Name of the Institution: TECHNICAL UNIVERSITY OF CRETE

Web: http://www.display.tuc.gr

Name of the TEMPUS CRH-BME representative (for your Institution): Michalis Zervakis

BME Group/laboratory presentation: Digital Image and Signal Processing Laboratory (DISPLAY Lab)

TUC maintains long experience on information systems technology with emphasis on the management (processing, information extraction, dissemination and retrieval) of complex information; Bioinformatics and Medical Imaging (Marker selection from mass genomic data, Electro Encephalogram (EEG) analysis, Time-Frequency signal characterisation of EEGs, Cancer research on Diagnosis & Prognosis (Breast and Ovarian cancer, Acute Myeloid Leukemia); Image / video processing and compression, Image / Video content analysis and description (e.g., motion analysis, shape analysis, object tracking); Pattern recognition; Design and analysis of Surveillance Systems; Panoramic image generation; Real-time implementation of integrated imaging systems on DSP boards; Non-destructive inspection and monitoring; Image analysis methods for erosion/corrosion evaluation; Quantification of pollution effects on stone surfaces; Non-destructive vibration analysis of electric machines.

TUC has participated successfully in many research and R&D projects. Furthermore, the group has published several articles on image indexing & retrieval, semantic web technology as well as on image processing and biomedical data analysis in high quality conferences and journals. Please advise http://www.intelligence.tuc.gr and the DISPLAY Lab URL at http://www.display.tuc.gr/Display/.

The group has developed various system prototypes which are accessible on the internet through the web, as the following:

- *IntelliSearch*: A Semantic information retrieval system for the Web, supporting retrieval by text and image content using ontologies http://www.intelligence.tuc.gr/intellisearch

- *MedSearch*: Semantic information retrieval system for *MedLine* (the premier bibliographic database of the U.S. National Library of Medicine with more than 15 million articles) http://www.intelligence.tuc.gr/medsearch

- *WebSummarization*: A web summarization system for image content (using machine learning and image content analysis) http://www.intelligence.tuc.gr/websummarization

- *Semantic Similarity System*: A system implementing several (ontology-based) methods for computing the similarity of conceptually similar terms http://www.intelligence.tuc.gr/similarity

- OPTAG camera system, Demo in CER'2005 Communicating European Research Show, Brussels, Nov. 2006

BME EDUCATION

TUC does not offer a specific programme on BME education. It offers special graduate courses related to image processing and biomedical signal analysis and a research course on BME

COURSES AVAILABLE IN ENGLISH? (IF YES, ON WHICH LEVEL?)

• BSc:	• MSc:	• PhD:

ECTS: Total number

• BSc:	• MSc:	• PhD:

BILATERAL AGREEMENTS WITH OTHER UNIVERSITIES? (LIST THOSE UNIVERSITIES)

- UNIVERSIDADE NOVA DE LISBOA

MAIN BME INTERESTS

- Genomic Analysis
- Electro-physiological signals
- Imaging and multispectral devices

ACTIVE PROJECTS

National

2010-2012 **"OASYS:** Osteoarthritis: Integrated Systemic Analysis for targeted Biological Treatment**", Funding Agency:** Greek National Strategic Reference Framework 2007-2013, Project number 09ΣΥΝ-13-705**, Role:** Partner

2009-2010 *"Syn-EEG*: Detection, Analysis and Synchronization of EEG Components", **Funding Agency:** TUC-Research Grant, Project number (TUC) 80037, **Role:** Coordinator.

International

2010-2012 *"RT3S:* Real Time Simulation for Safer vascular Stenting", **Funding Agency:** EC-ICT, FP-7, Project number 248801, **Role:** Partner.

2009-2012 *"CRH-BME*: Curricula Reformation and Harmonisation in the field of Biomedical Engineering", **Funding Agency:** EC-TEMPUS, FP-7, Project number 144537, **Role:** Partner.

Other

Patents

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RECENT PUBLICATIONS (LAST 2 YEARS)

Journal Publications:

[1] *P. Kapsalas, P. Maravelaki-Kalaitzaki, M. Zervakis, E. T. Delegou, A. Moropoulou*, "A morphological fusion algorithm for optical detection and quantification of decay patterns on stone surfaces", *Construction and Building Materials*, *Volume 22, Issue 3, March 2008, Pages 228-238.*

[2] M. E. Blazadonakis and M.Zervakis, "The Linear Neuron as Marker Selector and Clinical Predictor". *Computer Methods and Programs in Biomedicine*, Elsevier, Vol 91/1 (2008) pp 22-35

[3] M. E. Blazadonakis and M.Zervakis, "Wrapper Filtering Criteria via Linear Neuron and Kernel Approaches". *Computers in Biology and Medicine*, Elsevier, Vol38/8 (2008) pp. 894-912.

[4] *V. Sakkalis*, T. Cassar, M. Zervakis, K.P. Camilleri, S.G. Fabri, C. Bigan, E. Karakonstantaki and S. Micheloyannis, "Parametric and Nonparametric EEG Analysis for the Evaluation of EEG Activity in Young Children with Controlled Epilepsy", Computational Intelligence & Neuroscience CIN, Vol. 2008 Article ID 462593 (DOI:10.1155/CIN).

[5] *V. Sakkalis*, C.D. Giurcăneanu, P. Xanthopoulos, M. Zervakis, V. Tsiaras, Y. Yang, and S. Micheloyannis, "Assessment of Linear and Nonlinear Synchroniztion Measures for Analyzing EEG in a Mild Epileptic Paradigm", IEEE Trans. Information Technology in Biomedicine, Vol. 13, No 4, pp. 433-441, July 2009 (DOI: 10.1109/TITB.2008.923141)

[6] R. Grech, T. Cassar, J. Muscat, K.P. Camilleri, S.G. Fabri,, M. Zervakis, P. Xanthopoulos,

V. Sakkalis and B. Vanrumste, "Review on solving the inverse problem in EEG source analysis", Journal of Neuroengineering and Rehabilitation, vol. 5, no. 1, p. 25, 2008 (DOI:10.1186/1743-0003-5-25).

[7]   M. Zervakis, M. E. Blazadonakis, Vasiliki Danilatou, Georgia Tsiliki, Manolis Tsiknakis, Dimitris Kafetzopoulos, "Outcome Prediction Based on Microarray Analysis: A Critical Perspective on Methods", *BMC Bioinformatics* 2009, 10:53 (doi:10.1186/1471-2105-10-53).

[8]   S. K. Goumas, I. N. Dimou, M. E. Zervakis, "Combination of Multiple Classifiers for Post Placement Quality Inspection of Components: A Comparative Study", Journal of Information Fusion, Elsevier, article in press (doi:10.1016/j.inffus.2009.06.009).

[9]   S. Sfakianakis, M. Blazantonakis, I. Dimou, M. Zervakis, M. Tsiknakis, G. Potamias, D. Kafetzopoulos and D. Lowe, "Decision Support Based on Genomics: Integration of Data and Knowledge Driven Reasoning", International Journal of Biomedical Engineering and Technology, 3(3), 287—307, April 2010, Inderscience.

[10]   Dimou, B. Van Calster, S. Van Huffel, D. Timmerman, M. Zervakis, "Evaluation Of Imputation Methods In Ovarian Tumour Diagnostic Models Using Generalised Linear Models And Support Vector Machines", Journal of Medical Decision Making, vol:30, no.1, pp.123-131, Jan. 2010, Sage Publications.

[11]   Ardoino I., Ambrogi F., Iacobelli S., Boracchi P., Manikis G., Kounelakis M., Zervakis M., Lisboa P. J. G., Vignetti M., Starita A. and Biganzoli E., "Evaluation of Short and Long Term Response to Treatment in GIMEMA Protocol for Acute Myeloid Leukemia", Int. J. Biomedical Engineering & Technology, vol. 3, pp. 329-348, 2010.

[12]   Gketsis Z., Zervakis M., Stavrakakis G., "Detection and Classification of Winding Faults in Windmill Generators Using Wavelet Transform and ANN," *Electric Power Systems Research,* Vol. 79, no 11, pp. 1483-1494, 2009, doi:10.1016/j.epsr.2009.05.001

[13]   P.Y. Ktonas, S. Golemati, P. Xanthopoulos, *V. Sakkalis*, M. D. Ortigueira, H. Tsekou, M. Zervakis, T. Paparrigopoulos, T. Bonakis, N. Economou, P. Theodoropoulos, S. Papageorgiou, D. Vasilopoulos and C.R. Soldatos, "Time-frequency analysis methods to quantify the time-varying microstructure of sleep EEG spindles: Possibility for dementia biomarkers", Journal of Neuroscience Methods, Vol. 85, no. 1, pp. 133-142, 2009.

[14]   G. Giakos, K. Valluru, V. Adya, K. Ambadipudi, S. Paturi, P. Bathini, M. Becker, P. Farajipour, S. Marotta, J. Paxitzis, B. Mandadi, M. Zervakis and G. Livanos, "Stokes parameter imaging of multi-index of refraction biological phantoms utilizing optically active molecular contrast agents", Measurement Science and Technology, Vol. 20, No. 10, Sept. 2009, http://iopscience.iop.org/0957-0233/20/10/104003/?ejredirect=.iopscience

[15]   B. W. Jervis, S. Belal, T. Cassar, M. Besleaga, C. Bigan, K. Michalopoulos, M. Zervakis, K. Camilleri, and S. Fabri, "Waveform Analysis of Non-oscillatory Independent Components in Single-Trial Auditory Event-Related Activity in Healthy Subjects and

Alzheimer's Disease Patients", Journal of Current Alzheimer Research, Vol. 7, no. 4, pp. 334-347, June 2010.

[16] G. Giakos, S. Paturi, K. Valluru, P. Bathini, V. Adya, S. Sukumar, K. Ambadipudi, B. Mandadi, M. Becker, S. Athawale, P. Farajipour, D. Sheffer, G. Livanos and M. Zervakis, "Efficient Imaging Techniques using Optically Active Molecules", IEEE Trans. On Instrumentation and Measurement, accepted 23/9/2010 http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5582281.

[17] V. Sakkalis, T. Cassar, M. Zervakis, C. Giurcaneanu, C. Bigan, S. Micheloyannis, K. Camilleri, S. Fabri, E. Karakonstantaki, K. Michalopoulos, "A Decision Support Framework for the Diagnosis of Children with Mild Epilepsy based on EEG Analysis", Journal of Neuroengineering and Rehabilitation, Vol. 7, No. 24, 2010 (available online: DOI: 10.1186/1743-0003-7-24).

[18] Roniotis, K. Marias, *V. Sakkalis* and M. Zervakis, "Diffusive Modelling of Glioma Evolution: A review", Journal of Biomedical Science and Engineering, Scientific Research Publishing, Vol. 3, No. 5, pp. 501-508, 2010 (available online: DOI: 10.4236/jbise.2010.35070).

[19] Ioannis N. Dimou, Michalis E. Zervakis Error bounds of decision templates and support vector machines in decision fusion. Int. J. of Knowledge Engineering and Soft Data Paradigms published 1/10/2009

[20] M. E. Blazadonakis, M. Zervakis, D. Kafetzopoulos, "Gene Signature Integration in Multiplatform Microarray Experiments". IEEE transactions on Information Technology in Biomedicine, accepted July 2010, to appear

[21] G. Livanos , M. Zervakis , G.C. Giakos , K. Valluru , S. Paturi, and S. Marotta "Modeling the characteristics of material distributions in polarimetric images" IET Image Processing, accepted Oct. 2010, to appear

[22] I.N. Dimou, I. Tsougos, E. Tsolaki, E. Kousi, E. Kapsalaki, K. Theodorou, M. Kounelakis and M. Zervakis, Brain lesion classification using 3T MRS spectra and paired SVM kernels, Biomedical Signal Processing and Control, 2011 in press, Elsevier.

BOOK CHAPTERS

[1] Ioannis Barbounakis, Michael Zervakis, "GRIDS in community settings", a book chapter in *Communities, new media and social practices*, IGI Global Inc. D. Akoumianakis (Editor), 2009.

[2] *V. Sakkalis* and M. Zervakis, "Methodological Framework for EEG Feature Selection based on spectral and temporal profiles", Springer Optimization and Its Applications series, Vol. 38, Ed. by Chaovalitwongse Wanpracha et al., ISBN: 978-0-387-88629-9, Springer New York/Vienna, 2010.

[3] Manikis C. G., Kounelakis G. M., Zervakis E. M., "Pattern Recognition Methods for Acute Myeloid Leukemia (AML) Induction- Treatment Analysis", in Computational Intelligence and Bioengineering, F. Masulli, A. Micheli & A. Sperduti (eds) – IOS Press, vol. 196, pp. 69-80, July 2009

[4]   Ifeachor E., Hu P., Sun L., Hudson N. and Zervakis M., "Bioprofiling over Grid for Personalized eHealthcare for AD", in Computational Intelligence and Bioengineering, IOS Press, vol. 196, pp. 155-168, The Netherlands, 2009

[5]   *V. Sakkalis* and M. Zervakis, "Linear and Nonlinear Synchronization Analysis and Visualization during Altered States of Consciousness", Recent Advances in Biomedical Engineering, Ed. by Ganesh R Naik, ISBN 978-953-307-004-9, IN-TECH, Vienna 2010.

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