Contents

Part I  Design Theory and Research Methodology

How I Became a Design Researcher ........................................ 3
Gabriela Goldschmidt

Why do Motifs Occur in Engineering Systems? .................. 15
A. S. Shaja and K. Sudhakar

Thinking About Design Thinking: A Comparative Study of Design and Business Texts ............................. 29
Marnina Herrmann and Gabriela Goldschmidt

Advancing Design Research: A “Big-D” Design Perspective ........ 41
Christopher L. Magee, Kristin L. Wood, Daniel D. Frey and Diana Moreno

Proposal of Quality Function Deployment Based on Multispace Design Model and its Application .................. 61
Takeo Kato and Yoshiyuki Matsuoka

Exploring a Multi-Meeting Engineering Design Project .......... 73
John S. Gero, Jiang Hao and Sonia Da Silva Vieira

Integrating Different Functional Modeling Perspectives ........ 85
Boris Eisenbart, Ahmed Qureshi, Kilian Gericke and Luciënne Blessing
## Part II  Design Creativity, Synthesis, Evaluation and Optimization

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Entropy in the Design Process</td>
<td>101</td>
</tr>
<tr>
<td>Petter Krus</td>
<td></td>
</tr>
<tr>
<td>Mitigation of Design Fixation in Engineering Idea Generation:</td>
<td>113</td>
</tr>
<tr>
<td>A Study on the Role of Defixation Instructions</td>
<td></td>
</tr>
<tr>
<td>Vimal Viswanathan and Julie Linsey</td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary Design Optimization of Transport Class Aircraft</td>
<td>125</td>
</tr>
<tr>
<td>Rahul Ramanna, Manoj Kumar, K. Sudhakar and Kota Harinarayana</td>
<td></td>
</tr>
<tr>
<td>Using Design-Relevant Effects and Principles to Enhance Information Scope in Idea Generation</td>
<td>137</td>
</tr>
<tr>
<td>Zhihua Wang and Peter R. N. Childs</td>
<td></td>
</tr>
<tr>
<td>Determining Relative Quality for the Study of Creative Design Output</td>
<td>151</td>
</tr>
<tr>
<td>Chris M. Snider, Steve J. Culley and Elies A. Dekoninck</td>
<td></td>
</tr>
<tr>
<td>Development of Cognitive Products via Interpretation of System Boundaries</td>
<td>163</td>
</tr>
<tr>
<td>Torsten Metzler, Iestyn Jowers, Andreas Kain and Udo Lindemann</td>
<td></td>
</tr>
<tr>
<td>A Design Inquiry into the Role of Analogy in Form Exploration:</td>
<td>175</td>
</tr>
<tr>
<td>An Exploratory Study</td>
<td></td>
</tr>
<tr>
<td>Sharmila Sinha and B. K. Chakravarthy</td>
<td></td>
</tr>
<tr>
<td>Supporting the Decision Process of Engineering Changes Through the Computational Process Synthesis</td>
<td>187</td>
</tr>
<tr>
<td>Florian Behncke, Stefan Mauler, Udo Lindemann, Sama Mbang, Manuel Holstein and Hansjörg Kalmbach</td>
<td></td>
</tr>
<tr>
<td>Concept Generation Through Morphological and Options Matrices</td>
<td>199</td>
</tr>
<tr>
<td>Dani George, Rahul Renu and Gregory Mocko</td>
<td></td>
</tr>
<tr>
<td>Understanding Internal Analogies in Engineering Design:</td>
<td>211</td>
</tr>
<tr>
<td>Observations from a Protocol Study</td>
<td></td>
</tr>
<tr>
<td>V. Srinivasan, Amaresh Chakrabarti and Udo Lindemann</td>
<td></td>
</tr>
<tr>
<td>Craftsmen Versus Designers: The Difference of In-Depth Cognitive Levels at the Early Stage of Idea Generation</td>
<td>223</td>
</tr>
<tr>
<td>Deny W. Junaidy, Yukari Nagai and Muhammad Ihsan</td>
<td></td>
</tr>
</tbody>
</table>
Part III  Design Aesthetics, Semiotics, Semantics

A Comparative Study of Traditional Indian Jewellery Style of Kundan with European Master Jewellers, a Treatise on Form and Structure .................................................. 237
Parag K. Vyas and V. P. Bapat

A Structure for Classification and Comparative Study of Jewellery Forms .......................................................... 249
Parag K. Vyas and V. P. Bapat

Product Design and the Indian Consumer: Role of Visual Aesthetics in the Decision Making Process ....................... 261
Naren Sridhar and Mark O’Brien

Effective Logo Design .................................................. 271
Sonam Oswal, Roohshad Mistry and Bhagyesh Deshmukh

Effect of Historical Narrative Based Approach in Designing Secondary School Science Content on Students’ Memory Recall Performance in a School in Mumbai ......................... 283
Sachin Datt and Ravi Poovaiah

The Home as an Experience: Studies in the Design of a Developer-Built Apartment Residence ....................... 293
P. K. Neelakantan

Meta-Design Catalogs for Cognitive Products .................. 303
Torsten Metzler, Michael Mosch and Udo Lindemann

Extracting Product Characters Which Communicate Eco-Efficiency: Application of Product Semantics to Design Intrinsic Features of Eco-Efficient Home Appliances ............... 317
Shujoy Chakraborty

Indian Aesthetics in Automotive Form ............................ 331
Chirayu S. Shinde

Understanding Emotions and Related Appraisal Pattern ........ 347
Soumava Mandal and Amitoj Singh
Part IV  Human Factors in Design

Force JND for Right Index Finger Using Contra Lateral Force Matching Paradigm .................................. 365
M. S. Raghu Prasad, Sunny Purswani and M. Manivannan

Modeling of Human Hand Force Based Tasks Using Fitts’s Law . . . 377
M. S. Raghu Prasad, Sunny Purswani and M. Manivannan

Self-Serving Well-Being: Designing Interactions for Desirable Social Outcomes ........................................ 387
Soumitra Bhat

Do We Really Need Traditional Usability Lab for UX Practice? . . . 399
Anshuman Sharma

Muscle Computer Interface: A Review. ............................... 411
Anirban Chowdhury, Rithvik Ramadas and Sougata Karmakar

Preliminary Analysis of Low-Cost Motion Capture Techniques to Support Virtual Ergonomics .......................... 423
Giorgio Colombo, Daniele Regazzoni, Caterina Rizzi and Giordano De Vecchi

A User-Centered Design Methodology Supported by Configurable and Parametric Mixed Prototypes for the Evaluation of Interaction .................................................. 435
Monica Bordegoni and Umberto Cugini

Study of Postural Variation, Muscle Activity and Preferences of Monitor Placement in VDT Work .................. 447
Rajendra Patsute, Swati Pal Biswas, Nirdosh Rana and Gaur Ray

Relation-Based Posture Modeling for DHMs ......................... 463
Sarath Reddi and Dibakar Sen

How do People View Abstract Art: An Eye Movement Study to Assess Information Processing and Viewing Strategy ........... 477
Susmita Sharma Y. and B. K. Chakravarthy
Part V Eco-Design, Sustainable Manufacturing, Design for Sustainability

Sustainability and Research into Interactions .......................... 491
Suman Devadula and Amaresh Chakrabarti

Residential Buildings Use-Phase Memory for Better Consumption Monitoring of Users and Design Improvement ...................... 505
Lucile Picon, Bernard Yannou and Stéphanie Minel

Developing Sustainable Products: An Interdisciplinary Challenge . . 517
Kai Lindow, Robert Woll and Rainer Stark

Life Cycle Assessment of Sustainable Products Leveraging Low Carbon, Energy Efficiency and Renewable Energy Options . . . 529
S. S. Krishnan, P. Shyam Sunder, V. Venkatesh and N. Balasubramanian

Inverse Reliability Analysis for Possibility Distribution of Design Variables .......................................................... 543
A. S. Balu and B. N. Rao

Analyzing Conflicts Between Product Assembly and Disassembly for Achieving Sustainability ................................. 557
S. Harivardhini and Amaresh Chakrabarti

Conceptual Platform to View Environmental Performance of Product and Its Usage in Co-Design ................................. 569
Srinivas Kota, Daniel Brissaud and Peggy Zwolinski

Design of Product Service Systems at the Base of The Pyramid .... 581
Santosh Jagtap and Andreas Larsson

Re-Assignment of E-Waste Exploring New Livelihood from Waste Management ......................................................... 593
P. Vivek Anand, Jayanta Chatterjee and Satyaki Roy

Conflicts in the Idea of ‘Assisted Self-Help’ in Housing for the Indian Rural Poor ......................................................... 605
Ameya Athavankar, Sharmishta Banerjee, B. K. Chakravarthy and Uday Athavankar

A Method to Design a Value Chain from Scratch ...................... 617
Romain Farel and Bernard Yannou
Part VI  Design Collaboration and Communication

Developing a Multi-Agent Model to Study the Social Formation of Design Practice .......................... 631
Vishal Singh and John S. Gero

Improving Common Model Understanding Within Collaborative Engineering Design Research Projects .................... 643
Andreas Kohn, Julia Reif, Thomas Wolfenstetter, Konstantin Kernschmidt, Suparna Goswami, Helmut Krcmar, Felix Brodbeck, Birgit Vogel-Heuser, Udo Lindemann and Maik Maurer

Issues in Sketch Based Collaborative Conceptual Design .............. 655
Prasad S. Onkar and Dibakar Sen

Strategies for Mutual Learning Between Academia and Industry .... 667
Margareta Norell Bergendahl and Sofia Ritzén

Participatory Design for Surgical Innovation in the Developing World ........................................... 679
Florin Gheorghe and H. F. Machiel Van der Loos

Co-Web: A Tool for Collaborative Web Searching for Pre-Teens and Teens ........................................ 691
Arnab Chakravarty and Samiksha Kothari

Part VII  Design Management, Knowledge Management and Product Life Cycle Management

Modeling and Analyzing Systems in Application ......................... 707
Maik Maurer and Sebastian Maisenbacher

A Categorization of Innovation Funnels of Companies as a Way to Better Make Conscious Agility and Permeability of Innovation Processes .................................................. 721
Gwenola Bertoluci, Bernard Yannou, Danielle Attias and Emilie Vallet

A Methodology for Assessing Leanness in NPD Process ............... 735
B. A. Patil, M. S. Kulkarni and P. V. M. Rao

PREMAP: Exploring the Design and Materials Space for Gears .... 745
Nagesh Kulkarni, Pramod R. Zagade, B. P. Gautham, Jitesh H. Panchal, Janet K. Allen and Farrokh Mistree
PREMAP: Exploring the Design Space for Continuous Casting of Steel ........................................ 759
Prabhash Kumar, Sharad Goyal, Amarendra K. Singh, Janet K. Allen, Jitesh H. Panchal and Farrokh Mistree

Requirements for Computer-Aided Product-Service Systems Modeling and Simulation ................................. 773
Gokula Vasantha, Romana Hussain, Rajkumar Roy and Jonathan Corney

Designers’ Perception on Information Processes .................... 785
Gokula Annamalai Vasantha and Amaresh Chakrabarti

Assessing the Performance of Product Development Processes in a Multi-Project Environment in SME .......................... 797
Katharina G. M. Kirner and Udo Lindemann

Information in Lean Product Development: Assessment of Value and Waste .................................................. 809
Katharina G. M. Kirner, Ghadir I. Siyam, Udo Lindemann, David C. Wynn and P. John Clarkson

A Method to Understand and Improve Your Engineering Processes Using Value Stream Mapping .................. 821
Mikael Ström, Göran Gustafsson, Ingrid Fritzell and Gustav Göransson

Lifecycle Challenges in Long Life and Regulated Industry Products ......................................................... 833
S. A. Srinivasa Moorthy

Idea Management: The Importance of Ideas to Design Business Success .................................................... 845
Camille Chinneck and Simon Bolton

The Role of Experimental Design Approach in Decision Gates During New Product Development ................ 859
Gajanan P. Kulkarni, Mary Mathew and S. Saleem Ahmed

Design Professionals Involved in Design Management: Roles and Interactions in Different Scenarios: A Systematic Review ......................................................... 873
Cláudia Souza Libânio and Fernando Gonçalves Amaral
Design Professional Activity Analysis in Design Management: A Case Study in the Brazilian Metallurgical Market
Cláudia de Souza Libânio, Giana Carli Lorenzini, Camila Rucks and Fernando Gonçalves Amaral

Analysis of Management and Employee Involvement During the Introduction of Lean Development
Katharina Helten and Udo Lindemann

ICT for Design and Manufacturing: A Strategic Vision for Technology Maturity Assessment
Mourad Messaadia, Hadrien Szigeti, Magali Bosch-Mauchand, Matthieu Bricogne, Benoît Eynard and Anirban Majumdar

Part VIII Enabling Technologies and Tools (Computer Aided Conceptual Design, Virtual Reality, Haptics, etc.)

Approaches in Conceptual Shape Generation:
Clay and CAD Modeling Compared
Tjamme Wiegers and Joris S. M. Vergeest

Optimization of the Force Feedback of a Dishwasher Door Putting the Human in the Design Loop
Guilherme Phillips Furtado, Francesco Ferrise, Serena Graziosi and Monica Bordegoni

Cellular Building Envelopes
Yasha Jacob Grobman

Development and Characterization of Foam Filled Tubular Sections for Automotive Applications
Raghu V. Prakash and K. Ram Babu

The Current State of Open Source Hardware: The Need for an Open Source Development Platform
André Hansen and Thomas J. Howard

Part IX Applications in Practice (Automotive, Aerospace, Biomedical-Devices, MEMS, etc.)

Drowsiness Detection System for Pilots
Gurpreet Singh and M. Manivannan
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion About Goal Oriented Requirement Elicitation Process into V Model</td>
<td>1005</td>
</tr>
<tr>
<td>Göknur Sirin, Bernard Yannou, Eric Coatanéa and Eric Landel</td>
<td></td>
</tr>
<tr>
<td>Prediction of Shock Load due to Stopper Hitting During Steering in an Articulated Earth Moving Equipment</td>
<td>1015</td>
</tr>
<tr>
<td>A. Gomathinayagam, B. Raghuvaman, S. Babu and K. Mohamed Rasik Habeeb</td>
<td></td>
</tr>
<tr>
<td>A Simple Portable Cable Way for Agricultural Resource Collection</td>
<td>1023</td>
</tr>
<tr>
<td>Shankar Krishnapillai and T. N. Sivasubramanian</td>
<td></td>
</tr>
<tr>
<td>Bio Inspired Motion Dynamics: Designing Efficient Mission Adaptive Aero Structures</td>
<td>1031</td>
</tr>
<tr>
<td>Tony Thomas</td>
<td></td>
</tr>
<tr>
<td>External Barriers to User-Centred Development of Bespoke Medical Devices in the UK</td>
<td>1039</td>
</tr>
<tr>
<td>Ariana Mihoc and Andrew Walters</td>
<td></td>
</tr>
<tr>
<td>Autonomous Movement of Kinetic Cladding Components in Building Facades</td>
<td>1051</td>
</tr>
<tr>
<td>Yasha Jacob Grobman and Tatyana Pankratov Yekutiel</td>
<td></td>
</tr>
<tr>
<td>Design, Development and Analysis of Press Tool for Hook Hood Lock Auxiliary Catch</td>
<td>1063</td>
</tr>
<tr>
<td>Chithajalu Kiran Sagar, B. W. Shivraj and H. N. Narasimha Murthy</td>
<td></td>
</tr>
<tr>
<td>Design of a Support Structure: Mechanism for Automated Tracking of 1 kWe Solar PV Power System</td>
<td>1077</td>
</tr>
<tr>
<td>Pravimal Abhishek, A. S. Sekhar and K. S. Reddy</td>
<td></td>
</tr>
<tr>
<td>Automated Brain Monitoring Using GSM Module</td>
<td>1089</td>
</tr>
<tr>
<td>M. K. Madhan Kumar</td>
<td></td>
</tr>
<tr>
<td>Part X Design Training and Education</td>
<td></td>
</tr>
<tr>
<td>Mapping Design Curriculum in Schools of Design and Schools of Engineering: Where do the Twains Meet?</td>
<td>1105</td>
</tr>
<tr>
<td>Peer M. Sathikh</td>
<td></td>
</tr>
</tbody>
</table>
A National Academic-Industrial Research Program
with an Integrated Graduate Research School............... 1117
Göran Gustafsson and Lars Frenning

Future Proof: A New Educational Model to Last?........ 1129
Mark O’Brien

Talking Architecture: Language and Its Roles in the Architectural
Design Process.............................................. 1139
Yonni Avidan and Gabriela Goldschmidt

Cross-Disciplinary Approaches: Indications of a Student
Design Project.............................................. 1151
Helena Hashemi Farzaneh, Maria Katharina Kaiser,
Torsten Metzler and Udo Lindemann

Reflecting on the Future of Design Education in 21st Century India:
Towards a Paradigm Shift in Design Foundation........... 1165
Indrani de Parker

Design of Next Generation Products by Novice Designers
Using Function Based Design Interpretation............... 1177
Sangarappillai Sivaloganathan, Aisha Abdulrahman, Shaikha Al Dousari,
Abeer Al Shamshi and Aysha Al Ameri

Changing Landscapes in Interactive Media Design Education..... 1189
Umut Burcu Tasa and Simge Esin Orhun

System Design for Community Healthcare Workers Using ICT... 1201
Vishwajit Mishra and Pradeep Yammiyavar

Developing Young Thinkers: An Exploratory Experimental Study
Aimed to Investigate Design Thinking and Performance
in Children..................................................... 1215
Anisha Malhotra and Ravi Poovaiah

Part XI Posters

Learning from Nature for Global Product Development......... 1231
Axel Thallemer and Martin Danzer

Design2go. How, Yes, No?.................................... 1243
Nikola Vukašinović and Jože Duhovnik
Integrating the Kansei Engineering into the Design Golden Loop Development Process .................................................. 1253
Vanja Čok, Metoda DodiČ Fikfak and Jože Duhočnik

Design and Development: The Made in BRIC Challenge .............. 1265
Luciana Pereira

Stylistic Analysis of Space in Indian Folk Painting ....................... 1277
Shatarupa Thakurta Roy and Amarendra Kumar Das

Classifying Shop Signs: Open Card Sorting of Bengaluru Shop Signs (India) ............................................................. 1287
Nanki Nath and Ravi Poovaiah

PREMAP: A Platform for the Realization of Engineered Materials and Products ............................................................ 1301
B. P. Gautham, Amarendra K. Singh, Smita S. Ghaisas,
Sreedhar S. Reddy and Farrokh Mistree

PREMAP: Knowledge Driven Design of Materials and Engineering Process ................................................................. 1315
Manoj Bhat, Sapan Shah, Prasenjit Das, Prabash Kumar,
Nagesh Kulkarni, Smita S. Ghaisas and Sreedhar S. Reddy

Bridging the Gap: From Open Innovation to an Open Product-Life-Cycle by Using Open-X Methodologies ....................... 1331
Matthias R. Gürtler, Andreas Kain and Udo Lindemann

Researching Creativity Within Design Students at University of Botswana ............................................................. 1345
Chinandu Mwendapole and Zoran Markovic

Role of Traditional Wisdom in Design Education for Global Product Development .......................................................... 1357
Ar Geetanjali S. Patil and Ar Suruchi A. Ranadive

Color Consideration for Waiting Areas in Hospitals ...................... 1369
Parisa Zraati

Hybrid ANP: QFD—ZOGP Approach for Styling Aspects Determination of an Automotive Component .......................... 1381
K. Jayakrishna, S. Vinodh and D. Senthil Kumar
Kalpana: A Dome Based Learning Installation for Indian Schools ............................................. 1391
Ishneet Grover

Design and Development of Hypothermia Prevention Jacket for Military Purpose ................................................................. 1403
S. Mohamed Yacin, Sanchit Chirania and Yashwanth Nandakumar

Decoding Design: A Study of Aesthetic Preferences ................................. 1413
Geetika Kambli

Earthenware Water Filter: A Double Edged Sustainable Design Concept for India ................................................................. 1421
M. Aravind Shanmuga Sundaram and Bishakh Bhattacharya

Designer’s Capability to Design and its Impact on User’s Capabilities ................................................................. 1433
Pramod Ratnakar Khadilkar and Monto Mani

Author Index ........................................................................................................... 1445
ICoRD'13
Global Product Development
Chakrabarti, A.; Prakash, R.V. (Eds.)
2013, XLVIII, 1448 p. In 2 volumes, not available separately., Hardcover
ISBN: 978-81-322-1049-8