Sandeep Maurice Dsouza

Contact Information

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Education

Carnegie Mellon University — Pittsburgh, United States
Ph.D. Candidate, — August 2015 - present
Electrical and Computer Engineering
- *Advisor:* Prof. Ragunathan (Raj) Rajkumar
- *Thesis:* Designing Predictable Energy-, Thermal- and Time-Aware 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

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 and RTAS '18.
- 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

Experience

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.
- JPEG Write-Engine Performance Debug.

Tokyo Institute of Technology — Tokyo, Japan
Research Intern — May 2013 - July 2013
Advisor : Prof. Osamu Hasegawa
- Determining Cause-Effect Relationships between two variables.
- Image Classification using *Self-Organizing Incremental Neural Networks.*
- *Self-Organizing Incremental Neural Network* based model for Time-Series Forecasting.

Publications

Conferences

[C.10] S. D'souza, H. Koehler, A. Joshi and R. Rajkumar, *Quartz: Time-as-a-Service for Coordination in Geo-Distributed Systems*, under submission

[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

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**.

High School

- Ranked **407** in IIT Joint-Entrance Examination(IITJEE)-2011 among 485,000 examinees.
- Ranked **541** in All India Engineering Entrance Examination 2011 among 1,065,000 examinees.

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.

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, Java
- Software Packages : Robot Operating System (ROS), OpenCV, Matlab, Xilinx ISE, LaTeX
- Virtualization : Docker, Kubernetes, QEMU-KVM
- 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

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