

## Andrew P. Murray, Ph.D.

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### Education

- **Ph.D.** Mechanical Engineering **University of California, Irvine, 1996**  
**Dissertation:** *Global Properties of Constraint Manifolds in the Kinematic Synthesis of Closed Chains*  
**Advisor:** J. Michael McCarthy
- **M.S.** Mechanical Engineering **University of California, Irvine, 1993**  
**Thesis:** *The Central Axis and Circling Axis Congruences as Projections of the Constraint Manifold of the Complementary Screw Quadrilateral*  
**Advisor:** J. Michael McCarthy
- **B.S.** Mechanical Engineering **Rose-Hulman Institute of Technology, 1989**

### Professional Experience

- **Professor**, Aug. 2011–present, **Associate Professor**, Aug. 2003–Aug. 2011, **Assistant Professor**, Jan. 1997–Aug. 2003  
**University of Dayton**, Dayton, OH  
Department of Mechanical & Aerospace Engineering
- **Associate Director**, Aug. 2007–Jul. 2011  
**University of Dayton**, Dayton, OH  
University Honors and Scholars Programs
- **Visiting Researcher**, Sep. 2006–Jun. 2007, Jun. –Dec. 2014, **Postdoctoral Fellow**, Sep. 1996–Aug. 1997  
**Université Montpellier II**, Montpellier, France  
Laboratoire d'Informatique, de Robotique et de Micro-electronique de Montpellier
- **Visiting Faculty**, Air Vehicles Directorate, May–Aug. 2002 & May–Aug. 2003, Information Directorate, May–Aug. 2000  
**Wright Patterson Air Force Base**, Fairborn, OH  
Air Force Research Laboratory
- **Graduate Research and Teaching Assistant**, Sep. 1990–Aug. 1996]  
**University of California, Irvine**, Irvine, CA  
Robotics and Automation Laboratory

### Awards and Honors

- Presenter at Spotlight on Technology, Arts, Research and Scholarship (STARS), University of Dayton, 2015
- ASME Fellow, elected 2014
- Alumni Award for Faculty Teaching, University of Dayton's highest teaching award, 2013
- Award for Faculty Excellence in Teaching, Southwestern Ohio Council for Higher Education, 2011
- Top Engineering Professor, Univ. of Dayton chapter of Society of Women Engineers, 2011
- Professor of the Year, Univ. of Dayton chapter of Epsilon Delta Tau Fraternity, 2009
- Award for Educational Excellence, Univ. of Dayton chapter of Alpha Nu Omega Fraternity, 2009
- Best Paper Award, 30<sup>th</sup> ASME Mechanisms and Robotics Conference, 2006
- University of Dayton Humanities Fellows recipient, 2005-2007
- Co-Chair of the 18<sup>th</sup> Annual University of Dayton Stander Symposium, 2006
- Selected for the "Engineering and a Catholic University" seminar and planning team, University of Dayton, 2004-2005
- University of Dayton School of Engineering Award for Excellence in Teaching, 2001
- Professor of the Year, Univ. of Dayton chapter of Pi Tau Sigma 2001
- MDI Mechanical Simulation Software Award, 26<sup>th</sup> ASME Mechanisms and Robotics Conference, 2000
- University of Dayton Teaching Fellow, 1998-1999
- Bourses Chateaubriand fellowship supporting a year of study in France, 1996-1997

## Journal Publications

- Ali, H., **Murray**, A., and Myszka, D., "The Synthesis of Function Generating Mechanisms for Periodic Curves Using Large Numbers of Double-Crank Linkages", *ASME Journal of Mechanisms and Robotics*, vol. 9, no. 3, 2017, pp. 031002:1-8.
- Brake, D., Hauenstein J., **Murray**, A., Myszka, D., and Wampler, C., "The Complete Solution of Alt-Burmester Synthesis Problems for Four-Bar Linkages", *ASME Journal of Mechanisms and Robotics*, vol. 8, no. 10, 2016, pp. 041008:1-8.
- Almestiri, S., **Murray**, A., Myszka, D., and Wampler, C., "Singularity Traces of Single Degree-of-Freedom Planar Linkages that Include Prismatic and Revolute Joints", *ASME Journal of Mechanisms and Robotics*, vol. 8, no. 5, 2016, 051003:1-3.
- Almandeel, A., **Murray**, A., Myszka, D., and Stumph, H., "A Function Generation Synthesis Methodology for All Defect-Free, Slider-Crank Solutions for Four Precision Points", *ASME Journal of Mechanisms and Robotics*, vol. 7, no. 3, 2015, pp. 031020:1-10
- Myszka, D., **Murray**, A., Giaier, K., Jayaprakash, V., and Gillum, C., "A Mechanical Regenerative Brake and Launch Assist Using an Open Differential and Elastic Energy Storage", *SAE International Journal of Alternative Powertrains*, vol. 4, no. 1, 2015, pp. 199-208
- Li, B., **Murray**, A., and Myszka, D., "Improving Techniques in Statically Equivalent Serial Chain Modeling for Center of Mass Estimation", *ASME Journal of Mechanisms and Robotics*, vol. 7, no. 1, 2015, pp. 011013:1-10
- Myszka, D., Lauden, J., Joyce, P., **Murray**, A., and Gillum C., "Development of a Spring-Based Automotive Starter", *SAE International Journal of Commercial Vehicles*, vol. 7, no. 1, 2014, pp. 286-294
- Myszka, D., **Murray**, A., and Wampler, C., "Computing the Branches, Singularity Trace, and Critical Points of Single Degree-of-Freedom, Closed-Loop Linkages," *ASME Journal of Mechanisms and Robotics*, vol. 6, no. 1, 2014, pp. 011006:1-10
- Shamsudin, S., **Murray**, A., Myszka, D., and Schmiedeler, J., "Kinematic Synthesis of Planar, Shape-Changing Rigid Body Mechanisms for Design Profiles with Significant Differences in Arc Length," *IFTOMM Mechanism and Machine Theory*, vol. 70, no. 12, 2013, pp. 425-440
- Shamsudin, S., and **Murray**, A., "A Closed-Form Solution for the Similarity Transformation Parameters of Two Planar Point Sets," *Journal of Mechanical Engineering Technology*, vol. 5, no. 1, 2013, pp. 59-68
- Zhao, K., Schmiedeler, J.P., and **Murray**, A.P., "Design of planar, shape-changing rigid-body mechanisms for morphing aircraft wings," *ASME Journal of Mechanisms and Robotics*, vol. 4, no. 4, 2012, pp. 041007:1-10
- Perkins, D., and **Murray**, A., "Singularity Free RPR and SPS Chains for Actuating Planar and Spherical Single Degree of Freedom Mechanisms", *ASME Journal of Mechanisms and Robotics*, vol. 4, no. 1, 2012, pp. 011007:1-6
- Cotton, S., Vanoncini, M., Fraisse, P., Ramdani, N., Demircan, E., **Murray**, A.P., and Keller, T., "Estimation of the Centre of Mass from Motion Capture and Force Plate Recordings: A Study on the Elderly", *Applied Bionics and Biomechanics*, vol. 8, 2011, pp. 67-84
- Myszka, D., and **Murray**, A., "Pole Arrangements that Introduce Prismatic Joints into the Design Space of Four- and Five-Position Rigid-Body Synthesis", *IFTOMM Mechanism and Machine Theory*, vol. 45, no. 9, 2010, pp. 1314-25
- Myszka, D., and **Murray**, A., "Slider Cranks as Compatibility Linkages for Parameterizing Center Point Curves", *ASME Journal of Mechanisms and Robotics*, vol. 2, no. 2, 2010, pp. 021007:1-7
- Cotton, S., **Murray**, A., and Fraisse, P., "Estimation of the Center of Mass: From Humanoid Robots to Human Beings", *IEEE/ASME Transactions on Mechatronics*, vol. 14, no. 6, 2009, pp. 707-12
- Persinger, J.A., Schmiedeler, J.P., and **Murray**, A.P., "Synthesis of Planar Rigid-Body Mechanisms Approximating Shape Changes Defined by Closed Curves", *ASME Journal of Mechanical Design*, vol. 131, no. 7, 2009, pp. 071006:1-7
- Myszka, D.H., **Murray**, A.P., and Schmiedeler, J.P., "Singularity Analysis of an Extensible Kinematic Architecture: Assur Class N, Order N-1", *ASME Journal of Mechanisms and Robotics*, vol. 1, no. 1, 2009, pp. 011009:1-7
- Myszka, D.H., **Murray**, A.P., and Schmiedeler, J.P., "Assessing Position Order in Rigid Body Guidance: An Intuitive Approach to Fixed Pivot Selection", *ASME Journal of Mechanical Design*, vol. 131, no. 1, 2009, pp. 014502:1-5
- Frank, G.J., Joo, J.J., Sanders, B., Garner, D.M., and **Murray**, A.P., "Mechanization of a High Aspect Ratio Wing for Aerodynamic Control", *Journal of Intelligent Material Systems and Structures*, vol. 19, September, 2008, pp. 1101-12
- **Murray**, A.P., Schmiedeler, J.P., and Korte, B.M., "Synthesis of Planar, Shape-Changing Rigid-Body Mechanisms", *ASME Journal of Mechanical Design*, vol. 130, no. 3, 2008, pp. 032302:1-10
- **Murray**, A.P., Turner, M.L., and Martin, D.T., "Synthesizing Single DOF Linkages via Transition Linkage Identification", accepted for publication in *ASME Journal of Mechanical Design*, vol. 130, no. 2, 2008, pp. 022301:1-8
- Larochelle, P.M., **Murray**, A. P., and Angeles, J., "A Distance Metric for Finite Sets of Rigid-Body Displacements via the Polar Decomposition", *ASME Journal of Mechanical Design*, vol. 129, no. 8, 2007, pp. 883-886
- **Murray**, A. P., and McCarthy, J. M., "Burmester Lines of Spatial Five Position Synthesis from the Analysis of a 3-CPC Platform", *ASME Journal of Mechanical Design*, vol. 121, no. 1, 1999, pp. 45-49

- **Murray**, A. P., Pierrot, F., Dauchez, P., and McCarthy, J. M., "A Planar Quaternion Approach to the Kinematic Synthesis of a Parallel Manipulator", *IFR Robotica*, vol.15, Part 4, 1997, pp. 361-365
- **Murray**, A. P., and McCarthy, J. M., "Center-Point Curves Through Six Arbitrary Points", *ASME Journal of Mechanical Design*, vol. 119, no. 1, 1997, pp. 36-39
- **Murray**, A. P., and McCarthy, J. M., "Passing a Central Axis Congruence Through Six Arbitrary Lines in Space", *ASME Journal of Mechanical Design*, vol. 118, no. 4, 1996, pp. 515-519
- **Murray**, A. P., and McCarthy, J. M., "Determining Burmester Points from the Analysis of a Planar Platform", *ASME Journal of Mechanical Design*, vol. 117, no. 2(A), 1995, pp. 303-307

### **Refereed Conference Publications\***

- Almestiri, S., **Murray**, A., and Myszka, D., "Spherical Linkages Analysis and Synthesis by Special Unitary Matrices for Solution via Numerical Algebraic Geometry", *Proceedings of the 2017 ASME International Design Engineering Technical Conference*, Cleveland, OH, Aug. 6-9, 2017.
- Li, B., **Murray**, A., Myszka, D., "Synthesizing Planar Rigid-Body Chains for Morphometric Applications", *Proceedings of the 2016 ASME International Design Engineering Technical Conference*, Charlotte, NC, Aug. 21-24, 2016.
- Almandeel, A., Myszka, D., Gonzalez, A., Fraise, P., and **Murray**, A., "Rapidly Locating and Accurately Tracking the Center of Mass Using Statically Equivalent Serial Chains", *Proceedings of the 2015 IEEE International Conference on Humanoid Robots*, Seoul, Korea, Nov. 3-5, 2015.
- Li, B., **Murray**, A., and Myszka, D., "Designing Variable-Geometry Extrusion Dies that Utilize Planar Shape-Changing Rigid-Body Linkages", *Proceedings of the 2015 ASME International Design Engineering Technical Conference*, Boston, MA, Aug. 2-5, 2015.
- Almestiri, S., **Murray**, A., Myszka, D., and Wampler, C., "Singularity Traces of Planar Linkages that Include Prismatic and Revolute Joints", *Proceedings of the 2015 ASME International Design Engineering Technical Conference*, Boston, MA, Aug. 2-5, 2015.
- Ali, H., **Murray**, A., and Myszka, D., "Reducing Structural Error in Function Generating Mechanisms Via the Addition of Large Numbers of Four Bar Mechanisms", *Proceedings of the 2015 ASME International Design Engineering Technical Conference*, Boston, MA, Aug. 2-5, 2015.
- Myszka, D., **Murray**, A., Giaier, K., Jayaprakash, V., and Gillum, C., "A Mechanical Regenerative Brake and Launch Assist using an Open Differential and Elastic Energy Storage", *Proceedings of the 2015 SAE World Congress and Exhibition*, SAE Technical Paper 15SDP-0051, Detroit, MI, Apr. 21-23, 2015.
- Giaier, K.S., Myszka, D.H., Kramer, W.P., and **Murray**, A.P., "Variable Geometry Dies for Polymer Extrusion", *Proceedings of the ASME 2014 International Mechanical Engineering Congress and Exposition*, Montreal, Canada, Nov. 14-20, 2014
- Giaier, K., **Murray**, A., and Myszka, D., "Serial Chains of Spherical Four-Bar Mechanisms to Achieve Design Helices", *Proceedings of the 2014 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Buffalo, NY, Aug. 17-20, 2014
- Nieman, J., Myszka, D., and **Murray**, A., "A Novel, Elastically-Based, Regenerative Brake and Launch Assist Mechanism", *Proceedings of the 2014 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Buffalo, NY, Aug. 17-20, 2014
- Li, B., **Murray**, A., Myszka, D., "Improving Techniques in Statically Equivalent Serial Chain Modeling for Center of Mass Estimation", *Proceedings of the 2014 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Buffalo, NY, Aug. 17-20, 2014
- Myszka, D.H., Guan, C., Murray, A.P., and Hodapp, T.R., "A Semi-Empirical Prediction Model for the Discharge Line Temperature of Hermetic Compressors", *Proceedings of the 2014 International Compressor Engineering Conference*, West Lafayette, IN, Jul. 14-17, 2014
- Myszka, D., Lauden, J., Joyce, P., **Murray**, A., and Gillum, C., "Development of a Spring-Based Automotive Starter", *Proceedings of the SAE World Congress & Exhibition*, SAE Technical Paper 14SDP-0053, Detroit, MI, Apr. 8-10, 2014
- Tong, Y., Myszka, D., and **Murray**, A., "Four-Bar Linkage Synthesis for a Combination of Motion and Path-Point Generation," *Proceedings of the 2013 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Portland, OR, Aug. 4-7, 2013
- Li, L., Myszka, D., **Murray**, A., and Wampler, C., "Using the Singularity Trace to Understand Linkage Motion Characteristics," *Proceedings of the 2013 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Portland, OR, Aug. 4-7, 2013

- Li, B., **Murray**, A., and Myszka, D., "Improving Techniques for Center of Mass Estimation Using Statically Equivalent Serial Chain Modeling," *Proceedings of the 2013 Canadian Congress of Applied Mechanics*, Saskatoon, Saskatchewan, Canada, Jun. 2-5, 2013
- Myszka, D., **Murray**, A., and Wampler, C., "Mechanism Branches, Turning Curves, and Critical Points", *Proceedings of the 2012 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Chicago, IL, Aug. 12-15, 2012
- Zhao, K., Schmiedeler, J.P., and **Murray**, A.P., "Synthesis of planar, shape-changing compliant mechanisms using pseudo-rigid-body models," *Proceedings of the 2012 ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, Chicago, IL, August 12-15, 2012
- Shamsudin, S., **Murray**, A., Myszka, D., and Schmiedeler, J., "Kinematic Synthesis of Planar, Shape-Changing Rigid Body Mechanisms for Design Profiles With Significant Differences in Arc Length", *Proceedings of the 2011 ASME International Design and Engineering Technical Conferences*, Washington, DC, Aug. 28-31, 2011
- Perkins, D., and **Murray**, A., "Synthesis of Coupler-Drivers for Four Position Planar Synthesis Tasks", *Proceedings of the 2011 ASME International Design and Engineering Technical Conferences*, Washington, DC, Aug. 28-Aug. 31, 2011
- Zhao, K., Schmiedeler, J., and **Murray**, A., "Kinematic Synthesis of Planar, Shape-Changing Rigid Body Mechanisms with Prismatic Joints", *Proceedings of the 2011 ASME International Design and Engineering Technical Conferences*, Washington, DC, Aug. 28-Aug. 31, 2011
- Perkins, D., and **Murray**, A., "Singularity-Free RPR and SPS Chains for Actuating Single Degree of Freedom Planar and Spherical Mechanisms", *Proceedings of the 2010 ASME International Design and Engineering Technical Conferences*, Montreal, Can, Aug. 15-Aug. 18, 2010
- Myszka, D., **Murray**, A., and Schmiedeler, J., "Using a Singularity Locus to Exhibit the Number of Geometric Inversions, Transitions and Circuits of a Linkage", *Proceedings of the 2010 ASME International Design and Engineering Technical Conferences*, Montreal, Can, Aug. 15-Aug. 18, 2010
- Cotton, S., Fraise, P., and **Murray**, A., "On the Manipulability of the Center of Mass of Humanoid Robots, Application to Design", *Proceedings of the 2010 ASME International Design and Engineering Technical Conferences*, Montreal, Can, Aug. 15-Aug. 18, 2010
- Myszka, D., and **Murray**, A., "Slider Cranks as Compatibility Linkages for Parameterizing Center Point Curves", *Proceedings of the 2009 ASME International Design and Engineering Technical Conferences*, San Diego, CA, Aug. 30-Sep. 2, 2009
- Myszka, D., and **Murray**, A., "Identifying Sets of Four and Five Positions That Generate Distinctive Center-Point Curves", *Proceedings of the 2009 ASME International Design and Engineering Technical Conferences*, San Diego, CA, Aug. 30-Sep. 2, 2009
- Perkins, D., and **Murray**, A., "Comparison of Torque and Coupler-Driven Four-Bar Mechanisms As Solutions to Planar Four Position and Spherical Four Orientation Tasks", *Proceedings of the 2009 ASME International Design and Engineering Technical Conferences*, San Diego, CA, Aug. 30-Sep. 2, 2009
- Cotton, S., **Murray**, A., and Fraise, P., "Estimation of the Center of Mass Using Statically Equivalent Serial Chains", *Proceedings of the 2009 ASME International Design Engineering Technical Conferences*, San Diego, CA, Aug. 30-Sep. 2, 2009
- Cotton, S., **Murray**, A., and Fraise, P., "Statically Equivalent Serial Chains for Modeling the Center of Mass of Humanoid Robots", *Proceedings of the 2008 IEEE-RAS International Conference on Human Robotics*, Daejeon, Korea, Dec. 1-3, 2008
- Myszka, D.H., **Murray**, A.P., and Schmiedeler, J.P., "Singularity Analysis of Rigid-Body, Closed-Loop, Shape Changing Mechanisms", *Proceedings of the 2008 ASME International Design Engineering Technical Conferences*, New York, Aug. 3-6, 2008
- Persinger, J., Schmiedeler, J., and **Murray**, A., "Synthesis of Planar Shape-Changing Rigid-Body Mechanisms Approximating Closed Curves", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007
- Myszka, D., **Murray**, A., and Schmiedeler, J., "Assessing Position Order in Rigid Body Guidance: An Intuitive Approach to Fixed Pivot Selection", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007
- Grimm, E., **Murray**, A., and Turner, M., "Software for the Kinematic Synthesis of Coupler-Driven Spherical Four-Bar Mechanisms", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007
- Perkins, D., Turner, M., and **Murray**, A., "Static Analysis of Torque and Coupler Driven Spherical Four-bar Mechanisms with an Applied Load", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007

- **Murray, A.**, and Pierrot, F., "Design of a High-Speed Spherical Four-bar Mechanism for use in a Motion Common in Assembly Processes", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007
- Turner, M., Grimm, E., Debrosse, D., Kosmac, K., and **Murray, A.**, "Software for Investigating the Kinematics, Statics and Dynamics of Coupler-Driven Four-Bars for Two Position Synthesis", *Proceedings of the 2007 ASME International Design Engineering Technical Conferences*, Las Vegas, Sept. 4-7, 2007
- Korte, B., **Murray, A.** and Schmiedeler, J., "Synthesis of Planar, Shape-Changing Rigid Body Mechanisms", *Proceedings of the 2006 ASME International Design Engineering Technical Conferences*, Philadelphia, Pennsylvania. Paper # DETC2006-99431. ASME Press. September 10 - 13, 2006
- **Murray, A.**, Korte, B. and Schmiedeler, J., "Approximation Planar, Morphing Curves with Rigid Body Linkages", *Proceedings of the 10<sup>th</sup> International Symposium on Advances in Robot Kinematics (ARK)*, Ljubljana, Slovenia, June 25-29, 2006
- Turner, M., **Murray, A.**, Perkins, D. and Larochelle, P., "Systematic Process for Constructing Spherical Four Bar Mechanisms", *Proceedings of the 2005 ASME International Mechanical Engineering Congress and Exposition*, Orlando, Florida. Paper # IMECE2005-80058. ASME Press. November 5 - 11, 2005
- Larochelle, P. and **Murray, A.**, "Projection Metrics for Rigid-Body Displacements", *Proceedings of the 2005 ASME International Design Engineering Technical Conferences*, Long Beach, California. Paper # DETC2005-84698. ASME Press. September 24 - 28, 2005
- Frank, G., Joo, J., Sanders, B., Garner, D. and **Murray, A.**, "Mechanization of a High Aspect Ratio Wing for Aerodynamic Control," *Proceedings of the 15<sup>th</sup> International Conference on Adaptive Structures and Technologies*, Bar Harbor, ME, Oct 25-27, 2004
- Perry, L., and **Murray, A.**, "Selecting Joint Locations in a Watt II Six-Bar to Ensure a Cranking Input," *Proceedings of the ASME 2004 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Salt Lake City, UT, Sept 28-Oct 2, 2004
- Larochelle, P., **Murray, A.**, and Angeles, J., "SVD and PD Based Projection Metrics on SE(n)," *Proceedings of the 9<sup>th</sup> International Symposium on Advances in Robot Kinematics (ARK)*, Sestri Levante, Italy, Jun 28-Jul 1, 2004
- Perry, L., and **Murray, A.** "Suggesting Joint Limitations and Physical Parameters for Motion Generating 3 DOF Planar Chains," *Proceedings of the 2003 ASME Design Engineering Technical Conference*, Chicago, Sept., 2003
- Martin, D., and **Murray, A.** "Developing Classifications for Synthesizing, Refining, and Animating Planar Mechanisms," *Proceedings of the 2002 ASME Design Engineering Technical Conference*, Montreal, Sept., 2002
- Perry, L., Turner M. and **Murray, A.** "Two Position, Two Velocity Synthesis of a Spherical Mechanism with Translating Center," *Proceedings of the 2002 ASME Design Engineering Technical Conference*, Montreal, Sept., 2002
- **Murray, A.**, Stevens, J., Smari, W., Kremer, G. and Marquart, J. "Early Lessons in Executing Distributed Collaborative Student Design Projects," *Proceedings of the 2001 ASME Design Engineering Technical Conference*, Baltimore, Sept., 2001
- Doepker, P. and **Murray, A.**, "Experiences in Integrating the Product Realization Process into the Design Curriculum," *Proceedings of the 2001 ASME Design Engineering Technical Conference*, Baltimore, Sept., 2001
- **Murray, A.**, Stevens, J. and Smari, W., "Learning the Tools and Techniques of Geographically Dispersed Collaborative Design Via a Brief Student Project," *Proceedings of the 2001 ASEE Annual Conference and Exposition*, Albuquerque, NM, July, 2001
- Hanchak, M. S., Kashani, A. R. and **Murray, A. P.**, "Dynamics and Control of a 4C Mechanism," *Proceedings of the 2000 ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, Nov., 2000
- Hanchak, M. S. and **Murray, A. P.**, "Kinematic Synthesis of Binary Actuated Mechanisms for Rigid Body Guidance," *Proceedings of the 2000 ASME Design Engineering Technical Conference*, Baltimore, MD, Sept., 2000
- Stumph, H. E. and **Murray, A. P.**, "SDAMP: Software for the Design and Analysis of Mechanical Presses," *Proceedings of the 2000 ASME Design Engineering Technical Conference*, Baltimore, MD, Sept., 2000
- Stumph, H. E. and **Murray, A. P.**, "Defect-free Slider-crank Function Generation for 4.5 Precision Points," *Proceedings of the 2000 ASME Design Engineering Technical Conference*, Baltimore, MD, Sept., 2000
- **Murray, A. P.** and Hanchak, M., "Kinematic Synthesis of Planar Platforms with RPR, PRR and RRR Chains", *Advances in Robot Kinematics*, Ed. J. Lenarcic and M. Stanisic, Academic Publishers, Boston, MA, June, 2000
- **Murray, A. P.** and Pierrot, F., "N-Position Synthesis of Parallel Planar Platforms", *Advances in Kinematics: Robotics and Control*, Ed. J. Lenarcic and M. Husty, Academic Publishers, Boston, MA, June, 1998, pp. 69-78
- **Murray, A. P.** and Larochelle, P. M., "A Classification Scheme for Planar 4R, Spherical 4R and Spatial RCCC Linkages to Facilitate Computer Animation", *Proceedings of the 1998 ASME Design Engineering Technical Conferences: Mechanisms Conference*, Atlanta, Georgia, 1998

- **Murray, A. P. and McCarthy, J. M.**, “Constraint Manifold Synthesis of Planar Linkages”, *Proceedings of the 1996 ASME Design Engineering Technical Conferences: Mechanisms Conference*, Irvine, CA, August, 1996
  - **Murray, A. P., Pierrot, F., Dauchez, P. and McCarthy, J. M.**, “On the Design of Parallel Manipulators for a Prescribed Workspace: a Planar Quaternion Approach”, *5th International Symposium on Advances in Robot Kinematics*, Ed. J. Lenarcic and V. Parenti-Castelli, Kluwer Academic Publishers, Boston, MA, June, 1996, pp. 349-357
  - **Murray, A. P. and McCarthy, J. M.**, “A Linkage Type Map for Spherical 4 Position Synthesis”, *Proceedings of the 1995 ASME Design Engineering Technical Conferences*, Boston, MA, Sept., 1995
  - **Murray, A. and McCarthy, J.**, “Five Position Synthesis of Spatial CC Dyads”, *Proceedings of the 1994 ASME Design Engineering Technical Conferences: Mechanisms Conference*, DE-Vol. 70, Minneapolis, MN, Sept., 1994
  - **Murray, A. and McCarthy, J.**, “Characterizing the Workspace of the Spherical Image of Cooperating Robots”, *Advances in Robot Kinematics and Computational Geometry*, Ed. J. Lenarcic and B. Ravani, Kluwer, Academic Publishers, Boston, MA, 1994.
  - Larochelle, P., Dooley, J., **Murray, A. and McCarthy, J.**, “SPHINX: Software for Synthesizing Spherical 4R Mechanisms”, *Proceedings of the NSF Design and Manufacturing Systems Conference*, University of North Carolina at Charlotte, NC, Jan., 1993, pp. 607-611
  - Park, F., **Murray, A. and McCarthy, J.**, “Designing Mechanisms for Workspace Fit”, *Computational Kinematics: Proceedings of the Computational Kinematics Workshop*, Dahgstuhl, Germany, Ed. J. Angeles, G. Hommel and P. Kovacs, Kluwer Academic Publishers, Boston, MA, 1993, pp. 295-306
  - Bodduluri, R. M. C., **Murray, A. and McCarthy, J. M.**, “The Opposite Pole Quadrilateral Parameterization of Planar and Spherical Center Point and Circling Point Curves”, *Proceedings of the Applied Mechanisms and Robotics Conference*, Cincinnati, OH, Nov., 1991
- \* Non-refereed Conference Publications not listed

### **External Research Funding**

- “Robotic Source Capsule Loading, Welding and Inspection”  
**VEGA Americas**  
1-year (2015-2016) \$37,962 as PI, +\$9,045 in UD GAA tuition supplements
- “Collaborative Research: Variable-Geometry Dies for Polymer Extrusion”  
**National Science Foundation**  
3-year (2012-2015) \$318,830 as PI, +\$32,200 in NSF REU supplements, +\$13,316 in UD GAA tuition supplements
- “Novel Concepts for Spring-Based Mechanical Energy Storage in Motor Vehicles”  
**General Motors Global Research and Development**  
2-year (2010-2012), \$140,000 as PI
- “Flow Field Modification for Aero-Optics Applications Using Shape Change”  
**AFRL/DAGSI Ohio Student-Faculty Research Fellowship Program**  
1-year (2006-2007), \$63,060 with PI J. Schmiedeler, The Ohio State University, 0% to Univ. of Dayton
- “PODS: Novel Devices for Spatial Assembly Tasks”  
**National Science Foundation**  
3-year (2004-2007), \$275,000 as PI (plus \$25,000 in supplemental awards)
- “Software for the Kinematic Synthesis and Optimization of Balancing Mechanisms”  
**OPW Engineered Systems, Lebanon, OH**  
1-year (2003-2004), \$13,000 as PI
- “Design of a Tensegrity-Based Deformable Wing”  
**Air Force Research Laboratory, Air Vehicles Directorate**  
1-year (2002-2003), \$45,000 as PI (UDRI sub-contract with PI Robert Brockman)
- “SDAMP: Software for the Design and Analysis of Mechanical Presses”  
**The Minster Machine Company, Minster, OH**  
1-year (2000-2001), \$9,600 as PI

### **Internal Funding for Research and Teaching**

- “Inventive Design”  
**University of Dayton New Engineering Program**  
1-year (2004) \$4,500 as PI
- “Novel, Low Cost, Robotic Manipulation in Lean Manufacturing”

#### **University of Dayton Research Council Seed Grant**

1-year (2000) \$7,600 as PI

- “Experiential Learning to Prepare Students for Geographically Disperse Collaborative Engineering Environments”

#### **University of Dayton Fund for Educational Development**

1-year (2000) \$4,000 as PI

- “Novel, Low Cost, Robotic Manipulation in Lean Manufacturing”

#### **Ohio Board of Regents Challenge Grant Program**

1-year (1999-2000) \$40,000 as PI

- “A Methodology for Designing Machine Tools with Novel Closed Chain Topologies”

#### **University of Dayton Research Council Seed Grant**

1-year (1998) \$4,000 as PI

- “Interactive Software to Enhance the Learning of New Techniques in the Design of Mechanical Systems”

#### **University of Dayton Fund for Educational Development**

1-year (1998) \$4,000 as PI

### **University of Dayton Teaching Activities**

- Mechanical Reasoning, MEE 227L
- Computational Methods, MEE 314
- Theory of Machines, MEE 321
- Mechanical Design Laboratory I, MEE 427L
- Feedback Control Systems, MEE 435
- Engineering Analysis, MEE 460
- Kinematics of Mechanisms and Robots, MEE 490
- Inventive Design, MEE 499 & MEE 590
- Kinematic Principles in Design, MEE 499 & MEE 521
- Theoretical Kinematics, MEE 520
- Geometric Methods in Kinematics, MEE 522
- Computational Methods for Design, MEE/AEE 545
- Characterization of Dynamical Systems, MEE 595
- By Design, REL 369 & Engineering Systems Design, EGR 320 (team taught with Religious Studies faculty)

### **Invited Short Courses**

- Center of Mass Identification in Humans, Université Montpellier 2, MS level, 4 hrs, Fall, 2015, 15 students
- Kinematic and Static Modelling of Humanoids, Université Montpellier 2, MS level, 12 hrs, Fall, 2014, 16 students
- Kinematic Synthesis of Mechanisms, Université Montpellier 2, MS level, 12 hrs, Fall, 2007, 24 students

### **Recent Keynotes & Panels**

- Panelist, “Humanizing Technology”  
Univ. of Dayton installation of President Eric Spina, Dayton, OH, Apr. 2017
- Keynote, “Applications of Bertini in Kinematics, Robotics, and Machine Design”  
The Software and Applications of Numerical Algebraic Geometry Workshop  
Univ. of Notre Dame, South Bend, IN, May 2016

### **Recent Invited Seminars & Lectures**

- “Design with Many (& Sometimes Too Many) Links”  
LIRMM, Montpellier, France, Mar. 2017
- “Design Involving Many Links: Shape-Changing Mechanisms in Dies and Morphometry, Infinity Chains, and Statically Equivalent Serial Chains”  
Seoul National University, Seoul, Korea, Nov. 2015
- “Complexity for Simplicity: The Elegance of Variable Geometry Mechanisms”  
University of Dayton STARS, Dayton OH, Sep. 2015
- “Accurately Locating and Tracking the Center of Mass in Humanoids and Humans”  
Sapienza, Università di Roma, Rome, Italy, Dec. 2014
- “From High Order Polynomials to Low Degree of Freedom Machines: An Overview of Research in the DIMLab”

LIRMM HRP-4 Inaugural Workshop, L.I.R.M.M., Montpellier, France, Mar. 2014

- “Statically Equivalent Serial Chain Modeling”  
M.S. Electrical Engineering course “Robotics: Modeling & Control”  
Université Montpellier II, Montpellier, France, Mar. 2014
- “Everything I Know About Teaching”  
University of Dayton New Faculty Orientation, Dayton OH, Aug. 2013
- “Morphing Between Shapes the Old-Fashioned Way”  
Ignite Innovation: Dayton Regional Science Festival, Dayton OH, Sep. 2011
- “Adaptive Structures Research using Planar Rigid-Body Mechanisms”  
Boeing Research and Technology, St. Louis, Jun. 2011

## **Media**

- STARS presentation “Complexity for Simplicity: The Elegance of Variable Geometry Mechanisms” video, <https://www.youtube.com/watch?v=8zg62ne19pU>
- 90 Second Lectures video, <https://www.youtube.com/watch?v=4589op6bH8Y>  
“Why Are We Addicted to Gasoline?”  
Video on stored energy in gasoline as part of the University of Dayton’s “90 Second Lectures” Series, 2015
- Blurb selected for the back cover of B. Kallenberg’s “By Design: Ethics, Theology and the Practice of Engineering”  
Wipf and Stock Publishers, 2013
- 90 Second Lectures video, <https://www.youtube.com/watch?v=IE6hUjjQVSc>  
“Can you Lift the Empire State Building with the Weight of a Notebook?”  
Video on mechanical advantage as part of the University of Dayton’s “90 Second Lectures” Series, 2012

## **Ph.D. Research Directed**

- S. Alkestiri, expected May 2018, advised with D. Myszka  
Dissertation title not yet selected
- B. Li, Aug. 2017, advised with D. Myszka  
“Variable Geometry Extrusion Die Synthesis and Morphometric Analysis via Planar, Shape-changing Rigid Body Mechanisms”
- A. Almandeel, Dec. 2015, advised with D. Myszka  
“Rapidly Locating and Accurately Tracking the Center of Mass Using Statically Equivalent Serial Chains”
- S. Shamsudin, May 2013  
“Kinematic Synthesis of Planar, Shape-Changing Rigid Body Mechanisms for Design Profiles with Significant Differences in Arc Length”
- D. Perkins, Dec. 2011  
“Synthesis Techniques for Coupler-Driven Planar and Spherical Single Degree of Freedom Mechanisms”
- S. Cotton, Jul. 2010, co-advised with P. Fraise of Université de Montpellier II, Montpellier, France  
“Modélisation, dynamique et estimation du centre de masse de robots humanoïdes”,  
 (“Modeling, Dynamics, and Estimation of the Center of Mass of Humanoid Robots”)
- D. Myszka, Aug. 2009  
“Kinematic Synthesis and Analysis Techniques to Improve Planar Rigid-Body Guidance”

## **M.S. Thesis Research Directed**

- H. Ali, Dec. 2015, advised with D. Myszka  
“Reducing Structural Error in Function Generating Mechanisms via the Addition of Large Numbers of Double-Crank Linkages”
- K. Giaier, Dec. 2014, advised with D. Myszka  
“Designing Shape Changing Mechanisms for Planar and Spatial Applications”
- J. Nieman, May 2014, advised with D. Myszka  
“A Novel, Elastically-Based, Regenerative Brake and Launch Assist Mechanism”
- B. Li, Aug. 2013, advised with D. Myszka  
“Improving Techniques for Center of Mass Estimation Using Statically Equivalent Serial Chain Modeling”
- Y. Tong, May 2013, advised with D. Myszka  
“Four-bar Linkage Synthesis for a Combination of Motion and Path-Point Generation”



- L. Li, May 2013, advised with D. Myszka  
"Using the Singularity Trace to Understand Linkage Motion Characteristics"
- M. Sejba, Dec. 2004  
"The Development of Software Tools for the Redesign of Loading Arm Counter Balance Mechanisms"
- L. Perry, Aug. 2003  
"Contributions to the Synthesis of Ps4R Spatial Mechanisms, 6 DOF Spatial Open Chains, and Planar Four- bars, Six- bars and 3DOF Open Chains"
- J. Stevens, Aug. 2001  
"The Synthesis Form of the Constraint Manifold in the Design of Planar Parallel Manipulators"
- M. Hanchak, May 2000  
"Kinematic Synthesis of Binary and Continuously Actuated Planar Platforms"
- H. Stumph, May 2000  
"Kinematic Synthesis of Four and Six Link Mechanisms used in Mechanical Presses"

### **M.S. Project Research Directed**

- K. Brand, May 2018, advised with D. Myszka  
"Calibration and Protocol Improvements in Statically Equivalent Serial Chain Modeling"
- S. Conway, May 2017, advised with D. Myszka  
"Mechanical Design of Variable Geometry Extrusion Dies"
- J. Vogel, May 2017, advised with D. Myszka  
"Mechanical Design of Variable Geometry Extrusion Dies for Extreme Changes in Profile"
- A. Hazlett, Dec. 2016, advised with D. Myszka  
"Robotics Source Capsule Loading, Welding and Inspection"
- A. Swigert, Dec. 2015, advised with D. Myszka  
"Laser Scan Analysis of Variable Geometry Die Profiles"
- S. Kanathala, Dec. 2015, advised with D. Myszka  
"Analysis of Variable Geometry Die Joint Leakage"
- V. Jayaparakash, Dec. 2015, advised with D. Myszka  
"A Mechanical Regenerative Brake and Launch Assist using a Differential Mechanism and Elastic Energy Storage"
- C. Guan, May 2014, advised with D. Myszka  
"A Semi-Empirical Prediction Model for the Discharge Line Temperature of Hermetic Compressors"
- Y. Liang, May 2014, advised with D. Myszka  
"Assessment of Port Opening and Closing in a Scroll Compressor"
- B. O'Grady, Aug. 2010  
"Rapid Prototyping of Spherical Mechanisms"
- E. Grimm, Dec. 2006  
"Software for the Synthesis of Coupler-Driven Spherical Four-bar Mechanisms"
- S. Akepati, May 2006  
"Kinematic Synthesis Issues in Planar Three-Legged Platforms"
- S. Chuahan, Aug. 2005  
"Synthesizing Planar Platforms from RPR, PRR and RRR Chains"
- S. Bilen, May 2005  
"Position Selection to Generate Special Cases of Center-Point Curves"
- T. Blum, May 2005  
"Developing a Course in Innovative Design for Mechanical Engineers"
- D. Garner, Dec. 2003  
"The Relationship Between Poles and Degenerate Center-Point Curves"
- D. Martin, May 2002  
"Transition Linkages of Planar Four-Bar Mechanisms"

### **Undergraduate Honors Theses Directed**

- E. McGill, expected May 2018, co-advised with D. Myszka  
"Design of a Positioning Mechanism for CubeSat Solar Arrays"
- T. Rolfe, expected Dec. 2017, co-advised with D. Myszka

- “Design of a Shape-Changing Prosthetic Foot”
- L. Kozal, May 2017, co-advised with D. Myszka  
“Development of an Opposed-Stroke, Diesel Engine for Utility Aircraft”
- D. Bell, May 2016, co-advised with D. Myszka  
“Design and Prototyping of a Variable Geometry Extrusion Die to Exhibit Significant Alteration in Shape”
- P. Joyce, Dec. 2013, co-advised with D. Myszka  
“Development of a Spring-Based Automotive Starter System”
- T. Schubert, May 2012, co-advised with D. Myszka  
“Design, Prototyping, and Evaluation of an Elastically-Based Mechanical Starter for Automotive Engines”
- N. Direnzi, Dec. 2011, co-advised with D. Myszka  
“The Use of Elastically-Based Mechanical Energy Storage in Motor Vehicles”
- M. Plecnik, May 2010, co-advised with D. Myszka  
“Design of a Shape-Changing Rigid-Body Parabolic Light Reflector”
- T. Tarnacki, May 2003  
“Future Impact of Current and Past Technological Advancements”
- J. Ramsier, May 2002  
“The Techniques of Ancient Engineers”
- C. Schreier, Dec. 2001  
“Synthesizing a Machine to Replace Robotics in Complex Motion Assembly Tasks”
- K. Kindbom, May 2001  
“Influences of Geographically Dispersed Collaboration on the Future of Engineering Design”
- H. Stumph, May 1999  
“Design of a Webpage to Facilitate the Learning of Machine Theory”

### **Graduate Student Committees**

- L. Funke, Ph.D., May 2017, University of Notre Dame, J. Schmiedeler advisor
- A. González de Alba, Ph.D., Dec. 2014, Université Montpellier 2, M. Hayashibe & P. Fraise advisors
- K. Zhao, Ph.D., Dec. 2013, University of Notre Dame, J. Schmiedeler advisor
- J. Lauden, M.S., May 2013, University of Dayton, D. Myszka advisor
- A. Jennings, Ph.D., Aug. 2012, University of Dayton, R. Ordonez advisor
- B. O’Grady, M.S., Aug. 2010, University of Dayton, J. Joo advisor
- S-Y. Kim, Ph.D., Aug. 2007, University of Dayton, M. Daniels advisor
- V. Nabat, Ph.D., Mar. 2007, Université Montpellier 2, F. Pierrot advisor
- T. Mandourah, Ph.D., Oct. 2004, University of Dayton, A.R. Kashani advisor
- S. Shaikh, M.S., May 2004, University of Dayton, M. Turner advisor
- A. S. Mohammed, M.S., Aug. 2001, University of Dayton, A.R. Kashani advisor
- A. Mazdeh, M.S., Aug. 2000, University of Dayton, A.R. Kashani advisor

### **National Service Activities**

- **ASME Design Engineering Division**  
2016-2018 Mechanisms and Robotics Conference, Paper Awards Committee, chair  
2015 Mechanisms and Robotics Conference: Theoretical and Computational Kinematics Symposium Chair  
2013-2016 Mechanisms and Robotics Conference, Paper Awards Committee, member  
2010 International Design Engineering Technical Conferences, General Conference Program Chair  
739 accepted papers spanning 9 conferences  
2009 Mechanisms and Robotics Conference, Program Chair  
137 accepted papers  
Mechanisms and Robotics Committee Treasurer, 2004-2008  
Student Affairs Subcommittee Vice Chair, 2002-2007  
2007 Mechanisms and Robotics Conference: Medical Devices and their Applications Symposium Co-Chair  
2006 International Design Engineering Technical Conferences Exhibits Chair  
2005 Mechanisms and Robotics Conference: Mechanism Synthesis, Components and Applications Symposium Co-Chair  
2004 Mechanisms and Robotics Conference: Mechanism Synthesis, Components and Applications Symposium Co-Chair  
2002 Mechanisms and Robotics Conference: Chair of Interactive Presentations

- **ASME member** since 1998, **ASME fellow** since 2014
- **Associate Editor**  
ASME Journal of Mechanisms and Robotics, 2008-2015, 2017-2020
- **IEEE member** since 2015
- **IEEE Robotics and Automation Society Technical Committee on Human Movement Understanding**  
Founding member

### **University Service Activities**

- **University of Dayton**  
University of Dayton Research Council, 2016-2019  
Habits of Inquiry and Reflection Practical Wisdom Working Group, 2015-2017  
Distinguished Speaker Series Committee, 2011-2014  
University of Dayton Graduate School Summer Fellowship Program Decision Committee, 2010, 2011, 2013  
Search Committee, Dean of Students and Associate Vice President for Student Development, 2011  
Search Committee, University Honors Program Director, 2010  
Midterm Instructional Diagnostic facilitator, 2002-present  
Lilly Advisory Council, 2007-2010  
Faculty Development Committee, 2001-2004, 2006-2009  
Representative to Higher Learning Commission on Faculty Development, 2007  
Co-Chair, 18<sup>th</sup> Annual Stander Symposium, 2006-2007  
17<sup>th</sup> Annual Stander Symposium Steering Committee and Honors Convocation Subcommittee, 2005-2006
- **School of Engineering**  
Strategic Planning & Implementation Team, Invigorating Undergraduate Research Committee, 2016-2017  
Search Committee, Dean of the School of Engineering, 2014  
Innovation Minor Committee, 2012-2014  
Design and Manufacturing Clinic Council, 2000-2011  
Workload Committee, 2005-2006  
Undergraduate Studies Committee, 2004-2006  
Engineering Technology Peer Review of Faculty Committee, 2004-2005  
Chair, General Education and Competencies Subcommittee on Math and Natural Sciences, 2003-2004  
Chair, School of Engineering Awards for Excellence Committee, 2002  
Chair, School of Engineering Committee to review math curriculum, 2001-2002  
Task Force on Research and Graduate Studies, 1998-1999
- **Department of Mechanical & Aerospace Engineering**  
Undergraduate academic advising, 29 advisees currently, 1997-present  
Advisor, Pi Tau Sigma, 2000-present  
Promotion, Tenure and Post-tenure Review Committee, 2015-present  
Mechanical Engineering Department Tenure-Track Faculty Search Committee (for 3 positions), 2015-2016  
Hiring for Mission retreat, 2013  
Chair, Mechanical Engineering Department Tenure-Track Faculty Search Committee, 2012  
Sabbatical Review Committee, 2012  
Peer Evaluator, Peer Assessment of Teaching Committee, 2012  
Mechanical Engineering Department Lecturer Search Committee, 2011  
Mechanical Engineering Department Tenure-Track Faculty Search Committee, 2008  
Mechanical Engineering Department Tenure-Track Faculty Search Committee, 2001  
Have participated in:  
Women in Engineering, Open House, Career Awareness Day,  
Explore Engineering, Minority Engineering Program Open House,  
Wright Scholars Summer Program, Summer Honors Institute