

Buddhi Ashan Mallika Kankanamalage

Doctoral Candidate, Department of Computer Science, University of Texas at San Antonio, TX 78249

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<https://buddhi1.github.io/bashan/>

I am a Computer Science Ph.D. candidate at the University of Texas, San Antonio, specializing in geometric intersection and approximate nearest neighbor similarity search within expansive geospatial datasets. Proficient in parallel and distributed computing, high-performance computing, GPU programming, and spatiotemporal data processing, my research aims to optimize polygonal operations' performance and scalability across diverse computing platforms. I design efficient data structures and algorithms for multi-core and many-core systems, contributing valuable insights at the interface of computer science and geospatial data. Seeking to leverage my expertise in research-driven innovation to tackle complex challenges in computer science.

Education

- **Doctor of Philosophy (Ph.D.) in Computer Science** | Fall 2019 - Summer 2024 (Expected)
University of Texas at San Antonio
Dissertation: Geometric intersection and approximate nearest neighbor similarity search over large geospatial polygonal datasets.
Advisor: Dr. Sushil K. Prasad (UTSA), **Co-advisor:** Dr. Satish Puri (MST)
- **Master of Science (M.S.) in Computing and Information Science** | Fall 2017 - Spring 2019
Sam Houston State University (GPA 4.0/4.0)
Project: Performance evaluation of transfer learning for pornographic detection.
- **Bachelor of Science (B.Sc.) (Special) in Computer Science** | 2011 November - 2016 May
University of Kelaniya, Sri Lanka (First class honours. GPA 3.77/4.0)
Dissertation: Recognition of vehicle license plates using MATLAB.

Experience

- **Graduate Research / Teaching Assistant** | Fall 2019 - Onwards
Department of Computer Science, University of Texas at San Antonio
- **Graduate Assistant** | Fall 2017 – Spring 2019
Department of Computer Science, Sam Houston State University
- **Temporary Lecturer** | 2017 March – 2017 August
Department of Software Engineering, University of Kelaniya, Sri Lanka
- **Temporary Demonstrator** | 2016 February – 2017 February
Department of Statistics and Computer Science, University of Kelaniya, Sri Lanka

Research Interests

Parallel and distributed computing | High performance computing | GPU programming | Spatiotemporal data processing

Skills

- Big data parallel and distributed programming: CUDA, OpenMP, OpenACC, MPI, Hadoop.
- Machine learning: Entry level experience developing DNN models for image classification using transfer learning techniques.
- Software development: Experience with tools such as Git and Docker.
- Programming languages: C, C++, Python, Java.
- Web-based system development: HTML, PHP, CSS, MySQL, Laravel.
- Algorithms and data structures: Strong background developing data structures for parallel algorithms.

Publications

- Ashan, M. K. Buddhi, Satish Puri, and Sushil K. Prasad. "Efficient PRAM and Practical GPU Algorithms for Large Polygon Clipping with Degenerate Cases." *2023 IEEE/ACM 23rd International Symposium on Cluster, Cloud and Internet Computing (CCGrid)*. IEEE, 2023 (**Acceptance rate 21%. Best paper finalist**).

- Ashan, M. K. Buddhi, Hyuk Cho, and Qingzhong Liu. "Performance evaluation of transfer learning for pornographic detection." *Advances in Natural Computation, Fuzzy Systems and Knowledge Discovery: Volume 2*. Springer International Publishing, 2020.
- Ashan, M. K. Buddhi, and N. G. J. Dias. "Recognition of Vehicle License Plates using MATLAB." *European International Journal of Science and Technology* 5.6, 2016.

Awards and Honors

- Best paper finalist: CCGrid 2023.
- NSF student travel grant: Annual MVAPICH user group (MUG) 2022 conference.
- Member of the Team Northern Lights-UTSA selected for final 3 teams at the Innovation bowl competition organized by Radiance technologies, 2023.

Poster Presentations

- IPDPS 2024 PhD forum: accepted. IPDPS 2022 PhD forum.
- Annual MVAPICH user group (MUG) 2022 conference.
- 30 to R1 research poster showcase organized by the UTSA graduate school, 2023.

Research Projects

- Efficient PRAM and practical GPU algorithms for large polygon clipping with degenerate cases.
 - ✓ Presented a **CREW PRAM** polygon clipping algorithm that handles degenerate cases properly.
 - ✓ Developed **CUDA C++** implementation of the theoretical algorithm optimizing it employing filtering techniques.
 - ✓ Presented a performance analysis using real-world and synthetic datasets.
- Extending segment tree for polygon clipping and parallelizing using OpenMP and OpenACC compiler directives.
 - ✓ The first work to extend a segment tree data structure for polygon clipping leveraging Chaselle's rules.
 - ✓ Parallelized segment tree construction including augmented data structures and line segment intersection finding using **OpenMP** directives.
 - ✓ Presented a performance analysis including parallel kernel offloading using **OpenACC**.
- Quad tree-based polygon encoding for shape-based similarity over large datasets of exponential area variations (NSF # 2344585).
 - ✓ Developed uniform grid-based and quad tree-based **polygon encoding** techniques to encode a polygon into a feature vector.
 - ✓ Presented a workflow leveraging Jaccard distance to find similar shapes from a large reference dataset employing a HNSW graph for fast searching (**Python**).
- Applications and data visualization researcher: ScooterLab (NSF # 2234516).
 - ✓ Developed a Map tool employing an **ArcGIS base map** visualizing scooter trip trajectories and their sensor data (**JavaScript**).
 - ✓ Designed and contributed to develop a **PHP** backend application to manage researchers and experiments using **Laravel** framework.

Teaching Experience

- Graduate teaching assistant: CS4823/CS6643 Parallel programming/processing | Fall 2021 (UTSA)
- Graduate assistant: COSC 1436: Introduction to programming and algorithms | Fall 2018, Spring 2019 (SHSU)

Other Contributions

- Student volunteer at the international conference for high performance computing, networking, storage, and analysis (SC 2023).
- Webmaster for workshop series on Education for High Performance: EduHiPC-23 in conjunction with HiPC 2023, EduHPC-23 in conjunction with SC 2023, EduPar-24 in conjunction with IPDPS 2024, EduHPC-24 in conjunction with SC 2024.