Mugilan Mariappan

PhD in Computing Science, Simon Fraser University
mmariapp@sfu.ca | mmugilan.github.io

Education

Ph.D. in Computing Science — Burnaby, Canada
Simon Fraser University (Advisor: Dr. Keval Vora) — 2018–2026
Dissertation: **Dependency-Driven Incremental Processing of Streaming Graphs** (defended Oct 2026)

B.E. in Computer Science — Coimbatore, India
Coimbatore Institute of Technology (GPA: 8.5/10) — 2010–2014

Research & Industry Experience

Simon Fraser University, PDC Lab — Burnaby, Canada
Graduate Research Assistant — 2018–2026

- Built **GraphBolt**, a dependency-driven streaming graph engine that makes incremental graph analytics with BSP guarantees practical on constantly evolving graphs, without exhaustive state tracking. Achieves a median **18× speedup** (up to 232×) over recomputation from scratch for **billion-edge graphs on a single machine**.
- Built **DZiG**, a sparsity-aware engine that pushes the **effectiveness** of dependency-driven incremental processing to **update batches orders of magnitude larger** than prior systems. Designed an adaptive executor that uses a linear-regression cost model to switch strategies at runtime, across algorithms, graphs, and update patterns.
- Architected the **end-to-end parallel C++ system** (stream ingestor, dynamic graph store, incremental engines). Designed a **high-performance framework** for developing new graph analytics that run incrementally on evolving graphs with correctness guarantees. Open-sourced at github.com/pdclab/graphbolt; 150 stars, 25 forks.
- Built **Olfin**, a concurrent graph ingestion system for multi-source update streams with tunable ordering guarantees, using lockless, linearizable graph update operations. Speeds up GraphBolt's ingestion by **8.5–43×**.
- Optimized feature-aware CUDA kernels for GCN, GAT, and GGNN training, improving memory coalescing.
- Mentored 6 grad and undergrad students in systems research; TA for Distributed Systems and Operating Systems.

LinkedIn Graph Systems Lab — Sunnyvale, USA
Graduate Research Intern — Sep 2022–Dec 2022

- Benchmarked the proprietary **Liquid Graph Database** against the complex-query workloads of the LDBC Social Network Benchmark, diagnosing root causes of slow execution and identifying optimizations.
- Surfaced design constraints for graph query processing with mentors at LinkedIn and **Microsoft Research (Gray Systems Lab)**, informing a rearchitecture of Liquid's query processing over the next two years.

athenaHealth — Chennai, India
Software Engineer — May 2014–Jul 2017

- Rearchitected the secure messaging module of the athenaText iOS app, reducing crashes by **50%** and eliminating UI stalls during message sync and refresh.
- Maintained and extended the indexing and ranking components of search for Epocrates, a clinical reference app used by over 50% of US physicians.

Publications

1. GraphBolt: Dependency-Driven Synchronous Processing of Streaming Graphs — EuroSys 2019
   M. Mariappan, K. Vora. | 183 citations
2. DZiG: Sparsity-Aware Incremental Processing of Streaming Graphs — EuroSys 2021
   M. Mariappan, J. Che, K. Vora. | 79 citations
3. Anti-Vertex for Neighborhood Constraints in Subgraph Queries — GRADES-NDA 2022
   K. Jamshidi, M. Mariappan, K. Vora. | 7 citations
4. Threshold Strategy for Leaking Corner-Free Hamilton-Jacobi Reachability — CDC 2025
   C. He, M. Mariappan, K. Vora, M. Chen. | 1 citation

Technical Skills

Expertise: Parallel systems (design, debugging, optimization), incremental processing, dynamic data structures
Technologies: C++, CUDA, OpenMP, pthreads, Cilk Plus, perf, Python, Java, SQL, Cypher

Service

Reviewer: IEEE TKDE (2026). **External Reviewer:** EuroSys, USENIX ATC, SOSP, SIGMOD, ICDCS, PACT, IEEE TPDS.