

# Lydia Tapia

---

## CONTACT INFORMATION

1 University of New Mexico  
Department of Computer Science  
University of New Mexico  
Albuquerque, NM  
87131-0001 USA

*Voice:* (505) 277-0858  
*Fax:* (505) 277-6927  
*E-mail:* [tapia@cs.unm.edu](mailto:tapia@cs.unm.edu)  
*homepage:* [www.cs.unm.edu/~tapia](http://www.cs.unm.edu/~tapia)  
*Research WWW:* [www.cs.unm.edu/amprg](http://www.cs.unm.edu/amprg)

## RESEARCH INTERESTS

Motion Planning, Robotics, Computational Biology, Machine Learning, Artificial Intelligence, Virtual Reality

## EDUCATION

**Texas A&M University**, College Station, Texas

Ph.D., Computer Science, December 2009

- Thesis “Intelligent Motion Planning and Analysis with Roadmap Methods for the Study of Complex and High-Dimensional Motions”
- Advisor: Nancy M. Amato

**Tulane University**, New Orleans, Louisiana

B.S., Computer Science, May, 1998

- Thesis Topic: “The Role of Tulane University in Expanding The Shrinking Pipeline of Women in Engineering and Computer Science”
- Advisor: Johnette Hassell

## HONORS AND AWARDS

Faculty Research Award, University of New Mexico Faculty of Color Awards, 2012  
Computing Innovation Postdoctoral Fellow sponsored by the Computing Community Consortium (CCC) and the Computing Research Association (CRA), 2009, 2010  
Sloan Scholar, 2009  
National Science Foundation GRASSROOTS Fellow, 2009  
Texas A&M University Computer Science and Engineering Department Award for Leadership, 2009  
Philanthropic Educational Organization (P.E.O.) Scholar Award, 2008-2009  
Texas A&M NIH Molecular Biophysics Training Grant Fellow, 2006-2007  
US Department of Education GAANN Fellowship, 2000-2001, 2005-2006  
Center for Teaching Excellence Graduate Teaching Academy Fellow, 2006  
Coalition to Diversify Computing (CDC) Fellow, 2005  
Texas A&M University Women’s Progress Award, 2005  
Texas A&M University Women in Science and Engineering Ethel Ashworth-Tsutsui Memorial Award for Mentoring, 2004  
Texas A&M University Department of Computer Science Award for Mentoring, 2002  
Tulane University- Graduated Cum Laude/Honors in Computer Science, Dean’s Honor Scholar, 1998

## EXPERIENCE

**University of New Mexico**, Albuquerque, New Mexico

*Assistant Professor*

**January 2011-present**

Director of the Adaptive Motion Planning Research Group in the Computer Science Department at the University of New Mexico.

**University of Texas, Institute for Computational Engineering and Sciences**, Austin, Texas

*Computing Innovation Postdoctoral Fellow*

**November 2009-January 2011**

Postdoctoral research focused on the study of protein folding using both coarse-grained and fine-grained techniques. Research was supervised by Professor Ron Elber.

**Texas A&M University**, College Station, Texas

*Graduate Student*

**August 1999 - present**

Ph.D. research is focused on the use of intelligent motion planning techniques to aid in the study of complex, high-dimensional motion planning in protein folding and robotics. Published papers on feature-sensitive motion planning for robotics. Currently exploring intelligent techniques in the analysis of high-dimensional protein folding landscapes.

*Research Assistant*

**August 2007 - August 2008**

Research assistant for motion planning for protein folding and robotics.

*Teaching Assistant*

**August 2001 - April 2002**

Teaching Assistant for Artificial Intelligence. Graded Junior/Senior level assignments. Created assignments and aided in the creation of student exams. Organized and ran classes when needed.

**Computing Research Association**, Washington, DC

*Committee on the Status of Women in Computing Research (CRA-W)*

*Webmaster*

**May, 2003 - May, 2006**

Development and maintenance of webpages for all CRA-W programs. These programs serve to increase the number of women participating in Computer Science and Engineering research.

**Sandia National Laboratories**, Albuquerque, New Mexico

*Technical Research Staff*

**May, 1998 - August, 1999**

Contributed as team member to large scale research projects. Programmed voice recognition and text to speech software. Extended 3-D security visualization program. Presented team projects to large and small audiences.

PUBLICATIONS IN  
REFEREED  
JOURNALS AND  
CONFERENCES  
(\*INDICATES  
STUDENT ADVISEE  
OF TAPIA)

- [1] Nick Malone\*, Kasra Manavi\*, John Wood, Lydia Tapia, "Construction and Use of Roadmaps That Incorporate Workspace Modeling Errors," Accepted to the 2013 *IEEE International Conference on Intelligent Robots and Systems (IROS)*, Tokyo, Japan, November 2013. Acceptance rate = 43% (903/2089).
- [2] Kasra Manavi\*, Alan Kuntz\*, Lydia Tapia, "Geometrical Insights into the Process of Antibody Aggregation," Accepted to the *AAAI Workshop on Artificial Intelligence and Robotics Methods in Computational Biology (AIRMCB)*, Bellevue, WA, USA, July 2013. Acceptance rate unknown.
- [3] Aleksandra Faust\*, Ivana Palunko, Patricio Cruz, Rafael Fierro, Lydia Tapia, "Learning Swing-free Trajectories for UAVs with a Suspended Load," *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4881-4886, Karlsruhe, Germany, May 2013. Acceptance rate = 39% (883/2265).
- [4] Ivana Palunko, Aleksandra Faust\*, Patricio Cruz, Lydia Tapia, Rafael Fierro, "A Reinforcement Learning Approach to Suspended Load Manipulation with Aerial Robots," *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp.4887-4894, Karlsruhe, Germany, May 2013. Acceptance rate = 39% (883/2265).

- [5] Kasra Manavi\*, Bridget Wilson, Lydia Tapia, “Simulation and Analysis of Antibody Aggregation on Cell Surfaces Using Motion Planning and Graph Analysis,” *Proceedings of ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM BCB Short Presentation)*, pp.458-465, Orlando, FL, October 2012.  
Acceptance rate = 40% (64/159).
- [6] Troy McMahon, Sam Ade Jacobs, Bryan Boyd, Lydia Tapia, Nancy M. Amato, “Local Randomization in Neighbor Selection Improves PRM Roadmap Quality,” *Proceedings of IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp.4441-4448, Vilamoura, Portugal, October 2012.  
Acceptance rate = 45% (812/1801).
- [7] Nick Malone\*, Brandon Rohrer, Lydia Tapia, Ron Lumia, John Wood, “Implementation of an Embodied General Reinforcement Learner on a Serial Link Manipulator”, *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 862-869, St. Paul, Minnesota, May 2012.  
Acceptance rate = 40% (816/2040).
- [8] Lydia Tapia, Shawna Thomas, Nancy M. Amato, “A Motion Planning Approach to Studying Molecular Motions”, *Journal of Communications in Information and Systems*, Volume 10, Number 1, 53-68, 2010.
- [9] Lydia Tapia, Shawna Thomas, Bryan Boyd, Nancy M. Amato, “An Unsupervised Adaptive Strategy for Constructing Probabilistic Roadmaps”, Technical Report, TR08-004, Parasol Lab, Dept. of Computer Science, Texas A&M Univ., Sep 2008. *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4037-4044, Kobe, Japan, May 2009.  
Acceptance rate = 43% (699/1624).
- [10] Xinyu Tang, Shawna Thomas, Lydia Tapia, David Giedroc, Nancy M. Amato, “Simulating RNA Folding Kinetics on Approximated Energy Landscapes”, *Journal of Molecular Biology (JMB)*, 3811(4): 1055-1067, Sep 2008.
- [11] Lydia Tapia, Xinyu Tang, Shawna Thomas, Nancy M. Amato, “Kinetics Analysis Methods For Approximate Folding Landscapes”, In *International Conference on Intelligent Systems for Molecular Biology (ISMB)/European Conference on Computational Biology (ECCB)*, Vienna, Austria, Jul 2007. Published in *Bioinformatics*, 23(13): i539-i548, July 2007.  
Acceptance rate = 15% (66/418).
- [12] Xinyu Tang, Shawna Thomas, Lydia Tapia, Nancy M. Amato, “Tools for Simulating and Analyzing RNA Folding Kinetics”, In *Proceedings of International Conference on Research in Computational Molecular Biology (RECOMB)*, pp. 268-282, San Francisco, CA, Apr 2007.  
Acceptance rate = 22% (39/170).
- [13] Shawna Thomas, Xinyu Tang, Lydia Tapia, Nancy M. Amato, “Simulating Protein Motions with Rigidity Analysis”, *Journal of Computational Biology (JCB)*, 14(6): 839-855, July 2007. A preliminary version appeared in [12].
- [14] Shawna Thomas, Xinyu Tang, Lydia Tapia, Nancy M. Amato, “Simulating Protein Motions with Rigidity Analysis”, In *Proceedings of International Conference on Research in Computational Molecular Biology (RECOMB)*, pp. 294-409, Venice, Italy, Apr 2006.  
Acceptance rate = 18% (40/212).
- [15] Marco Morales, Lydia Tapia, Roger Pearce, Samuel Rodriguez, Nancy M. Amato, “C-space Subdivision and Integration in Feature Sensitive Motion Planning”, In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3125-3130, Barcelona, Spain, April 2005.  
Acceptance rate = 44% (750/1700).

- [16] Marco Morales, Lydia Tapia, Roger Pearce, Samuel Rodriguez, Nancy M. Amato, "A Machine Learning Approach for Feature-Sensitive Motion Planning", In *International Workshop on Algorithmic Foundations of Robotics (WAFR)*, Utrecht/Zeist, The Netherlands, Jul 2004. Published in M. Erdmann et al., editors, *Algorithmic Foundations of Robotics VI*, pp. 361-376, Zeist, Springer, 2005.  
Acceptance rate unknown.
- [17] Sharon Stansfield, Dan Shawver, Annette Sobel, Monica Prasad, Lydia Tapia, "Design and Implementation of a Virtual Reality System and Its Application to Training Medical First Responders", *Presence Teleoperators and Virtual Environments*, 9(6):524-556,2000.

SELECTED  
PRESENTATIONS  
(LAST 5 YEARS)

- [1] Lydia Tapia, "Computational Study of Molecular Motions in Immunological Proteins", Invited Talk at the *Computational Life Sciences and Biology (CLSB) Seminar*, University of Texas, December 2011.
- [2] Lydia Tapia, "Molecular Motion from Robotic Motion Planning", Invited Talk at the *Integrative Graduate Education and Research Traineeship (IGERT) in Integrating Nanotechnology with Cell Biology and Neuroscience Seminar*, University of New Mexico, October 2011.
- [3] John Baxter and Lydia Tapia, "Adaptive Motion Planning for Complex Planning Problems", Poster at the *Workshop on Progress and Open Problems in Motion Planning at the IEEE/RSJ International Conference on Intelligent Robots and Systems*, San Francisco, California, September 2011.
- [4] Lydia Tapia, "From Robots to Proteins: Intelligent Motion Planning and Analysis with Probabilistic Roadmaps", Invited talk at *Los Alamos National Laboratories*, Los Alamos, New Mexico, May 2010.
- [5] Lydia Tapia, "From Robots to Proteins: Intelligent Motion Planning and Analysis with Probabilistic Roadmaps", Invited talk at the *Cancer Research Facility at the University of New Mexico School of Medicine*, Albuquerque, New Mexico, May 2010.
- [6] Lydia Tapia, "From Robots to Proteins: Randomized Motion Planning for High-Dimensional Problems", Invited talk at the *Robotics: Science and Systems Conference*, Seattle, WA, June 2009.
- [7] Lydia Tapia, "From Robots to Proteins: Intelligent Motion Planning and Analysis with Probabilistic Roadmaps", Invited talk at the *Texas Protein Folder's Conference*, Camp Allen, TX, Apr 2009.
- [8] Lydia Tapia, "Analysis of Motion Landscapes", presentation at the *Richard Tapia Celebration of Diversity in Computing Conference* Doctoral Consortium, Portland, Oregon, Apr 2009.
- [9] Lydia Tapia, "Motion Landscapes: Approximation and Analysis", Presentation at the *Parasol Seminar, Department of Computer Science, Texas A&M University*. Also, presentation at *Computer Science Department, University of Illinois at Chicago*, April 2008. Also, presentation at *Computer Science and Software Engineering Department, Rose-Hulman Institute of Technology*, April 2008.
- [10] Lydia Tapia, Xinyu Tang, Shawna Thomas, Nancy M. Amato, "Kinetics Analysis Methods For Approximate Folding Landscapes", Poster at the *International Conference on Research in Computational Molecular Biology (RECOMB)*, San Francisco, CA, Apr 2007. Also, poster at the *Texas Protein Folders Meeting*, Camp Allen, Texas, Mar 2008.

COURSES  
TAUGHT

Graduate:

- CS 427 "Introduction to Artificial Intelligence", Fall 2012
- CS 464 "Introduction to Database Management", Spring 2011, Spring 2012, Spring 2013
- CS 591 "Planning Methods for Games, Robots, and Biomolecules", Fall 2011

Undergraduate:

- CS 527 “Principles of Artificially Intelligent Machines”, Fall 2012.
- CS 293 “Social and Ethical Issues in Computing”, Fall 2011
- CS 564 “Introduction to Database Management”, Spring 2011, Spring 2012, Spring 2013

RESEARCH GRANTS “Computational Study of Molecular Motions Involved in peptide, MHC, and TCR binding” NIH COBRE Center Subproject Grant (P20RR018754), *The National Institutes of Health*, PI: Locker, Subaward to: Tapia, subaward amount: \$855,000, subaward dates: 06/01/2011-05/31/2014.

STUDENTS

Doctoral:

- Mr. John Baxter, in progress.
- Ms. Aleksandra Faust, in progress. Awarded Sandia National Laboratories Doctoral Studies Program Fellowship, 2012-2014. Awarded New Mexico National Space Grant Consortium Fellowship, 2013-2014.
- Mr. Nicholas Malone, in progress.
- Mr. Kasra Manavi, in progress. Awarded UNM Program in Interdisciplinary Biological & Biomedical Sciences Fellowship, 2013-2014.

Masters:

- Mr. Torin Adamson, in progress.

Undergraduate:

- Mr. Alan Kuntz, UNM Computer Science Major, Summer 2012 - present. Awarded Computing Research Association Outstanding Undergraduate Researchers Award Honorable Mention, 2013.
- Ms. Erica Lopez, Participant in Computing Research Association’s Distributed Research Experiences for Undergraduates (DREU) Program, Undergraduate Researcher, Summer 2013.
- Ms. Molly Salman, Participant in Computing Research Association’s Distributed Research Experiences for Undergraduates (DREU) Program, Undergraduate Researcher, Summer 2013.

Alumni:

- Ella Algermissen, Bosque School (High school student), Summer 2012.
- Mr. Logan Crowley, University of Maryland University College Computer Science Major, Undergraduate Researcher, Summer 2012.
- Mr. Anthony Hickerson, UNM Computer Science Major, Undergraduate Researcher, May 2011-December 2012.
- Ms. Andrea Howells, Participant in Computing Research Association’s Distributed Research Experiences for Undergraduates (DREU) Program, Undergraduate Researcher, Summer 2011.
- Ms. Rachel Webster, Participant in Computing Research Association’s Distributed Research Experiences for Undergraduates (DREU) Program, Undergraduate Researcher, Summer 2011.

ACADEMIC SERVICE AND ACTIVITIES **CS Department Lobo Women in Computer Science, Faculty Advisor**, 2013.

Advised women graduate students about internship, career, and research opportunities.

**Grace Hopper Celebration of Women in Computing Conference**, 2013.

Co-organizing the “Navigating the Academic Job Search” panel. Conference to be held October 2013.

**Associate Editor, IEEE IROS Conference**, 2012, 2013.

Served as associate editor for the 2012, 2013 IEEE International Conference on Intelligent Robots and Systems (IROS 2012, 2013).

**CS Department Job Hunting Group, Faculty Advisor**, 2011-2012.

Advised graduate students about academic and industry job searches.

**CS@UNM Brown Bag Lunch Series, Organizer**, Summer 2011.

Organized weekly lunches for undergraduates and early graduate students on topics about graduate school.

**Computational Biology Workshop Co-organizer, 2010.**

Co-organized the “Computational Biology Workshop at the 2010 SIAM Conference on Discrete Mathematics in Austin, TX, June 2010.

**Grace Hopper Celebration of Women in Computing Committee Member, 2007-2010.**

Member of scholarship committee for the Grace Hopper Celebration of Women in Computing Conference.

**Robotics Science and Systems Workshop, 2009.**

Co-organized “Protein Structure, Kinematics, and Motion Planning” workshop held in Seattle Washington, June 2009.

**Richard Tapia Celebration of Diversity in Computing Conference, 2009.**

Organizing “Steps to a PhD: A Student’s Perspective” panel. Conference to be held in Portland, Oregon, April 2009.

**Reviewer for Scientific Conferences and Journals, ongoing.**

Reviewer for IEEE International Conference on Robotics and Automation (ICRA), International Journal of Robotics Research , IEEE/ACM Transactions on Computational Biology and Bioinformatics, International Conference on Intelligent Robots and Systems (IROS).