

# **1st International Design Technology Conference (DESTECH 2015)**

Procedia Technology Volume 20

Geelong, Australia  
29 June - 1 July 2015

## **Editors:**

**Guy Littlefair  
Ian Gibson  
Clara Usma**

**Paul Collins  
Tim Hilditch**

ISBN: 978-1-5108-1239-0

**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.**

Copyright© by Elsevier B.V.  
All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact Elsevier B.V.  
at the address below.

Elsevier B.V.  
Radarweg 29  
Amsterdam 1043 NX  
The Netherlands

Phone: +31 20 485 3911  
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>Foreword</b> .....	1
<i>I. Gibson</i>	
<b>New Challenges in Making Plans: Putting Design back into the Applied Science of Planning</b> .....	2
<i>D. Jones</i>	
<b>Wetting Characteristics of Al-containing Sn-1Ag-0.5Cu Solder Alloy on Cu Substrate using Wetting Balance and Spread area Methods</b> .....	9
<i>M. Sabri, S. Said, D. Shmawah</i>	
<b>Connectivism as a Pedagogical Model within Industrial Design Education</b> .....	15
<i>G. Renda, B. Kuys</i>	
<b>Design and Fabrication of an Electrode for Low-actuation-Voltage Electrowetting-on-Dielectric Devices</b> .....	20
<i>M. Samad, A. Kouzani, M. Rahman, K. Magniez, A. Kaynak</i>	
<b>Virtual Lumbar Spine of Multi-body Model Based on Simbody</b> .....	26
<i>Z. Gao, I. Gibson, C. Ding, J. Wang</i>	
<b>Industrial Design Digital Technology</b> .....	32
<i>J. Loy, S. Canning, C. Little</i>	
<b>The Making of Geometry</b> .....	39
<i>D. Bertol</i>	
<b>Looking Back to Move Forward: The Dymaxion Revisited</b> .....	46
<i>R. Kennedy</i>	
<b>Lab-on-a-chip or Chip-in-a-lab: Challenges of Commercialization Lost in Translation</b> .....	54
<i>M. Mohammed, S. Haswell, I. Gibson</i>	
<b>An Investigation of Human Cortical Bone's Response to Mechanical Stimuli</b> .....	60
<i>Y. Wang</i>	
<b>The Effect of Pulsed Electromagnetic Field on the Bone Volume of Human Being</b> .....	66
<i>Y. Wang, W. Zhang</i>	
<b>Designing and Making a Movement Infrastructure</b> .....	72
<i>D. Bertol</i>	
<b>Mining the Gap! Fostering Creativity and Innovative Thinking</b> .....	79
<i>G. Brand, L. Hendy, R. Harrison</i>	
<b>Development of Next-generation Compression Apparel</b> .....	85
<i>A. Belbasis, F. Fuss</i>	
<b>Finite Element Bicycle Helmet Models Development</b> .....	91
<i>H. Mustafa, T. Pang, T. Perret-Ellena, A. Subic</i>	
<b>Design Strategy For Selecting Appropriate Energy Absorbing Materials and Structures: Data Library and Customised Selection Criteria</b> .....	98
<i>F. Fuss, A. Belbasis, B. Hazel, A. Ketabi</i>	
<b>Seesaw: An Interactive Display to Facilitate Social Interaction</b> .....	104
<i>C. Yang, S. Wang</i>	
<b>[DesktopLabs] Desktop Laboratories: Web Share and Additive Manufacture of Engineering Educational Models</b> .....	111
<i>M. Leary, M. Mazur, M. McMillan, M. Brandt, A. Subic</i>	
<b>Design of Low Cost Smart Insole for Real Time Measurement of Plantar Pressure</b> .....	117
<i>A. Tan, F. Fuss, Y. Weizman, Y. Woudstra, O. Troynikov</i>	
<b>Design of Seamless Knitted Radiation Shielding Garments with 3D Body Scanning Technology</b> .....	123
<i>H. Maghrabi, A. Vijayan, L. Wang, P. Deb</i>	
<b>Development of a Smart Cricket Ball for Advanced Performance Analysis of Bowling</b> .....	133
<i>B. Doljin, F. Fuss</i>	
<b>Sensor Array Design and Development of Smart Sensing System for Kick Force Visualization in Soccer</b> .....	138
<i>Y. Weizman, F. Fuss</i>	
<b>A Novel Approach to Low Temperature Thermal Reverse Osmosis Desalination</b> .....	144
<i>J. Nihill, M. Leary, A. Date</i>	
<b>Taking the LEAP with the Oculus HMD and CAD - Plucking at thin Air?</b> .....	149
<i>N. Beattie, B. Horan, S. McKenzie</i>	
<b>3D Printed Biocompatible Enclosures for an Implantable DBS Microdevice</b> .....	155
<i>S. Adams, A. Kouzani, M. Mohammed, C. Usma, S. Tye</i>	

<b>Tangible Interaction Design: Preparing Future Designers for the Needs of Industrial Innovation</b> .....	162
<i>S. Wang, P. Moriarty, S. Wu</i>	
<b>Development of Visual Aspect of Porsche Brand using CAD Technology</b> .....	170
<i>A. Aqeel</i>	
<b>Programmatic Lattice Generation for Additive Manufacture</b> .....	178
<i>M. McMillan, M. Jurg, M. Leary, M. Brandt</i>	
<b>Design of a Virtual Reality Training System for Micro-robotic Cell Injection</b> .....	185
<i>S. Faroque, B. Horan, H. Adam, S. Thomas</i>	
<b>An Approach for Personalised Product Development</b> .....	191
<i>M. Kajtaz, B. Witherow, C. Usma, M. Brandt, A. Subic</i>	
<b>Design of a Personalised Faceguard for an Elite Cricketer</b> .....	199
<i>M. Kajtaz, B. Witherow, M. Leary, M. Brandt, A. Subic</i>	
<b>Design of a Patterned Diamond Substrate for Ordered Neural Cell Adhesion</b> .....	206
<i>W. Tong, K. Fox, K. Ganesan, S. Prawer</i>	
<b>Videogame Technology Re-Purposed: Towards Interdisciplinary Design Environments for Engineering and Architecture</b> .....	212
<i>J. Moloney</i>	
<b>Improved Manufacturing Quality and Bonding of Laser Machined Microfluidic Systems</b> .....	219
<i>M. Mohammed, K. Quayle, R. Alexander, E. Doeven, R. Nai, S. Haswell, A. Kouzani, I. Gibson</i>	
<b>Wireless Optogenetics: An Exploration of Portable Microdevices for Small Animal Photostimulation</b> .....	225
<i>R. Kale, A. Kouzani, M. Berk, K. Walder, J. Berk, S. Tye</i>	
<b>Microstructure and Mechanical Properties of Wrought and Additive Manufactured Ti-6Al-4V Cylindrical Bars</b> .....	231
<i>M. Shunmugavel, A. Polishetty, G. Littlefair</i>	
<b>Simplifying Medical Additive Manufacturing: Making the Surgeon the Designer</b> .....	237
<i>I. Gibson, A. Srinath</i>	
<b>Influence of Fill Gap on Flexural Strength of Parts Fabricated by Curved Layer Fused Deposition Modeling</b> .....	243
<i>H. Guan, M. Savalani, I. Gibson, O. Diegel</i>	
<b>Application of Additive Manufacturing to the Digital Restoration of Archaeological Artifacts</b> .....	249
<i>F. Zhang, R. Campbell, I. Graham</i>	
<b>Building a Local Design and Entrepreneurship Ecosystem</b> .....	258
<i>P. Collins</i>	
<b>Fabrication of Force Sensor Circuits on Wearable Conductive Textiles</b> .....	263
<i>C. Usma, A. Kouzani, J. Chua, A. Arogbonlo, S. Adams, I. Gibson</i>	
<b>Design and Fabrication of a Capacitance Based Wearable Pressure Sensor Using E-textiles</b> .....	270
<i>A. Arogbonlo, C. Usma, A. Kouzani, I. Gibson</i>	
<b>Integrating Product Design and Entrepreneurship Education: A Stimulant for Enterprising Design and Engineering Students in South Africa</b> .....	276
<i>R. Odora</i>	
<b>Author Index</b>	