Technology and Medical Sciences – TMSi 2010

Editors

R.M. Natal Jorge & João Manuel R.S. Tavares
Faculdade de Engenharia da Universidade do Porto, Porto, Portugal

Marcos Pinotti Barbosa
Universidade Federal de Minas Gerais, Brasil

Alan Peter Slade
University of Dundee, Dundee, Scotland
Table of contents

Preface xi
Acknowledgements xiii

Full papers

Modelling, designing and simulating living systems with BlenX 3
P. Lecca

Measurement system of the eye vergence and accommodation with 3D hologram stimulation 15
J. Dušek, T. Jindra & M. Dostálek

3D modelling for FEM simulation of an obese foot 19
V.C. Pinto, N.V. Ramos, M.A.P. Vaz & M.A. Marques

A breast modelling application for surgeons 23
A. Cardoso, H. Costa, V. Sá & G. Smirnov

A framework model for e-Health services 29
M. Macedo & P. Isaias

A possibility for pos-EVAR surveillance: A novel smart stent-graft 35

Analysis of the contraction of the pelvic floor through the finite element method considering different pathologies 39

Anticipatory postural adjustments in post-stroke subjects during reaching 43
S. Ferreira, C. Silva, P. Carvalho, A. Silva & R. Santos

Approaches to juxta-pleural nodule detection in CT images 51
A. Massafra

Blood flow in artificial bypass graft: A numerical study 57
L.C. Sousa, C.F. Castro, C.C. António & B. Relvas

Calibration of free hand ultrasound probe tracked by optical system 63
K. Krzyżtoforski, R. Będziński, E. Świątek-Najwer & P. Krowicki

Contact finite element with surface tension adhesion 69
R.A.P. Hellmuth & R.G. Lima

Crystalline lens imaging with a slit-scanning system 79
C. Oliveira, J.B. Almeida & S. Franco

Design of Medical Rehabilitation Devices: A case study 83
E. Seabra, L.F. Silva, P. Flores & M. Lima

Development of a flexible pressure sensor for measurement of endotension 89

Development of an adaptable system for a stationary bike to convert mechanical energy into electric power applied in indoor cyclism training 95
J.B. Soldati, Jr., L.A. Szmuchrowski, D.N. Rocha, F.L. Corrêa, Jr., T.S.P. Sono, C.B.S. Vinieiro & M. Pinotti
Development of computational model to analyze the influence of fiber direction in the Tympanic Membrane

Electronic device for temperature monitoring during the decompression surgery of the facial nerve
S.S.R.F. Rosa, M.L. Altoé, L.S. Santos, C.P. Silva & M.V.G. Morais

Ethical aspects in the design of medical devices
J. Ferreira, F. Soares, J. Machado & M. Curado

Evaluation and implementation of technology in health care
R. Santos

Frequency domain validation of a tetrapolar bioimpedance spectroscopy system with tissue equivalent circuit
A.S. Paterno, V.C. Vincence & P. Bertemes-Filho

Highly Focalized Thermotherapy: A minimally invasive technique for the treatment of solid tumours
A. Portela, M. Vasconcelos & J. Cavalheiro

Identification of rib boundaries in chest X-ray images using elliptical models
L. Brás, A.M. Jorge, E.F. Gomes & R. Duarte

Improving diagnosis processes through multidimensional analysis in medical institutions
O. Belo

In vivo measurement of skeletal muscle impedance from rest to fatigue

Influence on the mandible and on a condyle implant of the distribution of the fixation surgical screws
A. Ramos, M. Mesnard, C. Relvas, A. Completo & J.A. Simões

Intensity inhomogeneity corrections in MRI simulated images for segmentation
R. Lavrador, L. Caldeira, N.F. Lori & F. Janela

Interactive collaboration for Virtual Reality systems related to medical education and training
B.R.A. Sales, L.S. Machado & R.M. Moraes

Lissajous scanning pattern simulation, for development of a FLO
P. Nunes & P. Vieira

Measuring the pressure in a laryngoscope blade
A. Silva, J. Teixeira, P. Amorim, J. Gabriel, M. Quintas & R.M. Natal Jorge

Mechanical properties of temporalis muscle: A preliminary study

Medial-lateral CoP-rearfoot relation during stance
T.J.V. Atalaia & J.M.C.S. Abrantes

Multidisciplinary interactions for the development of medical devices
R. Simoes

Multi-objective optimization of bypass grafts in arteries
C.F. Castro, C.C. Antônio & L.C. Sousa

Multiple Sclerosis subjects plantar pressure—A new tool for postural instability diagnosis
L.F.F. Santos & J.M.C.S. Abrantes
Neurom: A motor treatment system for chronic stroke patients
F.L. Corrêa, Jr., R.C. de Araújo, D.N. Rocha, T.S.P. Sono, L.R. dos Santos, A.M.V.N. Van Petten & M. Pinotti

Non-invasive diagnosis and monitoring of Cystic Fibrosis by mass spectrometry of the exhaled breath
S. Gramacho, M. Pinheiro, A.A.C.C. Pais, A.M.d’A.R. Gonsalves, F. Gambôa & C.R. Cordeiro

Noninvasive assessment of Blood-Retinal Barrier function by High-Definition Optical Coherence Tomography
T. Santos, R. Bernardes, A. Santos & J. Cunha-Vaz

OCT noise despeckling using a 3D nonlinear complex diffusion filter
C. Maduro, R. Bernardes, P. Serranho, T. Santos & J. Cunha-Vaz

Possible relations between female pelvic pathologies and soft tissue properties

Processing and classification of biological images: Application to histology
B. Nunes, L.M. Rato, F.C. Silva, A. Rafael & A.S. Cabrita

Reducing and preventing drug interactions—An approach
R. Barros & F. Janela

Registration of bone ultrasound images to CT based 3D bone models
P.J.S. Gonçalves & P.M.B. Torres

Segmentation and 3D reconstruction of the vocal tract from MR images—A comparative study

Significance of fast and simple determination of catecholamines and their metabolites in patients with Down syndrome

Study of pressure sensors placement using an Abdominal Aortic Aneurysm (AAA) model

Termographic assement of internal derangement of the temporomandibular joint
M. Clemente, A. Sousa, A. Silva, J. Gabriel & J.C. Pinho

The action of middle ear muscles using the finite element method

The contribution of the scapular patterns to the amplitude of shoulder external rotation on thrower athletes
A.M. Ribeiro & A.G. Pascoal

Influence of an unstable shoe on compensatory postural adjustments

The use of muscle recruitment algorithms to better assess problems for children with gait deficiency

Using an Infra-red sensor to measure the dynamic behaviour of N₂O gas escaping through different sized holes
A.P. Slade, D. Convales, J. Vorstius & G. Thomson

Visual tracking of surgical instruments, application to laparoscopy
P.J.S. Gonçalves & A.M.D. Gonçalves

Wavelet analysis of the pupil’s autonomic flow
G. Leal, P. Vieira & C. Neves
White matter segmentation in simulated MRI images using the Channeler Ant Model

E. Fiorina

Abstracts

In-silico models as a tool for the design of medical device technologies

3D biomechanical model of the human hand using FEM
D.N. Rocha, R.M. Natal Jorge & M. Pinotti

Using radiobiology simulators for evaluation of $^{99m}$Tc Auger electrons for targeted tumor radiotherapy
A.A.S. Tavares & J.M.R.S. Tavares

Therapeutic contact lenses obtained by SCF-assisted imprinting processes: Improved drug loading/release capacity
M.E.M. Braga, M.H. Gil, H.C. de Sousa, F. Yañez, C. Alvarez-Lorenzo, A. Concheiro & C.M.M. Duarte

Supercritical solvent impregnation of natural bioactive compounds in N-carboxybutyl chitosan membranes for the development of topical wound healing applications
A.M.A. Dias, I.J. Seabra, M.E.M. Braga, M.H. Gil & H.C. de Sousa

Potential and suitability of Ion Mobility Spectrometry (IMS) for breath analysis
V. Vassilenko, A.M. Bragança, V. Ruzsanyi & S. Sielemann

Phosphonium-based ionic liquids as new Greener plasticizers for poly(vinyl chloride) biomedical applications

New approach to bone surface reconstruction from 2.5D sonographic dataset
P. Krowicki, K. Krysztoforski, E. Świątek-Najwer & R. Będziński

Metal-Organic Framework as potential drug carriers against inflammation
I.B.V. Santos, T.G. da Silva & S. Alves, Jr.

Knowledge based system for medical applications
C.S. Moura, P.J. Bártolo & H.A. Almeida

In vitro method for test and measure the accuracy of implant impression
F.J. Caramelo, P. Brito, J. Santos, A. Carvalho, G. Veiga, B. Vasconcelos, J.N. Pires & M.F. Botelho

Improving the resolution of scintigraphic images with super-resolution: Development of a dedicated device
R. Oliveira, F.J. Caramelo & N.C. Ferreira

Hyperbolic surfaces for scaffold design
H.A. Almeida & P.J. Bártolo

Finite element analysis of a three layered cartilage
D.M. Freitas, P.J. Bártolo & H.A. Almeida

External breast radiotherapy treatment planning verification using advanced anthropomorphic phantoms

Blood Volume Pulse peak detector with a double adaptive threshold
J. Medeiros, R. Martins, S. Palma, H. Gamboa & M. Reis

Bilateral study on arterial stiffness assessment by a non-invasive optical technique of Photoplethysmography
V. Vassilenko, A.C. Silva, A.M. Martin & J.G. O’Neill
A biomimetic strategy to prepare silica- and silica/biopolymer-based composites for biomedical applications


Non-invasive biomonitoring of human health: Technical developments in breath analysis

V. Vassilenko

Author index