

# PAUL EGAN, PH.D.

USA/Ireland dual citizen

Assistant Professor and Lab Director  
Medicine, Mechanics, & Manufacturing (M3D) Design Lab  
Texas Tech University, Mechanical Engineering  
paul.egan@ttu.edu

<https://m3d-lab.com>      <https://paul-egan.com>



## EDUCATION

### ETH Zurich, Switzerland

#### Postdoctoral Research:

3D Printing  
Mech/Bio Simulation  
Tissue Engineering  
Design Automation

2014 - 2018

#### Postdoctoral Teaching:

Engineering Design Methods  
Design Thinking and Cognition

### Carnegie Mellon University

**Ph.D., Mechanical Engineering**

2014

**M.S., Mechanical Engineering**

2010

Dissertation: "Cognitive and Agent-based Design Methodologies  
for Engineering Complex Biological Systems."

Advisors: Dr. Jonathan Cagan  
Dr. Philip LeDuc

### Oklahoma State University

Department of Mechanical and Aerospace Engineering

2004 - 2009

**B.S., Aerospace Engineering**

2009

**B.S., Mechanical Engineering**

2009

General Honor's Degree

2005

#### Additional Completed Majors:

**Applied Physics**  
**Philosophy**

### International Studies

STARTUP Campus

Zurich, Switzerland

2017

ETH Zurich, German (A1)

Zurich, Switzerland

2014 - 2015

University of Canterbury

Christchurch, New Zealand

2008

Trinity University

Dublin, Ireland

2007

Cambridge University

Cambridge, England

2005, 2007

# ACADEMIC PUBLICATIONS

ORCID: 0000-0003-1252-5819

## JOURNAL

- [21] Kulkarni, N., S. Ekwaro-Osire, and **P. Egan**. "Fabrication, mechanics, and reliability analysis for 3D printed lattice designs." *Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, 8.1, 2022.
- [20] Arefin, A., M. Lahowetz, and **P. Egan**. "Simulated tissue growth in tetragonal lattices with mechanical properties tuned for bone tissue engineering." *Computers in Biology and Medicine*, 2021.
- [19] Arefin, A., N. Khatri, N. Kulkarni, and **P. Egan**. "Polymer 3D printing review and outlook: Materials, process, and design for medical applications." *Polymers*, 13(9), 2021.
- [18] Scheele, S., C. Hartmann, M. Siegrist, M. Binks, and **P. Egan**. "Consumer assessment of 3D printed food shape, taste, and fidelity using chocolate and marzipan materials." *3D Printing and Additive Manufacturing*, 2021.
- [17] Moniruzzaman, M., C. O'Neal, A. Bhuiyan, and **P. Egan**. "Design and Mechanical Testing of 3D Printed Hierarchical Lattices Using Biocompatible Stereolithography." *Designs*, 24(3), pp. 22, 2020.
- [16] **Egan, P.** "Integrated design approaches for 3D printed tissue scaffolds: Review and outlook." *Materials*, 12(25), pp. 2355, 2019.
- [15] **Egan, P.**, X. Wang, H. Greutert, K. Shea, K. Würtz-Kozak, and S. Ferguson. "Mechanical and biological characterization of 3D printed lattices." *3D Printing and Additive Manufacturing*, 6.2, pp. 73-81, 2019.
- [14] **Egan, P.**, I. Bauer, K. Shea, and S. Ferguson. "Mechanics of three-dimensional printed lattices for biomedical devices." *Journal of Mechanical Design*, 141(3), pp. 031703, 2019.
- [13] **Egan, P.**, K. Shea, and S. Ferguson. "Simulated tissue growth in 3D printed scaffolds." *Biomechanics and modeling in mechanobiology*, pp. 1-15, 2018.
- [12] **Egan, P.**, J. Moore, A. Ehrlicher, D. Weitz, C. Schunn, J. Cagan, and P. LeDuc. "Robust mechanobiological behavior emerges in heterogeneous myosin systems." *PNAS*, pp. 201713219: 1-8, 2017.
- [11] **Egan, P.**, V. Gonella, M. Engelsperger, S. Ferguson, and K. Shea. "Computationally designed lattices with tuned properties for tissue engineering using 3D printing." *PLoS One*, 12(8), pp. e0182902: 1-20, 2017.
- [10] **Egan, P.**, S. Ferguson, and K. Shea. "Design of hierarchical three-dimensional printed scaffolds considering mechanical and biological factors for bone tissue engineering." *Journal of Mechanical Design*, 139(6), pp. 061401: 1-9, 2017.
- [9] **Egan, P.**, J. Cagan, C. Schunn, F. Chiu, J. Moore, and P. LeDuc. "The D3 Methodology: Bridging science and design for bio-based product development." *Journal of Mechanical Design*, 138(8), pp. 081101: 1-13, 2016.
- [8] **Egan, P.**, C. Schunn, J. Cagan, and P. LeDuc. "Improving human understanding and design of complex multi-level systems with animation and parametric relationship supports." *Design Science*, e3: pp. 1-31, 2015.
- [7] **Egan, P.**, B. Sinko, S. Ketan, and P. LeDuc. "The role of mechanics in biological and bio-inspired systems." *Nature Communications*, 6, pp. 1-11, 2015.
- [6] Stankovic, T., J. Mueller, **P. Egan**, and K. Shea. "Generalized optimality criteria for optimization of additively manufactured multi-material lattice structures." *Journal of Mechanical Design*, 137(11), pp. 111705: 1-12, 2015.
- [5] **Egan, P.**, J. Moore, C. Schunn, J. Cagan, and P. LeDuc. "Emergent systems energy laws for predicting myosin ensemble processivity." *PLOS Computational Biology*, 11(4), pp. e1004177: 1-16, 2015.

- [4] Egan, P., J. Cagan, C. Schunn, and P. LeDuc. "Synergistic human-agent methods for deriving effective search strategies: The case of nanoscale design." *Research in Engineering Design*, 26(2), pp. 145-169, 2015.
- [3] Egan, P., J. Cagan, C. Schunn, and P. LeDuc. "Design of complex biologically based nanoscale systems using multi-agent simulations and structure-behavior-function representations." *Journal of Mechanical Design*, 135(6), pp. 061005: 1-12, 2013.
- [2] Zapf, V., V. Correa, P. Sengupta, C. Batista, M. Tsukamoto, N. Kawashima, P. Egan, C. Pantea, A. Migliori, J. Betts, M. Jaime, and A. Paduan-Filho. "Direct measurement of spin correlations using magnetostriction." *Physical Review B*, 77(2), pp. 020404: 1-4, 2008.
- [1] Franco, A., V. Zapf, and P. Egan. "Magnetic properties of nanoparticles of  $\text{CoFe(3-x)O}_4$  prepared by combustion reaction." *Journal of Applied Physics*, 101(9), pp. 09M506: 1-3, 2007.

## BOOK CHAPTERS

- [2] Chirico, S., M. Binks, and P. Egan. "3D Printing Food: Manufacturing, Mechanics, and Validation." *Materials Science and Engineering in Food Product Development*. Wiley Publishing, in press.
- [1] Egan, P., and J. Cagan. "Human and computational approaches for design problem-solving." *Experimental Design Research*. Springer House Publishing, 2016. pp. 187-205.

## CONFERENCE PROCEEDINGS

### PEER-REVIEWED PAPERS W/ PRESENTATIONS

- [26] Chirico, S., and P. Egan. "Effect of various types of additives on texture and shape stability of mashed potato and pumpkin." *ASME IDETC DFMLC Conference*. St. Louis, MO, 2022.
- [25] Khatri, N., J. A. Smith, and P. Egan. "Empirical characterization of lattice, spring, and non-assembly mechanisms fabricated with nylon powder printing." *ASME IDETC DAC Conference*. St. Louis, MO, 2022.
- [24] Masud, A., A. Arefin, M. Chyu, and P. Egan. "Design and testing of 3D printed tissue scaffolds with directionally tunable stiffness." *ASME IMECE Conference*. Virtual Conference, 2021.
- [23] Khatri, N., and P. Egan. "Tailored energy absorption for 3D printed multi-material cellular structures using ABS and TPU." *ASME IMECE Conference*. Virtual Conference, 2021.
- [22] Arefin, A., and P. Egan. "Computational investigation of tissue and blood vessel growth trade-offs in hierarchical lattices." *ASME IDETC Design Automation Conference*. Virtual Conference, 2021.
- [21] Chirico, S., M. Hoque, G. Christopher, and P. Egan. "Printability and fidelity of protein-enriched 3D printed foods: A case study using cricket and pea protein powder." *ASME IDETC DFMLC Conference*. Virtual Conference, 2021.
- [20] Mahmoud, R., Q. Nguyen, G. Christopher, and P. Egan. "3D printed food design and fabrication approach for manufacturability, rheology, and nutrition trade-offs." *ASME IDETC Design Automation Conference*. Virtual Conference, 2021.
- [19] Kulkarni, N., S. Ekwaro-Osire, and P. Egan. "Mechanical testing and reliability analysis for 3D printed cubic lattices." *ASME IMECE Conference*. Virtual Conference, 2020.
- [18] Arefin, A. and P. Egan. "Computational design generation and evaluation of beam-based tetragonal bravais lattice structures for tissue engineering." *ASME IDETC Design Automation Conference*. Virtual Conference, 2020.
- [17] Briguiet, G. and P. Egan. "Structure, process, and material influences for 3D printed lattices designed with mixed unit cells." *ASME IDETC Design Automation Conference*. Virtual Conference, 2020.
- [16] Chirico S., M Binks, and P. Egan. "Design and manufacturing of 3D printed foods with user validation." *ASME IDETC Design for Manufacturing and Life Cycle Conference*. Virtual Conference, 2020.

- [15] **Egan, P.** "Design and biological simulation of 3D printed lattices for biomedical applications." *ASME IDETC Design Automation Conference*. Anaheim, CA, 2019.
- [14] **Egan, P.,** I. Bauer, K. Shea, and S. Ferguson. "Integrative design, build, test approach for biomedical devices with lattice structures." **\*Best Paper Finalist\*** *ASME IDETC Design Theory and Methodology Conference*. Quebec City, Canada, 2018.
- [13] **Egan, P.,** V. Gonella, M. Engelsperger, S. Ferguson, and K. Shea. "Design and fabrication of 3D printed tissue scaffolds informed by mechanics and fluids simulations." *ASME IDETC Design Automation Conference*. Cleveland, OH, 2017.
- [12] **Egan, P.,** S. Ferguson, and K. Shea. "Design and 3D printing of hierarchical tissue engineering scaffolds based on mechanics and biology perspectives." *ASME IDETC Design Theory and Methodology Conference*. Charlotte, NC, 2016.
- [11] **Egan, P.,** J. Cagan, P. LeDuc, and C. Schunn. "The d<sub>3</sub> science-to-design methodology: Automated and cognitive-based processes for discovering, describing, and designing complex nanomechanical biosystems." *ASME IDETC Design Theory and Methodology Conference*. Boston, MA, 2015.
- [10] **Egan, P.,** C. Schunn, J. Cagan, and P. LeDuc. "Development of graphical user interfaces to improve human design proficiency for complex multi-level biosystems." **\*Best Paper Award\*** at *ASME Computers and Information in Engineering Conference*. Boston, MA, 2015.
- [9] Stankovic, T., J. Mueller, **P. Egan,** and K. Shea. "Optimization of additively manufactured multi-material lattice structures using generalized optimality criteria." **\*Best Paper Award\*** at *ASME Computers and Information in Engineering Conference*. Boston, MA, 2015.
- [8] Chen, T., **P. Egan,** F. Stoeckli, and K. Shea. "Studying the impact of incorporating an additive manufacturing based design exercise in a large, first year technical drawing and CAD course." *ASME IDETC Engineering Education Conference*. Boston, MA, 2015.
- [7] **Egan, P.,** T. Ho, C. Schunn, J. Cagan, and P. LeDuc. "The effects of training background and design tools on multi-level biosystems design." *International Conference on Engineering Design*. Milano, Italy, 2015.
- [6] **Egan, P.,** J. Cagan, C. Schunn and P. LeDuc. "Cognitive-based search strategies for complex bio-nanotechnology design derived through symbiotic human and agent-based approaches." *ASME IDETC Design Theory and Methodology Conference*. Buffalo, NY, 2014. DETC2014-34714.
- [5] **Egan, P.,** C. Schunn, J. Cagan, and P. LeDuc. "Surprisingly stochastic: Learning and design application of emergent behavior using interactive simulations of nano-mechanical biological systems." *Annual Conference of the Cognitive Science Society*. Quebec City, CA, 2014.
- [4] **Egan, P.,** J. Cagan, C. Schunn, and P. LeDuc. "A modular design tool for visualizing complex multiscale systems." *International Conference on Engineering Design*. Seoul, South Korea, 2013.
- [3] **Egan, P.,** J. Cagan, C. Schunn, and P. LeDuc. "Utilizing emergent levels to facilitate complex systems design: demonstrated in a synthetic biology domain." *ASME IDETC Design Automation Conference*. Portland OR, 2013. DETC2013-12072
- [2] **Egan, P.,** J. Cagan, C. Schunn, and P. LeDuc. "Design of complex nano-scale systems using multi-agent simulations and structure-behavior-function representations." *ASME IDETC Design Theory and Methodology Conference*. Chicago, IL, 2012. pp. 793-804.
- [1] **Egan, P.,** P. LeDuc, J. Cagan, and C. Schunn. "A design exploration of genetically engineered myosin motors." *ASME IDETC Design Automation Conference*. Washington DC, 2011. pp. 1017-1025.

## CONFERENCE POSTERS/PRESENTATIONS

- [12] Chirico, S., and **P. Egan.** "Effects of cricket and pea protein addition on the firmness, taste preference, and printability of 3D printed mashed potatoes." *First annual event and expo, Institute of Food Technologists Conference*. Chicago, IL, 2022 (Poster session).



- [11] **Egan, P.** "Prototyping 3D printed foods: Linking biomaterial fabrication to rheological properties." *ASME IDETC Design for Manufacturing and Lifecycle Conference*. Virtual conference, 2020 (Virtual presentation).
- [10] **Egan, P.** "Comparison of 3D printed scaffolds for bone tissue engineering." *Biomedical Engineering Society Annual Meeting*. Philadelphia, PA, 2019 (Poster session).
- [9] Cabellero, B., C. Carson, I. Delgado, **P. Egan**, and C. Ronaghan. "Simulation device to instruct, assess, and provide feedback on abdominal wall myofascial closure techniques." *The Association for Surgical Education Annual Meeting*. Chicago, IL, 2019 (Video/Showcase session).
- [8] **Egan, P.**, I. Bauer, K. Shea, and S. Ferguson. "Mechanics and tissue growth for beam-based scaffolds." *World Congress of Biomechanics*. Dublin, Ireland, 2018 (Oral presentation).
- [7] **Egan, P.**, X. Wang, H. Greutert, K. Shea, K., Würtz-Kozak, and S. Ferguson. "Mechanical and biological characterization of 3D printed polymer lattices for bone tissue engineering." *Swiss Society for Biomedical Engineering*. Winterthur, Switzerland, 2017. (Oral presentation and poster).
- [6] Wang, X., **P. Egan**, X. K. Shea, and S. Ferguson. "Finite element simulation for 3D printed scaffolds." *Swiss Society for Biomedical Engineering*. Winterthur, Switzerland, 2017. (Oral presentation and poster).
- [5] **Egan, P.**, K. Shea, and S. Ferguson. "Tissue growth simulations for 3D printed scaffolds." *European Society of Biomechanics*. Seville, Spain, 2017. (Oral presentation).
- [4] **Egan, P.**, C. Schunn, J. Cagan, and P. LeDuc. "Multiscale modeling and optimization of natural and biomimetic myosin-based systems." *World Congress of Biomechanics*. Boston, MA, 2014. (Oral presentation).
- [3] **Egan, P.**, C. Schunn, J. Cagan, and P. LeDuc. "Robust active material components designed with agent-based myosin-actin simulations." *Materials Research Society Meeting and Exhibit*. Boston, MA, 2013. (Poster session).
- [2] **Egan, P.**, C. Schunn, J. Cagan, and P. LeDuc. "Probing why nature may favor heterogeneous myosin systems through single molecule and systems level approaches." *Biophysical Society Annual Meeting, Systems Biology*. Philadelphia, PA, 2013. (Poster session, accepted by abstract review).
- [1] **Egan, P.**, C. Schunn, J. Cagan, and P. LeDuc. "Investigating heterogeneous system performance of synthetic myosins computationally." *AIChE Synthetic and Systems Biology Conference*. Pittsburgh, PA, 2012. (Oral presentation).

## INVITED TALKS

- [19] **Workshop.** "3D Food Printing for Societal Well-being." *International Conference on Engineering Design*, Virtual conference, 2021.
- [18] **Entrepreneurship Event.** "Surgic: Building educational tools for the surgeons of tomorrow." *Texas Tech University Innovation Hub*, One Million Cups, Lubbock, TX, 2021.
- [17] **Virtual Event.** "Frontiers of Engineering Design for Medical Innovations." *Texas Tech University Health Sciences Center*, School of Health Professions Endowed Lecture Series, Lubbock, TX, 2021.
- [16] **Open Seminar.** "Intersections in biological sciences and mechanical engineering." *Texas Tech University*, Department of Biological Sciences, Lubbock, TX, 2019.
- [15] **Open Seminar.** "Computational design for mechanobiology and advanced manufacturing in medicine." *University of Texas at Austin*, Department of Mechanical Engineering, Austin, TX, 2018.
- [14] **Open Seminar.** "Computational design of additively manufactured lattices for regenerative medicine." *University of Bern*, ARTORG Center for Biomechanical engineering Research, Bern, Switzerland, 2018.
- [13] **Open Seminar.** "Computational design for biomechanics and medicine." *Texas Tech University*, Department of Mechanical Engineering, Lubbock, TX, 2018.

- [12] Open Seminar. "Computational design methods for biomechanics and 3D printing." *Virginia Polytechnic Institute and State University*, Mechanical Engineering Department, Blacksburg, VA, 2017.
- [11] Open Seminar. "Computational design methods for biomechanics and 3D printing." *Ecole polytechnique federale de Lausanne (EPFL)*, Mechanical Engineering Department, Lausanne, Switzerland, 2017.
- [10] Internal Talk. "Design and 3D printing of tissue scaffolds tuned for mechanics and biology." *Swiss Federal Institute of Technology (ETH Zurich)*, for European Grants Commission and Postdoctoral Fellows, Zurich, Switzerland, 2017.
- [9] Flash Talk. "Design and 3D printing of tissue scaffolds with mechanics and biology perspectives." *Life Sciences Post-doc Day*, Zurich, Switzerland, 2016.
- [8] Open Seminar. "Computational, human-centered, and manufacturing approaches for complex biological systems design." *University of California Berkeley*, Mechanical Engineering Department, Berkeley, CA, 2016.
- [7] Open Seminar. "Cognitive and agent-based design methodologies for engineering complex biological systems." *Northwestern University*, Mechanical Engineering Department, Evanston, IL, 2016.
- [6] Flash Talk. "Characterization, design, and fabrication of tissue engineering scaffolds for optimal mechanical and biological functioning." *Life Sciences Post-doc Day*, Zurich, Switzerland, 2015.
- [5] Outreach Talk. "Overcoming the challenges of effective interdisciplinary communication." *ASME IDETC conference FutureME speakers*, Boston, MA, 2015.
- [4] Open Seminar. "Computational, human-centered, and manufacturing approaches for complex biological systems design." *University of Michigan*, Mechanical Engineering Department, Ann Arbor, MI, 2015.
- [3] Open Seminar. "Biological systems inspire non-obvious engineering design principles." *Mechanics and Engineering of Cellular Systems Center*, Carnegie Mellon University, Pittsburgh, PA, 2013.
- [2] Dynamic Talk. "Designing complex systems in the human body." *ICED conference Young Member's Event*, Seoul, South Korea, 2013.
- [1] Awards Seminar. "State of the art in unmanned aerial vehical design at Oklahoma State University." *AIAA Conference*, Albuquerque, NM, 2009.

## PRESS RELEASES

- [7] "Surgic's Anatomy: A Cut Above the Rest." Innovation Hub at Research Park, Texas Tech University. 2022. <link:[https://www.depts.ttu.edu/research/researchpark/hustle/posts/2022/06/surgics-anatomy-a-cut-above-the-rest.php?mc\\_cid=1e885d6f57&mc\\_eid=07b03a2c14](https://www.depts.ttu.edu/research/researchpark/hustle/posts/2022/06/surgics-anatomy-a-cut-above-the-rest.php?mc_cid=1e885d6f57&mc_eid=07b03a2c14)>
- [6] "Surgic's Anatomy: The Next Big Innovation in Surgical Training Tools." Innovation Hub at Research Park, Texas Tech University. 2021. <link:[https://www.depts.ttu.edu/research/research-park/hustle/posts/2021/06/surgics-anatomy-the-next-big-innovation-in-surgical-training-tools.php?mc\\_cid=343657387e&mc\\_eid=07b03a2c14](https://www.depts.ttu.edu/research/research-park/hustle/posts/2021/06/surgics-anatomy-the-next-big-innovation-in-surgical-training-tools.php?mc_cid=343657387e&mc_eid=07b03a2c14)>
- [5] "Academic Spotlight: Department of Mechanical Engineering." Mechanical Engineering Department, Texas Tech University. 2021. <link: <https://campuslivettu.com/academic-spotlight-department-of-mechanical-engineering/>>
- [4] "ME Design Expo." Mechanical Engineering Department. 2019. <link: <https://www.depts.ttu.edu/me/departments/news/deisgnexpo2019.php>>
- [3] "CardioAI: For those who value their health." ETH Startup Campus. 2018. <link: <https://www.startup-campus.ch/en/startups/cardioai-2/>>
- [2] "Researchers design the building blocks of synthetic muscle using computational method." *Phys.org*. 2017. <link: <https://phys.org/news/2017-09-blocks-synthetic-muscle-method.html>>
- [1] "Three OSU students selected Goldwater Scholars." *Oklahoma State University*. 2008.

<link:<https://news.okstate.edu/articles/communications/2008/three-osu-students-selected-goldwater-scholars.html>>

## INTELLECTUAL PROPERTY

- [1] **Egan, P.**, T. Reiss, K. Fenn, and C. Ronaghan. "TTU-1062PROV." *Surgical Training Device with Mechanical Feedback*. Filed 2021.

## INNOVATION ACTIVITIES

<b>Surgic LLC</b>	<b>Chief Technical Office &amp; Co-founder</b>	Spring 2021
Tech start-up for developing transformative technology for surgical education Participated in TTU Accelerator Program w/ monthly entrepreneurship classes		
<b>NSF Regional I-Corps</b>	<b>Texas Tech University</b>	Fall 2020
Bio-building blocks team: Investigated personalized health solutions with 3D printing Surgical trainer team: Investigated mechanical feedback for surgical trainers		

## RESEARCH EXPERIENCES

<b>Postdoctoral Research</b> Stephen Ferguson Kristina Shea	<b>ETH Zurich</b> Laboratory of Orthopaedic Technology Engineering Design and Computing Lab	Zurich, Switzerland Fall 2014 - 2018
<b>Visiting Researcher</b> Mauro Ferrari	<b>Houston Methodist Research Institute</b> Nanomedicine, Biomechanics, and Cancer	Houston, TX Fall 2015
<b>Doctoral Research</b> Jonathan Cagan Philip LeDuc	<b>Carnegie Mellon University</b> Integrated Design Innovation Group Biomechanics and Cellular Systems	Pittsburgh, PA Fall 2009 - 2014
<b>Visiting Researcher</b> David Weitz Allen Ehrlicher Jeffrey Moore	<b>Harvard University and Boston University</b> Applied Physics and Soft Matter Biophysics and Protein Mechanics Physiology and Biophysics	Boston, MA Summer 2012
<b>Undergraduate Researcher</b> Larry Hoberock Doren Recker	<b>Oklahoma State University</b> Machine Vision and Robotics Philosophy of Science and Cognition	Stillwater, OK Fall 2008 Fall 2006 - 2009
<b>Research Internship</b> Richard Welle	<b>Aerospace Corporation</b> Microfluidics Research and Development	El Segundo, CA Summer 2007
<b>Research Internship</b> Viven Zapf	<b>Los Alamos National Laboratory</b> National High Magnetic Field Lab	Los Alamos, NM Summer 2006

## AWARDS & HONORS

Texas Tech University Prototyping Fund for Surgic, LLC (\$25,000)	2021
Texas Tech University Accelerator Team for Surgic, LLC (\$25,000)	2021
Texas Tech University President's Innovation Award for Surgic, LLC (\$25,000)	2021
A Most Influential Faculty Member, Texas Tech	2019
Travel Award: National Academy of Sciences, sixth Arab-American Frontiers, Kuwait	2018
Best Paper Finalist: IDETC/CIE Conference for Design, Theory, Methodology	2018
Best Business Plan, ETH Zurich Business Concept Course	2017
Favorable Submission for Branco Weiss Postdoctoral Fellowship (top 7% of 592)	2017
<b>Best Paper:</b> IDETC/CIE Conference for Additive Manufacturing and 3D-Printing	<b>2015</b>
<b>Best Paper:</b> IDETC/CIE Conference for Virtual Environments and Systems	<b>2015</b>
<b>ETH Zurich Postdoctoral Fellowship</b>	<b>2015</b>
Travel Scholarship for Bio-Inspired Design Workshop in Palo Alto California	2011
<b>National Defense Science and Engineering Graduate Fellowship (NDSEG)</b>	<b>2010</b>
Carnegie Institute of Technology Dean's Fellow	2009
<b>1<sup>st</sup> Place AIAA International Design Build Fly Competition</b> , Chief Engineer	<b>2009</b>
Mechanical Engineering Department All Around Student Activities Award	2009
<b>Barry M. Goldwater Scholarship</b>	<b>2008</b>
Lew Wentz Foundation Research Scholarship	2006 - 2008
Honor's Freshman Research Scholarship	2004
Oklahoma State Regent's Scholarship	2004
Valedictorian, Union High School	2004
Eagle Scout, Boy Scouts of America	2002

## SERVICE

<b>Outreach:</b>	"3D Printing and You" Library Talks, Lubbock	2021
	West Texas 3D Covid-19 Relief Consortium	2020
	-President's Engaged Scholarship Award	
	Texas Tech STEM CORE Affiliate Member	2018 - present
<b>University:</b>	Dean's representative PhD Thesis Defense	2020
	Sling Health Faculty Advisor and Coordinator	2019 - present
	TTU Undergraduate Outreach for ASME, IEEE, Pi Squared	2019 - present
	TTU Undergraduate Research Symposium Judge	2019
	TTU Engineers in Medicine	2018 - present
<b>Department:</b>	ME Department Chair Search	2019 - 2021
	ME Senior Design Expo Organizer	2019 - present
	ME Design Qualifying Exams Coordinator	2019 - present
	ME Senior Design Expo Judge	2018
<b>Professional:</b>	Guest Editor: <i>JoVE</i> 3DP Scaffold Design Methods	2020 - 2021
	Guest Editor: <i>Frontiers ME</i> 3D Printing Scaffolds	2020 - 2021
	Guest Editor: <i>Polymers</i> 3D Printing Applications	2020 - 2021
	MDPI <i>Materials</i> Reviewer Board	2020 - present
	NSF Grant Review Panel	2019
<b>Conference:</b>	ASME IDETC DFMLC Special Session Chair	2021
	Session Chair ASME IDETC DTM Conference	2018
	ASME Early Career Design and Advanced Manufacturing	2015 - 2016
	Market Segment Leadership Team.	



	Design Society, Organizer for Young Member's Speakers Event for ICED Conference in Milan, Italy, 2015.	2015
<b>Mentoring:</b>	ASME IDETC PhD student mentorship program	2020

## INTERNAL FUNDING

<b>Texas Tech University Faculty Start-up Grant Innovation Hub</b> , \$2,500	2020
Course focus: ME 4371 Capstone Engineering Design II	
<b>Texas Tech University Open-Access Initiative</b> , \$1,000	2019
Egan, P., <i>Materials</i> , 12(25), pp. 2355, 2019	
<b>Texas Tech University TrUE</b> , \$2,000	2019 - 2020
2020 Scholarship for Fnu Md-Moniruzzaman/Khawja Mezbah Uddin	
2019 Scholarship/Equipment for Christopher O'neal	

## EXTERNAL FUNDING

<b>NSF I-CORPS:</b>	\$50,000 (100% credit)	2021
Grant title: "Laparotomy simulator platform with mechanical feedback for surgical training"		
<b>NSF IUSE: HER-20-0366:</b>	\$522,998 (1% credit)	2019
Grant title: "Cultivating Engineers in Medicine: Interdisciplinary Engaged Learning for Biomedical Innovation"		
<b>NSF CMMI-1160840 Grant:</b>	\$425,000 (Advisor's proposal)	2012
Significantly aided writing with PIs Jonathan Cagan and Philip LeDuc		
Grant title: "Computational design of complex multi-scale systems: Design of synthetic muscle with shape grammars and agent-based search"		

## TEACHING

<b>Texas Tech University, Costa Rica Campus</b>		
Medical Design Innovation and Manufacturing		2021 - present
<b>Texas Tech University</b>		
Medical Design & Entrepreneurship, undergraduate/graduate course		2022
Advanced Engineering Design, graduate level course		2021
Design II, capstone project-based undergraduate course		2019 - 2021
Design I, capstone project-based undergraduate course		2019 - 2020
Introduction to Design, upper-level undergraduate course		2018
<b>École Polytechnique Fédérale de Lausanne (EPFL)</b>		
Lecture for Short PhD Course: "Design for 3D printed tissue scaffolds"		2017
<b>Swiss Federal Institute of Technology (ETH Zurich)</b>		
Developed and Taught Course (50%): Engineering Design Methods		2015 - 2016

Research Skills for Engineering Design and Computing Lab Group

2014 - 2015

### **Carnegie Mellon University**

Teaching Assistant for Engineering Design: Grand Challenges

2012

Teaching Assistant for Engineering Design I

2011

## **STUDENT ADVISING**

### **Texas Tech University (PhD Students)**

Nava Khatri	3D printing and computation	2020 - present
Amit Arefin	Computational design	2019 - present
Stefania Chirico	3D Food printing	2019 - present

### **Texas Tech University (Hired Researchers)**

Quang Nguyen	3D Food printing	2019
Rahmatul Mahmoud	3D Bioprinting	2019

### **Texas Tech University (Master's Student)**

Manasi Parab	Design for 3D printing	2020 - 2021
Harshavardhan Agale	3D Printed Materials (Thesis)	2020 - 2021
Elizabeth Burnett	3DP Water filters (Project)	2019 - 2020
Nitin Kulkarni	3DP Reliability (Thesis)	2019 - 2020
Rahmatul Mahmoud	3D Bioprinting (Thesis)	2019 - 2020

### **Texas Tech University (Undergraduate Students)**

Jonathan Smith	3D printing lattice mechanics (Honor's funded)	2021 - present
Brandon Darby	3D printing prototyping (TrUE funded)	2021 - present
Narsis Sailale	Food design automation and mechanics	2021
William Renter	Game Learning Strategies	2021
Juan Leon	Silicone molding	2021
Zareez Choudhury	3D food printing	2021
Sebastian Valbuena	3DP prosthetics	2021
Ray Elias	Ultimaker lattices	2021
Michael Hart	3DP education/innovation	2021
Sean Trimmier	Metal molding	2021
Kyle Schmidt	Innovative physical therapy device	2021
Travis Reiss	Innovative surgical trainer	2021
Austin Scott	Machine learning	2020
Elijah Garcia	Engineers in Medicine project	2020
Michael Lahowetz	Lattice design and simulation	2020
Wesley O'Quinn	Synthetic bone 3D printing	2020
Gabriel Briguiet	3DP Heterogeneous lattices (Int'l funding)	2019
Quang Nguyen	3D food printing materials	2019
Nicholas Salazar	Abaqus simulations	2019
Emmitt McFather	Food silicon molding	2019
Cody Carson	Ab tester clamp mechanisms	2019
Ivan Delgado	Ab tester material development	2019
Fnu Md-Moniruzzaman	3DP Design (TrUE funded, lead author <i>Designs</i> )	2019 - 2020
Khawja Mezbah Moin Uddin	3D food printing testing (TrUE funded)	2019 - 2020
Christopher O'neal	3DP Mechanics (TrUE funded, co-author <i>Designs</i> )	2019 - 2020

**Texas Tech University/University Health Sciences (Entrepreneurship)**

Kevin Hinds	3D printing surgical molding	2021
Jesus Acuna	Automated smell delivery	2021
Luke Blackwell	Ear surgical device	2020
Claire Rahlfs	Ear surgical device	2020
Maverick Weidman	Embolism device	2020
Jacob Lambert	Embolism device	2020

**ETH Zurich**

Isabella Bauer	Research Internship	2017 - 2018
Xiuyu Wang	Master's Thesis	2017
Veronica Gonella	Research Assistant	2016
Max Engensperger	Master's Thesis	2016
Fernando Rodriguez	Bachelor's Thesis	2016

**Carnegie Mellon University**

Felix Chiu	Undergraduate/Honor's Research	2011 - 2014
Tiffany Ho	Undergraduate/Honor's Research	2012 - 2013
Patra Virasathienpornkul	Undergraduate Project	2012
Xiaozhou Fu	Master's Project	2010 - 2011
Chao Li	Master's Project	2010 - 2011