



Πανεπιστήμιο
Κύπρου



ΣΥΝΔΕΣΜΟΣ
ΙΑΤΡΟΦΥΣΙΚΗΣ
ΚΑΙ ΒΙΟΙΑΤΡΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ
ΚΥΠΡΟΥ



ΕΤΑΙΡΕΙΑ
ΙΑΤΡΙΚΗΣ
ΠΛΗΡΟΦΟΡΙΚΗΣ
ΚΥΠΡΟΥ

Εργαστήριο Ηλεκτρονικής Υγείας, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου

Σειρά Διαλέξεων στη Ηλεκτρονική Υγεία

Το εργαστήριο Ηλεκτρονικής Υγείας του Τμήματος Πληροφορικής - Πανεπιστήμιο Κύπρου, ο Σύνδεσμος Ιατροφυσικής και Βιοιατρικής Κύπρου και η Εταιρεία Ιατρικής Πληροφορικής Κύπρου, σας προσκαλούν στην ημερίδα με θέμα:

ABCDCAD – Development of A Breast Cancer Density Specific Computer Aided Detection System

Που διεξάγεται μέσα στα πλαίσια του Έργου με τη ίδια ονομασία και Αριθμό Πρωτοκόλλου ΤΠΕ/ΟΡΙΖΟ/0311(BIE)/29 που συγχρηματοδοτείται από την Κυπριακή Δημοκρατία και το Ευρωπαϊκό Ταμείο Περιφερειακής Ανάπτυξης της Ευρωπαϊκής Ένωσης διαμέσου του Ιδρύματος Προώθησης Έρευνας.

Τοποθεσία:

Αίθουσα 148, Σχολή Θετικών και Εφαρμοσμένων Επιστημών (ΘΕΕ-01), Πανεπιστημιούπολη ([οδηγίες](#))

Ημερομηνία: Τετάρτη - 24 Ιουνίου, 2015 3:00 - 7:30μ.μ.

Πρόγραμμα Ημερίδας

Μέρος Α

Μέρος Α σε συνεργασία με το

Κέντρο Επιχειρηματικότητας του Πανεπιστημίου Κύπρου

3:00- 4:00μ.μ. : **From White Boards to White Coats**

Prof. Sir Michael Brady, Department of Oncology, University of Oxford, UK

4:00 - 4:15μ.μ. : Διάλειμμα – Καφές

Μέρος Β

4:15 - 4:25μ.μ. : **Εισαγωγή**

Καθ. Κωνσταντίνος Σ. Παττίχης, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου

4:25 – 4:30μ.μ. : **Πρόγραμμα Πληθυσμιακού Ελέγχου για τον Καρκίνο του Μαστού**

Δρ Χρύσα Τζιακούρη, Διευθύντρια Ακτινολογίας, Γενικό Νοσοκομείο Λευκωσίας

4:30 - 5:15μ.μ. : **Development of A Breast Cancer Density Specific Computer Aided Detection System**

Καθ. Κωνσταντίνος Σ. Παττίχης, (Συντονιστής Έργου - ΣΕ), **Δρ. Άθως Αντωνιάδης**, **Ιωάννης Κωνσταντίνου**, **Ζήνωνας Αντωνίου**, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου, **Δρ Στυλιανή Πετρούδη** (ΣΕ έως 2/11/2015)

5:15 - 5:45μ.μ. : Διάλειμμα – Καφές



5:45- 6:30μ.μ. : **Recent Developments in Medical Image Analysis – Mammographic Breast Density**

Prof. Sir Michael Brady, Department of Oncology, University of Oxford, UK

6:30 - 7:00μ.μ. : **Multi-scale AM-FM Models with Applications in Medical Imaging**

Prof. Marios S. Pattichis, Department of Electrical and Computer Engineering, University of New Mexico, USA

7:00 - 7:30μ.μ. : Ανοικτή συζήτηση: **Mammographic Breast Density**

Καθ. Κωνσταντίνος Σ. Παττίχης, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου (Συντονιστής)

Πληροφορίες: Κωνσταντίνος Σ. Παττίχης, τηλ. 99680711

Abstracts

From White Boards to White Coats

Prof. Sir Michael Brady, Department of Oncology, University of Oxford, UK

This talk has two inter-twined aims. First, it introduces the medical challenges, and the science that is being developed to address those challenges, that underlie my (current) companies: Mirada Medical, Volpara Solutions, Perspectum Diagnostics, ScreenPoint bv, further illustrated by Guidance Navigation Holdings, IRISS Medical Technologies, and Acuitas Medical. Second, it asks why I am driven by the translation of mathematics and computing (white board) to clinical practice (white coats). More detail of the companies I am currently a Founder/Director of can be found at:

<http://www.mirada-medical.com/>; <http://volparasolutions.com/>; <http://perspectum-diagnostics.com/>;
<http://www.screenpoint-medical.com/>; <http://www.guidance.eu.com/ui/content/content.aspx?id=229#>;
<http://www.guidanceautomation.com/cms/content/view/1>; <http://www.irissmedical.com/>;
<http://www.acuitasmedical.com/>; <http://www.colwiz.com/>.

Development of A Breast Cancer Density Specific Computer Aided Detection System

Καθ. Κωνσταντίνος Σ. Παττίχης, (Συντονιστής Έργου - ΣΕ), **Δρ. Άθως Αντωνιάδης**, **Ιωάννης Κωνσταντίνου**, **Ζήνωνας Αντωνίου**, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου, **Δρ Στυλιανή Πετρούδη** (ΣΕ έως 2/11/2015)

Mammographic breast density is recognized as one of the most important risk factors in developing breast cancer. Breast density may mask abnormalities and result in a false negative, and women with dense breast are at a 4 to 6 times higher risk of breast cancer. Information on breast density and features is important in the development of density specific Computer Aided Detection (CAD) systems to achieve higher sensitivity and specificity. This talk presents research work and outcomes of the ABCDCAD research project (ΤΠΕ/ΟΡΙΖΟ/0311(BIE)/29) funded by the Cyprus Research Promotion Foundation. A mammographic database with more than 400 cases has been established that includes BI-RADS breast density annotations. Furthermore a number of algorithms that involve breast region segmentation and the evaluation of textons using different filterbanks, Amplitude-Modulation Frequency-Modulation (AM-FM) and respective co-occurrence features were developed and evaluated for automatic breast density classification. Then results are presented on the development and



evaluation of a density specific CAD system using a methodology based on AM-FM and Support Vector Machines (SVM) – where density specific subsystems are trained on features derived from mammograms of the corresponding breast density class - are reported. Work is also presented in the development and evaluation of segmentation of 7T breast MRI volumes for future use in characterization of breast density and breast cancer detection.

Recent Developments in Medical Image Analysis – Mammographic Breast Density

Prof. Sir Michael Brady, Department of Oncology, University of Oxford, UK

We report on progress that we have made recently in a number of medical image analysis projects in the Oxford Cancer Imaging Centre. These include: deformable registration to compensate for the motions of the lungs (an imaging modality invariant representation, sliding motion regularisation, and discrete optimisation); discriminating between colorectal cancer patients who respond to neoadjuvant chemoradiotherapy and those that do not; the use of a superpixel representation and pictorial descriptions in whole body image registration and in quantifying tumour heterogeneity; and shape representations for image matching in cancer; breast density classification and its use for personalised breast cancer screening workflow. Furthermore we will report on breast imaging and how automated mammographic density underpins both Analytics and Dose. The first of these provides management of breast imaging centres with quality control information and provides for statistical analyses of populations of women. The second provides for personalised assessment of mean glandular dose (MGD). Evidence is presented that the MGD reported for a tomography system correlates closely with the personalised MGD estimate in the case of dense breasts; but that the tomography dose is consistently under-reported for fatty breasts.

Multi-scale AM-FM Models with Applications in Medical Imaging

Prof. Marios S. Pattichis, Department of Electrical and Computer Engineering, University of New Mexico, USA

Non-stationary image content can be effectively modeled using multi-scale AM-FM representations. Depending on the application, the different scales can be designed by adjusting the underlying filterbank that is used for extracting the AM-FM representations. This basic framework has been successfully used in several medical image analysis applications. Furthermore, there are several challenges and opportunities for extending the current AM-FM methods to cover new applications.

Short Bios

Προσκεκλημένος ομιλητής Prof. Sir Michael Brady, Department of Oncology, University of Oxford, UK

Professor Sir Michael Brady is currently Professor in Oncological Imaging in the Department of Oncology at the University of Oxford, having recently retired as Professor in Information Engineering (1985-2010). Mike is co-Director of the Oxford Cancer Imaging Centre, one of four national cancer imaging centres in the UK. He is the author of over 750 articles and 45 patents in computer vision, robotics, medical image analysis, and AI, and the author or editor of ten books. He has successfully supervised the PhD theses of 115 students. He is particularly well known for his pioneering research in quantitative methods for mammography and breast cancer more generally. Mike has a continuing strong commitment to commercialisation of his science and to entrepreneurial



activity more generally. Current companies he has founded are: Mirada Medical; Matakina; Perspectum Diagnostics; Guidance; and ScreenPoint. As well, he is an NED of IRISS Medical Technologies; Acuitas Medical; and colwiz. He recently stepped down after 19 years as Deputy Chairman of Oxford Instruments plc. Finally, he is a member of the Syncona Advisory Board and Chair of the Royal Society Publications Board.

Προσκεκλημένος ομιλητής Prof. Marios S. Pattichis, Department of Electrical and Computer Engineering, University of New Mexico, USA

Dr. Marios Pattichis is currently Professor and area chair of the Computer Engineering program in the Department of Electrical and Computer Engineering in the USA. His current research interests include digital image, video processing, communications, dynamically reconfigurable computer architectures, and biomedical and space image-processing applications. Dr. Pattichis has been an associate editor for the *IEEE Transactions on Image Processing*, *IEEE Transactions on Industrial Informatics*, and has also served as a guest associate editor for the *IEEE Transactions on Information Technology in Biomedicine*. He was the general chair of the *2008 IEEE Southwest Symposium on Image Analysis and Interpretation*. He was a recipient of the 2004 Electrical and Computer Engineering Distinguished Teaching Award at UNM. For his development of the digital logic design labs at UNM he was recognized by the Xilinx Corporation in 2003 and by the UNM School of Engineering's Harrison faculty excellent award in 2006. He was a founding Co-PI of COSMIAC at UNM. At UNM, he is currently the director of the image and video Processing and Communications Lab (ivPCL) at UNM.

