



Proceedings of the

Asian Workshop on

3D Body Scanning Technologies

Tokyo, Japan, 17-18 April 2012

Editor and Organizer

Hometrica Consulting - Dr. Nicola D'Apuzzo
Switzerland
www.hometrica.ch



This compilation © 2012 by Hometrica Consulting - Dr. Nicola D'Apuzzo, Switzerland. Reproduction of this volume or any parts thereof (excluding short quotations for the use in the preparation of reviews and technical and scientific papers) may be made only after obtaining the specific approval of the publisher. The papers appearing in this volume reflect the author's opinions. Their inclusion in this publication does not necessary constitute endorsement by the editor or by the publisher. Authors retain all rights to individual papers.

Published by

Hometrica Consulting - Dr. Nicola D'Apuzzo
Via Collegio 28, CH-6612 Ascona, Switzerland
Tel: +41 91 7915524
Email: info@hometrica.ch
Web: www.hometrica.ch

Table of contents

Introduction	6	
Technical Session 1: Full Body Scanning Systems	<i>pag.</i>	<i>paper#</i>
KX-16: 3D Body Scanning Using Low Cost Depth Sensors David Bruner <i>[TC]², Textile/Clothing Technology Corp., Cary (NC), USA</i>	7	#29
VITUS 3D Body Scanner Markus Maurer <i>Vitronic GmbH, Wiesbaden, Germany</i>	9	#08
A Portable 3D Body Scanner and its Application Hideto Kameshima ^a , Masaki Hayashi ^{a,b} , Yuji Nishio ^a , Yukio Sato ^a ^a <i>Spacevision Inc., Tokyo, Japan;</i> ^b <i>Keio University, Kanagawa, Japan</i>	16	#14
The Ubiquity of Scanning Technologies Robert Kutnick <i>Me-Ality, Unique Solutions Ltd., Dartmouth (NS), Canada</i>	19	#33
Technical Session 2: Body Scanning for Medicine and Health	<i>pag.</i>	<i>paper#</i>
Applications of 3D Body Scanning Technology to Human Anthropometry: Body Surface Area and Body Volume Measurements in the Fields of Health and Sports Sciences Kazuo Funato ^a , Noriko Hakamada ^a , Hidehiko Nagashima ^b , Chiyoharu Horiguchi ^b ^a <i>Laboratory for Human Movement Sciences, Nippon Sport Science University, Yokohama, Japan;</i> ^b <i>Hamamatsu Photonics K.K., Hamamatsu, Japan</i>	21	#05
Using 1D and 3D Anthropometric Data to Develop a Biofidelic Breast Cancer Patient Simulator Daisy Veitch ^a , Rachel Dawson ^b , Harry Owen ^b , Chris Leigh ^a ^a <i>SHARP Dummies Pty Ltd, Belair (SA), Australia;</i> ^b <i>Flinders Medical Centre, Bedford Park (SA), Australia</i>	29	#26
Analysis of 3D Foot Shape Features in Elderly with Hallux Valgus Using Multi-Dimensional Scaling Method SungHyek Kim <i>Health Science University, Fuji-Kawaguchiko, Yamanashi, Japan</i>	37	#02
Technical Session 3: Body Scanning Systems and Technologies	<i>pag.</i>	<i>paper#</i>
3D Foot Scanning System INFOOT - Automated Anatomical Landmark Detection and Labeling Kozo Kimura ^a , Tsuneaki Utsumi ^a , Makiko Kouchi ^b , Masaaki Mochimaru ^b ^a <i>I-Ware Laboratory Co. Ltd, Osaka, Japan;</i> ^b <i>Digital Human Research Center, AIST, Tokyo, Japan</i>	44	#30
Human Body Measurement by Digital Photogrammetry System Nobuo Kochi, Kazuo Kitamura, Hiroto Watanabe, Takayuki Noma, Mitsuharu Yamada <i>Imaging and Measuring Laboratory, R&D Center, Topcon Corporation, Tokyo, Japan</i>	47	#12

Real-Time 3D Body Scanning Minoru Niimura ^a , Matthew W. Bellis ^a , Daniel L. Lau ^b ^a SEIKOWAVE, Kawasaki, Japan; ^b University of Kentucky, Lexington (KY), USA	54	#32
Development of Low Cost Foot Scanner Using Foot Model Ameersing Luximon ^a , Zhang YiFan ^a , Ma Xiao ^a , Yan Luximon ^b ^a Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Hong Kong, SAR China; ^b School of Design, The Hong Kong Polytechnic University, Hong Kong, SAR China	60	#31
Technical Session 4: Processing of Body Scan Data	<i>pag.</i>	<i>paper#</i>
Estimation of Center of Gravity Obtained from 3D Whole Body Scanning Anthropometry Method Noriko Hakamada ^a and Kazuo Funato ^b ^a Nippon Sport Science University, Tokyo, Japan; ^b Graduate School of Health and Sport Science, Nippon Sport Science University, Tokyo, Japan	64	#04
Shape Map Method for 3D Body Scanning Information Storage Peng Sixiang ^a , Chan Chee-Kooi ^a , Ameersing Luximon ^a , W.H. Ip ^b ^a Institute of Textiles & Clothing, Hong Kong Polytechnic University, Hong Kong, SAR China; ^b Department of Industrial and Systems Engineering, Hong Kong Polytechnic University, Hong Kong, SAR China	71	#19
Rules Research of Neck Curves for 3D Female Body Mannequin Junqiang Su ^{a,b,c} , Bingfei Gu ^{a,b} , Guolian Liu ^{a,b} ^a National Engineering Laboratory for Modern Silk, Suzhou, China; ^b College of Textile and Clothing Engineering, Soochow University, Suzhou, China; ^c Changzhou Textile & Garment Institute, Changzhou, China	77	#22
Using Body Scan Technology (Computer-Aided Anthropometry) to Measure Breast Volume Daisy Veitch ^a , Karen Burford ^b , Phil Dench ^c , Nicola Dean ^b , Philip Griffin ^b ^a SHARP Dummies Pty Ltd, Belair (SA), Australia; ^b Flinders Medical Centre, Bedford Park (SA), Australia; ^c headus (metamorphosis) Pty Ltd, Osborne Park (WA), Australia	82	#28
Three Dimensional (3D) Head Data Classification Based on a Local Shape Feature Description X.H. Zheng ^{a,b} , J.W. Niu ^c , S.T. Ding ^b , Q.X. Zhou ^a ¹ School of Biological Science and Medical Engineering, Beihang University, China; ^b Research Institute of Chemical Defense, Beijing, China; ^c Department of Logistics Engineering, University of Science and Technology Beijing, Beijing, China	91	#23
Technical Session 5: Human Body Sizing Surveys	<i>pag.</i>	<i>paper#</i>
National Anthropometric Surveys in China Taijie Liu ^a , Chuzhi Chao ^a , Chaoyi Zhao ^a , Recharad Zhao ^b ^a China National Institute of Standardization, Beijing, P.R. China; ^b Leatech Co. Ltd., Beijing, P.R. China	97	#24
Anthropometric Study on Chinese Head Roger MacLaren Ball, Yan Luximon, Ho Chi Eric Chow School of Design, The Hong Kong Polytechnic University, Hong Kong, SAR China	101	#07
3D Size Survey – Process Chain and Available Products Anton Preiss, Ulrich Botzenhardt Human Solutions GmbH, Kaiserslautern, Germany	106	#25

SIZE INDIA: India's first 3-D Whole Body Scanning Survey - Experiences & Future Scope Dileep D. Kulkarni, C.V. Ghaisas, A. V. Mannikar <i>The Automotive Research Association of India, Pune, India</i>	115	#16
Technical Session 6: Body Scanning for Apparel	<i>pag.</i>	<i>paper#</i>
Analysis of three dimensional torso shape and bodice pattern shape of young Japanese Women Keiko Watanabe <i>Kyoto Women's University, Kyoto, Japan</i>	116	#11
Waist Measurements Compared: Definitions (ISO vs CAESAR) and Instruments (Manual vs 3D Scanned Data) Daisy Veitch <i>SHARP Dummies Pty Ltd, Belair (SA), Australia</i>	123	#27
In Pursuit of the IDEAL Fit Joanna Gould-Thorpe <i>Me-Ality, Unique Solutions Ltd., Dartmouth (NS), Canada</i>	132	#34
Made-to-Measure Jeans Pirjo Elbrecht <i>Nomo Jeans Corp., Helsinki, Finland</i>	134	#13
Technical Session 7: Digital Anthropometry	<i>pag.</i>	<i>paper#</i>
A Protocol for Evaluating the Accuracy of 3D Body Scanners - Landmark Locations and Surface Shape Makiko Kouchi ^a , Masaaki Mochimaru ^a , Bruce Bradtmiller ^b , Hein Daanen ^c , Peng Li ^d , Beatriz Nacher ^e , Yunja Nam ^f ^a <i>Digital Human Research Center, AIST, Tokyo, Japan;</i> ^b <i>Anthrotec Inc., Yellow Springs (OH), USA;</i> ^c <i>TNO, Soesterberg, The Netherlands;</i> ^d <i>US Army, Natick (MA), USA;</i> ^e <i>IBV, Valencia, Spain;</i> ^f <i>Seoul National University, Seoul, Korea</i>	139	#01
Automatic Measurement of Dimensions of 3D Foot Scan Data Jinkyou Son, Seung-Yeob Baek, Kunwoo Lee <i>Human Centered CAD Laboratory, Seoul National University, S. Korea</i>	147	#20
Web-Based Human Body Modeling by Restricted Number of Anthropometric Data Igor Goncharenko ^a , Heihachi Ueki ^a , Katsuaki Takashiba ^a , Masaaki Mochimaru ^b , Makiko Kouchi ^b , Satoko Usui ^c , Masakazu Odahara ^c ^a <i>I-Net Corp., Tokyo, Japan;</i> ^b <i>AIST, Tokyo, Japan;</i> ^c <i>Nihon Unisys Ltd., Tokyo, Japan</i>	155	#10
Digital Human Modeling for Indian Anthropometry Abira Dasgupta ^a , Bharat Vijayaraghavan ^a , N. R. Rajhans ^a , Dileep Kulkarni ^b , A. V. Mannikar ^b ^a <i>College of Engineering, Pune, India;</i> ^b <i>The Automotive Research Association of India, Pune, India</i>	165	#21