Reyan Ahmed

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Research Area: Graph Algorithms, Network Visualization, Data Science

Education

2016-2021	Ph.D. in Computer Science – University of Arizona Thesis: Multi-level Graph Spanners Adviser: Stephen Kobourov
2014-2016	M.Sc. in Computer Science – Bangladesh University of Engineering and Technology Thesis: Online Algorithms for Facility Assignment Problem Adviser: Md. Saidur Rahman
2008-2012	Bachelor's in Computer Science – Bangladesh University of Engineering and Technology Thesis: On acyclic colorings of graphs Adviser: Md. Saidur Rahman

Job Experience

Sep 2023- Current	Assistant Professor of Practice University of Arizona
July 2021- June 2023	Visiting Assistant Professor Colgate University
Summer 2021, Summer 2020	Instructor University of Arizona
Jan 2020- May 2021	Graduate Research Associate University of Arizona
Aug 2016- Dec 2019	Graduate Research Assistant University of Arizona
Summer 2018, Summer 2019	Optimization Software Engineer Intern Hexagon Mining
Summer 2017	Graduate Teaching Assistant University of Arizona
Nov 2015 - Jan 2016	Web Developer Bangladesh University of Engineering and Technology
Feb 2013 - Mar 2015	Software Engineer Reve Systems, Bangladesh

Honors and Awards

- Received torch medal from Nico Butterfield '23 for making a meaningful impact at Colgate.
- CS Spring 2021 Graduate Scholarship (Research) Award, University of Arizona, 2021.
- Best paper award, Graph Drawing via Gradient Descent, $(GD)^2$, The 28th International Symposium on Graph Drawing and Network Visualization, 2020.
- Galileo Circle Scholarship, University of Arizona, 2020.
- Won 3rd place in the Graph Drawing Competition at the 26th Symposium on Graph Drawing, 2018.
- Best paper award, Online Facility Assignment, The 12th International Workshop on Algorithms and Computation, 2018.
- Placed in 5th position in the Fake News Challenge (in a field of 50 international teams), 2017.
- Dean's list award, Bangladesh University of Engineering and Technology, 2012.
- Board Scholarship, Bangladesh University of Engineering and Technology, 2010.
- Received gold medal, Secondary school certificate, Bangladesh International School, Jeddah, 2005.

Journal Publications

- Kathryn Gray, Mingwei Li, **Reyan Ahmed**, Md. Khaledur Rahman, Ariful Azad, Stephen Kobourov, Katy Börner, **Scalable Methods for Readable Tree Layouts**, *IEEE Transactions on Visualization and Computer Graphics*, (also arXiv:2305.09925), 2023.
- **Reyan Ahmed**, Felice De Luca, Sabin Devkota, Stephen Kobourov, Mingwei Li, **Multicriteria Scalable Graph Drawing via Stochastic Gradient Descent, $(SGD)^2$**, *IEEE Transactions on Visualization and Computer Graphics*, (also arXiv:2112.01571), 2022.
- **Reyan Ahmed**, Patrizio Angelini, Faryad Darabi Sahneh, Alon Efrat, David Glickenstein, Martin Gronemann, Niklas Heinsohn, Stephen G. Kobourov, Richard Spence, Joseph Watkins, and Alexander Wolff. **Multi-level Steiner trees**, *J. Exp. Algorithmics*, 2019.
- **Reyan Ahmed**, Md. Saidur Rahman, Stephen Kobourov, **Online facility assignment**, *Theoretical Computer Science*, 2019.

Conference Publications

- Mohammad Shamim Ahsan, **Reyan Ahmed**, and Md. Saidur Rahman, **Randomized Algorithm for Online K-Server Problem on a Line**, *In Proceedings of the 9th International Conference on Information and Communication Technology for Competitive Strategies, Springer,* 2025.
- **Reyan Ahmed**, Keaton Hamm, Stephen Kobourov, Mohammad Javad Latifi Jebelli, Faryad Darabi Sahneh, and Richard Spence. **Multi-priority graph sparsification**, *In International Workshop on Combinatorial Algorithms*, 2023.
- **Reyan Ahmed**, Stephen Kobourov, Myroslav Kryven, **An FPT Algorithm for Bipartite Vertex Splitting**, *In Proceedings of the 30th International Symposium on Graph Drawing and Network Visualization*, (also arXiv:2208.12898), 2022.
- Kathryn Gray, Mingwei Li, **Reyan Ahmed**, Stephen Kobourov, **Visualizing Evolving Trees**, *In Proceedings of the 30th International Symposium on Graph Drawing and Network Visualization*, (also arXiv:2106.08843), 2022.
- **Reyan Ahmed**, Greg Bodwin, Keaton Hamm, Stephen Kobourov, and Richard Spence. **On additive spanners in weighted graphs with local error**, *In Proceedings of the 47th International Workshop on Graph-Theoretic Concepts in Computer Science*, (also arXiv:2103.09731), 2021.
- **Reyan Ahmed**, Greg Bodwin, Keaton Hamm, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Multi-level Weighted Additive Spanners**, *In Proceedings of the 20th International Symposium on Experimental Algorithms,* (also arXiv:2102.05831), 2021.

- **Reyan Ahmed**, Felice De Luca, Sabin Devkota, Stephen Kobourov, and Mingwei Li. **Graph Drawing via Gradient Descent, (GD)^2**, *In Proceedings of the 28th International Symposium on Graph Drawing and Network Visualization*, (also arXiv:2008.05584), 2020. (**best paper award**)
- **Reyan Ahmed**, Greg Bodwin, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Weighted Additive Spanners**, *In Proceedings of the 46th International Workshop on Graph-Theoretic Concepts in Computer Science*, (also arXiv:2002.07152), 2020.
- **Reyan Ahmed**, Keaton Hamm, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Kruskal-based approximation algorithm for the multi-level Steiner tree problem**, *In Proceedings of the 28th Annual European Symposium on Algorithms*, (also arXiv:2002.06421), 2020.
- Sabin Devkota, **Reyan Ahmed**, Felice De Luca, Kate Isaacs, Stephen Kobourov. **Stress-Plus-X (SPX) Graph Layout**, *In Proceedings of the 27th International Symposium on Graph Drawing and Network Visualization,* (also arXiv:1908.01769), 2019.
- **Reyan Ahmed**, Keaton Hamm, Mohammad Javad Latifi Jebelli, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Approximation algorithms and an integer program for multi-level graph spanners**, *In Proceedings of the 18th International Symposium on Experimental Algorithms* (also arXiv:1904.01135), 2019.
- **Reyan Ahmed**, Patrizio Angelini, Faryad Darabi Sahneh, Alon Efrat, David Glickenstein, Martin Gronemann, Niklas Heinsohn, Stephen G. Kobourov, Richard Spence, Joseph Watkins, and Alexander Wolff. **Multi-level Steiner trees**, *In Proceedings of the 17th International Symposium on Experimental Algorithms* (also arXiv:1804.02627), 2018.
- **Reyan Ahmed**, Md. Saidur Rahman and Stephen Kobourov, **Online Facility Assignment**, *In Proceedings of the 12th International Workshop on Algorithms and Computation*, 2018. (**best paper award**)
- **Reyan Ahmed**, Md. Mazharul Islam and Md. Saidur Rahman, **On acyclic colorings of graphs**. *In Proceedings of the 15th International Conference on Computer and Information Technology*, 2012.

Other Publications

- Minglai Yang and **Reyan Ahmed**. **Word2VecGD: Neural Graph Drawing with Cosine-Stress Optimization**, arXiv preprint arXiv:2509.17333, 2025.
- Sumaiya Malik, **Reyan Ahmed**, and Md Manzurul Hasan. **Online Facility Assignments on Polygons**, arXiv preprint arXiv:2504.04556, 2025.
- **Reyan Ahmed**, Debajyoti Mondal, and Rahnuma Islam Nishat, **Subsetwise and Multi-Level Additive Spanners with Lightness Guarantees**, arXiv:2411.07505, 2025.
- **Reyan Ahmed**, Cesim Erten, Stephen Kobourov, Jonah Lotz, Jacob Miller, and Hamlet Taraz, **Size should not matter: Scale-invariant stress metrics**, arXiv:2408.04688, 2024.
- Alvin Chiu, Mithun Ghosh, **Reyan Ahmed**, Kwang-Sung Jun, Stephen Kobourov, Michael T. Goodrich, **Graph Sparsifications using Neural Network Assisted Monte Carlo Tree Search**, arXiv:2311.10316, 2023.
- **Reyan Ahmed**, Mithun Ghosh, Kwang-Sung Jun, Stephen Kobourov, **Nearly Optimal Steiner Trees using Graph Neural Network Assisted Monte Carlo Tree Search**, arXiv:2305.00535, 2023.
- Kathryn Gray, Mingwei Li, **Reyan Ahmed**, Md Khaledur Rahman, Ariful Azad, Stephen Kobourov, Katy Börner, **A Map-based Interactive System for Visualizing Large Networks with Semantic Zooming**, *Presented at AVI 2022 workshop on Map-based Interfaces and Interactions (MAPII)*, 2022.
- **Reyan Ahmed**, Md Asadullah Turja, Faryad Darabi Sahneh, Mithun Ghosh, Keaton Hamm, Stephen Kobourov, **Computing Steiner Trees using Graph Neural Networks**, arXiv:2108.08368, 2021.

- Saad Al Muttakee, **Reyan Ahmed**, and Md. Saidur Rahman. **New Results and Bounds on Online Facility Assignment Problem**, arXiv:2009.01446, 2020.
- **Reyan Ahmed**, Greg Bodwin, Keaton Hamm, Mohammad Javad Latifi Jebelli, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Graph Spanners: A Tutorial Review**, *Computer Science Review,* 37, p.100253 (also arXiv:1909.03152), 2020.
- **Reyan Ahmed**, Keaton Hamm, Mohammad Javad Latifi Jebelli, Stephen Kobourov, Faryad Darabi Sahneh, and Richard Spence. **Multi-Level Graph Sketches via Single-Level Solvers**, arXiv:1905.00536, 2019.
- **Reyan Ahmed**, Felice De Luca, Sabin Devkota, Alon Efrat, Md Iqbal Hossain, Stephen Kobourov, Jixian Li, Sammi Abida Salma and Eric Welch, **L-Graphs and Monotone L-Graphs**, arXiv:1703.01544, 2017.

Presentations

- Keynote speech in the 3rd International Conference on Computing Advancements 2024. Topic: Large Network Visualization using Graph Spanners.
- Workshop presentation in the 7th Workshop on Geometry and Machine Learning, CG Week 2023. Topic: Nearly Optimal Steiner Trees using Graph Neural Network Assisted Monte Carlo Tree Search.
- Conference presentation in the 20th International Symposium on Experimental Algorithms 2021 (virtual conference). Topic: Multi-level Weighted Additive Spanners.
- Conference presentation in the 28th International Symposium on Graph Drawing and Network Visualization 2020 (virtual conference). Topic: Graph Drawing via Gradient Descent, $(GD)^2$.
- Conference presentation in the 28th Annual European Symposium on Algorithms, 2020 (virtual conference). Topic: Kruskal-based approximation algorithm for the multi-level Steiner tree problem.
- Conference presentation in the 46th International Workshop on Graph-Theoretic Concepts in Computer Science, 2020 (virtual conference). Topic: Weighted additive spanners.
- Invited speaker in the SIAM student seminar, the department of mathematics, the University of Arizona, 2020 (virtual presentation). Topic: Multi-level Graph Spanners.
- Poster presentation in TRIPODS conference, 2019. Topic: Approximation algorithms and an integer program for multi-level graph spanners.
- Conference presentation in the 12th International Workshop on Algorithms and Computation, 2018. Topic: Online facility assignment.

Teaching

- Web Programming: Spring, Fall 2025, Spring 2026.
- Honors Thesis - Graph layout recognition via neural networks: Fall 2025, Spring 2025.
- Directed Research - Approximation algorithms for spanners: Fall 2025.
- Discrete Mathematics for Computer Science I: Spring, Summer 2025.
- Introduction to Computer Programming I: Summer 2024.
- Introduction to Computer Programming II: Spring 2024, 2025, Fall 2024.
- Directed Research - Graph drawing using neural networks: Fall 2024, Spring 2025.
- Directed Research - Size invariant stress: Spring 2024.
- Discrete Mathematics for Computer Science II: Fall 2023, 2024, 2025, Spring, Summer 2024.
- Data Visualization: Fall 2021, 2022, Spring 2023.
- Independent research: light weight spanners, Spring 2023.
- Independent study: spectral sparsifiers, Spring 2023.
- Graph Theory: Fall 2022.

- Student initiated research - dynamic network visualization, Summer, 2022.
- Discrete Structures: Spring 2022.
- Data Structures and Algorithms: Fall 2021, 2022, Spring 2022, 2023.
- Analysis of Discrete Structures: Summer 2020, 2021.

Funding

- Graph Sparsifiers for Large Network Visualization, Principal Investigator, Algorithmic Foundations, NSF (Proposal not funded; resubmission planned for 2026), 2024.
- Registration fund, Colgate University, 2023.
- Publication fund, Colgate University, 2023.
- Discretionary fund, the research council, Colgate University, 2023.

Professional Service

- Program committee member, WALCOM 2025-2026.
- Career track faculty search committee member, 2025-2026.
- Transfers and internships faculty liaison, 2025-2026.
- Department statistic committee member, Fall 2023 to Spring 2025.
- Received IEEE TVCG reviewer certificate, 2024.
- Curriculum committee member, Fall 2023, Spring 2024.

Mentoring

- Cesar Daniel Quihuis-Romero, the TA of the Month, February 2025.
- Minglai Yang, Undergraduate Student, University of Arizona, 2024-2025.
- Marissa Nicole Kroeger, the TA of the Month, February 2024.
- Jordan Ernesto Rodriguez, the TA of the Month, February 2024.
- Hamlet Amadeo Taraz, Undergraduate Student, University of Arizona, 2024.
- Mentored students in TRIPODS Machine Learning Literacy Project, 2020.
- Kathryn Gray, Ph.D. Student, University of Arizona, 2019.
- Ahmad Musa, Ph.D. Student, University of Arizona, 2018.

Community Engagement

- Adviser of Bangladesh Student Association, University of Arizona, 2025.
- Reviewed Provost's Investment Fund at UoA in Fall 2023.
- Reviewed student research proposals at Colgate for Summer 2022, 2023.
- Completed Google summer of code 2022 with GeomScale.
- Peer-reviewed 14 conference/journal papers.
- Maintain web pages: gama.cs.arizona.edu, walcom-conference.org
- Volunteer activities in Hack Arizona, 2019.