

Kirshanthan Sundararajah

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Education

PhD, Purdue University, West Lafayette, IN.

Dec 2020

Advised by [Milind Kulkarni](#)

Major: Electrical and Computer Engineering

GPA - 3.93/4.00

B.Sc.Eng.(Hons), University of Moratuwa, Katubedda, Sri Lanka.

Mar 2014

Major: Electronic and Telecommunication Engineering

GPA - 4.02/4.20 [First Class Honours]

Research Interests

Programming Languages, Compilers, Systems and High Performance Computing

Optimizing irregular programs through code transformations

Current Research

A unified framework for the principled application of optimizations to traversals on irregular data structures such as trees and graphs.

Goals: Reducing the burden of performing complex *dependence analysis* and gaining a better understanding of *performance benefits*.

Publications

L Sakka, **K Sundararajah** and M Kulkarni "TreeFuser: A Framework for Analyzing and Fusing General Recursive Tree Traversals" in *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA 2017, Vancouver, Canada.

[ACM DL](#)

N Hegde, J Liu, **K Sundararajah** and M Kulkarni "Treelogy: A Benchmark Suite for Tree Traversals" in *IEEE International Symposium on Performance Analysis of Systems and Software*, ISPASS 2017, San Francisco, USA. [IEEE Xplore](#)

K Sundararajah, L Sakka and M Kulkarni "Locality Transformations for Nested Recursive Iteration Spaces" in *Architectural Support for Programming Languages and Operating Systems*, ASPLOS 2017, Xi'an, China. [ACM DL](#)

K Sundararajah and S Jayasena, "Model-based Input-adaptive Vectorization" in *Moratuwa Engineering Research Conference*, MERCon 2016, Moratuwa, Sri Lanka. [IEEE Xplore](#)

S Kirshanthan, L Lajanugen, PND Panagoda, LP Wijesinghe, DVSX De Silva and AA Pasqual, "Layered Depth Image Based HEVC Multi-view Codec" in *Advances in Visual Computing: Proceedings of the International Symposium on Visual Computing*, ISVC 2014, Las Vegas, Nevada. [Springer](#)

Skills

Programming Languages: C/C++, Python, Bash

Operating Systems: Unix/Linux

Frameworks: Clang/LLVM, Intel Pin, Gem5, Flex, Bison, Valgrind

Professional Experience

Associate Electronic Engineer (Intern) Zone24x7 (Pvt.) Ltd.

(May 2012 - Oct 2012)

Signs24x7: A sophisticated electronic signage alternative to a paper-based system.

Image Compression Algorithm

Implementation of memory efficient image compression algorithm, supposed to perform decompression on an *STM32 microcontroller* based system.

Clock Synchronization Algorithm

Implementation of real-time clock synchronization algorithm, deployed on an *ARM microprocessor* runs *embedded Linux*.

Hardware Abstraction Layer

Implementation of *Hardware Abstraction Layer (HAL)* for radio communication protocol stack of *Electronic Paper Display (EPD)*, driven by an *STM32 microcontroller*.

Research Experience

Descriptor Selection for Parsing Rare Categories

Undergraduate Research Project

(Mar 2013 - Jan 2014)

Improving the *Non-parametric Scene Parsing Framework* utilizes *Label Transfer* technique.

Replacing the feature descriptor with a suitable one to recognize rare categories.

Sync Word Selection to Reduce False Wake Up Alarm

Internship Research Project

(Jul 2012 - Oct 2012)

Finding a pool of *Sync Words* to selectively wake up *Wireless Sensor Network (WSN)* nodes from sleep.

Constructing the pool to be resilient to false triggers for extended battery life.

Graduate Course Projects

Compiler for LITTLE Programming Language

(Fall 2015)

Building all stages of a compiler (scanner, parser, code generator, and optimizer) from scratch in C++.

Compiler-based Prefetching for Recursive Data Structures

(Fall 2016)

Inserting software prefetching calls as a compiler pass and evaluating the effects on Gem5 simulator.

Provenance Tracking Tool for Valgrind

(Spring 2017)

Constructing a dynamic binary instrumentation tool for VEX IR, in order to track the memory locations effected by an input to the program.

Call Graph Construction for LLVM IR

(Spring 2017)

Writing an LLVM IR pass to construct the call graph of a C program involving pointers.

Achievements

Awards and Grants

ACM Travel Grant to Volunteer at *PLDI 2016*.

Electrical and Computer Engineering Fellowship 2015, Purdue University.

V.K.Samaranayake Grant 2014 for Research Assistantship.

Mahapola Merit Scholarship 2009 for Undergraduate Studies.

Competitions

Placed 25th, 34th, 29th and 45th correspondingly in *IEEEExtreme 7.0, 6.0, 5.0 and 4.0*.

Placed 4th in *Sri Lanka Robot Competition (SLRC) 2012*.

Champions of *Inter-University Statistics Quiz Competition 2010*, University of Colombo, Sri Lanka.

Represented Sri Lanka at *International Mathematics Olympiad Competition (IMO) 2009*, Bremen, Germany