CURRICULUM VITAE
Andres Tovar

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Updated: Nov, 2018

EDUCATION

Ph.D. Aerospace and Mechanical Engineering, University of Notre Dame, Indiana, Jan 2005
Dissertation: *Bone Remodeling as a Hybrid Cellular Automaton Optimization Process*
Advisor: John E. Renaud

M.S. Mechanical Engineering, University of Notre Dame, Indiana, May 2004
Advisor: John E. Renaud

M.S. Industrial Automation, National University of Colombia, Bogotá, Colombia, Sep 2000
Thesis: *Identification of Local Bifurcations in Dynamic Systems*
Advisor: Hernándo Díaz Morales

B.S. Mechanical Engineering, National University of Colombia, Bogotá, Colombia, Jul 1995
Thesis: *Dynamic Analysis of a Positioning Table for Machining Processes Using Bond Graphs*
Advisor: Fernando Mejía Umaña

PROFESSIONAL DEVELOPMENT

Certified, Technology Management and Commercialization Strategy, IC2 Institute at the University of Texas, Austin & Monterrey Technology Institute, Apr 2000 – Apr 2001.

APPOINTMENTS

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

Associate Professor, Mechanical and Energy Engineering, Aug 2017 – Present
Assistant Professor, Mechanical Engineering, Aug 2011 – Aug 2017
Adjunct Assistant Professor, Biomedical Engineering, Aug 2015 – Present

UNIVERSITY OF NOTRE DAME

Adjunct Associate Professor, Aerospace and Mechanical Engineering, Sep 2011 – Aug 2012
Research Assistant Professor, Aerospace and Mechanical Engineering, Aug 2008 – Aug 2011

NATIONAL UNIVERSITY OF COLOMBIA

Academic Provost, Bogotá Campus, Feb 2007 – Aug 2008
Department Chair, Mechanical and Mechatronic Engineering, Apr 2005 – Jan 2007
Associate Professor, Mechanical and Mechatronic Engineering, Jun 2005 – Feb 2012
Assistant Professor, Mechanical and Mechatronic Engineering, Dec 2000 – Jun 2005
Associate Lecturer, Mechanical Engineering, Dec 1998 – Dec 2000
Assistant Lecturer, Mechanical Engineering, Dec 1997 – Dec 1998
Teaching Assistant, Mechanical Engineering, Sep 1996 – Dec 1997

OTHER

Chair of Education and Student Relationships, SHPE Indiana Chapter, since Jan 2018
Founder and General Manager, Complex Design, LLC, since Jan 2017

Visiting Scholar, Federal University of Rio de Janeiro, Brazil, Dec 2006
Engineer, Tekniker, Mechatronics and Ultra-precision Eng. Division, Gipuzkoa, Spain, Jan–Dec 1999
Founder and General Manager, IngeCol Ltd, Colombia, Jun 1994–Jun 1995
Intern, Internal Combustion Machines Lab, University of Cataluña, Terrassa, Spain, Spring 1995
Intern, TermoRex Ltd., Thermo King Co. branch in Bogotá, Colombia, Winter 1994
Intern, Indumil, Colombian Military Industry, Bogotá, Colombia, Summer 1993

SPONSORED RESEARCH

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

Current (external)

1. General Motors. Title: Structural multiscale, multimaterial topology optimization for crashworthiness using Extended Hybrid Cellular Automata—Phases II and III. **Amount: $100,000**. Role: PI. Effort: 100%. Dates: April 2017 – Dec 2018.
2. National Science Foundation. Title: NRT-IGE: Promoting Creativity in Engineering/Technology Graduate Education. Role: co-PI. Effort: 20%. **Amount: $458,057**. Dates: Sep 2016 – Aug 2019.

Current (internal)

3. IUPUI Welcoming Campus Fund. Project Title: Creating a vibrant and inclusive student experience through multidisciplinary design projects and participation in intercollegiate competitions. Role: PI. **Amount: $50,000** ($25,000 cost-share from the E&T School). Dates: July 15, 2018 – May 15, 2019.
4. IUPUI-RSFG. Characterizing Flow Profiles, Perfusion Characteristics, and Tissue Response of Bioprinted Tissues in a Novel Perfusion Bioreactor System. Role: co-PI. Effort: 30%. **Amount: $35,000**. Dates: Jan 2018 – Dec 2018.
5. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of recycled HDPE and PP in extrusion-based additive manufacturing. Role: co-PI. Effort: 50%. **Amount: $10,000**. Dates: Sep 2018 – Apr 2019.

Pending (external)

6. U.S. Army U.S. Army Reserve Education Assistance Program (REAP). Title: Strain-rate sensitive properties of 3D-printed thermoplastics. **Amount: $4,000**. Role: PI. Effort: 100%. Dates: May 2018 – Aug 2019.
7. NSF. Developing a Microstructure-based Simulation and Optimization Platform to Improve Lithium Ion Battery Performance. **Amount: $200,000**. Role: Co-PI. Effort: 30%. Dates: Sep 2018 – Jan 2020.

Pending (internal)

8. (none)

Completed (external)

9. Detroit Mercy Dental. Title: The Biomechanical Effects of Implantoplasty on Dental Implant with Compromised Bony Supports: A Finite Element Model. Role: PI. Effort: 100%. **Amount: $5,000**. Dates: Sep 1, 2017 – Aug 31, 2018.
10. Honda R&D Americas. Title: Topology Crash Optimization of Progressively Buckling Thin-walled Structures using Tubular Compliant Mechanisms—Improved Conceptual Design using a Target Dynamic Response. Role: PI. Effort: 100%. **Amount: $201,748**. Dates: June 2015 – May 2018.
11. Walmart U.S. Manufacturing Innovation Fund. Title: Optimal plastic injection molding tooling design and production through advanced additive manufacturing. **Amount: $291,202**. Role: PI. Effort: 35%. Dates: Aug 2014 – Mar 2018.

12. U.S. Army U.S. Army Reserve Education Assistance Program (REAP). Title: Strain-rate sensitive properties of 3D-printed thermoplastics. **Amount: $4,000**. Role: PI. Effort: 100%. Dates: May 2017 – Aug 2017.
13. General Motors. Title: Structural multiscale, multimaterial topology optimization for crashworthiness using Extended Hybrid Cellular Automata. **Amount: $100,000**. Role: PI. Effort: 100%. Dates: May 2016 – Nov 2016.
14. U.S. Army REAP. Title: Strain-rate sensitive properties of 3D-printed thermoplastics. **Amount: $4,000**. Role: PI. Effort: 100%. Dates: May 2016 – Aug 2016.
15. The Raytheon Foundation. Title: Development and Evaluation Additive Manufacturing Technologies. **Amount: $10,000** (donation). Role: PI. Effort: 100%. Dates: March – Dec 2015.
16. Honda R&D Americas. Title: Nonlinear Crashworthiness Design Tool Development Using Hybrid Cellular Automata. Role: PI. Effort: 100%. **Amount: $139,000**. Dates: Apr 2012 – Oct 2014.
17. University of Notre Dame Alumni Association: Design of Robotic Football Players. Role: Advisor. Effort: 100%. **Amount: $5,000**. Dates: Aug 2012 – Aug 2014.
18. Air Force Office of Scientific Research (AFOSR), sub-award from the University of Notre Dame. Title: *Nanocomposite Materials Design Optimization with Experimental Validation for Engineered Microstructure at Multiple Length-Scales*. Role: PI. Effort: 100%. **Amount: $70,000**. Dates: Oct 2012 – Sep 2013.
19. BISHOP Steering Technology Inc. Title: Development of Advanced Direct-generated G-code CNC program based on NURBS geometry. Role: Co-PI. Effort: 50%. **Amount: $4,000**. Dates: Jun - Sep 2013.
20. NASA Indiana Space Grant Consortium (INSGC). Title: Design of space exploration vehicle structures and mechanisms for operation in uncertain environments. Role: PI. Effort: 100%. **Amount: $10,000**. Dates: May 2012 – May 2013.
21. U.S. Army TARDEC/Mississippi State University, Simulation Based Reliability and Safety (SimBRS) Program, sub-award from the University of Notre Dame. Title: *Multifunctional Nano-Ceramic Composite Design Optimization and Blast-Worthiness Design Using Hybrid Cellular Automata for Improved Soldier Survivability*. Role: PI. Effort: 100%. **Amount: $61,551**. Dates: Aug 2011 – Mar 2012.

Completed (internal)

22. IUPUI OVCR Release Time for Research (RTR). Title: Improved crashworthiness in lightweight automotive vehicles through material substitution and shape optimization with carbon fiber-reinforced composites. Phase 2: metamodel-based global optimization. **Amount: $10,000**. Role: PI. Effort: 100%. Dates: Jan 2018 – May 2018.
23. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Application recycled plastic in extrusion-based additive manufacturing. Role: co-PI. Effort: 50%. **Amount: $10,000**. Dates: May 2018 – Aug 2018.
24. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Suitability of recycled plastic for extrusion-based additive manufacturing. Role: PI. Effort: 50%. **Amount: $7,000**. Dates: Sep 2017 – Apr 2018.
25. IUPUI OVCR Funding Opportunities for Research Commercialization and Economic Success (FORCES). Title: Commercialization of a Topology Optimization Algorithm to Design Lightweight, Multi-Functional Components with Optimized Internal Cellular (Porous) Structure. **Amount: $25,000**. Role: PI. Effort: 100%. Dates: May 2016 – May 2017.
26. Sports Innovation Institute at IUPUI, Inaugural Grant Program. Title: Design of organic-shaped sport helmets through bioinspired form-finding and optimization algorithms. Role: PI. Effort: 75%. **Amount: $20,000**. Dates: Jan 2017 – Dec 2017.
27. Purdue Research Foundation (PRF) International Travel Grant. **Amount: $1,000**. Date: Jun 2017.

28. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Modeling and Validation of Basic Cellular Metabolism in Spheroids Used for Scaffold-Free 3D Bioprinting. Role: co-PI. Effort: 33%. **Amount: $20,000**. Dates: May 2017 – Aug 2017.
29. IUPUI OVCR Release Time for Research (RTR). Title: Improved crashworthiness in lightweight automotive vehicles through material substitution and shape optimization with carbon fiber-reinforced composites. Phase 1: material modeling and simulation. **Amount: $10,000**. Role: PI. Effort: 100%. Dates: Sep 2016 – Dec 2016.
30. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Modeling and Validation of Basic Cellular Metabolism in Spheroids Used for Scaffold-Free 3D Bioprinting. Role: co-PI. Effort: 33%. **Amount: $20,000**. Dates: Aug 2016 – May 2017.
31. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Development of additive manufacturing technologies to 3D print with recycled mixed shredded plastic. **Amount: $15,000**. Role: PI. Effort: 50%. Dates: May 2016 – Aug 2016.
32. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Development of the 3D printing technologies to reduce the cost of filament fused fabrication. Role: PI. Effort: 50%. **Amount: $10,000**. Dates: Aug 2015 – Apr 2016.
33. Purdue Research Foundation (PRF) Doctoral Research Grant. Title: Multiscale Topology Optimization of Nonlinear Structures. Role: Research Advisor. **Amount: $18,000**. Dates: June 2015 – May 2016.
34. Purdue Research Foundation (PRF) Summer Faculty Grant. Title: Biometric topology optimization algorithms for 3D printed lightweight impact protective structures: From Safer Helmets to Enhanced Vehicle Crashworthiness. Role: PI. Effort: 100%. **Amount: $10,400**. Dates: June – July 2015.
35. Engineering Excellence Research Fund, Purdue School of E&T. Title: Optimization of IUPUI Robotics Reception Performance via a Semi-Autonomous Control System for Determination of Target Angular Position and Distance. Role: Advisor. Effort: 100%. Student: Anna Glumb **Amount: $2,500**. Dates: Sep 2014 – Apr 2015.
36. Engineering Excellence Research Fund, Purdue School of E&T. Title: Optimal Plastic Injection Molding Tooling and Production through Advanced Additive Manufacturing. Role: Advisor. Effort: 100%. Student: Ricardo A. Ortiz. **Amount: $2,500**. Dates: Sep 2014 – Apr 2015.
37. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: 3D printing optimization for smooth surface generation in complex mechanical components. Role: PI. Effort: 35%. **Amount: $32,000**. Dates: Aug 2014 – Apr 2015.
38. RISE Curriculum Development Grant, IUPUI. Title: Development of a Research course on Design of Mechanical Systems. Role: PI. Effort: 100%. **Amount: $2,500**. Dates: Aug 2012 – Aug 2014.
39. Purdue Research Foundation (PRF) International Travel Grant. **Amount: $1,000**. Date: Sep 2014.
40. Engineering Excellence Research Fund, Purdue School of E&T. Title: Design Optimization of Lightweight Crashworthy Structures for Uncertain Collision Scenarios. Role: Advisor. Effort: 100%. Student: Ricardo Ortiz **Amount: $2,500**. Dates: Oct 2013 – Apr 2014.
41. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: *Agent-based design of ultra-lightweight materials and components*. Role: PI. Effort: 50%. **Amount: $15,800**. Dates: May– Aug 2013.
42. Purdue Research Foundation (PRF) International Travel Grant. **Amount: $1,000**. Date: Sep 2012.
43. Engineering Excellence Research Fund, Purdue School of E&T. Title: Crash Analysis and Multidisciplinary Design Optimization of Lightweight Vehicle Chassis: Application to Electric Vehicle Design. Role: Advisor. Effort: 100%. Student: Sara Grimany. **Amount: $2,430**. Dates: Oct 2011 – Apr 2012.

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44. National Science Foundation (NSF) REU Supplement. Title: GOALI: Hybrid Cellular Automata for Topology and Topography Synthesis in Automotive Structural Design. Role: PI. Effort: 100%. **Amount: $12,000**. Dates: May – Jun 2011.
45. National Science Foundation (NSF) REU Supplement. Title: Multiscale Design Tool Development for High Performance Nanocomposites. Role: PI. Effort: 100%. **Amount: $12,000**. Dates: May – Jun 2011.
46. Air Force Office of Scientific Research (AFOSR). Title: Nanocomposite Materials Design Optimization with Experimental Validation for Engineered Microstructure at Multiple Length-Scales. Role: Co-PI. Effort: 15%. **Amount: $832,197**. Dates: Sep 2009 – Sep 2012.
47. U.S. Army TARDEC/Mississippi State University, Simulation Based Reliability and Safety (SimBRS) Program. Title: *Multifunctional Nano-ceramic Composite Design Optimization and Blast-worthiness Design using Hybrid Cellular Automata for Improved Soldier Survivability*. Role: Co-PI. Effort: 15%. **Amount: $1,051,346**. Dates: Apr 2009 – Sep 2011.
48. Honda R&D Americas. Title: Nonlinear Crashworthiness Design Tool Development Using Cellular Automata. Role: Co-PI. Effort: 50%. **Amount: $53,436**. Dates: Jun 2010 – May 2011.
49. A.M. General. Title: Optimization of Structures for Energy Absorption and Dissipation under Extreme Loads. Role: Co-PI. Effort: 50%. **Amount: $37,388**. Dates: Apr 2010 – Mar 2011.

NATIONAL UNIVERSITY OF COLOMBIA

50. Office of Research Fund at the National University, Bogotá campus. Title: Design Optimization of Shape and Materials for Composites. Role: PI. Effort: 100%. **Amount: $15,000**. Dates: Aug 2007 – Aug 2009.
51. Colombian Navy Corporation for the Development of Science and Technology (Cotecmar). Title: *Multidisciplinary Optimum Design of a Combat Boat*. Role: PI. Effort: 35%. **Amount: $50,000**. Dates: Oct 2007 – Mar 2008.
52. Office of Research Fund at the National University, Young Investigator Award. Title: Structural Optimization Using Hybrid Cellular Automata. Role: PI. Effort: 100%. **Amount: $15,000**. Dates: Aug 2005 – Aug 2007.
53. Office of Research Fund at the National University, Bogotá campus. Title: Design and Manufacturing of a Myoelectric Hand Prosthesis. Role: Co-PI. Effort: 50%. **Amount: $15,000**. Dates: Nov 2005 – Nov 2007.
54. Office of Research Fund at the National University, Bogotá campus. Title: Technology for Prosthetic Design and Manufacturing. Role: Co-PI. Effort: 50%. **Amount: $15,000**. Dates: Sep 2004 – Sep 2007.

PATENTS AND INVENTIONS

1. IURTC Project # 2016-104: Porous 3D Topology Optimization Design Algorithm: A. Tovar, K. Liu, and T. Wu, 2016.
2. IURTC Project # 2016-073: Advanced layered composite for energy dissipation using a 3D lattice of micro compliant mechanism array: A. Tovar and V. Gokhale, 2016.
3. IURTC Project # 2015-080: Computational Design Algorithm: Thermo-Mechanical Topology Optimization: A. Tovar, K. Liu, and T. Wu, 2015.
4. IURTC Project 2015-178: Algorithm for Modeling Solids as Porous Materials in CAD: A. Tovar, K. Liu, and T. Wu, 2015.
5. Invention Disclosure: Electrode Microstructure Optimization. Schubert, P., L. Zhu, and A. Tovar, U.S. Patent Application through IURTC, Filed: June 29, 2014.

6. Provisional U.S. Patent Application No. 61/830: Ultra-lightweight Sinusoidal Blast Mitigating Structure. Tovar, A. and J. Israel, Filed June 4, 2013.
7. IU 13069-2012: Compliant Tubular Structures for Controlled Energy Absorption under Crash. A. Tovar, and P. Bandi, U.S. Patent Application filed: November 2012.

HONORS AND AWARDS

1. SHPE STAR Award, Educator of the Year 2018
2. Indiana University Trustees Teaching Award 2016 ($2,500)
3. IUPUI Wisner-Stoelk Outstanding Faculty Award 2015 ($1,000)
4. Grand Prize Winner, DOE/ARPA-E-Local Motors LITECAR Challenge 2015 ($60,000)
5. IUPUI Department of Athletics Favorite Professor 2014-2015
6. SAE Ralph R. Teetor Educational Award 2014
7. Best Faculty Advisor, IUPUI Purdue School of Engineering and Technology 2013-2014
8. IUPUI Department of Athletics Favorite Professor 2013-2014
9. IUPUI Department of Athletics Favorite Professor 2012-2013
10. ROSAM Project Second Place Design Team Faculty Advisor, NAVSEA Crane Division, Apr 2012
11. AIMUM Recognized Department Chair 2005-2007, Jul 2011
12. Young Investigator Award, National University of Colombia, 2005-2007
13. Fulbright Scholar, PhD at the University of Notre Dame, 2001–2004
14. Honored M.S. Thesis in Industrial Automation, National University of Colombia, 2000
15. Outstanding Faculty Recognition, National Univ. of Colombia, Dept. Mechanical Eng., Dec 2000
16. CYTED Scholar, Santa Cruz de la Sierra, Bolivia, Summer 1998
17. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Spring 1997
18. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Fall 1996
19. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Fall 1995
20. First runner up, Undergraduate Research Academic Excellence Program, National U of Col, Nov 1995
21. Distinguished B.S. Research Thesis, National Univ. of Colombia, Dept. Mechanical Eng., Jun 1995
22. Intercampus Scholar, Latin America–Spain Program, Polytechnic University of Catalonia, Spring 1995
23. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Fall 1993
24. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1993
25. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Fall 1992
26. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1991
27. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1990
28. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1989

TEACHING

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

(Taught 4 undergraduate level courses and 4 graduate level courses)

- Optimal Design of Mechatronic Systems (ME 59700 developed): Fall 2017
- Design of Complex and Origami Structures (ME 59700 developed): Spr 2017, Spr 2018
- Additive Manufacturing (ME 59700 developed): Fall 2015, Fall 2016, Fall 2017
- Advanced Dynamics (ME 56200): Spr 2015
- Basic Engineering Mechanics—Statics and Dynamics (EEN 24000): Spr 2013
- Basic Mechanics II—Dynamics (ME 27400): Fall 2014, Fall 2011

- Design of Mechanisms (ME 37200, Spring 2012, Fall 2012, Fall 2013)
- Machine Design (ME 45310 developed): Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017
- Optimal Design of Complex Mechanical Systems (ME 59700 developed): Spr 2014, Spr 2016
- Topology Optimization (ME 59700 developed): Sum 2012, Sum 2014, Sum 2015, Sum 2017

UNIVERSITY OF NOTRE DAME

(Taught 3 undergraduate and 2 graduate level courses)

- Design Methodology (AME 30362, Fall 2008)
- Introduction to Engineering – Learning Center (EG 11111, Fall 2009)
- Introduction to Engineering – Lectures (EG 10111, Fall 2009)
- Optimum Design of Mechanical Elements (AME 60661, Spring 2009, Spring 2010).
- Topology Optimization (AME 60662, Spring 2011): Project-based graduate-level course.

NATIONAL UNIVERSITY OF COLOMBIA

(Taught 6 graduate courses and 9 undergraduate courses. Co-lectured over 12 courses in Engineering, Medicine, Applied Mathematics, and Fine Arts)

- Automation of Manufacturing Processes (Senior): Fall 1997
- Biomechanical Engineering (Grad): Spring 2005, Spring 2006, Spring 2007
- Biomedical Engineering Fundamentals for Engineers (Grad): Spring 2007
- Descriptive Geometry (Freshman): Fall 1998, Spring 2000, Fall 2000, Spring 2001
- Engineering Fundamentals for non-Engineers (Grad): Spring 2007
- Finite Element Analysis (Senior): Spring 2005
- Graduate Research Seminar in Biomechanics (Grad): Fall 2007
- Graduate Research Seminar in Optimization (Grad): Fall 2007
- Mechanical Technology (Freshman): Fall 1996, Spr 1996, Fall 1997, Spr 1997, Fall 1997, Spr 1998, Fall 1998
- Machine Design (Senior): Fall 1998, Spring 2000, Fall 2000, Spring 2001
- Machining Processes (Senior): Fall 1997
- Mechatronic Design (Senior): Spring 2011
- Optimal Design of Industrial Processes (Grad): Fall 2004, Fall 2005, Fall 2006, Summer 2007
- Technical Drawing (Freshman): Fall 1998, Spring 2000, Fall 2000, Spring 2001

INVITED SEMINARS

1. Tovar, A., *Design of lightweight vehicle structures using lessons from nature*. SHPE 2018 National Convention, Cleveland, Ohio, Nov 7-11, 2018
2. Tovar, A., *Design of Cellular Structures for Crashworthiness*. Seminar at the University at Buffalo, Buffalo, New York, Nov 1, 2018.
3. Tovar, A., *Design of Origami and Complex Structures*. Rolls-Royce, Indianapolis, Indiana, Jun 29, 2018.
4. Tovar, A., *Integration of Engineering, Technology, and Arts in Graduate-level Education*. Allegion Plc, Carmel, Indiana, Jan 23, 2018.
5. Tovar, A., *How Additive Manufacturing is Transforming the Plastic Processing Industry*. Logitech, May 22, 2017
6. Tovar, A., *Design of complex structures and additive manufacturing*, SENA, Cali, Colombia, Dec 13 and 14, 2016

7. Tovar, A., *Control-Based Structural Design for Crashworthiness Using Cellular Automata*, Electrical and Computer Engineering Research Seminar, IUPUI, Nov 9, 2016.
8. Tovar, A., *Leadership Symposium Panel*, IUPUI Engr. and Technology, Oct 12, 2016
9. Tovar, A., *NSF, NIH, and industry grant applications*, IUPUI Engr. and Technology Convocation, Aug 19, 2016
10. Tovar, A., *Sustainable 3D Printing.* Indy's Open Source Circular Economy (OSCE) Days 2016, Indianapolis, IN, June 9-13, 2016
11. Tovar, A., *Design and Art in Engineering*. Thompson Crossing Elementary, Southeast Marion County, IN, Apr 28, 2016
12. Tovar, A., *Topology optimization of cellular materials: from lightweight vehicles and porous injection molds to prosthesis and scaffolds*. Biomedical Engineering Research Seminar, IUPUI, Apr 8, 2016
13. Tovar, A., *Bioinspired design of impact-protective structures: from safer helmets to lightweight automotive structures*. International Research Conference on Health Science, Education, and Music (CINVEST), Paipa, Colombia, Nov 19-20, 2015 (keynote speaker)
14. Tovar, A., *Bio-inspired structural design*. IUPUI Biology Fall Research Seminar, Sep 11, 2015.
15. Tovar, A., *Advances in Optimal Design of Structures for Crashworthiness*. General Motors Corporation. Warren, Michigan, May 22, 2015
16. Tovar, A., *Design for Additive Manufacturing (3D Printing)*. The Scientech Club. Indianapolis, Indiana, May 11, 2015
17. Tovar, A., *Design for crashworthiness*. 4th Symposium for Design Optimization and Simulation-Based Design, New Advancements, Technology and Future, Northwestern University, Evanston, Illinois. Dec 5, 2014
18. Tovar, A., *Mathematical programming in topology optimization*. University of Illinois at Urbana-Champaign, Dept. of Civil and Environmental Engineering. Invited by Prof. G.H. Paulino. Nov 20, 2014
19. Tovar, A., *Optimal design and additive manufacturing (3D printing) of ultra-lightweight structures*. Raytheon, Indiana, Jun 4, 2014.
20. Tovar, A., *Mathematical programming in topology optimization*. University of Illinois at Urbana-Champaign, Dept. of Civil and Environmental Engineering. Invited by Prof. G.H. Paulino. Nov 12, 2013
21. Tovar, A., *Welcome to Engineering freshmen students*. Purdue School of Engineering & Technology at IUPUI, Indianapolis, IN, Aug 13, 2013.
22. Tovar, A., *Mathematical programming in topology optimization*. University of Illinois at Urbana-Champaign, Dept. of Civil and Environmental Engineering. Invited by Prof. G.H. Paulino. Nov 27, 2012.
23. Tovar, A., *Emerging Technologies in Engineering*. Society of Hispanic Professional Engineers, IUPUI Chapter Indianapolis, IN, Apr 19, 2012.
24. Tovar, A., *Structural and Material Optimization*. IUPUI Mechanical Engineering Dept. Industry Advisory Board Meeting, Indianapolis, IN, Dec 16, 2011.
25. Tovar, A., *In Memoriam John Eldon (Jack) Renaud*. ASME International Design Engineering Technical Conference & Computers and Information in Engineering Conference (IDETC 2011), Washington, DC. Aug 28–31, 2011
26. Tovar, A., Keynote speaker: *Topology Optimization of Nonlinear Structures Subject to Impact*. 5th International Conference on Mechanical Engineering (CIMM 2011), Bogotá, Colombia, Aug 11–12, 2011.
27. Tovar, A., *Hybrid Cellular Automata: From Bone Remodeling to Crashworthiness Design*. 2nd Symposium for Design Optimization and Simulation-Based Design, New Advancements, Technology and Future, Northwestern University, Evanston, Illinois. Dec 8, 2010.

28. Tovar, A., *Cellular Automata and Other Emerging Technologies in Design Optimization*. Society of Women Engineers, Professional Development Conference, Fort Wayne, Indiana. Mar 20, 2010.
29. Tovar, A., *Crashworthiness Design Using Topology Optimization*. Symposium for Design Optimization and Simulation-Based Design, New Advancements, Technology and Future, Northwestern University, Evanston, Illinois, Nov 11, 2008.
30. Tovar, A., *Biomechanics, Biomechatronics and Other Emerging Technologies*. 20th Show of Machines and Prototypes, College of Engineering, National University of Colombia, Bogotá, Colombia. April 27, 2007.
31. Tovar, A., *Structural Optimization with HCA.* Invited by the Department of Mechanical Engineering. Worked with Dr. José Herskovits, Federal University of Rio de Janeiro, Brazil. Dec 7, 2006.
32. Tovar, A., *Mechanics, Biomechanics and Biomechatronics*. Symposium on Mechanical Engineering, Celebration of 145th Anniversary of the College of Engineering, National University of Colombia, Nov 24, 2006.
33. Tovar, A., *Artificial Limb Design*. Keynote speaker at the Engineering Week, Saint Thomas Aquinas University, Bogotá, Colombia. Nov 16, 2006.
34. Tovar, A., *Prosthetic Design and Bone Remodeling*. Research Meeting on Mechanical Engineering. University of Ibagué–Cooruniversitaria. Ibagué, Colombia. October 13, 2006.
35. Tovar, A., *Support of Modeling to Solve Problems in Engineering.* Seminar on *Engineering Problems: Making Science Work*. College of Engineering, National University of Colombia, Bogotá, Colombia. Oct 5, 2006
36. Tovar, A., *Technology for Prosthetic Design and Manufacturing*. Presentation of Projects Founded by the Research Division of the National University of Colombia, Bogotá, Colombia. October 12, 2006.
37. Tovar, A., *Structural Optimization with Hybrid Cellular Automata*. Third International Conference on Mechanical Engineering and First on Mechatronic Engineering (CIMM 2006). Bogotá, Colombia. Sep 20–22, 2006.
38. Tovar, A., *Simulation of the Process of Bone Functional Adaptation Using HCA*. First Bi-national Congress Colombia–Venezuela on Mechanical and Industrial Engineering. Mérida, Venezuela, May 18–20, 2006
39. Tovar, A., *Computational Models of the Human Body and Cellular Automata*. Colombian Society for the Development of Science (ACAC), Expociencia – Expotecnología, Bogotá, Colombia, Oct 18, 2005.

POSTER PRESENTATIONS

1. Cardona, C., S. Anwar, and A. Tovar. *Optimal design of self-unfolding origami structures*. SHPE 2018 National Convention, Cleveland, Ohio, Nov 7-11, 2018.
2. Sarah Pugliese, A. Tovar. *Investigation of Phase Field Methods in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
3. Sophia Kardadi, A. Tovar. *The Level Set Method in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
4. John Rowe, A. Tovar. *Adjoint Methods in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
5. Cardona-Serrano, C., A. Siegel, A. Tovar. *Additive Manufacturing with recycled plastic from everyday household items*. IUPUI Center for Research and Learning, Division of Undergraduate Education, Indianapolis, Nov. 17, 2017.
6. Valladers-Guerra, H., A. Jones, A. Tovar. *Surrogate-Based Global Optimization of Composite Material Parts under Dynamic Loading*. 2nd Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 11, 2017.

7. Najmon, J., V. Gokhale, P. Tapkir, A. Tovar. *Design of Sport Helmet Liner through the Topology Optimization of a Compliant Mechanism Lattice Structure*. 2nd Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 11, 2017.
8. Liu, K., D. Detwiler, A. Tovar. *Design of Protective Vehicle through Multiscale Structural Optimization*. 2nd Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 11, 2017.
9. Raeisi, S., P. Tapkir, A. Tovar. *Topology design of crashworthy structures for minimum peak crushing force and penetration*. 2nd Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 11, 2017.
10. Tong, W., A. Tovar. *Multiscale, thermomechanical topology optimization of self-supporting cellular structures for porous injection molds*. 2nd Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 11, 2017.
11. Luther, L, U. Kasacheuski, Q. Deng, J, Zhou, A. Siegel, A. Tovar. *Suitability of Recycled ABS-HDPE Plastic Blends for Extrusion-based Additive Manufacturing*. IUPUI Nanotechnology Research Forum and Poster Symposium, Indianapolis, IN, USA, Nov 18, 2016.
12. Sego, T.J., U. Kasacheuski, A. Tovar, N. Moldovan. *Hybrid Cellular Automata Modeling of Cellular Dynamics and Metabolism*. International Biofabrication 2016 Conference, Wake Forest Institute, Winston-Salem, North Carolina, October 29-31, 2016.
13. Sego, T.J., U. Kasacheuski, A. Tovar, N. Moldovan. *Hybrid CA Modeling of Cellular Dynamics and Metabolism*. IUPUI 3D Bioprinting Core Symposium, Oct 21, 2016.
14. Sego, T.J., U. Kasacheuski, N. Moldovan, A. Tovar. *Hybrid CA Modeling of Cellular Dynamics and Metabolism*. 1st Annual School of Engineering & Technology Leadership Symposium, Indianapolis, Oct 12, 2016.
15. Wu, T., S.A. Jahan, Y. Zhang, H. El-Mounayri, J. Zhang, D. Acheson, R. Nalim, A. Tovar. *Optimization of Multiphase Lattice Structures Subjected to Thermal and Mechanical Loads*. 1st Annual School of Engineering & Technology Leadership Symposium, Oct 12, 2016.
16. Chaudhari, P., P. Tapkir, A. Tovar. *Optimal Design of Lightweight Crashworthy Structures for Improved Energy Absorption*. 1st Annual School of Engineering & Technology Leadership Symposium, Oct 12, 2016.
17. Solis-Ocampo, J., H. Valladares, A. Tovar. *Multimaterial Topology Optimization with Ordered SIMP Interpolation*. 1st Annual School of Engineering & Technology Leadership Symposium, Oct 12, 2016.
18. Liu, K., D. Detwiler. A. Tovar. *Design of Protective Vehicle through Multiscale Structural Optimization*. 1st Annual School of Engineering & Technology Leadership Symposium, Oct 12, 2016.
19. Sego, T.J., Y. T. Hsu, T. M. Gabriel Chu, and A. Tovar. *On the Significance and Predicted Functional Effects of the Crown-to-Implant Ratio: a Finite Element Study of Long-Term Implant Stability Using High-Resolution, Nonlinear Numerical Analysis*. IUPUI Research Day 2016, Indianapolis, IN, Apr 8, 2016.
20. Isaacs, A., D. Rodriguez-Gambetta, C. Cardona-Serrano, C. Marko, X. Zongying, and A. Tovar. *Determining Optimal Characteristics of Filament for Fused Filament Fabrication (FFF) 3D Printing Technology*. IUPUI Research Day 2016, Indianapolis, IN, Apr 8, 2016.
21. Liu, K., Z. Xu, A. Tovar, D. Detwiler. *Discovering Protective Vehicle Designs through Multiscale Structural Optimization*. Poster session, Joint Board of Advisors Meeting, Oct 13, 2015.
22. Cardona-Serrano, C. and A. Tovar. *Design of Transmission Systems for Additive Manufacturing Demonstrated by the 3D Printing of a Harmonic Drive*. 29th Annual National Conference on Undergraduate Research (NCUR 2015), Spokane, WA, April 16-18, 2015.

23. Wu, T., S.A. Jahan, P. Kumaar, A. Tovar, H. El-Mounayri, Y. Zhang, J. Zhang, D. Acheson, K. Brand, R. Nalim. *Design Optimization of Injection Molds with Conformal Cooling for Additive Manufacturing*. Poster session, IUPUI Research Day 2015, Indianapolis, IN, Apr 17, 2015.
24. Allen, T., and A. Tovar. *The Development of a Wireless Control System for Integration on Drones Engineering and Technology*. IUPUI Research Day 2015, Indianapolis, IN, Apr 17, 2015.
25. Ozdemir, H, D. Rodriguez-Gambetta, J. Mendoza, G. K. Wong, L. Li, and A. Tovar. *Trajectory Planning for Additive Manufacturing Based on Mechanical Performance*. IUPUI Research Day 2015, Indianapolis, IN, Apr 17, 2015.
26. Cardona-Serrano, C. and A. Tovar. *Design of Transmission Systems for Additive Manufacturing Demonstrated by the 3D Printing of a Harmonic Drive*. Indiana University Undergraduate Research Conference (IUURC 2014), Bloomington, IN, Nov 21-22, 2014.
27. Charlton, K. A., C. Kello, and A. Tovar. *Topology Optimization and 3D Printing of a Lightweight Protective Robotic Vehicle Structure*. IUPUI Research Day 2014, Indianapolis, IN, April 11, 2014.
28. Allen, T. and A. Tovar. *Design of Radio Communication Control System for Robotic Applications*. IUPUI Research Day 2014, Indianapolis, IN, April 11, 2014.
29. Reynolds, A, S. Mukhopadhyay, and A. Tovar. *Genetic Network Programming Learning Process Applied to Agent-Based Structural Design*. CRL poster presentations, Indianapolis, IN, July 26, 2013.
30. Angrick, Q., S. Mukhopadhyay, and A. Tovar. *Exploring Risk Analysis for Design of Multiscale Structures under Uncertain Design Hazards*. CRL poster presentations, Indianapolis, IN, July 26, 2013.
31. Wang, Y., S. Mukhopadhyay, and A. Tovar. *Sugarscape model for Agent-Based Structural Design*. CRL poster presentations, Indianapolis, IN, July 26, 2013.
32. Chow, K. H., S. Mukhopadhyay, and A. Tovar. *Exploring Genetic Algorithm for Numerical Optimization*. CRL poster presentations, Indianapolis, IN, July 26, 2013.
33. Liu, K., S. Shinde, A. Tovar. *Design of energy absorbing lightweight structures for improved vehicle crashworthiness*. Poster session, Joint Board of Advisors Meeting, Oct 25, 2013.

RESEARCH MENTORING AND ADVISING

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

Ph.D. students

- Joel Najmon (Aug 2018 – Aug 2022): *Energy absorption with smart cellular materials*
- Homero Valladares Guerra (Aug 2017 – Aug 2021): *Design of composite structures for crash*
- T.J. Sego (Aug 2016 – Aug 2020) *Multi-phase topology optimization and 3D bio printing*
- Sajjad Raeisi (Aug 2015 – Aug 2019): *Design of porous structures for crash*
- Tong Wu (Aug 2013 – Dec 2018): *Thermo-mechanical multiscale design*
- Kai Liu (Aug 2013 – Jun 2018): *Multimaterial topology optimization and crashworthiness*

M.S. students

- Namrata Upadhyaya (Jan 2017 – present): *Optimal design of injection molds with lattice cooling*
- Joel Najmon (Jan 2017 – Dec 2017): *Simulation-based methods for helmet design*
- Prasad Tapkir (Aug 2016 – Dec 2017): *Design for crashworthiness using hybrid cellular automata*
- Jennifer Solis Ocampo (Aug 2015 – Aug 2017): *Design of multimaterial structures*
- Prathamesh Chaudhari (Jun 2014 – present): *Design for crash/safety*
- Homero Valladares Guerra (Aug 2015 – Aug 2017): *Design of composite structures for crash*
- T.J. Sego (Jun 2015 – Aug 2016, co-advised by G. Chu): *Nonlinear analysis of dental implants*
- Fabian Lischke (Jan 2015 – Aug 2016): *Design for additive manufacturing*
- Vaibhav Gokhale (Jun 2014 – Aug 2016): *Design of advanced composite helmets*
- Nishanth Sai Reddy Bhimireddy (Aug 2013 – present): *High strain rate material testing and design*

- Sai Ashish Kanna (Jun 2013 – present, co-advised by H. El-Mounayri): *G-code optimization*
- Parisa Ghane (Jun 2014 – Aug 2015, co-advised by L. Li): *Brain-computer interface*
- Kunal Khadke (Nov 2011 – May 2015): *Ceramic composite material design under uncertainty*
- Anahita Emami (Aug 2012 – Aug 2014): *Microstructured material design*
- Satyajeet Shinde (Sep 2011 – May 2014): *Vehicle component design for crashworthiness*
- Kai Liu (May 2012 – Aug 2013), *Multiscale Topology Optimization*
- Joshua Israel (Oct 2011 – May 2013), *Optimization of Structures under Blast Loading*

Post-doctoral visiting scholars

- Xuebin Fan (2017-18, Northeast Electric Power University, China)
- Yaghob Gholipour (2017-18, University of Teheran, Iran)
- Chi "Chris" Di (Aug 2015 – Aug 2016, Beijing University of Aeronautics and Astronautics, China)
- Weigang An (Dec 2012 – Dec 2013, Northwestern Polytechnic University, China)

Ph.D. visiting scholars

- Edwin Prieto (Summer and Fall 2018)
- Jaime Arcos Legarda, Nat U of Colombia (Fall 2012, AY 2017-18): *Design of mechatronic systems*

Undergraduate students

- Sarah Pugliese (Brown University), NSF REU, Summer 2018, Topology optimization
- Sophia Kardadi (University of Notre Dame), NSF REU, Summer 2018, Topology optimization
- John Rowe (Clemson University), NSF REU, Summer 2018, Topology optimization
- Megan Miller, MURI, Summer 2018, AM with recycled plastic
- Kaylee Crowell, MURI, Summer 2018, AM with recycled plastic
- Rachel Cadle, MURI, Summer 2018, AM with recycled plastic
- Pratik Rath, MURI, Summer 2018, AM with recycled plastic
- Matthew Joseph, MURI, Summer 2018, AM with recycled plastic
- Skye Tutino, MURI, AY 2017-18, AM with recycled plastic
- Julian Strobel, MURI, AY 2017-18, AM with recycled plastic
- Nicholas C. Lozier, MURI, AY 2017-18, AM with recycled plastic
- Tanjimul Alam , MURI, AY 2017-18, AM with recycled plastic
- Dante Goss, Diversity Research Scholar, 2017-Present, Design for AM
- Carolina Cardona-Serrano, Diversity Research Scholar, 2014-Present, Design for AM
- Luke Baker, Honors, Fall 2017, Topology optimization and additive manufacturing
- Daniel Hauersperger, MURI, AY 2016-17, Biofabrication
- Vladzimir Kasacheuski, MURI, AY 2016-17, Biofabrication
- Qiuyu "Autumn" Deng, MURI, Summer 2016, Recycling plastic for FFF
- Jinyun "Jason" Zhou, MURI, Summer 2016, Recycling plastic for FFF
- Vladzimir Kasacheuski, MURI, Summer 2016, Recycling plastic for FFF
- Laura Luther, MURI, Summer 2016, Recycling plastic for FFF
- Michael Johnson, Honors, Fall 2016, Topology optimization and additive manufacturing
- Joel Rasor, Honors, Fall 2016, Topology optimization and additive manufacturing
- Aaron Isaacs,, MURI, AY 2015-16, Additive manufacturing
- Zongying "Ivy" Xu, MURI, AY 2015-16, Additive manufacturing
- Abigail Curdes, MURI, AY 2015-16, Additive manufacturing
- Carl Marko, MURI, AY 2015-16, Additive manufacturing
- Jorge A. Ortiz, Diversity Research Scholar, AY 2015-16, Thermo-mechanical components
- Yufeng Zhang, Independent Study, AY 2015-16, Microstructured material design

- Weiyuan Deng, Independent Study, AY 2015-16, Microstructured material design
- Lifu Wang, Independent Study, AY 2015-16, Microstructured material design
- Zheng "Nicole" Huang, Independent Study, AY 2015-16, Split-Hopkinson Bar test
- Tanjimul Alam, URA, 2015-Present, Split-Hopkinson Bar test
- Aaron Kreutzjans, Independent Study, Spring 2015, Turtle shell helmet
- Michael Klemen, URA, Fall 2014, Split-Hopkinson Bar test
- Anna Glumb, Diversity Research Scholar, AY 2014-15, Robotic football
- Ricardo Ortiz, Diversity Research Scholar, AY 2014-15, Thermo-mechanical components
- Cullen Shorey, Honors, Fall 2015, Topology optimization
- Gillian Bundles, Diversity Research Scholar, Summer 2015, Material testing
- Daniel Rodriguez Gambetta, MURI, AY 2014-15, Additive manufacturing
- Ali Mohammed Alkhaleefah, MURI, AY 2014-15, Additive manufacturing
- Aquil Faisal Janwari, MURI, AY 2014-15, Additive manufacturing
- Hikmet Duygu Ozdemir, MURI, AY 2014-15, Additive manufacturing
- Jomar Mendoza, MURI, AY 2014-15, Additive manufacturing
- Hamza Nawaz, MURI, AY 2014-15, Additive manufacturing
- Kenny Guan Kiak Wong, MURI, AY 2014-15, Additive manufacturing
- Raveena Maharu Patil, MURI, AY 2014-15, Additive manufacturing
- Samantha Mayer, Honors, Fall 2014, Topology optimization
- Zachary Wozniak, Honors, Fall 2014, Topology optimization
- Braden Ratekin, Honors, Fall 2014, Topology optimization
- Katie Griswold, Independent Study, Summer 2014, Orthopedic biomechanics
- Timothy Allen, UROP, Spring 2014, Robotic systems design
- Kerri Anne Charlton, Diversity Research Scholar, Spring 2014, Robust topology optimization
- Amanda Justiniano-Pagan, Diversity Research Scholar, Fall 2013, 3D topology optimization
- Madeline Dement, Diversity Research Scholar, Fall 2013, Biological branched structures
- Adam El-Rahaiby, UROP, Fall 2012, MDO
- Adam El-Rahaiby, Independent Study, 2013, MDO
- Yumin Wang, MURI, Summer 2013, Agent-based programming in engineering design
- Kok Hwang Chow, MURI, Summer 2013, Agent-based programming in engineering design
- Zachary Paul Reynolds, MURI, Summer 2013, Agent-based programming in engineering design
- Quinn Angrick, MURI, Summer 2013, Agent-based programming in engineering design
- Chirag Patel, Independent Study, 2013, Crashworthiness MBD
- Eduardo Muller, URA, Spring 2012, Energy harvesting
- Sara Grimany, Diversity Research Scholar, AY 2011-12, Crashworthiness FEA

High school students

- Lynn Ahrens, Ursuline Academy (Summer 2017): *Additive manufacturing*
- Shaleese Jefferson, Decatur Central High School (Summer 2017): *Additive manufacturing*
- Brianna Hibbler, Rose-Hulman, co-advisor: Diane Wagner (Summer 2016): *Additive manufacturing*
- Shanlyn Jefferson, Decatur Central High School (Summer 2016): *Additive manufacturing*
- Makylah Wallace, Decatur Central High School (Summer 2016): *Additive manufacturing*

UNIVERSITY OF NOTRE DAME

Ph.D. students

- Punit Bandi (co-advisors: J.E. Renaud and J. Schmiedeler), *Controlled Energy Management under Crash Loads Using HCA*. Ph.D. in Mechanical Engineering, 2013: Project Engineer at General Motors, Michigan, USA

M.S. students

- Huade Tan (co-advisor: J.E. Renaud), *Topography optimization of thin walled structures subject to blast*. M.S. Mechanical Engineering, 2010
- Amanda PeGan, *Optimum design of crashworthy composite structures*. ESTEEM, 2010
- Conor Riordan (co-advisor: J.E. Renaud), *Manufacturability of optimal topologies*. M.E. Mechanical Engineering, 2009

Undergraduate students

- David Bonitsky (ND, Summer 2011)
- Brendan McAuliffe (ND, Summer 2011)
- Christopher DiBernardo (ND, Summer 2011)
- Kathleen Murphy (ND, Summer 2011)
- Sarah McShane (ND, Summer 2011)
- Teresa Henisey (ND, Summer 2010)
- Kyle Kinnary (ND, Summer 2010)
- Jorge Alvarez (Autonomous University of San Luis Potosí, Mexico, Summer 2010)
- Jay Reddick (Morehouse College, Georgia, Summer 2010)
- Joshua Nosal (ND, Spring 2010)
- Dennis Malloy (ND, Summer 2009)
- Mike Penninger (Western Michigan University, Summer 2009)

NATIONAL UNIVERSITY OF COLOMBIA

Ph.D. students

- Willington Jaime Arcos Legarda (co-advisor: J.A. Cortés, UNC, Bogotá), *Self-optimizing biomechatronic systems*. Ph.D. in Electrical Engineering, 2018 (expected graduation)
- Luis Carlos Sarmiento Vela (co-advisor: C.J. Cortés, UNC, Bogotá), *Control of prosthetic hands based on brain signals.* Ph.D. in Mechanical Engineering, 2016: Tenure-track faculty at the Pedagogic Natl. Univ., Colombia

M.S. students

- Willington Jaime Arcos Legarda (co-advisor: H. Díaz, UNC, Bogotá), *Automatic control of an exoskeleton for patients with motor disability*. M.S. Industrial Automation, 2013
- María Fernanda Espitia Moreno (co-advisor: C.J. Cortés, UNC, Bogotá), *Parametric study on inter-vertebral implants for spine fusion*. M.S. Biomedical Engineering. Honor's thesis, 2012
- Andrés Julián Arias Moreno (co-advised by D.A. Garzón-Alvarado, UNC, Bogotá), *Computational model for osteogenesis and fracture healing*. M.S. Biomedical Engineering, 2011
- Germán Andrés Méndez Algarra, *Computational tool for topology and shape optimization*. M.S. Mechanical Engineering, 2009
- Wilson Isaac Quevedo Trujillo, *Computational tool based on HCA for topology optimization*. M.S. Industrial Automation, 2008
- Andrea Stella Vera Velandia, *Effect of microcracks, aging and apoptosis in bone remodeling*. M.S. Mechanical Engineering, 2008
- Heriberto Augusto Pinto Linares (co-advisor: by F. Angulo García, UNC, Manizales), *Optimum design of linkages with fixings and transmission constraints*. M.S. Industrial Automation, 2007

- Luis Carlos Sarmiento Vela, *Design and manufacturing of myoelectric hand prosthesis*. M.S. Industrial Automation, 2007
- Fernando José Rodríguez Mesa, *Design and Manufacturing of an Artificial Hand*. M.S. Industrial Automation, 2007
- Oscar Rodrigo López Vaca, *Cellular automaton method for structural analysis*. M.S. Materials and Manufacturing, 2006
- Carlos Alberto Narváez Tovar (co-advised by D.A. Garzón-Alvarado, UNC, Bogotá) *Design of compliant mechanisms using topology optimization*. M.S. Materials and Manufacturing, 2006

Undergraduate students

- Roland Fernando Galvis Forero, B.S. Mechanical Engineering, 2007
- Juan Camilo González Bautista, B.S. Mechanical Engineering, 2006
- Rosana Bolivar, B.S. Mechanical Engineering, 2005
- Andrés Julián Arias Moreno, B.S. Mechanical Engineering, 2005
- Andrea Stella Vera Velandia, B.S. Mechanical Engineering, 2005
- Henry Octavio Cortés Ramos, B.S. Mechanical Engineering, 2005
- Carlos Augusto Diaz Castillo (co-advisor: M. Zatarain, Tekniker, Spain), B.S. Mechanical Eng., 2000
- John Henry Gonzales Arévalo, B.S. Mechanical Engineering, 1999

UNIVERSITY SERVICE

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

Purdue School of Engineering and Technology

- Diversity Task Force Committee (Aug 2017 – Present)
- Accelerate Innovation Task Force Committee (Aug 2017 – Present)
- Diversity Recruitment and Retention Committee, Faculty Member (Aug 2016 – Present)
- IUPUI Coordinator for the 2018 AgBOT Challenge, 2017 – 2018
- Faculty Search Committee for Motorsports Engineering (Jan 2017 – Aug 2017)
- IUPUI Coordinator for the 2017 AgBOT Challenge, 2016 – 2017
- IUPUI Coordinator for the 2016 AgBOT Challenge, 2015 – 2016
- NSF Proposal Preparation Group Coordinator, Purdue School of Eng. and Tech., 2013 – Present
- Faculty advisor for the Robotics Club at IUPUI, 2012 – Present
- Faculty advisor for the Society of Hispanic Professional Engineers at IUPUI, 2011 – Present
- IUPUI Coordinator for the 2012 NAVSEA Crane Undergraduate Design Contest, Spring 2012

Department of Mechanical Engineering

- Faculty Search Committee (Jan 2018 – Aug 2018)
- Faculty Search Committee (Jan 2017 – Aug 2017)
- Faculty Search Committee (Aug 2015 – May 2016)
- Graduate Education and Research Committee Faculty Member (Aug 2013 – Present)
- ME Design Focus Group Faculty Member (Aug 2012 – Present)
- ME Course Coordinator of six courses in mechanics, design, and numerical methods (Aug 2011 – Present)
- Chair of the ME Research Seminar (Aug 2012 – Aug 2013)
- Co-chair of the ME Research Seminar (Aug 2011 – Aug 2012)
- Director of the Engineering Design Research Laboratory (Aug 2011 – Present)

- Director of the Additive Manufacturing Laboratory (Aug 2015 – Present)
- Director of the Center for Additive Manufacturing Research at IUPUI (Aug 2016 – Present)

Graduate Committee Membership

- PhD student Jennifer Corredor, Nat Univ of Colombia, Advisor: C.J. Cortes (Spring 2017)
- PhD student Edwin Prieto, Nat Univ of Colombia, Advisor: C.J. Cortes (Fall 2016)
- MS student Deepak Tangirala, Purdue University, Advisors: J. Chen, A. Razban (Fall 2016)
- PhD student Junho Chun, UIUC, Advisor: G. Paulino (Summer 2016)
- MS student Suchana Akter Jahan, Advisor: H. El-Mounayri (Summer 2016)
- MS student Ayan Roy, Purdue University, Advisor: Tamer Wasfy (Spring 2016)
- MS student Jersson Leon, Nat U of Colombia, Advisor: M.A. Guzman (Fall 2015)
- MS student Cagkan Yildiz, Purdue University, Advisor: Tamer Wasfy (Spring 2015)
- PhD student Helbert Espitia, Nat U of Colombia, Advisor: J Sofrony (Spring 2014)
- MS student Yi Zhang, Purdue University, Advisor: Jing Zhang (Summer 2014)
- MS student Ragibul Huq, Purdue University, Advisor: Sohel Anwar (Spring 2014)
- PhD student Qi Liu, Purdue University, Advisor: Jian Xie (Spring 2014)
- PhD student (c) Junho Chun, UIUC, Advisor: G. Paulino (Spring 2013)
- PhD student John Goetz, Notre Dame, Advisor: K. Matous (Spring 2013)

UNIVERSITY OF NOTRE DAME

Fitzpatrick College of Engineering

- Co-director of the Design Automation Laboratory, August 2008 – August 2011
- Graduate School Recruiter, Tau Beta Pi 2008 Annual Convention, Sacramento, California (Oct 2008)

Graduate Committee Membership

- Committee Member to PhD student Punit Bandi (Doctoral Candidacy, 2011)
- Committee Member to PhD student John Goetz (Doctoral Candidacy, 2011)
- Committee Member to PhD student Chandan Mozumder (Candidacy, 2010 and Dissertation, 2011)
- Committee Member to PhD student Gilberto Mejía (Candidacy, 2009 and Dissertation, 2010)
- Committee Member to MS student Devendra Dubey (Master's Defense, 2009)
- Committee Member to MS student Vikas Samvedi (Master's Defense, 2009).
- Outside Chair to PhD student Mary Wagner Fuhs (Doctoral Candidacy, Psycology, 2008)
- Outside Chair to PhD student Matthew Meixner (Doctoral Candidacy, Physics, 2009),
- Outside Chair to PhD student Daniel S. Alessi (Doctoral Dissertation, Geological Sciences, 2010)

NATIONAL UNIVERSITY OF COLOMBIA

National University of Colombia, Bogotá campus

- University Academic Provost, Bogotá Campus (Jun 2007 – Aug 2008). The holder of this high-level administrative position is charged with proposing and implementing university policies to ensure the academic quality of 49 undergraduate programs and 220 graduate programs in 11 colleges and 7 research institutes at the largest campus of the National University of Colombia. Ex-officio committees include: Accreditation Committee, Industry Liaisons Committee, Foreign Language Committee, University's K-12 Committee, Council of College Associate Deans, Council of Research Institute Directors, Academic Vice-President's Advisory Committee, and Bogotá Campus General Council.

- University Vice-President (interim) of the National University of Colombia, Bogotá Campus (Dec 2007 – Jan 2008). During this winter break period I was also the director in charge of the Division of Extension (Industry Liaisons), four Research Institutes, and the University's Press.

College of Engineering

- Coordinator of the design of the questionnaire for professional examinations in Mechanical Engineering for the Colombian Institute for the Development of Post-Secondary Education – *Instituto Colombiano para el Fomento de la Educación Superior*, ICFES (Nov 2006 – Feb 2007)
- Faculty Delegate to the Committee of the Graduate Program in Industrial Automation, Department of Electrical and Electronic Engineering (Aug 2004 – May 2007)
- Director of the Office of Assistance and Contracts with the Industry for the College of Engineering (Sep 2000 – Aug 2001)

Department of Mechanical and Mechatronic Engineering

- Department Chairman (Apr 2005 – Jan 2007). This is the highest administrative position at the department level. Ex-officio committees include: Undergraduate (Mechanical and Mechatronic Engineering) and Graduate (M.S. in Materials and Manufacturing) Studies Committees, Committee on Appointments and Promotions, and Engineering College Council. During this period I was one of the main proponents of the Master's Program in Mechanical Engineering and the Master's Program in Biomedical Engineering. Both were approved in Spring 2006 and offered in Spring 2007.
- Chair of three Shows of Machines and Prototypes for ME students (1998, 2000, 2001)
- Faculty advisor for the Go-kart Club (2000 – 2011)

Graduate Committee Membership

- Committee Member to PhD student Dennis León (Mechanical Engineering, Candidacy Fall 2015)
- Committee Member to PhD student Andrés Eleazar Jaramillo Velásquez (Industrial Automation, Candidacy Fall 2006, and Dissertation Fall 2012)
- Committee Member to MS student Jennifer Paola Corredor Gómez (Mechanical Eng., Fall 2011)
- Committee Member to MS student Claudia Garzón (Industrial Automation, Spring 2005)

PROFESSIONAL SERVICE

TECHNICAL PROGRAMS AND CONFERENCES

- Symposium Co-organizer and Review Coordinator for the ASME 44th Design Automation Conference, Design for Additive Manufacturing Session, Quebec City, Canada, Aug 26-29, 2018.
- Symposium Co-organizer and Review Coordinator for the ASME 44th Design Automation Conference, Design of Engineering Materials and Structures Session, Quebec City, Canada, Aug 26-29, 2018.
- Symposium Co-organizer and Review Coordinator for the ASME 43th Design Automation Conference, Design of Engineering Materials and Structures Session, Cleveland, Ohio, Aug 6-9, 2017.
- International Scientific Committee Member of the ISSMO 4th International Conference on Engineering Optimization (EngOpt 2016), Iguassu Falls, Brazil, June 19-23, 2016.
- Symposium Co-organizer and Review Coordinator for the ASME 42th Design Automation Conference, Design of Engineering Materials and Structures Session, Charlotte, North Carolina, Aug 21-24, 2016.
- Symposium Co-organizer and Review Coordinator for the ASME 41th Design Automation Conference, Design of Engineering Materials and Structures Session, Boston, Massachusetts, August 2-5, 2015.

- International Scientific Committee Member of the ISSMO 4th International Conference on Engineering Optimization (EngOpt 2014), Lisbon, Portugal, September 8-11, 2014.
- Symposium Co-organizer and Review Coordinator for the ASME 40th Design Automation Conference, Design of Engineering Materials and Structures Session, Buffalo, New York, August 17-20, 2014.
- Symposium Co-organizer and Review Coordinator for the ASME 39th Design Automation Conference, Design of Engineering Materials and Structures Session, Portland, Oregon, August 4-7, 2013.
- Scientific Committee Member of the 6th International Conference on Mechanical Engineering and 4th on Mechatronic Engineering (CIMM 2013). Barranquilla, Colombia. May 2-4, 2013.
- International Participants Chair of the 2012 ASME International Design Engineering Technical Conferences (IDETC 2012), Chicago, Illinois, August 12-15, 2012.
- Organizer of the Special Session In Memory of Prof. John E. Renaud and Review Coordinator for the ASME 38th Design Automation Conference, Chicago, Illinois, August 14, 2012.
- Local Organizing Committee Member and Symposium Organizer In Memory of Prof. John E. Renaud, Joint EMI Conference and ASCE 11th Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC 2012), Notre Dame, Indiana, June 17-20, 2012.
- International Scientific Committee Member of the 2nd International Conference on Engineering Optimization (EngOpt 2010), Lisbon, Portugal, September 6-9, 2010.
- International Scientific Committee Member of the 1st International Conference on Engineering Optimization (EngOpt 2008), Rio de Janeiro, Brazil, June 2-5, 2008.
- International Committee Member of the 23rd ISPE International Conference on CAD/CAM, Robotics and Factories of the Future (CARS&FOF 2007). Bogotá, Colombia. August 16-18, 2007.
- General Conference Chair of the 3rd International Conference on Mechanical Engineering and 1st on Mechatronic Engineering (CIMM 2006). Bogotá, Colombia. September 20-22, 2006.
- General Conference Vice-Chair. Binational Conference on Industrial and Mechanical Engineering, Venezuela–Colombia. Mérida, Venezuela. May 18-20, 2006.
- International Committee Member. International Conference on Bond Graph Modeling and Simulation (ICBGM 1999), San Francisco, California, January 17-22, 1999.
- Board Member of the National Commission for Maintenance, Colombian Association of Mechanical, Electrical and related Engineers (ACIEM), Colombia, 1988.

EDITORIAL MEMBERSHIP

- Guest Associate Editor. ASME Journal of Mechanical Design. Since Aug 2017.
- Elsevier Innovation Panel Member. Since Aug 2015
- Editorial Board Member. Austin Journal of Robotics & Automation. Since May 2014
- Editorial Board Member. Journal of Surfaces and Interfaces of Materials. Since Aug 2011
- Editorial Board Member. Journal Intekhnia, Saint Thomas Aquinas University. Since Jun 2010

PROFESSIONAL ORGANIZATION MEMBERSHIPS

- America Makes Design Swimlane Working Group Member (since 2016)
- American Society of Mechanical Engineering (ASME member # 8100596 since 2003)
- American Institute of Aeronautics and Astronautics (AIAA member # 241479 from 2004 to 2014)
- International Society for Structural and Multidisciplinary Optimization (ISSMO member since 2004)
- Society of Automotive Engineers (SAE member # 6135603884 since 2010)
- American Society for Engineering Education (ASEE member since 2013)

- Society of Hispanic and Professional Engineers (SHPE member since 2013)
- Biomechanics and Biomaterials Research Center at IUPUI (core member since May 2012)
- Richard G. Lugar Center for Renewable Energy at IUPUI (research member since June 2013)
- Center for Additive Manufacturing Research at IUPUI (CAMRI) (director since Aug 2016)

JOURNAL REVIEWS

2018
ASME Journal of Mechanical Design
Engineering Structures
Structural and Multidisciplinary Optimization

2017
ASME Journal of Mechanical Design
Engineering Structures
Mathematical Biosciences
Structural and Multidisciplinary Optimization

2016
Applied Mathematical Modeling
Journal of Computing and Information Science in Engineering
Biomechanics and Modeling in Mechanobiology
Journal of Mechanical Engineering Research
PLoS ONE Journal
Symmetry
Journal of Computational Physics
Structural and Multidisciplinary Optimization
Austin Journal of Robotics and Automation
Multidiscipline Modeling in Materials and Structures

2015
Engineering Structures
International Journal of Vehicle Design
Mathematical Problems in Engineering
Structural and Multidisciplinary Optimization
Journal of Aerospace Engineering
Mechanics Research Communications
Ingeniare Chilean Journal of Engineering
Civil Engineering Infrastructure Journal
Physica A
International Journal of Computational Methods
Austin Journal of Robotics and Automation

2014
Journal of the Engineering School, University of Antioquia
Physica A
Academic Journals
Ingeniare Chilean Journal of Engineering

Mechanics Research Communications
Tecnura
PLoS ONE Journal
Engineering Structures
Journal of the Dental School, University of Antioquia, Colombia
Structural and Multidisciplinary Optimization

2013
Tecnura
Journal of Pediatric Intensive Care
Applied Stochastic Models in Business and Industry
ASME Journal of Mechanical Design
Computer Methods and Programs in Biomedicine
Structural and Multidisciplinary Optimization
IET Systems Biology
Journal of Materials Engineering and Performance
Journal of Structural Engineering
International Journal of Solids and Structure
Ingeniare Chilean Journal of Engineering

2012
Structural and Multidisciplinary Optimization
Engineering Computations
Ingeniare, Chilean Journal of Engineering
Ingeniería y Universidad, Pontifical Xavierian University
Journal of Systems and Control Engineering
Journal of the Dental School, University of Antioquia
Journal of the Engineering School, University of Antioquia
Revista DYNA, National University of Colombia, Medellín
Revista Ingeniería, University of the Andes, Colombia

2011
Structural and Multidisciplinary Optimization
Mechanisms and Machine Theory
PLoS ONE Journal
Journal DYNA, National University of Colombia, Medellín
Control Engineering Practice

2010
Revista DYNA, National University of Colombia, Medellín
Structural and Multidisciplinary Optimization

2009
Annals of Biomedical Engineering

2008
ASME Journal of Mechanical Design

2007

ASME Journal of Mechanical Design
AIAA Journal
Revista Ingeniería, University of the Andes, Colombia
AIAA Journal

2006
ASME Journal of Mechanical Design
International Journal of Computers and Structures
Revista Ingeniería e Investigación, National University of Colombia, Bogotá

2005
AIAA Journal
ASME Transactions
International Journal of Simulation and Process Medellin

CONFERENCE PAPER REVIEWS

2017 ASME International Design Engineering Technical Conference IDETC: 5 papers
2016 ASME International Design Engineering Technical Conference IDETC: 5 papers
2016 SAE World Congress: 1 paper
2015 ASME International Design Engineering Technical Conference IDETC: 2 papers
2015 SAE World Congress: 2 papers
2014 IEEE Biosignals and Biorobotics Conference BRC: 1 paper
2014 ASME International Design Engineering Technical Conference IDETC: 4 papers
2013 ASME International Design Engineering Technical Conference IDETC: 4 papers
2012 ASME International Design Engineering Technical Conference IDETC: 3 papers
2012 Engineering Mechanics Institute and Probabilistic Mechanics Conferences EMI/PMC: 6 abstracts
2011 ASME International Design Engineering Technical Conference IDETC: 1 paper
2011 Encuentro Nacional de Investigación y Desarrollo ENID: 1 paper
2009 ASME International Design Engineering Technical Conference IDETC: 1 paper
2007 ASME International Design Engineering Technical Conference IDETC: 1 paper
2007 ISPE International Conference on CAD/CAM, Robotics and Factories of the Future: 2 papers
2007 Iberoamerican Conference on Mechanical Engineering CIBIM8: 4 papers
2007 Encuentro Nacional de Investigación y Desarrollo ENID: 3 papers
2007 World Multi-Conference on Systemics, Cybernetics and Informatics WMSCI: 1 paper
2006 XII Congreso Latinoamericano de Fisioterapia y Kinesiología: 1 paper
1999 International Conference on Bond Graph Modeling and Simulation ICBGM: 2 papers

GRANT PROPOSAL AND SCHOLAR REVIEWS

2016 Delft University of Technology: 1 proposal
2016 National Science Foundation CMMI: 8 proposals
2016 Universidad Antonio Nariño: 1 proposal
2015 IUPUI Multidisciplinary Undergraduate Research Institute MURI: 2 proposals
2015 IUPUI Research Support Funds Grant RSFG: 2 proposals
2014 National Science Foundation CMMI: 6 proposals
2014 Otto De Greiff Colombian National Contest of Best Research Thesis: 1 thesis
2014 University Saint Thomas Aquinas: 1 proposal
2014 Air Force Summer Faculty Fellowship Program: 20 proposals
2013 National Science Foundation CMMI: 11 proposals

2013 Colciencias: 2 proposals
2013 Fulbright Commission Colombia-USA: 3 applications
2013 University Saint Thomas Aquinas: 1 proposal
2012 Fulbright Commission Colombia-USA: 5 applications
2012 Colciencias: 11 proposals
2010 Colciencias: 3 proposals
2008 Colciencias: 2 proposals
2007 Colciencias: 1 proposal
2007 Fulbright Commission Colombia-USA: 5 applications
2006 Colciencias: 1 proposal
2006 Fulbright Commission Colombia-USA: 5 applications

BOOKS AND BOOK PROPOSAL REVIEWS

2017 Elsevier: 1 book proposal
2014 CRC Press: 1 book proposal

PUBLICATION LIST
Andres Tovar

JOURNAL PAPERS

(37 papers published and 2 accepted for publication from 2005 to 2018)

2018 (4 accepted, 5 papers under review)

1. Najmon, J.C., J.J. DeHart, Z.M. Wood, A. Tovar. Cellular Helmet Liner Design through Bio-inspired Structures and Topology. Optimization of Compliant-Mechanism Lattices SAE International Journal of Transportation Safety, manuscript number: JTS-2018-0011 (in press).
2. Liu, K., D. Detwiler, **A. Tovar**. *Cluster-based optimization of cellular materials and structures for crashworthiness*. ASME Journal of Mechanical Designs, special issue on Special Issue on Design of Engineered Materials and Structures, 2018 (in press).
3. Wu, T. and **A. Tovar**. *Multiscale, thermomechanical topology optimization of self-supporting cellular structures for porous injection molds*. Rapid Prototyping Journal, Vol. 24, Issue 5, 2018 (in press).
4. Han, X., W. An, **A. Tovar**. *Targeting the Force-Displacement Response of Thin-walled Structures Subjected to Crushing Load using Curve Decomposition and Topometry Optimization*. Structural and Multidisciplinary Optimization (accepted).
5. Liu, K, T. Wu, D. Detwiler, J. Panchal, **A. Tovar**. *Design for crashworthiness of categorical multimaterial structures using cluster analysis and Bayesian optimization*. Materials & Design (Submitted: Nov 2018).
6. Raeisi, S, J. Kadkhodapour, and **A. Tovar**. *Mechanical properties and energy absorbing capabilities of Z-pinned aluminum foam sandwich*. Journal of Sandwich Structures and Materials (Submitted: Mar 2018).
7. Arcos-Legarda, J., J.A. Cortes, **A. Tovar**. *Robust Compound Control of Dynamic Bipedal Robots*. Robotics and Autonomous Systems (Submitted: Feb 2018).
8. Arcos-Legarda, J., J.A. Cortes, A. Beltran-Pulido, **A. Tovar**. *Hybrid disturbance rejection control of dynamic bipedal robots*. Multibody System Dynamics (Submitted: Mar 2018).

2017 (4 papers)

9. Sego, T.J., U. Kasacheuski, D. Hauersperger, **A. Tovar**, N.I. Moldovan. *A Heuristic Computational Model of Basic Cellular Processes and Oxygenation during Spheroid-Dependent Biofabrication*. Biofabrication, Vol. 9, Issue 2, Pages 024104, 2017
10. Liu, K., D. Detwiler, **A. Tovar**. *Optimal Design of Nonlinear Multimaterial Structures for Crashworthiness using Cluster Analysis*. ASME Journal of Mechanical Design, Vol. 139, Issue 10, Pages 101401 (11 pages), doi: 10.1115/1.4037620, 2017
11. Wu, T., K. Liu, **A. Tovar**. *Multiphase Topology Optimization of Lattice Injection Molds*. Computers & Structures, Vol. 192, Pages 71-82, https://doi.org/10.1016/j.compstruc.2017.07.007, 2017
12. Jahan, S. A., T. Wu, Y. Zhang, J. Zhang, **A. Tovar**, H. El-Mounayri. *Thermo-mechanical design optimization of conformal cooling channels using design of experiments approach*. Procedia Manufacturing, Vol. 10, Pages 898-911, 2017

2016 (1 paper)

13. Jahan, S. A., T. Wu, Y. Zhang, H. El-Mounayri, **A. Tovar**, J. Zhang, D. Acheson, R. Nalim, X. Guo, W. H. Lee. *Implementation of Conformal Cooling and Topology Optimization in 3D Printed Stainless Steel Porous Structure Injection Molds*. Procedia Manufacturing, Vol. 5, Pages 901-9015, 2016

2015 (3 papers)

14. Wu, T., S.A. Jahan, P. Kumaar, **A. Tovar**, H. El-Mounayri, Y. Zhang, J. Zhang, D. Acheson, K. Brand, R. Nalim. *A framework for optimizing the design of injection molds with conformal cooling for additive manufacturing*. Procedia Manufacturing, Vol. 1, Pages: 404-415, doi:10.1016/j.promfg.2015.09.049, 2015
15. Bandi, P., D. Detwiler, J. Schmiedeler, and **A. Tovar**. *Design of Progressively Folding Thin-Walled Tubular Components Using Compliant Mechanism Synthesis*. Thin-Walled Structures, Vol. 37, Issue 2, Pages: 723-735, doi:10.1007/s40430-014-0197-0, 2015
16. León, D., N. Arzola, and **A. Tovar**. *Statistical analysis of the influence of tooth geometry in the performance of harmonic drive*. Journal of the Brazilian Society of Mechanical Sciences and Engineering. Vol. 37, Pages: 723-735, 2015, doi:10.1007/s40430-014-0197-0, 2015

2014 (2 papers)

17. Liu, K. and **A. Tovar**. *An efficient 3D topology optimization code written in Matlab*. Structural and Multidisciplinary Optimization, Vol. 50, Issue 6, Pages: 117-1196, 2014, doi:10.1007/s00158-014-1107-x, 2014.
18. Lee, S. and **A. Tovar**. *Outrigger placement in tall buildings using topology optimization*. Engineering Structures. Vol. 74, Issue 1, Pages: 122-129, doi:10.1016/j.engstruct.2014.05.019, 2014.

2013 (7 papers)

19. Bandi, P., J. Schmiedeler, and **A. Tovar**. *Design of Crashworthy Structures with Controlled Energy Absorption in the HCA Framework*. ASME Journal of Mechanical Design, Vol. 135, Issue 9, Pages 091002.1-091002.11, 2013.
20. Uribe, B., L.M. Méndez, **A. Tovar**, J.P. Charalambos, O. Arcila, and A.D. López. *Mixed Reality Boundaries in Museum Preservation Areas*. International Journal of Art, Culture and Design Technologies, Vol. 3, Issue 2, Pages: 63-74, 2013.
21. Shinde, S., P. Bandi, D. Detwiler, and **A. Tovar**. *Structural Optimization of Thin-Walled Tubular Structures for Progressive Buckling Using Compliant Mechanism Approach*. SAE International Journal of Passenger Cars – Mechanical Systems, Vol. 6, Issue 1, Pages: 109-120, 2013.
22. **Tovar, A.** and K. Khandelwal. *Topology Optimization for Minimum Compliance using a Control Strategy*. Engineering Structures, Vol. 48, Pages: 674-682, 2013.
23. Lee, S., and **A. Tovar**. *Topology Optimization of Piezoelectric Energy Harvesting Skin using Hybrid Cellular Automata*. ASME Journal of Mechanical Design, Vol. 135, Issue 3, Pages: 031001.1-031001.12, 2013.
24. Arcos, W.J. and **A. Tovar**. *LQR optimal control of an exoskeleton for walking*. Intekhnia, Vol. 2, Issue. 2, 2013.
25. Penninger, C.L. **A. Tovar**, V. Tomar, and J.E. Renaud. *A high fidelity HCA model for bone adaptation with cellular rules for bone resorption*. Journal of Surfaces and Interfaces of Materials, Vol. 1, Issue: 1, Pages: 60-70, 2013.

2012 (3 papers)

26. Yokota, H., **A. Tovar**, and A. Robling. *Dynamic Muscle Loading and Mechanotransduction*. BONE, Vol. 51, Issue 4, Pages 826-827, 2012.
27. Goetz, J.C., H. Tan, **A. Tovar**, and J.E. Renaud. *Two-material structural topology optimization for blast mitigation using hybrid cellular automata*. Engineering Optimization. Vol. 44, Issue 8, Pages 985-1005, 2012.
28. Mozumder, C., **A. Tovar**, and J.E. Renaud. *Topometry optimization for crashworthiness design using hybrid cellular automata.* International Journal of Vehicle Design, Vol. 60, Issue 1/2, Pages: 100-120, 2012.

2011 (4 papers)

29. Guo, L., J. Huang, **A. Tovar**, and J.E. Renaud. *Multidomain Topology Optimization for Crashworthiness based on Hybrid Cellular Automata*. Key Engineering Materials. Vol. 486, Pages 250-253, 2011.
30. Penninger, C.L., **A. Tovar**, L.T. Watson, and J.E. Renaud. *KKT conditions satisfied using adaptive neighboring in hybrid cellular automata for topology optimization.* International Journal of Pure and Applied Mathematics. Vol. 66, Issue 3, Pages 245-262, 2011.
31. Guo, L., **A. Tovar**, C.L. Penninger and J.E. Renaud. *Strain-based topology optimization for crashworthiness using hybrid cellular automata*. International Journal of Crashworthiness. Vol. 16, Issue 3, Pages 239-252, 2011.
32. Goetz, J.C., H. Tan, **A. Tovar**, J.E. Renaud. *Optimization of One-Dimensional Aluminum Foam Armor Model for Pressure Loading*, SAE International Journal of Materials and Manufacturing, Vol. 4, Issue 1, Pages 1138-1146, 2011.

2010 (1 paper)

33. Penninger, C.L., L.T. Watson, **A. Tovar**, and J.E. Renaud. *Convergence Analysis of Hybrid Cellular Automata for Topology Optimization*. Structural and Multidisciplinary Optimization. Vol. 40, Issue 1-6, Pages 271-282, 2010.

2009 (2 papers)

34. Galeano, C.H., C.A. Duque, and **A. Tovar**. *Interactive Optimization Tool for the Optimum Design of Helical Extension Springs* (in Spanish). Revista Técnica de la Facultad de Ingeniería Universidad del Zulia. Vol. 32, Issue 2, Pages 98-108, 2009.
35. Patel, N.M., B.S. Kang, J.E. Renaud, and **A. Tovar**. *Crashworthiness design using topology optimization*. ASME Journal of Mechanical Design. Vol. 131, Issue 6, Pages 061013.1-061013.12, 2009.

2008 (3 papers)

36. Vera, A. and **A. Tovar**. *Computational study on the effect of microcracks, cellular aging and apoptosis in bone remodeling* (in Spanish). Revista Ingeniería Biomédica. Vol. 2, Issue 4, Pages 73-83, 2008.
37. Patel, N.M., D. Tillotson, **A. Tovar**, K. Izui, and J.E. Renaud. *A comparative study of topology optimization techniques*. AIAA Journal. Vol. 46, Issue 8, Pages 1963-1975, 2008.
38. Penninger, C.L., N.M. Patel, G.L. Niebur, **A. Tovar**, and J.E. Renaud. *A fully anisotropic hierarchical hybrid cellular automaton algorithm to simulate bone remodeling*. Mechanics Research Communications. Vol. 35, Issue 1-2, Pages 32-42, 2008.

2007 (3 papers)

39. Arzola, N., **A. Tovar**, and A. Gómez. *Retrofit and optimization of a steel-bar bending machine* (in Spanish). Ingeniería y Competitividad, University of Valle. Vol. 9. Issue 2, Pages 7-19, 2007.
40. **Tovar, A.**, N.M. Patel, A.K. Kaushik, and J.E. Renaud. *Optimality Conditions of the Hybrid Cellular Automata for Structural Optimization*. AIAA Journal. Vol. 45, Issue 3, Pages 673-683, 2007.
41. **Tovar, A.**, N. Arzola and A. Gómez. *Multidisciplinary Design Optimization Techniques* (in Spanish). Ingeniería e Investigación, National University of Colombia. Vol, 7, Issue 1, Pages 84-92, 2007.

2006 (1 paper)

42. **Tovar, A.**, N.M. Patel, G.L. Niebur, M. Sen, and J.E. Renaud. *Topology Optimization Using a Hybrid Cellular Automaton Method with Local Control Rules*. ASME Journal of Mechanical Design. Vol. 128, Issue 6, Pages 1205-1216, 2006.

2005 (3 papers)

43. Gano, S.E., J.E. Renaud, H. Agarwal, and **A. Tovar**. *Reliability Based Design Using Variable Fidelity Optimization*. Structure and Infrastructure Engineering. Vol. 2, Issue 3-4, Pages 247-260, 2005.
44. **Tovar, A.**, *Topology Optimization with the Hybrid Cellular Automaton Technique* (in Spanish). *Optimización Topológica con la Técnica de los Autómatas Celulares Híbridos*. Revista Internacional de Métodos Numéricos para el Cálculo y Diseño en Ingeniería. Vol. 21, Issue 4, Pages 365-383, 2005.
45. **Tovar, A.**, S.E. Gano, J.J. Mason, and J.E. Renaud. *Optimum Design of an Interbody Implant for Lumbar Spine Fixation*. Journal of Advances in Engineering Software. Special number in Design Optimization. Vol. 36, Issue 9, Pages 634-642, 2005.

CONFERENCE PAPERS

(147 papers published from 1997 to 2018)

2018 (5 papers)

1. Hess, J.L., A.S. Rao, G.A. Fore, J. Wu, **A. Tovar**, and S. Anwar. *Quantifying Changes in Creativity: Findings from an Engineering Course On the Design of Complex and Origami Structures*. Proceedings of the 2018 ASEE Annual Conference & Exposition, Salt Lake City, UT, USA, Jun 24-17, 2018.
2. **Tovar, A.**, J.C. Najmon, A.S. Rao, J.L. Hess, G.A. Fore, J. Wu, and S. Anwar. *Integration of Art Pedagogy in Engineering Graduate Education*. Proceedings of the 2018 Illinois Indiana ASEE Section Conference, West Lafayette, IN, USA, Mar 24, 2018.
3. Valladares-Guerra, H., A. Jones, and **A. Tovar**. *Surrogate-Based Global Optimization of Composite Material Parts under Dynamic Loading*. In Proceedings of the SAE World Congress 2018, Detroit, MI, USA, Apr 10-12, 2018.
4. Raeisi, S., and **A. Tovar**. *The Effect of the Cell Shape on Compressive Mechanical Behavior of 3-D Printed Extruded Cross-Sections*. In Proceedings of the SAE World Congress 2018, Detroit, MI, USA, Apr 10-12, 2018.
5. Najmon, J.C., J. DeHart, Z. Wood, and **A. Tovar**. *Development of a Helmet Liner through Bio-Inspired Structures and Topology Optimized Compliant Mechanism Arrays*. In Proceedings of the SAE World Congress 2018, Detroit, MI, USA, Apr 10-12, 2018.

2017 (9 papers)

6. Malekipour, H., A. Tovar, H. El-Mounayri. *Heat Conduction and Geometry Topology Optimization of Support Structure in Laser-based Additive Manufacturing*. Mechanics of Additive and Advanced Manufacturing, SEM Annual 2017, Conference & Exposition on Experimental and Applied Mechanics, Indianapolis, Indiana, June 12-15, 2017.
7. Sego, T.J., Y-T. Hsu, T-M. G. Chu, and **A. Tovar**. *Towards the Optimal Crown-To-Implant Ratio in Dental Implants*. In Proceedings of the ASME 2017 International Design Engineering Technical Conferences (IDETC 2017). Cleveland, OH, USA, Aug 6-9, 2017.
8. Wu, T., N. Upadhyaya, D. Acheson, and **A. Tovar**. *Topology optimization of injection mold with lattice cooling*. In Proceedings of the ASME 2017 International Design Engineering Technical Conferences (IDETC 2017). Cleveland, OH, USA, Aug 6-9, 2017.
9. Gokhale, V., P. Tapkir, and **A. Tovar**. *Force Diverting Helmet Liner Achieved Through a Lattice of Multi-Material Compliant Mechanisms*. In Proceedings of the ASME 2017 International Design Engineering Technical Conferences (IDETC 2017). Cleveland, OH, USA, Aug 6-9, 2017.
10. Jahan, S.A., T. Wu, Y, Zhang, J. Zhang, **A. Tovar**, H. El-Mounayri. *Effect of porosity on thermal performance of plastic injection molds based on experimental and numerically derived material properties*. In Proceedings of the Annual Conference and Exposition on Experimental and Applied Mechanics. Indianapolis, IN, USA, June 12-15, 2017.
11. Liu, K., D. Detwiler, and **A. Tovar**. *Metamodel-based global optimization of vehicle structures for crashworthiness supported by clustering methods*. In Proceedings of the 12th World Congress on Structural and Multidisciplinary Optimization (WCSMO12). Braunschweig, Germany, June 5-9, 2017.
12. Wu, T., K. Brand, D. Hewitt, and **A. Tovar**. *Multiscale, thermomechanical topology optimization of cellular structures for porous injection molds*. In Proceedings of the 12th World Congress on Structural and Multidisciplinary Optimization (WCSMO12). Braunschweig, Germany, June 5-9, 2017.

13. Jahan, S.A., T. Wu, Y. Zhang, J. Zhang, **A. Tovar**, H. El-Mounayri. Thermo-mechanical design optimization of conformal cooling channels using design of experiments approach. In Proceedings of the 45th SME North American Manufacturing Research Conference (NAMRC 45), Los Angeles, CA, USA, June 4-8, 2017.
14. Wu. T., S.A. Jahan, Y. Zhang, J. Zhang, H. El-Mounayri, **A. Tovar**. Design optimization of plastic injection tooling for additive manufacturing. In Proceedings of the 45th SME North American Manufacturing Research Conference (NAMRC 45), Los Angeles, CA, USA, June 4-8, 2017.

2016 (10 papers)

15. Ghane, P., G. Hossain, **A. Tovar**. *Robust understanding of EEG patterns in silent speech*. IEEE National Aerospace Electronics Conference-Ohio Innovation Summit, NAECON-OIS 2015, Dayton, OH, June 16-19, 2015. Proceedings of the IEEE National Aerospace Electronics Conference, NAECON, Mar, 2016.
16. Sego, T.J., Y-T Hsu, T-M G. Chu, **A. Tovar**. On the Significance and Predicted Functional Effects of the Crown-to-Implant Ratio: a Finite Element Study of Long-Term Implant Stability Using High-Resolution, Nonlinear Numerical Analysis. 2016 ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, USA, Nov 11-17, 2016.
17. Arcos-Legarda, J., J. Cortes-Romero, **A. Tovar**. *Generalized Proportional Integral Control for Aperiodic Gait Stabilization of a Bipedal Robot with Seven Degrees of Freedom*. In Proceedings of the XVII CLCA Latin American Conference on Automatic Control, Medellín, Colombia, Oct 13-15, 2016.
18. Arcos-Legarda, J., J. Cortes-Romero, **A. Tovar**. *Active Disturbance Rejection Control based on Generalized Proportional Integral Observer to Control a Bipedal Robot with Five Degrees of Freedom*. In Proceedings of the 2016 American Control Conference (ACC). Boston, MA, USA, July 6-8, 2016.
19. Liu, K., Z. Xu, D. Detwiler, **A. Tovar**. *Optimal Design of Cellular Material Systems for Crashworthiness. In Proceedings of the SAE World Congress*. Detroit, MI, USA, Apr 12-14, 2016.
20. Mehta, P.S., J.S. Ocampo, P. Chaudhari, **A. Tovar**, *Bio-inspired design of lightweight and safe vehicle structures*. In Proceedings of the SAE World Congress. Detroit, MI, USA, Apr 12-14, 2016.
21. Gokhale V.V., C. Marko, T. Alam, P. Chaudhari, **A. Tovar**. *Design of an advanced layered composite for energy dissipation using a 3D-lattice of micro compliant mechanism*. In Proceedings of the SAE World Congress. Detroit, MI, USA, Apr 12-14, 2016.
22. Liu, K., D. Detwiler, and **A. Tovar**. *Machine Learning and Metamodel-based Design Optimization of Nonlinear Multimaterial Structures*. In Proceedings of the ASME 2016 International Design Engineering Technical Conferences (IDETC 2016). Charlotte, NC, USA, Aug 21-24, 2016.
23. Wu, T., K. Liu, and **A. Tovar**. *Multiscale Thermomechanical Topology Optimization of Functionally Graded Lattice Injection Molds*. In Proceedings of the ASME 2016 International Design Engineering Technical Conferences (IDETC 2016). Charlotte, NC, USA, Aug 21-24, 2016.
24. Lischke, F. and **A. Tovar**. *Design of Self-supporting 3D Structures for Fused Deposition Modeling*. In Proceedings of the ASME Additive Manufacturing + 3D Printing Conference (AM3D). Charlotte, NC, USA, Aug 21-24, 2016.

2015 (5 papers)

25. Hossain, G., P. Ghane, and **A. Tovar**. *Towards an Effective Neuro-Feature Selection Method in Robust Voice Controlled Prosthetic Arm Design*. Cell Symposia: Engineering the Brain – Technologies for Neurobiological Applications (CSFN 2015). Chicago, IL, USA, Oct 15-16, 2015.
26. Liu, K., **A. Tovar**, E. Nutwell, and D. Detwiler. *Towards nonlinear multimaterial topology optimization using unsupervised machine learning and metamodel-based multiobjective*

optimization. In Proceedings of the ASME 2015 International Design Engineering Technical Conferences (IDETC 2015). Boston, MA, USA, Aug 2-5, 2015.

27. Wu, T., S.A. Jahan, P. Kumaar, **A. Tovar**, H. El-Mounayri, Y, Zhang, J, Zhang, D. Acheson, K. Brand, R. Nalim, A Framework for Optimizing the Design of Injection Molds with Conformal Cooling for Additive Manufacturing. In Proceeding of the International Manufacturing Research Conference (NAMRC 2015). Charlotte, North Carolina, June 8-12, 2015.
28. Liu, K., **A. Tovar**, E. Nutwell, and D. Detwiler. *Thin-walled compliant mechanism component design assisted by machine learning and multiple surrogates*. In Proceedings of the SAE World Congress. Detroit, MI, USA, Apr 2015. SAE Technical Paper 2015-01-1369, doi:10.4271/2015-01-1369, 2015.
29. Acheson, D., H. El-Mounayri, **A. Tovar**, R. Nalim, J. Zhang, K. Brand, and D. Hewitt, *Groundbreaking Collaboration between Consumer Retailer Walmart, University Research, and Existing Manufacturing and Revolutionary Additive Manufacturing Firms*. In Proceedings of the ASEE Conference for Industry & Education Collaboration (CIEC 2015), Palm Springs, California, February 4-6, 2015.

2014 (6 papers)

30. Liu, K., **A. Tovar**, and D. Detwiler, *Thin-walled component design optimization for crashworthiness using principles of compliant mechanism synthesis and Kriging sequential approximation*. In Proceedings of the 4th International Conference on Engineering Optimization (EngOpt 2014), Lisbon, Portugal, September 8-11, 2014.
31. Emami, A., T. Wu, and **A. Tovar**. *Optimization of Heterogeneous Microstructure Using Statistical and Physical Descriptors within a Cellular Automaton Reconstruction Framework*. In Proceedings of the 4th International Conference on Engineering Optimization (EngOpt 2014), Lisbon, Portugal, September 8-11, 2014.
32. Kanna, S.A., **A. Tovar**, J.S. Wou, and H. El-Mounairy. *Optimized NURBS based G code part program for high-speed CNC machining*. In Proceedings of the ASME 2014 International Design Engineering Technical Conferences (IDETC 2014). Buffalo, New York, USA, August 4-7, 2014.
33. El-Rahaiby, A. and **A. Tovar**. *Multidisciplinary Design Optimization of Robotic Systems by Undergraduate Students from Multiple Science and Engineering Programs*. In Proceedings of the 121st ASEE Annual Conference & Exposition. Indianapolis, Indiana, USA, June 15-18, 2014.
34. Sarmiento, L.C., C.J. Cortés, J.A. Bacca, P. Lorenzana, W.J. Arcos, and **A. Tovar**. *Brain computer interface (BCI) with EEG signals for automatic vowel recognition based on articulation mode*. In Proceedings of the 5th ISSNIP Biosignals and Biorobotics Conference. Salvador, Brazil, May 27-28, 2014.
35. Lee, S., C. DiBernardino, **A. Tovar**. *Outrigger System Design of Tall Buildings using Topology Optimization*. In Proceedings of the 8th China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems. Gyeongju, Korea, May 25-29, 2014.

2013 (9 papers)

36. Arias Moreno, A.J., **A. Tovar**, and D.A. Garzón-Alvarado. *Cellular Automata Model to Simulate Osteogenesis and Bone Fracture Healing*. In Proceedings of the V International Conference on Computational Bioengineering (ICCB 2013). Leuven, Belgium, September 11-13, 2013.
37. Khadke, K.R., W. An, and **A. Tovar**. *Variable fidelity and reliability based optimization for ceramic composite material design*. In Proceedings of the ASME 2013 International Design Engineering Technical Conferences (IDETC 2013). Portland, Oregon, USA, August 4-7, 2013.
38. Liu, K., and **A. Tovar**. *Multiscale topology optimization of structures and cellular materials using direct and inverse homogenization*. In Proceedings of the ASME 2013 International Design Engineering Technical Conferences (IDETC 2013). Portland, Oregon, USA, August 4-7, 2013.

39. Emami, A. and **A. Tovar**. *Biomimetic design of lightweight structures for energy absorption: learning from antlers and horns*. In Proceedings of the Engineering Mechanics Institute Conference (EMI 2013), Evanston, Illinois, USA, August 4-7, 2013.
40. Israel, J.J. and **A. Tovar**. *Reliability-based design development of lightweight vehicle shell structures for blast mitigation*. In Proceedings of the 10th World Congress on Structural and Multidisciplinary Optimization (WSCMO-10), Orlando, Florida, USA, May 19-24, 2013.
41. Shinde, S., D. Detwiler, and **A. Tovar**. *Optimization of Crashworthy Thin Walled Tubular Structures by Intelligent Tailoring of Mechanical Properties Using a Compliant Mechanism Approach*. In Proceedings of the 10th World Congress on Structural and Multidisciplinary Optimization (WSCMO-10), Orlando, Florida, USA, May 19-24, 2013.
42. Liu, K., K. Khandelwal, and **A. Tovar**. *Multiscale topology optimization of structures and non-periodic cellular materials*. In Proceedings of the 10th World Congress on Structural and Multidisciplinary Optimization (WSCMO-10), Orlando, Florida, USA, May 19-24, 2013.
43. Shinde, S., P. Bandi, D. Detwiler, and **A. Tovar**. *Structural Optimization of Thin-Walled Tubular Structures for Progressive Buckling using Compliant Mechanism Approach*. In Proceedings of the SAE 2013 World Congress. Detroit, Michigan, USA, April 16-18, 2013.
44. Sarmiento, L.C., C.J. Cortés, and **A. Tovar**. *Brain signal processing for prosthetic hand control*. In Proceedings of the 6th International Conference on Mechanical Engineering and 4th on Mechanical Engineering (CIMM 2013). Barranquilla, Colombia. May 2-4, 2013.

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45. Lee, S., S. Bobby, **A. Tovar**, A. Kareem. *Shape and Topology Sculpting of Tall Buildings under Aerodynamic Loads*. In Proceedings of the 20th Analysis and Computation Specialty Conference. pp. 323-334, Chicago, Illinois, USA, March 29-31, 2012, doi: 10.1061/9780784412374.029.
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