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Bojie Shen

Education

2019 - 2023 Doctor of Philosophy **Monash University**
- Thesis title: "Advances in Pathfinding Algorithms for Games, Route Planning Software, and Automated Warehouses".
- **CORE Award for the Australasian Distinguished Doctoral Dissertation**
- Supervisor: A/Prof. Muhammad Aamir Cheema, Prof. Peter J. Stuckey and A/Prof. Daniel Harabor.

2014 - 2018 Bachelor of Software Engineering (Honours) **Monash University**
- Thesis title: "Finding Surrounding Objects in Spatial Database".
- Supervisor: A/Prof. David Taniar.

Research Experience

July 2023 - Present Postdoctoral Research Fellow **Monash University**
- Advisor: A/Prof. Muhammad Aamir Cheema.

March 2024 - June 2024 Teaching Assistant **Monash University**
- Unit: FIT 2094 - Databases.
- Unit: FIT 5225 - Cloud Computing and Security.

April 2023 - July 2023 Research Assistant **Monash University**
- Advisor: A/Prof. Muhammad Aamir Cheema.

June 2018 - July 2018 Research Assistant **Griffith University**
- Advisor: Dr. Muhammad Saiful Islam.

Honors and Awards

2025 Australasian Distinguished Doctoral Dissertation *CORE*

2022 2023 ICAPS and SoCS Travel Grant *ICAPS and SoCS conference*

2022 CIRES Travel Grant - Information Resilience PhD School *CIRES, ARC*

2019-2023 Monash & FIT International Postgrad Research Scholarship *Monash University*
- Funded by A/Prof. Muhammad Aamir Cheema's ARC discovery project.

2019 Dean's Achievement Award-Undergraduate *Monash University*
- Awarded to the top 10 undergraduate students (2018) in the faculty.

2016-2018 Monash International Merit Scholarship *Monash University*

- Offered to 31 recipients across all faculties within the university.

2015 IT international Merit Scholarship *Monash University*

- IT faculty scholarship offered depends on available funding.

Research Highlight

[C7] [J4] Our papers have garnered considerable attention from the gaming industries. Two notable companies, including: (i) Hello Games (https://hellogames.org), a AAA game studio, the developer of No Man's Sky; and (ii) 37Games (https://en.37games.com), a listed company ranking 23rd among the top 100 internet companies in China (2015), have approached us with keen interest in incorporating our pathfinding algorithm, End Point Search (EPS), into their development projects.

[C7] [J4] EPS currently holds the first-ranked position in the any-angle track of GPPC2 (https://gppc.search-conference.org/anyangle). Notably, GPPC2 (GPPC 2023) is one of the major competitions for pathfinding algorithms in Artificial Intelligence, building on the success of its previous editions in 2012, 2013, and 2014.

[D1] Our web platform (https://tracker.pathfinding.ai) for monitoring progress in Multi-Agent Path Finding (MAPF) has delivered substantial benefits to the MAPF research community. Notably, the platform has served as a fundamental tool for comprehending the relative strengths of various solvers in the recent Amazon MAPF competition (https://www.leagueofrobotrunners.org/resources). Moreover, the extensive collection of best-known results maintained on the web platform has been utilized and requested by multiple research groups from institutions worldwide, including the University of Southern California, USA; Ben-Gurion University, Israel; and the Tokyo Institute of Technology, Japan.

Publications

Conferences

2023 [C8] A. Abuaisha, M. Wallace, D. D. Harabor, **B. Shen**, Efficient and Exact Public Transport Routing via a Transfer Connection Database, in: Proceedings of the International Symposium on Combinatorial Search, (**SoCS**), 2024. (**CORE - A**)

2023 [C7] **B. Shen**, Z. Chen, J. Li, M. A. Cheema, D. D. Harabor, P. J. Stuckey, Beyond Pairwise Reasoning in Multi-Agent Path Finding, in: Proceedings of the International Conference on Automated Planning and Scheduling, (**ICAPS**), 2023. (**CORE - A***)

2023 [C6] J. Du, **B. Shen**, M. A. Cheema, Euclidean Shortest Path Computation using Hub Labeling, in: Proceedings of the Thirty-Seventh AAAI Conference on Artificial Intelligence, (**AAAI**), 2023. (**CORE - A***)

2023 [C5] J. Du, **B. Shen**, S. Zhao, M. A. Cheema, A. N. Toosi, Efficient Object Search in Game Maps, in: Proceedings of the Thirty-Second International Joint Conference on Artificial Intelligence, (**IJCAI**), 2023. (**CORE - A***)

2022 [C4] **B. Shen**, M. A. Cheema, D. D. Harabor, P. J. Stuckey, Improving Time- Dependent Contraction Hierarchies, in: Proceedings of the International Conference on Automated Planning and Scheduling, (**ICAPS**), 2022. (**CORE - A***)

2021 [C3] **B. Shen**, M. A. Cheema, D. D. Harabor, P. J. Stuckey, Contracting and compressing shortest path databases, in: Proceedings of the International Conference on Automated Planning and Scheduling, (**ICAPS**), 2021. (**CORE - A***)

2020 [C2] **B. Shen**, M. A. Cheema, D. Harabor, P. J. Stuckey, Euclidean pathfinding with compressed path databases, in: Proceedings of the Twenty-Ninth International Joint Conference on Artificial Intelligence, (**IJCAI**) 2020. (**CORE - A***)

2019 [C1] **B. Shen**, M.S. Islam, D. Taniar and J. Wang, Retrieving Text- based Surrounding Objects in Spatial Databases, 33rd IEEE Intl. Conf. On Advanced Information Networking and Applications (**AINA**), 2019. (**CORE - B**)

Journal

2024 [J6] A. Fahmin, M. A. Cheema, M. E. Ali, A. N. Toosi, H. Lu, H. Li, D. Taniar, H. A. Rakha, **B. Shen**, Eco-Friendly Route Planning Algorithms: Taxonomies, Literature Review and Future Directions. ACM Computing Surveys, 2024. (**CORE - A***)

2024 [J5] A.Fahmin, **B. Shen**, M. A. Cheema, A. N. Toosi, M. E. Ali, Efficient Alternative Route Planning in Road Networks. IEEE Transactions on Intelligent Transportation Systems, 2024. (**IF=9.55, CiteScore=13.7**)

2022 [J4] **B. Shen**, M. A. Cheema, D. Harabor, P. J. Stuckey, Fast optimal and bounded suboptimal Euclidean pathfinding. Artificial Intelligence, 2022. (**CORE - A***)

2018 [J3] **B. Shen**, M.S. Islam, D. Taniar and J. Wang, Direction-based Spatial Skyline for Retrieving Surrounding Objects, World Wide Web: Internet and Web Information Systems Journal, 2018. (**CORE - A**)

2018 [J2] **B. Shen**, M.S. Islam and D. Taniar, Direction-based Spatial Skyline for Retrieving Arbitrary Shaped Surrounding Objects, Computer Journal, 2018. (**CORE - B**)

2018 [J1] M.S. Islam, **B. Shen**, C. Wang, D. Taniar and J. Wang, Efficient Processing of Reverse Nearest Neighborhood Queries in Spatial Database, Information Systems, 2018. (**CORE - A***)

Demo

2023 [D1] **B. Shen**, Z. Chen, M. A. Cheema, D. D. Harabor, P. J. Stuckey, Tracking Progress in Multi-Agent Pathfinding, System Demonstrations and Exhibits Program at International Conference on Automated Planning and Scheduling (**ICAPS**), 2023. (**CORE - A***). (This work was also presented at SoCS 2023. A full length manuscript is available at arXiv preprint arXiv:2305.08446, see https://arxiv.org/abs/2305.08446).

Student Supervision

Ph.D. students at Monash

2023-present Abdurrahman Beg

- Research Topic: Using Electric Vehicles to reduce GHG emissions.
- Co-Supervise with: A/Prof. Muhammad Aamir Cheema, Dr. Adel N. Toosi and Dr. Hao Wang.

2023-present Faisal Alam

- Research Topic: Vehicular edge computing.

- Co-Supervise with: A/Prof. Muhammad Aamir Cheema and Dr.Chetan Arora.

2022-present Jinchun (Goldi) Du
- Research Topic: Indoor data management.
- Co-Supervise with: A/Prof. Muhammad Aamir Cheema and Dr. Adel Toosi.

2022-present Ahmed Fahmin
- Research Topic: Eco-friendly routing.
- Co-Supervise with: A/Prof. Muhammad Aamir Cheema and Dr. Adel Toosi.

2022-present Faiza Babakano
- Research Topic: Path planning for robots on uneven terrains.
- Co-Supervise with: A/Prof. Muhammad Aamir Cheema and Dr. Adel N. Toosi.

2022-present Abdallah Abu Aisha
- Research Topic: Efficient and Exact Public Transport Routing
- Co-Supervise with: A/Prof. Daniel Harabor and Prof. Mark Wallace.

Master's students at Monash

2021-2022 Jinchun (Goldi) Du
- Master thesis: Pathfinding in Game Maps.
- Co-Supervise with: A/Prof. Muhammad Aamir Cheema.

Academic Activities

Conference Program Committee

2024 PC member for International Conference on Data Engineering (**ICDE**).
2024 PC member for European Conference on Artificial Intelligence (**ECAI**).
2024 PC member for International Symposium on Combinatorial Search (**SoCS**).
2024 PC member for International Conference on Automated Planning ... (**ICAPS**).
2023 PC member for the AAAI-23 Workshop on Multi-Agent Path Finding. (**AAAI**).

Conference Reviewer

2023 ACM Special Interest Group on Management of Data Conference (**SIGMOD**).
2023 International Conference on Autonomous Agents and Multiagent Syst. (**AAMAS**).
2023 AAAI-23 Workshop on Multi-Agent Path Finding (**WoMAPF**).
2022 International Conference on Automated Planning and Scheduling (**ICAPS**).
2022 International Symposium on Combinatorial Search (**SoCS**).
2020 ACM International Conference on Advances in Geographic Inf. Syst.(**SIGSPATIAL**).
2019 International Conference on Database Systems for Advance Applications (**DASFAA**).
2019 IEEE International conference on Big Data and Smart Computing (**BIGCOMP**).

Journal Reviewer

2022 2023 IEEE Transactions on Knowledge and Data Engineering (**TKDE**).
2022 International Journal on Very Large Data Base (**VLDB**).
2021 Information Processing and Management.

2019 Knowledge-Based Systems.

2019 International Journal of Communication Systems.

Referees

A/Prof. Muhammad Aamir Cheema **Ph.D. Supervisor**

- Associate Professor, ARC Future Fellow, Director of Research in the Department of Software Systems and Cybersecurity, FIT, Monash University.
- Contact: aamir.cheema@monash.edu

Prof. Peter J. Stuckey **Ph.D. Supervisor**

- Professor, Director of Optimisation Research Group in the Department of Data Science and Artificial Intelligence, FIT, Monash University.
- Contact: peter.stuckey@monash.edu

Prof. Wheeler Ruml **Ph.D. Thesis Examiner**

- Professor in the Department of Computer Science, University of New Hampshire.
- Contact: ruml@cs.unh.edu