

CURRICULUM VITAE

Andres Tovar

723 West Michigan Street, SL 260N
Mechanical Engineering, IUPUI
Indianapolis, IN 46202-5132

Office: (317) 278-7090
Fax: (317) 278-9744

Email: tovara@iupui.edu
<http://www.engr.iupui.edu/~tovara/>
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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: Hernando 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
Adjunct Assistant Professor, Biomedical Engineering, Aug 2015 – Present
Assistant Professor, Mechanical Engineering, Aug 2011 – Aug 2017

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

Associate Professor, Mechanical and Mechatronic Engineering, Jun 2005 – Aug 2008
Academic Provost, Bogotá Campus, Feb 2007 – Aug 2008
Department Chair, Mechanical and Mechatronic Engineering, Apr 2005 – Jan 2007
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

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

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

CURRENT PROJECTS

External funding

1. U.S. Navy and via Cadent Technologies, Inc. STTR N22A-T002. Title: Analysis and design optimization of a Multifunctional Heat Exchanger for Aerodynamic Aircraft Inlets. Role: PI from IUPUI. \$41,500 (Jun - Nov, 2022) and \$29,500 (Dec, 2022 – May, 2023).
2. Indiana Technical Assistance Program (INTAP) Phase II (Advanced Renewable Power, LLC (ARP) and NineTwelve Institute, Indiana, Title: Design and Fabrication of an Electric Vehicle Chassis. Role: PI, \$10,000, Dates: Jul 1, 2022 – Dec 31, 2022.
3. The National Academies of Sciences U.S. - Egypt Science and Technology Joint Fund. Title: Developing a Microstructure-based Design and Optimization Software for Lithium Ion Batteries. Role: co-PI. Effort: 20%. Amount: \$188,424. Dates: Jul 2019 – Jul 2022.

Internal funding

4. IUPUI Biomechanics and Biomaterials Research Center (BBRC). Title: Vascularization of 3D bioprinted tissue during formation and maturation. Role: Co-PI (PI: Lester Smith). Amount: \$10,000. Dates: Dec 2021 – Dec 2022.
5. IUPUI Institute of Integrative Artificial Intelligence (iAI). Title: Machine Learning-Assisted Design of Lithium-Ion Battery Electrodes. Role: PI. Amount: \$20,000. Dates: Jun 2021 – Jun 2022.
6. Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of compostable plastic for additive manufacturing. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$8,000. Summer 2022.

PENDING PROPOSALS

External funding

7. NSF, Immediate perfusion during formation and maturation of 3D tissues exhibiting vascular-like structures, Role: Co-PI, \$551,181, Sep 2021 – Sep 2024.
8. NSF ASCENT: Connected Autonomous Recharging Articulating Vehicles for Agile Networks (CARAVAN), Role: Co-PI, PI: Razi Nalim, \$1,499,699, Dates: Sep 2021 – Sep 2025.

Internal funding

(None)

COMPLETED PROJECTS

External funding

9. Indiana Technical Assistance Program (INTAP) Phase I (Advanced Renewable Power, LLC (ARP) and NineTwelve Institute, Indiana, Title: Design and Fabrication of an Electric Vehicle Chassis. Role: PI, \$6,336, Dates: Aug 31, 2021 – Mar 31, 2022.
10. NSF I-Corps. Title: Developing a Microstructure-based Simulation and Optimization Platform to Improve Lithium Ion Battery Performance. Role: PI. Amount: \$50,000. Dates: Jul 2020 – Jul 2021.
11. 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 2020.

12. National Science Foundation. Title: REU Site: IUPUI REU Program in mathematics with applications to medical sciences, biophysics, and inverse problems. Role: Mentor/Senior Personnel, Andres Tovar (PI: Julia Arciero). Award: 1559745. Dates: Summer 2020.
13. National Science Foundation. Title: REU Site: Multidisciplinary Research for Undergraduates in Nanomaterials for Energy and Biological Applications. Role: Mentor/Senior Personnel, Andres Tovar (PI: Mangilal Agarwal). Award: 1659688. Dates: Summer 2020.
14. National Science Foundation. Title: REU Site: IUPUI REU Program in mathematics with applications to medical sciences, biophysics, and inverse problems. Role: Mentor/Senior Personnel, Andres Tovar. NSF DMS-1559745. Amount: \$249,994. Dates: 2015-2019.
15. 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.
16. 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.
17. 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.
18. 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 – Aug 2018.
19. 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.
20. Yamaha Motor Corporation, USA. Donation of a Yamaha Wolverine side-by-side for student projects. Amount: \$15,000 (in-kind). Role: PI. Date: Dec 2016.
21. 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.
22. 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.
23. The Raytheon Foundation. Title: Development and Evaluation Additive Manufacturing Technologies. Amount: \$10,000 (donation). Role: PI. Effort: 100%. Dates: March – Dec 2015.
24. 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.
25. University of Notre Dame Alumni Association: Design of Robotic Football Players. Role: Advisor. Effort: 100%. Amount: \$5,000. Dates: Aug 2012 – Aug 2014.
26. 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.
27. 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.
28. 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.
29. 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.

30. 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.
31. 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.

Internal funding

32. IUPUI CRL Undergraduate Research Opportunity Program (UROP). Title: 3D printing lithium-ion batteries. Role: Mentor. Student: Kourtney Collier. Amount: \$2,500. Dates: AY 2021-22.
33. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of compostable plastic for additive manufacturing. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$8,000. Dates: AY 2021-22.
34. IUPUI Diversity Scholars Research Program (DSRP). Title: Fused deposition modeling of compostable plastics and lithium-ion batteries. Role: Advisor. Effort: 100%. Student: Kyran Randle. Amount: \$2,500. Dates: AY 2021-22.
35. IN LSAMP-IUPUI. Title: Effect of infill patterns in 3D printed parts. Role: Mentor. Effort: 50%. Amount: \$8,000. Dates: Summer 2021.
36. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Developing the technology to 3D print with potato starch-based plastic. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$15,000. Dates: Summer 2021.
37. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Effect of natural fibers in the mechanical properties of starch-based plastic. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$8,000. Dates: AY 2020-21.
38. IN LSAMP-IUPUI. Title: Computational fluid dynamic models for 3D bioprinting. Role: Mentor. Effort: 50%. Amount: \$8,000. Dates: Summer 2020.
39. IN LSAMP-IUPUI. Title: Optimal vehicle design using machine learning. Role: Mentor. Effort: 50%. Amount: \$8,000. Dates: Summer 2020.
40. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Tailoring Mechanical Properties of Compostable Plastic: Effects of natural plasticizers and initiators. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$15,000. Dates: Summer 2020.
41. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of compostable plastic. Role: PI (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$8,000. Dates: AY 2019-20.
42. IN LSAMP-IUPUI. Title: Processing potato starch-based plastic. Role: Mentor. Effort: 50%. Amount: \$4,000. Dates: Summer 2020.
43. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of recycled HDPE and PP in extrusion-based additive manufacturing and injection molding. Role: co-PI (PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$15,000. Dates: Summer 2019.
44. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Processing of recycled HDPE and PP in extrusion-based additive manufacturing. Role: co-PI (PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$8,000. Dates: AY 2018-19.
45. 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.

46. IUPUI-FORCES. Title: Chest Tube Securing Device. Amount: \$18,106. Role: Co-PI (PI: Samer Abu-Sultaneh). Dates: Aug 2018 – Jan 2019.
47. IUPUI-RSFG. Title: 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.
48. IUPUI BBRC-INDI. Title: Hybrid Cellular Automaton Model of Complex Cellular Migratory Behavior. Amount: \$5,000. Role: PI. Effort: 100%. Dates: AY 2017-18.
49. 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.
50. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Application recycled plastic in extrusion-based additive manufacturing. Role: co-PI (PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$15,800. Dates: Summer 2018.
51. IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI). Title: Suitability of recycled plastic for extrusion-based additive manufacturing. Role: PI, (co-PI: Amanda Siegel, INDI). Effort: 50%. Amount: \$7,000. Dates: AY 2017-18.
52. 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.
53. 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.
54. Purdue Research Foundation (PRF) International Travel Grant. Amount: \$1,000. Date: Jun 2017.
55. 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 (PI: Nic Moldovan). Effort: 33%. Amount: \$20,000. Dates: Summer 2017.
56. 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.
57. 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 (PI: Nic Moldovan). Effort: 33%. Amount: \$20,000. Dates: AY 2016-17.
58. 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 (co-PI: Amanda Siegel, INDI). Effort: 50%. Dates: Summer 2016.
59. 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.
60. 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.
61. 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.
62. IUPUI Diversity Scholars Research Program (DSRP). 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.

63. IUPUI Diversity Scholars Research Program (DSRP). 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.
64. 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: AY 2014-2015.
65. 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.
66. Purdue Research Foundation (PRF) International Travel Grant. Amount: \$1,000. Date: Sep 2014.
67. IUPUI Diversity Scholars Research Program (DSRP). 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.
68. 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: Summer 2013.
69. Purdue Research Foundation (PRF) International Travel Grant. Amount: \$1,000. Date: Sep 2012.
70. IUPUI Diversity Scholars Research Program (DSRP). 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.

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.

PROFESSIONAL AWARDS

1. IUPUI Athletics Favorite Professor 2021-2022
2. SADCO Our Talent Award 2020
3. IUPUI Athletics Favorite Professor 2019-2020
4. Indiana University Trustees Teaching Award 2019
5. IUPUI Athletics Favorite Professor 2018-2019
6. SHPE STAR Award, Educator of the Year 2018
7. Indiana University Trustees Teaching Award 2016
8. IUPUI Wisner-Stoelk Outstanding Faculty Award 2015
9. Grand Prize Winner, DOE/ARPA-E-Local Motors LITECAR Challenge 2015

10. IUPUI Athletics Favorite Professor 2014-2015
11. SAE Ralph R. Teetor Educational Award 2014
12. Best Faculty Advisor, IUPUI Purdue School of Engineering and Technology 2013-2014
13. IUPUI Athletics Favorite Professor 2013-2014
14. IUPUI Athletics Favorite Professor 2012-2013
15. AIMUM Recognized Department Chair 2005-2007, Jul 2011
16. Young Investigator Award, National University of Colombia, 2005-2007
17. Fulbright Scholar, PhD at the University of Notre Dame, 2001–2004
18. Outstanding Faculty Recognition, National Univ. of Colombia, Dept. Mechanical Eng., Dec 2000
19. CYTED Scholar, Santa Cruz de la Sierra, Bolivia, Summer 1998

STUDENT AWARDS

20. Honored M.S. Thesis in Industrial Automation, National University of Colombia, 2000
21. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Spring 1997
22. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Fall 1996
23. Best GPA fellowship, M.S. Industrial Automation, National University of Colombia, Fall 1995
24. First runner up, Undergrad Research Academic Excellence Program, National U of Col, Nov 1995
25. Distinguished B.S. Research Thesis, National Univ. of Colombia, Dept. Mechanical Eng., Jun 1995
26. Intercampus Scholar, Latin America–Spain Program, Polytechnic Univ. of Catalonia, Spring 1995
27. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Fall 1993
28. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1993
29. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Fall 1992
30. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1991
31. Best GPA fellowship, B.S. Mechanical Engineering, National University of Colombia, Spring 1990
32. 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, 2018
- Design of Complex and Origami Structures (ME 59700 developed): Spr 2017, 2018, 2019, 2020
- Additive Manufacturing (ME 59700 developed): Fall 2015, 2016, 2017, 2018, 2019, 2020
- Advanced Dynamics (ME 56200): Spr 2015
- Basic Engineering Mechanics (EEN 24000): Spr 2013
- Basic Mechanics II (ME 27400): Fall 2014, 2011
- Design of Mechanisms (ME 37200): Spr 2012, Fall 2012, Fall 2013
- Machine Design (ME 45310 developed): Fall 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021
- Optimal Design of Complex Mechanical Syst. (ME 59700 developed): Spr 2014, 2016, 2018, 2020
- Bayesian Optimization (ME 60601 developed): Spr 2021
- Topology Optimization (ME 59700 developed): Sum 2012, 2014, 2015, 2017, 2018, 2019, 2020

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

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): AY 1996, 1997, 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. Valladares, H., L. Zhu, H. El-Mounayri, and A. Tovar. *Machine Learning-assisted design of lithium-ion batteries*. Indiana Artificial Intelligence Week, Indianapolis, IN, Sep. 3, 2021 (Speaker).
2. Tovar, A., *Topology Optimization and Generative Design of Lightweight Structures*. XI Jornada de Mecánica, Universidad Distrital Francisco José de Caldas, Bogotá, Colombia, Nov 26, 2020 (Seminar Speaker).
3. Tovar, A., *Topology Optimization for Mechatronics Design*. Universidad de San Buenaventura, Bogotá, Colombia, Nov 17, 2020 (Masterclass)
4. Tovar, A., *Lessons from natural materials and the design of engineering structures*. International Research Conference on Health Science, Education, and Music (CINVEST), Juan N. Corpas University Foundation, Bogota, Colombia, Nov 13, 2020 (Keynote speaker)
5. Tovar, A., *Design of lightweight vehicle structures for crashworthiness using Bayesian optimization and generative design*. 7 Day International Webinar on Recent Trends in Automotive Technologies, VIT Vellore India, Webinar, Nov 2, 2020.
6. Tovar, A., *Cellular dynamic models and design of engineering structures*. Biomedical Engineering, IUPUI, Oct 30, 2020
7. Tovar, A., *Complex design*. Faculty Spotlight. Dean's Industrial Advisory Council (DIAC), May 2, 2019.
8. Tovar, A., *Art and bio-inspired design*. IUPUI 50th Anniversary Birthday Bash, Research Panel, Indianapolis, Indiana, Jan 24, 2019
9. Tovar, A., *Design of lightweight vehicle structures using lessons from nature*. SHPE 2018 National Convention, Cleveland, Ohio, Nov 7-11, 2018
10. Tovar, A., *Design of Cellular Structures for Crashworthiness*. Seminar at the University at Buffalo, Buffalo, New York, Nov 1, 2018.

11. Tovar, A., *Design of Origami and Complex Structures*. Rolls-Royce, Indianapolis, Indiana, Jun 29, 2018.
12. Tovar, A. and S. Anwar, *Integration of Engineering, Technology, and Arts in Graduate-level Education*. Allegion Plc, Carmel, Indiana, Jan 23, 2018.
13. Tovar, A. and T. Wu, *How Additive Manufacturing is Transforming the Plastic Processing Industry*. Logitech, May 22, 2017
14. Tovar, A., *Design of complex structures and additive manufacturing*, SENA, Cali, Colombia, Dec 13 and 14, 2016
15. Tovar, A., *Control-Based Structural Design for Crashworthiness Using Cellular Automata*, Electrical and Computer Engineering Research Seminar, IUPUI, Nov 9, 2016.
16. Tovar, A., *Leadership Symposium Panel*, IUPUI Engr. and Technology, Oct 12, 2016
17. Tovar, A., *NSF, NIH, and industry grant applications*, IUPUI Engr. and Technology Convocation, Aug 19, 2016
18. Tovar, A., *Sustainable 3D Printing*. Indy's Open Source Circular Economy (OSCE) Days 2016, Indianapolis, IN, June 9-13, 2016
19. Tovar, A., *Design and Art in Engineering*. Thompson Crossing Elementary, Southeast Marion County, IN, Apr 28, 2016
20. 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
21. 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)
22. Tovar, A., *Bio-inspired structural design*. IUPUI Biology Fall Research Seminar, Sep 11, 2015.
23. Tovar, A., *Advances in Optimal Design of Structures for Crashworthiness*. General Motors Corporation. Warren, Michigan, May 22, 2015
24. Tovar, A., *Design for Additive Manufacturing (3D Printing)*. The Sciencetech Club. Indianapolis, Indiana, May 11, 2015
25. 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
26. 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
27. Tovar, A., *Optimal design and additive manufacturing (3D printing) of ultra-lightweight structures*. Raytheon, Indiana, Jun 4, 2014.
28. 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
29. Tovar, A., *Welcome to Engineering freshmen students*. Purdue School of Engineering & Technology at IUPUI, Indianapolis, IN, Aug 13, 2013.
30. 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.
31. Tovar, A., *Emerging Technologies in Engineering*. Society of Hispanic Professional Engineers, IUPUI Chapter Indianapolis, IN, Apr 19, 2012.
32. Tovar, A., *Structural and Material Optimization*. IUPUI Mechanical Engineering Dept. Industry Advisory Board Meeting, Indianapolis, IN, Dec 16, 2011.

33. 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
34. 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.
35. 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.
36. Tovar, A., *Cellular Automata and Other Emerging Technologies in Design Optimization*. Society of Women Engineers, Professional Development Conference, Fort Wayne, Indiana. Mar 20, 2010.
37. 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.
38. 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.
39. 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.
40. 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.
41. Tovar, A., *Artificial Limb Design*. Keynote speaker at the Engineering Week, Saint Thomas Aquinas University, Bogotá, Colombia. Nov 16, 2006.
42. Tovar, A., *Prosthetic Design and Bone Remodeling*. Research Meeting on Mechanical Engineering. University of Ibagué–Cooruniversitaria. Ibagué, Colombia. October 13, 2006.
43. 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
44. 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.
45. 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.
46. 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
47. 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. Ximena Andrea Quevedo Martinez, Camilo Andres Cortes Garzon, Andres Hoyos, Jhon Perez, Santiago Triana Sotelo, Sohel Anwar, Andrea Tovar and Jaime Arcos-Legarda. *Active Disturbance Rejection Control for a Self-Driven Race Car in the Indy Autonomous Challenge*. IEEE Latin American Electron Devices Conference (LAED) 2022. Puebla, Mexico, Jul 4-6, 2022.

2. Jake Staker, Riya Singh, Kourtney Collier, Sarah Franklin, Andres Tovar, Amanda P. Siegel. *Evaluation of Potato Starch-Based Plastic for use in Liquid Deposition Modeling*. ACS Central Regional Meeting (CERM), Ypsilanti, Michigan, Jun 7-10, 2022.
3. Riya Singh, Jake Staker, Kourtney Collier, Sarah Franklin, Andres Tovar, Amanda P. Siegel. *Techniques for improving mechanical and material properties of potato starch bio-based plastic film*. ACS Central Regional Meeting (CERM), Ypsilanti, Michigan, Jun 7-10, 2022. Mia Sosa, Kourtney Collier, Amanda P. Siegel, Andres Tovar. *Effects of Starch and Glycerin Mass Ratios on the Mechanical Properties of Manually Extruded Potato Starch-Based Plastics*. IUPUI CRL Student Research and Creative Activities Day 2022, Indianapolis, Indiana, Apr 22, 2022.
4. Kourtney Collier, Hua Wang, Amanda P. Siegel, Likun Zhu, Andres Tovar. Fabrication and characterization of 3D cathodes for increased capacity of Lithium-ion battery cells. Poster and oral presentations. IUPUI CRL Student Research and Creative Activities Day 2022, Indianapolis, Indiana, Apr 22, 2022.
5. Jake Staker, Riya Singh, Kourtney Collier, Sarah Franklin, Andres Tovar, Amanda P. Siegel. *Pelletization of Potation Starch-Based Plastic for Injection Molding*. Poster and oral presentations. IUPUI CRL Student Research and Creative Activities Day 2022, Indianapolis, Indiana, Apr 22, 2022.
6. Riya Singh, Jake Staker, Kourtney Collier, Sarah Franklin, Andres Tovar, Amanda P. Siegel. *Processing and Mechanical Characterization of Potato Starch-Based Plastic Film Sealing*. Poster and oral presentations. IUPUI CRL Student Research and Creative Activities Day 2022, Indianapolis, Indiana, Apr 22, 2022.
7. Austin Owens, Brendon Shelton, Andres Tovar. *Effect of Infill Patterns on the Mechanical Properties of 3D Printed Parts by Fused Deposition Modeling*. 2021 Louis Stokes Midwest Regional Center of Excellence (LSMRCE) Virtual Conference. Oct 22-24, 2021. Competitive Poster Session, Oct 23, 2021. Poster Awarded with the First Place.
8. Chelsea Uyeno, Sidnee Zeiser, Regan Dwenger, Amanda Siegel, Andres Tovar. *The Effects of Reaction, Reduction, and Dehydration Methods in Potato Starch-Based Plastic Film Quality*. IUPUI CRL Research Day 2021. Indianapolis, Indiana, Apr 4, 2021.
9. Elysa Thompson and Andres Tovar. *Computational fluid dynamics of 3D-printed tissues*. IN LSAMP 2020 Annual Research Conference, Indianapolis, Indiana, Oct 3, 2020.
10. Kourtney Collier, Samantha Goins, Austin Chirgwin, Isabelle Stanfield, Amanda Siegel, and Andres Tovar. *Effect of Dehydration Methods in Starch-Based Plastics*. IUPUI CRL Summer Symposium, Indianapolis, Indiana, July 30, 2020.
11. Alexis Hecker, Kourtney Collier, Salvador Rodriguez, Sarah Smith, Ashlee Gibson, Kaycee Hammond, Amanda Siegel, and Andres Tovar. *Mechanical and Chemical Characterization of Potato Starch-Based Plastics*. IUPUI CRL Summer Symposium 2020, Indianapolis, Indiana, July 30, 2020.
12. Salvador F. Rodriguez Valle and Andres Tovar. *Production of Potato Starch-Based Bioplastic*. IUPUI CRL Summer Symposium 2019, Indianapolis, Indiana, Jul. 25, 2019.
13. Aaron Scheiner, Thomas Shomer, T.J. Sego, and Andres Tovar. *Multi-material Topology Optimization using a Cellular Potts Model*. IUPUI CRL Summer Symposium 2019, Indianapolis, Indiana, Jul. 25, 2019.
14. Shelby Bowmer, Elexis Shields, Zain Akbar, Kate Edler, Jason Smith, Mangilal Agarwal, Andres Tovar, and Amanda Siegel. *Chemical and Mechanical Characterization of Virgin and Recycled HDPE for use in Additive Manufacturing and Injection Molding*. IUPUI CRL Summer Symposium 2019, Indianapolis, Indiana, Jul. 25, 2019.
15. Jason Smith, Kate Edler, Zain Akbar, Elexis Shields, Shelby Bowmer, Mangilal Agarwal, Andres Tovar, and Amanda Siegel. *Mechanical Characterization of Virgin and Recycled HDPE and LDPE for use in Additive Manufacturing and Injection Molding*. IUPUI CRL Summer Symposium 2019, Indianapolis, Indiana, Jul. 25, 2019.

16. Valladares, H., J. Najmon, and A. Tovar. *Structural Optimization of Thin-Walled Tubular Structures for Progressive Collapse Using Hybrid Cellular Automaton with a Prescribed Response Field*, 3rd Annual Engineering and Technology Leadership Symposium, Indianapolis, Indiana, Nov 16, 2018.
17. Segó, T.J., J.A. Glazier, A. Tovar. *A Hybrid Kinetic Monte Carlo Method to Predict Extracellular Matrix Remodeling and Induction Processes in Biology and Biofabrication*, 3rd Annual Engineering and Technology Leadership Symposium, Indianapolis, Indiana, Nov 16, 2018.
18. Cardona, C., S. Anwar, and A. Tovar. *Optimal design of self-unfolding origami structures*. SHPE 2018 National Convention, Cleveland, Ohio, Nov 7-11, 2018.
19. Sarah Pugliese, A. Tovar. *Investigation of Phase Field Methods in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
20. Sophia Kardadi, A. Tovar. *The Level Set Method in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
21. John Rowe, A. Tovar. *Adjoint Methods in Topology Optimization*. IUPUI CRL Summer Symposium 2018, Jul. 26, 2018.
22. Segó, T.J., Y-T. Hsu, T-M. G. Chu, A. Tovar. *Multiscale Modeling of Peri-implant Bone Remodeling using Finite Element Analysis*, American Association for Dental Research/Canadian Association for Dental Research Annual Meeting and Exhibition, Ft. Lauderdale, Florida, Mar 22, 2018.
23. 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.
24. 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.
25. 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.
26. 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.
27. 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.
28. 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.
29. U. Kasacheuski, D. Hauerperger, T.J. Segó, A. Tovar, N. Moldovan. *Performance Optimization of a Hybrid Cellular Automaton Model of Cell Spheroids Fusion and Metabolism during Scaffold-free Bioprinting*, IUPUI Research Day, Indianapolis, Indiana, Apr 7, 2017.
30. 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.
31. Segó, T.J., U. Kasacheuski, N. Moldovan, A. Tovar. *Hybrid Cellular Modeling of Cellular Dynamics and Metabolism*, Nanotechnology Research Forum and Poster Symposium, Indianapolis, Indiana, Nov 18, 2016.
32. Segó, 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, Oct 29-31, 2016.
33. Segó, T.J., U. Kasacheuski, A. Tovar, N. Moldovan. *Hybrid CA Modeling of Cellular Dynamics and Metabolism*. IUPUI 3D Bioprinting Core Symposium, Oct 21, 2016.

34. 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.
35. 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.
36. 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.
37. 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.
38. 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.
39. 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.
40. 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.
41. 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.
42. 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.
43. 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.
44. 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.
45. 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.
46. 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.
47. 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.
48. Allen, T. and A. Tovar. *Design of Radio Communication Control System for Robotic Applications*. IUPUI Research Day 2014, Indianapolis, IN, April 11, 2014.
49. 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.
50. 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.
51. Wang, Y., S. Mukhopadhyay, and A. Tovar. *Sugarscape model for Agent-Based Structural Design*. CRL poster presentations, Indianapolis, IN, July 26, 2013.

52. Chow, K. H., S. Mukhopadhyay, and A. Tovar. *Exploring Genetic Algorithm for Numerical Optimization*. CRL poster presentations, Indianapolis, IN, July 26, 2013.
53. 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

1. Prathamesh Saudhari (Jun 2021 – Present)
2. Aakash Gupta. Machine learning-assisted topology optimization (Jan 2019 – Present)
3. Joel Najmon. Multi-physics topology optimization (Aug 2018 – Present)
4. Homero Valladares. Bayesian optimization (Aug 2017 – Present)
5. Sajjad Raeisi. Design for crashworthiness (Aug 2015 – Aug 2021). Thesis: Design of multi-material structures for crashworthiness using hybrid cellular automata. Current affiliation: Sr. Engineer - Multi-Disciplinary Optimization at Rivian, Irvine, California.
6. T.J. Segó (Aug 2016 – Aug 2019). Thesis: Hybrid Kinetic Monte Carlo Models of Cellular Processes in Interactive Dynamic Microenvironments. Current affiliation: Postdoctoral fellow at Indiana University, Bloomington, Indiana, USA.
7. Tong Wu (Aug 2015 – Jun 2019). Thesis: Topology optimization of multiscale structures coupling fluid, thermal, and mechanical analysis. Current affiliation: Software engineer at Siemens PLM, Belgium.
8. Kai Liu (Aug 2014 – Jun 2018). Thesis: Cluster-based Structural Optimization and Applications to Crashworthiness. Current affiliation: Software engineer at Google, Boston, USA.

M.S. students (thesis)

1. Benjamin Coovert (Jan 2022 – Present) co-advised by Khosrow Nematollahi
2. Mayur Patil (Aug 2018 – Present)
3. Ashwin Gaonkar (Aug 2019 – Aug 2022) co-advised by Hazim El-Mounayri
4. Alen Anthony (Aug 2018 – Dec 2021): Design Engineer at Rivian, Irvine, CA
5. Shantanu Shinde (Aug 2017 – Jul 2019): PhD student at Temple University, Philadelphia, PA
6. Prathamesh Chaudhari (Jun 2014 – Jun 2019): Product Reliability Engineer, Siemens, Columbus, IN
7. Sai Ashish Kanna (Jun 2013 – Nov 2018): Control engineer at LHP Software
8. Joel Najmon (Jan 2017 – Dec 2017): See under Ph.D. students
9. Prasad Tapkir (Aug 2016 – Dec 2017): CAE Engineer at Ford Motor Co., Detroit, MI
10. Jennifer Solis Ocampo (Aug 2015 – Aug 2017): Test R&D Engineer at Intel Corporation
11. Homero Valladares (Aug 2015 – Aug 2017): See under Ph.D. students
12. T.J. Segó (Jun 2015 – Aug 2016): See under Ph.D. students
13. Fabian Lischke (Jan 2015 – Aug 2016): Senior R&D Engineer, Robert Bosch LLC, Germany
14. Vaibhav Gokhale (Jun 2014 – Aug 2016): Data Science Professional at Maharashtra, India
15. Parisa Ghane (Jun 2014 – Aug 2015, co-advised by L. Li): Ph.D. Student at Texas A&M University
16. Kunal Khadke (Nov 2011 – May 2015): CAE Engineer at General Motors
17. Anahita Emami (Aug 2012 – Aug 2014): PhD student at Virginia Tech
18. Satyajeet Shinde (Sep 2011 – May 2014): Design engineer at Ford Motor Company
19. Kai Liu (May 2012 – Aug 2013): See under Ph.D. students
20. Joshua Israel (Oct 2011 – May 2013): General Manager, SGS Columbus, Indiana

Post-doctoral visiting scholars

1. Alvaro Arias (Fall 2018, National University of Colombia)

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

Ph.D. visiting students

1. Edwin Prieto, Nat U of Colombia (Summer and Fall 2018)
2. Jaime Arcos Legarda, Nat U of Colombia (Fall 2012, AY 2017-18)

Undergraduate students (research)

- IUPUI CRL Multidisciplinary Undergraduate Research Institute (MURI): Summer 2022 (5 students): Jake Staker, Riya Singh, Jose Quintero, Zhen Hong, and Sydney Schott. AY 2021-22 (7 students): Jake Staker, Riya Singh, Sarah Franklin, Ahmed Daood, Jose Quintero, and Gavin Anspach. Summer 2021 (4 students): Regan Dwenger, Samuel Brumfield, Sidnee Zeiser, and Chelsea Uyeno. AY 2020-21 (5 students): Kourtney Collier, Alexa Calonia, Emily Hine, Fadumo Warsame, Victoria Bozinovski. Summer 2020 (4 students): Kourtney Collier, Samantha Goins, Austin Chirgwin, Isabelle Stanfield. AY 2019-20 (6 students): Kaycee Hammond, Alexis Hecker, Ashlee Gibson, Kourtney Collier, Salvador Rodriguez, Sarah Smith; Summer 2019 (5 students): Shelby Bowmer, Elexis Shields, Zain Akbar, Kate Edler, and Jason Smith. AY 2018-19 (5 students): Rachael Benoy, Fatimah Alkadhim, Kerri Anne Charlton, Seth Kussow, Abole Diwate; Summer 2018 (4 students): Megan Miller, Kaylee Crowell, Rachel Cadle, Pratik Rath, Matthew Joseph; AY 2017-18 (4 students): Skye Tutino, Julian Strobel, Nicholas Lozier, Tanjimul Alam; AY 2016-17 (2 students): Daniel Huersperger, Vladzimir Kasacheuski; Summer 2016 (4 students): Qiuyu “Autumn” Deng, Jinyun “Jason” Zhou, Vladzimir Kasacheuski, Laura Luther; AY 2015-16 (4 students): Aaron Isaacs, Zongying “Ivy” Xu, Abigail Curdes, Carl Marko; AY 2014-15 (8 students): Daniel Rodriguez Gambetta, Ali Mohammed Alkhaleefah, Aquil Faisal Janwari, Hikmet Duygu Ozdemir, Jomar Mendoza, Hamza Nawaz, Kenny Guan Kiak Wong, Raveena Maharu Patil; Summer 2013 (4 students): Yumin Wang, Kok Hwang Chow, Zachary Paul Reynolds, Quinn Angrick.
- Capstone Design in Mechanical Engineering: Spring 2021 (3 groups, 18 students): Group J (6 students): Mohammad Mhod, Hiu Cheng, Brett Harvey, Brandon Lacy, Hani Salehi, Miguel Trejo; Group I (6 students): Danielle Trivett, Francis Iloeje, Nicole Rivera, Omar Ocelotl, Rakan Alzahrani, Sunday Folorunso; Group N (6 students): Sutton Evans, Bryce Kelly, Fabio Carpi, Evan Parker, Dalton Sholders, Justin Wagler. Fall 2020 (4 students): Raja Daniel, Jesse Li, Karan Karthik. Fall 2019 (5 students): Garrett Nogoda, Sara Matinmehr, Jonatan Gomez, Jon Bratton, Nathaniel Toney; Spring 2019 (8 students): Nick Peskind, Megan Fraider, Grady Bennet, Gus Post, Tanner Cline, Matt Skoog, Thomas Bennett, Alec Schory; Spring 2018 (5 students): Leanne Abel, Carolina Cardona, Samantha Mayer, Brandon Watson, Brett Ronczka; Spring 2017 (5 students): Linlin Cai, Bryan Kirk, Casey Woods, Josh Brown, Omar El-Mounayri; Spring 2016 (5 students): Kristin LaBounty, Richard Lindsay, Marko Saad, Kazuaki Tamura, Jacob Waugh; Spring 2015 (4 students): Amanda Lund, Carl Marko, Tim Allen.
- NEWM-N 420 Multimedia Project Development: Fall 2020 (4 students): Ted Emery, Dakota Bennet, Colleen O’Brien, Abby Markel; Spring 2020 (2 students): Kalene Kingery, Eric Ortiz.
- Indiana STEM Louis Stokes Alliance for Minority Participation (IN LSAMP): Summer 2020 (1 student): Elysa Thomson. Summer 2019 (1 student): Salvador Rodriguez Valle.
- School of Engineering & Technology Commitment to Engineering Excellence Research Fund: Kaycee Hammond (Summer 2019), Kate Edler (Spring 2019), Dante Goss (AY 2017-18), Carolina Cardona-Serrano (AY 2016-17), Jorge Ortiz (AY 2015-16), Anna Glumb (AY 2014-15), Ricardo Ortiz (AY 2014-15), Gillian Bundles (Summer 2015), Kerri Anne Charlton (Spring 2014), Amanda Justiniano (Fall 2013), Madeline Dement (Fall 2013), Sara Grimany (AY 2011-12).

- IUPUI CRL Undergraduate Research Opportunities Program (UROP): AY 2021-22: Kourtney Collier. Spring 2014: Timothy Allen; Fall 2012: Adam El-Rahaiby.
- NSF Research Experience for Undergraduates (REU): Summer 2020 (3 students): Eric Raymond (IUPUI), Trevor Gordley (University of Illinois at Urbana-Champaign), Benjamin Thomas (Louisiana State University). Summer 2019 (2 students): Aaron Scheiner (Rutgers) and Thomas Shomer (Valparaiso University). Summer 2018 (3 students): Sarah Pugliese (Brown University), Sophia Kardadi (University of Notre Dame), John Rowe (Clemson University).
- IUPUI Honors Program: Fall 2019 (3 students): Drew Fryman, Braden Havics, Michael Zajac; Fall 2017 (1 student): Luke Baker, Honors; Fall 2016 (2 students): Michael Johnson, Joel Rasor; Fall 2015 (1 student): Cullen Shorey; Fall 2014 (3 students): Samantha Mayer, Zachary Wozniak, Braden Ratekin.
- Externally Funded Undergraduate Research Assistants: Tanjimul Alam, (AY 2015-16, AY 2016-17, AY 2017-18), Carol Marko (Fall 2016), Michael Klemen (Fall 2014), Eduardo Muller (Spring 2012).

Teachers

- NSF Research Experience for Teachers (RET): Vanessa Gee, Eastwood Middle School, Indianapolis (Summer 2017, Summer 2018).

High school students

- Advanced Placement Program: Mia Sosa (Carmel High School, AY 2021-22), U.S. Army REAP grant: Lynn Ahrens, (Ursuline Academy, Summer 2017), Shaleese Jefferson (Decatur Central High School, Summer 2017), Brianna Hibbler (Rose-Hulman, Summer 2016), Shanlyn Jefferson (Decatur Central High School, Summer 2016), Makylah Wallace (Decatur Central High School, Summer 2016).

UNIVERSITY OF NOTRE DAME

Ph.D. students

1. Punit Bandi (co-advisors: J.E. Renaud and J. Schmiedeler), Ph.D. in Mechanical Engineering, 2013: Current affiliation: Project Engineer at General Motors, Michigan, USA

M.S. students (thesis)

2. Huade Tan (co-advisor: J.E. Renaud), M.S. Mechanical Engineering, 2010
3. Amanda PeGan, M.S., Engineering, Science, and Technology Entrepreneurship, 2010
4. Conor Riordan (co-advisor: J.E. Renaud), M.S. Mechanical Engineering, 2009

Undergraduate students

5. NSF Research Experience for Undergraduates (REU): 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

1. Willington Jaime Arcos Legarda (co-advisor: J.A. Cortés), Ph.D. in Electrical Engineering, 2018. Assistant Professor, Dept of Mechatronic Eng, University of San Buenaventura, Colombia.

2. Luis Carlos Sarmiento Vela (co-advisor: C.J. Cortés), Ph.D. in Mechanical Engineering, 2016. Currently, Department Chair at the Pedagogic National University of Colombia.

M.S. students (thesis)

3. Willington Jaime Arcos Legarda (co-advisor: H. Díaz), M.S. Industrial Automation, 2013
4. María Fernanda Espitia Moreno (co-advisor: C.J. Cortés), M.S. Biomedical Engineering, 2012
5. Andrés Julián Arias Moreno (co-advisor: D.A. Garzón), M.S. Biomedical Engineering, 2011
6. Germán Andrés Méndez Algarra, M.S. Mechanical Engineering, 2009
7. Wilson Isaac Quevedo Trujillo, M.S. Industrial Automation, 2008
8. Andrea Stella Vera Velandia, M.S. Mechanical Engineering, 2008
9. Heriberto Augusto Pinto Linares (co-advisor: by F. Angulo), M.S. Industrial Automation, 2007
10. Luis Carlos Sarmiento Vela, M.S. Industrial Automation, 2007
11. Fernando José Rodríguez Mesa, M.S. Industrial Automation, 2007
12. Oscar Rodrigo López Vaca, M.S. Materials and Manufacturing, 2006
13. Carlos Alberto Narváez Tovar (co-advisor: D.A. Garzón), M.S. Materials and Manufacturing, 2006

Undergraduate students (thesis)

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

UNIVERSITY SERVICE

INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

Campus Level

- Evaluation Committee of Dean Russomanno (Fall 2021 – Spring 2022)
- APLU Diversity Task Force Faculty Member (Summer 2018 – 2020)

Purdue School of Engineering and Technology

- Nominations Committee Chair (Aug 2020 – Aug 2022)
- Faculty Senate Member (Aug 2018 – Aug 2020, Aug 2021 – Aug 2022)
- Grievance Board Chair (Aug 2018 – Aug 2019)
- Diversity Task Force Committee (Aug 2017 – Aug 2019, Aug 2020 – Present)
- Accelerate Innovation Task Force Committee (Aug 2017 – Aug 2019)
- Diversity Recruitment and Retention Committee, Faculty Member (Aug 2016 – Present)
- Faculty Search Committee for Motorsports Engineering (Jan 2017 – Aug 2017)
- IUPUI Co-coordinator for the AgBOT Challenge (Aug 2017 – Present)
- IUPUI Coordinator for the AgBOT Challenge (Aug 2015 – Aug 2017)
- NSF Proposal Preparation Group Coordinator, Purdue School of Engr. and Tech. (2013 – 2016)
- 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

- Research Committee Faculty Member (Aug 2018 – Present)
- 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 – Aug 2018)
- ME Design Focus Group Faculty Member (Aug 2012 – Present)
- ME Course Coordinator 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

- MS student Harsh Saksena, IUPUI, Advisor: Sohel Anwar (Summer 2021)
- MS student Vidya Wable, IUPUI, Advisor: Hamid Dalir (Spring 2021)
- MS student Omkar Parkar, IUPUI, Advisor: Sohel Anwar (Spring 2021)
- MS student Harshal Dhamade, IUPUI, Advisor: Jing Zhang (Spring 2021)
- PhD student Dennis Leon, National Univ. of Colombia, Advisor: Nelson Arzola (Summer 2020)
- MS student Pedro Rubio, National Univ. of Colombia, Advisor: Alexander Gomez (Summer 2020)
- MS student Tajesh Dube, IUPUI, Advisor: Jing Zhang (Spring 2020)
- MS student Sanskar Thakur, IUPUI, Advisor: Mangilal Agarwal (Spring 2020)
- MS student Salah Hassan, IUPUI, Advisor: Sohel Anwar (Fall 2019)
- MS student Meghana Kamble, IUPUI, Advisor: Hamid Dalir (Summer 2019)
- MS student Riddhi Joshi, IUPUI, Advisor: Hazim El-Mounayri (Spring 2019)
- MS student Anudeep Padmanabhan, IUPUI, Advisor: Jing Zhang (Spring 2019)
- MS student Mallikharjun Marrey, IUPUI, Advisor: Hazim El-Mounayri (Spring 2019)
- MS student Archit Deshpande, IUPUI, Advisor: Hamid Dalir (Spring 2019)
- PhD student Sheng Yang, McGill University, Advisor: Fiona Zhao (Fall 2018)
- MS student Tianyang Wu, IUPUI, Advisor: Carlos Larriba (Fall 2018)
- MS student Shitiz Vij, IUPUI, Advisor: Mangilal Agarwal (Fall 2018)
- MS student Aaron Berndt, IUPUI, Advisor: Jong Ryu (Summer 2018)
- MS student Sugrim Sagar, IUPUI, Advisor: Jing Zhang (Spring 2018)
- MS student Nishant Hawaldar, IUPUI, Advisor: Jing Zhang (Spring 2018)
- MS student Eduardo Salcedo, IUPUI, Advisor: Jong Ryu (Fall 2017)
- PhD student Guodong Zhang, Notre Dame, Advisor: Kapil Khandelwal (Fall 2017)
- MS student Samuel Attoye, IUPUI, Advisor: H. El-Mounayri (Fall 2017)
- PhD student Christian Silva, Nat Univ of Colombia, Advisor: C.J. Cortes (Fall 2017)
- MS student Praveen Kumar, IUPUI, Advisor: H. El-Mounayri (Spring 2017)
- 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

- PhD student Punit Bandi (Doctoral Candidacy, 2011)
- PhD student John Goetz (Doctoral Candidacy, 2011)
- PhD student Chandan Mozumder (Candidacy, 2010 and Dissertation, 2011)
- PhD student Gilberto Mejía (Candidacy, 2009 and Dissertation, 2010)
- MS student Devendra Dubey (Master's Defense, 2009)
- MS student Vikas Samvedi (Master's Defense, 2009).
- PhD student Mary Wagner Fuhs (Doctoral Candidacy, Psychology, 2008)
- PhD student Matthew Meixner (Doctoral Candidacy, Physics, 2009),
- 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)

STUDENT COMPETITION AWARDS

Under Prof. Tovar's mentoring, IUPUI student teams have received the following awards:

1. Agricultural Robotics AgBOT Challenge 2019, Second Place, June 2019
2. Conexus Indiana Logistics and Automotive Case Competition, Third Place, Oct 2018
3. Agricultural Robotics AgBOT Challenge 2018, Second Place, May 2018
4. Agricultural Robotics AgBOT Challenge 2017, Fourth Place, May 2017
5. Agricultural Robotics AgBOT Challenge 2016, Fourth Place, May 2016
6. ROSAM Project Second Place Design Team Faculty Advisor, NAVSEA Crane Division, Apr 2012

PROFESSIONAL SERVICE

TECHNICAL PROGRAMS AND CONFERENCES

- International Scientific Committee Member of the ISSMO 6th International Conference on Engineering Optimization (EngOpt 2020), Indianapolis, Indiana, Sep 23-25, 2020.
- Symposium Co-organizer, Review Coordinator, ASME 46th Design Automation Conference, Design for Additive Manufacturing Session, St. Louis, MO, Aug 16-19, 2020.
- Symposium Co-organizer, Review Coordinator, ASME 46th Design Automation Conference, Design of Engineering Materials and Structures Session, St. Louis, MO, Aug 16-19, 2020.
- Symposium Co-organizer, Review Coordinator, ASME 45th Design Automation Conference, Design for Additive Manufacturing Session and Design of Engineering Materials and Structures Session, Anaheim, CA, Aug 18-21, 2019.
- Symposium Co-organizer, Review Coordinator, ASME 44th Design Automation Conference, Design for Additive Manufacturing Session and Design of Engineering Materials and Structures Session, Quebec City, Canada, Aug 26-29, 2018.
- Symposium Co-organizer, Review Coordinator, 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, Review Coordinator, ASME 42th Design Automation Conference, Design of Engineering Materials and Structures Session, Charlotte, North Carolina, Aug 21-24, 2016.

- Symposium Co-organizer, Review Coordinator, 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, Review Coordinator, ASME 40th Design Automation Conference, Design of Engineering Materials and Structures Session, Buffalo, New York, August 17-20, 2014.
- Symposium Co-organizer, Review Coordinator, 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. Aug 2017 – Dec 2018
- Editorial Board Member. Journal Cuarzo. Since 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 (2016 – 2018)
- 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)

- Society of Hispanic and Professional Engineers (SHPE member # 65558 since 2013)
- American Society for Engineering Education (ASEE member 2013-2017)
- 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 PAPER REVIEWS

Prof. Tovar has served as reviewer of over a hundred journal papers submitted to scientific journals including: ASME Journal of Mechanical Design, Structural and Multidisciplinary Optimization, Engineering Structures, Additive Manufacturing, Materials and Design, Mathematical Biosciences, 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 Aerospace Engineering, AIAA Journal, Mathematical Problems in Engineering, Journal of Computational Physics, Mechanics Research Communications, Physica A, Thin-Walled Structure, and International Journal of Vehicle Design, among others.

CONFERENCE PAPER REVIEWS

Prof. Tovar has served as reviewer for several conferences including: ASME International Design Engineering Technical Conference IDETC (since 2007), SAE World Congress (since 2015), among others.

GRANT PROPOSAL AND SCHOLAR REVIEWS

Prof. Tovar has served as grant proposal for several organizations including: National Science Foundation CMMI (2013, 2014, 2016, 2018), The Fulbright Commission (2006, 2007, 2012, 2013), Air Force Summer Faculty Fellowship (2014), Colciencias (2006, 2007, 2008, 2010, 2012, 2013), Delft University of Technology (2016), IUPUI (since 2011), among others.

BOOKS AND BOOK PROPOSAL REVIEWS

Prof. Tovar has served as reviewer of book proposal for Elsevier (2017), Wiley (2017), and CRC Press (2014).

PUBLICATION LIST

Andres Tovar

JOURNAL PAPERS

(50+ papers published)

2022 (2 paper published, 2 paper accepted, 2 papers under review)

1. Valladares, H., T. Li, L. Zhu, H. El-Mounayri, A. Hashem, A. Abdel-Ghany, and **A. Tovar**. *Gaussian Process-based Prognostics of Lithium-ion Batteries and Design Optimization of Cathode Active Materials*. Journal of Power Sources. Vol: 528, Page: 231026, <https://doi.org/10.1016/j.jpowsour.2022.231026>, 2022.
2. Hua Wang, Ahmed M Hashem, Ashraf E Abdel-Ghany, Somia M Abbas, Rasha S El-Tawil, Tianyi Li, Xintong Li, Hazim El-Mounayri, **Andres Tovar**, Likun Zhu, Alain Mauger, Christian M Julien. Effect of cationic (Na⁺) and anionic (F⁻) co-doping on the structural and electrochemical properties of LiNi_{1/3}Mn_{1/3}Co_{1/3}O₂ cathode material for lithium-ion batteries. *Physical Chemistry and Chemical Physics*. Special Issue “Advanced Materials for Electrochemical Energy Storage: Lithium-Ion, Lithium-Sulfur, Lithium-Air and Sodium Batteries”. Vol: 23, Issue: 12, Pages: 6755 (22 pages); <https://doi.org/10.3390/ijms23126755>, 2022.
3. Collier, K., S. Goins, A. Chirgwin, I. Stanfield, A.P. Siegel, **A. Tovar**. *Effect of Drying Methods in Potato Starch-based Plastic*. Purdue Journal of Undergraduate Research (Accepted).
4. Goakar, A., H. Valladares, **A Tovar**, L. Zhu, and H. El-Mounayri. *Multi-objective Bayesian optimization of lithium-ion battery cells for electric vehicle operational scenarios*. Journal of Electronic Materials (Accepted).
5. Sajjad, R, J. Arcos-Legarda, **A. Tovar**. *Adaptive Hybrid Cellular Automata A Framework for Generative Structural Design*. Structural and Multidisciplinary Optimization (Submitted).
6. Han X, W. An, **A. Tovar**, and S. Wang. *An Innovative Evolutionary Truss Map Method for Continuum-based Topology Optimization of Energy Absorbing Structure*. Multidisciplinary and Structural Optimization (Under review: accepted with revisions).

2021 (6 paper published)

7. Hua Wang, Tianyi Li, Ahmed M. Hashem, Ashraf E. Abdel-Ghany, Rasha S. El-Tawil, Hanaa M. Abuzeid, Amanda Coughlin, Kai Chang, Shixiong Zhang, Hazim El-Mounayri, **Andres Tovar**, Likun Zhu, and Christian M. Julien. *Nanostructured Molybdenum-Oxide Anodes for Lithium-Ion Batteries: An Outstanding Increase in Capacity*. Nanomaterials. Vol: 11, Issue: 12, Pages: 13. <https://doi.org/10.3390/nano12010013>, 2021
8. Najmon, J.C., T. Wu, and **A. Tovar**. *Implementation of Thermomechanical Multiphysics in a Large Scale Three-dimensional Topology Optimization Code*. SAE International Journal of Advances and Current Practices in Mobility, Vol.: 3, Issue: 6, Pages: 2972-2984, doi:10.4271/2021-01-0844, 2021.
9. Valladares, H, **A. Tovar**. *Multilevel Design of Sandwich Composite Armors for Blast Mitigation using Bayesian Optimization and Non-Uniform Rational B-Splines*. SAE International Journal of Advances and Current Practices in Mobility. Vol.: 3, Issue: 4, Pages: 2146-2158, <https://doi.org/10.4271/2021-01-0255>, 2021
10. Arcos-Legarda, J. and **A. Tovar**. *Mechatronic Design and Active Disturbance Rejection Control of a Bag Valve-based Mechanical Ventilator for COVID-19 Treatment*. Journal of Medical Devices. Vol.: 15, Issue: 3, Pages: 031006 (8 pages), <https://doi.org/10.1115/1.4051064>, 2021
11. An, W., X. Han, **A. Tovar**, and S. Wang. *Targeting the acceleration-time response of vehicle structures under crash impact using equivalent dynamic loads*. Structural and Multidisciplinary Optimization. Vol.: 64, Issue: 2, Pages: 599-612, <https://doi.org/10.1007/s00158-021-02845-y>, 2021

12. Tianyi Li, Kai Chang, Ahmed M. Hashem, Ashraf E. Abdel-Ghany, Rasha S. El-Tawil, Hua Wang, Yaroslav Losovyj, Hazim El-Mounayri, **Andres Tovar**, Likun Zhu, Christian M. Julien. *Long-term cycling stability of Ni-rich spinel cathode for high-voltage Li-ion batteries*. *Electrochem.* <https://doi.org/10.3390/electrochem2010009>, 2021

2020 (3 papers)

13. Sego, T.J.; M. Prideaux, B. McCarthy, P. Li, L. Bonewald, B. Ekser, **A. Tovar**, Smith, L., *Computational Fluid Dynamic Analysis of Bioprinted Self-Supporting Perfused (SSuPer) Tissue Models*. *Biotechnology and Bioengineering*, Vol.: 117, Issue: 3, Pages: 798-815, <https://doi.org/10.1002/bit.27238>, 2020.
14. Sego, T.J., Y-T. Hsu, T-M. G. Chu, **A. Tovar**. *Modeling Progressive Damage Accumulation in Bone Remodeling Explains the Thermodynamic Basis of Bone Resorption by Overloading*. *Bulletin of Mathematical Biology*. Vol.: 82, Issue: 134, <https://doi.org/10.1007/s11538-020-00808-w>, 2020.
15. Sego, T.J., James A. Glazier, **A. Tovar**. *Unification of Aggregate Growth Models by Emergence from Cellular and Intracellular Mechanisms*. *Royal Society Open Science*. Vol.: 7, Issue: 192148, <https://doi.org/10.1098/rsos.192148>, 2020.

2019 (6 papers)

16. Liu, K, T. Wu, D. Detwiler, J. Panchal, **A. Tovar**. *Design for crashworthiness of categorical multimaterial structures using cluster analysis and Bayesian optimization*. *ASME Journal of Mechanical Design*, Special issue on Machine Learning, Vol.: 141, Issue: 12, Pages: 121701 (15 pages), <https://doi.org/10.1115/1.4044838>, 2019.
17. Wu, T. and **A. Tovar**. *Multiscale, thermomechanical topology optimization of self-supporting cellular structures for porous injection molds*. *Rapid Prototyping Journal*, Vol. 25, Issue 9, Pages: 1482-1492, <https://doi.org/10.1108/RPJ-09-2017-0190>, 2019.
18. 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*, Vol.: 214, Pages: 34-46, <https://doi.org/10.1016/j.compstruct.2019.01.095>, 2019.
19. 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*, Vol.: 59, Issue: 6, Pages: 2303-2318, <https://doi.org/10.1007/s00158-019-02197-8>, 2019.
20. Arcos-Legarda, J., J.A. Cortes, **A. Tovar**. *Robust Compound Control of Dynamic Bipedal Robots*. *Mechatronics*, Vol. 59, Pages 154-167, <https://doi.org/10.1016/j.mechatronics.2019.04.002>, 2019.
21. Arcos-Legarda, J., J.A. Cortes, A. Beltran-Pulido, **A. Tovar**. *Hybrid disturbance rejection control of dynamic bipedal robots*. *Multibody System Dynamics*, Vol.: 46, Issue: 3, Pages: 281-306, <https://doi.org/10.1007/s11044-019-09667-3>, 2019.

2018 (2 papers)

22. Najmon, J., DeHart, J., Wood, Z., and **A. Tovar**., *Development of a Helmet Liner through Bio-Inspired Structures and Topology Optimized Compliant Mechanism Arrays*, *SAE International Journal of Transportation Safety* 6(3), <https://doi.org/10.4271/2018-01-1057>, 2018.
23. 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, Vol. 140, Issue 11, Pages: 111412 (10 pages), <https://doi.org/10.1115/1.4040960>, 2018.

2017 (4 papers)

24. 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.
25. 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.
26. 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.
27. 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)

28. 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)

29. 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
30. 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
31. 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)

32. 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.
33. 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)

34. 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.
35. 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.
36. 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.
37. **Tovar, A.** and K. Khandelwal. *Topology Optimization for Minimum Compliance using a Control Strategy*. Engineering Structures, Vol. 48, Pages: 674-682, 2013.

38. 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.
39. Arcos, W.J. and **A. Tovar**. *LQR optimal control of an exoskeleton for walking*. Intekhnia, Vol. 2, Issue. 2, 2013.
40. 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)

41. Yokota, H., **A. Tovar**, and A. Robling. *Dynamic Muscle Loading and Mechanotransduction*. BONE, Vol. 51, Issue 4, Pages 826-827, 2012.
42. 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.
43. 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)

44. 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.
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3. **Tovar, A.** *Editorial*, Revista Ingeniería e Investigación, National University of Colombia, Vol. 26, Issue 2, Pages 3-9, 2006.
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