Christopher Bryant Williams, Ph.D.

Associate Professor
Department of Mechanical Engineering
Virginia Polytechnic and State University

Current Position

August 2014 - present

Associate Professor
J. R. Jones III Faculty Fellow
Electro-Mechanical Corporation Senior Faculty Fellow
Associate Director, Macromolecules & Interfaces Institute
Department of Mechanical Engineering
Affiliate Faculty, Department of Materials Science & Engineering
Affiliate Faculty, Department of Engineering Education
Virginia Tech

Professional Preparation

2008 **Ph.D., Mechanical Engineering**
Georgia Institute of Technology; Atlanta, GA.
Dissertation: "Design and Development of a Layer-Based Additive Manufacturing Process for the Realization of Metal Parts of Designed Mesostructure"
Co-Advisors: David Rosen & Farrokh Mistree

2003 **M.S., Mechanical Engineering**
Georgia Institute of Technology; Atlanta, GA.
Thesis: "Hierarchic Platform Design for Customizable Products and Processes with Non-Uniform Demand"
Co-Advisors: Farrokh Mistree & David Rosen

2000 **Bachelor of Science, Mechanical Engineering**
University of Florida; Gainesville, FL
High Honors
Thesis: "SATViewer: An Internet-based Solid Model Visualization Software"
Advisor: Ashok Kumar

Previous Positions

2014 - 2016 **W. S. Pete White Chair for Innovation in Engineering Education**,

College of Engineering, Virginia Tech

2008 – 2014 **Assistant Professor**, Departments of Engineering Education & Mechanical Engineering *(joint appointment)*, Virginia Tech

2003 – 2007 **NSF IGERT Graduate Research Fellow** and Graduate Research Assistant
Georgia Institute of Technology; Atlanta, GA.

2000 – 2003 **Graduate Research Assistant** and Georgia Tech Presidential Fellow
Georgia Institute of Technology; Atlanta, GA.

1999 – 2000 **Undergraduate Research Scholar**
University of Florida; Gainesville, FL.

1997 – 1998 **HVAC Designer and Draftsman**
Affiliated Engineers, SE, Inc.; Gainesville, FL.

Honors and Awards

- J. R. Jones III Faculty Fellow, Virginia Tech Department of Mechanical Engineering, 2017
- America Makes Innovation Sprint Competition: Smart Structures, 1st Place, Co-authors: J. Kubalak, L. Sturm, R. Dumene, D. Aduba, 2016
- Faculty Fellow, Virginia Tech College of Engineering, 2015
- Electro-Mechanical Corporation Senior Faculty Fellowship, 2015
- Best Poster Award, *26th International Solid Freeform Fabrication Symposium*, Co-authors: L. Bass, N. Meisel, 2015
- W. S. "Pete" White Chair for Innovation in Engineering Education, Virginia Tech College of Engineering, 2014
- Outstanding Paper Award, *Rapid Prototyping Journal*, Co-authors: O. Ivanova & T. Campbell, 2014
- Best Paper Award, *ASME IDETC 19th Design for Manufacturing and the Life Cycle Conference,* Co-Author: B. Perez, 2014
- Best Poster Award, *25th International Solid Freeform Fabrication Symposium*, Co-author: Y. Bai, 2014
- National Science Foundation CAREER Award, 2013
- National Academy of Engineers German-American Frontiers of Engineering Symposium, Session Organizer, Additive Manufacturing, 2013
- Reviewers' Favorite Award, *2013 International Conference on Engineering Design*
- John A. Curtis Lecture Award, *ASEE Annual Conference & Exposition – Computers in Education Division* (Best Paper Award), Co-author: J. Mohammadi-Aragh, June 2013
- International Outstanding Young Researcher in Freeform and Additive Fabrication Award (FAME Jr. Award), presented by the International Solid Freeform Fabrication Symposium, August 2012

- Best Paper Award, *ASME IDETC Design Education Conference*, Co-authors: Y. Lee & J. S. Gero, August 2012
- Virginia Tech XCaliber Team Award, Team: Jacob P. Moore, Austin Amaya, & Ethan Groves, 2012
- Excellence in Access and Inclusion Award, Virginia Tech Office of Services for Students with Disabilities, 2012
- National Academy of Engineers German-American Frontiers of Engineering Symposium, Invited Attendee, 2012
- W. S. "Pete" White Award for Innovation in Engineering Education, Virginia Tech College of Engineering, 2011
- Charles and Joan Nunnally Outstanding Engineering Education Faculty Member Award, VT Department of Engineering Education, May 2011.
- Best Poster Award, *Virginia Tech Interdisciplinary Research Symposium*, Co-authors: J. P. Moore, A. Amaya, E. Groves, 2011.
- Emerald Engineering Outstanding Doctoral Research Award, Additive Manufacturing, 2010
- Best Paper Award Finalist, *ASEE Annual Conference and Exposition – Design in Engineering Education Division*, Co-Authors: E. Crede, R. Goff and J. P. Terpenny, 2010
- Best Poster Award, *20th International Solid Freeform Fabrication Symposium*, Co-author: R. Illardo, 2009
- Dean's Award for Outreach Excellence, Virginia Tech College of Engineering, 2009
- Virginia Tech Scholar of the Week, 2008
- Best Paper Award, *ASME IDETC 13th Design for Manufacturing and the Life Cycle Conference*, Co-Authors: David Rosen & Farrokh Mistree, 2008
- National Science Foundation Design, Service, and Manufacturing Grantees and Research Conference Student Travel Grant Competition Winner, 2006
- National Science Foundation IGERT Graduate Research Fellowship, 2003 – 2005
- Georgia Tech Presidential Fellowship, 2000 – 2004
- National Science Foundation Graduate Research Fellowship, Honorable Mention, 2001 and 2002
- National Science Foundation ASME Design Engineering Technical Conferences Travel Grant, Student Paper Contest, 2001
- University of Florida Outstanding Student, 2000
- University of Florida Undergraduate Research Scholarship, 1999-2000
- Florida Bright Futures Academic Scholarship, University of Florida, 1996 – 2000

Membership in Professional and Honor Societies

- American Society of Mechanical Engineering

- Society of Manufacturing Engineers
- American Society of Engineering Education
- The Minerals, Metals & Materials Society
- Tau Beta Pi, National Engineering Honor Society
- Pi Tau Sigma, National Mechanical Engineering Honor Society
- Golden Key International Honor Society
- Gamma Beta Phi, Honor and Service Society

Publications

Total: 3 book chapters, 45 journal papers, 89 refereed conference papers

Journal Papers

1. M Hegde, V Meenakshisundaram, N Chartrain, S Sekhar, D Tafti, C. B. Williams, T. E. Long, "3D Printing All-Aromatic Polyimides using Mask-Projection Stereolithography: Processing the Nonprocessable," *Advanced Materials*, 29 (31), DOI: 10.1002/adma.201701240
2. AM Pekkanen, RJ Mondschein, CB Williams, TE Long, 2017, "3D Printing Polymers with Supramolecular Functionality for Biological Applications," *Biomacromolecules*, 18 (9), 2669-2687.
3. LD Sturm, CB Williams, JA Camelio, J White, R Parker, 2017, "Cyber-physical vulnerabilities in additive manufacturing systems: A case study attack on the. STL file with human subjects," *Journal of Manufacturing Systems*, 44, 154-164
4. RJ Mondschein, A Kanitkar, CB Williams, SS Verbridge, TE Long, 2017, "Polymer structure-property requirements for stereolithographic 3D printing of soft tissue engineering scaffolds," *Biomaterials*, https://doi.org/10.1016/j.biomaterials.2017.06.005
5. AM Pekkanen, C Zawaski, AT Stevenson Jr, R Dickerman, AR Whittington, C. B. Williams, T. E. Long, 2017, "Poly (ether ester) Ionomers as Water-Soluble Polymers for Material Extrusion Additive Manufacturing Processes," *ACS Applied Materials & Interfaces*, 9 (14), 12324-12331
6. M. Albakri, L. Sturm, C. B. Williams, P. Tarazaga, 2017, "Impedance-based Non-destructive Evaluation of Additively Manufactured Parts," *Rapid Prototyping Journal*, 23 (3), 589-601.
7. D.A. Snelling, C. B. Williams, A. Druschitz, CTA Suchicital, 2017, "Binder Jetting Advanced Ceramics for Metal-Ceramic Composite Structures," *International Journal of Advanced Manufacturing Technology*, 92: 531. https://doi.org/10.1007/s00170-017-0139-y
8. B. Brand, M. Kasarda, C. B. Williams, 2017, "Inquiry by Engineering Design: Applying the Sixth "E"," *Technology and Engineering Teacher*.

9. Y. Bai, G. Wagner, C. B. Williams, 2017, "Effect of Particle Size Distribution on Powder Packing and Sintering in Binder Jetting Additive Manufacturing of Metals," *Journal of Manufacturing Science and Engineering*, 139 (8), 081019.
10. Y. Pan, J. White, D. Schmidt, A. Elhabashy, L. Sturm, J., Camelio, C. Williams, 2017, "Taxonomies for Reasoning About Cyber-physical Attacks in IoT-based Manufacturing Systems," *International Journal of Interactive Multimedia and Artificial Intelligence*, 4(3), 45. doi:10.9781/ijimai.2017.437
11. N. Chartrain, C. B. Williams, A. Whittington, 2016, "Engineering Tissues with Bioprinting," *BioProcess International*, 14(10).
12. J. G. Wells, M. Lammi, J. Gero, M. Grubbs, M. Paretti, C. B. Williams, 2016, "Characterizing design cognition of high school students: Initial analyses comparing those with and without pre-engineering experiences," *Journal of Technology Education*, 27(2), 78-91.
13. T. Simpson, C. B. Williams, M. Hripko, 2016, "Preparing Industry for Additive Manufacturing and Its Applications: Summary & Recommendations from a National Science Foundation Workshop," *Additive Manufacturing*, 13(January), 166-178. doi:10.1016/j.addma.2016.08.002.
14. N. A. Meisel, C. B. Williams, K. Ellis, G. D. Taylor, 2016, "A Decision Support Tool to Select Additive Manufacturing Technologies for Deployment in Remote or Austere Environments," *Journal of Manufacturing Technology Management*, 27(7), 898-914. doi:10.1108/JMTM-06-2015-0040.
15. L. Bass, N. A. Meisel, C. B. Williams, 2016, "Exploring Variability of Orientation and Aging Effects in Material Properties of Multi-material Jetting Parts," *Rapid Prototyping Journal*, 22(5), pp. 826-834.
16. J. Sirrine, A. Pekkanen, A. Nelson, N. Chartrain, C. Williams, T. Long, 2015, "3D-Printable Biodegradable Polyester Tissue Scaffolds for Cell Adhesion," *Australian Journal of Chemistry*, 68 (9), 1409-1414.
17. D. Snelling, Q. Li, N. Meisel, C. B. Williams, R. C. Batra, and A. P. Druschitz, 2015, "Lightweight Metal Cellular Structures Fabricated via 3D Printing of Sand Cast Molds," *Advanced Engineering Materials*, 17(7), pp. 923-932 (DOI: 10.1002/adem.201400524).
18. P. Rao, J. Liu, D. Roberson, Z. J. Kong, and C. B. Williams, 2015, "Online Real-time Quality Monitoring in Additive Manufacturing Processes using Heterogeneous Sensors," *ASME Journal of Manufacturing Science and Engineering*, 137(6), 061007 (12 pages) (DOI: 10.1115/1.4029823).
19. Y. Bai and C. B. Williams, 2015, "An Exploration of Binder Jetting of Copper," *Rapid Prototyping Journal*, 21(2), pp. 177-185 (DOI: 10.1108/RPJ-12-2014-0180).
20. N. Meisel and C. B. Williams, "Design and Assessment of a 3D Printing Vending Machine," *Rapid Prototyping Journal*, 21(5), pp. 471-481.

21. J. Moore, and C. B. Williams, 2015, "Fatigue Properties of Parts Printed by PolyJet Material Jetting," *Rapid Prototyping Journal*, 21(6), pp. 675-685.
22. H. Turner, B. Amos, J. White, J. A. Camelio, C. B. Williams, and R. Parker, 2015, "Bad Parts: Are Our Manufacturing Systems At Risk of Silent Cyber-attacks?", *IEEE Security & Privacy*, 13(3), pp. 40-47.
23. W. Gao, Y. Zhang, *D. Ramanujana, K. Ramani, Y. Chen, C. B. Williams, C. Wang, Y. Shin, S. Zhang, and P. Zavattieri, 2015, "The Status, Challenges, and Future of Additive Manufacturing in Engineering," *Computer-Aided Design*, 69, pp. 65-89 (DOI: 10.1016/j.cad.2015.04.001)
24. N. Meisel and C. B. Williams, 2015, "Design for Additive Manufacturing: An Investigation of Key Manufacturing Considerations in Multi-Material PolyJet 3D Printing," *ASME Journal of Mechanical Design*, 137(11), pp.111406-1 – 111406-9.
25. J. Moore, C. B. Williams, A. Johri, M. Paretti, and C. North, 2015, "Effectiveness of Adaptive Concept Maps for Promoting Conceptual Understanding: Findings from a Design-Based Case Study of a Learner-Centered Tool," *Advances in Engineering Education*, 4(4), pp. 1-35.
26. A. R. Schultz, P. M. Lambert, N. A. Chartrain, D. M. Ruohoniemi, Z. Zhang, C. Jangu, M. Zhang, C. B. Williams, and T. E. Long, 2014, "3D Printing Phosphonium Ionic Liquid Networks with Mask Projection Microstereolithography," *ACS Macro Letters*, 3 (11), pp 1205–1209. (DOI: 10.1021/mz5006316)
27. O. Ivanova, A. Elliott, T. Campbell, and C. B. Williams, 2014, "Unclonable Security Features for Additive Manufacturing," *Additive Manufacturing*, 1-3, pp. 24-31. (DOI: 10.1016/j.addma.2014.07.001)
28. A. Gaynor, N. A. Meisel, C. B. Williams, and J. K. Guest, "Multiple-Material Topology Optimization of Compliant Mechanisms Created via PolyJet 3D Printing," *ASME Journal of Manufacturing Science and Engineering,* 136(6), 061015 (10 pages) (doi: 10.1115/1.4028439).
29. N. A. Meisel, A. M. Elliott, and C. B. Williams, 2014, "A procedure for creating actuated joints via embedding shape memory alloys in PolyJet 3D printing," *Journal of Intelligent Material Systems and Structures*, 26 (12), pp. 1498-1512.
30. L. J. Wells, J. A. Camelio, C. B. Williams, J. White, 2014, "Cyber-Physical Security Challenges in Manufacturing Systems," *Manufacturing Letters*, 2(2), pp. 74-77. (DOI: 10.1016/j.mfglet.2014.01.005)
31. D. Snelling, A. Druschitz, C. B. Williams, 2014, "Mitigating Gas Defects in Castings Produced from 3D Printed Molds," *International Foundry Research Journal*, Issue 2/2014.
32. M. J. Mohammadi-Aragh, C. B. Williams, "Student Attention in Unstructured-Use, Computer-Infused Classrooms," *Computers in Education Journal*, accepted August 2013.

33. A. M. Elliott, O. S. Ivanova, C. B. Williams, T. A. Campbell, 2013, "Inkjet Printing of Quantum Dots in Photopolymer for Use in Additive Manufacturing of Nanocomposites," *Advanced Engineering Materials*, 15(10), pp.903-907, DOI: 10.1002/adem.201300020.
34. M. J. Mohammadi-Aragh, C. B. Williams, 2013, "Tablet PC Instructional Strategies for Structured Computer Use: An Instructor's Experience and Student Perceptions". *Computers in Education Journal*, 4(2), pp. 39-50.
35. O. S. Ivanova, C. B. Williams, T. A. Campbell, 2013, "Additive Manufacturing (AM) and Nanotechnology: Promises and Challenges". *Rapid Prototyping Journal*, 19(5), pp. 353 - 364. (DOI: 10.1108/RPJ-12-2011-0127) (Outstanding Paper Award)
36. J. S. Gero, H. Jiang, C. B. Williams, 2013, "Design Cognition Differences When Using Structured and Unstructured Concept Generation Creativity Techniques," *International Journal of Design Creativity and Innovation*. DOI: 10.1080/21650349.2013.801760.
37. A. Johri, C. B. Williams, J. Pembridge, 2012, "Creative Collaboration: A Case Study of the Role of Computers in Supporting Representational and Relational Interaction in Student Engineering Design Teams," *International Journal of Engineering Education* 29(1), pp. 33-44, 2013. (ISSN: 0949-149X/92)
38. C. B. Williams, F. Mistree, D. W. Rosen, 2011, "A Functional Classification Framework for the Conceptual Design of Additive Manufacturing Technologies," *Journal of Mechanical Design*, Vol. 113, No. 12, pp. 121002-1 – 121002-11 (DOI: 10.1115/1.4005231).
39. C. B. Williams, J. K. Cochran, D. W. Rosen, 2011, "Additive Manufacturing of Metallic Cellular Materials via Three-Dimensional Printing," *The International Journal of Advanced Manufacturing Technology*, Vol. 53, No. 1-4, pp. 231-239 (DOI 10.1007/s00170-010-2812-2).
40. S. A. Sarles, L. J. Stiltner, C. B. Williams, D. J. Leo, 2010, "Bilayer formation between Lipid-Encased Hydrogels Contained in Solid Substrates," *ACS Applied Materials & Interfaces*, Vol. 2, Iss. 12, pp. 3654-3663 (DOI: 10.1021/am100826s).
41. R. Illardo and C. B. Williams, 2010, "Design and Manufacture of a Formula SAE Intake System Using Fused Deposition Modeling and Fiber-Reinforced Composite Materials," *Rapid Prototyping Journal*, Vol. 16, Iss. 3, pp. 174-179.
42. R. Goff, C. B. Williams, J. P. Terpenny, K. Gilbert, T. Knott, J. Lo, 2010, "ROXIE: Real Outreach Experiences in Engineering First-Year Engineering Students Designing for Community Partners," *International Journal of Engineering Education*, Vol. 26, No. 2, pp. 349-358.
43. C. B. Williams, L. D. McNair, E. D. Crede, M. C. Paretti, J. P. Terpenny, 2010, "Designing Hands-On Teaming Activities for Courses with Large Enrollments: Exploring Sustainability Tradeoffs," *International Journal of Engineering Education*, Vol. 26, No. 2, pp. 408-417.

44. C. B. Williams, J. K. Allen, D. W. Rosen, F. Mistree, 2006, "Designing Platforms for Customizable Products and Processes in Markets of Non-Uniform Demand," *Concurrent Engineering: Research and Applications – Special Issue on Managing Modularity and Commonality in Product and Process Development,* Eds. Jiao, J., Gershenson, J. K., Michalek, J. J., Vol. 15, No. 2, pp. 201-216.
45. C. B. Williams and F. Mistree, 2006, "Empowering Students to Learn How to Learn: Mass Customization of a Graduate Engineering Design Course," *The International Journal of Engineering Education*, Vol. 22, No. 6, pp. 1269-1280.

Book Chapters

1. N. Meisel and C. B. Williams, 2017, "Designing for Material Jetting Additive Processes," *Design for Manufacturability: New Materials, Technologies and Processes*, McGraw-Hill, New York, pp. 127-138.
2. J. S. Gero, M. Pourmohamadi, C. B. Williams, 2012, "The Effect of Employing Different Design Methods on Design Cognition of Small Design Teams". *Articulating Design Thinking* (P. Rodgers, ed.), Libri Publishing, pp. 73-87. 2012.
3. C. B. Williams, D. W. Rosen, F. Mistree, 2004, "Process Parameter Design to Manage Workstation Capacity," *Product Platform and Product Family Design: Methods and Applications* (Simpson, T., Siddique, Z., Jiao, J., eds.), Springer, New York, pp. 421-456.

Refereed Conference Papers

1. S Dinda, D Modi, TW Simpson, S Tedia, CB Williams, 2017, "Expediting Build Time, Material, and Cost Estimation for Material Extrusion Processes to Enable Mobile Applications," *ASME 2017 International Design Engineering Technical Conferences*, V02AT03A034-V02AT03A034.
2. C Tenney, MI Albakri, J Kubalak, LD Sturm, C. B. Williams, P. Tarazaga, 2017, "Internal Porosity Detection in Additively Manufactured Parts via Electromechanical Impedance Measurements," *ASME 2017 Conference on Smart Materials, Adaptive Structures and Intelligent Systems.*
3. S. Tedia and C. B. Williams, 2016, "Manufacturability Analysis Tool for Additive Manufacturing Using Voxel-based Geometric Modeling," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
4. N. Jorapur, R. West, C. B. Williams, A. Druschitz, 2016, "Design of Fiber-Reinforced Additively Manufactured Cellular Structures with Tensegrity Behavior," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
5. N. A. Chartrain, M. Vratsanos, D. T. Han, J. M. Sirrine, A. Pekkanen, T. E. Long, A. R. Whittington, C. B. Williams, 2016, "Microstereolithography of Tissue Scaffolds Using a Biodegradable Photocurable Polyester," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.

6. S. M. Kraft, B. Y. Lattimer, C. B. Williams, 2016, "Flammability of 3D Printed Polymers – Composition and Geometry Factors," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
7. J. R. Kubalak, T. H. Pesek, Z. K. Snow, E. B. Cottiss, O. D. Ebeling-Koning, M. G. Price, M. H. Traverso, L. D. Tichnell, C. B. Williams, A. L. Wicks, 2016, "Design and Realization of a 6 Degree of Freedom Robotic Extrusion Platform," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
8. A.P. Druschitz, S. Cowden, A. Dudley, S. Walsh, A. Weir, C.B. Williams, B. Wood, 2016, "Metal-Ceramic Composite Lattice Structures Using 3D Printed Sand Molds and Cores," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
9. R. Lynn, K. Jablokow, N. Reddy, C. Saldana, T. Tucker, T. W. Simpson, T. Kurfess, C. B. Williams, 2016, "Toward Rapid Manufacturability Analysis Tools for Engineering Design Education," *ASME Manufacturing Science and Engineering Conference,* June 27 – July 1, Blacksburg, VA.
10. R. Lynn, K. Jablokow, N. Reddy, C. Saldana, T. Tucker, T. W. Simpson, T. Kurfess, C. B. Williams, 2016, "Using Rapid Manufacturability Analysis Tools to Enhance Decision-Making in Engineering Design Education," *ASME IDETC Design Education Conference*, August 21-24, Charlotte, NC., DETC2016-59295.
11. T. E. Diller, A. Hermundstad, C. B. Williams, H. Matusovich, 2016, "Exploring Conceptual Understanding in Heat Transfer: A Qualitative Analysis," In *123rd ASEE Annual Conference*.
12. C. B. Williams, L. Sturm, and A. E. Wicks, 2015, "Advancing Student Learning of Design for Additive Manufacturing Principles through an Extracurricular Vehicle Design Competition," *ASME IDETC Design Education Conference*, August 2-5, DETC2015-47622.
13. Y. Bai, C. B. Williams, 2015, "Effect of Bimodal Powder Mixture on Powder Packing Density and Sintered Density in Binder Jetting of Metals," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX.
14. I. Vu, L. Bass, N. Meisel, B. Orler, C. B. Williams, D. A. Dillard, 2015, "Characterization of Mutli-Material Interfaces in PolyJet Additive Manufacturing," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX.
15. L. Bass, N. A. Meisel, C. B. Williams, 2015, "Exploring Variability in Material Properties of Multi-Material Jetting Parts," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX. (Best Poster Award)
16. D. A. Snelling, C. B. Williams, C. Suchicital, A. Druschitz, 2015, "Fabrication of Cellular Cordierite Preforms via Binder Jetting," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX.

17. M. Albakri, L. Sturm, C. B. Williams, P. Tarazaga, 2015, "Non-Destructive Evaluation of Additively Manufactured Parts via Impedance-Based Monitoring," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX.
18. R. Dumene, P. Kennedy, C. B. Williams, D. Sweeney, G. Earle, 2015, "Creating Embedded Radiofrequency Structures using Polyjet Material Jetting," *International Solid Freeform Fabrication Symposium*, August 10-12, Austin, TX.
19. C. Cirenza, T. Diller, and C. B. Williams, 2015, "Conveying Difficult Heat Transfer Concepts with Hands-On Workshops," *ASEE Annual Conference and Exhibition*, June 14-17, Seattle, WA., accepted February 2015.
20. C. B. Williams and T. Simpson, 2015, "Advancing the Additive Manufacturing Workforce: Summary and Recommendations from a NSF Workshop, *ASME IDETC Design Education Conference*, August 2-5, DETC2015-47274, accepted March 2015.
21. C. B. Williams, *L. Sturm, and A. E. Wicks, 2015, "Advancing Student Learning of Design for Additive Manufacturing Principles through an Extracurricular Vehicle Design Competition," *ASME IDETC Design Education Conference*, August 2-5, DETC2015-47622, accepted March 2015.
22. J. S. Gero, U. Kannengiesser, and C. B. Williams, 2014, "Does Designing Have a Common Cognitive Behavior Independent of Domain and Task: A Meta-Analysis of Design Protocols," *International Conference on Human Behavior in Design*, Ascona, Switzerland, October 14-17.
23. K. B. Perez and C. B. Williams 2014, "Characterization of In-Situ Conductive Paste Extrusion on PolyJet Substrates," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6.
24. Y. Bai and C. B. Williams, 2014 "An Exploration of Binder Jetting of Copper," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6. (Best Poster Award)
25. L. D. Strum, C. B. Williams, J. Camelio, J. White, and R. Parker, 2014, "Cyber-physical Vulnerabilities in Additive Manufacturing Systems," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6.
26. P. Lambert, N. Chartrain, C. B. Williams, T. Long and A. Whittington, 2014, "Mask Projection Microstereolithography of Biocompatible Block-Copolymers," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6.
27. D. Snelling, C. B. Williams, and A. P. Druschitz, 2014, "Complex Geometrical Effects on Depowdering and Solidification in Sand Molds Fabricated via Binder Jetting," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6.
28. N. A. Meisel and C. B. Williams, 2014, "An Investigation of Key Manufacturing Constraints Toward the Creation of Optimized Multi-Material Compliant Mechanisms with PolyJet 3D Printing," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6.

29. M. Lammi, J. Wells, J. Gero, M. Paretti, and C. B. Williams, 2014, "Initial Findings of High School Pre-engineering and Non-engineering Students' Design Cognition," *IEEE Frontiers in Education Conference*, Madrid, Spain, October 22-25.
30. K. Lewis, T. Simpson, A. McKenna, C. B. Williams, M. Paretti, L. McNair, W. Chen, D. Gatchell, A. Johnson, G. Kremer, S. Shooter, and C. Tucker, 2014, "Assessment of Product Archaeology as a Framework for Contextualizing Engineering Design," *ASEE Annual Conference & Exposition*, Indianapolis, IN., June 15-18.
31. K. B. Perez and C. B. Williams, 2014, "Design Considerations for Hybridizing Additive Manufacturing and Direct Write Technologies," *ASME IDETC Design for Manufacturing and the Lifecycle Conference*, Buffalo, NY, August 17-20, DETC2014-35408. (Best Paper Award)
32. A. Gaynor, N. Meisel, C. B. Williams, and J. Guest, 2014, "Topology Optimization for Additive Manufacturing: Considering Multiple Materials," 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, *AIAA Aviation and Aeronautics Forum and Exposition*, June 16.
33. A. Druschitz, C. B. Williams, and M. Seals, 2014, "Additive Manufacturing Supports the Production of Complex Castings," *2014 TMS Annual Meeting & Exhibition: Shape Casting: 5th International Symposium*, pp. 51-57.
34. U. Kannengiesser, C. B. Williams, J. S. Gero, 2013, "What do the concept generation techniques of TRIZ, morphological analysis and brainstorming have in common?," *International Conference on Engineering Design*, Seoul, South Korea, August 19-22,.
35. K. B. Perez, C. B. Williams, 2013, "Conductive Materials for Additive Manufacturing – A Review," *International Solid Freeform Symposium*, Austin, TX., August 12-14.
36. D. A. Snelling, D.A., H. Blount, C. Forman, K. Ramsburg, A. Wentzel, C. B. Williams, A. Druschitz, 2013, "A Comparison of Material Properties of Castings Produced by Different 3D Printed Sands," *International Solid Freeform Symposium*, Austin, TX., August 12-14.
37. N. A. Meisel, A. Gaynor, C. B. Williams, J. K. Guest, 2013, "Multiple-Material Optimization of Compliant Mechanisms Created via PolyJet 3D Printing," *International Solid Freeform Symposium*, Austin, TX., August 12-14.
38. P. Lambert, E. Campaigne, C. B. Williams, 2013, "Design Considerations for Mask Projection Micro-Stereolithography Systems," *International Solid Freeform Symposium*, Austin, TX., August 12-14.
39. C. B. Williams, Y. Lee, J. S. Gero, M. C. Paretti, 2013, "Exploring the Effect of the Design Prompt on Students' Design Cognition," *ASME IDETC Symposium on International Design and Design Education*, Portland, OR., August 4-7.
40. T. Diller, C. B. Williams, 2013, "Exploration of Hands-On Pedagogy in Heat Transfer," *ASME Heat Transfer Conference*, Minneapolis, MN, July 14-19.

41. M. J. Mohammadi-Aragh, C. B. Williams, 2013, "Student Attention in Unstructured-Use, Computer-Infused Classrooms," *ASEE Annual Conference & Exposition*, Atlanta, GA., June 23-26. (Computers in Education Division Best Paper Award)
42. J.P. Moore, C. B. Williams, 2013, "Translating Educational Theory into Educational Software: A Case Study of the Adaptive Map Concept," *ASEE Annual Conference & Exposition*, Atlanta, GA., June 23-26.
43. J. P. Moore, C. B. Williams, A. Johri, C. North, 2013, "Promoting Conceptual Understanding in Engineering Statics through the use of Adaptive Concept Maps," *ASEE Annual Conference & Exposition*, Atlanta, GA., June 23-26.
44. K. Lewis, D. A. Moore-Russo, G. E. Okudan Kremer, T. W. Simpson, S. E. Zappe, A. F. McKenna, A. R. Carberry, W. Chen, D. W. Gatchell, S. B. Shooter, M. C. Paretti, L. D. McNair, C. B. Williams, 2013, "The Development of Product Archaeology as a Platform for Contextualizing Engineering Design," *ASEE Annual Conference & Exposition*, Atlanta, GA., June 23-26.
45. D. A. Snelling, R. Kay, A. Druschitz, A., C. B. Williams, 2013, "Mitigating Gas Defects in Castings Produced From 3D Printed Molds," *Metalcasting Congress Proceedings by the American Foundry Society*, St. Louis, MO., April 6-9.
46. R. L. Mahajan, J. Reed, N. Ramakrishnan, R. Mueller, C. B. Williams, T. A. Campbell, 2012, "Cultivating Emerging and Disruptive Technologies," *ASME International Mechanical Engineering Congress & Exposition*, November 9-15, Houston, TX.
47. M. Seals, S. McKinney, P. Walsh, A. Druschitz, C. B. Williams, 2012, "Comparison of Wax and 3D Printed Investment Casting Pattern Materials," *Materials Science & Technology Conference and Exhibition*, Pittsburgh, PA., October 7-11, 2012.
48. C. B. Williams, Y. Lee, J. Gero, M. C. Paretti, 2012, "Examining the Effect of Design Education on Design Cognition," *IEEE Frontiers in Engineering Education Conference*, October 3-6, Seattle, WA.
49. J. Gero, H. Jiang, C. B. Williams, 2012, "Design Cognition Differences When Using Structured and Unstructured Concept Generation Creativity Techniques," *2nd International Conference on Design Creativity*, September 18-20, Glasgow, UK.
50. J. Gero, M. Pourmohamadi, C. B. Williams, 2012, "Does Using Different Concept Generation Methods Change the Design Cognition of Designers?," *ASME IDETC* Design Theory and Methodology Conference, Chicago, IL.
51. C. B. Williams, Y. Lee, J. Gero, 2012, "Exploring the Effect of Design Cognition of Two Engineering Majors," *ASME IDETC 9th Symposium on International Design and Design Education*, Chicago, IL. (Best Paper Award)
52. N. A. Meisel, C. B. Williams, A. Druschitz, 2012, "Lightweight Metal Cellular Structures via Indirect 3D Printing and Casting," *International Solid Freeform Fabrication Symposium*, August 6-8, Austin, TX.

53. M. W. Barclift, C. B. Williams, 2012, "Examining Variability in the Mechanical Properties of Parts Manufactured via Polyjet Direct 3D Printing," *International Solid Freeform Fabrication Symposium*, August 6-8, Austin, TX.
54. A. M. Elliott, O. Ivanova*, C. B. Williams, T. Campbell, 2012, "An Investigation of the Effects of Quantum Dot Nanoparticles on Photopolymer Resin for Use in PolyJet Direct 3D Printing," *International Solid Freeform Fabrication Symposium*, August 6-8, Austin, TX.
55. J. P. Moore and C. B. Williams, 2012, "Fatigue Characterization of 3D Printed Elastomer Material," *International Solid Freeform Fabrication Symposium*, August 6-8, Austin, TX.
56. D. L. McCarthy and C. B. Williams, 2012, "Creating Complex Hollow Metal Geometries Using Additive Manufacturing and Electroforming," *International Solid Freeform Fabrication Symposium*, August 6-8, Austin, TX.
57. O. S. Ivanova, A. M. Elliott, C. B. Williams, T. A. Campbell, 2012, "Additive Manufacturing with Nano-Inks," *Nanotechnology Conference and Expo*, June 18-21, Santa Clara, CA.
58. M. Mohammadi-Aragh and C. B. Williams, 2012, "Student's Perceptions of Tablet PC Interaction Techniques," *ASEE Annual Conference and Exhibition*, June 10-13, San Antonio, TX.
59. J. P. Moore and C. B. Williams, 2012, "Towards an Adaptive Concept Map: Creating a Concept Map of an Engineering Statics Curriculum," *ASEE Annual Conference and Exhibition*, June 10-13, San Antonio, TX.
60. J. P. Moore, C. B. Williams, C. North, A. Johri, 2012, "Advancing Personalized Learning via an Adaptive Concept Map," *ASEE Annual Conference and Exhibition*, June 10-13, San Antonio, TX.
61. C. B. Williams, Y. Lee, J. Gero, M. C. Paretti, 2012, "Exploring the Effect of Design Education on the Design Cognition of Sophomore Engineering Students," *ASEE Annual Conference and Exhibition*, June 10-13, San Antonio, TX.
62. J. Gero, M. Pourmohamadi, C. B. Williams, 2012, "The Effect of Employing Different Design Methods on the Design Cognition of Small Design Teams," *Design Thinking Research Symposium*, April 18-19, Tyne, UK.
63. L. J. Stiltner, A. M. Elliott, C. B. Williams, 2011, "A Method for Creating Actuated Joints via Fiber Embedding in a Polyjet 3D Printing Process," *International Solid Freeform Fabrication Symposium*, August 8-10, Austin, TX.
64. J. Bernardo, S. Samavedi, C. B. Williams, A. R. Whittington, 2011, "Indirect Tissue Scaffold Fabrication via Fused Deposition Modeling and Biomimetic Mineralization," *International Solid Freeform Fabrication Symposium*, August 8-10, Austin, TX.

65. O. S. Ivanova, C. B. Williams, T. A. Campbell, 2011, "Additive Manufacturing and Nanotechnology: Promises and Challenges," *International Solid Freeform Fabrication Symposium*, August 8-10, Austin, TX.
66. C. B. Williams, Y. Lee, M. C. Paretti, J. Gero, 2011, "Effects of Design Education on Design Cognition: A Preliminary Study of a Sophomore Design Course," *Frontiers in Education Conference*, October 12-15, Rapid City, SD.
67. C. B. Williams, J. Gero, M. C. Paretti, Y. Lee, 2011, "Exploring the Effect of Design Education on the Design Cognition of Mechanical Engineering Students," *ASME IDETC 8th Symposium on International Design and Design Education*, Washington DC, DETC2011-48357.
68. J. P. Moore, C. B. Williams, M. C. Paretti, 2011, "Using Wikis as a Formative Assessment Tool for Student Engineering Design Teams," *ASME IDETC 8th Symposium on International Design and Design Education*, Washington DC, DETC2011-48310.
69. C. B. Williams, J. Gero, M. C. Paretti, Y. Lee, 2010, "Exploring Spatial Reasoning Ability and Design Cognition in Undergraduate Engineering Students," *ASME IDETC 7th Symposium on International Design and Design Education*, Montreal, Quebec, Canada, DETC2010/DEC-28925.
70. C. B. Williams, E. Crede, R. Goff, J. P. Terpenny, 2010, "Effects of Student-Customer Interaction in a Cornerstone Design Project," *ASEE Annual Conference and Exposition*, June 20 – 23, Louisville, KY. (Finalist for DEED Best Paper Award)
71. C. B. Williams, J. Gero, M. C. Paretti, Y. Lee, 2010, "WIP: Studying Design Cognition to Improve Design Education," *Frontiers In Education Conference*, October 27-30, Washington D.C., S3G-1 S3G-3.
72. J. Bernardo, S. Samavedi, C. B. Williams, A. W. Morgan, 2010, "Towards Indirect Tissue Scaffold Fabrication via Additive Manufacturing and Hydroxyapatite Mineralization," *International Solid Freeform Fabrication Symposium*, Austin, TX.
73. J. J. Pembridge, A. Johri, C. B. Williams, 2009, "Transformative Design Practices: Comparing Face-to-Face and Technology-Mediated Design Experiences among Engineering Students," *Frontiers in Education Conference*, October 18-21, San Antonio, TX. T1A-1–T1A-7.
74. C. B. Williams, J. P. Terpenny, R. Goff, 2009, "Designing a Service-Learning Design Project for a First-Year Engineering Course," *ASME IDETC 6th Symposium on International Design and Design Education*, San Diego, CA., DETC2009/DEC-87091.
75. C. B. Williams, R. Goff, J. P. Terpenny, 2009, "Real Outreach Experiences in Engineering: Merging Service-Learning and Design in a First-Year Engineering Course," *ASEE Annual Conference and Exposition*, June 14-17, Austin, TX.
76. C. B. Williams, L. D. McNair, M. C. Paretti, J. P. Terpenny, 2009, "Designing Hands-On Teaming Activities for Courses with Large Enrollments: Exploring

Sustainability Tradeoffs," *Mudd Design Workshop VII: Sustaining Sustainable Design*, May 28-30, Harvey Mudd College, Claremont, CA.

77. R. Goff, C. B. Williams, J. P. Terpenny, K. Gilbert, T. Knott, J. Lo, 2009, "ROXIE: Real Outreach Experiences in Engineering First-Year Engineering Students Designing for Community Partners," *Mudd Design Workshop VII: Sustaining Sustainable Design*, May 28-30, Harvey Mudd College, Claremont, CA.
78. C. B. Williams, J. Cochran, D. W. Rosen, 2009, "Layered Manufacturing of Metallic Cellular Materials via Three-Dimensional Printing of Spray-Dried Metal Oxide Powder," *The Materials, Metals & Mining Society Annual Meeting and Conference*, San Francisco, CA.
79. C. B. Williams, F. Mistree, D. W. Rosen, 2008, "A Functional Classification Framework for the Conceptual Design of Layered Manufacturing Technologies," *ASME IDETC 13th Design for Manufacturing and the Lifecycle Conference*, Brooklyn, NY., DETC2004/DFMLC-49353. (Best Paper Award)
80. C. B. Williams, F. Mistree, D. W. Rosen, "The Systematic Design of a Layered Manufacturing Process for the Realization of Metal Parts of Designed Mesostructure," *ASME IDETC 5th Symposium on International Design and Design Education*, Brooklyn, NY., DETC2008/DEC-49457, 2008.
81. C. B. Williams, D. W. Rosen, 2007, "Manufacturing Metallic Parts with Designed Mesostructure via Three-Dimensional Printing of Metal Oxide Powder," *18th Solid Freeform Fabrication Symposium*, Austin, TX, pp. 586-597.
82. C. B. Williams, D. W. Rosen, 2007, "Manufacturing Cellular Materials via Three-Dimensional Printing of Metal Oxide Powders," *3rd International Conference on Advanced Research in Virtual and Rapid Prototyping*, Leiria, Portugal, Taylor & Francis, pp. 331-340.
83. C. B. Williams, F. Mistree, D. W. Rosen, 2005, "Towards the Design of a Layer-Based Additive Manufacturing Process for the Realization of Metal Parts of Designed Mesostructures," *16th Solid Freeform Fabrication Symposium*, August 1-3, Austin, TX, pp. 217-230.
84. C. B. Williams, F. Mistree, D. W. Rosen, 2005, "Investigation of Additive Manufacturing Processes for the Manufacture of Parts with Designed Mesostructure," *ASME IDETC 10th Design for Manufacturing and the Life Cycle Conference*, September 24-28, Long Beach, CA, Paper No. DETC2005/DFMLC-84832.
85. C. B. Williams, J. K. Allen, D. W. Rosen, F. Mistree, 2004, "Designing Platforms for Customizable Products in Markets with Non-Uniform Demand," *ASME IDETC 16th Design Theory and Methodology Conference*, September 28 – October 2, Salt Lake City, UT, Paper No. DETC2004/DTM-57469.
86. M. K. Chamberlain, C. B. Williams, F. Mistree, 2003, "Strategic Design: Leveraging Market Forecasts and Emerging Technologies in Engineering Design Applications,"

10th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization, August 30 – September 1, Albany, NY, Paper No. AIAA-2004-4652.

87. M. J. Carone, C. B. Williams, J. K. Allen, F. Mistree, 2003, "An Application of Constructal Theory in the Non-Deterministic, Multi-Objective Design of Product Platforms," *ASME IDETC 15th Design Theory and Methodology Conference*, September 2-6, Chicago, IL, Paper No. DETC2003/DTM-48667.
88. C. B. Williams, J. H. Panchal, D. W. Rosen, 2003, "A General Decision-Making Method for the Rapid Manufacturing of Customized Parts," *ASME IDETC 23rd Computers and Information in Engineering Conference*, September 2-6, Chicago, IL, Paper No. DETC2003/CIE-48198.
89. M. K. Chamberlain, C. B. Williams, F. S. Cowan, F. Mistree, 2001, "Orchestrating Learning in a Graduate Engineering Design Course," *ASME IDETC 13th International Conference on Design Theory and Methodology*, September 9-12, Pittsburgh, PA, Paper No. DETC 2001/DTM-2037.

Papers and Posters Presented at Professional Meetings

1. L. Sturm, M. Albakri, C. B. Williams, P. Tarazaga, 2016, "In-situ Detection of Build Defects in Additive Manufacturing via Impedance-Based Monitoring," *International Solid Freeform Fabrication Symposium*, August 4-7, Austin, TX.
2. L. D. Sturm, S. Tedia, C. B. Williams, 2016, "Circumventing the STL: Design and Fabrication of Complex Structures with Voxels," SME RAPID, Orlando, FL., May 18.
3. C. B. Williams, 2016, "Realizing Multi-Functional Products via Multi-Material Additive Manufacturing," SME RAPID, Orlando, FL., May 18.
4. A. Schultz, P. Lambert, N. Chartrain, D. Ruohoniemi, Z. Zhang, C. Jangu, M. Zhang, C. Williams, T.E. Long, 2015, "3D printing phosphonium ionic liquid networks with mask projection microstereolithography," *American Chemical Society National Meeting & Exposition*, August 16-20, Boston, MA.
5. S. Hemp, R.J. Mondschein, C. Jangu, A. Schultz, N. Chartrain, C. Williams, T. E. Long, "Ionic liquids inspiring the design of phosphonium-containing polymers: From 3D printed objects to block copolymer elastomers," *American Chemical Society National Meeting & Exposition*, August 16-20, Boston, MA.
6. J. Sirrine, N. Chartrain, A. Schultz, C. Williams, T.E. Long, 2015, "3D printing tailored interfaces with mask projection microstereolithography," *American Chemical Society National Meeting & Exposition*, August 16-20, Boston, MA.
7. J. Sirrine, A.M. Nelson, A. Pekkanen, A. Schultz, N. Chartrain, C. Williams, T. E. Long, 2015, "3D-printed biodegradable polyester tissue scaffolds for cell adhesion," *American Chemical Society National Meeting & Exposition*, August 16-20, Boston, MA.
8. Y. Bai, C. B. Williams, 2015, "Printing of Conductive and Reflective Materials," *Additive Manufacturing Users Group*, April 22, Jacksonville, FL.

9. Y. Bai, C. B. Williams, 2015, "A Study of Sintering in Binder Jetting of Pure Copper," *Additive Manufacturing with Powder Metallurgy Conference*, May 17-19, San Diego, CA.
10. C. B. Williams, 2015, "Additive Manufacturing of Multifunctional Products via Tailored Materials and Topologies," *NSF/DOE Workshop on Additive Manufacturing*, June 3, Knoxville, TN.
11. J. Stephenson, B. Brand, and C. B. Williams, 2015, "Research experiences for teachers: Engineering applications in science and math classrooms," *National Association for Research in Science Teaching Annual International Conference*, Chicago, IL., April 11-14.
12. C. Cirenza, R. Cherry, T. Diller, and C. B. Williams, 2015, "Assessing Effects of Hands-On Instruction on Conceptual Understanding in Heat Transfer," *7th Annual Conference on Higher Education Pedagogy*, February 5, Blacksburg, VA.
13. N. Chartrain, A. Schultz, T. Long, C. Williams, A. Whittington, 2015, "From Molecules to Manufacturing: Developing Novel Polymers for Additive Manufacturing," *Virginia Tech Interdisciplinary Research Symposium*, February 26, Blacksburg, VA.
14. N. Chartrain, A. Schultz, T. Long, C. Williams, and A. Whittington, 2015, "From Molecules to Manufacturing: Developing Novel Polymers for Additive Manufacturing," *31st Annual Graduate Research Symposium*, March 25, Blacksburg, VA. (Bronze Award for Poster Presentation)
15. N. Chartrain, A. Schultz, T. Long, C. Williams, and A. Whittington, 2015, "Fabrication of Multi-Material Tissue Scaffolds via Additive Manufacturing," *Society For Biomaterials 2015 Annual Meeting and Exposition*, April 15-18, Charlotte, NC.
16. N. Chartrain, P. Lambert, A. Schultz, T. Long, C. Williams, and A. Whittington, 2014, "Mask Projection Microstereolithography of Novel Biocompatible Polymers,"*16th Annual Conference of the North Carolina Tissue Engineering and Regenerative Medicine Society*, October 13, Durham, NC.
17. L. D. Sturm and C. B. Williams, 2014, "Attacks on the Digital Thread: Cyber/Physical Vulnerabilities in Additive Manufacturing," *SME RAPID*, Detroit, MI., June 11.
18. B. Perez and C. B. Williams, 2014, "Printing Smart Parts: Embedded Actuation and Sensing via Multi-Material 3D Printing and Direct Write," *SME RAPID*, Detroit, MI., June 11.
19. C. B. Williams, "Embedded Actuation and Sensing Via Multi-Material 3D Printing and Direct Write," *2014 Electronics Packaging Symposium*, Binghamton, NY., October 8-9, 2014.
20. C. B. Williams, "Design Automation for Additive Manufacturing," *ASME IDETC Design Automation Conference*, Buffalo, NY., August 17-20, 2014

21. D. A. Snelling and C. B. Williams, "Manufacturing Metal-Ceramic Cellular Materials via Binder Jetting and Casting," *ASME Advanced Manufacturing Impact Forum*, Buffalo, NY., August 17-20, 2014.
22. E. Campaigne, L. Sturm, P. Lambert, and C. B. Williams, "Origami inspired Vehicles Fabricated via Additive Manufacturing," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 4-6, 2014.
23. C. B. Williams and T. S. Simpson, "Workshop Report: Educating the Future Additive Manufacturing Workforce," *International Solid Freeform Fabrication Symposium,* Austin, TX., August 4-6, 2014.
24. Meisel, N. A., Elliot, A., and Williams, C. B., "Design and Implementation of an AM Vending Machine for Student Use," *International Solid Freeform Symposium*, Austin, TX., August 12-14, 2013.
25. Moore, J. P., Williams, C. B., North, C., Pierce, S., and Johri, A., "Promoting Conceptual Understanding via an Adaptive Concept Map". *NSF TUES/CCLI PIs Conference*, Washington DC, January 23-25, 2013.
26. Mohammadi-Aragh, M. J. and Williams, C. B., "Instructors' Influence on Student Attention in Computer-Infused Classrooms". *Conference on Higher Education Pedagogy*, Blacksburg, VA. 2013.
27. Seals, M., Druschitz, A., Williams, C .B., and Suchicital, C., "Investment Casting at Virginia Tech," *Investment Casting Institute Conference Proceedings*, ICI Technical Paper 946, Montvale, NJ. 2012.
28. Williams, C. B. and Seepersad, C. C., "Design for Additive Manufacturing Curriculum: A Problem- and Project-Based Approach," *International Solid Freeform Fabrication Symposium*, Austin, TX., August 6-8, 2012.
29. Ivanova, O. S., Elliott, A., Campbell, T. A., and Williams, C. B., "Polymer Nanocomposites for Additive Manufacturing," *IUPAC World Polymer Congress – MACRO 2012*, Blacksburg, VA, June 26, 2012.
30. Williams, C. B., Lee, Y., Gero, J. S., and Paretti, M. C., "Effects of Design Education on Design Cognition: A Longitudinal Study of Mechanical Engineering Students," *International Conference on Design Computing and Cognition*, College Station, TX., June 7-9, 2012.
31. Moore, J. P. and Williams, C. B., "Adaptive Concept Maps as a Way to Promote Conceptual Understanding in Digital Textbooks". *Conference on Higher Education Pedagogy*, Virginia Tech, February 9, 2012.
32. Moore, J. P., Amaya, A., Groves, E., and Williams, C. B., "Using Additive Manufacturing Technologies as an Instructional Tool for the Blind and Visually Impaired". *Conference on Higher Education Pedagogy*, Virginia Tech, February 9, 2012.
33. Amaya, A., Moore, J. P., Groves, E., and Williams, C. B., "A Multi-Disciplinary Approach to Providing Visualizations for the Visually Impaired," *Virginia Tech*

Interdisciplinary Research Symposium, Virginia Tech, November 4, 2011. (Best Poster Award)

34. Moore, J. P., Williams, C. B., and Paretti, M. C., "Using Wikis as a Formative Assessment Tool for Student Engineering Design Teams". *Conference on Higher Education Pedagogy*, Virginia Tech, February 4, 2011.
35. Illardo, R. and Williams, C. B., "Design and Manufacture of a Formula SAE Intake System Using Fused Deposition Modeling and Fiber-Reinforced Composite Materials". *International Solid Freeform Fabrication Symposium*, Austin, TX., August 3-5, 2009. Best Poster Presentation Award.
36. Williams, C. B., Goff, R., Terpenny, J., Knott, T., Matusovich, H., Gregg, M., "The ROXIE Project: Service Learning + Design in a First-Year Engineering Course". *The Center for Student Engagement and Community Partnerships Annual Engagement Expo*, Virginia Tech, April 15, 2009.
37. Williams, C. B., Goff, R., Terpenny, J., and Gilbert, K., "Real Outreach Experiences in Engineering (ROXIE): Merging Design and Service Learning for First-Year Students on a Large Scale". *EPICS Conference on Service-Learning in Engineering and Computing*, Austin, TX., August 4, 2009.
38. Williams, C. B., Goff, R., Terpenny, J., Knott, T., Greg, M., ‡Matusovich, H., and ‡Gilbert, K., "The ROXIE Project: Service Learning + Design in a First-Year Engineering Course," *Conference on Higher Education Pedagogy*, Virginia Tech, February 18, 2009.
39. Williams, C. B., Knott, T., Goff, R., and Gilbert, K., "ROXIE, Real Outreach eXperiences In Engineering Design Project". *Outreach NOW 2008: The Promise of Campus-Community Partnerships -Learning through Student Engagement*, Virginia Tech, September 8, 2008.
40. Goff, R., Williams, C. B., Terpenny, J., Knott, T., and Lo, J., "Real Outreach Experiences in Engineering – A Service-Learning Design Project". *Annual Engagement Expo*, Blacksburg, VA., April 24, 2008.
41. Wang, H. V., Williams, C. B., and Rosen, D. W., "Design Synthesis of Adaptive Mesoscopic Cellular Structures with Unit Truss Approach and Particle Swarm Optimization Algorithm," *International Solid Freeform and Fabrication Symposium*, Austin, TX., pp. 433-445, August 14-16, 2006.

Significant Invited State-of-the-Art or Review Papers and/or Presentations

1. C. B. Williams, "Additive Manufacturing of Multifunctional Products via Tailored Materials and Topologies," Johns Hopkins University, Baltimore, MD, February 11, 2016.

2. C. B. Williams, "Additive Manufacturing: Research at the Intersection of Materials, Manufacturing, Science & Design," Eastern Carolina University, Greenville, NC., April 1, 2016.
3. C. B. Williams, "Cyber-Physical Security Vulnerabilities in Additive Manufacturing," *North Carolina State University Fitts Industrial and Systems Engineering Additive Manufacturing & Logistics Spring Symposium*, Raleigh, NC, April 21, 2016
4. C. B. Williams, "Molecules to Manufacturing: Expanding the Polymeric Materials Toolbox – In-Situ Processing Measurements," *Polymer-based Additive Manufacturing Workshop*, NIST, Gaithersburg, MD, June 9, 2016.
5. C. B. Williams, "Design for Additive Manufacturing: Exploring an Expanding Design Space," *ASME IDETC Design Automation Conference Keynote Panel*, Charlotte, NC, August 22, 2016.
6. T. E. Long and C. B. Williams, "3D Printing: From Molecules to Manufacturing," *American Chemical Society Webinar*, January 22, 2015 (over 1500 attendees).
7. C. B. Williams, "An Analysis of Cyber-Physical Vulnerabilities in Additive Manufacturing," *Cybersecurity for Direct-Digital Manufacturing Workshop*, NIST, Gaithersburg, MD., February 3, 2015.
8. C. B. Williams, "Designing Materials, Processes, Products, and Pedagogy for Additive Manufacturing," *Mechanical Engineering Graduate Seminar*, Texas A&M University, February 25, 2015.
9. Williams, C. B., "An Analysis of Cyber-Physical Vulnerabilities in Additive Manufacturing," *Navy Additive Manufacturing Technology Interchange*, April 28, 2015.
10. C. B. Williams, "Realizing Multi-Functional Products via Additive Manufacturing," *Virginia Tech Hampton Roads Showcase*, Hampton Roads, VA., May 6, 2015.
11. C. B. Williams, "Achieving Product Multi-functionality through Multi-Material Additive Manufacturing," *Additive Manufacturing in Defense and Aerospace Conference*, Arlington, VA., June 25, 2015.
12. "Realizing Multi-functional Products through Multi-Material Additive Manufacturing," *3D and 4D Printing Trends Conference*, Arlington, VA., August 19, 2015.
13. C. B. Williams and J. Dobstetter, "How to Leverage 3D Printing for End-Use Parts," *American Society of Mechanical Engineers Webinar*, September 2015 (over 2000 attendees)
14. J. Beaman, D. Rosen, B. Stucker, C. B. Williams, "Panel: AM Founders and Futurists," *American Society of Engineers Additive Manufacturing + 3D Printing Conference*, Keynote Panel Discussion (T. Simpson, moderator), August 3, 2015
15. C. B. Williams, "Designing Materials, Processes, Products, and Pedagogy for Additive Manufacturing," *Chevron Frontiers of Mechanical Engineering Lecture*, University of Texas – Austin, Austin, TX., October 2, 2015.

16. C. B. Williams, "Additive Manufacturing @ Virginia Tech: From Molecules to Manufacturing," *Northrop Grumman 3D Additive Manufacturing Consortium Meeting*, Baltimore, MD., October 14, 2015.
17. C. B. Williams, "Additive Manufacturing at Virginia Tech," *Virginia Manufacturers Association 2015 Virginia Industry Forum*, Charlottesville, VA., November 13, 2015.
18. H. Ilies, M. Parkinson, C. C. Seepersad, M. Kokkolaras, K. Ragsdell, P. Papalambros, F. Mistree, C. B. Williams, R. Rai, J. Panchal, S. Ferguson, B. DuPont, and J. Allison, "New Perspectives on Design Automation: Celebrating the 40th Anniversary of the ASME Design Automation Conference," Guest Editorial, *Journal of Mechanical Design*, 137(5), 050301 (5 pages), doi: 10.1115/1.4030256.
19. Williams, C. B., "Designing Materials, Processes, Products, and Pedagogy for Additive Manufacturing," *Industrial Engineering Graduate Seminar*, University of Louisville, December 11, 2014.
20. Williams, C. B., "Designing Materials, Processes, Products, and Pedagogy for Additive Manufacturing," *Industrial Engineering Graduate Seminar*, Pennsylvania State University, September 25, 2014.
21. Williams, C. B., "Design Automation for Additive Manufacturing," *ASME IDETC Design Automation Conference*, August 19, 2014.
22. Williams, C. B., Kulkarni, R., Pollack, R., DeFellce, S., "Panel Session: Individual Access – Personal Machines," *Additive Manufacturing Summit*, Oak Ridge National Lab (TN), May 13, 2014.
23. Williams, C. B., Lee, J., Kosal, M., "Emerging Technologies and National Security," (Moderator: K. Berger), *AAAS Forum on Science & Technology Policy*, Washington D.C., May 2, 2014.
24. Williams, C. B., "Open-Source Design, 3D Printing, and Additive Manufacturing," *Joint Staff Sponsored Science, Technology and Engineering Futures Seminar*, Johns Hopkins University / Applied Physics Laboratory, Laurel, MD, March 17, 2014.
25. Williams, C. B., "Additive Manufacturing Research Opportunities," *National Academy of Engineering Regional Symposium: Challenges of Advanced Manufacturing*, Charlottesville, VA, March 25, 2014.
26. Williams, C. B., Crump, S., Wicker, R., Hebert, R., DeFelice, S., "The Next Big Step Changes in Innovation," *FBR 3D Printing Conference: Additive Manufacturing's Next Inflection Point*, New York, NY., December 9, 2013. (invited panelist)
27. Williams, C. B., "Additive Manufacturing as a Transformative Technology," *Glen Raven Executive Meeting*, University of Virginia Darden School of Business, Charlottesville, VA., December 4, 2013.
28. Williams, C. B., "Disrupting Design via Additive Manufacturing," *TEDx Virginia Tech*, Blacksburg, VA., November 9, 2013.
29. Williams, C. B., Sreenvinisan, S.V., Yukish, M., and Wampler, C., "Plenary Panel Session: Advanced Manufacturing: Opportunities and Challenges," (Moderator: T.

Simpson), *ASME IDETC Mechanisms and Robotics Conference & Design for Manufacturing and the Lifecycle Conference*, Portland, OR., August 7, 2013. (invited panelist)

30. Mistree, F., Allen, J. K., Chen, W., and Williams, C. B., "Panel Discussion: Educating the Faculty of the Future," (Moderator: J. Panchal), *ASME IDETC International Conference on Design Education*, Portland, OR., August 6, 2013. (invited panelist)
31. Williams, C. B., Wallace, D. R., and Aslin, B. A., "Panel Discussion: Equipping the Additive Manufacturing Workforce," (Moderator: D. Mitchell), *2013 Society of Manufacturing Engineers RAPID Conference*, Pittsburgh, PA., June 11, 2013. (invited panelist)
32. Williams, C. B., "From Rapid Prototyping to Additive Manufacturing: The Potential of 3D Printing," *Innovation in Manufacturing Conference*, Roanoke, VA., April 23, 2013.
33. Williams, C. B., "Building the Additive Manufacturing Workforce: Integrating AM Throughout the Educational Continuum," *U. S. Manufacturing Competitiveness Dialogue*, Oak Ridge, TN., April 19, 2013.
34. Williams, C. B., "Creating the Next-Gen Designers/Manufacturers via Additive Manufacturing," *Product Design and Development Webinar*, http://www.pddnet.com/stratasys, (220 attendees) March 19, 2013.
35. Williams, C. B., "From Rapid Prototyping to Additive Manufacturing," *Institute for Advanced Learning and Research: The Network*, Danville, VA., March 6, 2012.
36. Williams, C. B., "From Rapid Prototyping to Additive Manufacturing: AM Research at Virginia Tech," *In-Q-Tel Focus Day*, Arlington, VA., November 15, 2012.
37. Williams, C. B., Lobovsky, M., Tibbits, S., Smurov, I., Summit, S., and Lassiert, S., 2012, "Panel Discussion: Revolution in 3D Printing: On-Demand, Whatever, Whenever," *Open Innovations: Moscow International Forum for Innovative Development*, (Moderator: I. Bortnik,), Moscow, Russia, November 1. (invited panelist)
38. Williams, C. B., "From Rapid Prototyping to Additive Manufacturing," *A Symposium on the U. S. Renaissance in Advanced Manufacturing*, South Boston, VA., October 24, 2012.
39. Williams, C. B., "Additive Manufacturing: Technology Overview," *Central Intelligence Agency*, Washington DC, October 16, 2012.
40. Williams, C. B., "Additive Manufacturing: Disruption through Design," *Atlantic Council*, Washington DC, October 16, 2012.
41. Williams, C. B., "3D Printing: Technologies and Implications of Additive Manufacturing," *American Society for Quality Radford/Roanoke Section meeting*, Blacksburg, VA, September 18, 2012.
42. Williams, C. B., "Designing Hybrid Additive Manufacturing Processes, *International Solid Freeform Fabrication Symposium*, Austin, TX., August 6, 2012.

43. Williams, C. B., "Sponsor Technical Session Presented by Objet: Objet Connex 3D Printers: Advancing Student Design and Research Projects at Virginia Tech's DREAMS Lab," Am*erican Society of Engineering Education Annual Conference & Expo*, San Antonio, TX., June 13, 2012.
44. Williams, C. B., and Campbell, T. A., "Additive Manufacturing: Technologies and Policy Implications," *U. S. Department of State*, Washington D.C., January 30, 2012.
45. Williams, C. B., and Campbell, T. A., "Additive Manufacturing Research at Virginia Tech," *National Defense University: STAR-TIDES @ Pentagon Atrium*, Washington, D.C., October 12, 2011.
46. Williams, C. B., and Campbell, T. A., "Additive Manufacturing in Action," *National Defense University: STAR-TIDES Event*, Washington, D.C., October 5, 2011.
47. Williams, C. B., and Campbell, T. A., "Additive Manufacturing: State of the Art, Potential and Implications," *National Defense University*, Washington D.C., August 19, 2011.
48. Williams, C. B., and Campbell, T. A., "Additive Manufacturing (3D Printing): State of the Art, Potential and Implications," *Atlantic Council*, Washington D.C., March 23, 2011.

Exhibitions

1. Kubalak, J., Buss, C., King, N., Williams, C.B., "Design Robotics: Robot-Assisted Fabrication," *ACCelerate Creativity and Innovation Festival*, Smithsonian Institute's American History Museum, October 13-15, 2017.
2. Zawaski, C., Kubalak, J., Chatham, C., Williams, C. B. "DreamVendor: The 3D Printing Vending Machine," *SXSW Interactive,* Virginia Tech booth. Austin, TX., March 13-16, 2016.
3. Kalantar, N., Borhani, A., and Williams, C. B., "3D Printing Flexible Textile Structures," 3D Printshow, New York City, February 12-15, 2014.
4. "Merging Arts and Engineering Education via Rapid Prototyping," Creative Technologies @ Kent Square, Virginia Tech Arts Initiative, Blacksburg, VA, 2009-2011.
5. "3D Printing in Art, Architecture, and Engineering," Taubman Museum of Art, ArtVenture Space permanent exhibit, Roanoke, VA, 2012 – 2015.

Patents

1. Williams, C. B., Elliott, A., McCarthy, D. L., and Meisel, N. A., "3-D Printing Vending Machine," US Patent 9,418,503, 2016, Assignee: Virginia Tech.

Patent Disclosures

1. Meenakshisundaram, V., & Williams, C. B., 09/01/2016. Large Area - High Resolution Additive Manufacturing of thin patterned membranes with varying thickness using a continuous, recoat-less Vat Photopolymerization technique.
2. Bai Y. & Williams, C. B., 2016. Binderless Jetting- Using Nanoparticles to Replace Polymer Binders in Binder Jetting of Metal. Provisional patent. Application number: 62/402,000
3. Hegde M., Chartrain N. A., Williams C. B., Long T. E. 3D Printing All-Aromatic, High Performance Polyimides and Polybenzoxazoles Using Stereolithography (SLA): Processing the Unprocessable. Provisional patent. Application number: 62/375,968.
4. Cockerill, M., DeWillie, K., Domaratzky, M., Scholl, M., Szkodny, K., Uehling, G., Sturm, L., Williams, C. B., Dillard, D., "Method and Apparatus for Measuring Static Friction at High Speeds," VT 15-094, April 30, 2015.
5. Buss, C., Williams, C. B., Perez, K. B., "3-D Printed Folding Quadcopter," U. S. Provisional Patent, U. S. Patent Application No: 61/901,743, Assignee: Virginia Tech, 2013.
6. Druschitz, A., Williams, C. B., and Snelling, D., "Lightweight Composite Cellular Cast Structures," Invention Disclosure VTIP 13-151, Assignee: Virginia Tech, 2013.
7. Williams, C. B., Elliott, A., McCarthy, D. L., and Meisel, N. A., "3-D Printing Vending Machine," Invention Disclosure VTIP 13-113, Assignee: Virginia Tech, 2013.
8. Campbell, T. A., Williams, C. B., and Ivanova, O. S., "Fabrication of Physically Unclonable Functions via Additive Manufacturing," U. S. Provisional Patent, U.S. Patent Application No: 61/704,197, Assignee: Virginia Tech, September 21, 2012.
9. Campbell, T.A., Ivanova, O.S., and Williams, C.B., "Smart Camouflage," Invention Disclosure VTIP 12-115, Assignee: Virginia Tech, April 4, 2012.
10. Campbell, T. A., Ivanova, O. S., and Williams, C.B., "Quantum Dot Optical Temperature and Pressure Probes Embedded in 3D Objects", U. S. Provisional Patent, U.S. Patent Application No: 61/538,495, Assignee: Virginia Tech, September 23, 2011.
11. Ivanova, O.S., Campbell, T.A., and Williams, C.B., "Personalized Body Armor through Additive Manufacturing," Invention Disclosure VTIP 12-038, Assignee: Virginia Tech, September 14, 2011.
12. Campbell, T.A., Williams, C.B., and Ivanova, O.S., "Feedback Monitoring and Control Capability through Nanomaterials for Additive Manufacturing Processes," Invention Disclosure VTIP 12-0824, Assignee: Virginia Tech, January 24, 2012.
13. Campbell, T. A., Williams, C. B., and Lu, P., "Programmable Matter via 3D Printing of Nanomaterials," Invention Disclosure VTIP 11-069, Assignee: Virginia Tech, December 21, 2010.

Funded Grants and Contracts

Funding Category	Total	Personal Share Total
External	$6,934,071	$3,221,223
Internal	$928,807	$472,613
Total Funded Research	**$7,862,878**	**$3,693,836**

- P. Tarzaga (PI), C. B. Williams, J. Camelio, "Non-Destructive Evaluation of Additively Manufactured Parts Via Impedance-based Measurements," NSF, $100,000, 09/01/16 – 08/31/18.
- T. E. Long (PI), C. B. Williams, "Material Design for Additive Manufacturing of Orthodontics," Align Technology Inc., $252,273, 04/01/16 – 03/31/17.
- C. B. Williams (PI), "3D Printing of Copper Thermoacoustics Component," Nirvana Energy Systems Inc., $660, 02/18/16- 05/31/16.
- C. B. Williams (PI), D. Dillard, "Design of High-Speed Friction Testing Device," Nike, $16,500, 09/01/15 – 03/31/16.
- T. E. Long (PI), C. B. Williams, "Material Design for Next Generation SLS Additive Manufacturing," Honeywell Federal Manufacturing & Technologies, LLC, $150,000, 10/01/15 – 09/30/16
- C. B. Williams (PI), A. Wicks, "Scientific and Technical Analysis of the Additive Manufacturing Vehicle Design Challenge (AMVDC)," VT ARC, $55,000, 06/08/15 – 09/30/15
- C. B. Williams (PI), T. E. Long, "Complex Sculpture by Additive Manufacturing for Wear Performance Evaluation," Michelin, $220,574, 08/01/15 – 07/31/16
- C. B. Williams (PI), "EAGER: Cybermanufacturing: Just Make It: Integrating Cybermanufacturing into Design Studios to Enable Innovation," National Science Foundation, $99,976, 08/15/15 – 12/31/16
- C. B. Williams (PI), A. Druschitz, C. Moen; "Collaborative Research: GOALI: Topology Optimization for Additively Manufactured Metal Castings;" National Science Foundation; $242,704; 06/01/2015 – 05/31/2018
- J. Camelio (PI), C. B. Williams, L. Wells; "Cyber-Physical Approaches to Advanced Manufacturing Security;" National Science Foundation; $765,247; 06/01/2015 – 05/31/2018
- C. B. Williams (PI); "NASA SBIR – Mold for Mirror Support;" Lightweight Telescopes, Inc., $20,447; 05/31/2015 – 11/30/2015
- A. Whittington (PI), C. B. Williams, T. E. Long; "Incorporating Actives into Additive Manufacturing Approaches for P&G"; Proctor & Gamble; $305,961; 02/16/2015 – 02/15/2016.

- C. B. Williams (PI), R. West; "LMI R&D Project for DLA: STP 5-L01 Additive Manufacturing;" LMI; $99,350; 12/01/2015 – 08/31/2015.
- N. King (PI), C. B. Williams, C. Moen, M. Eatherton, C. Clark, R. Dunay, B. Kennedy; "Additive Manufacturing and Construction Technologies Group;" VT Institute for Creativity, Arts, and Technology, $25,000; 05/01/2015 – 04/31/2016
- C. B. Williams (PI); "Advanced Inkjet Printing Platform for Additive Manufacturing"; Altria; $21,000; 01/01/2015
- C. B. Williams (PI); "Additive Manufacturing Workforce Development"; SAIC; $60,000; 01/01/2015
- C. B. Williams (PI); "DREAMS Lab gift"; General Motors; $4,000; 01/01/2015
- C. B. Williams (PI); "Gift to Virginia Tech;" ExOne; $40,000; 01/01/2015
- T. Long (PI), C. B. Williams; "Advanced Materials and Manufacturing Fellowship"; RJ Reynolds; $500,000; 10/01/14-09/30/17
- C. B. Williams (PI), T. Long, D. Dillard; "Improving Glove Grip Performance via Material and Additive Manufacturing Research;" Nike; $185,105; 05/31/14-0530/15
- C. B. Williams (PI), A. Wicks, "2014 Virginia Tech Additive Manufacturing Grand Challenge;" VT-ARC; $99,000; 01/17/14-12/31/14
- Z. Kong (PI), C. B. Williams, J. Camelio, J. Ran; "GOALI: Online Defect Detection and Mitigation Method for Incipient Anomalies in Additive Manufacturing Processe;" NSF; $300,000; 09/01/14-08/31/17
- T. Simpson (PI), C. B. Williams (PI); "Collaborative Research: Workshop on the Educational Needs and Opportunities in Additive Manufacturing;" NSF; $42,000 (VT Share: $7,900); 4/1/14-12/31/14
- T. Diller (PI), C. B. Williams; "Challenge-Based Workshops for Correcting Heat Transfer Misconceptions;" NSF; $200,000; 09/01/13-08/31/15
- C. B. Williams (PI), A. Aning; "Insert Manufacturing;" Sandvik Coromant; $28,912; 08/26/13-12/31/13
- C. B. Williams (PI, A. Aning; "Multilayered Technologies for Armored Structures and Composites (MultiTASC); Army Research Lab – Materials Research Program; $40,000; 08/01/13-12/31/13
- C. B. Williams (PI); "Gift to Virginia Tech;" ExOne; $30,000; 08/15/13-08/14/14
- C. B. Williams (PI), K. Ellis, G. D. Taylor; "Additive Manufacturing in Remote or Austere Environments;" LMI; $49,957; 05/01/13-09/30/13
- C. B. Williams (PI); "Small Satellite Fabrication via Additive Manufacturing;" Virginia Space Grant Consortium;" $20,000; 02/01/13 – 01/31/14
- C. B. Williams (PI); "CAREER: Additive Manufacture of Copper Cellular Materials;" NSF; $400,000; 01/01/13-12/31/17
- C. B. Williams (PI) and B. Brand; "Research Experience for Teachers: Innovation-based Manufacturing;" NSF; $450,000; 10/02/12-09/30/15

- T. A. Campbell (PI), C. B. Williams, B, Knapp, J. Camelio, R. Goff; "Additive Manufacturing (3D Printing) System for Nanocomposites;" Commonwealth Research Commercialization Fund; $200,000; 08/01/12 – 07/31/14
- D. J. Leo (PI), C. B. Williams, J. Camelio, J. White; "Cyber Physical Systems Security – Advanced Manufacturing;" Virginia Tech Applied Research Center; $55,000; 02/15/13 – 02/14/14
- L. Bickford (PI), C. B. Williams, C. G. Rylander, M. N. Rylander, P. Shen; "Minimally Invasive Medical Devices for Neoadjuvant Pancreatic Cancer Therapy;" Virginia Tech Institute of Critical Technology and Applied Science; $31,209; 09/01/12 – 08/31/13
- T. A. Campbell (PI), C. B. Williams; "Chemical Synthesis and Functionalization of Nanomaterials for Additive Manufacturing of Nano-Inks;" Virginia Tech Institute of Critical Technology and Applied Science; $31,209; 02/15/13 – 02/14/14
- C. B. Williams (PI), M. C. Paretti, E. D. McNair, M. Wisnioski; "Collaborative Research: The Institutionalization and Sustainability of Product Archaeology – A National Rollout Plan;" NSF DUE TUES; $64,933; 09/01/12 – 08/31/14
- J. Camelio (PI), C. B. Williams, R. Jin; "Lightweight Heavy Truck Chassis Redesign;" Metalsa; $19,290; 08/01/12-07/31/13
- A. P. Druschitz (PI), C. B. Williams, R. C. Batra; "A Transformative Approach to Lightweight Armor: Metal-Ceramic Cellular Composite Castings; Virginia Tech Institute of Critical Technology and Applied Science; $74,915; 08/01/12 – 07/31/13
- C. B. Williams (PI), T. E. Long; "Tissue Scaffold Fabrication via Micro-Stereolithography;" Virginia Tech Institute of Critical Technology and Applied Science; $119,967; 08/01/12 – 07/31/14
- C. B. Williams (PI); "Embedded Flexible Control Surfaces;" Air Force Research Laboratory; 01/09/12 – 01/08/14; $199,995
- J. Wells (PI), C. B. Williams, M. Paretti; "Collaborative Research: Understanding High School Pre-Engineering Student Design Cognition, Comparisons with Engineering Students and Educational Implications;" NSF EEC; 01/01/12-12/31/14; $109,205
- C. B. Williams (PI), J.-H. Bohn, L. McNair; "Exploring the Effects of Telepresence Technologies on Distributed Collaborative Design and Manufacturing;" CISCO Systems, Inc.; 01/01/12 – 12/31/12; $30,000
- C. B. Williams (PI); "DREAMS Lab gift"; General Motors; $2,000; 01/01/2012
- C. P. Koelling (PI) and C. B. Williams, "Modular Concepts and Small Parts Painting;" Volvo; 08/01/11 – 06/31/12; $70,695
- C. B. Williams (PI), K. Lu, T. Campbell, "3D Printing of Nano-Inks for Physical Cryptography Applications," Virginia Tech Institute of Critical Technology and Applied Science; 07/01/11-06/30/13; $118,810

- J. Camelio (PI) and C. B. Williams, "Center for Innovation-Based Manufacturing," Virginia Tech Institute of Critical Technology and Applied Science, 1/1/11 – 12/31/15, $375,000
- C. B. Williams (PI), "3D Printing Station for Engineering Students;" Virginia Tech Student Engineering Council Big Contribution; 05/01/11 – 05/01/12; $7,500
- C. B. Williams (PI), A. Johri, C. North, R. S. Pierce, "Advancing Personalized Engineering Learning via an Adaptive Concept Map;" NSF-TUES; 09/01/10 – 08/31/12; $199,394
- T. Campbell (PI), C. B. Williams; "Three-Dimensional Printing of Nano-Inks," Virginia Tech ICTAS; 08/30/2010 – 08/01/2012; $82,597
- M. C. Paretti (PI), B. Jones, H. Matusovich, C. B. Williams, T. Knott, J. P. Terpenny, "A Mixed-Methods Study of the Effects of First-Year Project Pedagogies on the Retention and Career Plans of Women in Engineering;" NSF; 11/1/09 – 10/31/12; $488,251
- M. C. Paretti (PI), C. B. Williams, J. P. Terpenny, "Collaborative Research: Using Innovations in Cognitive Science to Monitor the Development of Design Thinking in Engineering Students – A Longitudinal Study;" NSF – EEC; 09/01/09 – 08/31/12; $111,080
- L. McNair (PI), M. C. Paretti, A. Johri, C. B. Williams, J. Lo, O. H. Griffin, "Building Connections within the Engineering Education Research Community," NSF-EEC; 5/1/08 – 12/31/10; $307,468
- C. B. Williams (PI), "Merging Arts and Engineering Education via Rapid Prototyping: Developing Clay Material and K-12 STEM Curricula," Virginia Tech Arts Initiative: Educational Enhancement Collaboration Grants, 2009-2010; $4,100
- C. B. Williams (PI), "Merging Arts and Engineering Education via Rapid Prototyping," Virginia Tech Arts Initiative: Educational Enhancement Collaboration Grants; 2008-2009; $3,500

Teaching Activities

Graduate Courses:

- ME 5644, Rapid Prototyping
  - Fall 2011; Instructor rating: 5.6 / 6.0
  - Fall 2012; Instructor rating: 6.0 / 6.0
  - Fall 2013; Instructor rating: 5.73 / 6.0
  - Fall 2014; Instructor rating: 5.5 / 6.0
  - Fall 2015; Instructor rating: 5.5 / 6.0
  - Fall 2016; Instructor rating: 5.67 / 6.0
- ENGE 5024, Design in Engineering Education and Practice
  - Spring 2012; Instructor rating: 5.5 / 6.0

    - Spring 2015; Instructor rating: 4.5 / 6.0
- ENGE 5704, Engineering Education Graduate Seminar
    - Fall 2008; Instructor rating: 3.4 / 4.0
    - Spring 2009; Instructor rating: 3.7 / 4.0

Undergraduate Courses:

- ENGE 1114, Exploration of Engineering Design
    - Spring 2008; Instructor rating: 3.02 / 4.0 (evaluation was for all instructors)
    - Spring 2009; Instructor rating: 3.6 / 4.0
    - Spring 2010; Instructor rating: 3.7 / 4.0
    - Spring 2011; Instructor rating: 3.36 / 4.0
    - Spring 2013; Instructor rating: 4.97 / 6.0
- ME 2024, Engineering Design and Economics
    - Fall 2008; Instructor rating: 3.5 / 4.0
    - Fall 2009; Instructor rating: 3.4 / 4.0
    - Fall 2010; Instructor rating: 3.6 / 4.0
- ME 4015, Capstone Design I
    - Fall 2009; Instructor rating: 3.9 / 4.0
    - Fall 2011; Instructor rating: 5.43 / 6.0
    - Fall 2012 - 2016
- ME 4016, Capstone Design II
    - Spring 2010; Instructor rating; 3.9 / 4.0
    - Spring 2011 - 2017
- ME 4644, Rapid Prototyping
    - Fall 2011; Instructor Rating: 5.75 / 6.0
    - Fall 2012; Instructor Rating: 5.57 / 6.0
    - Fall 2013; Instructor Rating: 5.45 / 6.0
    - Fall 2014; Instructor rating: 6.0 / 6.0
    - Fall 2015; Instructor rating: 5.4 / 6.0
    - Fall 2016; Instructor rating: 5.2 / 6.0
- ME 4994, Undergraduate Research
    - Fall 2008 – Spring 2016
- MSE 4075, Senior Design Laboratory (Material Science)
    - Fall 2012; Instructor rating: 6.0 / 6.0
- MSE 4076, Senior Design Laboratory (Material Science)
    - Spring 2013; Instructor rating: 6.0 / 6.0

Continuing Education:

- Air Force Research Laboratory Manufacturing Technology Workshop
    - "From Rapid Prototyping to Additive Manufacturing," August 2010

- "Rapid Tooling in Foundry Practices," August 1, 2011
- "Innovation Processes," August 2, 2011
- "From Rapid Prototyping to Additive Manufacturing," August 4, 2011
- "Design for Manufacturing and Additive Manufacturing," August 2, 2012
- "Design for Additive Manufacturing," July 29, 2014

- NavAir Manufacturing Technology Workshop
  - "Design for Additive Manufacturing," June 16, 2014
  - "Design for Additive Manufacturing," August 4, 2016
- SAIC
    - "Additive Manufacturing Short Course," 20 participants, May 18-21, 2015
    - "Additive Manufacturing Short Course," 20 participants, June 8-11, 2015

Additional Teaching Activities

- Invited Seminars, Virginia Tech
  - Williams, C. B., "Designing Design Experiences," Virginia Tech Engineering Education Graduate Seminar, October 14, 2011.
  - Williams, C. B., "Additive Manufacturing of Metals, Ceramics and Biomaterials," Virginia Tech Materials Science and Engineering Department Seminar, April 1, 2011.
  - Williams, C. B. and Campbell, T., "Black Swan: Additive Manufacturing," Virginia Tech Institute for Critical Technology and Applied Science, September 21, 2012.
  - Williams, C. B., "From Tissue Scaffolds to Buildings: How Additive Manufacturing Could Revolutionize Structural Design," Virginia Tech Department of Civil Engineering Graduate Seminar, Blacksburg, VA., March 27, 2013.
- Guest Lecturer, Virginia Tech
  - ME 4015 – Engineering Design and Project
    - Fall 2011 - 2015: "Concept Generation" & "Concept Selection"
    - Fall 2010: "Concept Generation: Morphological Analysis", "Concept Generation: TRIZ" & "Concept Evaluation and Selection"
  - ENGE 5024 – Design in Engineering Education and Practice
    - Fall 2010: "Prototyping in Design and Design Education"
  - ME 5984 – Microrobotics
    - Spring 2012, "3D Printing at the Micro Scale"
    - Fall 2010, "3D Printing at the Micro Scale"
  - ENGE 1014 – Engineering Seminar
    - Fall 2010, "From Rapid Prototyping to Additive Manufacturing"
  - ENGE 5014 – Foundations of Engineering Education

    - Fall 2008, "The Science of Design"
  - CHE 4104 – Process Materials
    - Fall 2012 – "Additive Manufacturing: Polymers, Metals, Ceramics and Biomaterials"
  - STS 6234 – Design Cultures
    - Spring 2012, "Mechanical Engineering Design and Manufacture"
    - Fall 2008, "The Mind's Eye and the Process of Abstraction"
  - MSE 4056 - Materials Selection & Design
    - Spring 2012, "Additive Manufacturing: Polymers, Metals, Ceramics, and Biomaterials"

Student Advising (Committee Chair)

Completed:

- Post-Doctoral Researcher
  - Olga Ivanova; Virginia Tech Institute of Critical Technology & Applied Science (co-advised with T. Campbell); 2011 – 2013; Lynntech, Inc. (College Station, TX.)
- Ph.D.
  - Jacob P. Moore, Ph.D. Engineering Education (August 2013); Assistant Professor, Penn State University Mont Alto.
    - "Promoting Conceptual Understanding via Adaptive Concept Maps"
  - Mahnas Jean Mohammadi-Aragh, Ph.D. Engineering Education (May 2013); Assistant Professor, Mississippi State University.
    - "Characterizing Student Attention in Technology-Infused Classrooms Using Real-time Active Window Data"
  - Amelia Elliott, Ph. D. Mechanical Engineering (February 2014); Post-Doctoral Researcher, Oak Ridge National Laboratory.
    - "The Effects of Quantum Dot Nanoparticles on the PolyJet Direct 3D Printing Process"
  - Drew Snelling, Ph.D. Mechanical Engineering (February 2015); Manufacturing Engineer, General Electric
    - "A Process for Manufacturing Metal-Ceramic Cellular Materials with Designed Mesostructure"
  - Nicholas Meisel, Ph.D. Mechanical Engineering (May 2015); Assistant Professor, Penn State University
    - "Design for Additive Manufacturing Considerations for Self-Actuating Compliant Mechanisms Created via Multi-Material PolyJet 3D Printing"
- M.S.

- Jesse Bernardo, M.S. Mechanical Engineering (December 2010); Mechanical Engineer, Bettis Atomic Power Laboratory.
  - "Indirect Tissue Scaffold Fabrication via Additive Manufacturing and Biomimetic Mineralization"
- David McCarthy, M.S. Mechanical Engineering (August 2012); Acquisition Engineer, U. S. Marine Corps.
  - "Creating Complex Hollow metal Geometries Using Additive Manufacturing and Metal Plating"
- Kevin B. Perez, M.S. Mechanical Engineering (December 2013); Ph.D. student, Singapore University of Technology and Design.
  - "Hybridization of PolyJet and Direct Write for the Direct Manufacture of Functional Electronics in Additively Manufactured Components"
- Emily Mikkelson, M. S. Mechanical Engineering (May 2014); Interiors Mechanical/Structural Design Engineer, Boeing.
  - "Characterization and Modeling of the Thermal Properties of Photopolymers for Material Jetting Processes"
- Earl Campaigne, M. S. Mechanical Engineering (June 2014); Engineering Leadership Program, National Instruments.
  - "Fabrication & Characterization of Carbon Nanocomposite Photopolymers via Projection Stereolithography"
- Philip Lambert, M. S. Mechanical Engineering (June 2014); Mechanical Engineer, Normal
  - "Design and Fabrication of a Mask Projection Microstereolithography System for the Characterization and Processing of Novel Photopolymer Resins"

- M. Eng.
  - Jacob P. Moore, M.Eng. Mechanical Engineering (December 2012).
    - "Fatigue Characterization of 3D Printed Elastomer Material"

Current:

- Post-Doctoral Research Fellow
  - Donald Aduba, 2015 - present
- Ph.D.
  - Yun Bai, Mechanical Engineering, expected May 2018
  - Nicholas Chartrain, Materials Science & Engineering, expected May 2018
  - Logan Sturm, Mechanical Engineering, expected May 2018
  - Callie Zawaski, Mechanical Engineering, expected May 2019
  - Joseph Kubalak, Mechanical Engineering, expected May 2019
  - Camden Chatham, Macromolecular Science & Engineering, expected May 2019
- M.S.

- Maleshia Jones, Mechanical Engineering, expected August 2016
- Nikhil Jorapur, Mechanical Engineering, expected August 2016
- Viswanath Meenakshisundaram, expected August 2017
- Saish Tedia, expected August 2017
- Ashwath Kumar, expected December 2017
- Sanchit Ingale, expected December 2017
- Joshua Brandman, expected December 2017

Other Research Supervision

- PhD Committee member, Dept. of Mechanical Engineering
  - Eric Williams, 2014
  - Yongesok Park, 2014
  - Nathan Sharpes, 2016
- Master of Science Committee member, Dept. of Mechanical Engineering
  - Matthew Colbert, 2011
  - Shajan Thomas, 2011
  - Robert J. Collins, 2012
  - Kevin Hoopes, 2013
  - William French, 2013
  - Rande Cherry, 2015
  - Yang Hua, 2015
  - Christopher Cirenza, 2015
  - Matthew Meeder, 2016
- Master of Engineering Committee member, Dept. of Mechanical Engineering
  - Kevin Sevilla, 2012
  - Eric Baldrighi, 2013
  - Adam Cho, 2014
- PhD Committee member, Dept. of Engineering Education
  - James Pembridge, 2011
  - Katherine Winters, 2012
  - Michael William Butler, 2012
  - Andrea Goncher, 2012
  - Kevin Sevilla, 2014
  - David Richter
  - Hon Jei Choi, 2014
  - Stephanie Kusano, 2014
  - Deirdre Hunter, 2015
  - Daniel Brogan
- PhD Committee member, Dept. of Industrial & Systems Engineering

- Yoon Lee, 2013
- Lee Wells, 2014
- Jia Liu

- PhD Committee member, Macromolecular Science & Engineering
  - Justin Sirrine
  - Katherine Valentine
- PhD Committee member, Biomedical Engineering and Mechanics
  - Ahmad Mojdehi
- Master of Science Committee member, Dept. of Material Science & Engineering
  - Jacob Calvert, 2015
- Undergraduate Research
  - Served as research advisor for 37 undergraduate students, 2008 – present

Professional Service

- Member, Society of Manufacturing Engineers Additive Manufacturing Community Advisors, 2016 - present
- Secretary, ASME Design Education Executive Committee, 2010 – 2014
- Director, ASEE Design in Engineering Education Division, 2009 – 2010
- Organizing Committee, NSF EEC Grantees Conference, 2008 – 2010
- Guest Editor, ASME Journal of Mechanical Design, Special Issue: Design for Additive Manufacturing, August 2014 – May 2015
- Editorial Board, Additive Manufacturing, Period of Service: 2014 – current
- Proposal Panel Reviewer
  - NSF Division of Manufacturing Machines and Equipment
  - NSF Division of Engineering Education Research and Centers
- Judging Committee, Pi Tau Sigma Ed and Faye Griggs Scholarship, 2008
- Judging Committee, NSF ASME IDETC Graduate Student Travel Grant, 2012
- Judging Committee, NSF ASME IDETC Graduate Student Travel Grant, 2013
- Freeform and Additive Manufacturing Excellence (FAME) Awards Selection Committee, International Solid Freeform Fabrication Symposium, 2013 - 2014
- Best Poster and Best Paper Awards Selection Committee, International Solid Freeform Fabrication Symposium, 2013
- Review Coordinator
  - 2010 ASME IDETC Design for Manufacturing and the Life Cycle Conference; "Integrated Product and Process Development Processes"
  - 2013 ASME IDETC International Conference on Design Education; "Research Methods in Engineering Design Education"
  - 2014 ASME IDETC Design for Manufacturing and the Life Cycle Conference; "Design for Additive Manufacturing"

- 2016 ASME IDETC Design Automation Conference; "Design for Additive Manufacturing"

- Reviewer
  - Springer textbook, Additive Manufacturing Technologies
  - Additive Manufacturing
  - 3D Printing and Additive Manufacturing
  - ASME Journal of Mechanical Design
  - Journal of Engineering Education
  - Rapid Prototyping Journal
  - ASME Journal of Manufacturing Science and Engineering
  - Acta Materialia
  - Artificial Intelligence for Engineering Design, Analysis and Manufacturing
  - Advances in Engineering Education
  - International Journal of Engineering Education
  - International Solid Freeform Fabrication Symposium
  - ASME International Design Engineering Technical Conferences
  - ASEE Annual Conference and Exposition
  - International Conference on Design Cognition and Creativity
  - International Conference on Manufacturing Automation

Professional Meetings, Panels, Workshops, etc. Led or Organized

- Conference co-organizer, Virginia Tech International Conference for Advanced Manufacturing, Virginia Tech, Arlington, VA., May 5-6, 2016.
- Session co-chair, "Design for Additive Manufacturing," *ASME IDETC Design Automation Conference*, DAC-6-1, August 22, 2016.
- Session Chair, Poster Session, *International Solid Freeform Fabrication Symposium*, August 11, 2015
- Session Organizer, "Polymer Advanced and Additive Manufacturing," *National American Chemical Society National Meeting & Exposition,* 2015
- Workshop co-lead, "National Science Foundation Workshop on Additive Manufacturing Education," *National Science Foundation*, Alexandria, VA. April 10-12, 2014
- Workshop facilitation assistant, "Design for Additive Manufacturing," hosted by National Additive Manufacturing Innovation Institute, *International Solid Freeform Fabrication Symposium*, Austin, TX. August 12, 2013.
- Workshop co-lead, "From Product Dissection to Product Archaeology: Understanding the Global, Economic, Environmental, and Societal Foundations of Engineering Design," *ASME International Design Engineering Technical Conferences*, August 4, 2013, 10 participants

- Session Co-Organizer, "Additive Manufacturing," *2013 National Academy of Engineers: German-American Frontiers of Engineering Symposium*, April 2013.
- Organizing Committee, *Additive Manufacturing Symposium—Preparing for National Prominence in a Disruptive Technology*, Whitehouse Conference Center, Washington D.C., August 20, 2012.
- Panel Coordinator, "Research Methods in Engineering Design Education," *ASME IDETC Design Education Conference*, Chicago, IL., August 14, 2012
- Session chair, "Applications I – Structures," *International Solid Freeform Fabrication Symposium*, August 4, 2014.
- Session co-chair, "Design for Additive Manufacturing, *ASME IDETC Design for Manufacturing and the Lifecycle Conference*, DFMLC-6-1, August 20, 2014.
- Session Chair, "Process Development II," *International Solid Freeform Fabrication Symposium*, Austin, TX, August 7, 2012.
- Workshop lead, "Innovation Tools in Action," *Virginia Tech Innovation Based Manufacturing Workshop*, November 8, 2011.
- Session Chair, "DEC-7-1: Innovation and Entrepreneurship in Design," *ASME IDETC Design Education Conference*, Washington DC, August 28 – 31, 2011.
- Session co-Chair, "DEC: Best Practices and Lessons Learned in Design Education," *ASME IDETC Design Education Conference*, Washington DC, August 28 – 31, 2011.
- Session Chair, "DEC: Innovation and Entrepreneurship in Design," *ASME IDETC Design Education Conference*, Washington DC, August 28 – 31, 2011.
- Session Moderator, "Materials: Ceramics, Metals and Composites," *International Solid Freeform Fabrication Symposium*, Austin, TX, August 8-10, 2011.
- Organizing Committee, NSF EEC Grantees Conference, 2008 – 2010
- International Program Committee, *The International Conferences on Manufacturing Automation*, Hong Kong, December 13 – 15, 2010.
- Session Chair, "Applications III – Bio," *International Solid Freeform Fabrication Symposium*, August 8 – 10, 2010.
- Session Chair, "International Research and Education in Engineering (IREE) Participants Breakout Session," *NSF Engineering Education Awardees Conference*, Reston, VA., 2009.
- Session Moderator, "Design for Society and the Environment," *ASEE Annual Conference & Exposition, Design in Engineering Education Division*, Austin, TX., June 17, 2009.
- Session Chair, "Design for Mass Customization and Layered Manufacturing," *ASME IDETC Design for Manufacturing and the Life Cycle Conference*, Brooklyn, NY, 2008.

Outreach and Extension Activities

- C. B. Williams and T. E. Long, "Science AMA Series: We are professors in the Virginia Tech Macromolecules and Interface Institute working together to develop new materials for 3D Printing, AUA!" Reddit Journal of Science, Ask Us Anything series, https://www.reddit.com/r/science/comments/2t6237/science_ama_series_we_are_professors_in_the/, January 21, 2015
- Virginia Tech ICAT Cube Launch, DREAMS Lab display and demo, January 30, 2015
- American Foundry Society Piedmont Chapter, DREAMS Lab tour, March 19, 2015
- Virginia Tech Women's Preview Weekend Lab tours, April 11, 2015
- Virginia Tech Additive Manufacturing Design Competition March – May, 2015
- Virginia Tech ICAT Day, DREAMS Lab display and demo, "Design, Build, Learn: Additive Manufacturing/3D Printing Research at the Virginia Tech DREAMS Lab," May 2, 2015
- 3D Printing Workshop, Taubman Museum of Art, June 13, 2015
- Virginia Tech CEED Blast Camp, July 13, 2015
- Virginia Tech CEED STEP Program, July 28, 2015
- 3D Printing Workshop, TechGirls, August 4, 2015
- Virginia Tech Fall Family Weekend, DREAMS Lab open house, September 25, 2015
- Virginia Tech Galileo / Hypatia Lab Tour for Professional Development Event, November, 18, 2015
- Exhibitor, Kids Tech University
    - "3D Scanning and Printing," February 25, 2012
    - "From 3D Printing to Additive Manufacturing," April 9, 2011
    - "From 3D Printing to Additive Manufacturing," February 26, 2011
    - "How can you print your ideas in 3D?", February 27, 2010
    - "How might astronauts make replacement parts for their spacecraft while in space?, April 28, 2009.
    - Workshop lead, Virginia State 4-H Congress
    - "3D Printing and Art;" June 18, 2013; 18 participants
    - "3D Printing and Art;" June 26, 2012; 12 participants
    - "3D Printing;" June 21, 2011; 30 participants
- Workshop lead, "Dive into 3D Design;" Taubman Museum of Art, July 13, 2013.
- Workshop lead, "Designing and Manufacturing Products via 3D Printing," STEMAbility Summer Camp, Virginia Tech, June 14, 2013; 12 participants
- DREAMS Lab student representation, Venture Camp: Entrepreneurship Speaker Series, George Mason University, May 1, 2013.
- DREAMS Lab Tour, CEED Women's Preview Weekend, April 14, 2013
- DREAMS Lab student representation, "An Overview of Additive Manufacturing Technologies," Chattanooga Maker Day, Chattanooga, TN., March 16, 2013.

- Snelling, D. A. and Williams, C. B., "VT FIRE Rapid Prototyping Capabilities," AFS Piedmont Chapter Meeting, Blacksburg, VA., January 23-24, 2013.
- DREAMS Lab tour and presentation, APICS: The Association for Operations Management, December 11, 2012.
- Workshop lead, "Dive into 3D Design," Taubman Museum of Art, November 10, 2012; 10 participants.
- DREAMS Lab tour, Women's Tour in Engineering: Woodbridge High School, November 2, 2012
- Workshop coordinator, "Additive Manufacturing in K-12 STEM Classrooms," Center for e-Design Research Experience for Teachers program; June 27, 2012; 15 participants
- Summer Camp Technical Director; Taubman Museum of Art; "Dive into 3D Design;" June 25-29, 2012; 12 participants
- Lab tour, VT Hypatia Women's Preview Weekend, April 15, 2012
- Exhibitor, Second Science Saturday, Science Museum of Western Virginia, April 14, 2012
- Lab tour, VT College of Engineering Open House, April 2, 2012
- Workshop lead, "Product Design and Manufacturing," NASA Inspire Camp, June 30, 2011 (~20 participants)
- Workshop coordinator, "Design and Manufacturing," VT National Society of Black Engineers Pre-College Initiative, February 11, 2011
- Guest Lecturer, "From Rapid Prototyping to Additive Manufacturing", Gereau Center for Applied Technology and Career Exploration (Franklin County, VA), 8th Grade Honors Economics class; April 2010; 35 participants.
- "Exploring Engineering through Product Dissection," with T. Simpson, Penn State's Women in Science & Engineering (WISE) Residential Camp, June 26, 2008.

University Service

- Associate Director, Macromolecules & Interfaces Institute, 2014 - present
- Co-Director, Center for Innovation-based Manufacturing, 2010 – present
- Senior Fellow, Virginia Tech Institute for Creativity, Arts, and Technology, 2014 – present
- Member, Library Dean's Advisory Council, Virginia Tech Library (May 2014 – present)
- Internal Advisory Board member, Green Engineering Program, Virginia Tech, Period of Service: January 2013 – 2016.
- Member, Engineering Education Promotion & Tenure Committee (June 2014 – 2015)

- Chair, Mechanical Engineering Search Committee, Advanced Manufacturing (August 2015 – May 2016)
- Chair, Mechanical Engineering Search Committee, Advanced Manufacturing (August 2014 – May 2015)
- Member, Engineering Education Department Head Search Committee, (August 2016 – present)
- Member, Engineering Education Search Committee, 3 positions (August 2014 – March 2015)
- Member, Industrial Systems Engineering Search Committee (August 2014 – March 2015)
- Dean's Review Committee, College of Engineering (January 2015 – May 2015)
- Graduate Program Committee member, Department of Mechanical Engineering (July 2013 – present)
- Graduate Program Committee member, Department of Mechanical Engineering, Virginia Tech, Period of Service: July 2013 – August 2014.
- Undergraduate Program Committee member, Department of Engineering Education, Virginia Tech, Period of Service: August 2013 – 2014.
- Search Committee Member, Industrial Systems and Engineering Department, Virginia Tech, Period of Service: January – April 2013.
- DREAMS Lab tour, Virginia Tech Board of Visitors' Spouses, March 25, 2013.
- DREAMS Lab tour, Virginia Tech Staff Appreciation Day, May 22, 2013.
- DREAMS Lab tour, Virginia Tech Office of Sponsored Programs, March 29, 2013
- VT INVENTS Planning Committee (1st year student design and prototyping space), Spring 2012 – Fall 2012
- Engineering Education Graduate Program Committee, 2008 – 2013
- Panel member, "Teaching with Scholar," Virginia Tech Faculty Development Institute, April 12, 2011
- Department of Mechanical Engineering Strategic Planning Fiscal Committee, 2009
- Member, ex-officio, Undergraduate Curriculum Strategic Planning Committee, Dept. of Mechanical Engineering (Summer 2009 – Fall 2009)
- Course Coordinator, Engineering Design and Economics (ME2024), Dept. of Mechanical Engineering (Fall 2009)
- Exhibitor, Mechanical Engineering Alumni Open House, VT Arlington Campus, August 18, 2011.
- Graduate Program Committee member, Department of Engineering Education, Virginia Tech, Period of Service: Fall 2010 – Fall 2012.
- Chair, Overhead Committee, Dept. of Engineering Education (Fall 2011 – Summer 2012)

- Application Reviewer, Virginia Tech Graduate Research and Development Program, Spring 2009