Spark Guest Lecture Intro to Data Science
DATA11001: Introduction to Data Science
Host: Prof. Dr. Teemu Roos
University of Helsinki, Finland
Slides: <https://bit.ly/2YgIrxI>
-  Providing Networking at Edge CleanSky Workshop '18
4th International CleanSky Summer School
Host: Prof. Dr. Jussi Kangasharju
University of Helsinki, Finland
- 2017  Scaling computational clouds to network edge CleanSky Summer School '17
3rd International CleanSky Summer School
Host: Prof. Dr. Dan Li
Tsinghua University, Beijing, China
-  Filling Edge-Fog cloud cover: All power to robots! CleanSky Workshop '17
3rd International CleanSky Workshop
Host: Prof. Dr. Xiaoming Fu
University of Göttingen, Germany
- 2016  *MiddleBox Broker*: Enabling in-network functions in secured traffic CleanSky Workshop '16
2nd International CleanSky Workshop
Host: Prof. Dr. Yuming Jiang
NTNU Trondheim, Norway
-  *Edge-Fog cloud*: Scaling IoT computations on the Edge Invited Talk GI-Dagstuhl '16
Aware Machine-to-Machine Communication
GI-Dagstuhl Seminar 16353
Dagstuhl, Germany
Slides: <https://bit.ly/2y4BSUu>
-  Computing IoT data on *Edge-Fog cloud* CleanSky Summer School '16
2nd International CleanSky Summer School
Host: Prof. Dr. Jussi Kangasharju
University of Helsinki, Finland

Research Contribution (continued)

- Simplifying IoT computation in the “Cloud”
1st International CleanSky Workshop
Host: Dr. Fabian Schneider
NEC Europe Labs, Heidelberg, Germany
CleanSky Workshop '16
- 2015 ■ Scaling eScience computational-intensive cloud
1st International CleanSky ITN Summer School
Host: Prof. Dr. Xiaoming Fu
University of Göttingen, Germany
CleanSky Summer School '15

Conference Participation

A: attended, P: presentation, O: poster.

International Conferences

- 2019 ■ Network Traffic Measurements & Analysis (TMA) [A] Paris, France
- 2018 ■ ACM MOBICOM [O] New Delhi, India
■ ACM SIGCOMM [P] Budapest, Hungary
■ IFIP Networking [P] Zürich, Switzerland
■ EuroSys [P] Porto, Portugal
- 2017 ■ Networked Systems [P,O] Göttingen, Germany
■ EuroSys [P,O] Belgrade, Serbia
- 2016 ■ ACM SIGCOMM [A] Florianopolis, Brazil
■ IEEE Cloudification of IoT [P] Paris, France

Seminars/Summer Schools

- 2017 ■ 3rd CleanSky ITN Summer School [P] Beijing, China
nasp.cs.tsinghua.edu.cn/CleanSky/
- 2016 ■ [GI-Dagstuhl] Aware-to-aware machine communication [P] Dagstuhl, Germany
www.dagstuhl.de/en/program/calendar/evhp/?semnr=16353
■ 2nd CleanSky ITN Summer School [P,O] Helsinki, Finland
cleanskysummer.cs.helsinki.fi/
■ Mobile Services and Edge Computing Workshop [A] Helsinki, Finland
www.cs.helsinki.fi/group/close/edge-computing-2016/
- 2015 ■ 1st CleanSky ITN Summer School [P] Göttingen, Germany
cleanskysummer.uni-goettingen.de/
- 2014 ■ South Asia Workshop On Research Frontiers In Computing [A] Singapore
www.comp.nus.edu.sg/programmes/pg/workshops/southasia/

Open Source Contributions

- [rpi-mptcp](#), A tool for measuring MPTCP performance over LTE links on Raspberry Pi
- [anveshak](#), A tool which calculates optimal deployment of cellular Edge servers in an area
- [ns3-qaware](#), ns3 implementation of MPTCP QAware scheduler
- [qaware](#), Linux kernel implementation of MPTCP QAware scheduler
- [efsim](#) A Python-based simulator for Edge cloud networks
- [ccnac](#), A tool to enable application checkpointing in Information-centric networks

Memberships

- Association of Computing Machinery (ACM) Student Member
- Institute of Electrical and Electronics Engineers (IEEE) Student Member
- SIGCOMM Membership
- EUROSYS Membership
- Indian Society of Technical Education (ISTE) Student Member

References

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Deutsche Telekom

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