



Erin MacDonald

Assistant Professor of Mechanical Engineering

 Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Mechanical Engineering

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Outstanding Young Investigator, ASME Design Automation Committee (2012)
- Assistant Professor of Mechanical Engineering and Art & Design, Iowa State University (2009 - 2014)

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, MIT Sloan School of Management , Marketing & Mechanical Engineering (2009)
- Ph.D., University of Michigan , Mechanical Engineering (2008)
- M.S., University of Michigan , Mechanical Engineering (2004)
- B.S., Brown University , Materials Science and Engineering (1998)

LINKS

- <http://erinmacd.stanford.edu/>: <http://erinmacd.stanford.edu/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Research Focus

Research projects in Dr. MacDonald's IRIS Design lab have three foci: (1) Modeling the role of the public's decisions in effective large-scale sustainability implementation; (2) Improving engineering designers' abilities to address complex customer preference for sustainability; and (3) Using data on how consumers perceive products, especially visually, to understand how products are evaluated and subsequently improve those evaluations. These foci represent three corresponding design vantage points: (1) system-level; (2) human-scale or product-level, and (3) single-decision-level, as shown in the Figure. The exploration of these different vantage points is fundamental to performing insightful design research on complex design issues, such as sustainability.

Sustainable design readily spreads across many disciplines and necessarily requires an interdisciplinary and system-based design approach. At the heart of this system is the relationship between product engineering and human behavior. The designer must include this relationship in the product's design along with other sustainability concerns such as technology advancement, life cycle assessment, policy compliance, larger societal impact, and economic viability. As behavior is difficult for engineers to quantify, it can be lost in engineering analysis. The resulting sustainable products and technologies may not be used and/or purchased, may not be as

efficient as predicted, and thus may not have the beneficial impact that they were designed to have. The relationship between the sustainable product engineering and human behavior can be quantified, for example by modeling decision-making, and incorporated into engineering analysis. Often, the reformulation of the engineering system problem required to accommodate human behavior is beneficial to other elements of the design. We perform research at the intersection of analytical design methods, conceptual design methods, and decision-making theory to design successful sustainable products and energy technologies.

Teaching

COURSES

2021-22

- Introduction to Mechanical Engineering: ME 1 (Aut)

2020-21

- Design Experiments: ME 341 (Win)
- Introduction to Mechanical Engineering: ME 1 (Aut)

2019-20

- Design Experiments: ME 341 (Win)
- Design Impact Master's Project II: ME 316B (Win)

2018-19

- Analytical Product Design (APD): ME 215C (Spr)
- Design Experiments: ME 341 (Win)
- Design Impact Master's Project I: ME 316A (Aut)
- Design Impact Master's Project II: ME 316B (Win)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

Yiqing Ding

Master's Program Advisor

Yutian Gao, Mei Hao, Mohamed Nijad, Emily Richter, Nicholas Riley, Betty Wan

Doctoral (Program)

Orisa Coombs

Publications

PUBLICATIONS

- **Manipulating Users' Trust of Autonomous Products With Affective Priming** *JOURNAL OF MECHANICAL DESIGN*
Liao, T., MacDonald, E. F.
2021; 143 (5)
- **Priming on Sustainable Design Idea Creation and Evaluation** *SUSTAINABILITY*
Liao, T., MacDonald, E. F.
2021; 13 (9)
- **Quantifying the Importance of Solar Soft Costs: A New Method to Apply Sensitivity Analysis to a Value Function** *JOURNAL OF MECHANICAL DESIGN*
Syal, S. M., MacDonald, E. F.
2020; 142 (12)

- **Agent-Based Modeling of Decisions and Developer Actions in Wind Farm Landowner Contract Acceptance** *JOURNAL OF MECHANICAL DESIGN*
Syal, S. M., Ding, Y., MacDonald, E. F.
2020; 142 (9)
- **A human-centered design approach to evaluating factors in residential solar PV adoption: A survey of homeowners in California and Massachusetts** *RENEWABLE ENERGY*
Bao, Q., Sinitskaya, E., Gomez, K. J., MacDonald, E. F., Yang, M. C.
2020; 151: 503–13
- **Designing linked journey maps to understand the complexities of the residential solar energy market** *RENEWABLE ENERGY*
Sinitskaya, E., Gomez, K. J., Bao, Q., Yang, M. C., MacDonald, E. F.
2020; 145: 1910–22
- **Revealing insights of users' perception: an approach to evaluate wearable products based on emotions** *DESIGN SCIENCE*
Liao, T., Tanner, K., MacDonald, E.
2020; 6
- **AGENT-BASED MODELING OF DECISIONS AND DEVELOPER ACTIONS IN WIND FARM LANDOWNER CONTRACT ACCEPTANCE**
Syal, S. M., Ding, Y., MacDonald, E. F., ASME
AMER SOC MECHANICAL ENGINEERS.2020
- **EXTRACTING CUSTOMER PERCEPTIONS OF PRODUCT SUSTAINABILITY FROM ONLINE REVIEWS**
EI-Dehaibi, N., MacDonald, E. F., ASME
AMER SOC MECHANICAL ENGINEERS.2020
- **A WIZARD-OF-OZ EXPERIMENT TO DEMONSTRATE WATER REDUCTION AND USER TRAINING WITH AN "AUTONOMOUS" FAUCET**
Jou, W., Beaulieu, S. M., Lim, A. K., MacDonald, E. F., ASME
AMER SOC MECHANICAL ENGINEERS.2020
- **MANIPULATING TRUST OF AUTONOMOUS PRODUCTS WITH AFFECTIVE PRIMING**
Liao, T., MacDonald, E., ASME
AMER SOC MECHANICAL ENGINEERS.2020
- **Extracting Customer Perceptions of Product Sustainability From Online Reviews**
El Dehaibi, N., Goodman, N. D., MacDonald, E. F.
ASME.2019
- **Consideration-Constrained Engineering Design for Strategic Insights** *JOURNAL OF MECHANICAL DESIGN*
Long, M., Erickson, M., MacDonald, E. F.
2019; 141 (6)
- **Examining the Influence of Solar Panel Installers on Design Innovation and Market Penetration** *JOURNAL OF MECHANICAL DESIGN*
Sinitskaya, E., Gomez, K. J., Bao, Q., Yang, M. C., MacDonald, E. F.
2019; 141 (4)
- **A Test of the Rapid Formation of Design Cues for Product Body Shapes and Features** *JOURNAL OF MECHANICAL DESIGN*
Du, P., MacDonald, E. F.
2018; 140 (7)
- **Exploring the Effects of a Product's Sustainability Triggers on Pro-Environmental Decision-Making** *JOURNAL OF MECHANICAL DESIGN*
She, J., MacDonald, E. F.
2018; 140 (1)
- **EFFECTS OF COLLAGE PRIMING ON SUSTAINABLE DESIGN IDEA CREATION AND ASSESSMENT**
Liao, T., MacDonald, E. F., ASME
AMER SOC MECHANICAL ENGINEERS.2018
- **Priming Designers Leads to Prime Designs** *DESIGN THINKING RESEARCH: MAKING DISTINCTIONS: COLLABORATION VERSUS COOPERATION*
She, J., Seepersad, C., Holttä-Otto, K., MacDonald, E. F., Plattner, H., Meinel, C., Leifer, L.
2018: 251–73

- **Wind Farm Layout Sensitivity Analysis and Probabilistic Model of Landowner Decisions** *JOURNAL OF ENERGY RESOURCES TECHNOLOGY-TRANSACTIONS OF THE ASME*
Chen, L., MacDonald, E.
2017; 139 (3)
- **EXAMINING THE INFLUENCE OF SOLAR PANEL INSTALLERS ON DESIGN INNOVATION AND MARKET PENETRATION**
Sinitskaya, E., Gomez, K. J., Bao, Q., Yang, M. C., MacDonald, E. F., ASME
AMER SOC MECHANICAL ENGINEERS.2017
- **Modeling noise and lease soft costs improves wind farm design and cost-of-energy predictions** *RENEWABLE ENERGY*
Chen, L., Harding, C., Sharma, A., MacDonald, E.
2016; 97: 849-859
- **Products' Shared Visual Features Do Not Cancel in Consumer Decisions** *JOURNAL OF MECHANICAL DESIGN*
Du, P., MacDonald, E. F.
2015; 137 (7)
- **Seven cognitive concepts for successful eco-design** *JOURNAL OF CLEANER PRODUCTION*
MacDonald, E. F., She, J.
2015; 92: 23-36