Department of Computer Science
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Timothy R. Wylie

Curriculum Vitae

Education

- **Montana State University** — Bozeman, MT, USA
  Ph.D. Computer Science — *2010 - 2013*

  Dissertation Advisor: Dr. Binhai Zhu
  Dissertation Title: The Discrete Fréchet Distance with Applications
- **The University of Montana** — Missoula, MT, USA
  M.S. Computer Science — *2008 - 2010*
- **Harding University** — Searcy, AR, USA
  B.S. Computer Science - Cum Laude — *1999 - 2004*
- **Harding University** — Searcy, AR, USA
  B.S. Mathematics - Cum Laude — *1999 - 2004*

Employment History

- **Associate Professor** — 2020 -
  The University of Texas Rio Grande Valley, Edinburg, TX
- **Assistant Professor** — 2014 - 2020
  The University of Texas Rio Grande Valley, Edinburg, TX
- **Post-doctoral Researcher** with Dr. Guohui Lin — 2013 - 2014
  The University of Alberta, Edmonton, AB
- **Software Developer** — Summer 2008, 2009
  Axiom, Missoula, MT
- **Database Developer** — 2004 - 2008
  Moceansoft, Denham Springs, LA

Research Publications

Peer-reviewed Journal Publications

1. **Covert Computation in Self-Assembled Circuits**. A. A. Cantu, A. Luchsinger, R. Schweller, and T. Wylie. To appear in *Algorithmica*, 2020.
2. **Crazy Sequential Representations of Numbers for Small Bases**. T. Wylie. In *Recreational Mathematics Magazine*, 6(12), 33–48, ISSN 2182-1976, 2020.

3. **Nearly Constant Tile Complexity for any Shape in Two-Handed Tile Assembly**. R. Schweller, A. Winslow, and T. Wylie. *Algorithmica*, 81(8), 3114-3135, 2019.
4. **Optimal Staged Self-Assembly of Linear Assemblies**. C. Chalk, E. Martinez, R. Schweller, L. Vega, A. Winslow, and T. Wylie. *Natural Computing*, 18(3) 527-548, 2019.
5. **Self-Assembly of Shapes at Constant Scale using Repulsive Forces**. A. Luchsinger, R. Schweller, and T. Wylie. *Natural Computing*, 18(1), 93-105, 2019.
6. **Verification in Staged Tile Self-Assembly**. R. Schweller, A. Winslow, and T. Wylie. *Natural Computing*, 18(1), 107-117, 2019.
7. **Optimal Staged Self-Assembly of General Shapes**. C. Chalk, E. Martinez, R. Schweller, L. Vega, A. Winslow, and T. Wylie. *Algorithmica*, 80(4), 1383-1409, 2018.
8. **Concentration Independent Random Number Generation in Tile Self-Assembly**. C. Chalk, B. Fu, E. Martinez, R. Schweller, and T. Wylie. *Theoretical Computer Science*, 667, 1-15, March 2017.
9. **Enabling High-Dimensional Range Queries using kNN Indexing Techniques: Approaches and Empirical Results**. T. Wylie, M. A. Schuh, and R. A. Angryk. *Journal of Combinatorial Optimization*, 32(4), 1107-1132, 2016.
10. **Whole Genome SNP Genotype Piecemeal Imputation**. Y. Wang, T. Wylie, P. Stothard, and G. Lin. *BMC Bioinformatics*, 16(340), 2015.
11. **On Visualization Techniques for Solar Data Mining**. M. A. Schuh, J. M. Banda, T. Wylie, P. McInerney, K. Ganesan Pillai, and R. A. Angryk. *Journal of Astronomy and Computing*, 10:32-42, Apr 2015.
12. **Following a Curve with the Discrete Fréchet Distance**. T. Wylie and B. Zhu. *Theoretical Computer Science*, 556:34-44, Oct 2014.
13. **Protein Chain Pair Simplification Under the Discrete Fréchet Distance**. T. Wylie and B. Zhu. *IEEE/ACM Trans. on Computational Biology and Bioinformatics*, 10(6):1372-1383, Nov/Dec 2013.

Peer-reviewed Conference Publications

1. **Hierarchical Shape Construction and Complexity for Slidable Polyominos under Uniform External Forces**. J. Balanza-Martinez, D. Caballero, A. A. Cantu, M. Flores, T. Gomez, A. Luchsinger, R. Reyes, R. Schweller, and T. Wylie. In *Proc. of the* 31^{st} *ACM-SIAM Symposium on Discrete Algorithms* (SODA'20), 2625-2641, 2020.
2. **Verification and Computation in Restricted Tile Automata**. D. Caballero, T. Gomez, R. Schweller, and T. Wylie. To appear in *Proc. of the* 26^{th} *Inter. Conf. on DNA Computing and Molecular Programming* (DNA'20), 2020.
3. **Signal Passing Self-Assembly Simulates Tile Automata**. A. A. Cantu, A. Luchsinger, R. Schweller, and T. Wylie. To appear in *Proc. of the* 31^{st} *International Symposium on Algorithms and Computation* (ISAAC'20), 2020.
4. **Relocating Units in Robot Swarms with Uniform Control Signals is PSPACE-Complete**. D. Caballero, A. A. Cantu, T. Gomez, A. Luchsinger, R. Schweller, and T. Wylie. In *Proc. of the* 32^{nd} *Canadian Conference on Computational Geometry* (CCCG'20), 2020.
5. **Building Patterned Shapes in Robot Swarms with Uniform Control Signals**. D. Caballero, A. A. Cantu, T. Gomez, A. Luchsinger, R. Schweller, and T. Wylie. In *Proc. of the* 32^{nd} *Canadian Conference on Computational Geometry* (CCCG'20), 2020.
6. **Covert Computation in Self-Assembled Circuits**. A. A. Cantu, A. Luchsinger, R. Schweller, and T. Wylie. In *Proc. of the* 46^{th} *Inter. Col. on Automata, Languages, and Programming* (ICALP'19), 132, 31:1–31:14, 2019.
7. **Full Tilt: Universal Constructors for General Shapes with Uniform External Forces**. J. Balanza-Martinez, D. Caballero, A. A. Cantu, L. A. Garcia, A. Luchsinger, R. Reyes, R. Schweller, and T. Wylie. In *Proc. of the* 30^{th} *ACM-SIAM Symposium on Discrete Algorithms* (SODA'19), 2689-2708, 2019.
8. **Discrete Planar Map Matching**. B. Fu, R. Schweller, and T. Wylie. In *Proc. of the* 31^{st} *Canadian Conference on Computational Geometry* (CCCG'19), 218-224, 2019.

9. **Relocation with Uniform External Control in Limited Directions (Short Abstract)**. J. Balanza-Martinez, D. Caballero, A. A. Cantu, T. Gomez, A. Luchsinger, R. Schweller, and T. Wylie. To appear in *The 22^{nd} Japan Conference on Discrete and Computational Geometry, Graphs, and Games* (JCDCG^3'19), 39-40, 2019.
10. **Self-Assembly of Any Shape with Constant Tile Types using High Temperature**. C. Chalk, A. Luchsinger, R. Schweller, and T. Wylie. In *Proc. of the 26^{th} European Symposium on Algorithms* (ESA'18), 14:1-14:14, 2018.
11. **Freezing Simulates Non-freezing Tile Automata**. C. Chalk, A. Luchsinger, E. Martinez, R. Schweller, A. Winslow, and T. Wylie. In *Proc. of 24^{th} Inter. Conf. on DNA Computing and Molecular Programming* (DNA'18), 155-172, 2018.
12. **Optimal Staged Self-Assembly of Linear Assemblies**. C. Chalk, E. Martinez, R. Schweller, L. Vega, A. Winslow, and T. Wylie. In *Proc. of 17^{th} Inter. Conf. on Unconventional Computation and Natural Computation* (UCNC'18), 32-45, 2018.
13. **Tile Pattern-Building Games on a Grid are PSPACE-complete (Short Abstract)**. A. A. Cantu, A. Gonzalez, C. Lozano, A. Luchsinger, F. Martinez, E. Medina, A. Ramirez, and T. Wylie. In *Proc. of the 21^{st} Japan Conf. on Discrete and Computational Geometry, Graphs, and Games* (JCDCG^3'18), 18-21, 2018.
14. **Complexities for High-Temperature Two-Handed Tile Self-Assembly**. R. Schweller, A. Winslow, and T. Wylie. In *Proc. of the 23^{rd} Int. Conf. on DNA Computing and Molecular Prog.* (DNA'17), 98-109, 2017.
15. **Universal Shape Replicators via Self-Assembly with Attractive and Repulsive Forces**. C. Chalk, E. D. Demaine, M. L. Demaine, E. Martinez, R. Schweller, L. Vega, and T. Wylie. In *Proc. of the 28^{th} ACM-SIAM Symposium on Discrete Algorithms* (SODA'17), 225-238, 2017.
16. **Verification in Staged Tile Self-Assembly**. R. Schweller, A. Winslow, and T. Wylie. In *Proc. of the 16^{th} Int. Conf. on Unconventional Computation and Natural Computation* (UCNC'17), 98-112, 2017.
17. **Self-Assembly of Shapes at Constant Scale using Repulsive Forces**. A. Luchsinger, R. Schweller, and T. Wylie. In *Proc. of the 16^{th} Int. Conf. on Unconventional Computation and Natural Computation* (UCNC'17), 82-97, 2017.
18. **Optimal Staged Self-Assembly of General Shapes**. C. Chalk, E. Martinez, R. Schweller, L. Vega, A. Winslow, and T. Wylie. In *Proc. of the 24^{th} European Sym. of Algorithms (ESA'16)*, (57)26:1–26:17, 2016.
19. **Flipping Tiles: Concentration Independent Coin Flips in Tile Self-Assembly**. C. T. Chalk, B. Fu, A. Huerta, M. A. Maldonado, E. Martinez, R. T. Schweller, and T. Wylie. In *Proc. of the 21^{st} Int. Conf. on DNA Computing and Molecular Programming (DNA'15)*, 87–103, 2015.
20. **On the Chain Pair Simplification Problem**. C. Fan, O. Filtser, M. J. Katz, T. Wylie, and B. Zhu. In *Proc. of the 14^{th} Algorithms and Data Structures Sym. (WADS'15)*, LNCS 9214, 351–362, 2015.
21. **Approximating High-Dimensional Range Queries with kNN Indexing Techniques**. M. A. Schuh, T. Wylie, C. Liu, and R. A. Angryk. In *Proc. of the 20^{th} Int. Computing and Combinatorics Conf. (COCOON'14)*, LNCS 8591, 369-380, 2014.
22. **Mitigating the Curse of Dimensionality for Exact kNN Retrieval**. M. A. Schuh, T. Wylie, and R. A. Angryk. In *Proc. of the 27^{th} Int. Florida Artificial Intelligence Research Society Conf. (FLAIRS'14)*, 363–368, 2014.
23. **Discretely Following a Curve**. T. Wylie. In *Proc. of the 7^{th} Int. Conf. on Combinatorial Optimization and Applications (COCOA'13)*, LNCS 8287, 13–24, 2013.
24. **Cluster Analysis for Optimal Indexing**. T. Wylie, M. A. Schuh, J. Sheppard, and R. A. Angryk. In *Proc. of the 26^{th} Int. Florida Artificial Intelligence Research Society Conf. (FLAIRS'13)*, 166–171, 2013.
25. **A Comprehensive Study of iDistance Partitioning Strategies for kNN Queries and High-Dimensional Data Indexing**. M. A. Schuh, T. Wylie, J. M. Banda, and R. A. Angryk. In *Proc. of the 29^{th} British National Conf. on Databases (BNCOD'13)*, LNCS 7968, 238–252, 2013.
26. **Improving the Performance of High-dimensional kNN Retrieval Through Localized Dataspace Segmentation and Hybrid Indexing**. M. A. Schuh, T. Wylie, and R. A. Angryk. In *Proc. of the 17^{th} East-European Conf. on Advances in Databases and Information Sys. (ADBIS'13)*, LNCS 8133, 344–357, 2013.

27. **When Too Similar is Bad: A Practical Example of the Solar Dynamics Observatory Content-Based Image-Retrieval System**. J. M. Banda, M. A. Schuh, T. Wylie, P. McInerney, and R. A. Angryk. *New Trends in Databases and Information Systems*, Vol. 241, 87-95, 2013.
28. **Spatiotemporal Co-occurrence Rules**. K. Ganesan Pillai, R. A. Angryk, J. M. Banda, T. Wylie, and M. A. Schuh. *New Trends in Databases and Information Systems*, Vol. 241, 27-35, 2013.
29. **Co-occurrence Pattern Mining in Data Sets with Evolving Regions**. K. Ganesan Pillai, R. A. Angryk, J. M. Banda, M. A. Schuh, and T. Wylie. Spatio-temporal *2012 IEEE 12th International Conf. on Data Mining Workshops*, 0:805-812, 2012.
30. **Discretely Following a Curve (Short Abstract)**. T. Wylie and B. Zhu. *Computational Geometry: Young Researchers Forum (CG:YRF)*, June 17-20, 2012.
31. **A Polynomial Time Solution for Protein Chain Pair Simplification Under the Discrete Fréchet Distance**. T. Wylie and B. Zhu. In *Proc. of the 2012 Int. Sym. on Bioinformatics Research and Applications (ISBRA'12)*, LNBI 7292, 287–298, 2012.
32. **A Practical Solution for Aligning and Simplifying Pairs of Protein Backbones Under the Discrete Fréchet Distance**. T. Wylie, J. Luo, and B. Zhu. In *Proc. of the 11th Int. Conf. on Computational Science and Its Applications (ICCSA'11)*, LNCS 6784, 74–83, 2011.

Technical Documents/Preprints

- **Hardness of Reconfiguring Robot Swarms with Uniform External Control in Limited Directions**. D. Caballero, A. A. Cantu, T. Gomez, A. Luchsinger, R. Schweller, and T. Wylie. *arXiv:2003.13097*, 2020.
- **Covert Computation in Self-Assembled Circuits**. A. A. Cantu, A. Luchsinger, R. Schweller, and T. Wylie. *arXiv:1908.06068*, 2019.
- **Full Tilt: Universal Constructors for General Shapes with Uniform External Forces**. J. Balanza-Martinez, D. Caballero, A. A. Cantu, L. A. Garcia, A. Luchsinger, R. Reyes, R. Schweller, and T. Wylie. *arXiv:1907.06741*, 2019.
- **Crazy Sequential Representations of Numbers for Small Bases**. T. Wylie. *arXiv:1810.05070*, 2018.
- **Verification in Staged Tile Self-Assembly**. R. Schweller, A. Winslow, and T. Wylie. *arXiv:1703.04598*, 2017.
- **Self-Assembly of Shapes at Constant Scale using Repulsive Forces**. A. Luchsinger, R. Schweller, and T. Wylie. *arXiv:1608.04791*, 2016.
- **Universal Shape Replicators via Self-Assembly with Attractive and Repulsive Forces**. C. Chalk, E. D. Demaine, M. L. Demaine, E. Martinez, R. Schweller, L. Vega, and T. Wylie. *arXiv:1608.00477*, 2016.
- **Concentration Independent Random Number Generation in Tile Self-Assembly**. C. Chalk, B. Fu, E. Martinez, R. Schweller, and T. Wylie. *arXiv:1506.00680v2*, 2016.
- **An Interesting Gadget for Chain Pair Simplification**. T. Wylie. *arXiv:1607.06539*, 2016.
- **Optimal Staged Self-Assembly of General Shapes**. C. Chalk, E. Martinez, R. Schweller, L. Vega, A. Winslow, and T. Wylie. *arXiv:1510.03919*, 2015.
- **On the Chain Pair Simplification Problem**. C. Fan, O. Filtser, M. J. Katz, T. Wylie, and B. Zhu. *arXiv:1409.2457v2*, 2014.
- **Intermittent Map Matching Under the Discrete Fréchet Distance**. T. Wylie and B. Zhu. *arXiv:1409.2456*, 2014.

Other Documents

- **The Discrete Fréchet Distance with Applications**. T. Wylie. Ph.D. Dissertation, Montana State University, 2013.
- **The Integration of an HP-Adaptive Finite Element Analysis Library into the Community Ice-Sheet Model**. T. Wylie. M.S. Thesis, The University of Montana, 2010.

Grants

- **AF: Small: RUI: Unifying Self-Assembly Through Tile Automata**. PI R. Schweller and co-PI T. Wylie. *National Science Foundation*, CCF-1817602, 2018-2021.
- **EAGER:Randomization and Parallelization in Algorithmic Self-Assembly**. PI R. Schweller and co-PI T. Wylie. *National Science Foundation*, CCF-1555626, 2015-2016.

Student Grants

- **Verifying Uniqueness in Multiple Assemblies**. PI M. Flores and advisor T. Wylie. *Louis Stokes Alliances for Minority Participation*, 2018.
- **Abstract Tile Self-Assembly Simulation: Minimum cut and Line index for the identification of unstable assemblies**. PI A. Cantu and advisor T. Wylie. *Engaged Scholar Award*, 2017-2018.
- **Self-Assembly of Shapes at Constant Scale using Repulsive Forces**. PI A. Luchsinger and advisor T. Wylie. *Engaged Scholar Award*, 2016-2017.

Teaching Experience

University of Texas - Pan American / University of Texas - Rio Grande Valley

- CMPE 1101 - Introduction to Computer Engineering
- CSCI/CMPE 1370 - Engineering Computer Science I
- CSCI/CMPE 2380 - Engineering Computer Science II
- CSCI 3310 - Mathematical Foundations of Computer Science
- CSCI 4325 - Automata, Formal Languages, and Computability
- CSCI 4341 - Games & Computation

Research Software

- Tumble Tiles - Tilt-assembly simulator
  https://github.com/asarg/TumbleTiles
- VersaTILE - Tile self-assembly simulator
  https://github.com/asarg/VersaTile
- FPACT - The Fréchet-based Protein Alignment & Comparison Toolkit
- iDistance - An open-source version of the high-dimensional indexing method
- SDOCBIR - Solar Dynamics Observatory (SDO) Content-Based Image Retrieval System
- CISM - The Community Ice-Sheet Model

Service

Senior Project Advisor

- 2015-2016: Gilbert Salazar
- 2016-2017: Robert Carrera, Yituo Chen, Arturo Gonzalez, Fernando Martinez, Luis Prada-Regla, Joseph Rangel, Oscar Serna
- 2017-2018: Eric Cancino, Alejandro Cano, Edwin Gomez, Eli Gonzalez, Tony Lujan, William MacDonald, Vedanth Mapakshi, Alfredo Martinez, Marlon Martinez, Eduardo Medina, Scott Mercer, Pablo Sandoval, Harsimranjeet Singh, Giselle Razo, Erin Reyes, Joseph Reyes, Angel Rodriguez, Guillermo Stentler, Jaime Tijernia, Ernesto Valdez, Pablo Vasquez, Matthew Wilson
- 2018-2019: Jose Balanza-Martinez, David Cabellero, Edwin Cantu, Juan Guerrero, Jaziel Hernandez, Austin Karingada, Marco Lazo, Brandon Martinez, Raul Muniz, Angel Rodriguez, Roberto Rivas, Brandon Sandoval, Rodrigo Sandoval, David Vargas
- 2019-2020: Michael Alaniz, Jose Cabrera, Antonio de la Garza, Reynoldo de Leo, Mason Garza, Benito Gomez, Brando Lugo, Abram Maldanado, Christian Martinez, Richard Marvin, Gabriel Mata, Jose O. Mendoza, Tivon Mohammed, Aaron Ortiz, Leo Pena, Marco Pena, Manuel Perez, Kevin Ramirez, Bryant Riley, Roel Tijerina, Jason Villareal

Masters Advisor

- 2020: Angel A. Cantu

Masters Committee

- 2015: Bamikole Ogundele, Juan Monrreal
- 2016: Sanjyothsna Jonnalagadda, Eric Martinez
- 2017: Cameron Chalk
- 2020: Austin Luchsinger

Reviewer

- Theoretical Computer Science
- Information Processing Letters
- International Journal of Computational Geometry & Applications
- International Symposium on Theoretical Aspects of Computer Science (STACS)
- Solar Astronomy Big Data Workshop at IEEE Int. Conf. on Big Data (SABiD)
- American Mathematical Society
- UTRGV Engaged Scholar Symposium (ES^2)
- International Symposium on Discrete Algorithms (SODA)
- National Science Foundation (grant panels)
- International Conference on Data Intelligence and Security (ICDIS)
- Mathematical Foundations of Computer Science (MFCS)

Program Committee

- IWBNA - International Workshop on Biological Network Analysis and Integrative Graph-Based Approaches (2016)
- SABiD - Solar Astronomy Big Data Workshop at IEEE Int. Conf. on Big Data (2014 - 2020)
- ICDIS - International Conference on Data Intelligence and Security (2018)

Departmental

- Faculty Search Committee (2016-2020)
- Chair Search Committee (2017-2018, 2019-2020)
- Annual Evaluation Committee (2014-2018)

- Library Liaison (2015-2020)
- Undergraduate Curriculum Committee (2014-)
- Graduate Curriculum Committee (2014-)

Other

- Sponsor for Hack and Make Creative Coalition (2014-)
- Director for Hack Research (2018-)

Awards

Outstanding Faculty Award (Computer Engineering) 2017, 2019
Outstanding Ph.D. Student 2012–2013

General Errata

Eagle Scout 1998
Jo Cleveland Creative Writing Contest . . . . . First Place, 1996
Rubik's Cube Average . . . . . 24.09 seconds