Adhitha Dias

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Research Interests

I am broadly interested in compilers, programming languages and high performance computing research. My current research focuses on developing compile-time optimizations for sparse tensor algebra computations.

Education

PhD, Purdue University, West Lafayette, IN. Jan 2021 - Dec 2025 (expected)
Major: Electrical and Computer Engineering
Advised by: Prof. `Milind Kulkarni`
Thesis Topic: Sparse Tensor Algebra Compiler Optimizations

MS, Purdue University, West Lafayette, IN. Jan 2021 - May 2023 (expected)
Major: Electrical and Computer Engineering
GPA - 4.00/4.00
Relevant Courses: Data Structures & Algorithms, Compilers, Computer Architecture, Programming Languages, Operating Systems, Parallel Programming.

B.Sc. Engineering (Hons), University of Moratuwa, Sri Lanka. Sep 2014 - Dec 2018
Major: Electronic and Telecommunication Engineering
GPA - 4.05/4.20 [First Class Honours]

Publications

- **Adhitha Dias**, Kirshanthan Sundararajah, Charitha Saumya and Milind Kulkarni "SparseLNR: Accelerating Sparse Tensor Computations Using Loop Nest Restructuring" in *International Conference on Supercomputing*, ICS 2022.
  🏆 **Best Paper Award** `[ACM DL]`
- **Adhitha Dias**, Hasitha Prashan, Yasod Rasanka, Menusha Munasinghe and Ranga Rodrigo and Peshala Jayasekara "Deep Learning of Augmented Reality Based Human Interactions for Automating a Robot Team" in *International Conference on Control, Automation, and Robotics*, ICCAR 2020. `[IEEE Xplore]`

Experience

Graduate Research Assistant, Purdue University Jan 2021 - Present

- **SparseTDA**: Compile time optimizations for complex sparse tensor algebra multiplications using tensor kernel dis-association/distribution and fusion. This is an extension to our *SparseLNR* work. Intended to exploit the scheduling space more broadly and introduce an auto-scheduler (on-going).
- **SparseLNR**: Optimized sparse tensor algebra operations at compile-time using a novel loop nest restructuring algorithm. Filled the gap, partly, in fusing kernels with non-affine loop bounds in tensor computations. Achieved speedups of 0.86-1997x compared to the baseline. The paper written won the best-paper award at the International Conference on Supercomputing (ICS) '22. (C/C++, DSL, Tensor Algebra Compiler).

Software Engineer, Sysco LABS, Sri Lanka (Branch of Sysco Corporation, Houston, TX) Feb 2019 - Dec 2020

- **Enterprise Menu**: Developed features for two complex sections in a graph-based menu management system for multi-location restaurants. (JanusGraph, Neo4J, NodeJS, React/Redux, Java Spring MVC, SonarQube, GrayLog, AWS SNS, AWS S3)
- **Merchandising User Management**: Implemented the first cur version of the application allowing administrators to manage user access to the merchant portal. (JavaScript, NodeJS, React/Redux, Java, Spring Boot, PostgreSQL)
- **Merchandising Authorization and Authentication**: Implemented API for handling secure access to the merchant portal. (Microsoft Active Directory, Amazon Cognito, JWT authentication, Single sign-on (SSO), Introspection, Redis)

- **Cloud Reports**: Developed features in cloud reports for restaurant point-of-sale devices. (React/Redux, Jenkins, Docker, AWS ECS, AWS S3, Java Spring Web Flux)
- **Communicator API**: Introduced a lock mechanism to distribute load among a cluster of docker instances for sending emails, SMS, and voice messages, and improvments like dockerizing the component and deploying to AWS ECS. (MySQL, Twilio integration, SendGrid integration, Redis, Graylog, Symfony, PHP)

Research Intern, School of Information Systems, Singapore Management University, Singapore June 2016 - Dec 2016

- **Follow My Lead**: Introduced an algorithm to automate the checkpoint acquisition in a video-based indoor-navigation system. (Android, AR, Sensor Fusion, OpenCV).
- **Wi-Fi based Indoor Localization using Distributed Antennas**: Worked on finding a localization solution using different Wi-Fi access-points using the angle of arrival of the Wi-Fi packets. (FPGA, GNU Radio, IEEE 802.11 PHY, OFDM, WARP devices, MATLAB, Music and SAGE algorithms)

Skills

- Programming Languages: Java, C/C++, Python, JavaScript, Scala, Coq, Cuda, MATLAB and Bash.
- Operating Systems: Unix/Linux, Windows, Android, ROS.
- Tools/Frameworks, IDEs, DBs: OpenMP, MPI, NumPy, PyTorch, TensorFlow, Git, Docker, AWS, gem5, MySQL, CouchDB, Neo4J, Janus Graph, NetBeans, Visual Studio Code.

Achievements

- **Awards, Honors and Grants**
  - **The Best Paper Award** At the International Conference on Supercomputing 2022.
  - ACM Grants to Attend *PLDI 2021 and 2022.*
  - *Dean's List Award* Included in the Dean's List in all 8 semesters for obtaining a high GPA during Undergrad.
  - *Sri Lanka Telecom Scholarship 2016* For Best Academic Performance.
  - *Mahapola Merit Scholarship* And *Dialog Merit Scholarship 2014-2018* For Undergraduate Studies.
  - *People's bank scholarship 2014* For G.C.E.(A/L) performance.
  - Ranked 1^{st} (out of 32*k* students) in Sri Lanka in Math Stream at the University Entrance Examination 2013.
  - Ranked 15^{th} (out of 400*k* students) in Sri Lanka at the G.C.E.(O/L) examination 2010.
- **Competitions**
  - Finalists in *International Robotics Challenge (IRC) 2016-2017* at TECHFEST, IIT Bombay, India.
  - Winners in *Sri Lankan Robotics Challenge (SLRC) 2016.*
  - Runners-up in *MoraXtreme Coding Competition 2016* organized by University of Moratuwa, Sri Lanka.
  - Placed 4^{th} in *Sri Lanka Mathematics Olympiad Competition 2013.*
  - Runners-up in *The Australian National Chemistry Quiz 2012* organized by the Royal Australian Chemical Institute.

Qualifications

- **Comprehensive Master Java Developer (CMJD) 2014**, Institute of Java and Software Engineering (IJSE), Sri Lanka.
- **CIMA Diploma in Management Accounting 2014-2015**, Charted Institute of Management Accountants, UK.

Professional Activities

- Coordinate seminars for Purdue Programming Languages group 2022-2023.
- Attended Programming Language Mentoring Workshops at PLDI '21, OOPSLA '21 and PLDI '22.