Akshay Gadre

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Education

Program	Institution	%/CGPA	Years
Doctor of Philosophy, Electrical and Computer Engineering, Advisor: ***Prof. Swarun Kumar***	Carnegie Mellon University	**4.00/4.00**	2017 –
Dual Degree (B.Tech.(Honors)+M.Tech.), Computer Science and Engineering Advisor: ***Prof. Krishna Sivalingam***	Indian Institute of Technology Madras	**9.14/10.00**	2012 – 2017

Selected Publications

Frequency Configuration for Low-Power Wide-Area Networks in a Heartbeat **Feb 2020**
Akshay Gadre, *Revathy Narayanan, Anh Luong, Swarun Kumar, Anthony Rowe, Bob Iannucci* *USENIX NSDI 2020*

Invited Paper: Towards Enabling City-Scale Internet of Things – Challenges and Opportunities **Jan 2019**
Akshay Gadre, *Diana Zhang, Swarun Kumar* *IEEE COMSNETS 2019*

Poster: Maintaining UAV Stability using Low-Power WANs **Oct 2018**
Akshay Gadre, *Revathy Narayanan, Swarun Kumar* **[BEST POSTER RUNNER-UP]** *ACM MOBICOM 2018*

A Deep Learning Approach to IoT Authentication **May 2018**
Rajshekhar Das, ***Akshay Gadre****, Shanghang Zhang, Swarun Kumar, José Moura* *IEEE ICC 2018*

Charm: Exploiting Geographical Diversity in Low-Power WANs **Apr 2018**
A. Dongare, R. Narayanan, ***Akshay Gadre****, A. Balanuta, A. Luong, S. Kumar, B. Iannucci, A. Rowe*
[BEST PAPER AWARD] *ACM/IEEE IPSN 2018*

A Customizable Agile Approach to Network Function Placement **Jun 2017**
Akshay Gadre, *Anix Anbiah, Krishna Sivalingam* *IEEE EuCNC 2017*

Internships

Research Intern – Univ. of Massachusetts, Amherst **Mentor: Prof. Arjun Guha |May - July 2016**
Programming Languages and Systems at Massachusetts(PLASMA) Lab *(11 weeks)*

- Performed research on software-defined network super-optimizers
- Worked with physical OpenStack cluster and OpenFlow switches to derive proof of concept of the planned algorithm.
- Developed a robust tool to integrate the above algorithm into modern systems using OpenFloodlight and OpenStack.

Research Intern – Microsoft Research India **Mentor: Dr. Monojit Choudhury | May - July 2015**
Machine Learning, Natural Language Processing and Multilingual Systems Group *(12 weeks)*

- Developed a procedure to compare the performances of Machine Translation systems on code-mixed texts.
- Investigated features for studying language independent and unsupervised code-switching Named Entity Recognition.
- Demonstrated the efficacy of these features in segregating named entities for machine translation of code-mixed text.

Research Intern – Tata Research Development and Design Centre **May - July 2014**
Software R&D Human Centric Systems Lab *(10 weeks)*

- Deployed game-based assessment of behavioral characteristics and nudging person's choices through gamification.
- Developed a web-based game to extract valuable emotional and behavioral data to predict real life behavior.

Talks

A Deep Learning Approach to IoT Authentication **May 2018**
IEEE ICC 2018 *Kansas City, USA*

A Customizable Agile Approach to Network Function Placement **June 2017**
IEEE EUCNC 2017 *Oulu, Finland*

Research Projects

Spectrum Selection for Low-Power WANs **Dec 2017 - Mar 2019**

LP-WAN devices are enabling a lot of city-scale IoT applications. The most important parameter that greatly impacts battery life of LP-WAN clients is their choice of transmission frequency. We design an intelligent spectrum selection protocol for LP-WANs that incurs minimal overhead and minimal power consumption to find the optimum band.

Maintaining UAV Stability using Low-Power WANs **May 2018 - Aug 2018**

Future urban spaces will see Unmanned Aerial Vehicles (UAVs) deployed for wide-ranging applications. Today's UAVs rely critically on inertial sensors and GPS to remain stable in-flight, struggling to penetrate urban canyons where GPS is unavailable. We develop a system that maintains stability of a UAV using a LP-WAN transmitter at large distances.

Deep Learning for IoT Security **Oct 2017 - Dec 2017**

Internet-of-Things(IoT) is penetrating all walks of life, from cars to implanted pacemakers. Most of these devices being low-power and cheap remain vulnerable to malicious intruders. We develop novel communication mechanisms to secure these billions of heterogeneous devices with minimal power and compute consumption and yet remain secure against much more powerful adversaries.

Coherent Combining for Low-Power WANs **Aug 2017 - Oct 2017**

LP-WAN devices are pushing the boundaries of long range low-cost battery powered communications. The benefits also bring a set of new exciting challenges, related to low-cost, low power consumption and small bandwidth. My research on coherent combining for LP-WANs attempts to improve the range, data rates and battery life of these devices by exploiting geographical diversity.

Centralized Approaches for Static and Dynamic NFP in SDN-enabled networks **May 2016 - May 2017**

Master's Thesis *IIT Madras*

We developed a fast customizable heuristic for service of network function placement(NFP) using a divide-and-conquer approach. Our solution is 186× better than any previous solution for a 48-pod fat-tree without decrease in performance. It uses a dynamic on-line service model using a hybrid Dijkstra's algorithm to perform empirical time-driven analysis.

Teaching Experience

Compiler Design Lab and Computer Networks Lab **August 2016 - May 2017**

Teaching Assistant *IIT Madras*

- Assisted professor during lab hours to instruct students on in-lab assignments
- Single-handedly managed a part of the lab from developing the assignment, clearing the doubts and grading it.
- Invigilated and graded exams along with other TAs
- Redesigned the UI/UX of the course webpage.

Computer Networks **January 2018 - May 2018**

Teaching Assistant *Carnegie Mellon University*

- Assisted professor during recitations and meeting hours to instruct students on projects and theory of the class
- Managed the project component of the course, clearing the doubts and grading it.
- Proctored and graded exams

Scholastic Achievements and Awards

- ACM/IEEE IPSN 2018 Best Paper Award
- ACM/IEEE CPSWeek 2018 Travel Grant Recipient
- Named a Carnegie Institute of Technology Dean's Fellow
- One of the two people awarded Bachelor of Technology (Honors) out of 62
- Selected for the ACM ICPC 2013 Amritapuri Asia Regionals.
- Placed 3rd in the Microsoft Code.Fun.Do. Hackathon 2014
- Placed 3rd internationally in ThinkQuest Digital Media Event 2011 conducted by ORACLE Education Foundation

Related Research Areas - Wireless Communication, Mobile Systems, City-scale Internet-of-Things, LP-WANs, Sensor Networks, UAVs, Security, Deep Learning, Software-defined Networks, Network Function Virtualization