The 7th ACM International Conference on PErvasive Technologies Related to Assistive Environments

PETRA 2014

Conference Program

May 27-30, 2014 Rhodes, Greece

Organized by

The University of Texas at Arlington, Arlington, Texas, USA

With sponsorship from:

The US National Science Foundation (NSF), The Doctoral Consortium Program



And the following:

The University of Texas at Arlington Research Institute (UTARI), USA Computer Science and Engineering Department, UTA (CSE@UTA)

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The National Center for Scientific Research (NCSR)- Demokritos, Greece The HERACLEIA Human Centered Computing Laboratory at UTA (heracleia.uta.edu) The iPerform Center on Assistive Technologies to Enhance Human Performance













Conference Proceedings

ACM - Association for Computing Machinery



Dear Colleague,

We cordially welcome you to PETRA 2014 Conference, the 7th ACM International Conference on **PE**rvasive**T**echnologies **R**elated to **A**ssistive Environments, May27-30 2014, on the island of Rhodes, Greece.

Conference Theme

The PETRA Conference is a highly interdisciplinary conference that focuses on computational and engineering approaches to improve the quality of life and enhance human performance in a wide range of settings, in the workplace, at home, in public spaces, urban environments, and other. Outcomes of this conference have a broad impact in application areas that include, manufacturing, transportation, healthcare, energy systems, security and safety, robotics, biomedicine, environment and conservation, and many others.

Petra brings together very different types of technologies to also address important social and healthcare issues for sensitive populations, such as the elderly, persons suffering from chronic conditions such as Alzheimer's, Parkinson's, Cerebral Palsy, and other disabilities or traumas.

PETRA (which means "stone" in Greek) addresses important human living needs. From a technological perspective, PETRA motivates and inspires new scientific thrusts, innovations and discoveries to improve living environments, a particularly important issue, in an increasingly crowded and complex world where the need for inclusiveness and connectivity with the rest of the world is key. For the elderly in particular, PETRA addresses the fact that, as people grow older; they will increasingly rely on technology to be able to prolong staying in their homes and enjoy an independent life.

The conference attracted paper submissions from 16 countries, which underwent a thorough reviewing process; 37 of these were accepted as full papers, 11 as short papers and 9 as posters. The Petra Technical Program includes also the 5 following supported workshops.

PETRA WORKSHOPS

W1 VRTHR: Workshop on Virtual Reality and Technologies for Health and Rehabilitation: Promises, Proofs, and Preferences

W2 STHENOS: Workshop on Affective Computing for Biological Activity Recognition in Assistive Environments

W3 RasEnv: Workshop on Robotics in Assistive Environments

W4 SafeOperation: Workshop on Assistive Technologies For Safe Operation Of Complex Technological Systems Including Industrial Sites, Shipping, Off-Shore Platforms And Mining Activities

W5 Di-Sensa: Workshop on Distributed Sensor Systems for Assistive Environments

FIRST DAY: May 27

	Room 1	Room 2
10:00- 10:30	Conference Opening Fillia Makedon, Conference Chair Ilias Maglogiannis, University of Piraeus, Department of Digital Systems, Greece (Program Committee Co-Chair)	
10:30- 11:30	A. Keynote Lecture - Nikolaos Mavridis NCSR Demokritos Robots, Language, Space, and Interaction Session Chair: Ilias Maglogiannis	
11:30- 13:10	Session B: Reasoning systems and machine learning for assistive environments Session Chair: Vangelis Metsis B1 - Human Activity Recognition in Smart Homes Based on Passive RFID Localization, Kevin Bouchard, Jean-Sébastien Bilodeau, Dany Fortin-Simard, Sébastien Gaboury, Bruno Bouchard, Abdenour Bouzouane B2 - Learning a classifier for Cardiovascular Events Using Privileged Information, Georgios Giannoulis, Stanislav Yotov, Ioannis Kakadiaris B3 - Intelligent Decision Making for Risk Screening, Panagiotis Moutafis, Ioannis Kakadiaris B4 - Classifying Electocardiograms using time warping methods, Nikolaos Tselas, Panagiotis Papapetrou B5 - A Supervised Learning Approach for Fast Object Recognition from RGB-D Data, David Paulk, Vangelis Metsis, Christopher McMurrough, Fillia Makedon	Session C: Wearable Systems and Monitoring Devices Session Chair: Gerald Bieber C1 - Is photoplethysmography-derived pulse shape useful for fall detection?, Jason Leake, Nigel Harris, Edmund Keogh, Christopher Eccleston C2 - ADVENT: A System Architecture for Advanced Monitoring of Elders with Chronic Conditions, Theodor Panagiotakopoulos, Christos Antonopoulos, George Koutalieris, Panagiotis Kalantzis, Costas Theodoropoulos, George Koumanakos, Achilles Kameas, Nikolaos Voros, Stavros Koubias C3 - Battery Optimization in Remote Health Monitoring Systems to Enhance User Adherence, Nabil Alshurafa, Wenyao Xu, Jason J. Liu, Mohammad Pourhomayoun, Majid Sarrafzadeh, Suneil Nyamathi, JoAnn Eastwood C4 - WI-PATCH: Stick-On Wireless Sensor Platform for Continuous Monitoring of Human Physiology, Varsha Evanglene Sudula, Igor paprotny C5 - Towards a Low Cost Open Architecture Wearable Sensor Network for Health Care Applications, Panayotis M. Papazoglou, Theoni I. Laskari, George K. Fourlas
13:10- 14:30	Lunch Break	

FIRST DAY: May 27

	Room 1	Room 2
14:30- 16:10	Session D: Ambient Assisted Living and Smart Homes Session Chair: Panagiotis Papapetrou D1 - A new system for assistance and guidance in smart homes based on electrical devices identification, Corinne Belley, Sebastien Gaboury, Bruno Bouchard, Abdenour Bouzouane D2 - Gesture Recognition in Smart Home Using Passive RFID Technology, Kevin Bouchard, Abdenour Bouzouane, Bruno Bouchard D3 - An Evaluation of RGB-D Skeleton Tracking for Use in Large Vocabulary Complex Gesture Recognition, Christopher Conly, Vassilis Athitsos D4 - Live Evaluation within Ambient Assisted Living Scenarios, Carlos Pereira, António Teixeira, Miguel Oliveira e Silva D5 - Low Sampling Rate for Physical Activity Recognition, Gerald Bieber, Thomas Kirste, Michael Gaede	Session W1: Workshop on on Virtual Reality and Technologies for Health and Rehabilitation: Promises, Proofs, and Preferences (VRTHR) Workshop Chairs: Maureen J. Simmonds, Wendy Powell, Vaughan Powell W11 - Virtual Reality for Gait Rehabilitation - Promises, Proofs and Preferences, Wendy Powell, Vaughan Powell, Maureen Simmonds W12 - Considerations for Virtual Environments for Upper Limb Rehabilitation Tasks, Vaughan Powell, Wendy Powell, Maureen Simmonds W13 - Innovative Medical Applications and Beyond of 3D Techniques in a Responsive Virtual Reality Lab: Experience Report, Miao Song, Peter Grogano, Serguei Mokhov, Wang Song, Maureen Simmonds
16:10- 17:30	Poster Session Combined with Welcome cocktail party	

SECOND DAY: May 28

	Room 1	Room 2
09:00- 10:40	Session E: Data Modeling and Information Management for Pervasive Assistive Environments	<u>Session F:</u> Signal and Image Processing for Ambient Intelligence and Pervasive Computing
	Session Chair: Venet Osmani	Session Chair: Jan Dekelver
	E1 - Tell me your app and I will tell your mood: Correlation of Apps usage to Bipolar Disorder State, Venet Osmani, Jorge	F1 - Recognition of Structural Signs in the Human Iris using Data Mining Techniques, Manolis Maragoudakis
	Alvarez-Lozano, Oscar Mayora E2 - A Goal-Oriented Requirements Engineering Approach for the Ambient Assisted Living Domain, Andrea Claudi, Davide	F2 - A Comparative Study on 3-D Stereo Reconstruction from Endoscopic Images, Mostafa Parchami, Gustavo Puerto-Souza, Jeffrey Cadeddu, Gian-Luca Mariottini
	Calvaresi, Aldo Dragoni, Daniele Accattoli, Paolo Sernani, Eric Yu E3 - Data management and user centered rehabilitation in Rehab@Home project, Elisa Ferrara, Sonia Nardotto, Serena Ponte, Silvana Dellepiane	F3 - Hand Detection on Sign Language Videos , Zhong Zhang, Christopher Conly, Vassilis Athitsos
		F4 - A Markerless Tiling Method for Tracking Daily Lung Tumor Motion on Imperfectly Matched Images, Timothy Rozario, Sergey
	E4 - Mining Candidates for Adverse Drug Interactions in Electronic Patient Records, Lars Asker, Henrik Boström, Isak Karlsson, Panagiotis Papapetrou, Jing Zhao	Bereg, Weihua Mao F5 - Evaluation of Time and Frequency Domain Features for Seizure Detection from Combined EEG and ECG signals, Iosif
	E5 - Cognitive and Context-Aware Application, Sohail Rafiqi, Suku Nair, Ephrem Fernandez	Mporas, Vasiliki Tsirka, Evangelia Zacharaki, Michalis Koutroumanidis, Vasileios Megalooikonomou
10:40- 11:10	Coffee Break (PETRA NSF Doctoral Consortium Meeting)	
11:10- 12:10	<u>Session G</u> - Plenary Keynote Lecture Maureen Simmonds, Professor & Research Chair, UT San Antonio Health Science Centre	
	Virtual Reality in Pain, Mind, and Movement Rehabilitation: Pervasive and Persuasive?	
	Session Chair: Dimtrios Zikos	

12:10- 13:10	Session W2: Workshop on Affective Computing for Biological Activity Recognition in Assistive Environments (STHENOS) Workshop chairs: Ilias Maglogiannis, Panagiotis Bamidis, Kostas Karpouzis W21 - Human Centered Computing for the Development of Assistive Environments: The STHENOS project, Ilias Maglogiannis W22 - Human Movement Detection using Attitude and Heading Reference System, George Fourlas, Ilias Maglogiannis W23 - Multicamera Fusion for online Analysis of structured Processes, Dimitrios Kosmopoulos, Ilias Maglogiannis W24 - Employing Affection in Elderly Healthcare Serious Games Interventions, Charis Styliadis, Evdokimos Konstantinidis, Antonis Billis, Panagiotis Bamidis	Session W3: Workshop on Robotics in Assistive Environments (RasEnv) Workshop chairs: Gian-Luca Mariottini, Dan Popa W31 - Safety Challenges in using AR.Drone to collaborate with humans in indoor environments, Alexandros Lioulemes, Georgios Galatas, Vangelis Metsis, Gian Luca Mariottini, Fillia Makedon W32 - Indoor Quadrotor State Estimation using Visual Markers, Ghassan Atmeh, Isura Ranatunga, Dan Popa W33 - Service Robotics for the Home: A State of the Art Review, Kris Doelling, Jeongsik Shin, Dan Popa
13:10- 14:30	Lunch Break	
15:00	Excursion (Rhodes Aquarium)	

THIRD DAY: May 29

	THIRD DAY: May 29		
	Room 1	Room 2	
	Session H: Usability and HCI issues Session Chair: Dimitrios Spiliotopoulos	<u>Session W4</u> : Workshop on Assistive Technologies For Safe Operation Of Complex Technological Systems Including Industrial Sites, Shipping, Off-Shore Platforms And Mining Activities (SafeOperation)	
9:00- 10:40	H1 - A Marker Detection Method using Hysteresis Thresholding for User Posture Tracking: a Head Tracking System, Ahmet Cengizhan Dirican H2 - An Audiovisual Patient Identification System for Rehabilitation, Konstantinos Tsiakas, Dimitrios Zikos, Fillia Makedon H3 - Context-aware Assistive Systems at the Workplace. Analyzing the Effects of Projection and Gamification, Oliver Korn, Markus Funk, Stephan Abele, Thomas Hörz, Albrecht Schmidt H4 - Target Reverse Crossing - A Selection Method for Camera-Based Mouse-replacement Systems, Wenxin Feng, Ming Chen, Margrit Betke H5 - Development of a Smart Insole Tracking System for Physical Therapy and Athletics, Timothy Roden, Rob LeGrand, Raul Fernandez, Jacqueline Brown, James Deaton, Johnny Ross Jr.	W41 - Multi-sensor Target Detection and Tracking system for Sea Ground Borders Surveillance, Panagiotis Agrafiotis, Anastasios Doulamis, Nikolaos Doulamis, Andreas Georgopoulos W42 - Investigation of coinciding shipping accident factors with the use of partitional clustering methods, Eva Lema, Dimitris Papaioannou, George P. Vlachos W43 - Monitoring and evaluating failure-sensitive strategies in air traffic control simulator training, Stathis Malakis, Tom Kontogiannis, Panos Psaros W44 - Bayesian network to Predict Environmental Risk of a Possible Ship Accident, Ioanna Koromila, Zoe Nivolianitou, Theodoros Giannakopoulos W45 - AMINESS: A Platform for Environmentally Safe Shipping, Theodoros Giannakopoulos, Ioannis A. Vetsikas, Ioanna Koromila, Vangelis Karkaletsis, Stavros Perantonis	
10:40- 11:10	Coffe	e Break	
11:10- 12:10	Session I. Plenary Keynote Lecture Mark Hawley Professor University of Sheffield, UK Speech technology in assistive environments Session Chair: Vassilis Athitsos		

12:10- 13:10	Session J: Robotic Devices and Multimodal Interfaces Session Chair: Dan Popa J1 - Implementation of advanced manipulation tasks on humanoids through kinesthetic teaching, Sven Cremer, Matt Middleton, Dan Popa J2 - Multiple-Robot Monitoring System Based on a Service-Oriented DBMS, Yutaka Deguchi, Daisuke Takayama, Shigeru Takano, Vasile-Marian Scuturici, Jean-Marc Petit, Einoshin Suzuki J3 - Quantitative Evaluation of the Kinect Skeleton Tracker for Physical Rehabilitation Exercises, Shawn Gieser, Vangelis Metsis, Fillia Makedon	No Session
13:10- 14:30	Lunch Break	
	Room 1	Room 2
14:30- 16:00	Session K: Tools, Infrastructures, Architectures and Techniques for Deploying Pervasive Applications in Assistive Environments I Session Chair: Helen Karatza K1 - Mobile Bandwidth Prediction in the Context of Emergency Medical Service, Stefanie Judith Opitz, Nicole Todtenberg, Hartmut König K2 - Sign Language Recognition using Dynamic Time Warping and Hand Shape Distance Based on Histogram of Oriented Gradient Features, Pat Jangyodsuk, Christopher Conly, Vassilis Athitsos K3 - Mobility Behavior Assessment Using a Smart-Monitoring System to Care for the Elderly in a Hospital Environment, Marie Chan, Eric Campo, Walid Bourennane, Fehd Bettahar, Yoann Charlon K4 - Java Framework for Dialysis Monitoring using a Distributed Network Architecture, Hiren Sangani, Andreas Fink, Christian Peter	Session L: Healthcare and Industrial Innovations in Assistive Technologies Session Chair: Oliver Korn L1 - Effects of Gamification on the Performance in the Context of Industrial Workplaces, Oliver Korn L2 - Evaluation of Classification Methods for the Prediction of Hospital Length of Stay using Medicare Claims data, Dimitrios Zikos, Konstantinos Tsiakas, Fadiah Qudah, Vassilis Athitsos, Fillia Makedon L3 - Improving Healthcare Cost Transparency Through Mobile Application Development, David Allen, Ovidiu Daescu L4 - Computer Games to Decrease Pain and Improve Mood and Movement, Maureen Simmonds, Dimitrios Zikos L5 - Demo: Smart Insole Tracking System, Johnny Ross Jr.
16:00- 16:30	Coffee Break (PETRA NSF Doctoral Consortium Meeting)	
22:00	After Dinner Party	

FOURTH DAY: May 30

	Room 1	Room 2
10:00- 11:00	Session M. Plenary Keynote Lecture Matt Bishop Professor University of California at Davis, USA Testing the Resistance of Pervasive Technologies to Attack Session Chair: Fillia Makedon	1
11:00- 12:40	Session N: Tools, Infrastructures, Architectures and Techniques for Deploying Pervasive Applications in Assistive Environments I Session Chair: Dimitrios Kosmopoulos N1 - Co-creation for Empowerment: V-pad and a New Curriculum for Engineers, Inge Vervoort, Jan Dekelver, Jo Daems, Jan Engelen, Mohammed Mohammed N2 - eFriend: an Ethical Framework for Intelligent Environment Development, Simon Jones, Sukhvinder Hara, Juan Augusto N3 - Interdisciplinary Partnerships between Rehabilitation Therapists and Computer Scientists: A Proposed Model, Angie Boisselle, Maureen Simmonds N4 - Text Summarization as an Assistive Technology, Fahmida Hamid, Paul Tarau	Session W5: Workshop on Distributed Sensor Systems for Assistive Environments (Di-Sensa) Workshop chair: Vana Kalogeraki W51 - Sink Controlled Reliable Transport for Disaster Recovery, Charilaos Stais, George Xylomenos, Giannis F. Marias W52 - Towards Real-Time Emergency Response using Crowdsourcing, Ioannis Boutsis, Dimitrios Tomaras, Vana Kalogeraki W53 - Tracking persons using a network of RGBD cameras, George Galanakis, Xenophon Zabulis, Panagiotis Koutlemanis, Spiros Paparoulis, Vassilis Kouroumalis W54 - Defining A Mobile Architecture for Structural Health Monitoring, Panos Sakkos, Dimitrios Kotsakos, Vana Kalogeraki, Dimitrios Gunopulos, Jaakko Hollmén W55, The impact of resource heterogeneity on the timeliness of hard real-time complex jobs, Georgios L. Stavrinides, Helen D. Karatza
12:40- 13:00	Conference Closing	
13:00- 14:30	Lunch	
14:30- 18:30	Excursion (Tour of Lindos)	

Accepted Posters

P1. Wireless infrastructure setup strategies for healthcare,

Nikunj Agarwal, Sebastian M P

P2. Opportunistic Sensing and Detection of Mild Cognitive Impairment,

Bilgin Kosucu, Netzahualcóyotl Hernández, Temitayo Olugbade

P3. Hardware keys exchange protocol in wireless sensor networks,

Kahina Chelli

P4. Assistive Robotic Platform.

Harris Enotiades, Scott Phan, Christopher McMurrough, Fillia Makedon, Panos Shiakolas

P5. Greek-Language Verbal and Non-Verbal Interaction with a Philosopher Humanoid Robot,

Michalis Papakostas

P6. A probabilistic algorithm with User Feedback Loop for Decision Making during the Hospital Triage Process,

Dimitrios Zikos, Ismail Vandeliwala, Philip Makedon

P7. Experimental testing of a prototype wireless tele-alerting system for monitoring sleeping infants (smart cot MAIA).

Evangelia Spiridonou, Grigoris Matralis, Panagiotis Kartsidis, Lilia Raducan, Miltiadis Yfantis, Alexander Astaras

P8. Creating customizable point of gaze goggles through facial metrics,

Cyril Lutterodt, Scott Phan, Christopher McMurrough

P9. TigerBites: An Assistive Notification System for Local Dining,

David Paulk, Lisa Kim, Diogo Adrados

P10. A Framework for the development of an Assessment Tool for Children with Disabilities,

Philip Makedon, Lynette Watts, Dimitrios Zikos

NSF Doctoral Consortium Awardees

Varsha Evanglene Sudula - *University of Illinois Chicago*

Angela Boisselle - Texas Women's University

Christopher Conly - University of Texas at Arlington

Shawn Gieser - University of Texas at Arlington

Nabil Alshurafa - University of California Los Angeles

Panagiotis Moutafis - University of Houston

Stanislav Yotov - University of Houston

David Allen - University of Texas at Dallas

Timothy Rozario - University of Texas at Dallas

Fahmida Hamid - University of North Texas

Sohail Rafiqi - Southern Methodist University

Wenxin Feng - Boston University

Alexandros Lioulemes - UTA/NCSR

Konstantinos Tsiakas - UTA/NCSR

Michalis Papakostas - UTA/NCSR

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Grammati Pantziou - Technological Educational Institution of Athens, Greece

Vangelis Karkaletsis - National Centre for Scientific Research "Demokritos", Greece

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Gerald Bieber - Fraunhofer Institute for Computer Graphics, Rostock, Germany

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Paolo Bonato - Wyss Institute at Harvard

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Christos Douligeris - University of Piraeus, Greece

Zakia Hammal - Carnegie Mellon University

Hollmen Jaakko - Aalto University

Ioannis Kakadiaris - University of Houston

Sarantos Kapidakis - Ionian University, Greece

Vangelis Karkaletsis - NCSR "Demokritos", Greece

Oliver Korn - University of Stuttgart, VIS

Dimitrios Kosmopoulos - Technical Educational Institute of Crete Estavromenos, Greece

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Molly Lopez - The University of Texas, Austin

Gian-Luca Mariottini - University of Texas at Arlington, USA

Vangelis Metsis - University of Texas at Arlington, USA

Zoe Nivolianitou - N.C.S.R. DEMOKRITOS/I.N.R.A.S.T.E.S.

Grammati Pantziou - TEI of Athens (Department of Informatics), Greece

Panagiotis Papapetrou - Stockholm University, Sweden

Constantinos Pattichis - University of Cyprus

Christian Peter - BioArtProducts GmbH

Dan Popa - The University of Texas at Arlington

Laurel Riek - University of Notre Dame

Majid Sarrafzadeh - UCLA, USA

Li Shen - Indiana University, USA

Maureen Simmonds - UT Health Science Center San Antonio

Isabelle Viaud-Delmon - IRCAM, France

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Workshop Chair

Dimitrios Kosmopoulos - TEI of Crete and Institute of Computer Science, FORTH,, Greece Vangelis Metsis - University of Texas at Arlington, USA

Conference Web Support and e-Proceedings

Vangelis Metsis - University of Texas at Arlington, USA Rong Zhang - University of Texas at Arlington, USA Eric Becker - University of Texas at Arlington, USA

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