Lydia Tapia

Contact Information

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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

Honors and Awards

✦ ***Women in STEM Award***, University of New Mexico, 2021

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

✦ ***Faculty in Residence***, Google, Mountain View, California, 2018

✦ ***Best Paper in Service Robotics*** out of 2,500 papers, IEEE International Conference on Robotics and Automation (ICRA), 2018

✦ **International *Computing Research Association Borg Early Career Award***, 2017

✦ ***National Science Foundation CAREER Award***, 2016

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

✦ ***Faculty Research Award***, University of New Mexico Faculty of Color Awards, 2012

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

✦ ***Computing Innovation Postdoctoral Fellow***, Computing Community Consortium (CCC) and the Computing Research Association (CRA), 2009, 2010

Selected 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

University of New Mexico, Computer Science Department, Albuquerque, New Mexico
Chair **2022 - present**
Professor **2022 - present**
Associate Professor **2017 - 2022**
Assistant Professor **2011 - 2017**
Director of the Tapia Lab Research Group.

Google, Mountain View, California
Faculty in Residence **2018**
Worked with Engineering Education and fostered collaboration with Google Brain Robotics.

University of Texas, Institute for Computational Engineering and Sciences, Austin, Texas
Computing Innovation Postdoctoral Fellow **2009 - 2011**
Studied protein folding using both coarse-grained and all-atom techniques. Research supervised by Professor Ron Elber.

Book

Marco Morales, Lydia Tapia, Gildardo Sánchez-Ante, Seth Hutchinson (Editors),
Algorithmic Foundations of Robotics XIII, Zeist, Springer, June 29, 2020.

Publications in Refereed Journals (*indicates advisee of Tapia)

[1] Hao-Tien Chiang*, John Baxter*, Satomi Sugaya*, Mohammad R. Yousefi*, Aleksandra Faust, Lydia Tapia, "Fast Deep Swept Volume Estimator," *International Journal of Robotics Research*, 40(10-11), pp. 1068–1086, 2021.

[2] Yazied Hasan*, Arpit Garg*, Satomi Sugaya*, Lydia Tapia, "Defensive Escort Teams for Navigation in Crowds via Multi-Agent Deep Reinforcement Learning," *IEEE Robotics and Automation Letters*, 5(4), pp. 5645-5652, 2020.

[3] 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), pp. 4298–4305, 2019.

[4] 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.

[5] 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.

[6] Avanika 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.

[7] 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.

[8] 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] Lydia Tapia, Xinyu Tang, Shawna Thomas, Nancy M. Amato, "Kinetics Analysis Methods for Approximate Folding Landscapes," *Bioinformatics*, 23(13): i539–i548, July 2007.

[16] 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)

[17] John Baxter*, Torin Adamson*, Satomi Sugaya*, and Lydia Tapia, "Exploring Learning for Intercepting Projectiles with a Robot-Held Stick," In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, to appear, Prague, Czech Republic, Sept 2021.

[18] Satomi Sugaya*, Mohammad R. Yousefi*, Andrew R. Ferdinand, and Lydia Tapia, "Multitask and Transfer Learning of Geometric Robot Motion," In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, to appear, Prague, Czech Republic, Sept 2021.

[19] John Baxter*, Mohammad R. Yousefi*, Satomi Sugaya*, Marco Morales, and Lydia Tapia, "Deep Prediction of Swept Volume Geometries: Robots and Resolutions," In *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 6665–6672, Las Vegas, NV, USA, Oct 2020.

[20] Arpit Garg*, Hao-Tien 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)*, pp. 3534–3541, Macau, China, Nov 2019.

[21] 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)*, pp. 1–6, Newcastle on Tyne, United Kingdom, Oct 2019.

[22] Torin Adamson*, Julian Antolin Camarena*, Lydia Tapia and Bruna Jacobson, "Optimizing Low Energy Pathways in Receptor-Ligand Binding with Motion Planning," In *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, San Diego, CA, USA pp. 2041-2048, Nov 2019.

[23] Hao-Tien Chiang*, Aleksandra Faust, Satomi Sugaya*, Lydia Tapia, "Deep Neural Networks for Swept Volume Prediction," In *International Workshop on Algorithmic Foundations of Robotics (WAFR)*, Merida, Mexico, Dec 2018. Published in Algorithmic Foundations of Robotics XIII, Zeist, Springer, 2020.

[24] 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, USA, Dec 2018.

[25] 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**

[26] 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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.

[33] 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, USA, May 2015.

[34] 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, USA, May 2015.

[35] 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.

[36] 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, USA, Nov 2014.

[37] 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.

[38] 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.

[39] 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.

[40] 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.

[41] 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.

[42] 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, USA, Oct 2012.

[43] 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.

[44] 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, MN, USA, May 2012.

[45] 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.

[46] 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.

[47] 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, USA, Apr 2007.

[48] 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.

[49] 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.

[50] 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)

[51] Hao-Tien 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.

[52] 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, MA, USA, pp. 710–715, Aug 2017.

[53] 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, MA, USA, pp. 704–709, Aug 2017.

[54] 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.

[55] 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.

[56] Torin Adamson*, John Baxter*, Kasra Manavi*, Bruna Jacobson*, Lydia Tapia, "Crowdsourced 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.

[57] 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.

[58] 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.

[59] Shawna Thomas, Lydia Tapia, Chinwe Ekenna, 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.

[60] 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.

Magazine Articles

Elena Delgado and Lydia Tapia, "Retrospective on a Watershed Moment for IEEE Robotics and Automation Society Gender Diversity [Women in Engineering]", in *IEEE Robotics & Automation Magazine*, 28(3), pp. 163-167, Sept. 2021.

Laura Graesser, Aleksandra Faust, Hadas Kress-Gazit, Lydia Tapia and Risa Ulinski, "Gender Diversity of Conference Leadership [Women in Engineering]," in *IEEE Robotics & Automation Magazine*, 28(2), pp. 126-130, June 2021.

Lydia Tapia and Elena Delgado, "Best Practices: Becoming a Leader Through Conference Organization [Women in Engineering]," in *IEEE Robotics & Automation Magazine*, 27(4), pp. 78-80, Dec 2020.

Elena Delgado and Lydia Tapia, "Robotics Research During a Pandemic [Women in Engineering]," in *IEEE Robotics & Automation Magazine*, 27(3), pp. 17-18, Sept 2020,.

Chinwe Ekenna and Lydia Tapia, "Best Practices of Successful Academic Research Labs [Women in Engineering]," in *IEEE Robotics & Automation Magazine*, 26(4), pp. 138-141, Dec 2019.

Chinwe Ekenna and Lydia Tapia, "The Integration of Diversity with Robotics Start-Ups [Women in Engineering]," in *IEEE Robotics & Automation Magazine*, 25(4), pp. 100-104, Dec 2018.

Lydia Tapia, "Workshops to Diversify the Next Generation of Roboticists [Women in Engineering]," in the *IEEE Robotics & Automation Magazine*, 25(3), pp. 103-105, Sept 2018.

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 Ruymgaart*, Lydia Tapia, Aleksandra Faust*, Rafael Fierro, 11/2017.

Selected Research Grants Total $13,691,488 ($4,507,208 to Tapia)

Gifts ($176,000 total to Tapia):

- General Atomics: $100,000 (2020, 2021)

- Google: $35,000 (2018)
- Computing Research Association: $21,000 (2015), $20,000 (2016)

DOD Awards ($1,247,881 total to Tapia):

- Army Research Lab, ARL W911NF2120182, *Enhancing human-autonomy teaming through personalized models of decision making*, **PI: Tapia**, $498,703, 2021-2025.
- Army Research Lab, ARL W911NF1920215, *Studying Human Agent Teaming Through Games*, **PI: Tapia**, $440,000, 2019-2021.
- Air Force Research Lab, AFRL FA9453-18-2-0022, *Agile Manufacturing for High Value, Low Volume Production*, PI Fierro, **Lead CoPIs: Tapia**, Taha, Wood, and Yang, CoPIs: Christodoulou, Lumia, Naseri, Oishi, Tehrani $6,677,080 ($309,178 to Tapia), 2018-2023.

NSF Awards ($1,668,161 total to Tapia):

- NSF III Core Program Award, NSF III-1716195, *III: Small: Facilitating Search in the High-Dimensional Space of Molecular Interactions*, PI Jacobson, **CoPI: Tapia**, $507,965 ($250,000 to Tapia), 2017-2022.
- NSF CAREER Award, NSF IIS-1553266, *CAREER: Modeling and Analyzing High-Dimensional Molecular Assembly: Quantifying the Impact of Allergen Structure*, **PI: Tapia**, $551,499, 2016-2022.
- NSF Large Collaborative Algorithmic Foundations Core Program Award, NSF CCF-1518861, *AF: Large: Collaborative Research: Molecular computing for the real world*, PI Stefanovic, **CoPIs: Tapia (UNM)**, Lakin (UNM), Graves (UNM), Teuscher (Portland State University), Stojanovic (Columbia University), and Rudchenko (Hospital For Special Surgery), $2,000,000 ($934,358 to UNM, $200,000 to Tapia), 2015-2022.
- NSF National Robotics Initiative Award, NSF IIS-1528047, **PI: Tapia**, CoPI: Oishi, $999,998 ($666,662 to Tapia), 2015-2020.
- NSF Major Research Instrumentation Award, NSF ACI-1040530, *MRI: Acquisition of a GPU-Accelerated Parallel Supercomputer for Computational Science and Engineering Research at the University of New Mexico*, PI Atlas, **CoPIs: Tapia**, Guo, and Thomas, $435,077 (shared UNM resource), 2011-2015.

NIH Awards ($1,052,529 total to Tapia):

- NIH National Centers for Systems Biology Trainee Award, NIH 5P50GM085273-07, PI Wilson, **Subawardee: Tapia**, $198,470 to Tapia, 2014-2019.
- NIH COBRE Center Trainee Award, NIH P20RR018754, PI Locker, **Subawardee: Tapia**, $854,059 to Tapia, 2011-2015.

Other Awards ($362,637 total to Tapia):

- Lawrence Livermore National Lab, B644908, *Large-Scale Neural Architecture Search using Reinforcement Learning and Neuro evolution Techniques*, **PI: Tapia**, $58,257, 2020-2021.
- Department of Education GAANN Award, *University of New Mexico Artificial Intelligence GAANN Fellowships*, **PI Tapia**, $304,380, 2021.

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, Fall 2020, Fall 2021
- CS 529 "Machine Learning," Spring 2021
- 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 362 "Data Structures and Algorithms II," Spring 2020
- CS 427 "Introduction to Artificial Intelligence," Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Spring 2019, Fall 2019, Fall 2020, Fall 2021
- CS 429 "Machine Learning," Spring 2021
- CS 464 "Introduction to Database Management," Spring 2011, Spring 2012, Spring 2013
- CS 293 "Social and Ethical Issues in Computing," Fall 2011, Spring 2021

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 the University of New Mexico. Current Position: Assistant Professor (Tenure-Track) at the Univeristy 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. Hao-Tien 'Lewis' Chiang, Ph.D. in Computer Science from UNM, 2019. First Position: Research Scientist, Google X.
  - 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, 15 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. Arpit Garg, MS in Computer Science, 2019. Current position: Google.
  - 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:**

  Postdoc:
  - Dr. Antolin Julian, Ph.D. from U. of New Mexico, 2020-present, Army Research Laboratories Journeyman Postdoc.
  - Dr. Satomi Sugaya, Ph.D. from U. of New Mexico, 2018-present.

  Doctoral:
  - Torin Adamson.
  - John Baxter.
  - Jon David.
  - Elena Delgado.
  - Yazied Hasan
  - Mohammad 'Rashid' Yousefi.

  Undergraduate:
  - Ethan Armstrong, Computer Science, Freshman.
  - Elizabeth DiGioia, Computer Science, Senior.

International Academic Service and Activities

IEEE International Conference on Robotics and Automation (ICRA), Editor, 2019-2022.
Editor for the flagship conference in robotics with focus on autonomy and automation for mobility and manipulation.

IEEE Robotics and Automation Society Women in Engineering, Chair, 2018-present.

Robotics and Automation Letters Journal, Associate Editor, 2015-2021.

Workshop on the Algorithmic Foundations of Robotics (WAFR), Chair, 2018.
Co-Chair for the thirteenth WAFR Conference (149 attendees, 55 accepted papers, 5 keynotes) in Merida, Mexico, December 9-11, 2018.

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

Becoming a Robot Guru: Integrating Science, Engineering and Creativity Workshop,

Founder and Lead Organizer, 2018, 2016, 2015.
A broadening participation in computing workshop at the: (2018) WAFR Conference in Merida Mexico, (2016) Robotics: Science and Systems Conference (RSS) in Ann Arbor, MI, and (2015) IEEE International Conference on Robotics and Automation Conference (ICRA) in Seattle, WA

Grace Hopper Celebration of Women in Computing Conference, Invited Speaker 2018, 2020. 2021.
Invited speaker for Computing Research Association Session Tracks.

Machine Learning in Planning and Control of Robot Motion Workshop, Founder and Organizer, 2014, 2015, and 2018.
Held at the IEEE/RSJ International Conference on Intelligent Robots and Systems Conference (IROS) in (2014) Chicago, IL, (2015) in Hamburg, Germany, and (2018) in Brisbane, Australia.

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.

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

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.

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.
Consulted for professional development conference for new underrepresented minority and disabled graduate students started in 2018 and annually thereafter.

Computing Research Association Graduate Cohort, Invited Speaker, 2016 & 2018 & 2019.
Invited speaker at professional development conference for women graduate students at 2016, 2018, 2019 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.

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, 2014.

Grace Hopper Celebration of Women in Computing Conference, 2013.
Co-organized the "Navigating the Academic Job Search" panel.

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.

University Academic Service and Activities

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, 2014-2019.
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.
Provided 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.