
RESEARCH AREA

Operating Systems, Hypervisor and Kernel Design, Real-time Systems, Timing Predictability in Software

EDUCATION

Boston University, USA

Sep '16 – Jun '22

PhD, Computer Science

- **Advisor:** Prof. Richard West
- **Thesis:** Towards A Centralized Multicore Automotive System
- **Thesis Committee:** Prof. Richard West, Prof. Renato Mancuso, Prof. Raj Rajkumar, Prof. Vasiliki Kalavri

University of Alberta, Canada

Sep '14 – Jun '16

Master of Science, Computing Science

- **Advisors:** Prof. Paul Lu and Prof. Di Niu
- **Thesis:** Data Transfer Nodes for Cloud-Storage Providers

Bengal Engineering and Science University (presently IEST, Shibpur), India

Jul '08 – Apr '12

Bachelor of Engineering, Computer Science and Technology

- **Advisor:** Prof. Manas Hira
- **Final-year thesis:** Circuit Editor using Java

PROGRAMMING SKILLS

Languages: C (primary), C++, Python, Java, JavaScript

OS Development: Linux kernel and drivers (Yocto, Debian, Android, Linux for Tegra L4T), DRIVE OS, Quest RTOS, Quest-V partitioning hypervisor

Automotive Software: OpenPilot, MATLAB/Simulink Code Generation Backend

Embedded SDK: Nvidia Holoscan

INDUSTRIAL EXPERIENCE

NVIDIA

Sep '22 – Present

Senior Embedded Software Engineer

- Working on the operating system and hypervisor design and implementation for the NVIDIA Holoscan computing platform targeted towards real-time AI and sensor processing.
- Investigating the performance impact of different scheduling algorithms in the underlying Graph Execution Framework (GXF) of Holoscan on the end-to-end latency of different applications.
- Improving the real-time characteristics of the Holoscan applications involving AI and ML operations on the GPU.

Drako Motors

May '20 – Jun '22

Research Consultant

- Designed and implemented a lightweight inter-sandbox communication mechanism in the Quest-V partitioning hypervisor using x86 hardware virtualization, for the Drako DriveOS™ integrated vehicle management system.
- Proposed real-time-task-as-a-service model in DriveOS.
- Implemented a real-time CAN gateway service and integrated OpenPilot ADAS in DriveOS.
- Developed a Hardware-in-the-loop (HIL) simulator for DriveOS, on top of the CARLA Simulator.
- Designed an end-to-end scheduling algorithm for real-time task pipelines on multiprocessors.
- Developed a model-based application development framework to consolidate multiple ECUs (HVAC, BMS, etc.) in the centralized automotive OS Drive OS by Drako Motors.
- Published multiple research papers on the above work at conferences and journals like EMSOFT, JSys and ICCAD.

Intel

Jun '18 – Aug '18

Research Intern

Host: Dr. Ramesh Peri

- Designed a progress-aware scheduling policy (PAStime) in Linux, for mixed-criticality real-time systems to improve Quality-of-Service (QoS) of low-criticality tasks. A paper is published at ECRTS 2020 based on these ideas.
- Implemented an LLVM compiler pass to find interesting locations in a C program to instrument checkpoints.

Google

May '17 – Aug '17

Software Engineering Intern

Host: Dr. Harvey Tuch

- Bootstrapped an open-source benchmarking package for the layer-7 proxy, Envoy. Available at: <https://github.com/lyft/envoy-perf>
- Developed Python scripts to invoke Google Cloud Platform VMs and conduct automated benchmarking in the VMs.
- Incorporated a new functionality in the h2load benchmarking tool, and contributed to its open-source repository.

Ericsson India Global Services Pvt. Ltd.

Aug '12 – Jun '14

Solution Integrator

- Developed a web-application in C# language on .NET platform using the Model-View-Controller (MVC) architecture to manage a time-sheet of nearly 2,000 employees.
- Improved performance of the web-application by reducing the rendering time of web-pages by 30% and by implementing caching on the client-side.

PUBLICATIONS

1. [Soham Sinha](#), Anam Farrukh, and Richard West. **ModelMap: A Model-based Multi-domain Application Framework for Centralized Automotive Systems**. IEEE/ACM International Conference on Computer-Aided Design (ICCAD). San Diego, CA, USA. November 2022.
2. [Soham Sinha](#), and Richard West. **End-to-end Scheduling of Real-time Task Pipelines on Multiprocessors**. Journal of Systems Research (JSys). August 2022.
3. [Soham Sinha](#), and Richard West. **Towards an Integrated Vehicle Management System in DriveOS**. ACM SIGBED International Conference on Embedded Software (EMSOFT). October 08-15, 2021. (published in ACM Transactions on Embedded Computing Systems (TECS), Volume 20, Issue 5s, October 2021, Article No.: 82) ([Among 3 Best Papers at EMSOFT](#))
4. [Soham Sinha](#), Richard West, and Ahmad Golchin. **PAStime: Progress-aware Scheduling for Time-critical Computing**. Euromicro Conference on Real-Time Systems (ECRTS). July 7-10, 2020.
5. Ahmad Golchin, [Soham Sinha](#), and Richard West. **Boomerang: Real-Time I/O Meets Legacy Systems**. Proceedings of the 26th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS). April 21-24, 2020.
6. [Soham Sinha](#), Ahmad Golchin, Craig Einstein, and Richard West. **A Paravirtualized Android for Next Generation Interactive Automotive Systems**. Proceedings of the 21st International Workshop on Mobile Computing Systems and Applications (HotMobile). Austin, TX, USA. March 3-4, 2020.
7. [Soham Sinha](#). **Scheduling Policies and System Software Architectures for Mixed-criticality Computing**. Technical Report BUCS-TR-2018-001. Department of Computer Science, Boston University. December 2018.
8. Ying Ye, Zhuoqun Cheng, [Soham Sinha](#), and Richard West. **vLibOS: Babysitting OS Evolution with a Virtualized Library OS**. 2018. arXiv:1801.07880. arXiv.org.
9. [Soham Sinha](#), Di Niu, Zhi Wang, and Paul Lu. **Mitigating Routing Inefficiencies to Cloud-Storage Providers: A Case Study**. IEEE International Parallel and Distributed Processing Symposium (IPDPS) Workshop (DPDNS). May 2016. Chicago, IL, USA

UNDERGRADUATE STUDENT MENTEES

- Vijay Thakkar, BU ECE (*Next*: Masters at Georgia Tech.), Project: Android on x86
- Eesha Gholap, BU CS (*Next*: Intern at Amazon), Project: Multi-camera integration in OpenPilot
- Rahul Arasikere, BU CS (*Next*: SWE at Shell), Project: Benchmarking OpenPilot's performance on 32- and 64-bits Linux

Continued on next page

ACADEMIC EXPERIENCE

Teaching Assistant

- Operating Systems (CS 552) - Spring 2020 - Boston University
- Computer Systems (CS 210) - Fall 2017, 2019 - Boston University
- Introduction to Computer Science (CS 112) - Spring 2019 - Boston University
- Introduction to Computing (CS 101) - Fall 2016, Spring 2017 - Boston University
- Operating System Concepts (CMPUT 379) - Fall 2015, Winter 2016 - University of Alberta
- Introduction to Computing (CMPUT 101) - Winter 2015 - University of Alberta
- Practical Programming Methodology (CMPUT 201) - Fall 2014 - University of Alberta

Shadow Program Committee Member

- ACM European Conference on Computer Systems (**EuroSys**) **2022**

Secondary Reviewer

- ACM SIGBED International Conference on Embedded Software (**EMSOFT**) **2021**
- IEEE Real-Time Systems Symposium (**RTSS**) **2020, 2019**
- IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**) **2019, 2018**
- Operating Systems Platforms for Embedded Real-Time Applications (**OSPERT**) **2019**
- IEEE International Conference on Computer Communications (**INFOCOM**) **2016**
- IEEE INFOCOM **SDP** Workshop **2016**