

David Espalin

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**DETAILED ACADEMIC CURRICULUM VITAE
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EDUCATION

Ph.D. in Mechanical Engineering – December 2017

The University of Texas at El Paso
Dissertation: “Wire Embedding Apparatus and Process Characterization in the Context of Material Extrusion Additive Manufacturing”
Advisor: Ryan Wicker

M.S. in Mechanical Engineering – December 2012

The University of Texas at El Paso
Thesis: “Development of a multi-material, multi-technology FDM system for process improvement experimentation”

B.S. in Mechanical Engineering, *cum laude* - May 2010

The University of Texas at El Paso

PROFESSIONAL EXPERIENCE

PROFESSIONAL APPOINTMENTS

The University of Texas at El Paso:

Center Manager, W.M. Keck Center for 3D Innovation, September 2013 – August 2015
Associate Director, W.M. Keck Center for 3D Innovation, September 2015 – January 2018
Assistant Professor, Department of Mechanical Engineering, January 2018 to present
Director of Research, W.M. Keck Center for 3D Innovation, January 2018 – present

STUDENT RESEARCH AND TEACHING EXPERIENCE

Undergraduate Research Assistant, August 2008 – May 2010

The University of Texas at El Paso

- Developed parameters for processing polymethylmethacrylate with the fused deposition modeling (FDM) technology to fabricate patient-specific craniofacial models. This work led to a best paper presentation at the 2009 International Solid Freeform Fabrication Symposium and an academic publication in the Rapid Prototyping Journal.
- Identified bonding solutions and conducted bonding experiments for FDM materials in collaboration with Stratasys – the equipment manufacturer with the largest number of machines sold to date. Findings were presented in and published for the 2009 Rapid Prototyping & Manufacturing Conference.

- Evaluated a smoothing technology that chemically modified the surface of 3D printed parts (material extrusion process) in collaboration with Stratasys, Inc. Findings were presented in and published for the 21st Annual International Solid Freeform Fabrication Symposium in 2010.
- Contributed to the development and characterization of a mobile FDM machine for printing on non-horizontal planes. Findings were published in the Journal of Materials Processing Technology in 2011.
- Implemented a Cooke triplet optical configuration to reduce the laser diameter in a stereolithography machine that resulted in improved fabrication resolution.

Graduate Research Assistant, June 2010 – present

- Developed a hybrid additive manufacturing machine that integrated two legacy fused deposition modeling (FDM) machines and a CNC motion system. The resulting machine was used to fabricate multi-material parts (i.e., polycarbonate and acrylonitrile butadiene styrene parts) and explore alternative material deposition strategies.
- Developed a wire embedding technology for use with 3D printing to produce electrically conductive traces that acted as interconnect, radiating elements for antennas, and mechanical reinforcement elements.

Teaching Experience as Graduate Student

The University of Texas at El Paso

Teaching Assistant, Spring 2013, Rapid Manufacturing Systems

As teaching assistant, I developed and constructed CAD design exercises relevant to additive manufacturing. I also provided student training for operating additive manufacturing equipment.

ACADEMIC EXPERIENCE SUMMARY

COURSES TAUGHT

1. ME 2131 – Manufacturing Engineering Lab: Additive Manufacturing, Spring 2018
2. ME 5351 – Introduction to 3D Engineering and Additive Manufacturing, Fall 2018
3. ME 4395 - 3D Printing: Basics and Applications (undergraduate); Maymester 2015. Textbook: *Additive Manufacturing Technologies : Rapid Prototyping to Direct Digital Manufacturing* by Ian Gibson, David W. Rosen, Brent Stucker.
4. ME 4395 / MFG 5390 – Introduction to Additive Manufacturing (undergraduate and graduate); Wintermester 2014. Textbook: *Additive Manufacturing Technologies : Rapid Prototyping to Direct Digital Manufacturing* by Ian Gibson, David W. Rosen, Brent Stucker.

SIGNIFICANT COURSE DEVELOPMENT

1. ME 4395/MFG 5390 – Introduction to Additive Manufacturing (undergraduate/graduate). Adapted previous course and developed new course material based on my research experience with additive manufacturing and the book *Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing*, by Gibson, Rosen, and Stucker. The course

focuses on the seven additive manufacturing process categories, the application of additive manufacturing processes in the context of their constraints and limitations, standards developed by the ASTM F42 committee, and additive manufacturing research topics being addressed by researchers around the world.

PROFESSIONAL ADVISORY BOARDS

Stratasys, Inc., Eden Prairie, Minnesota, (2015)
Served on Education Customer Advisory Board
America Makes Road Map Advisory Group, (2018)
Academia Representative

PATENTS

1. "Filament delivery path for wire embedding technologies used in 3D Printing," D. Espalin, J. Ramirez, A. Fernandez, J. Motta, R. Wicker, (Patent Application 62/383,761, disclosed filed September 2016, filed September 2016 with U.S. Patent and Trademark Office, under review).
2. "Method for Manufacturing a VIA and Pad on 3D Printed Electronic Circuit Using a Pin," C. Kim, E. MacDonald, D. Espalin, R. Wicker (Patent Application 62/349,908, disclosed May 2016, filed June 2016 with U.S. Patent and Trademark Office, under review).
3. "In-situ Diagnostics and Control Method for the Material Extrusion 3D Printing Process," C. Kim, D. Espalin, E. MacDonald, R. Wicker (Patent Application 62/330,361, disclosed February 2016, filed May 2016 with U.S. Patent and Trademark Office, under review).
4. "Connecting Metal Foils/Wires and Component Pins in 3D Printed Substrates with Wire Bonding," E. MacDonald, D. Espalin, R. Wicker (Patent Application 62/292,414, disclosed December 2015, filed February 2016 with U.S. Patent and Trademark Office, under review).
5. "Connecting Metal Foils/Wires at Different Layers in 3D Printed Substrates with Wire Spanning," E. MacDonald, D. Espalin, R. Wicker, I. Varela (Patent Application 62/292,479, disclosed December 2015, filed February 2016 with U.S. Patent and Trademark Office, under review).
6. "Method and Apparatus for Wire Handling and Embedding on and within 3D Printed Parts," D. Espalin, D. Marquez, A. Fernandez, C. Kim, E. MacDonald, R. Wicker (Patent Application 15/244/061, disclosed July 2015, filed August 2015 with U.S. Patent and Trademark Office, under review).
7. "Multi-layered 3D Printed Laser Direct Structuring for Electrical Interconnect and Antennas," E. MacDonald, D. Espalin, R. Wicker (Patent Application 15/202,936, disclosed May 2015, filed July 2015 with U.S. Patent and Trademark Office, under review).
8. "Apparatus for Automatically Transporting 3D Printed Parts Between Manufacturing and Processing Stations," D. Espalin, E. MacDonald, R. Wicker (Patent Application 15/138,655, disclosed March 2015, filed April 2015 with U.S. Patent and Trademark Office, under review).
9. "Metal Objects Spanning Internal Cavities in Structures Fabricated by Additive Manufacturing," E. MacDonald, R. Wicker, D. Espalin (Patent Application 15/099,812, Publication 2016/0303800, disclosed March 2015, filed April 2015 with U.S. Patent and Trademark Office, under review).

10. "Embedding Apparatus and Method," C. Shemelya, D. Espalin, E. MacDonald, R. Wicker (Patent Application 62/127,035, disclosed January 2015, filed March 2015 with U.S. Patent and Trademark Office, under review).
11. "Structurally Integrating Metal Objects into Additive Manufactured Structures," D. Espalin, E. MacDonald, R. Wicker (Patent Application 62/135,249, disclosed February 2015, filed March 2015 with U.S. Patent and Trademark Office, under review).
12. "Methods and Systems for Integrating Ultrasonically Embedded Wiring with Additive Manufacturing Technologies for 3D Structural Electronics Fabrication," R. Wicker, F. Medina, E. MacDonald, D. Muse, D. Espalin (Patent Application 13/829,723, Publication US 2014/0268604 A1, disclosed October 2012, filed March 2013 with U.S. Patent and Trademark Office, also filed in Europe (October 2015), South Korea (October 2015), Japan (September 2015), and China, under review).
13. "Method and System for Integrating Ultrasonically Embedded Wiring with Additive Manufacturing Technologies for 3D Structural Electronics Fabrication," (Patent Application 13/829,921, Publication 2014/0268607 A1, disclosed October 2012, filed March 2013 with U.S. Patent and Trademark Office and issued in August 2016, also filed in Europe (October 2015), South Korea (October 2015), Japan (September 2015), and China, under review).
14. "Extrusion-based additive manufacturing system for 3D Structural Electronic, Electromagnetic, and Electromechanical Components/Devices," (Patent Application 13/343,651, Publication 2013/0170171, disclosed June 2011, filed January 2012 with U.S. Patent and Trademark Office, under review).

AWARDS AND HONORS

Solid Freeform Fabrication and Rapid Prototyping Journal Best Presentation Award, 20th Annual Solid Freeform Fabrication Symposium, August 3-5, 2009, for presentation of article entitled "Fused Deposition Modeling of Polymethylmethacrylate for Use in Patient-Specific Reconstructive Surgery" by D. Espalin, K. Arcaute, D. Rodriguez, F. Medina, M. Posner, and R.B. Wicker.

National Science Foundation *Louis Stokes Alliance for Minority Participation* (LSAMP) Fellow, June 2008 – May 2010

Honorable Mention at the 2009 NSF LSAMP Conference for presentation of "Fused Deposition Modeling of Polymethylmethacrylate for Use in Patient-Specific Reconstructive Structure".

Best Business Plan Award at the 2012 Camino Real Venture Competition for a business plan focused on a commercial additive manufacturing materials properties database named AMDAT. Team was composed of one mechanical engineering masters students, one metallurgical engineering masters student, one materials science and engineering doctoral student, and one business administration masters student.

National Science Foundation *Bridge to the Doctorate* Fellow, 2011-2013

Excellent Service Award from the University of Texas at El Paso Mechanical Engineering Department, December 2015.

Distinguished Engineering Project Achievement Award from The Engineer's Council, 2018.

SCHOLARLY ACTIVITY

JOURNAL ARTICLES

1. Shemelya, C., Zemba, M., Liang, M., Yu, X., Espalin, D., Wicker, R., Xin, H., MacDonald, E., 2016. Multi-layer Archimedean spiral antenna fabricated using polymer extrusion 3D printing. *Microw. Opt. Technol. Lett.* 58, 1662–1666. doi:10.1002/mop.29881
2. MacDonald, E., Wicker, R., Espalin, D., Kwas, A., Kief, P.R.C., 2016. 3D Printing of High Voltage Printed Wiring Boards. Additional Conferences (Device Packaging, HiTEC, HiTEN, & CICMT) 2016, 000542–000565. doi:10.4071/2016DPC-TA34
3. Kim, C., Espalin, D., Cuaron, A., Perez, M.A., MacDonald, E., Wicker, R.B., 2015. A study to detect a material deposition status in fused deposition modeling technology, in: 2015 IEEE International Conference on Advanced Intelligent Mechatronics (AIM). Presented at the 2015 IEEE International Conference on Advanced Intelligent Mechatronics (AIM), pp. 779–783. doi:10.1109/AIM.2015.7222632
4. Kim, C., Espalin, D., MacDonald, E., Wicker, R.B., Kim, D.-H., Sung, J.-H., Lee, J.-W., 2015. A Study on Manufacturing System Integration with a 3D printer based on the Cloud Network. *Journal of the Korean Society of Manufacturing Process Engineers* 14, 15–20. doi:10.14775/ksmpe.2015.14.3.015
5. Kim, C., Espalin, D., Cuaron, A., Perez, M.A., Lee, M., MacDonald, E., Wicker, R.B., 2015. Cooperative Tool Path Planning for Wire Embedding on Additively Manufactured Curved Surfaces Using Robot Kinematics. *J. Mechanisms Robotics* 7, 021003–021003. doi:10.1115/1.4029473
6. Shemelya, C., Banuelos-Chacon, L., Melendez, A., Kief, C., Espalin, D., Wicker, R., Krijnen, G., MacDonald, E., 2015a. Multi-functional 3D printed and embedded sensors for satellite qualification structures, in: 2015 IEEE SENSORS. Presented at the 2015 IEEE SENSORS, pp. 1–4. doi:10.1109/ICSENS.2015.7370541
7. Shemelya, C., Cedillos, F., Aguilera, E., Espalin, D., Muse, D., Wicker, R., MacDonald, E., 2015b. Encapsulated Copper Wire and Copper Mesh Capacitive Sensing for 3-D Printing Applications. *IEEE Sensors Journal* 15, 1280–1286. doi:10.1109/JSEN.2014.2356973
8. MacDonald, E., Espalin, D., Culp, S., Wicker, R., 2015. Multi3D Manufacturing: 3D Printing of Geometrically-Complex Aerospace Structures with Embedded Electronics. Additional Conferences (Device Packaging, HiTEC, HiTEN, & CICMT) 2015, 000301–000327. doi:10.4071/2015DPC-ta31
9. Rodriguez, E., Mireles, J., Terrazas, C.A., Espalin, D., Perez, M.A., Wicker, R.B., 2015. Approximation of absolute surface temperature measurements of powder bed fusion additive manufacturing technology using in situ infrared thermography. *Additive Manufacturing* 5, 31–39. doi:10.1016/j.addma.2014.12.001
10. Gaytan, S.M., Cadena, M.A., Karim, H., Delfin, D., Lin, Y., Espalin, D., MacDonald, E., Wicker, R.B., 2015. Fabrication of barium titanate by binder jetting additive manufacturing technology. *Ceramics International* 41, 6610–6619. doi:10.1016/j.ceramint.2015.01.108
11. Espalin, D., Ramirez, J.A., Medina, F., Wicker, R., 2014. Multi-material, multi-technology FDM: exploring build process variations. *Rapid Prototyping Journal* 20, 236–244. doi:10.1108/RPJ-12-2012-0112

12. Hossain, M.S., Espalin, D., Ramos, J., Perez, M., Wicker, R., 2014. Improved Mechanical Properties of Fused Deposition Modeling-Manufactured Parts Through Build Parameter Modifications. *J. Manuf. Sci. Eng* 136, 061002–061002. doi:10.1115/1.4028538
13. Terrazas, C.A., Gaytan, S.M., Rodriguez, E., Espalin, D., Murr, L.E., Medina, F., Wicker, R.B., 2014. Multi-material metallic structure fabrication using electron beam melting. *Int J Adv Manuf Technol* 71, 33–45. doi:10.1007/s00170-013-5449-0
14. MacDonald, E., Salas, R., Espalin, D., Perez, M., Aguilera, E., Muse, D., Wicker, R.B., 2014. 3D Printing for the Rapid Prototyping of Structural Electronics. *IEEE Access* 2, 234–242. doi:10.1109/ACCESS.2014.2311810
15. Espalin, D., Muse, D.W., MacDonald, E., Wicker, R.B., 2014. 3D Printing multifunctionality: structures with electronics. *Int J Adv Manuf Technol* 72, 963–978. doi:10.1007/s00170-014-5717-7
16. Garcia, C.R., Correa, J., Espalin, D., Barton, J.H., Rumpf, R.C., Wicker, R., Gonzalez, V., 2012. 3D Printing of Anisotropic Metamaterials. *Progress In Electromagnetics Research Letters* 34, 75–82. doi:10.2528/PIERL12070311
17. Mireles, J., Kim, H.-C., Hwan Lee, I., Espalin, D., Medina, F., MacDonald, E., Wicker, R., 2013. Development of a Fused Deposition Modeling System for Low Melting Temperature Metal Alloys. *J. Electron. Packag* 135, 011008–011008. doi:10.1115/1.4007160
18. Shemelya, C., Cedillos, F., Aguilera, E., Maestas, E., Ramos, J., Espalin, D., Muse, D., Wicker, R., MacDonald, E., 2013. 3D printed capacitive sensors, in: 2013 IEEE SENSORS. Presented at the 2013 IEEE SENSORS, pp. 1–4. doi:10.1109/ICSENS.2013.6688247
19. Roberson, D.A., Espalin, D., Wicker, R.B., 2013. 3D printer selection: A decision-making evaluation and ranking model. *Virtual and Physical Prototyping* 8, 201–212. doi:10.1080/17452759.2013.830939
20. Choi, J.-W., Medina, F., Kim, C., Espalin, D., Rodriguez, D., Stucker, B., Wicker, R., 2011. Development of a mobile fused deposition modeling system with enhanced manufacturing flexibility. *Journal of Materials Processing Technology* 211, 424–432. doi:10.1016/j.jmatprotec.2010.10.019
21. Espalin, D., Arcaute, K., Rodriguez, D., Medina, F., Posner, M., Wicker, R., 2010. Fused deposition modeling of patient-specific polymethylmethacrylate implants. *Rapid Prototyping Journal* 16, 164–173. doi:10.1108/13552541011034825

CONFERENCE AND OTHER PUBLICATIONS

(the publications listed below represent a partial list of conference and other publications as this list changes often)

1. Aguilera, E., Espalin, D., MacDonald, E., Wicker, R., 2016. Additive Manufacturing: Unified Software for Multi-functional G-Code. Southwest Emerging Technology Symposium 2016, April 9, 2016, El Paso, Texas.
2. Coronel, J., Ambriz, S., Kim, C., Espalin, D., Wicker, R., 2016. Multi^{3D} System: Advanced Manufacturing with Material Handling Robotics. Southwest Emerging Technology Symposium 2016, April 9, 2016, El Paso, Texas.
3. Ambriz, S., Espalin, D., Coronel, J., Perez, M., Wicker, R., 2016. Design and Development of the Material Handling Components for the Multi^{3D} System. Southwest Emerging Technology Symposium 2016, April 9, 2016, El Paso, Texas.

4. Motta, J., Espalin, D., Wicker, R., 2016. Developing a Controller for a Copper Wire Embedding Tool. Southwest Emerging Technology Symposium 2016, April 9, 2016, El Paso, Texas.
5. Marquez, D., Espalin, D., Wicker, R., 2016. Development of the Thermal Wire Embedding Apparatus for FDM-Printed Parts. Southwest Emerging Technology Symposium 2016, April 9, 2016, El Paso, Texas.
6. Shemelya, C., Zemba, M., Kief, C., Espalin, D., Wicker, R., MacDonald, E., 2016. Multi-layer Off-axis Patch Antennas Fabricated Using Polymer Extrusion 3D Printing. 2016 10th European Conference on Antennas and Propagation, April 15-15, 2015, Davos, Switzerland.
7. Marshall, W., Stegeman, J., Zemba, M., MacDonald, E., Shemelya, C., Espalin, D., Wicker, R., Kwas, A., Kief, C., 2015. Using Additive Manufacturing to Print a CubeSat Propulsion System. 51st AIAA/SAE/ASEE Joint Propulsion Conference, AIAA Propulsion and Energy Forum, July 27-29, 2015, Orlando, Florida.
8. Shemelya, C., Zemba, M., Liang, M., Espalin, D., Kief, C., Xin, H., Wicker, R., MacDonald, M., 2015. 3D Printing Multi-Functionality: Embedded RF antennas and components. 2015 9th European Conference on Antennas and Propagation, April 13-17, 2015, Lisbon, Portugal.
9. Shemelya, C., Banuelos-Chacon, L., Melendez, A., Kief, C., Espalin, D., Wicker, R., Krinjen, G., MacDonald, E., 2015. Multi-functional 3D Printed and Embedded Sensors for Satellite Qualification Structures. 2015 IEEE Sensors, November 1-4, 2015, Busan, South Korea.
10. Espalin, D., Herrera, L., Hossain, M.S., Wiker, R. 2014. Wire reinforced 3D printed parts made by using material extrusion Additive Manufacturing process. 2014 Composites and Advanced Materials Expo, Orlando, FL.
11. Ridwan, S., Mireles, J., Gaytan, S., Espalin, D., Wicker, R., 2014. Automatic Layerwise Acquisition of Thermal and Geometric Data of the Electron Beam Melting Process using Infrared Thermography. 25th Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 4-6, 2014.
12. Fly, D., Gradowski, A., Espalin, D., Winker, R., Rask, J., 2014. Measurement Systems Comparison on Various Feature Sizes of FDM Parts. 25th Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 4-6, 2014.
13. Perez, M., MacDonald, E., Espalin, M., Wicker, R., 2014. 3D Printing Multi-functionality: Aerospace Structures with Electronics, Rapid Production Development Association of South Africa 2014 Conference, November 6-7, 2014, Stellenbosch Institute for Advanced Study, Stellenbosch, South Africa.
14. Kim, C., Cuaron, A., Perez, M., Espalin, D., MacDonald, E., Wicker, R., 2014. Cooperative Fabrication Methodology for Embedding Wire On Curved Surfaces. 25th Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 4-6, 2014.
15. Hossain, M., Ramos, J., Espalin, D., Perez, M., Wicker, R., 2013. Improving Tensile Mechanical Properties of FDM-Manufactured Specimens via Modifying Build Parameters. Twenty Fourth Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 12-14, 2013.
16. Perez, M., Ramos, J., Espalin, D., Hossain, M., Wicker, R., 2013. Ranking Model for 3D Printers. Twenty Fourth Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 12-14, 2013.

17. Aguilera, E., Ramos, J., Espalin, D., Cedillos, F., Muse, D., Wicker, R., MacDonald, E., 2013. 3D Printing of Electro Mechanical Systems. Twenty Fourth Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 12-14, 2013.
18. Rodriguez, E., Medina, F., Espalin, D., Terrazas, C., Muse, D., Henry, C., MacDonald, E., Wicker, R., 2012. Integration of a Thermal Imaging System in an Arcam A2 System for Feedback Control. Twenty Third Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 6-8, 2012.
19. Espalin, D., Medina, F., Wicker, R., 2012. Multi-Material, Multi-Technology FDM Platform. Twenty Third Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 6-8, 2012.
20. Perez, M., Block, M., Espalin, D., Hoppe, T., Medina, F., Wicker, R., 2012. Sterilization of FDM-Manufactured Parts. Twenty Third Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 6-8, 2012.
21. Mireles, J., Espalin, D., Roberson, D., Zinniel, B., Medina, F., Wicker, R., 2012. Fused Deposition Modeling of Metals. Twenty Third Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, Austin, Texas, August 6-8, 2012.
22. Mireles, J., Adame A., Espalin, D., Medina, F., Wicker, R., Hoppe, T., Zinniel, B., Wicker, R., 2011. Analysis of Sealing Methods for FDM-fabricated parts. 22nd Annual International Solid Freeform Fabrication Symposium, An Additive Manufacturing Conference, Austin, Texas, August 8-10, 2011.
23. Mireles, J., Salas, R., Espalin, D., Medina, F., Wicker, R., 2011. Materials Selection Charts for Additive Manufacturing Materials. 22nd Annual International Solid Freeform Fabrication Symposium, An Additive Manufacturing Conference, Austin, Texas, August 8-10, 2011.
24. Espalin, D., Arcaute, K., Anchondo, E., Adame, A., Medina, F., Wicker, R., Hoppe, T., Wicker, R., 2010. Analysis of Bonding Methods for FDM-Manufactured Parts,” 21st Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference, University of Texas at Austin, August 9-11, 2010.
25. Posner, M., Espalin, D., Arcaute, K., Rodriguez, D., Medina, F., Wicker, R., 2009. Custom Patient-Specific Polymethylmethacrylate Implants for Use in Reconstructive Surgery,” Society of Military Orthopaedic Surgeons (SOMOS) 51st Annual Meeting, December 14-18, 2009, Hilton Hawaiian Village, Honolulu, Hawaii.
26. Espalin, D., Arcaute, K., Rodriguez, D., Medina, F., Posner, M., Wicker, R., 2009. Fused Deposition Modeling of Polymethylmethacrylate for Use in Patient-Specific Reconstructive Surgery. 20th Annual Solid Freeform Fabrication Symposium, University of Texas at Austin, August 3-5, 2009.
27. Espalin, D., Medina, F., Zinniel, B., Hoppe, T., Wicker, R., 2009. Effects of Vapor Smoothing on ABS Part Dimensions. Rapid Prototyping & Manufacturing 2009 Conference, May 12-14, 2009, Renaissance Schaumburg Hotel & Convention Center, Schaumburg, Illinois.

TECHNICAL REPORTS

1. Coronel, J., Ledezma, P., Ambriz, S., Espalin, D., Wicker, R., Final Report for Higher Level Hardware Integration through the Combination of FDM Additive Manufacturing and Automated Pick and Place Processes, Final Report submitted to Raytheon, May 2016.

2. Perez, M., Coronel, J., Ambriz, S., Chiyen, K., Ramirez, J., Fernandez, A., Cuaron, A., Vargas, J., Herrera, L., Aguilera, E., Shemelya, C., Espalin, D., MacDonald, E., Wicker, R., 3D Printing Multifunctionality: Additive Manufacturing for Aerospace Applications, Final Report Submitted to America Makes, May 2016.
3. Morton, P., Ledezma, P., Espalin, D., Additively Manufactured Cables, Final Report Submitted to Honeywell Federal Manufacturing & Technologies, October 2016.
4. McKenzie, B., Vargas, J., Espalin, D., Wicker, R., Monolithic Fabrication of Multi-Function Heterogeneous Systems, Final Report Submitted to Draper, July 2015.

SELECT PRESENTATIONS

(I have presented talks at technical conferences, other institutions, corporations, and various organizations. The list below includes presentations given by me that were either invited or did not include an article. In addition to the list below, every conference paper listed above included a presentation given by my students, my collaborators, my collaborators' students or me.)

1. Espalin, D. Overview of Research at the W.M. Keck Center for 3D Innovation. Delivered to Autodesk, September 7, 2016, Lake Oswego OR.
2. Fernandez, A., Espalin, D., 3D Printed Parts with Embedded Shape Memory Alloys for Actuator and Sensor Applications. AFRL Research Collaboration Program Review (Sponsored by the AFRL), September 21, 2016, University of Dayton Research Institute, Dayton OH.
3. Espalin, D. Embedded Sensors and Multi-Material Components for Energy Systems. Invited talk. Deep Space Deep Ocean: Aramco Technology and Operational Excellence Forum. April 7, 2015, Woodlands TX.
4. Espalin, D. 3D Electronics in Multi-Materials. Invited talk, Raytheon Additive Manufacturing Workshop, June 2, 2015, McKinney TX.
5. Espalin, D. Research Activities at the W.M. Keck Center for 3D Innovation in Additive Manufacturing. Invited talk. Propulsion Instrumentation Working Group. October 22, 2014, Hasbrouck Heights NJ.

PROFESSIONAL SERVICE ACTIVITY

JOURNAL AND CONFERENCE REVIEWS

1. Journal Reviewer (8 paper), Additive Manufacturing Journal, 2014-2018.
2. Journal Reviewer (1 paper), Journal of Materials and Design, 2016.
3. Journal Reviewer (1 paper), IEEE Transactions on Microwave Theory and Techniques, 2015.
4. Journal Reviewer (1 paper), International Mechanical Engineering Congress & Exposition, 2015.
5. Journal Reviewer (1 paper), Journal of Materials Processing Technology, 2015.
6. Journal Reviewer (1 paper), ASME Journal of Mechanical Design, 2015.
7. Journal Reviewer (2 paper), Journal of Manufacturing Science and Engineering, 2014.
8. Journal Reviewer (1 paper), ASME Journal of Mechanisms and Robots, 2014.
9. Journal Reviewer (1 paper), Rapid Prototyping Journal, 2012.

OTHER PROFESSIONAL SERVICE

1. Session Chair, Additive Manufacturing, Parallel Technical Session I, Southwest Emerging Technology Symposium, El Paso, Texas, April 8, 2016.
2. Poster Judge, Campus Office of Undergraduate Research Initiatives (COURI) Symposium, El Paso, Texas, May 2013
3. Poster Judge, UT System Louis Stokes Alliance for Minority Participation Conference, El Paso, Texas, September 2011 & 2012.
4. Instructor, Preparing Effective Research Posters, delivered annually to UTEP LSAMP's Summer Research Academy student group, Summer 2012-2016.
5. Instructor, Preparing Effective Research Posters, delivered to El Paso Community College STEM students, December 2015.
6. Presenter, Career Day at Riverside Elementary School in Gadsden Independent School District, Sunland Park, NM, Fall 2011 & 2012.
7. Member, Organizing Committee, America Makes' Technical Review and Exchange, Materials & Process Meeting, The University of Texas at El Paso, March 7-10 2016.