

Proceedings of the ASME

**INTERNATIONAL DESIGN ENGINEERING TECHNICAL
CONFERENCES & COMPUTERS AND INFORMATION IN
ENGINEERING CONFERENCE
- 2019 -**

VOLUME 7

**31ST INTERNATIONAL CONFERENCE ON
DESIGN THEORY AND METHODOLOGY**

presented at

ASME 2019 INTERNATIONAL DESIGN ENGINEERING TECHNICAL CONFERENCES &
COMPUTERS AND INFORMATION IN ENGINEERING CONFERENCE

AUGUST 18-21, 2019

ANAHEIM, CALIFORNIA, USA

sponsored by

DESIGN ENGINEERING DIVISION, ASME

COMPUTERS AND INFORMATION IN ENGINEERING DIVISION, AMSE

**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Two Park Avenue * New York, NY. 10016**

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Statement from By-Laws: The Society shall not be responsible for statements or opinions
Advanced in papers. . .or printed in its publications (7.1.3)

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY ASME FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

For authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, Tel: 978-750-8400

Requests for special permission or bulk reproduction should be addressed to permissions@asme.org.

ISBN NO. 978-0-7918-5927-8

© 2019 ASME

All rights reserved.

Printed in U.S.A with permission by Curran Associates, Inc. (2020)

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

31ST INTERNATIONAL CONFERENCE ON DESIGN THEORY AND METHODOLOGY

AGILE/SCRUM FOR HARDWARE

DETC2019-97008..... **V007T06A001**
Prototype Design in Agile Product Development Processes for Technical Systems
Michael Riesener, Christian Doelle, Sebastian Schloesser, Guenther Schuh

DETC2019-97261..... **V007T06A002**
How the Design of a 3D Printer Bridged Engineering Design Processes and the Agile
Software Manifesto
Steven Lindberg, Matthew I. Campbell

DETC2019-98424..... **V007T06A003**
An Association Rule Approach for Identifying Physical System-User Interactions and
Potential Human Errors Using a Design Repository
*Nicolas F. Soria Zurita, Melissa Anne Tensa, Vincenzo Ferrero, Robert B. Stone, Bryony
DuPont, H. Onan Demirel, Irem Y. Tumer*

CREATIVITY AND IDEATION

DETC2019-97141..... **V007T06A004**
To Classify or Combine: The Effects of Idea Generation Mechanisms on the Novelty
and Quantity of Ideas
Senni Kirjavainen, Katja Holtta-Otto

DETC2019-97232..... **V007T06A005**
The Sketch Quality Bias: Evaluating Descriptions of Product Ideas With and Without
Visuals
Jieun Kwon, Barry Kudrowitz

DETC2019-97285..... **V007T06A006**
Evaluating Crowdsourced Design Concepts With Machine Learning
Bradley Camburn, Yuejun He, Sujithra Raviselvam, Jianxi Luo, Kristin Wood

DETC2019-97778..... **V007T06A007**
Measuring and Optimizing Design Variety Using Herfindahl Index
Faez Ahmed, Sharath Kumar Ramachandran, Mark Fuge, Sam Hunter, Scarlett Miller

DETC2019-97828..... **V007T06A008**
Interpreting Measures of Rarity and Novelty: Investigating Correlations Between
Relative Infrequency and Perceived Ratings
Morgan B. Weaver, Benjamin W. Caldwell, Vicki Sheaffer

DETC2019-98188..... **V007T06A009**
Computationally Derived Adaptive Inspirational Stimuli for Real-Time Design Support
During Concept Generation
Kosa Goucher-Lambert, Joshua T. Gyory, Kenneth Kotovsky, Jonathan Cagan

DETC2019-98252..... **V007T06A010**
Dimensions of Product Similarity in Design by Analogy: An Exploratory Study
Amaninder Singh Gill, Arnold N. Tsoka, Chiradeep Sen

DETC2019-98266..... **V007T06A011**
An Extreme User Approach to Identify Latent Needs: Adaptation and Application in
Medical Device Design
Sujithra Raviselvam, Karupppasamy Subburaj, Kristin L. Wood, Katja Holtta-Otto

DETC2019-98276..... **V007T06A012**
Does Visual Fixation Affect Idea Fixation?
E. Kwon, J. D. Ryan, A. Bazylak, L. H. Shu

DETC2019-98277..... **V007T06A013**
Informing Design Defixation Using Interventions for Psychiatric Disorders
K. Pedret, L. H. Shu

DESIGN DECISION MAKING

DETC2019-97564..... **V007T06A014**
Should it Stay or Should it Go?: A Case Study of Concept Screening in Engineering
Design Industry
Xuan Zheng, Scarlett R. Miller

DETC2019-98335..... **V007T06A015**
Conducting Non-Adaptive Experiments in a Live Setting: A Bayesian Approach to
Determining Optimal Sample Size
Nandan Sudarsanam, Ramya Chandran, Daniel D. Frey

DETC2019-98362..... **V007T06A016**
Investigating Information: A Qualitative Analysis of Expert Designers' Information
Representation and Structuring Behaviors
Nicole B. Damen, Christine A. Toh

DESIGN OF COMPLEX SYSTEMS

DETC2019-97619..... **V007T06A017**
A Differential Game Approach to Dynamic Competitive Decisions Toward Human-
Computer Collaboration
Alparslan Emrah Bayrak, Christopher McComb, Jonathan Cagan, Kenneth Kotovsky

DETC2019-98185..... **V007T06A018**
Towards Consistent Value Orientation in Release Planning
Tarik Sahin, David Inkermann, Thomas Vietor

DETC2019-98268..... **V007T06A019**
Designing Self-Organizing Systems With Deep Multi-Agent Reinforcement Learning
Hao Ji, Yan Jin

DESIGN POTPOURRI: BIOLOGICALLY INSPIRED DESIGN AND HUMAN MEMORY

DETC2019-97455..... **V007T06A020**
Current State of the Art: Problem-Driven Multi-Functional Bio-Inspired Designs
Devesh Bhasin, Daniel A. McAdams

DETC2019-97543..... **V007T06A021**
Assessing the Impact of Cognitive Assistants on Mental Workload in Simple Tasks
Torsten Maier, Vincent Donghia, Chaoran Chen, Jessica Menold, Christopher McComb

DETC2019-98171..... **V007T06A022**
Bio-Inspired Modeling Approaches for Human Networks With Link Dissipation
Varuneswara Panyam, Astrid Layton

DETC2019-98235..... **V007T06A023**
Bio-Inspired Human Network Design: A Multi-Currency Robustness Metric Inspired by Ecological Network Analysis
Abheek Chatterjee, Astrid Layton

DETC2019-98383..... **V007T06A024**
Graduate Students' Mental Models: An Investigation Into the Role of Function in Systems Understanding
Alexander R. Murphy, Henry D. Banks, Robert L. Nagel, Julie S. Linsey

ENTREPRENEURSHIP AND TEAMS IN DESIGN

DETC2019-97475..... **V007T06A025**
The Prototyping Behaviors of Startups: Exploring the Relationship Between Prototyping Behavior and the Financial Success of Startups
Jacob Nelson, Tobias Mahan, Christopher McComb, Jessica Menold

DETC2019-97562..... **V007T06A026**
The Trajectory of Psychological Safety in Engineering Teams: A Longitudinal Exploration in Engineering Design Education
Scarlett Miller, Jacqueline Marhefka, Katie Heining, Kathryn Jablokow, Susan Mohammed, Sarah Ritter

DETC2019-97618..... **V007T06A027**
Build Your Firm With Strangers?: Longitudinal Studies on Open Source Hardware Firm Growth
Zhuoxuan Li, Warren Seering

DETC2019-97820..... **V007T06A028**
Manufacturing Vulnerability: How Resource Scarcity Hinders Team Coordination
During Manufacturing in Nigerian Factories
Abisola C. Kusimo, Sheri Sheppard

DETC2019-97932..... **V007T06A029**
Collaborating With Style: Using an Agent-Based Model to Simulate Cognitive Style
Diversity in Problem Solving Teams
Samuel Lapp, Kathryn Jablokow, Christopher McComb

HUMAN BEHAVIOR IN DESIGN

DETC2019-97017..... **V007T06A030**
Requirements Culture: A Case Study on Product Development and Requirement
Perspectives
Maria Vittoria Elena, Chase Wentzky, Joshua D. Summers

DETC2019-97311..... **V007T06A031**
The Effects of Locus of Control and Big Five Personality Traits on Collaborative
Engineering Design Tasks With Negotiation
Alkim Z. Avsar, Ambrosio Valencia-Romero, Paul T. Grogan

DETC2019-97417..... **V007T06A032**
Motivations for Users Participating in Co-Innovation Communities: A Case Study of
Local Motors
Qing Zheng, Wei Guo

DETC2019-97483..... **V007T06A033**
Antecedents and Outcomes of Designer Empathy: A Retrospective Interview Study
Antti Surma-aho, Claudia Chen, Katja Holttä-Otto, Maria Yang

DETC2019-97632..... **V007T06A034**
Application of a Protocol to Observe Leadership Behaviors in Engineering Design
Teams
James Righter, Chase Wentzky, Joshua D. Summers

DETC2019-97699..... **V007T06A035**
It Rings a Bell! Memory's Impact on Information Utilization by Novice Designers in the
Early Design Process
Attakias T. Mertens, Christine A. Toh

DETC2019-97719..... **V007T06A036**
Effect of Team Size on Problem-Solving and Solution Quality: An Empirical Study
Seth Jacobs, Matthew Pfarr, Mohammad Fazelpour, Abdul Koroma, Tseday Mesfin

DETC2019-97838..... **V007T06A037**
Understanding the Design Neurocognition of Mechanical Engineers When Designing
and Problem-Solving
*Sonia Vieira, John Gero, Jessica Delmoral, Valentin Gattol, Carlos Fernandes, Marco
Parente, Antonio Fernandes*

DETC2019-97873..... **V007T06A038**
Proposing a Design for Tangibility Framework: A Digital Payments Case Study
Yanling Li, Weston L. Baxter

DETC2019-98125..... **V007T06A039**
Collaborative Mind-Mapping: A Study of Patterns, Strategies, and Evolution of Maps
Created by Peer-Pairs
Ting-Ju Chen, Ronak R. Mohanty, Miguel A. Hoffmann Rodriguez, Vinayak R. Krishnamurthy

DETC2019-98199..... **V007T06A040**
Prediction of Design Team Performance on a Conceptual Design Task Using an
Automatable, Topic-Independent Analysis of Language Use
David M. Cannon, Jonathan Edelman

DETC2019-98371..... **V007T06A041**
Risk Perception and Product Safety in User-Centered Design
Mingzhi Cai, Erin N. Seligsohn, Zhinan Zhang, Yan Wang

DETC2019-98395..... **V007T06A042**
Manipulating Trust of Autonomous Products With Affective Priming
Ting Liao, Erin MacDonald

DETC2019-98516..... **V007T06A043**
Analysis of Designer Emotions in Collaborative and Traditional Computer-Aided
Design
Jinxuan (Janice) Zhou, Vrushank Phadnis, Alison Olechowski

PROTOTYPING AND DESIGN REPRESENTATION

DETC2019-97444..... **V007T06A044**
ARCHIE: An Automated Data Collection Method for Physical Prototyping Efforts in
Authentic Design Situations
Jacob Nelson, Andrew Berlin, Jessica Menold

DETC2019-98272..... **V007T06A045**
Similarity in Engineering Design: A Knowledge-Based Approach
Ashish M. Chaudhari, Ilias Bilonis, Jitesh H. Panchal

DETC2019-98398..... **V007T06A046**
From Idea to Production: A Retrospective and Longitudinal Case Study of Prototypes
and Prototyping Strategies
Camilla Arndt Hansen, Ali Gurcan Ozkil

DETC2019-98450..... **V007T06A047**
Computational Prototyping Methods to Design Human Centered Products of High and
Low Level Human Interactions
Salman Ahmed, Lukman Irshad, H. Onan Demirel

DETC2019-98517..... **V007T06A048**
ContaBat: Designing and Prototyping an Attachable Sports Analytics Device That Provides Ball-Bat Impact Location for Performance Enhancement
Umair Sarwar, Kamran Cheema, Tahira Reid

SUSTAINABILITY IN DESIGN

DETC2019-97296..... **V007T06A049**
Promoting Energy-Efficient Driving Using Associative Graphical Displays: Can a Cup of Coffee Encourage You to Drive More Smoothly?
J. Potvin-Bernal, L. H. Shu

DETC2019-97658..... **V007T06A050**
Exploring Situational Factors and Attitudes Affecting Sustainable Electric Kettle Usage
Kimberly Elisabeth Engelking, Kanako Irie, Rasmus Velling Thorup, Devarajan Ramanujan

DETC2019-98286..... **V007T06A051**
Exploring the Effectiveness of Providing Structured DfE Design Strategies During Conceptual Design
Donovan Ross, Vincenzo Ferrero, Bryony DuPont

DETC2019-98468..... **V007T06A052**
A Wizard-of-Oz Experiment to Demonstrate Water Reduction and User Training With an "Autonomous" Faucet
William Jou, Samantha M. Beaulieu, Adrienne K. Lim, Erin F. MacDonald

TRENDS IMPACTING DESIGN PROCESSES

DETC2019-97189..... **V007T06A053**
Predicting Multi-Disciplinary Design Performance Utilizing Automated Topic Discovery
Zachary Ball, Kemper Lewis

DETC2019-97400..... **V007T06A054**
Design Innovation With Additive Manufacturing: A Methodology
K. Blake Perez, Carlye A. Lauff, Bradley A. Camburn, Kristin L. Wood

DETC2019-97956..... **V007T06A055**
Towards an Information Archetypes Framework: Exploring the Types of Information Used in Open Source Design Engagements
Sue Yi, Kevin Lombard, Nicole B. Damen, Matt Germonprez, Christine A. Toh

DETC2019-98078..... **V007T06A056**
Successes and Challenges in Implementing Lean Product Development
Hrushikesh Godbole, Marcos Esterman, Shridhar Palekar, Alvaro Rojas Arciniegas

CONTENTS

31ST INTERNATIONAL CONFERENCE ON DESIGN THEORY AND METHODOLOGY

AGILE/SCRUM FOR HARDWARE

DETC2019-97008..... **V007T06A001**
Prototype Design in Agile Product Development Processes for Technical Systems
Michael Riesener, Christian Doelle, Sebastian Schloesser, Guenther Schuh

DETC2019-97261..... **V007T06A002**
How the Design of a 3D Printer Bridged Engineering Design Processes and the Agile
Software Manifesto
Steven Lindberg, Matthew I. Campbell

DETC2019-98424..... **V007T06A003**
An Association Rule Approach for Identifying Physical System-User Interactions and
Potential Human Errors Using a Design Repository
*Nicolas F. Soria Zurita, Melissa Anne Tensa, Vincenzo Ferrero, Robert B. Stone, Bryony
DuPont, H. Onan Demirel, Irem Y. Tumer*

CREATIVITY AND IDEATION

DETC2019-97141..... **V007T06A004**
To Classify or Combine: The Effects of Idea Generation Mechanisms on the Novelty
and Quantity of Ideas
Senni Kirjavainen, Katja Holtta-Otto

DETC2019-97232..... **V007T06A005**
The Sketch Quality Bias: Evaluating Descriptions of Product Ideas With and Without
Visuals
Jieun Kwon, Barry Kudrowitz

DETC2019-97285..... **V007T06A006**
Evaluating Crowdsourced Design Concepts With Machine Learning
Bradley Camburn, Yuejun He, Sujithra Raviselvam, Jianxi Luo, Kristin Wood

DETC2019-97778..... **V007T06A007**
Measuring and Optimizing Design Variety Using Herfindahl Index
Faez Ahmed, Sharath Kumar Ramachandran, Mark Fuge, Sam Hunter, Scarlett Miller

DETC2019-97828..... **V007T06A008**
Interpreting Measures of Rarity and Novelty: Investigating Correlations Between
Relative Infrequency and Perceived Ratings
Morgan B. Weaver, Benjamin W. Caldwell, Vicki Sheaffer

DETC2019-98188..... **V007T06A009**
Computationally Derived Adaptive Inspirational Stimuli for Real-Time Design Support
During Concept Generation
Kosa Goucher-Lambert, Joshua T. Gyory, Kenneth Kotovsky, Jonathan Cagan

DETC2019-98252..... **V007T06A010**
Dimensions of Product Similarity in Design by Analogy: An Exploratory Study
Amaninder Singh Gill, Arnold N. Tsoka, Chiradeep Sen

DETC2019-98266..... **V007T06A011**
An Extreme User Approach to Identify Latent Needs: Adaptation and Application in
Medical Device Design
Sujithra Raviselvam, Karupppasamy Subburaj, Kristin L. Wood, Katja Holtta-Otto

DETC2019-98276..... **V007T06A012**
Does Visual Fixation Affect Idea Fixation?
E. Kwon, J. D. Ryan, A. Bazylak, L. H. Shu

DETC2019-98277..... **V007T06A013**
Informing Design Defixation Using Interventions for Psychiatric Disorders
K. Pedret, L. H. Shu

DESIGN DECISION MAKING

DETC2019-97564..... **V007T06A014**
Should it Stay or Should it Go?: A Case Study of Concept Screening in Engineering
Design Industry
Xuan Zheng, Scarlett R. Miller

DETC2019-98335..... **V007T06A015**
Conducting Non-Adaptive Experiments in a Live Setting: A Bayesian Approach to
Determining Optimal Sample Size
Nandan Sudarsanam, Ramya Chandran, Daniel D. Frey

DETC2019-98362..... **V007T06A016**
Investigating Information: A Qualitative Analysis of Expert Designers' Information
Representation and Structuring Behaviors
Nicole B. Damen, Christine A. Toh

DESIGN OF COMPLEX SYSTEMS

DETC2019-97619..... **V007T06A017**
A Differential Game Approach to Dynamic Competitive Decisions Toward Human-
Computer Collaboration
Alparslan Emrah Bayrak, Christopher McComb, Jonathan Cagan, Kenneth Kotovsky

DETC2019-98185..... **V007T06A018**
Towards Consistent Value Orientation in Release Planning
Tarik Sahin, David Inkermann, Thomas Vietor

DETC2019-98268..... **V007T06A019**
Designing Self-Organizing Systems With Deep Multi-Agent Reinforcement Learning
Hao Ji, Yan Jin

DESIGN POTPOURRI: BIOLOGICALLY INSPIRED DESIGN AND HUMAN MEMORY

DETC2019-97455..... **V007T06A020**
Current State of the Art: Problem-Driven Multi-Functional Bio-Inspired Designs
Devesh Bhasin, Daniel A. McAdams

DETC2019-97543..... **V007T06A021**
Assessing the Impact of Cognitive Assistants on Mental Workload in Simple Tasks
Torsten Maier, Vincent Donghia, Chaoran Chen, Jessica Menold, Christopher McComb

DETC2019-98171..... **V007T06A022**
Bio-Inspired Modeling Approaches for Human Networks With Link Dissipation
Varuneswara Panyam, Astrid Layton

DETC2019-98235..... **V007T06A023**
Bio-Inspired Human Network Design: A Multi-Currency Robustness Metric Inspired by Ecological Network Analysis
Abheek Chatterjee, Astrid Layton

DETC2019-98383..... **V007T06A024**
Graduate Students' Mental Models: An Investigation Into the Role of Function in Systems Understanding
Alexander R. Murphy, Henry D. Banks, Robert L. Nagel, Julie S. Linsey

ENTREPRENEURSHIP AND TEAMS IN DESIGN

DETC2019-97475..... **V007T06A025**
The Prototyping Behaviors of Startups: Exploring the Relationship Between Prototyping Behavior and the Financial Success of Startups
Jacob Nelson, Tobias Mahan, Christopher McComb, Jessica Menold

DETC2019-97562..... **V007T06A026**
The Trajectory of Psychological Safety in Engineering Teams: A Longitudinal Exploration in Engineering Design Education
Scarlett Miller, Jacqueline Marhefka, Katie Heining, Kathryn Jablokow, Susan Mohammed, Sarah Ritter

DETC2019-97618..... **V007T06A027**
Build Your Firm With Strangers?: Longitudinal Studies on Open Source Hardware Firm Growth
Zhuoxuan Li, Warren Seering

DETC2019-97820..... **V007T06A028**
Manufacturing Vulnerability: How Resource Scarcity Hinders Team Coordination
During Manufacturing in Nigerian Factories
Abisola C. Kusimo, Sheri Sheppard

DETC2019-97932..... **V007T06A029**
Collaborating With Style: Using an Agent-Based Model to Simulate Cognitive Style
Diversity in Problem Solving Teams
Samuel Lapp, Kathryn Jablokow, Christopher McComb

HUMAN BEHAVIOR IN DESIGN

DETC2019-97017..... **V007T06A030**
Requirements Culture: A Case Study on Product Development and Requirement
Perspectives
Maria Vittoria Elena, Chase Wentzky, Joshua D. Summers

DETC2019-97311..... **V007T06A031**
The Effects of Locus of Control and Big Five Personality Traits on Collaborative
Engineering Design Tasks With Negotiation
Alkim Z. Avsar, Ambrosio Valencia-Romero, Paul T. Grogan

DETC2019-97417..... **V007T06A032**
Motivations for Users Participating in Co-Innovation Communities: A Case Study of
Local Motors
Qing Zheng, Wei Guo

DETC2019-97483..... **V007T06A033**
Antecedents and Outcomes of Designer Empathy: A Retrospective Interview Study
Antti Surma-aho, Claudia Chen, Katja Holtta-Otto, Maria Yang

DETC2019-97632..... **V007T06A034**
Application of a Protocol to Observe Leadership Behaviors in Engineering Design
Teams
James Righter, Chase Wentzky, Joshua D. Summers

DETC2019-97699..... **V007T06A035**
It Rings a Bell! Memory's Impact on Information Utilization by Novice Designers in the
Early Design Process
Attakias T. Mertens, Christine A. Toh

DETC2019-97719..... **V007T06A036**
Effect of Team Size on Problem-Solving and Solution Quality: An Empirical Study
Seth Jacobs, Matthew Pfarr, Mohammad Fazelpour, Abdul Koroma, Tseday Mesfin

DETC2019-97838..... **V007T06A037**
Understanding the Design Neurocognition of Mechanical Engineers When Designing
and Problem-Solving
*Sonia Vieira, John Gero, Jessica Delmoral, Valentin Gattol, Carlos Fernandes, Marco
Parente, Antonio Fernandes*

DETC2019-97873..... **V007T06A038**
Proposing a Design for Tangibility Framework: A Digital Payments Case Study
Yanling Li, Weston L. Baxter

DETC2019-98125..... **V007T06A039**
Collaborative Mind-Mapping: A Study of Patterns, Strategies, and Evolution of Maps
Created by Peer-Pairs
Ting-Ju Chen, Ronak R. Mohanty, Miguel A. Hoffmann Rodriguez, Vinayak R. Krishnamurthy

DETC2019-98199..... **V007T06A040**
Prediction of Design Team Performance on a Conceptual Design Task Using an
Automatable, Topic-Independent Analysis of Language Use
David M. Cannon, Jonathan Edelman

DETC2019-98371..... **V007T06A041**
Risk Perception and Product Safety in User-Centered Design
Mingzhi Cai, Erin N. Seligsohn, Zhinan Zhang, Yan Wang

DETC2019-98395..... **V007T06A042**
Manipulating Trust of Autonomous Products With Affective Priming
Ting Liao, Erin MacDonald

DETC2019-98516..... **V007T06A043**
Analysis of Designer Emotions in Collaborative and Traditional Computer-Aided
Design
Jinxuan (Janice) Zhou, Vrushank Phadnis, Alison Olechowski

PROTOTYPING AND DESIGN REPRESENTATION

DETC2019-97444..... **V007T06A044**
ARCHIE: An Automated Data Collection Method for Physical Prototyping Efforts in
Authentic Design Situations
Jacob Nelson, Andrew Berlin, Jessica Menold

DETC2019-98272..... **V007T06A045**
Similarity in Engineering Design: A Knowledge-Based Approach
Ashish M. Chaudhari, Ilias Bilonis, Jitesh H. Panchal

DETC2019-98398..... **V007T06A046**
From Idea to Production: A Retrospective and Longitudinal Case Study of Prototypes
and Prototyping Strategies
Camilla Arndt Hansen, Ali Gurcan Ozkil

DETC2019-98450..... **V007T06A047**
Computational Prototyping Methods to Design Human Centered Products of High and
Low Level Human Interactions
Salman Ahmed, Lukman Irshad, H. Onan Demirel

DETC2019-98517..... **V007T06A048**
ContaBat: Designing and Prototyping an Attachable Sports Analytics Device That Provides Ball-Bat Impact Location for Performance Enhancement
Umair Sarwar, Kamran Cheema, Tahira Reid

SUSTAINABILITY IN DESIGN

DETC2019-97296..... **V007T06A049**
Promoting Energy-Efficient Driving Using Associative Graphical Displays: Can a Cup of Coffee Encourage You to Drive More Smoothly?
J. Potvin-Bernal, L. H. Shu

DETC2019-97658..... **V007T06A050**
Exploring Situational Factors and Attitudes Affecting Sustainable Electric Kettle Usage
Kimberly Elisabeth Engelking, Kanako Irie, Rasmus Velling Thorup, Devarajan Ramanujan

DETC2019-98286..... **V007T06A051**
Exploring the Effectiveness of Providing Structured DfE Design Strategies During Conceptual Design
Donovan Ross, Vincenzo Ferrero, Bryony DuPont

DETC2019-98468..... **V007T06A052**
A Wizard-of-Oz Experiment to Demonstrate Water Reduction and User Training With an "Autonomous" Faucet
William Jou, Samantha M. Beaulieu, Adrienne K. Lim, Erin F. MacDonald

TRENDS IMPACTING DESIGN PROCESSES

DETC2019-97189..... **V007T06A053**
Predicting Multi-Disciplinary Design Performance Utilizing Automated Topic Discovery
Zachary Ball, Kemper Lewis

DETC2019-97400..... **V007T06A054**
Design Innovation With Additive Manufacturing: A Methodology
K. Blake Perez, Carlye A. Lauff, Bradley A. Camburn, Kristin L. Wood

DETC2019-97956..... **V007T06A055**
Towards an Information Archetypes Framework: Exploring the Types of Information Used in Open Source Design Engagements
Sue Yi, Kevin Lombard, Nicole B. Damen, Matt Germonprez, Christine A. Toh

DETC2019-98078..... **V007T06A056**
Successes and Challenges in Implementing Lean Product Development
Hrushikesh Godbole, Marcos Esterman, Shridhar Palekar, Alvaro Rojas Arciniegas