CARLYE LAUFF

Design researcher, design educator & product designer.

My passion and expertise lies within the design process: actively understanding human behaviors and emotions, synthesizing insights to reframe challenges, and rapidly prototyping and testing potential solutions. My dissertation research studies the role and impact of prototypes in companies. I enjoy working as a member of interdisciplinary teams and leveraging expertise from seemingly different fields to solve complex problems. I believe in a bias towards action, building to think, and that you can truly prototype anything.

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www.carlyelauff.com
www.medium.com/@carlyelauff

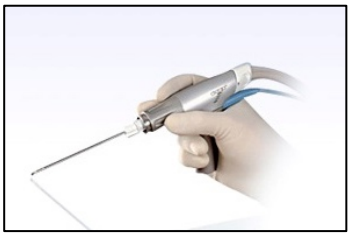
EDUCATION

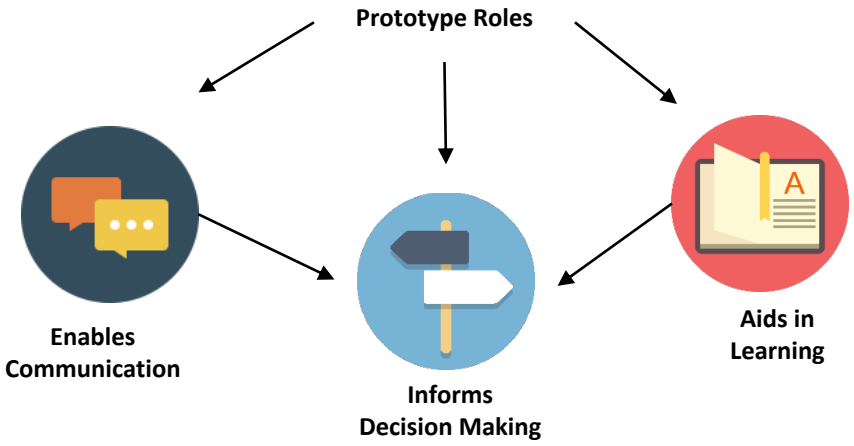
2013-2018 **Ph.D. Design Theory & Methodology**
University of Colorado Boulder
Department of Mechanical Engineering
Boulder, CO, USA – GPA 3.75
Thesis Title: Prototyping in the Wild: The Role and Impact of Prototypes in Companies

2013-2015 **M.S. Product Design Engineering**
University of Colorado Boulder
Department of Mechanical Engineering
Boulder, CO, USA – GPA 3.75

2009-2013 **B.S. Mechanical Engineering**
Minor in Engineering Leadership Development & Humanitarian Engineering and Social Entrepreneurship
The Pennsylvania State University
University Park, PA, USA – GPA 3.62

SUMMARY OF CONTENTS





2013-2018

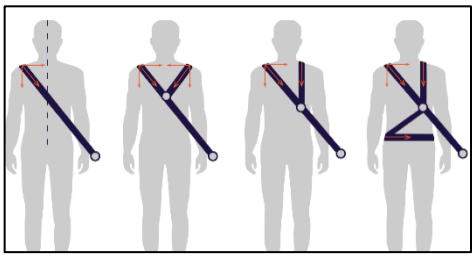
qualitative research methods:
ethnography, participant-observations, 1:1 interviews, focus groups, survey development, remote interviews, in-depth case studies, live prototyping sessions

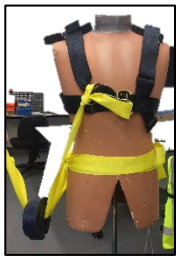
LEAD DESIGN RESEARCHER
Prototyping in Companies

I engaged in a 5-year field-based research study uncovering the roles of prototypes within companies who produce physical products in the fields of consumer electronics, footwear, and medical devices. I used ethnographically informed practices to collect data and insights from the companies for the full design process.

I inductively analyzed the data across the companies to uncover three roles of prototypes: as tools for communication, learning, and decision making. I developed a framework to exemplify how the role of prototypes shifts with context, and how prototypes can be used as objects of power to inform both micro and macro decisions. Other outcomes of my work include showing how prototypes can be both integrators and disruptors on design teams, comparing the perceptions of prototypes between different disciplines, and highlighting the importance of underlying social networks for design.

AWARD: National Science Foundation Graduate Research Fellowship from 2015-2018





2017

LEAD DESIGN RESEARCHER
Centre for Design Innovation

qualitative research methods: 1:1 interviews, focus groups, survey development, live prototyping sessions

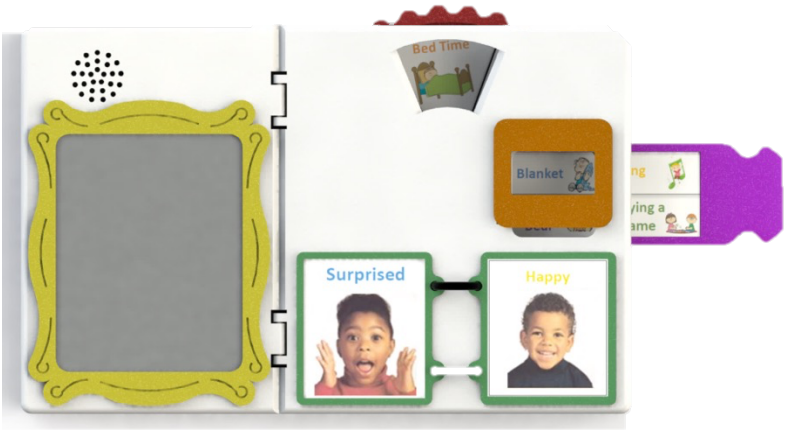
quantitative research methods: eye tracking studies, statistical market research, segmentation studies, finite element analysis, human factors analysis

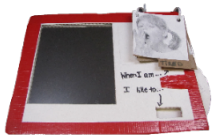
I served as an international fellow and lead design researcher at Swinburne University of Technology in the Centre for Design Innovation. As the lead design researcher, I worked on four company sponsored projects (sports injury device, premium built-in grill, 3D printed track lights, industrial food dispenser), with a team of twelve industrial designers and product design engineers to understand the design space for each project, uncover surprising insights, and run prototyping testing sessions.

As part of my position, I also studied the impact of sequential versus parallel prototyping for consumer products, and I compared five 3D printer's ability to convey the prototype's intent to end users during testing.

More details: www.cdiengage.com.au

AWARD: National Science Foundation Global Research Opportunities Worldwide from Jan-Aug 2017





2015

qualitative research methods: 1:1 interviews, focus groups, live prototyping sessions

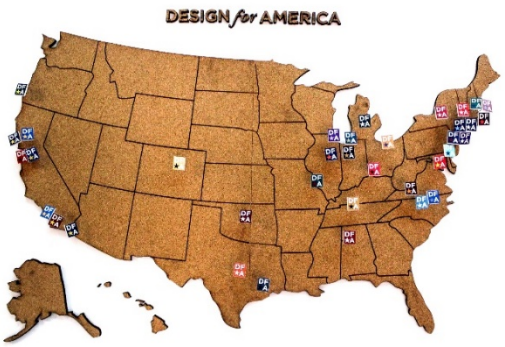
product design
3D printing
rapid prototyping
experience design
interaction design

DESIGN RESEARCHER & FACILITATOR
Robert Wood Johnson Foundation

I served as the lead design researcher and facilitator for the five-person Colorado team on a year-long project sponsored by the Robert Wood Johnson Foundation (RWJF). This project used the design thinking process to generate and test new solutions for increasing social and emotional learning in vulnerable young children. I developed materials and workshops to lead the Colorado team with diverse backgrounds in interaction design, mechanical engineering, psychology, learning sciences, and childhood education through the design thinking process.

We partnered with three pre-schools to gain insights about children's social-emotional competencies, prototyped ten solutions and iterated on them until we designed a children's toy to increase emotional awareness in young children during their critical daily transitions. We presented our insights and final product at a workshop to RWJF and the Hope Street Group in Omaha, NE in December 2015.

More details: www.innovationinsed.com



2015-2018

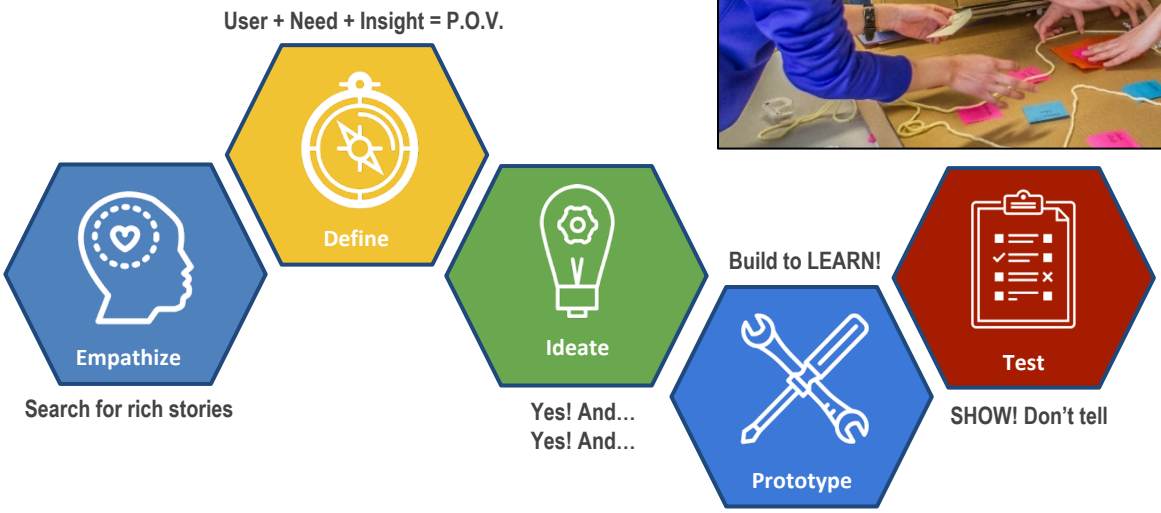
DESIGN FOR AMERICA
Founder, Studio Lead & Mentor

Design for America (DFA) is a student-run organization whose mission is to solve local, real-world problems with community partners using human-centered design principles on interdisciplinary design teams. I founded the CU Boulder DFA Studio in August 2015, then served as the Studio Lead until January 2017, and now serve as the organization's primary mentor.

I built the studio from the ground-up to a current self-sustaining organization with over 50 students involved from 15 different disciplines. I developed materials for a three-week design sprint, design thinking sessions, and additional design and prototyping workshops. I have raised over $10,000 in funding to support the studio and design projects. One of our recent successful projects includes a patent-pending mobility device for the elderly in partnership with Medline.

More details: www.colorado.edu/designforamerica

AWARD: James Dyson Foundation
Design Leader Award



DESIGN THINKING & PROTOTYPING WORKSHOPS

2017-2018

Design Instructor, Till Summer Institute
I co-teach a one-week design thinking course to high school students with the Till Summer Institute. In this program, students solve real problems with community partners using lessons on research, strategy, design thinking, leadership, and storytelling. Students discover their passions, learn new design skills, and create a portfolio piece. *More details: www.tillschool.com*

2015-2018

Instructor, Prototyping in the Design Process
I teach a prototyping workshop series to engineering students at CU Boulder where I emphasize the importance of prototyping throughout the entire design process. I have developed all of the materials for these hands-on workshops, including a 'preto-typing' assignment to get students into the 'build to think' mindset on their design teams.

2015-2018

Instructor, Design Thinking Workshops
I have developed curriculum to lead design thinking workshops either for 2-hours, 1-day, or over 3-weeks to undergraduate students, graduate students, community members, and professionals. These can overview the entire process or be 'deep-dives' into specific stages.

INSTRUCTOR, TEACHING ASSISTANT, & CURRICULUM DEVELOPMENT

2017

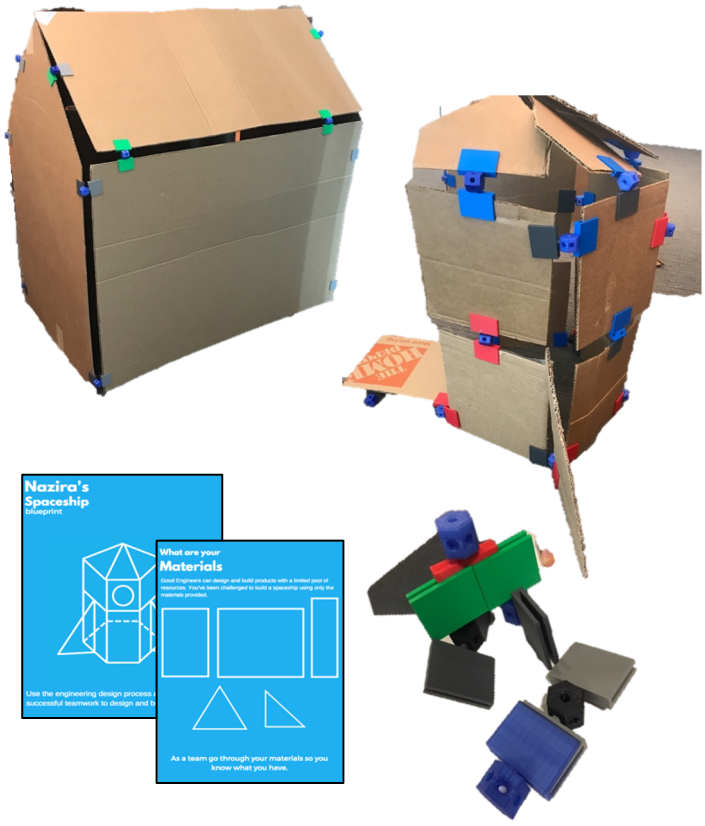
Technical Communication Teaching Assistant for a 5-credit Ph.D. course at Simula in Oslo, Norway during April. I aided in developing curricula to teach effective technical presentations, academic writing, and scientific posters to 30 graduate students in science and engineering. *More details: www.simula.no/education/courses/communicating-scientific-research-2017*

2014-2015

Program Assistant for Mechanical Engineering Senior Design Capstone Course at CU Boulder. I developed materials to teach 8 workshops on design, prototyping, and manufacturing, and I implemented new tools for concept generation, concept selection, and design critiques (180 students, 30 teams). I organized the final Design Expo for the students, industry partners, community members and expert judges. *More details: www.designcenter.colorado.edu*

2014

Course Development & Instruction for Biomechanics of Rock Climbing for the X-perience STEM Conference. I used experiential learning theory to guide my lessons of physics, mechanics, and geography to 60 professionals and teachers. *More details: www.xsci.org/work/x-stem*



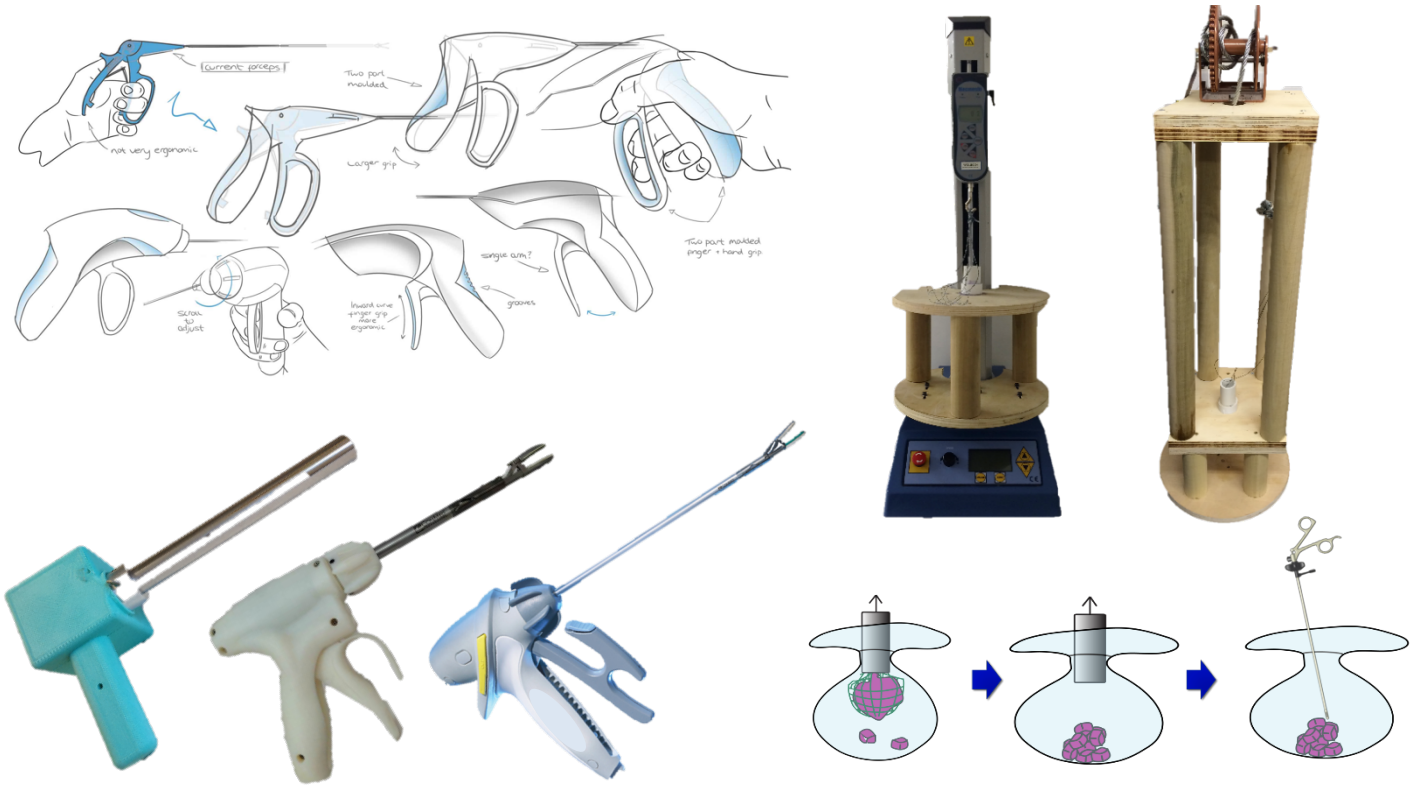
2016-present

CURIOSPACE, LLC
Co-Founder

mechanical design
3D printing
space design
user experience
creative writing
interaction design

CurioSpace's mission is to increase children's positive social interactions, curiosity, and creativity during group play through our guided building activities and stories. Our curated kits include interactive story books, 3D-printed brackets, and building materials for children to experience the design process through building out their own play-spaces. Each of our kits give children just enough structure and guidance to minimize frustration and encourage creativity. At CurioSpace, we are working to give children the chance to play in a way that is conducive to social and emotional development while emphasizing spatial reasoning skills. We are currently pilot testing our kits with children living in rural, under-resourced communities around Pennsylvania and Colorado.

AWARDS: Happy Valley LaunchBox Accelerator Cohort, Summer Founder's Program Grant Recipient



2014-2015

mechanical design
ergonomics
human factors
anatomy & physiology
finite element analysis

LAPROSCOPIC SURGICAL DEVICE
R&D Division of Medtronic

This project was part of the year-long capstone for the graduate product design program at CU Boulder. It was sponsored by the Research & Development division at Medtronic. We used a design thinking approach to solve this problem, where we let the primary needs emerge from observations, interviews, and reverse engineering of benchmarked products. We rapidly built and tested 20 different solutions before narrowing in on the 'mesh-cutter' design. We developed a laparoscopic surgical device that allows for safe tissue extraction, such as removal of uterine fibroids, collagenous tissue and soft organs. Our design has been patented by Medtronic and is currently being refined for human-trials testing.

2012-2013

systems engineering
user-research
experience design

MASHAVU NETWORKED HEALTH SOLUTIONS

Mashavu (*chubby-cheeks* in Swahili) strives to provide accessible healthcare in developing nations by working with international partners to confront provider shortages and reduce barriers to health care through pre-primary screenings in rural towns. We used principles from systems engineering to confront many of the systematic problems in our pilot location in Nyeri, Kenya – specifically understanding income-generating activities of women. I worked on Mashavu for a year as part of the Penn State's Humanitarian Engineering & Social Entrepreneurship Program, which culminated in spending 6-weeks in Nyeri, Kenya implementing our changes.

More details: www.mashavukenya.wordpress.com

ENGINEERING INTERNSHIPS & RESEARCH

2012-2013

Researcher on magnetically and thermally activated engineering origami materials
Engineering Design & Optimization Group (EDOG)
Pennsylvania State University
University Park, PA, USA

Summer 2012

Materials Engineering Intern on Space Flight Hardware
Ball Aerospace & Technologies Corporation
Boulder, CO, USA

Summer 2011

Mechanical Design Intern on 787 Dreamliner
The Boeing Company
Everett, WA, USA

Summer 2010

Service Productivity Analysis Intern on DC locomotives
General Electric Transportation Division
Erie, PA, USA

INVITED PRESENTATIONS, PANELS & WORKSHOPS

2017 Invited Presentation – **Prototyping in the Wild.** ATLAS Institute Research Showcase. October 30, 2017. Boulder, CO, USA. *Details*: www.colorado.edu/atlas/research-showcase

2017 Invited Panelist – **The Limitations of 3D Modeling & Simulations.** Denver Startup Week Maker Session. In Real Life: Physical Product Showcase. September 26, 2017. Denver, CO, USA. *Details: https://www.denverstartupweek.org/schedule/3835-the-limitations-of-3d-modeling-simulations-irl-physical-product-showcase*

2017 Invited Presentation – **Role of Prototyping in New Product Development.** Centre for Design Innovation. April 12, 2017. Hawthorn, VIC, Australia.

2016 Invited Workshop – **Prototyping for Social Impact.** Design for America in collaboration with the James Dyson Foundation. November 9, 2016. Boulder, CO, USA.

2016 Invited Presentation – **The Impact of Prototyping in the Design Process.** Mechanical Engineering Strategic Advisory Board (MESAB) Annual Meeting. April 16, 2016. Boulder, CO, USA.

2015 Invited Workshop – **Using Design Thinking for Improving Social Emotional Competencies in Young Children**, with Jessica Menold and Meg Small. Robert Wood Johnson Foundation and the Hope Street Group. December 8-10, 2015. Buffet Early Childhood Institute at the University of Nebraska. Omaha, NE, USA.

2015 Invited Workshop – **Focus Your Passion to Solve Problems and Make an Impact**, with Jessica Menold. Under 30 Changemaker Summit. August 7-10, 2015. San Francisco, CA, USA. *Details: www.changemakersummit.splashthat.com*

2015 Invited Presentation – **Engineering Design Process: More than the "Standardized Loop"**. University of Colorado Boulder. Graduate Engineering Recruitment and Research Symposium (GEARRS). March 5, 2015. Boulder, CO, USA.

2013 Invited Presentation – **Folding it Together: Art and Engineering-based Active Origami**, with Mary Frecker and Rebecca Strzelec. February 20, 2013. Penn State Greater Valley – Malvern, PA, USA. *Details: http://news.psu.edu/story/265034/2013/02/20/research/penn-state-investigators-discuss-how-origami-unites-art-and*

2012 Invited Presentation – **The Penn State Engineering Ambassadors**, November 9-15, 2012. ASME IMECE. Houston, Texas, USA.

NEWS & PRESS

2018 Three-Minute Thesis (3MT) Finalist Promotion Video from CU Boulder on my Dissertation Research: https://www.youtube.com/watch?v=NtaADvkQlYM&feature=youtu.be

2018 Research Spotlight – CU Boulder Mechanical Engineering: https://www.colorado.edu/mechanical/2018/01/03/carlye-lauff-design-theory-and-methodology

2018 CU Boulder Design for America featured in the winter 2017/18 edition of the Colorado Engineer magazine: "Design with Determination"- http://cem.colorado.edu/design-for-america/
Research Spotlight through NSF GROW: http://www.colorado.edu/mechanical/2017/01/18/fellowship-win-designing-down-under

2017 Design for America – James Dyson Fellow: http://designforamerica.com/2017/03/30/the-james-dyson-award-is-now-open/

2017 CurioSpace Spotlight: http://news.psu.edu/story/472258/2017/06/20/research/prepare-launch

2017 Design for America – CU Boulder Studio Launch: http://designforamerica.com/2016/05/23/dfa-welcomes-extraordinary-group-of-new-studios-to-the-network

2016 CurioSpace in Summer Founder's Program: http://news.psu.edu/story/425164/2016/09/12/summer-founders-program-helps-engineering-students-enhance-startups

2016 Penn State Engineering Origami Outreach: http://www.centredaily.com/news/article42824277.html; http://www.fultoncountynews.com/news/2013-08-08/Local_%28and%29_State/PSU_Students_Using_Origami_To_Teach_Engineering.html

2016 Penn State Engineering Ambassadors – J&J Medal through ASME, accepted on behalf http://news.psu.edu/story/148966/2012/05/10/engineering-ambassadors-win-johnson-johnson-medal

SELECTED RESEARCH PUBLICATIONS

Hwang, D., **Lauff, C.A**., Camburn, B.A., Wood, K.L., "Design Principle Cards: Toolset to Support Innovations with Additive Manufacturing", *Journal of Mechanical Design*, in review.

Lauff, C.A., Knight, D., Kotys-Schwartz, D., Rentschler, M.E., 2020, "The role of prototypes in communication between stakeholders," *Design Studies*, in press in January.

Lauff, C.A., Weidler-Lewis, J., Kotys-Schwartz, D., and Rentschler, M.E., 2018, "Prototypes as Intermediary Objects for Design Coordination in First-Year Design Courses," *International Journal of Engineering Education*, 34(3), 1085-1103.

Lauff, C.A., Kotys-Schwartz, D., Rentschler, M.E., 2018, "What is a prototype? What are the roles of prototypes in companies?" *Journal of Mechanical Design*, 140(6), p.061102.

Lauff, C. A., Perez, K. B., Camburn, B., Wood, K. L., 2019, "Design Principle Cards: Toolset to Support Innovations with Additive Manufacturing," *Proceedings of the ASME 2019 IDETC/CIE – Design Theory and Methodology Conference*, Anaheim, CA. August 18-21. DETC-2019-97231.

Lauff, C. A., Menold, J., Wood, K. L., 2019, "Prototyping Canvas: Design Tool for Planning for Purposeful Prototypes," *International Conference on Engineering Design (ICED)*. August 4-8. Delft, Netherlands.

Lauff, C.A., Kotys-Schwartz, D., Rentschler, M.E., 2018, "Company Case Study: Design Methods used during Early Stages of Evolutionary Product Development," *Proceedings of the ASME 2018 IDETC/CIE – Design Theory and Methodology Conference*, Quebec City, Quebec, CA, August 26-29. DETC-2018-85406.

Lauff, C.A., Kotys-Schwartz, D., Rentschler, M.E., 2017, "Perceptions of Prototypes: Pilot Study Comparing Students and Professionals," *Proceedings of the ASME 2017 IDETC/CIE – Design Education Conference*, Cleveland, OH, August 6-9, DETC2017-68117.

Stangl, A., Weidler-Lewis, J., **Lauff, C.A.**, Price, E., and Fauble, E., 2017, "The SEL Transition Wheel: Designing for Early Childhood Social Emotional Learning," *Proceedings of the 2017 Conference on Interaction Design and Children*, Stanford, CA, June 27-30, pp. 334-339, ACM.

Lauff, C.A., Menold, J., Small, M., 2016, "Two Design Cases Exploring Development of Social Emotional Learning Solutions," *Proceedings of the 10th International Conference on Design and Emotion,* Amsterdam, Netherlands, September 27-30.

Lauff, C., O'Connor, K., Kotys-Schwartz, D., and Rentschler, M.E., 2015, "Comparing Organizational Structures: Two Case Studies of Engineering Companies," *Proceedings of the ASEE Annual Conference and Exposition*, Seattle, WA, June 14-17.

Lauff, C., O'Connor, K., Kotys-Schwartz, D., and Rentschler, M.E., 2014, "How is Design Organized? A Preliminary Study of Spatiotemporal Organization in Engineering Design," *Proceedings of the IEEE Frontiers in Education Conference*, Madrid, Spain, October 22-25.

Lauff, C., Weidler-Lewis, J., O'Connor, K., Kotys-Schwartz, D., and Rentschler, M., 2014, "Cognitive Ethnographies of Heterogeneous Engineering Design," *Proceedings of the International Conference of the Learning Sciences*, Boulder, CO, June, 2014.