Sandeep Maurice Dsouza

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EDUCATION

Carnegie Mellon University   Pittsburgh, United States
Doctor of Philosophy (Ph.D.)   August 2015 - December 2019
Electrical and Computer Engineering
– *Advisor:* Prof. Raj Rajkumar
– *Thesis:* Designing Predictable Time-Aware and Energy-Efficient Cyber-Physical Systems

Indian Institute of Technology Kharagpur   Kharagpur, India
Bachelor of Technology (Honors)   July 2011 - April 2015
Electronics and Electrical Communication Engineering
– *Advisor:* Prof. Santanu Chattopadhyay
– *Thesis:* System-Design Methodologies for Application-Specific Network-on-Chip Topologies

EXPERIENCE

Stealth Startup   Pittsburgh, PA
Senior Software Engineer   January 2020 - Present
- Designing the systems infrastructure for connected and autonomous vehicles (CAVs).
- Sensor Fusion and Behavioral Planning for CAVs.

Microsoft Research   Redmond, WA
AI+Research Intern   May 2019 - August 2019
Advisors: Landon Cox and Victor Bahl
- Privacy-preserving Live Streaming and Video Analytics (patent application pending)

Nutanix Inc.   San Jose, CA
Member of Technical Staff - Intern   May 2018 - August 2018
Advisors: Akhilesh Joshi and Heiko Koehler
- *Time-as-a-Service* for Coordinated IoT Applications: Containerized micro-service architecture for distributed IoT applications performing coordinated actions using a shared notion of time.
- Proof-of-concept reinforcement-learning-based dynamic vehicular traffic-management.

Siemens Corporate Technology USA   Princeton, NJ
Manufacturing and Autonomy Intern   May 2017 - August 2017
Advisors: Hasan Sinan Bank and Francesco Bleve
- Task and Motion Planning for an Intelligent Industrial-Robotics Manufacturing System.
- Containerization for Industrial Cloud and Edge.

Qualcomm India   Bangalore, India
Engineering Intern   May 2014 - July 2014
Advisors: Ajay Sinha and Tushar Singhal
- Development of a Fast Auto-focus Measure for Smart Devices.

RESEARCH

Time-based Coordination in Geo-Distributed Cyber-Physical Systems
- Designing a geo-scale cloud-edge framework for time-based distributed coordination in cyber-physical systems, based on the notion of *Quality of Time* (QoT) and the *timeline* abstraction.
  – Research published at RTSS '16, HotCloud '17, RTAS '18 and SEC '19.
- Development of an open-source Quality of Time Stack for Linux.
  – Available online: https://bitbucket.org/rose-line/qot-stack

Energy and Thermal-Aware Real-Time Scheduling for Many-core Architectures
- Design and theoretical analysis of energy and thermally-efficient real-time scheduling techniques for multi-core processors and hardware accelerators such as GPUs and FPGAs.
  – Research published at ECRTS '16, ECRTS '17 and RTSS '18.
  – Included in Carnegie Mellon University's 18-648 Real-Time Embedded Systems course-work.
- Development of the *Inferno* power and thermal real-time scheduling simulation framework.
  – Available online: https://github.com/sandeepdsouza93/Inferno

PUBLICATIONS	**Conferences**

[C.11] S. D'souza, V. Bahl, L. Ao and L. Cox, *Amadeus: Scalable, Privacy-Preserving Live Video Analytics*, under review

[C.10] S. D'souza, H. Koehler, A. Joshi and R. Rajkumar, *Quartz: Time-as-a-Service for Coordination in Geo-Distributed Systems*, accepted at ACM Symposium on Edge Computing (**SEC**) 2019

[C.9] S. D'souza and R. Rajkumar, *CycleTandem: Energy-Saving Scheduling for Real-Time Systems with Hardware Accelerators*, in IEEE Real-Time Systems Symposium (**RTSS**) 2018

[C.8] S. D'souza and R. Rajkumar, *QuartzV: Bringing Quality of Time to Virtual Machines*, in IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**) 2018

[C.7] H. Bank, S. D'souza and A. Rasam, *Temporal Logic-based Autonomy for Smart Manufacturing Systems*, in North American Manufacturing Research Conference (**NAMRC**) 2018

[C.6] S. D'souza and R. Rajkumar, *Time-based Coordination in Geo-Distributed Cyber-Physical Systems*, in USENIX Worshop on Hot Topics in Cloud Computing (**HotCloud**) 2017

[C.5] S. D'souza and R. Rajkumar, *Thermal Implications of Energy-Saving Schedulers*, in Euromicro Conference on Real-Time Systems (**ECRTS**) 2017

[C.4] F. Anwar*, S. D'souza*, A. Symington*, A. Dongare*, R. Rajkumar, A. Rowe and M. Srivastava, *Timeline: An Operating-System Abstraction for Time-Aware Applications*, in IEEE Real-Time Systems Symposium (**RTSS**) 2016 (*Equally contributing authors)

[C.3] S. D'souza, A. Bhat and R. Rajkumar, *Sleep Scheduling for Energy-Savings in Multi-Core Processors*, in Euromicro Conference on Real-Time Systems (**ECRTS**) 2016

[C.2] S. D'souza, S. Jar, M. Chakraborti, A. Chatterjee and P. Ray, *Heart rate estimation from Photoplethysmogram during Intensive Physical Exercise using Non-Parametric Bayesian Factor Analysis*, in Asilomar Conference on Signals, Systems and Computers (**ACSSC**) 2015

[C.1] S. D'souza, S. Joshi and S. Chattopadhyay, *A Constructive Heuristic for Application Mapping onto an Express Channel based Network-on-Chip*, in International Symposium on VLSI Design and Test (**VDAT**) 2015

Journals

[J.2] P. Mukherjee, S. D'souza and S. Chattopadhyay, *Area Constrained Performance Optimized ASNoC Synthesis with Thermal-aware White Space Allocation and Redistribution*, in Integration 2018, 60, p.167

[J.1] S. D'souza, S. Joshi and S. Chattopadhyay, *Integrated Mapping and Synthesis Techniques for Network-on-Chip Topologies with Express Channels*, in ACM Transactions on Architecture and Code Optimization (TACO) 2016, 12 (4), p.40

RESEARCH DEMOS	**Coordinated City-Scale Traffic Management using Quartz "Time-as-a-Service"** − In Demo Session of IEEE Real-Time Systems Symposium (RTSS@Work) 2018 **Time-based Distributed Multi-Robot Coordination** − In Demo Session of NSF Cyber-Physical Systems Principal Investigators' Meeting 2017 **Synchronous Task Scheduling for Cyber-Physical Systems** − In Demo Session of IEEE Real-Time Systems Symposium (RTSS@Work) 2015
PROFESSIONAL SERVICE	**Reviewer** − ACM Transactions on Embedded Computing Systems **Mentored Students** − Sudarshan Mukunda Iyengar, CMU MS ECE '16, Guided Research Project
SKILLS	• Programming Languages : C, C++, Python • Virtualization : Docker, Kubernetes, QEMU-KVM • Software Packages : Robot Operating System (ROS), OpenCV, Matlab, LaTeX • Machine Learning : Tensorflow, Keras • Hardware Description : Verilog HDL

GRADUATE COURSEWORK	• *Embedded Systems:* Real-Time Embedded Systems, Wireless Sensor Networks • *Distributed Systems:* Advanced OS and Distributed Systems, Advanced Cloud Computing, Building Reliable Distributed Systems, Analytical Performance Modeling • *Algorithms:* Machine Learning • *Security and Privacy*: Information Security, Privacy, and Policy

ACADEMIC ACHIEVEMENTS AND AWARDS

Graduate
- Recipient of the **Carnegie Institute of Technology Dean's Fellowship** (2015-2016)
- Recipient of the **Tiara Special Grant** (2015-2016)

Undergraduate
- Awarded the **Aditya Birla Group Scholarship** (2011-2015).
- Awarded the **OP Jindal Engineering and Management Scholarship** (2011-2012).
- Finished Second at **Qualcomm India Intern IdeaQuest 2014**.
- Finished First at **Intel Ideation Contest 2013**, IIT Kharagpur.
- Finished Second in the **Microsoft India Academia Accelerator Programme 2013**.

TEACHING EXPERIENCE

18-648 Real-Time Embedded Systems   Fall 2017
Guest Lecturer
- Taught lectures on rate-monotonic analysis and energy-aware real-time scheduling.

18-748 Wireless Sensor Networks   Spring 2017
Teaching Assistant
- Mentored 6 teams for their course projects.
- Taught a lecture on Data Storage in Sensor Networks.

18-648 Real-Time Embedded Systems   Fall 2016
Teaching Assistant
- Design and grading of Real-Time OS-related programming assignments.
- Taught a lecture on Real-Time support in commercial Operating Systems.

EXTRA CURRICULARS

- *Best Cadet* for the session 2011-2012, of 3 Bengal Technical Air Squadron, Indian Institute of Technology Kharagpur of the **National Cadet Corps, India**.
- *Silver Medal* in **General Quiz** at Social and Cultural General Championships 2011-2012, Indian Institute of Technology Kharagpur.
- *Silver Medal* in **Foundation Day Debate 2012**, Indian Institute of Technology Kharagpur.
- *Bronze Medal* in **Business Quiz** at Technology General Championships 2012-2013, Indian Institute of Technology Kharagpur.
- Participation in **CBSE National Chess Championships** 2004, 2005, 2006 and 2007.
- *Board Prize Winner* at **CBSE National Chess Championships 2007**.
- Completed five of seven examinations in Hindustani Classical Vocals from Akhil Bhartiya Gandharva University.

VOLUNTARY POSITIONS

University Leadership Student Advisory Council   Carnegie Mellon University
Member   August 2017 - July 2018

Indian Graduate Student Association   Carnegie Mellon University
President   November 2016 - November 2017
Treasurer   November 2015 - November 2016

Entrepreneurship Cell   IIT Kharagpur
Associate Manager   July 2012 – January 2013
Associate Member   April 2012 – July 2012

REFERENCES

Available on Request