Zihe Zhou

PhD Applicant — Computer Science (Fall 2027)

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EDUCATION

University of Toronto — Toronto, Canada
Master of Engineering, Mechanical & Industrial Engineering — Sept 2025 – Sept 2026 (expected)
Emphasis in Data Analytics and Machine Learning · Research supervisor: Prof. Samin Aref
Cumulative GPA: **3.90 / 4.00** · Six graduate courses graded A+, including Machine Learning, Statistical Learning, Data Analytics, and MEng Research Project

University of Waterloo — Waterloo, Canada
Bachelor of Computer Science, Honours, **with Distinction** — Sept 2020 – June 2025
Computer Science Major · Artificial Intelligence Specialization · Computational Mathematics Minor
Cumulative average: **80.49 / 100** (Waterloo percentage scale)
University of Waterloo President's Scholarship (2021) · Term Distinction (six terms)

RESEARCH INTERESTS

Network Science
Graph Machine Learning
Community Detection
Network Representation and Structure
Large-Scale Graph Algorithms
Dynamic and Partially Observed Networks
Combinatorial Optimization

PUBLICATIONS AND PREPRINTS

Zihe Zhou and Samin Aref. "Overlapping network community detection using sparse backbones." *Proceedings of the International Conference on Advances in Social Networks Analysis and Mining* (ASONAM), 2026.
arXiv:2607.14531 · Repository · Recorded talk

Zihe Zhou. "Budgeted task-aware acquisition of dynamic networks." arXiv preprint, 2026. *Single-authored.*
arXiv:2609.05862 · Repository

RESEARCH EXPERIENCE

Graduate Researcher, University of Toronto — Sept 2025 – present
Department of Mechanical and Industrial Engineering · Supervisor: Prof. Samin Aref

- Developing exact and approximate optimization algorithms for overlapping network clustering, progressing from an optimization-based formulation (*Triad*) to the scalable *Highway* algorithm.
- Led the full research cycle: problem formulation, algorithm design, C++ and Python implementation, large-scale experimentation, analysis, and manuscript preparation.
- Evaluated *Highway* against ten published methods on roughly 3,000 synthetic benchmark graphs and on real-world networks of up to 1.13 million nodes, leading to a peer-reviewed paper at ASONAM 2026.
- Released the implementation and a reproducible benchmarking framework for overlapping community detection; the algorithm has been integrated into the open-source cdlib library.

Independent Research — Acquisition of Dynamic Networks — 2026
Sole author

- Formulated budgeted task-aware acquisition on partially observed dynamic networks, where a limited observation budget is allocated according to downstream task utility rather than structural change.
- Independently designed the method (*Scout*), the experimental protocol, the benchmark, the implementation, and the manuscript.

- Evaluated the framework across multiple dynamic networks, downstream tasks, and competing acquisition strategies.
- Released as a single-authored preprint with a fully reproducible open-source implementation.

WORK EXPERIENCE

Data Engineering and Governance Lead Mar. 2022 – present
Zhengzhou Zhengda Information Technology Co., Ltd. · Zhengzhou, China (remote)

- Built the company's core data platform and developed the ingestion, cleaning, transformation, and loading (ETL) pipelines that feed it.
- Integrated business-system interfaces with power grid enterprises and electricity trading institutions.
- Defined data classification and grading standards and data-quality management procedures; ran quality inspections, validation, and de-identification.
- Built standardized datasets and a feature library supporting rule evaluation and trading simulation.

ORAL PRESENTATIONS

Int'l Conference on Advances in Social Networks Analysis and Mining (ASONAM'26) Rabat, Morocco
Overlapping network community detection using sparse backbones (co-presented with S. Aref) 25 Aug. 2026

University of Toronto Engineering Research Conference (UTERC'26) Toronto, Canada
Highway algorithm: overlapping network community detection at scale using sparse backbones 21 Aug. 2026

Complex Systems Day, Toronto Metropolitan University Toronto, Canada
Highway algorithm: overlapping network community detection at scale using sparse backbones 12 Aug. 2026

The 21st Workshop on Algorithms and Models for the Web Graph (WAW'26) Toronto, Canada
Highway algorithm: overlapping network community detection at scale using sparse backbones 18 Jun. 2026

POSTER PRESENTATIONS

MIE Graduate Research Symposium, University of Toronto Toronto, Canada
Unsupervised clustering on networked data: an algorithm for scalable clustering with overlaps 4 May 2026

OPEN-SOURCE SOFTWARE

- **Highway** — C++ implementation with a Python interface for scalable overlapping community detection; integrated into the open-source cdlib community-detection library.
- **Overlapping Community Detection Benchmark** — reproducible benchmarking framework for overlapping community detection that lets third parties evaluate their own algorithm against published baselines and metrics. github.com/AmbitiousK/highway-ocd-benchmark
- **Scout** — reproducible implementation and full experimental artifacts for the single-authored preprint on budgeted task-aware acquisition of dynamic networks. github.com/AmbitiousK/Scout-code
- **DSEG-Char** — interpretable graph-structured generative modeling prototype with released trained weights. github.com/AmbitiousK/dseg_char

HONORS AND AWARDS

- 2026: Poster selected for the departmental research display, Department of Mechanical and Industrial Engineering, University of Toronto
- 2025: Bachelor of Computer Science awarded **with Distinction**, University of Waterloo
- 2021: University of Waterloo President's Scholarship
- 2020–2025: Term Distinction in multiple academic terms, University of Waterloo

TECHNICAL SKILLS

Programming: C++, Python, Java, JavaScript, SQL
Machine learning and scientific computing: PyTorch, NumPy, SciPy, pandas, scikit-learn, Matplotlib
Network analysis: NetworkX, igraph, cdlib, SNAP datasets, LFR and ABCD benchmark generators
Tools: Git, Linux, LaTeX