

**Biomedical Sciences
Instrumentation Volume 44:
Technical Papers Composing the
Proceedings of the 45th Annual
Rocky Mountain Bioengineering
Symposium and 45th International
ISA Biomedical Sciences
Instrumentation Symposium
2008**

ISA Volume 472

April 4-6, 2008
Copper Mountain, Colorado, USA

Printed from e-media with permission by:

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

ISBN: 978-1-60560-362-9

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

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© (2008) by International Society of Automation - ISA
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact International Society of Automation - ISA
at the address below.

International Society of Automation - ISA
67 Alexander Drive
Research Triangle Park, NC 27709 USA

Phone: (919) 549-8411

Fax: (919) 549-8288

info@isa.org

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
Web: www.proceedings.com

Biomedical Sciences Instrumentation Volume 44: Technical Papers Composing the
Proceedings of the 45th Annual Rocky Mountain Bioengineering Symposium and 45th
International ISA Biomedical Sciences Instrumentation Symposium
2008

TABLE OF CONTENTS

BIOINSTRUMENTATION

| | |
|--|----|
| A Confocal Laser Scanning Microscope Segmentation Method Applied to Magnetic Resonance Images | 1 |
| <i>Jeffrey R. Anderson, Electrical and Computer Engineering, University of Wyoming, Laramie, WY; Steven F. Barrett, Electrical and Computer Engineering, University of Wyoming, Laramie, WY</i> | |
| Functional Correlates of Diffusion Tensor Imaging in Spinal Cord Injury | 7 |
| <i>Benjamin M. Ellingson, Department of Biomedical Engineering, Marquette University, Milwaukee, WI; Shekar N. Kurpad, Department of Neurosurgery, Medical College of Wisconsin, Milwaukee, WI; Brian D. Schmit, Department of Biomedical Engineering, Marquette University, Milwaukee, WI</i> | |
| Effect of Low Power Laser Treatment on a Traumatized Disc in a Rat Model | 13 |
| <i>Felix Adah, University of Mississippi Medical Center, Jackson, MS; Hamed Benghuzzi, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, University of Mississippi Medical Center, Jackson, MS; Ashraf Ragab, University of Mississippi Medical Center, Jackson, MS; Neva Greenwald, University of Mississippi Medical Center, Jackson, MS</i> | |
| Repeatability of Posturographic Measures of the mCTSIB Static Balance Tests – A Preliminary Investigation | 20 |
| <i>Guido Pagnacco, Carrick Institute for Clinical Ergonomics Rehabilitation and Applied Neuroscience, Cape Canaveral, FL and Vestibular Technologies, Cheyenne WY; Elena Oggero, Carrick Institute for Clinical Ergonomics Rehabilitation and Applied Neuroscience, Cape Canaveral, FL and Vestibular Technologies, Cheyenne WY; Frederick R. Carrick, Carrick Institute for Clinical Ergonomics Rehabilitation and Applied Neuroscience, Cape Canaveral, FL</i> | |
| Expanding Smart Wheelchair Technology for Users with Severe Disabilities | 26 |
| <i>Gavin R. Phillips, University of Wyoming, Laramie, WY; Cameron H. G. Wright, University of Wyoming, Laramie, WY; Steven F. Barrett, University of Wyoming, Laramie, WY</i> | |
| Validity and Reliability of a Controlled Pneumatic Resistance Exercise Device | 32 |
| <i>David C. Paulus, Department Mechanical Engineering, University of Arkansas–Fort Smith, Fort Smith, AR; Michael C. Reynolds, Department Mechanical Engineering, University of Arkansas–Fort Smith, Fort Smith, AR; Brian K. Schilling, Department of Health and Sport Sciences, University of Memphis, Memphis, TN</i> | |
| Clinical Engineering Workshops in Latin America | 38 |
| <i>Matthew F. Baretich, Baretich Engineering, Inc., Fort Collins, CO</i> | |
| Information Processing from a One-Dimensional Bio-Inspired Analog Sensor | 42 |
| <i>S. F. Barrett, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; J. B. Benson, Electrical and Computer Engineering Department, University of Wyoming Laramie, WY; C. H.G. Wright, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY</i> | |
| Autonomous Vehicle Navigation Utilizing Fuzzy Controls: Concepts for a Next Generation Wheelchair | 48 |
| <i>J. D. Hansen, Rockwell Collins, Inc., Melbourne, FL; S. F. Barrett, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; C. H. G. Wright, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; M. Wilcox, Department of Biology, United States Air Force Academy, CO</i> | |

| | |
|--|----|
| Kinematic Analyses of Instrumentation Cubes in Vehicle Impact Experiments | 55 |
| <i>Jaeho Shin, University of Virginia Center for Applied Biomechanics, Charlottesville, VA; Costin D. Untaroiu, University of Virginia Center for Applied Biomechanics, Charlottesville, VA; Jason R. Kerrigan, University of Virginia Center for Applied Biomechanics, Charlottesville, VA; Jason L. Forman, University of Virginia Center for Applied Biomechanics, Charlottesville, VA; Jeff R. Crandall, University of Virginia Center for Applied Biomechanics, Charlottesville, VA</i> | |

BIOMATERIALS

| | |
|---|----|
| The Effect of NPY and Norepinephrine on the Triglyceride Droplets in Brown Adipose Tissue in Obese Warm Acclimated Rats | 61 |
| <i>Ateegh Al-Arabi, Department of Life Sciences, Johnson County Community College, Overland Park, KS; J.F. Andrews, Department of Physiology, Trinity College Dublin, Dublin, Ireland</i> | |

| | |
|---|----|
| Analysis of Tobramycin Release from Beta Tricalcium Phosphate Drug Delivery System | 67 |
| <i>Arun Aneja, Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; James Woodall, Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Scott Wingerter, Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Hamed Benghuzzi, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS</i> | |

| | |
|--|----|
| The Use of Androgen Loaded TCPL Delivery Devices to Assess the Proinflammatory Cytokines Profiles | 73 |
| <i>Ham Benghuzzi, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Orthopaedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS</i> | |

| | |
|---|----|
| Analysis of Retrieved Hemiresurfacing Implant | 79 |
| <i>Kendall M. Bieschke, Johns Hopkins University Orthopaedics, Good Samaritan Hospital, Baltimore, MD; Marc W. Hungerford, Johns Hopkins University Orthopaedics, Good Samaritan Hospital, Baltimore, MD; Lynne C. Jones, Johns Hopkins University Orthopaedics, Good Samaritan Hospital, Baltimore, MD</i> | |

| | |
|---|----|
| Mechanical Properties of Polytetrafluoroethylene Elastomer Membrane for Dynamic Cell Culture Testing | 84 |
| <i>Carolyn Hampton, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Gregory D. Webster, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Beverly Rzigalinski, Edward Via Virginia College of Osteopathic Medicine, Blacksburg, VA; Hampton C. Gabler, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

BIOMECHANICS

| | |
|---|----|
| Biofidelity of an Original and Modified SID-IIs Upper Extremity: Matched Cadaver and Dummy Compression Tests | 90 |
| <i>Andrew R. Kemper, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Craig McNally, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA</i> | |

| | |
|---|----|
| High Rate Internal Pressurization of the Human Eye to Determine Dynamic Rupture Pressure | 96 |
| <i>Jill A. Bisplinghoff, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Craig McNally, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Siyang Yang, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Ian P. Herring, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Fred T. Brozoski, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL; Stefan M. Duma, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

| | |
|--|-----|
| Torso Side Airbag Out-of-Position Evaluation Using Stationary and Dynamic Occupants | 102 |
| <i>Jason J. Hallman B.S., Department of Neurosurgery, Medical College of Wisconsin, and Zablocki Veterans Affairs Medical Center, Milwaukee, WI; Narayan Yoganandan Ph.D., Department of Neurosurgery, Medical College of Wisconsin, and Zablocki Veterans Affairs Medical Center, Milwaukee, WI; Frank A. Pintar, Ph.D., Department of Neurosurgery, Medical College of Wisconsin, and Zablocki Veterans Affairs Medical Center, Milwaukee, WI</i> | |
| How to Test Brain and Brain Simulant at Ballistic and Blast Strain Rates | 108 |
| <i>Jiangyue Zhang, Department of Neurosurgery, Medical College of Wisconsin and VA Medical Center, Milwaukee, WI; Bo Song, School of Aeronautics and Astronautics, and School of Materials Engineering, Purdue University, West Lafayette, IN; Frank A. Pintar, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI; Narayan Yoganandan, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI; Weinong Chen, School of Aeronautics and Astronautics, and School of Materials Engineering, Purdue University, West Lafayette, IN; Thomas A. Gennarelli, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI</i> | |
| Biomechanical Response of the Human Cervical Spine | 114 |
| <i>Stefan M. Duma, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Andrew R. Kemper, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; David J. Porta, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA, and Bellarmine University, Louisville, KY</i> | |
| Biomechanical Injury Response of Leg Subjected to Combined Axial Compressive and Bending Loading | 120 |
| <i>Costin D. Untaroiu, Center for Applied Biomechanics, University of Virginia, Charlottesville, VA; Johan Ivarsson, Center for Applied Biomechanics, University of Virginia, Charlottesville, VA; Dan R. Genovese, Center for Applied Biomechanics, University of Virginia, Charlottesville, VA; Dipan Bose, Center for Applied Biomechanics, University of Virginia, Charlottesville, VA; Jeff R. Crandall, Center for Applied Biomechanics, University of Virginia, Charlottesville, VA</i> | |
| The Use of Acoustic Emission in Facial Fracture Detection | 126 |
| <i>Joseph Cormier, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg VA; Sarah Manoogian, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Jill Bisplinghoff, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Craig McNally, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Geometric Scaling Factors for the Pediatric Brainstem | 132 |
| <i>Kerry A. Danelson, Wake Forest University School of Medicine and Virginia Tech – Wake Forest Center for Injury Biomechanics, Winston-Salem, NC; Mao Yu, Wake Forest University School of Medicine and Virginia Tech - Wake Forest Center for Injury Biomechanics, Winston-Salem, NC; F. Scott Gayzik, Wake Forest University School of Medicine and Virginia Tech - Wake Forest Center for Injury Biomechanics, Winston-Salem, NC; Carol P. Geer, Wake Forest University School of Medicine, Winston-Salem, NC; Dennis E. Slice, University of Vienna, Vienna, Austria; Joel D. Stitzel, Wake Forest University School of Medicine and Virginia Tech - Wake Forest Center for Injury Biomechanics, Winston-Salem, NC</i> | |
| Volumetric Splenic Injury Measurement in CT Scans for Comparison with Injury Score | 138 |
| <i>Kerry A. Danelson, Wake Forest University School of Medicine and Virginia Tech – Wake Forest Center for Injury Biomechanics, Winston-Salem, NC; Joel D. Stitzel, Wake Forest University School of Medicine and Virginia Tech - Wake Forest Center for Injury Biomechanics, Winston-Salem, NC</i> | |
| Differences in Hybrid III and THOR-NT Neck Response in Extension Using Matched Tests with Football Neck Collars | 144 |
| <i>Steven Rowson, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; David E. McNeely, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Dynamic Compressive Response of the Human Pelvis: Axial Loading of the Sacroiliac Joint | 150 |
| <i>Andrew R. Kemper, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Craig McNally, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

| | |
|---|-----|
| Dynamic Material Property Measurements of Human Eyes | 156 |
| <i>Jill A. Bisplinghoff, Virginia Tech - Wake Forest Center for Injury Biomechanics Blacksburg, VA; Craig McNally, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Fred T. Brozoski, United States Army Aeromedical Research Laboratory, Fort Rucker, AL; Stefan M. Duma, Virginia Tech – Wake Forest University Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Evaluation of Pregnant Female Injury Risk During Everyday Activities | 162 |
| <i>Sarah J. Manoogian, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; David M. Moorcroft, Federal Aviation Administration Civil Aerospace Medical Institute, Oklahoma City, OK; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Comparison of Radial Expansion of Stents Within Mock Vessels Molded with a Target Bent Radius Versus Straight Mock Vessels Bent to a Target Radius | 168 |
| <i>R. Ramesh, Dynatek Dalta Scientific Instruments, Galena, MO; J. C. Conti, Department of Physics, Astronomy and Material Sciences, Missouri State University, Springfield, MO and Harbin Engineering University, Harbin, China; E. R. Strobe, Dynatek Dalta Scientific Instruments, Galena, MO; M. Thompson, Dynatek Dalta Scientific Instruments, Galena, MO; K. S. Price, Dynatek Dalta Scientific Instruments, Galena, MO; D. Murray, Dynatek Dalta Scientific Instruments, Galena, MO</i> | |
| Force Transmission to the Mandible by Chin Straps During Head Impacts in Football | 174 |
| <i>Steven Rowson, Virginia Tech–Wake Forest Center for Injury Biomechanics, Blacksburg, VA; David E. McNeely, Virginia Tech–Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech–Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Forearm Fracture Bending Risk Function for the 50th Percentile Male | 180 |
| <i>Anthony C. Santago, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Joseph M. Cormier, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Narayan Yoganandan, Medical College of Wisconsin, Milwaukee, WI; Frank A. Pintar, Medical College of Wisconsin, Milwaukee, WI</i> | |
| Relationship Between Linear and Rotational Head Acceleration in Various Activities | 186 |
| <i>James R. Funk, Biodynamic Research Corporation, San Antonio, TX; Joseph M. Cormier, Biodynamic Research Corporation, San Antonio, TX; C. Edward Bain, Biodynamic Research Corporation, San Antonio, TX; Herb Guzman, Biodynamic Research Corporation, San Antonio, TX; Enrique Bonugli, Biodynamic Research Corporation, San Antonio, TX</i> | |
| Acceleration-Based Occupant Injury Criteria for Predicting Injury in Real-World Crashes | 192 |
| <i>Douglas J. Gabauer, Virginia Tech -Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Hampton C. Gabler, Virginia Tech -Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Comparison of Occupant Restraint Performance Measures for Crash Injury Prediction | 198 |
| <i>Douglas J. Gabauer, Virginia Tech -Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Hampton C. Gabler, Virginia Tech-Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Quantitative Histology of Contused Lung Tissue with Comparison to Computed Tomography | 204 |
| <i>F. Scott Gayzik, Wake Forest University School of Medicine and Virginia Tech – Wake Forest University School of Biomedical Engineering and Sciences, Winston-Salem, NC; J. Jason Hoth, Wake Forest University School of Medicine and Virginia Tech – Wake Forest University School of Biomedical Engineering and Sciences, Winston-Salem, NC; Joel D. Stitzel, Wake Forest University School of Medicine and Virginia Tech – Wake Forest University School of Biomedical Engineering and Sciences, Winston-Salem, NC</i> | |
| Humerus Fracture Bending Risk Function for the 50th Percentile Male | 210 |
| <i>Anthony C. Santago, Virginia Tech – Wake Forest University Center for Injury Biomechanics, Blacksburg, VA; Joseph M. Cormier, Virginia Tech – Wake Forest University Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest University Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Interactive Variable Resistance Exercise System: Concept and Preliminary Results | 216 |
| <i>David C. Paulus, Mechanical Engineering Department, University of Arkansas–Fort Smith, Fort Smith, AR; Raoul F. Reiser II, Health & Exercise Science Department, Colorado State University, Fort Collins, CO; Wade O. Troxell, Office of the Dean of Engineering, Colorado State University, Fort Collins, CO</i> | |

| | |
|--|------------|
| Matched Experimental and Computational Simulations of Paintball Eye Impacts | 222 |
| <i>Eric A. Kennedy, Bucknell University Biomedical Engineering Department, Lewisburg, PA; Joel D. Stitzel, Wake Forest University School of Medicine, Winston-Salem, NC and Virginia Tech-Wake Forest University Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech-Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Pregnant Occupant Injury Risk in Severe Frontal Crashes Using Computer Simulations | 228 |
| <i>Sarah J. Manoogian, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; David M. Moorcroft, Federal Aviation Administration Civil Aerospace Medical Institute, Oklahoma City, OK; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Head Motions Using Nine Accelerometer Package and Angular Rate Sensors | 235 |
| <i>Narayan Yoganandan, Department of Neurosurgery, Medical College of Wisconsin and VA Medical Center, Milwaukee, WI; John Humm, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI; Michael Schlick, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI; Frank Pintar, Department of Neurosurgery, Medical College of Wisconsin, and VA Medical Center, Milwaukee, WI</i> | |
| Trial Number and Duration Effects on Standing Weight-Bearing Asymmetry Measures | 241 |
| <i>Raoul F. Reiser, II, Department of Health & Exercise Science, Colorado State University, Ft. Collins, CO; Elan A. Dalton, Department of Health & Exercise Science, Colorado State University, Ft. Collins, CO; Joseph D. Pault, Department of Health & Exercise Science, Colorado State University, Ft. Collins, CO</i> | |
| Review of Correlation Methods for Evaluating Finite Element Simulations of Impact Injury Risk | 247 |
| <i>Qian Wang, Virginia Tech-Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Hampton C. Gabler, Virginia Tech-Wake Forest, Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Estimating Shoulder Injury Risk Using Low Rate Lateral Impacts to Dummies | 253 |
| <i>Craig P. Thor, Virginia Tech -Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Kathleen Bieryla, Virginia Tech, the Kevin P. Granata Musculoskeletal Biomechanics Laboratory; Hampton C. Gabler, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Influence of Total Laminectomy on the Mechanical Behavior of Lumbosacral Spine | 259 |
| <i>Yabo Guan, Department of Neurosurgery, Medical College of Wisconsin and Zablocki VA Medical Center, Milwaukee, WI; Narayan Yoganandan, Department of Neurosurgery, Medical College of Wisconsin and Zablocki VA Medical Center, Milwaukee, WI; Frank A. Pintar, Department of Neurosurgery, Medical College of Wisconsin and Zablocki VA Medical Center, Milwaukee, WI</i> | |
| Coordinated Muscle Activity of the Legs During Assisted Bilateral Hip Oscillation in Human Spinal Cord Injury | 265 |
| <i>Tanya Onushko, Department of Biomedical Engineering Marquette University, Milwaukee, WI; Brian D. Schmit, Ph.D., Department of Biomedical Engineering Marquette University, Milwaukee, WI</i> | |
| The Relationship Between Thoracic Organ Injuries and Associated Rib Fractures | 271 |
| <i>Craig P. Thor, Virginia Tech - Wake Forest Center for Injury Biomechanics; Hampton C. Gabler, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Validation of Finite Element Models of Injury Risk in Vehicle-Roadside Barrier Crashes | 277 |
| <i>Qian Wang, Virginia Tech - Wake Forest Center for Injury Biomechanics Blacksburg, VA; Hampton C. Gabler, Virginia Tech - Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |
| Categorical Similarity Comparison of CIREN and NASS | 283 |
| <i>Mao M. Yu, Wake Forest University School of Medicine and Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Kerry A. Danelson, Wake Forest University School of Medicine, Winston-Salem, NC and Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Joel D. Stitzel, Wake Forest University School of Medicine and Virginia Tech – Wake Forest University Center for Injury Biomechanics, Blacksburg, VA</i> | |

BIOMEDICAL MODELING

| | |
|---|-----|
| Implantable Axial-Flow Blood Pump for Left Ventricular Support | 289 |
| <i>Alexandrina Untaroiu, University of Virginia, Department of Mechanical and Aerospace Engineering, Charlottesville, VA; Houston G. Wood, University of Virginia, Department of Mechanical and Aerospace Engineering, Charlottesville, Va; Paul E. Allaire, University of Virginia, Department of Mechanical and Aerospace Engineering, Charlottesville, VA</i> | |
| Dressing Virtual Humans from 3d Scanned Data | 295 |
| <i>Hui Yu, School of Design and Engineering, Brunel University, Uxbridge, Middlesex, UK; Shengfeng Qin, School of Design and Engineering, Brunel University, Uxbridge, Middlesex, UK; David Wright, School of Design and Engineering, Brunel University, Uxbridge, Middlesex, UK</i> | |
| Human Fear Mechanism Emulator | 301 |
| <i>Paul Frenger, a Working Hypothesis, Inc., Houston, TX</i> | |
| A Finite Element Approach to Predicting Scleral Response to Mechanical Stress | 308 |
| <i>Ryan N. Mudry, United States Air Force Academy Department of Biology, USAF Academy, CO; Michael J. Wilcox, United States Air Force Academy Department of Biology, HQ USAFA/DFB, USAF Academy, CO</i> | |
| Three-Dimensional Egg Source Reconstruction on High Performance Computers: Methodological and Computational Issues | 315 |
| <i>F. Meneghini, Deei, University of Trieste, Trieste, Italy; S. Mininel, Deei, University of Trieste, Trieste, Italy; F. Vatta, Deei, University of Trieste, Trieste, Italy; P. Bruno, Deei, University of Trieste, Trieste, Italy</i> | |
| Head Modeling for Realistic Electrical Brain Activity Mapping: Identification of a Multimodal Neuroimaging Protocol | 321 |
| <i>F. Vatta, Deei, University of Trieste, Trieste, Italy; P. Bruno, Deei, University of Trieste, Trieste, Italy; F. Di Salle, Department of Neurosciences, University of Pisa, Pisa, Italy and Department of Cognitive Neurosciences, Faculty of Psychology, University of Maastricht, Maastricht, the Netherlands; F. Esposito, Department of Neurological Sciences, University of Naples "Federico II", Naples, Italy; F. Meneghini, Deei, University of Trieste, Trieste, Italy; S. Mininel, Deei, University of Trieste, Trieste, Italy; M. Rodaro, Deei, University of Trieste, Trieste, Italy</i> | |
| Cardiac Safety of the Surface Application of the Stinger S-200 | 328 |
| <i>Wayne C. Mcdaniel, Department of Electrical and Computer Engineering, University of Missouri, Columbia, MO</i> | |
| Pregnant Female Anthropometry from CT Scans for Finite Element Model Development | 334 |
| <i>Kathryn Loftis, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Michael Halsey, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Evelyn Anthony, Wake Forest School of Medicine, Winston-Salem, NC; Stefan M. Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Joel Stitzel, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA .</i> | |
| Modeling of Transdermal Transport of Alcohol: Effect of Body Mass and Gender | 340 |
| <i>Gregory D. Webster, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Hampton C. Gabler, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

BIOSENSORS

| | |
|--|-----|
| Redesign and Construction of an Artificial Compound Eye Visual Sensor | 346 |
| <i>John B. Benson. Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; Cameron H. G. Wright, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; Steven F. Barrett, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY</i> | |

| | |
|--|-----|
| Bio-Inspired Minimal Machine Multi-Aperture Opposition Vision System | 352 |
| <i>John D. Davis, Applied Research Laboratories, University of Texas, Austin, TX; Steven F. Barrett, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; Cameron H.G. Wright, Electrical and Computer Engineering Department, University of Wyoming, Laramie, WY; Michael Wilcox, Department of Biology, United States Air Force Academy, CO</i> | |

BIOSIGNAL PROCESSORS

| | |
|---|-----|
| Linear and Non-Linear Assessment of Heart Rate Variability in Nonacclimatized Middle-Aged Subjects at Different Hypoxic Levels | 359 |
| <i>Tanja Princi, Department of Physiology and Pathology, University of Trieste, Trieste, Italy; Petra Zupet, Sports Medicine Unit, Umc Ljubljana, Ljubljana, Slovenia; Zarko FINDERLE, Inst. of Physiology, University of Ljubljana, Ljubljana, Slovenia; Agostino Accardo, D.E.E.I., University of Trieste, Trieste, Italy .</i> | |

| | |
|--|-----|
| Automation of a Non-Invasive Cardiac Output Computation from Respiratory Gases and Flow | 365 |
| <i>Brennan G. Kilty, University of Wyoming, Laramie, WY; Cameron H.G. Wright, University of Wyoming, Laramie, WY; Jerry M. Calkins, Defense Research Technologies, Inc. (Drt), Lady Lake, Fl; Steve F. Barrett, University of Wyoming, Laramie, WY</i> | |

| | |
|--|-----|
| Data Transforms for Spectral Analyses of Heart Rate Variability | 371 |
| <i>Robert J. Ellis, Ellis.Department of Psychology, the Ohio State University, Columbus, OH; John J. Sollers Iii, Department of Psychology, the Ohio State University, Columbus, OH; Eve A. Edelstein, Division of Biological Sciences, University of California, San Diego, Ca; Julian F. Thayer, Department of Psychology, the Ohio State University, Columbus, OH</i> | |

| | |
|--|-----|
| System Identification for the Contribution of Light Variations to Pupil Diameter Change | 377 |
| <i>Ying Gao, Electrical and Computer Engineering Department, Florida International University, Miami, Fl; Armando Barreto, Electrical and Computer Engineering Department, Florida International University, Miami, FL; Kenneth John Faller II, Electrical and Computer Engineering Department, Florida International University, Miami, FL; Malek Adjouadi, Electrical and Computer Engineering Department, Florida International University, Miami, FL</i> | |

| | |
|--|-----|
| A Wavelet Transform Coupled with a Fuzzy Neural Network for Prediction of Significant St Segmental Changes in the ECG | 383 |
| <i>Victor P. Compe, Jr., Bsee, University of Connecticut, Storrs, CT</i> | |

| | |
|--|-----|
| Characterization of Selected Elementary Motion Detector Cells to Image Primitives | 389 |
| <i>Leslie A. Benson, University of Wyoming, Laramie, WY; Steven F. Barrett, University of Wyoming, Laramie, WY; Cameron H. G. Wright, University of Wyoming, Laramie, WY</i> | |

BONE

| | |
|---|-----|
| Dynamic Tensile Material Properties of Human Pelvic Cortical Bone | 395 |
| <i>Andrew R. Kemper, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Craig Mcnally, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Stefan N, Duma, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

| | |
|--|-----|
| Tensile Material Properties of Human Tibia Cortical Bone: Effects of Orientation and Loading Rate | 398 |
| <i>Andrew R. Kemper, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Craig Mcnally, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Sarah J. Manoogian, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA; Stefan M. Duma, Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, VA</i> | |

CELL TISSUE ENGINEERING

| | |
|--|-----|
| The Evaluation of Macrophages Following Bacterial or Cytokine Challenge | 404 |
| <i>Felicia M. Tardy, Department of Diagnostics & Clinical Health Sciences, Pharmacology, and Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Diagnostics & Clinical Health Sciences, Pharmacology, and Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS; Rodney Baker, Department of Diagnostics & Clinical Health Sciences, Pharmacology, and Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS; Ham Benghuzzi, Department of Diagnostics & Clinical Health Sciences, Pharmacology, and Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS</i> | |
| Effects of Thymoquinone and Selenium on the Proliferation of MG 63 Cells in Tissue Culture | 413 |
| <i>James Barron, School of Health Related Professions and Department of Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS 39216; Hamed Benghuzzi, School of Health Related Professions and Department of Orthopedic Surgery, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Orthopaedic Surgery, University of Mississippi Medical Center, Jackson, MS</i> | |
| Evaluation of Insulin Secretion by Pancreatic Cells in Response to Increasing Amounts of Glucose | 420 |
| <i>Lamar Hamil, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS.; Ham Benghuzzi, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS.; Michelle Tucci, University of Mississippi Medical Center, Jackson, MS</i> | |
| Biochemical Changes to Fibroblast Cells Subjected to Ionizing Radiation | 426 |
| <i>Pamala Jones, University of Southern Mississippi, Hattiesburg, MS; Hamed Benghuzzi, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Orthopaedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Latoya Richards, University of Mississippi Medical Center, Jackson, MS; George Harrison, University of Mississippi Medical Center, Jackson, MS</i> | |
| The Impact of Micafungin on the Cellular Integrity of MG-63 Osteoblast-Like Cells In Vitro: A Preliminary Study | 432 |
| <i>P. I. Sealy, Graduate Program in Clinical Health Sciences, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS; M. Tucci, Graduate Program in Clinical Health Sciences, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS; H. Benghuzzi, Graduate Program in Clinical Health Sciences, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS</i> | |
| Evaluation of Endotoxin Binding to UHMWPE and Inflammatory Mediator Production by Macrophages | 438 |
| <i>Renee Wilkins, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, University of Mississippi Medical Center, Jackson, MS; Ham Benghuzzi, University of Mississippi Medical Center, Jackson, MS</i> | |
| A Comparison of the Morphological Changes Associated with Conventional and Sustained Treatment with Pigalocatechin-3-Gallate, Thymoquinone, and Tannic Acid on LNCaP Cells | 444 |
| <i>La'toya Ross Richards, University of Mississippi Medical Center, Jackson, MS; Pamala Jones, University of Southern Mississippi, Hattiesburg, MS; Hamed Benghuzzi, University of Mississippi Medical Center, Jackson, Mississippi, Usa; Michelle Tucci, University of Mississippi Medical Center, Jackson, MS</i> | |
| Effect of Pulsatile Flow on the Osteogenic Differentiation of Bone Marrow Stromal Cells in Porous Scaffolds | 450 |
| <i>Katherine D. Kavlock, Virginia Tech – Wake Forest School of Biomedical Engineering and Sciences, Blacksburg, VA; Aaron S. Goldstein, Virginia Tech – Wake Forest School of Biomedical Engineering and Sciences, Blacksburg, VA</i> | |

| | |
|---|-----|
| Thymoquinone Supplementation and Its Effect on Kidney Tubule Epithelial Cells <i>In Vitro</i> | 456 |
| <i>Stacy Hull Vance, University of Mississippi Medical Center, Jackson, MS; Hamed Benghuzzi, University of Mississippi Medical Center, Jackson, MS; Felisa Wilson-Simpson, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, University of Mississippi Medical Center, Jackson, MS</i> | |

| | |
|---|-----|
| Development of an Improved Injury Device for Neural Cell Cultures | 462 |
| <i>Gregory D. Webster, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA; Beverly A. Rzigalinski, Edward Via Virginia College of Osteopathic Medicine, Blacksburg, VA; Hampton C. Gabler, Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA</i> | |

| | |
|--|-----|
| Cellular Effects of Platelet Rich Plasma: Interleukin-1 Release from PRP Treated Macrophages | 468 |
| <i>James Woodall Jr., Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Michelle Tucci, Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS; Allan Mishra, Department of Orthopedic Surgery, Stanford University Medical Center, Menlo Park, CA; Ayman Asfour, Department of Pathology, University of Mississippi Medical Center, Jackson, MS; Hamed Benghuzzi, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS</i> | |

CLINICAL INFORMATION SYSTEMS

| | |
|--|-----|
| Collagen Content Contributes to Arterial Narrowing in Human Atherosclerotic Plaques | 474 |
| <i>J. Eckstein, Anatomy and Cell Biology, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada; A. Mohamed, Anatomy and Cell Biology, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada</i> | |

| | |
|--|-----|
| Assessment of Rat Optic Nerve Damage Due to Microbeam Radiation Therapy in the Treatment of Glioblastomas | 480 |
| <i>A. Mohamed, Anatomy and Cell Biology, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada; S. Worobec, Anatomy and Cell Biology, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada; E. Schultke, Anatomy and Cell Biology, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada</i> | |

| | |
|---|-----|
| A System for Monitoring Cardiac Vibration, Respiration, and Body Movement in Bed | 486 |
| <i>Kouji Mukai, Department of Electronics, Hiroshima Inst. of Technology, Hiroshima, Japan; Yoshiharu Yonezawa, Department of Electronics, Hiroshima Institute of Technology, Hiroshima, Japan; Hiromichi Maki, International Trinity College Department of Clinical Engineering, Hiroshima, Japan; Ishio Ninomiya, Hiroshima International University, Hiroshima, Japan; Kouji Sada, Shakaihoken Shimonoseki Kousei Hospital, Yamaguchi, Japan; Shingo Hamada, Shakaihoken Shimonoseki Kousei Hospital, Yamaguchi, Japan; Allen W. Hahn, University of Missouri-Columbia Department of Vet. Med. and Surg., Columbia, MO; Hidekuni Ogawa, Hiroshima Institute of Technology Department of Health Science, Hiroshima, Japan; W. Morton Caldwell, Caldwell Biomedical Electronics, Finleyville, PA</i> | |

| | |
|---|-----|
| A Safety Support System for Patient Location | 492 |
| <i>Hidekuni Ogawa, Department of Health Science, Hiroshima Institute of Technology, Hiroshima, Japan; Yoshiharu Yonezawa, Hiroshima Institute of Technology Department of Electronics, Hiroshima, Japan; Hiromichi Maki, International Trinity College Department of Clinical Engineering, Hiroshima, Japan; Allen W. Hahn, University of Missouri-Columbia Department of Vet. Med. and Surg., Columbia, Mo; W. Morton Caldwell, Caldwell Biomedical Electronics, Finleyville, PA</i> | |

| | |
|---|-----|
| Personal Graphical Communicator | 498 |
| <i>Michael Stephens, University of Wyoming Electrical and Computer Engineering, Laramie, WY; Steven Barrett, University of Wyoming Electrical and Computer Engineering, Laramie, WY</i> | |

A Problem Solving in Driving Tests: Which Method for Carbohydrate-deficient Transferrin (CDT) in Adolescents Affected by Celiac Disease? 504
Giorgio Tamaro, Department of Lab. Medicine IRCCS Burlo Garofolo, Children's Hospital, Trieste, Italy; Sandra Perticarari, Department of Lab. Medicine IRCCS Burlo Garofolo, Children's Hospital, Trieste, Italy; Tanja Princi, Department of Physiology and Pathology, University of Trieste, Trieste, Italy; Agostino Accardo, Dept. E.E.I., University of Trieste, Trieste, Italy; Michela Donato, Department of Lab. Medicine IRCCS Burlo Garofolo, Children's Hospital, Trieste, Italy

Author Index