

## F. ANTONIO MEDRANO

### *Curriculum Vitae*

Texas A&M University Corpus Christi  
6300 Ocean Drive, Unit 5799  
Corpus Christi, TX 78412

**Email:** antonio.medrano@tamucc.edu  
**Phone:** (361) 825-2548  
**Web:** <https://antoniomedrano.github.io>

### EDUCATION

- Ph.D. University of California, Santa Barbara, 2014  
Department of Geography  
Emphasis on Modeling, Measurement and Computation
- M.S. University of California, Santa Barbara, 2009  
Media Arts and Technology Program  
Emphasis on Multimedia Engineering
- B.S. Harvey Mudd College, 2002  
Engineering, *with honors*  
Emphasis on Systems Engineering

### ACADEMIC AND RESEARCH POSITIONS

- Assistant Professor** Texas A&M University–Corpus Christi (January 2019–present)  
Department of Computing Sciences, Geospatial Computing Science Program  
Conrad Blucher Institute for Surveying and Science
- Postdoctoral Researcher** University of California, Santa Barbara (August 2017–December 2018)  
Bren School of Environmental Science & Management
- Co-Founder** Arogi, Inc., Santa Barbara, CA (February 2016–February 2017)
- Postdoctoral Researcher** University of California, Santa Barbara (April 2015–January 2016)  
Center for Spatial Studies, Department of Geography
- Visiting Professor** Universitat Jaume I, Castellón de la Plana, Spain (September–October 2015)  
*Geographic Information Systems I (SIW009)*
- Instructor** University of California, Santa Barbara (Winter 2011, Spring 2013, Winter 2018)  
*Introduction to Optimization for Geographic Problems (GEOG 191)*
- Instructor** University of California, Santa Barbara (Summer 2013)  
*Maps and Spatial Reasoning (GEOG W 12, online course)*
- Instructor** University of California, Santa Barbara (Winter 2006, 2007, 2008)  
*Mathematics for Digital Signal Processing (MAT 202)*
- Teaching Assistant** University of California, Santa Barbara (various quarters)  
*Intro to Geographic Information Systems, Intro to Optimization for Geographic Problems, Geography of Europe, Mathematics of Engineering, Media Digital Signal Processing, Intro to C Programming and MATLAB, Statics, Intro to Mechanical Engineering Design, Advanced Mechanical Engineering Lab, Intro to Machine Shop*

## GRANTS AND FELLOWSHIPS

- 2020–2025 NSF Grant – AI Institute: Artificial Intelligence for Environmental Sciences, #2019758, Senior Personnel, \$19,900,512
- 2020-2021 TAMUCC Division of Research and Innovation Student Research Competition, Awardee: Marina Vicens Miquel, Advisor: Antonio Medrano, \$800
- 2016 NSF SBIR Phase I: Advanced Data Analytics for Public Safety, #1549445, \$149,905
- 2010–2014 Graduate Research Assistantship, funding from Argonne National Laboratories, (Summer–Fall 2010, Fall 2011–Winter 2013, Summer–Winter 2014)
- 2010 University of California Transportation Center Graduate Fellowship, \$30,000

## REFEREED ARTICLES AND BOOK CHAPTERS

- 2020 Medrano, F.A. Effects of Raster Terrain Representation on GIS Shortest Path Analysis. *Submitted for publication, pending review.*
- 2020 Medrano, F.A. The Complete Vertex  $p$ -Center Problem. *EURO Journal on Computational Optimization* **8**, 327–343. DOI: 10.1007/s13675-020-00131-y.
- 2018 Church, R. and F.A. Medrano. Location-Allocation Modeling and GIS. *The Geographic Information Science & Technology Body of Knowledge (3rd Quarter 2018 Edition)*, John P. Wilson (ed). DOI: 10.22224/gistbok/2018.3.4.
- 2016 Lafia, S., J. Jablonski, W. Kuhn, S. Cooley, & F.A. Medrano. Spatial Discovery and the Research Library. *Transactions in GIS* **20**, 399–412.
- 2015 Medrano, F.A. & R.L. Church. A Parallel Computing Framework for Finding the Supported Solutions to a Biobjective Network Optimization Problem. *Journal of Multi-Criteria Decision Analysis* **22**, 244–259.
- 2014 Scaparra, M.P., R.L. Church & F.A. Medrano. Corridor Location: The Multi-Gateway Shortest Path Model. *Journal of Geographical Systems* **16**, 287–309.
- 2014 Medrano, F.A. & R.L. Church. Corridor Location for Infrastructure Development: A Fast Bi-Objective Shortest Path Method for Approximating the Pareto Frontier. *International Regional Science Review* **37**, 129–148.
- 2013 Medrano, F.A. & R.L. Church. “A Parallel Algorithm to Solve Near-Shortest Path Problems on Raster Graphs.” In Shi, X., Kindratenko, V. & Yang, C. eds. *Modern accelerator technologies for geographic information science*. Springer, 83–94.

## RESEARCH REPORTS AND THESES

- 2016 Kuhn, W., M. Hegarty, A. Ballatore, K. Doehner, A. Medrano, Donald Janelle. *Report on the Center for Spatial Studies*. Center for Spatial Studies, University of California at Santa Barbara
- 2015 Cooley, S., S. Lafia, A. Medrano, D. Stephens & W. Kuhn. *Spatial Discovery Expert Meeting—Final Report*. Center for Spatial Studies and UCSB Library, University of

California, Santa Barbara.

- 2014 Medrano, F.A. *Corridor Location: Generating Competitive and Efficient Route Alternatives*. Ph.D. Dissertation, Geography, University of California, Santa Barbara.
- 2014 Medrano, F.A. & R.L. Church. *A Parallel Biobjective Shortest Path Algorithm*. Santa Barbara: Geotrans Report 2014-12-01.
- 2013 Medrano, F.A. & R.L. Church. *Strahler Stream Order Inspired Gateway Shortest Path Subsets*. Santa Barbara: Geotrans Report 2013-12-01.
- 2013 Medrano, F.A. & R.L. Church. *An Exact Biobjective Shortest Path Method with Gateway Heuristic and Supported Point Upper-Bounds*. Santa Barbara: Geotrans Report 2013-06-01.
- 2012 Medrano, F.A. & R.L. Church. *A new parallel algorithm to solve the near- shortest-path problem on raster graphs*. Santa Barbara: Geotrans Report RP-01-12-01.
- 2011 Medrano, F.A. & R.L. Church. *Transmission corridor location: Multi-path alternative generation using the k-shortest path method*. Santa Barbara: Geotrans Report RP-01-11-01.
- 2009 Medrano, F.A. *Optical position sensors with applications in servo feedback subwoofer control*. M.S. Thesis, Media Arts and Technology Program, University of California, Santa Barbara.

## CONFERENCE PRESENTATIONS AND INVITED TALKS

- 2019 F.A. Medrano. "The Complete Vertex p-Center Problem: An Exact Set Covering Method with Brute Force Combinatorics." *INFORMS Annual Meeting*, Seattle, WA. October 20–23, 2019.
- 2019 F.A. Medrano. "The Complete p-Center Problem: A Planning Tool for Urban Location Coverage Optimization." *International Workshop on Urban Operations Research (IWUOR 2019)*, Nagoya, Japan, July 19–21, 2019.
- 2019 F.A. Medrano. "The Complete Vertex p-Center Problem: An Exact Set Covering Method." *30th European Conference on Operational Research (EURO)*, Dublin, Ireland, June 23–26, 2019.
- 2019 F.A. Medrano. "A Set Covering Trade-Off to Solve the Complete Vertex p-Center Problem." *25th International Conference on Multi-Criteria Decision Making (MCDM)*, Istanbul, Turkey. June 16–21, 2019.
- 2019 F.A. Medrano. "Effects of Raster Terrain Representation on GIS Spatial Network Analysis." *International Network Optimization Conference (INOC)*, Avignon, France, June 12–14, 2019.
- 2019 F.A. Medrano. "Brute Force Spatial Optimization: When It's Okay." *American Association of Geographers (AAG) Annual Meeting*, Washington DC. April 3–7, 2019.

- 2018 F.A. Medrano. "The Complete Vertex p-Center Problem: A Fast Set Covering Method." *American Association of Geographers (AAG) Annual Meeting*, New Orleans, LA. April 10–14, 2018.
- 2018 F.A. Medrano "GIS Data For Spatial Analysis: What To Avoid At All Costs!", *Bren School of Environmental Science & Management Seminar*, University of California, Santa Barbara. March 5, 2018.
- 2018 F.A. Medrano. "Understanding the Effects of Attribute Scale and Connectivity on GIS Raster Network Analysis." *Western Regional Science Association Annual Meeting (WRSA)*, Pasadena, CA. February 11–14, 2018.
- 2017 F.A. Medrano. "The Complete p-Center Problem: A Fast Set Covering Method." *64th Annual North American Meetings of the RSAI (NARSC)*, Vancouver, BC. November 8–11, 2017.
- 2017 F.A. Medrano. "GIS Data for Spatial Analysis: What to Avoid at All Costs!" *Environmental Studies Department seminar*, Zamorano University, Honduras. March 24, 2017
- 2017 F.A. Medrano. "Spatial Analysis." *GIS course guest lecture*, Zamorano University, Honduras. March 24, 2017
- 2016 F.A. Medrano. "The Clarity of Disruption." *TEDx Santa Barbara*, Santa Barbara, CA. August 20, 2016. (<https://tedxsantabarbara.com/2016/antonio-medrano/>)
- 2016 F.A. Medrano. "Attribute Scale on GIS Raster Data: What to Avoid at All Costs!" *ThinkSpatial brownbag seminar at the Center for Spatial Studies*, University of California, Santa Barbara. January 26, 2016.
- 2015 F.A. Medrano and R.L. Church. "GIS Raster Data for Multi-Objective Shortest Path Analysis: The Elephant in the Room." *62nd Annual North American Meetings of the RSAI (NARSC)*, Portland, OR. November 11–14, 2015.
- 2015 F.A. Medrano and R.L. Church. "Spatial Data for Multiobjective Shortest Path Analyses: Small Decisions with Large Consequences." *INFORMS Annual Meeting*, Philadelphia, PA. November 1–4, 2015.
- 2015 F.A. Medrano. "Modeling Wicked Spatial Problems: Lessons Learned from my Ph.D. Dissertation." *Invited talk at the Center for Spatial Studies*, University of California, Santa Barbara, February 18, 2015.
- 2014 F.A. Medrano. "Corridor Location: Generating Competitive and Efficient Route Alternatives." *Ph.D. Defense Presentation*, University of California, Santa Barbara, December 5, 2014.
- 2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using Java." *61st Annual North American Meetings of the RSAI (NARSC)*, Bethesda, MD. November 12–15, 2014.
- 2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using Java" *INFORMS Annual Meeting*, San Francisco, CA. November 9–12, 2014.

- 2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using JAVA." *20<sup>th</sup> Conference of the International Federation of Operational Research Societies (IFORS)*, Barcelona, Spain. July 13–18, 2014.
- 2013 F.A. Medrano and R.L. Church. "Fast Generation of Spatially Diverse One-To-One Shortest Path Options." *60th Annual North American Meetings of the RSAI (NARSC)*, Atlanta, GA. November 13–16, 2013.
- 2013 F.A. Medrano and R.L. Church. "Between Terrain and an NP-hard Place: Challenges of Solving Multiobjective Shortest Paths on GIS Networks." *INFORMS Annual Meeting*, Minneapolis, MN. October 6–9, 2013.
- 2013 F.A. Medrano and R.L. Church. "Improved Upper Bounds for a Two-Phase Biobjective Shortest Path Algorithm." *International Conference on Multi-Criteria Decision Making (MCDM)*, Málaga, Spain. June 16–21, 2013.
- 2013 F.A. Medrano and R.L. Church. "Corridor Location for Infrastructure Development: Solving For The Pareto-Frontier Of Solutions." *Western Regional Science Association Annual Meeting (WRSA)*, Santa Barbara, CA. February 24–27, 2013.
- 2013 F.A. Medrano and R.L. Church. "New Methods for Solving the Bi-Objective Shortest Path Problem." *13th INFORMS Computing Society Conference (ICS)*, Santa Fe, NM. January 6–8, 2013.
- 2012 F.A. Medrano. "Gateway to Computationally Efficient Corridor Location." *Invited Talk at Argonne National Laboratory*, Lemont, IL. November 28, 2013.
- 2012 F.A. Medrano and R.L. Church. "A Parallel Algorithm to Solve Near-Shortest Path Problems on Raster Graphs." *MAT4GIScience 2012 (workshop associated with GIScience 2012)*, Columbus, OH. September 18, 2012.
- 2012 F.A. Medrano and R.L. Church. "An Efficient Heuristic for Generating Unsupported Non-Dominated Solutions in a Bi-Objective Shortest Path Problem." *International Symposium on Location Decisions (ISOLDE XII)*, Nagoya & Kyoto, Japan. July 19–24, 2012.
- 2011 F.A. Medrano and R.L. Church. "Modeling Corridor Location Alternatives: New Methods and Future R&D Needs." *Invited talk at the Department of Energy Headquarters*, Washington DC. November 1, 2011.
- 2010 F.A. Medrano and R.L. Church. "Transmission Corridor Location: A Wicked Public Problem." *Invited talk at Argonne National Laboratory*, Lemont, IL. November 18, 2010.
- 2009 F.A. Medrano and R.L. Church. "Differentiated Least Cost Path Selection on Raster Networks." *Colloquium for the Department of Geography*, University of California, Santa Barbara. October 30, 2009.
- 2009 F.A. Medrano. "Optical Position Sensors with Applications in Servo Feedback Subwoofer Control." *Masters Defense Presentation*, University of California, Santa Barbara. February 13, 2009.

## **CERTIFICATIONS, AWARDS, AND HONORS**

Tau Beta Pi engineering honor society, Omega chapter, member  
State of California, Engineer in Training, #EIT115948  
California Non-Residential Title 24-2001 Certified Energy Plans Examiner

## **CONFERENCE ORGANIZATION**

- 2015 Spatial Information for Human Health (with M. Castro, M. Duckham and W. Kuhn)  
Santa Barbara, CA. December 9–11, 2015.
- 2015 Expert Meeting on Spatial Discovery (with D. Stephens and W. Kuhn) Santa Barbara,  
CA. June 17–18, 2015.

## **PROFESSIONAL SOCIETY MEMBERSHIPS**

Association of American Geographers (AAG) lifetime member

- Spatial Analysis and Modeling (SAM)
- GI Science & Systems (GISS)

Institute for Operations Research and the Management Sciences (INFORMS)

- Section on Location Analysis (SOLA)
- Multiple Criteria Decision Making (MCDM) Section
- Computing Society
- Optimization Society

Regional Science Association International (RSAI)

Western Regional Science Association (WRSA)

## **RESEARCH INTERESTS**

**Spatial Optimization:** Linear and Integer Programming, Heuristics, Multi-Objective Optimization, Location Modeling & Analysis, Location-Allocation and Covering Models, GIS and Geographical Analytics

**Combinatorial Optimization & Path Algorithms:** High Performance Computing on Big Data, Efficient Algorithms for Multi-Objective and Spatially Diverse Routing Problems

**Resource Management and Infrastructure Development:** Resource location and allocation for optimal performance and/or resiliency to climate change and other dynamic conditions. Spatial location of infrastructure design to optimize multi-criteria performance.

## **UNIVERSITY COMMITTEES**

Hiring Committee, Department of Computing Sciences, TAMUCC (2019–2020)  
Hiring Committee, Conrad Blucher Institute, TAMUCC (2019)  
Computer Committee, Department of Geography, UCSB (2011–2014)  
Events Committee, Department of Geography, UCSB (2008–2011)

## **JOURNAL REVIEWER**

*International Journal of Geographic Information Science*

*Transactions in GIS*

*Computers & Operations Research*

*Operations Research for Healthcare*

*Geographic Information Science & Technology Body of Knowledge*

*Networks and Spatial Economics*

*Geographical Analysis*

*Computers, Environment and Urban Systems*

*PLOS ONE*