

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
Homepage: www.cs.unm.edu/~tapia
Research webpage: tapialab.science

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

RECENT HONORS AND AWARDS

Distinguished Alumni, Texas A&M University, Computer Science and Computer Engineering Department, 2019

Best Paper in Service Robotics, IEEE International Conference on Robotics and Automation (ICRA), 2018

Computing Research Association Borg Early Career Award, 2017

National Science Foundation CAREER Award, 2016

Denice Denton Emerging Leader Award, Anita Borg Institute for Women and Technology, 2015

Senior Member, The Institute of Electrical and Electronics Engineers (IEEE), 2015

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

SELECTED RECENT PRESS

February 2019, “Long-Range Robotic Navigation via Automated Reinforcement Learning,” published in the Google AI Blog about easy-to-adapt robotic autonomy by combining deep RL with long-range planning.

September 2018, “Google suggests all software could use a little robot AI,” Associated Press article originally published at ZDNet about a paper that demonstrates software development with robustness through Artificial Intelligence.

September 2018, “UNM receives substantial grant from Google,” article published in the Daily Lobo about a Google Gift to PI Tapia.

October 2016, “UNM students create computer bots that talk,” news story from KRQE News about my Artificial Intelligence Class.

EXPERIENCE

Google, Mountain View, California

Faculty in Residence

June 2018

Worked with Engineering Education (EngEdu) and fostered collaboration with Google Brain Robotics.

University of New Mexico, Computer Science Department, Albuquerque, New Mexico

Associate Professor

June 2017 - present

Assistant Professor

January 2011 - 2017

Director of the Tapia Lab Research Group.

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

Computing Innovation Postdoctoral Fellow

November 2009 - January 2011

Studied protein folding using both coarse-grained and all-atom techniques. Research supervised by Professor Ron Elber.

Texas A&M University, College Station, Texas

Graduate Student

August 1999 - December 2009

Ph.D. research 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.

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

Developed and maintained 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.

PUBLICATIONS IN
REFEREED
JOURNALS
(*INDICATES
ADVISEE OF TAPIA)

- [1] Hao-Tien Chiang*, Jasmine Hsu, Marek Fiser, Lydia Tapia, Aleksandra Faust, "RL-RRT: Kinodynamic Motion Planning via Learning Reachability Estimators from RL Policies," *IEEE Robotics and Automation Letters*, 3(3), 4298–4305, 2019.
- [2] Hao-Tien Chiang* and Lydia Tapia, "COLREG-RRT: A RRT-based COLREGS-Compliant Motion Planner for Surface Vehicle Navigation," *IEEE Robotics and Automation Letters*, 3(3), 2024–2031, 2018.
- [3] Nicholas Malone*, Hao-Tien Chiang*, Kendra Lesser, Meeko Oishi, Lydia Tapia, "Hybrid Dynamic Moving Obstacle Avoidance Using a Stochastic Reachable Set-Based Potential Field," *IEEE Transactions on Robotics*, 33(5), 1124–1138, 2017.
- [4] Avani Mahajan, Lama A. Youssef, Cedric Cleyrat, Rachel Grattan, Shayna R. Lucero, Christopher P. Mattison, M. Frank Erasmus, Bruna Jacobson*, Lydia Tapia, William S. Hlavacek, Mark Schuyler, Bridget S. Wilson, "Allergen Valency, Dose, and FcεRI Occupancy Set Thresholds for Secretory Responses to Pen a 1 and Motivate Design of Hypoallergens," *The Journal of Immunology*, 198(3), 1034–1046, 2017.
- [5] Aleksandra Faust*, Ivana Palunko, Patricio Cruz, Rafael Fierro, Lydia Tapia, "Aerial Suspended Cargo Delivery through Reinforcement Learning," *Artificial Intelligence Journal Special Issue on Learning and Robotics*, 247, 381–398, 2017.
- [6] Brittany Hoard*, Bruna Jacobson*, Kasra Manavi*, Lydia Tapia, "Extending Rule-Based Methods to Model Molecular Geometry," *BMC Systems Biology Journal*, 10(2), 121–138, Aug 2016.

- [7] Kasra Manavi*, Bruna Jacobson*, Brittany Hoard*, Lydia Tapia, “Influence of Model Resolution on Geometric Simulations of Antibody Aggregation,” *Robotica Journal* Special Issue on Robotics Methods for Structural and Dynamics Modeling of Molecular Systems, 34(8), 1754–1776, May 2016.
- [8] Aleksandra Faust*, Peter Ruymgaart*, Molly Salman*, Rafael Fierro, Lydia Tapia, “Continuous Action Reinforcement Learning for Control-Affine Systems with Unknown Dynamics,” *IEEE/CAA Journal of Automatica Sinica* Special Issue on Extensions of Reinforcement Learning and Adaptive Control, 1(3), 323–336, July 2014.
- [9] Nicholas Malone*, Aleksandra Faust*, Brandon Rohrer, John Wood, Lydia Tapia, “Efficient Motion-based Task Learning for a Serial Link Manipulator,” *Transactions on Control and Mechanical Systems Journal*, 3(1), 25–35, Jan 2014.
- [10] Lydia Tapia, Shawna Thomas, Nancy M. Amato, “A Motion Planning Approach to Studying Molecular Motions,” *Journal of Communications in Information and Systems*, 10(1), 53–68, 2010.
- [11] 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.
- [12] 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.
- [13] Lydia Tapia, Xinyu Tang, Shawna Thomas, Nancy M. Amato, “Kinetics Analysis Methods for Approximate Folding Landscapes,” *Bioinformatics*, 23(13): i539–i548, July 2007.
- [14] 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, Dec 2000.

PUBLICATIONS IN
 REFEREED
 CONFERENCES
 (*INDICATES
 ADVISEE OF TAPIA)

- [15] Arpit Garg*, Lewis Chiang*, Satomi Sugaya*, Lydia Tapia, “Comparison of Deep Reinforcement Learning Policies to Formal Methods for Moving Obstacle Avoidance,” In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, to appear, Macau, China, Nov 2019.
- [16] Anna Chavez*, Torin Adamson*, Lydia Tapia, Bruna Jacobson, “A Mobile Game for Crowdsourced Molecular Docking Pathways,” In *Proceedings of the ACM SIGGRAPH Motion in Games (MIG)*, to appear, Newcastle on Tyne, United Kingdom, Oct 2019.
- [17] Lewis Chiang*, Aleksandra Faust, Satomi Sugaya*, Lydia Tapia, “Deep Neural Networks for Swept Volume Prediction,” In *International Workshop on Algorithmic Foundations of Robotics (WAFR)*, to appear, Merida, Mexico, Dec 2018. To be published in Algorithmic Foundations of Robotics XIII, Zeist, Springer, 2019.
- [18] Aleksandra Faust, James Bradley Aimone, Conrad James, Lydia Tapia, “Resilient Computing with Reinforcement Learning on a Dynamical System: Case Study in Sorting,” In *IEEE Conference on Decision and Control*, pp. 5999–6006, Miami, FL, Dec 2018.
- [19] Aleksandra Faust, Oscar Ramirez, Marek Fiser, Kenneth Oslund, Anthony Francis, James Davidson, Lydia Tapia, “PRM-RL: Long-range Robotic Navigation Tasks by Combining Reinforcement Learning and Sampling-based Planning,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 5113–5120, Brisbane, Australia, May 2018. **Selected as Best Paper in Service Robotics out of 2500 accepted papers**
- [20] Hao-Tien Chiang*, Baisravan HomChaudhri*, Lee Smith*, Lydia Tapia, “Safety, Challenges, and Performance of Motion Planners in Dynamic Environments,” In *Proceedings of International Symposium on Robotics Research (ISRR)*, pp. 1–16, Puerto Varas, Chile, Dec 2017.

- [21] Torin Adamson*, Meeko Oishi, Hao-Tien Chiang*, Lydia Tapia, “Busy Beeway: A Game for Testing Human-Automation Collaboration for Navigation,” In *Proceedings of the ACM SIGGRAPH Motion in Games (MIG)*, pp. 9:1–9:6, Barcelona, Spain, Nov 2017.
- [22] Hao-Tien Chiang*, Baisravan HomChaudhri*, Abraham P. Vinod, Meeko Oishi, Lydia Tapia, “Dynamic Risk Tolerance: Motion Planning by Balancing Short-Term and Long-Term Stochastic Dynamic Predictions,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3762–3769, Marina Bay Sands, Singapore, May 2017.
- [23] Hao-Tien Chiang*, Nathanael Rackley*, Lydia Tapia, “Runtime SES Planning: Online Motion Planning in Environments with Stochastic Dynamics and Uncertainty,” In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 4802–4809, Daejeon, South Korea, Oct 2016.
- [24] Aleksandra Faust*, Hao-Tien Chiang*, Nathanael Rackley*, Lydia Tapia, “Avoiding Moving Obstacles with Stochastic Hybrid Dynamics using PEARL: PrEference Appraisal Reinforcement Learning,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 484–490, Stockholm, Sweden, May 2016.
- [25] Brittany Hoard*, Bruna Jacobson*, Kasra Manavi*, Lydia Tapia, “Extending Rule-Based Methods to Model Molecular Geometry,” In *Proceedings of IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, pp. 587–594, Washington D.C., USA, Nov 2015.
- [26] Hao-Tien Chiang*, Nathanael Rackley*, Lydia Tapia, “Stochastic Ensemble Simulation Motion Planning in Stochastic Dynamic Environments,” In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 3836–3843, Hamburg, Germany, Sept 2015.
- [27] Aleksandra Faust*, Nicholas Malone*, Lydia Tapia, “Preference-balancing Motion Planning under Stochastic Disturbances,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3555–3562, Seattle, Washington, May 2015.
- [28] Hao-Tien Chiang*, Nicholas Malone*, Kendra Lesser, Meeko Oishi, Lydia Tapia, “Path-Guided Artificial Potential Fields with Stochastic Reachable Sets for Motion Planning in Highly Dynamic Environments,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp.2347–2354, Seattle, Washington, May 2015.
- [29] Hao-Tien Chiang*, Nicholas Malone*, Kendra Lesser, Meeko Oishi, Lydia Tapia, “Aggressive Moving Obstacle Avoidance Using a Stochastic Reachable Set Based Potential Field,” In *International Workshop on Algorithmic Foundations of Robotics (WAFR)*, Istanbul, Turkey, Aug 2014. Published in H. Akin et al., editors, *Algorithmic Foundations of Robotics XI*, pp. 73–90, Zeist, Springer, 2015.
- [30] Torin Adamson*, John Baxter*, Kasra Manavi*, April Suknot, Bruna Jacobson*, Patrick Kelley, Lydia Tapia, “Molecular Tetris: Crowdsourcing Molecular Docking Using Path Planning and Haptic Devices,” In *Proceedings of the ACM SIGGRAPH Motion in Games (MIG)*, pp. 133–138, Los Angeles, CA, Nov 2014.
- [31] Rafael Figueroa, Aleksandra Faust*, Patricio Cruz, Lydia Tapia, and Rafael Fierro, “Reinforcement Learning for Balancing a Flying Inverted Pendulum,” In *Proceedings of the 11th World Congress on Intelligent Control and Automation (WCICA)*, pp. 1787–1793, Shenyang, China, June 2014.
- [32] Nicholas Malone*, Kendra Lesser, Meeko Oishi, Lydia Tapia, “Stochastic Reachability Based Motion Planning for Multiple Moving Obstacle Avoidance,” In *Proceedings of the ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, pp. 51–60, Berlin, Germany, Apr, 2014.

- [33] Nicholas Malone*, Kasra Manavi*, John Wood, Lydia Tapia, “Construction and Use of Roadmaps That Incorporate Workspace Modeling Errors,” In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 1264–1271, Tokyo, Japan, Nov 2013.
- [34] Aleksandra Faust*, Ivana Palunko, Patricio Cruz, Rafael Fierro, Lydia Tapia, “Learning Swing-free Trajectories for UAVs with a Suspended Load,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4881–4886, Karlsruhe, Germany, May 2013.
- [35] Ivana Palunko, Aleksandra Faust*, Patricio Cruz, Lydia Tapia, Rafael Fierro, “A Reinforcement Learning Approach to Suspended Load Manipulation with Aerial Robots,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4887–4894, Karlsruhe, Germany, May 2013.
- [36] Kasra Manavi*, Bridget Wilson, Lydia Tapia, “Simulation and Analysis of Antibody Aggregation on Cell Surfaces Using Motion Planning and Graph Analysis,” In *Proceedings of ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM BCB Short Presentation)*, pp. 458–465, Orlando, FL, Oct 2012.
- [37] Troy McMahon, Sam Ade Jacobs, Bryan Boyd, Lydia Tapia, Nancy M. Amato, “Local Randomization in Neighbor Selection Improves PRM Roadmap Quality,” In *Proceedings of IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 4441–4448, Vilamoura, Portugal, Oct 2012.
- [38] Nick Malone*, Brandon Rohrer, Lydia Tapia, Ron Lumia, John Wood, “Implementation of an Embodied General Reinforcement Learner on a Serial Link Manipulator,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 862–869, St. Paul, Minnesota, May 2012.
- [39] Lydia Tapia, Shawna Thomas, Bryan Boyd, Nancy M. Amato, “An Unsupervised Adaptive Strategy for Constructing Probabilistic Roadmaps,” In *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4037–4044, Kobe, Japan, May 2009.
- [40] Lydia Tapia, Xinyu Tang, Shawna Thomas, Nancy M. Amato, “Kinetics Analysis Methods For Approximate Folding Landscapes,” In *Proceedings of International Conference on Intelligent Systems for Molecular Biology (ISMB)/European Conference on Computational Biology (ECCB)*, Vienna, Austria, July 2007.
- [41] 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.
- [42] 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.
- [43] 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, Apr 2005.
- [44] 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, July 2004. Published in M. Erdmann et al., editors, *Algorithmic Foundations of Robotics VI*, pp. 361–376, Zeist, Springer, 2005.

PUBLICATIONS IN
REFEREED
WORKSHOPS
(*INDICATES
ADVISEE OF TAPIA)

- [45] Torin Adamson*, Julian Antolin Camarena, Lydia Tapia, and Bruna Jacobson “Optimizing Low Energy Pathways in Receptor-Ligand Binding with Motion Planning,” In *Proceedings of the International Workshop on Biological Network Analysis and Integrative Graph-Based Approaches (IWBNA).*, *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, San Diego, California, Nov 2019.
- [46] Lewis Chiang*, Aleksandra Faust, Lydia Tapia, “Deep Neural Networks for Swept Volume Prediction Between Configurations,” In *Proceedings of the Third Workshop on Machine Learning in Planning and Control of Robot Motion Workshop (MLPC 18)*, *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, May 2018.
- [47] Kasra Manavi*, Sahba Tashakkori*, Lydia Tapia, “Gaussian Mixture Models with Constrained Flexibility for Fitting Tomographic Tilt Series,” Computational Structural Bioinformatics Workshop In *Proceedings of the 8th ACM International Conference on Bioinformatics, Computational Biology (ACM-BCB)*, Boston, Massachusetts, pp. 710–715, Aug 2017.
- [48] Bruna Jacobson, Jon Christian L. David*, Mitchell C. Malone*, Kasra Manavi*, Susan R. Atlas, Lydia Tapia, “Geometric Sampling Framework for Exploring Molecular Walker Energetics and Dynamics,” Computational Structural Bioinformatics Workshop In *Proceedings of the 8th ACM International Conference on Bioinformatics, Computational Biology (ACM-BCB)*, Boston, Massachusetts, pp. 704–709, Aug 2017.
- [49] Aleksandra Faust*, Hao-Tien Chiang*, Nathanael Rackley*, Lydia Tapia, “Dynamic Obstacle Avoidance with PEARL: PReference Appraisal Reinforcement Learning,” In *Proceedings of the Workshop on Machine Learning in Planning and Control of Robot Motion Workshop (MLPC)*, *IEEE International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, Sept 2015.
- [50] Aleksandra Faust*, Nick Malone*, Lydia Tapia, “Planning Preference-balancing Motions with Stochastic Disturbances,” In *Proceedings of the Workshop on Machine Learning in Planning and Control of Robot Motion Workshop (MLPC)*, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, USA, Sept 2014.
- [51] Torin Adamson*, John Baxter*, Kasra Manavi*, Bruna Jacobson*, Lydia Tapia, “Crowd-sourced Molecular Docking Using Path-Planning and Haptic Devices,” In *Proceedings of the Workshop on Robotics Methods for Structural and Dynamic Modeling of Molecular Systems (RMMS)*, *Robotics Science and Systems (RSS)*, Berkeley, CA, USA, July 2014.
- [52] Kasra Manavi*, Lydia Tapia, “Influence of Model Resolution on Antibody Aggregation Simulations,” In *Proceedings of the Workshop on Robotics Methods for Structural and Dynamic Modeling of Molecular Systems (RMMS)*, *Robotics Science and systems (RSS)*, Berkeley, CA, USA, July 2014.
- [53] Kasra Manavi*, Alan Kuntz*, Lydia Tapia, “Geometrical Insights into the Process of Antibody Aggregation,” In *Proceedings of the AAAI Workshop on Artificial Intelligence and Robotics Methods in Computational Biology (AIRMCB)*, pp. 26-31, Bellevue, WA, USA, July 2013.
- [54] Shawna Thomas, Lydia Tapia, Chinwe Ekenka, Hsin-Yi (Cindy) Yeh, Nancy M. Amato, “Rigidity Analysis for Protein Motion and Folding Core Identification,” In *Proceedings of the AAAI Workshop on Artificial Intelligence and Robotics Methods in Computational Biology (AIRMCB)*, pp. 38-43, Bellevue, WA, USA, July 2013.
- [55] Nick Malone*, Aleksandra Faust*, Brandon Rohrer, John Wood, Lydia Tapia, “Efficient Motion-based Task Learning,” In *Proceedings of the Robot Motion Planning Online, Reactive, and in Real-time Workshop*, *IEEE International Conference on Intelligent Robots and Systems (IROS)*, Vilamoura, Portugal, Oct 2012.

SELECTED
PRESENTATIONS
(LAST 5 YEARS)

- [1] Lydia Tapia, “Motion Planning Under Uncertain Conditions,” Keynote Talk at the IEEE International Conference on Robotics and Automation (ICRA) Workshop on Algorithms and Architectures for Learning in-the-Loop Systems in Autonomous Flight, Montreal, Canada, May 2019.

- [2] Lydia Tapia, “How Safe Can You Go: Motion Planning with Stochastic Moving Obstacles,” Invited Talk at the *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* Workshop on Crowd Navigation (CrowdNav), Madrid, Spain, October 2018.
- [3] Lydia Tapia, “Hispanics and Native Americans in Computer Science: Patterns, Pressures, and Programs,” Invited Talk at the *National Academies of Sciences* Roundtable on Post-Secondary Data Science Education, Atlanta, GA, Sept 2018.
- [4] Lydia Tapia, “Robotics Inspired Methods for Modeling Molecular Motion: From Molecular Docking to Antibody Assembly,” Invited Talk at *Carnegie Mellon University School of Computer Science*, Pittsburgh, PA, Mar 2018.
- [5] Bruna D. Jacobson, Kasra Manavi, Susan R. Atlas, and Lydia Tapia, “Impact of Structural and Dynamical Complexity on Kinesin Kinetics,” Poster at the *Biophysical Society Annual Meeting (BPS)*, Baltimore, Maryland, Feb 2015. *Biophysical Journal* 108, no. 2 (2015): 138a-139a.
- [6] Bridget Wilson, Avanika Mahajan, Diane Lidke, Chang-Shung Tung, Kasra Manavi, Lydia Tapia, Andrew Bradbury, and William Hlavacek, “Structure-Function Relationships That Govern FcεRI Signaling by Allergens,” Talk at the *American Association of Immunologists Annual Meeting (IMMUNOLOGY)*, Pittsburgh, Pennsylvania, May 2014. *The Journal of Immunology* 192.1 Supplement (2014): 54-2.
- [7] Lydia Tapia, “Automated Aerial Suspended Cargo Delivery through Reinforcement Learning and Robotic Motion Planning,” Invited Talk at the *Air Force Research Laboratory*, Kirtland Air Force Base, June 2014.

PATENTS

(*INDICATES
ADVISEE OF TAPIA)

“Autonomous Defensive Escort Teams” U.S. Provisional Patent filed, Inventors: Lydia Tapia, Arpit Garg*, 7/2017.

“Redundant Component and Intelligent Computerized Control System for Multi-rotor VTOL Aircraft,” U.S. Patent issued: 9,828,107 Inventors: Peter Ruyngaert*, Lydia Tapia, Aleksandra Faust*, Rafael Fierro, 11/2017.

“Gaussian Mixture Models for Fitting Tomographic Tilt Series” U.S. Provisional Patent filed, Inventors: Lydia Tapia, Kasra Manavi*, Bridget Wilson, and Niels Volkmann, 7/2017.

“Methods and Compositions Involving Recombinant Hypoallergens,” U.S. Patent filed, Inventors: Bridget Wilson, Avanika Mahajan, Mark Schuyler, Lydia Tapia, and Diane Lidke, 9/2015.

RESEARCH GRANTS

“Studying Human Agent Teaming Through Games,” ARL (W911NF1920215), *US Army Research Laboratory*, PI: Lydia Tapia, award amount: \$440,000, award dates: 7/2019-7/2021.

“Becoming a Robot Guru Workshop and Continued Mentoring: Attracting Women to Graduate School Through Robotics Research,” Google Explore Computer Science Research Gift, *Google*, PI: Lydia Tapia, CoPIs: Aleksandra Faust and Nancy Amato, gift amount (all to UNM): \$35,000, gift date: 09/2018.

“Agile Manufacturing for High Value, Low Volume Production,” AFRL (FA9453-18-2-0022), *US Air Force Research Laboratory*, PI: Rafael Fierro, Lead CoPIs: Mahmoud Taha, Lydia Tapia, John Wood, and Yin Yang, CoPIs: Christos Christodoulou, Ron Lumia, Asal Naseri, Meeko Oishi, Mehran Tehrani, award amount: \$6,677,080, award dates: 5/2018-5/2023.

“III: Small: Facilitating Search in the High-Dimensional Space of Molecular Interactions,” NSF III Core Programs (III-1716195), *National Science Foundation*, PI: Bruna Jacobson, CoPI: Lydia Tapia, award amount: \$507,956.00, award dates: 9/2017-8/2020.

“Student Mentoring Workshop on Robotics 2,” Computing Research Association Discipline-specific Workshop Student Travel Grant, *Computing Research Association funded by the National Science*

Foundation, PI: Lydia Tapia, CoPIs: Aleksandra Faust and Meeko Oishi, award amount: \$20,000, award dates: 1/2016-7/2016.

“CAREER: Modeling and Analyzing High-Dimensional Molecular Assembly: Quantifying the Impact of Allergen Structure,” NSF CAREER Award Grant (IIS-1553266), *The National Science Foundation*, PI: Lydia Tapia, award amount: \$551,499, award dates: 7/2016-6/2021.

“NRI: Planning, Collaborative Guidance and Navigation in Uncertain Dynamic Environments,” NSF National Robotics Initiative Grant (IIS-1528047), *The National Science Foundation*, PI: Lydia Tapia, CoPIs: Meeko Oishi and Patrick Kelley, award amount: \$999,998, award dates: 9/2015-8/2018.

“AF: Large: Collaborative Research: Molecular computing for the real world,” NSF Large Collaborative Algorithmic Foundations Core Program (CCF-1518861), *The National Science Foundation*, PI: Darko Stefanovic (UNM), CoPIs: Matthew Lakin (UNM), Lydia Tapia (UNM), Steven Graves (UNM), Christopher Teuscher (Portland State University), Milan Stojanovic (Columbia University), and Sergei Rudchenko (Hospital For Special Surgery) award amount: \$2,000,000 (\$934,358 to UNM), award dates: 9/2015-8/2020.

“Student Mentoring Workshop on Robotics,” Computing Research Association Discipline-specific Workshop Student Travel Grant, *Computing Research Association funded by the National Science Foundation*, PI: Lydia Tapia, CoPIs: Cindy Bethel, Aleksandra Faust, Hanna Kurniawati, and Melanie Moses, award amount: \$21,000, award dates: 8/2014-7/2015.

“Center for Spatiotemporal Modeling of Cell Signaling,” NIH National Centers for Systems Biology Grant (5P50GM085273-07), *The National Institutes of Health*, PI: Wilson, Project subaward to: Lydia Tapia, subaward amount: \$198,470, subaward dates: 7/2014-6/2019.

“MRI: Acquisition of a GPU-Accelerated Parallel Supercomputer for Computational Science and Engineering Research at the University of New Mexico,” NSF Major Research Instrumentation Program Grant (ACI-1040530), *The National Science Foundation*, PI: Susan Atlas, CoPIs: Hua Guo, Lydia Tapia, and Timothy Thomas, award amount: \$435,077, award dates: 9/2010-8/2015.

“Computational Study of Molecular Motions Involved in peptide, MHC, and TCR binding” NIH COBRE Center Subproject Grant (P20RR018754), *The National Institutes of Health*, PI: Sam Locker, Subaward to: Lydia Tapia, subaward amount: \$854,059, subaward dates: 6/2011-5/2015.

COURSES TAUGHT

Graduate:

- CS 592 “Colloquium,” Fall 2015, Spring 2016, Fall 2016
- CS 527 “Principles of Artificially Intelligent Machines,” Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Spring 2019, Fall 2019
- CS 591 “Advanced Artificial Intelligence,” Spring 2015
- CS 591 “Planning Methods for Games, Robots, and Biomolecules,” Fall 2011
- CS 564 “Introduction to Database Management,” Spring 2011, Spring 2012, Spring 2013

Undergraduate:

- CS 259 “Data Structures with Java,” Fall 2018
- CS 427 “Introduction to Artificial Intelligence,” Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Spring 2019, Fall 2019
- CS 464 “Introduction to Database Management,” Spring 2011, Spring 2012, Spring 2013
- CS 293 “Social and Ethical Issues in Computing,” Fall 2011

RESEARCH ADVISEES

• Alumni:

Postdoc:

- Dr. Baisravan HomChaudhri, Ph.D. from U. of Cincinnati, 2015-2017. First Position: Assistant Professor at Illinois Institute of Technology. (Primary advisor: Meeko Oishi.)

- Dr. Bruna Jacobson, Ph.D. from U. of Southern California, 2014-2017. First Position: Research Assistant Professor at University of New Mexico.
- Dr. A. Peter Ruymgaart, Ph.D. from U. Texas at Austin, 2013-2014. First Position: Manager of Technology Development at Thermon Manufacturing Company.

PhD:

- Dr. Aleksandra Faust, Ph.D. in Computer Science from UNM, 2014. Awarded Sandia National Laboratories Doctoral Studies Program Fellowship, 2012-2014. Awarded New Mexico National Space Grant Consortium Fellowship, 2013-2014. Awarded Graduation Distinction. Awarded UNM Popejoy Award, top dissertation in all STEM fields over a three year period, 2015. First Position: Senior Research Technical Staff at Sandia National Laboratories. Current Position: Google Brain.
- Dr. Nicholas Malone, Ph.D. in Computer Science from UNM, 2015. Awarded Graduation Distinction. Current Position: Research Staff at Tau Technologies.
- Mr. Kasra Manavi, Ph.D. in Computer Science from UNM, 2018. Awarded UNM Program in Interdisciplinary Biological & Biomedical Sciences Fellowship, 2013-2015. Current Position: Postdoctoral Fellow, Simtable.

Other (in summary: 2 MS thesis, 13 undergraduates, and 4 high school students):

- Ms. Ella Algermissen, Bosque School (high school student), Summer 2012.
- Mr. John Baxter, MS 2015.
- Mr. Logan Crowley, University of Maryland University College Computer Science Major, Summer 2012.
- Ms. Elena Delgado, BS Biochemistry 2018. First position: PhD student in Computer Science at the University of New Mexico.
- Mr. Anthony Hickerson, Undergraduate in Computer Science at UNM, May 2011-December 2012.
- Ms. Brittany Hoard, MS Thesis (Distinction) in Nanoscience and Microsystems Program, December 2015.
- Ms. Andrea Howells, Undergraduate in Computer Science at State University of New York at Plattsburgh, Summer 2011. Participant in Computing Research Association's Distributed Research Experiences for Undergraduates (DREU) Program.
- Mr. Elijah Jaffe, East Mountain High School, Summer 2014.
- Mr. Alan Kuntz, Undergraduate in Computer Science at UNM, Summer 2012 - 2014. Awarded Computing Research Association Outstanding Undergraduate Researchers Award Finalist (Third place), 2014 and Honorable Mention, 2013. First Position: Ph.D. Student at University of North Carolina Chapel Hill.
- Frederick Lee, University of New Mexico Computer Science Major, Summer 2016.
- Mr. Marcos Lemus, University of New Mexico Computer Science Major, Summer 2015.
- Ms. Erica Lopez, Undergraduate in Computer Science at UNM, Summer 2013. Participant in Computing Research Association's Distributed Research Experiences for Undergraduates (DREU) Program.
- Ms. Amanda Miner, Sandia Prep High School, Summer 2014. Awarded Runner-Up in the national 2014-2015 National Center for Women & Information Technology Aspirations in Computing competition.
- Ms. Molly Salman, Undergraduate in Math at Austin College, Summer 2013. Participant in Computing Research Association's Distributed Research Experiences for Undergraduates (DREU) Program.
- Ms. Valarie Sheffey, BS in Computer Science at University of New Mexico, 2016-2017. First position: Software Engineer at Facebook.
- Mr. Lee Smith, Undergraduate in Computer Engineering at University of New Mexico, 2016-2018.
- Mr. Jonah Spear, Highland High School, Summer 2014.
- Mr. Sahba Tashakori, BS Computer Science at the University of New Mexico, 2017-2018. First position: PhD student at Duke University.
- Ms. Rachel Webster, Undergraduate in Computer Science at Lewis and Clarke, Summer 2011. Participant in Computing Research Association's Distributed Research Experiences for Undergraduates (DREU) Program.

- **Current:**

Doctoral:

- Mr. Torin Adamson.
- Mr. John Baxter.
- Mr. Hao-Tien 'Lewis' Chiang.
- Mr. Jon David.
- Ms. Elena Delgado.
- Mr. Yazied Hasan
- Mr. Mohammad 'Rashid' Yousefi.

Masters:

- Mr. Arpit Garg.
- Mr. Michael Smith.

Undergraduate:

- Anna Carey, Computer Science Senior.
- Micaiah 'Kage' Weiss, Computer Science Senior.

INTERNATIONAL
ACADEMIC SERVICE
AND ACTIVITIES

Workshop on the Algorithmic Foundations of Robotics (WAFR), Chair, 2018.

Co-Chair for the thirteenth WAFR Conference in Merida, Mexico, Dec 2018. Editor of Proceedings to be published in the Springer Proceedings in Advanced Robotics book series.

IEEE Robotics and Automation Society Technical Committee on Algorithms for Planning and Control of Robot Motion, Co-Chair, 2015-2018.

Becoming a Robot Guru 3: Integrating Science, Engineering and Creativity Workshop, Lead Organizer, 2018.

Lead organizer for a broadening participation in computing workshop at the 2018 WAFR Conference in Merida Mexico. Awarded budget of \$35,000 from Google to fund the workshop.

Grace Hopper Celebration of Women in Computing Conference, Invited Speaker 2018.

Invited speaker for Computing Research Association Session Track in Houston, TX, Sept, 2018.

Third Machine Learning in Planning and Control of Robot Motion Workshop, Organizer, 2018.

Co-organized the Third Machine Learning in Planning and Control (MLPC) of Robot Motion Workshop at the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems Conference (IROS) in Brisbane, Australia, May 2018.

Becoming a Robot Guru 2: Integrating Science, Engineering and Creativity Workshop, Lead Organizer, 2016.

Lead organizer for a broadening participation in computing workshop at the 2016 Robotics: Science and Systems Conference (RSS) in Ann Arbor, MI, June 2016. Awarded budget of \$20,000 from the Computing Research Association Committee on the Status of Women in Research and the Coalition to Diversify Computing to fund student travel awards to the workshop.

Denice Denton Emerging Leaders Workshop Steering Committee Member, professional development workshop in 2016.

Robotics Science and Systems Conference (RSS) Organizing Committee Member, Co-Chair of Workshops at RSS 2016.

Robotica Special Issue on Robotics Methods for Structural and Dynamic Modeling of Molecular Systems, Guest Editor, 2016.

Lead Guest Editor for the special issue that published papers integrating concepts from molecular modeling and robotics. Special issue published in May 2016.

Robotics and Automation Letters Journal, Associate Editor, 2015-2018.

Machine Learning in Planning and Control of Robot Motion Workshop, Organizer, 2015.

Co-organized the Second Machine Learning in Planning and Control (MLPC) of Robot Motion Workshop at the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems Conference (IROS) in Hamburg, Germany, Sept 2015.

Becoming a Robot Guru: Integrating Science, Engineering and Creativity Workshop, Lead Organizer, 2015.

Lead organizer for a broadening participation in computing workshop at the 2014 IEEE International Conference on Robotics and Automation Conference (ICRA) in Seattle, WA, May 2015. Awarded budget of \$21,000 from the Computing Research Association Committee on the Status of Women in Research and the Coalition to Diversify Computing to fund student travel awards to the workshop.

IEEE International Conference on Robotics and Automation (ICRA) Organizing Committee Member, Chair of the Student Activities at ICRA 2015.

Machine Learning in Planning and Control of Robot Motion Workshop, Lead Organizer, 2014.

Lead organizer for the “Machine Learning in Planning and Control (MLPC) of Robot Motion” Workshop at the 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems Conference (IROS) in Chicago, IL, Sept 2014.

Workshop on Robotics Methods for Structural and Dynamic Modeling of Molecular Systems, Lead Organizer, 2014.

Lead organizer for the “Workshop on Robotics Methods for Structural and Dynamic Modeling of Molecular Systems” (RMMS) at the 2014 Robotics Science and Systems Conference (RSS) in Berkeley, CA, July 2014.

IEEE International Conference on Intelligent Robots and Systems (IROS) Conference, Associate Editor, 2012-2014, 2016.

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.

Protein Structure, Kinematics, and Motion Planning Workshop, 2009.

Co-organized “Protein Structure, Kinematics, and Motion Planning Workshop” held at the International Robotics: Science and Systems Conference in Seattle Washington, June 2009.

Reviewer for Scientific Conferences and Journals, ongoing.

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

NATIONAL
ACADEMIC SERVICE
AND ACTIVITIES

Computing Research Association URMD Graduate Cohort, Steering Committee, 2018 & 2019.

Aiding in development of professional development conference for new underrepresented minority and disabled graduate students held in 2018 and planned in 2019.

Computing Research Association Graduate Cohort, Invited Speaker, 2016 & 2018 & 2019.

Invited speaker at professional development conference for new graduate students at 2016 and 2018 conferences.

Computing Research Association Undergraduate Research Award, Selection Committee Member, 2014 & 2015.

Evaluated undergraduate research applications for the 2014 & 2015 Computing Research Association (CRA) Undergraduate Research Awards.

Congressional Science, Technology, Engineering and Math (STEM) Academic Competition, the “House Student App Challenge”, Judge, 2014.

Assisted Congressman Ben Luján with evaluating entries to the 2014 House Student App Challenge.

Engaging Undergraduates in Research, Invited Speaker, 2014.

Invited speaker at the Computing Research Association Education Committee (CRA-E) Engaging Undergraduates in Research Workshop held in Los Angeles, California, November 2014.

Grace Hopper Celebration of Women in Computing Conference, 2013.

Co-organized the “Navigating the Academic Job Search” panel. Conference held October 2013.

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.

Richard Tapia Celebration of Diversity in Computing Conference, 2009.
Organized “Steps to a PhD: A Student’s Perspective” panel. Conference held in Portland, Oregon, April 2009.

CS Department Chair/Faculty Search Committee, Member, 2015-2017, 2018-2019.

CS Department Promotion and Tenure Committee, Member, 2018-2019.

CS Department NCWIT-funded Committee for Increasing Enrollment of Women in CS at UNM, Member, 2018-2019.

CS Department Awards Committee, Chair, 2012-present.

Chair of committee to select students for departmental awards and to help with applications for national student awards.

UNM Faculty Senate, Member, 2016-2017.

Elected to represent the School of Engineering.

UNM Regent’s Scholar, Mentor, 2014-present.

Advisor for students in the UNM Regent’s Scholar Program, the top scholarship program at UNM.

CS Department Lobo Women in Computer Science, Faculty Advisor, 2013-2017.

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

CS Department Outreach Committee, Member, 2014-2016.

Providing robot demos and tutorials to local K-12 students.

New Mexico Supercomputing Challenge, Judge, 2014-2018.

Evaluated student projects at the Expos held in Los Alamos, New Mexico.

CS Department Graduate Student Association, Faculty Advisor, 2013-2016.

Advisor for organization that supports graduate student success.

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

Organized weekly lunches for new graduate student and undergraduate research mentoring.