

# The 16th ACM International Conference on Pervasive Technologies Related to Assistive Environments

# PETRA 2023

## Conference Program

July 05 – July 07, 2023  
Corfu, Greece

## Organized by

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

## With sponsorship from:

*The National Science Foundation (NSF), USA*

*The College of Engineering, University of Texas at Arlington (UTA), USA*

*The Department of Computer Science and Engineering at UTA, USA*

*The Human Centered Computing Laboratory (Heracleia) at UTA, USA*

*The iPerform Industry-University NSF Center at UTA, USA*

*Association for Computing Machinery (ACM-ICPS Digital Libraries)*

*The National Center for Scientific Research (NCSR)-Demokritos, Greece*

*Ionian University, Corfu, Greece*

*Technologies Journal*



*technologies*  
an Open Access Journal by MDPI

## Conference Proceedings

*Conference proceedings are available to authors only  
at [www.petrae.org/proceedings](http://www.petrae.org/proceedings)*

ACM - Association for Computing Machinery  
Digital Library Proceedings





## *Welcome from the Conference Chair*



**Dear Friends and Colleagues,**

On behalf of the Program Committee and the Organizing Committees, I welcome you to the **16th ACM International Conference on PErvasive Technologies Related to Assistive Environments, PETRA 2023**, taking place July 05 – July 07, 2023. The conference will take place on the majestic island of Corfu.

PETRA is an interdisciplinary conference with focus on pervasive technologies that improve the quality of life and enhance human experience and performance in a wide range of settings, in the workplace, at home, in public spaces, urban environments, and other.

This year, the conference theme of “PErvasive Technologies Related to Assistive Environments” takes a different meaning as we are recovering and coming out of a deep pandemic crisis and entering normalcy again. Scientific results emerge to meet emerging human needs and address compelling social applications to survive in an increasingly challenging world.

Results range from basic research in computer vision, machine learning, data mining, human robot interaction, and big data, to engineering applications in robotics, sensors, devices, wearables, and software solutions that address physical, cognitive, and mental human performance and monitoring. The conference addresses the needs of both healthy individuals and persons with special needs, such as providing safe in-home care for the elderly, or persons with Dementia, Alzheimer’s, Parkinson’s, chronic arthritis, PTSD, low vision, autism, COPD, Traumatic Brain Injury, and other conditions.

PETRA 2023 has 153 submissions from 35 countries and 132 registrations. Paper acceptance included 48 full papers, 13 short papers, 4 poster papers, 2 demo papers and twelve workshops. Like all previous years, the US National Science Foundation (NSF) has supported the conference with a Doctoral Consortium (DC) award that enabled the DC committee to offer support to 15 student authors, from different universities, 3 of them female. In addition, several accepted papers have undergraduate student coauthors, supported by the REU (Research Experiences for Undergraduates) NSF program.

***This year, PETRA 2023 distinguishes papers with six types of awards: Best Technical Paper, Best Paper for Novelty, Best Student Paper, Best Poster Paper, Best Demo Paper, and Best Workshop Paper.***

We hope that PETRA 2023 provides its participants exciting new opportunities to showcase their research and to network. We truly appreciate your participation and look forward to seeing you all in person in **PETRA 2024!** Wishing you a happy and safe summer,

**Fillia Makedon**  
2023 PETRA Conference Chair  
makedon@uta.edu



## ***KEYNOTE SPEAKERS***

### **DAY 1**



**Dr. Petros Maragos** is a Professor at the National Technical University of Athen (NTUA). He received his Ph.D. degree from Georgia Tech, Atlanta, in 1985. Then, he joined the faculty of the Division of Applied Sciences at Harvard University, where he worked for eight years as professor of EE affiliated with the Harvard Robotics Lab. In 1993 he joined the faculty of the School of ECE at Georgia Tech, affiliated with its Center for Signal & Image Processing. Since 1999, he has been working as professor at the NTUA, where he is currently the **Director of the Intelligent Robotics & Automation Lab**. He is also the coordinator of a robotics research unit at the **Athena Research & Innovation Center**. His research and teaching interests include signal processing, machine learning, computer vision & speech, and robotics. He is the recipient of several awards for his academic work. He was elected a **Fellow of IEEE** in 1995 and a **Fellow of EURASIP** in 2010 for his research contributions. He has served as IEEE SPS Distinguished Lecturer for 2017-2018.

### **DAY 2**



**Dr. Ahmad Lotfi** is Professor of Computational Intelligence and Head of the Department of Computer Science at Nottingham Trent University, Nottingham, where he is also leading the Computational Intelligence and Applications (CIA) research group. Areas of his research interest include computational intelligence, ambient intelligence, assistive robotics, and smart homes. His research has been recognized internationally for significant contributions to the application of computational intelligence techniques in control systems and intelligent environments. He has supervised many research fellows and over 20 PhD research students to successful completion. He has worked in collaboration with many healthcare commercial organizations and end-users. He has authored and co-authored over 200 scientific papers in the areas of computational intelligence, anomaly detection and machine learning in highly prestigious journals and international conferences. He has been invited as an **Expert Evaluator and Panel Member** for many EU Framework Research Programmes.

### **DAY 3**



**Dr. Ming Li** is an Associate Professor with the Computer Science and Engineering Department of the University of Texas at Arlington. Her research interests are in the general area of mobile computing and human-centered computing, with the focus on their novel applications in networking(e.g., crowdsensing/crowdsourcing, QoE assessment, resource optimization), smart city(e.g., mobility enhancement), and security and privacy(e.g., user-centered security, privacy-aware computing). Dr. Li explores those research topics with approaches within the core computer science and engineering discipline, including systems, signal processing, optimizations, and artificial intelligence, and with the principles across disciplines, including physiology and economics. She obtained her Ph.D. from the Electrical and Computer Engineering Department at Mississippi State University. Her research has been funded by the US National Science Foundation (NSF), Department of Transportation (DoT) and the National Institutes of Health (NIH). She is a recipient of the **NSF CRII Award** (2016) and **NSF CAREER Award** (2020)

# CONFERENCE DAY 1: July 05, 2023

08:00-09:00	Conference Registration		
09:00-09:25	Room 1 (KERKYRA) Conference Opening Fillia Makedon, Conference Chair, University of Texas Arlington, USA		
09:30-10:25	<b>KEYNOTE:</b> <i>Multimodal Robot Perception and Interaction</i> <b>Prof. Petros Maragos</b> National Technical University of Athens, Greece <i>Session Chair: Fillia Makedon</i>		
10:30-11:00	Coffee Break & Session P: Poster & Demo Presentations <i>List of presentations on page 11</i> <i>Location: Room 2 (NAUSICA)</i>		
11:00-12:30	Room 1 (KERKYRA)	Room 2 (NAUSICA)	Room 3 (ITHACA)
	<b>Session A: Accessibility Tools, Methods &amp; Applications</b> <i>Session Chair: Manizheh Zand</i> <b>A-1</b> Online symposium with touch: An attempt to organise an online 3D model tactile symposium for the visually impaired (12+3 min) Kazunori Minatani and Tetsuya Watanabe <b>A-2</b> TalkConnect: A Mobile Networking App for People with Visual Impairments Attending In-person Formal Events (10+2 min) Manizheh Zand, Joyce Ayoola, Roopan Tuli, Akshat Kalra, John Quach and Maria Kyrarini <b>A-3</b> Towards a Haptic-based Virtual Cane to Assist Blind People in Obstacle Detection (10+2 min) Barbara Leporini, Michele Raucci, Michele Rosellini and Nicola Forgione <b>A-4</b> Artificial cognitive functions towards AI-enabled collaborative robots (10+2 min) Evi Zouganeli and Athanasios Lentzas <b>A-5</b> Lung Nodule Segmentation Using Federated Active Learning (12+3 min) Andrei Tenescu, Cristian Avramescu, Bogdan Bercean and Marius Marcu <b>A-6</b> Assisting radiologists with transformer-based fracture detection for chest radiographs (12+3 min) Bogdan-Alexandru Bercean, Andrei Tenescu, Cristian Avramescu and Marius Marcu	<b>Session B: Assistive Robotic Systems and Human-Robot Interaction</b> <i>Session Chair: Sadjad Asghari-Esfeden</i> <b>B-1</b> Research through Design of Socially Cooperative Agents for Exoskeleton-based at Home Stroke Rehabilitation (12+3 min) Milton Mariani & John Paulin Hansen <b>B-2</b> Fabric-Silicone Composite Haptic Muscles for Sensitive Wearable Force Feedback (12+3 min) Raagini Rameshwar, Erik Skorina and Cagdas Onal <b>B-3</b> Real-Time Object Localization for Human-Robot Handover (12+3 min) Sadjad Asghari-Esfeden, Garrit Streng, Kyle Lockwood, Yunus Bicer, Tales Imbiriba, Mariusz Furmanek, Mathew Yarossi, Eugene Tunik, Taskin Padir and Deniz Erdogan <b>B-4</b> Effects of Presence on Human Performance and Workload in Simulated VR-based Telerobotics (12+3 min) Federica Nenna, Davide Zanardi and Luciano Gamberi <b>B-5</b> Gamified experiences using 360° photography (12+3 min) Aldo Xhako, Emmanouil Zidianakis, Eirini Kontaki, Konstantina Manoli, Stavroula Ntoa, Nikolaos Partarakis and Constantine Stephanidis <b>B-6</b> Reflect-AR: Insights into Mirror-Based Augmented Reality Instructions to Support Manual Assembly Tasks (12+3 min) Pascal Karg, Roman Stöhr, Lisa Jonas, Julian Kreimeier and Timo Götzelmann	<b>Workshop W1: Assistive Technologies for Activities of Daily Living Workshop</b> <i>Session Chair: Ashish Jaiswal</i> <b>W1-1</b> Towards prediction of Quality-of-Life aspects using wearable data with limited ground truth (12+3 min) Konstantina Pantelidou, Christoforos Papastergiopoulos, Ilias Kalamaras, Konstantinos Votis and Dimitrios Tzovaras <b>W1-2</b> Lightweight Mood Estimation Algorithm For Faces Under Partial Occlusion (12+3 min) Nikolas Petrou, Georgia Christodoulou, Konstantinos Avgerinakis and Pavlos Kosmides <b>W1-3</b> A Teleoperation Framework for Robots Utilizing Control Barrier Functions in Virtual Reality (12+3 min) Aref Hebri, Sneha Acharya, Michail Theofanidis and Fillia Makedon <b>W1-4</b> Assistive Robots for Persons with Visual Impairments: Current Research and Open Challenges (12+3 min) Maria Kyrarini, Manizheh Zand and Krisha Kodur <b>W1-5</b> A Framework Towards Ambient Assisted Living Enhanced by Service Robots (12+3 min) Petros Toupas, Georgios Tsamis, Andreas Kargakos, Dimitrios Giakoumis, Konstantinos Votis and Dimitrios Tzovaras 🤖 <b>W1-6</b> Beatrice: A Chatbot for Collecting Psychoecological Data and Providing QA Capabilities (12+3 min) Yeming Ni, Yuqing Chen, Ruyi Ding and Shiguang Ni 🤖



12:30-14:00	<b>Lunch Break</b> (Lunch is included <b>for registered participants</b> staying at the main venue during the days of the conference; if <i>at other hotels</i> , the cost for lunch is €18 for students & €24 for others. Lunch tickets can be obtained at the hotel front desk).		
14:00-15:45	<b>Room 1 (KERKYRA)</b> <b>Session C: Human Affect, Physiology and Biosignal Analysis</b> <i>Session Chair: Vangelis Metsis</i>  <b>C-1 Medical Face Masks and Emotion Recognition from the Body: Insights from a Deep Learning Perspective (12+3 min)</b> Nikolaos Kegkeroglou, Panagiotis P. Filntisis and Petros Maragos  <b>C-2 Facial Emotion Recognition in Immersive Virtual Reality: A Systematic Literature Review (12+3 min)</b> Thorben Ortmann, Qi Wang and Larissa Putzar  <b>C-3 Detecting Cognitive Fatigue In Subjects With Traumatic Brain Injury From Fmri Scans Using Self-Supervised Learning (12+3 min)</b> Ashish Jaiswal, Ashwin Ramesh Babu and Mohammad Zaki Zadeh  <b>C-4 An LLVM-Inspired Framework for Unified Processing of Multimodal Time-Series Data (10+2 min)</b> Lee Hinkle and Vangelis Metsis <b>C-5 Human Experts' Perceptions of Auto-Generated Summarization Quality (12+3 min)</b> Maryam Lotfigolian, Christos Papanikolaou, Samaneh Taghizadeh and Frode Eika Sandnes <b>C-6 Remote Operated Human Robot Interactive System using Hand Gestures for Persons with Disabilities (10+2 min)</b> Enamul Karim, Harish Ram Nambiappan, Sneha Acharya and Fillia Makedon  <b>C-7 Sporadic Audio-Visual Embodied Assistive Robot Navigation For Human Tracking (12+3 min)</b> Gaurav Singh, Mark Zolotas and Taskin Padir	<b>Room 2 (NAUSICA)</b> <b>Session D: Wearable Systems and Monitoring Devices</b> <i>Session Chair: Enamul Karim</i>  <b>D-1 Modeling Behavior, Perception and Cognition of Pilots in a Real-time Training Assistance Application (12+3 min)</b> Christian Thomay, Peter Fritz, Benedikt Gollan, Carsten Mangasser, Michael Matscheko and Harald Schitnig  <b>D-2 Developing Brain-Computer Interfaces with Everyone (12+3 min)</b> Garrett Flynn, Joshua Brewster, Dong Song and Marientina Gotsis  <b>D-3 Decentralized Resilient Smart Lock System with Offline Capabilities - ChainLock (10+2 min)</b> Robert Manthey, Richard Vogel, Matthias Baumgart, Christian Roschke, Marc Ritter and Matthias Vodel  <b>D-4 Digital technology for elders better living: a usability and user-experience assessment (12+3 min)</b> Agnese Brunzini, Manila Caragiuli, Flavia Atzori, Micol Bronzini and Michele Germani  <b>D-5 An EEG-based Cognitive Fatigue Detection System (12+3 min)</b> Enamul Karim, Hamza Reza Pavel, Ashish Jaiswal, Mohammad Zaki Zadeh, Michail Theofanidis, Glenn Wylie and Fillia Makedon  <b>D-6 How Could I Learn Rhythm Better? Investigating Three Learning Signals for Passive Haptic Learning in Different Context (12+3 min)</b> Likun Fang, Erik Pescara, Patrick Reiter and Michael Beigl	<b>Room 3 (ITHACA)</b> <b>Workshop W2: <u>NLP4Disability Workshop</u> A Workshop on Natural Language Processing (NLP) for Disability</b> <i>Session Chair: Hend Al-Khalifa</i>  <b>W2-1 Towards Designing a ChatGPT Conversational Companion for Elderly People (12+3 min)</b> Abeer Alessa and Hend Al-Khalifa  <b>W2-2 Towards a Measure for Empathy: a Cross-Language Investigation of #disability on Social Media (12+3 min)</b> Zainab Almeraj and Fatemah Husain 🤖  <b>W2-3 Evaluating Search Results Overviews and Previews with Visually Impaired Users (12+3 min)</b> Dena Al-Thani and Aboubakr Aqlé 🤖  <b>W2-4 JUMLA-QSL-22: Creation and Annotation of a Qatari Sign Language Corpus for Sign Language Processing (12+3 min)</b> Achraf Othman, Oussama El Ghoul, Maryam Aziz, Khansa Chemnad, Sammy Sedrati and Amira Dhouib 🤖  <b>W2-5 Easy-to-Read Language Resources and Tools for three European Languages (12+3 min)</b> Margot Madina, Itziar Gonzalez-Dios and Melanie Siegel 🤖  <b>W2-6 Practical Study of Deep Learning Models for Speech Synthesis (12+3 min)</b> Quentin Langlois and Sébastien Jodogne 🤖  <b>W2-7 Application of Large Language Models in Automatic Websites Remediation: A Preliminary Study on Enhancing Web Accessibility with ChatGPT (12+3 min)</b> Achraf Othman, Amira Dhouib and Aljazi Nasser Al Jabor 🤖
15:45-16:15	<b>NSF Doctoral Consortium Students (only) - Session 1</b> Room 2 (NAUSICA) (close to the registration desk)		
19:00 - 21:00	<b>Welcome Reception</b> (Room 2 (NAUSICA) – appetizers & drinks) (please bring reception coupons – <u>accompanying persons need to purchase them</u> )		

**CONFERENCE DAY 2: July 06, 2023**

09:00-09:55	<p align="center"><i>Room 1 (KERKYRA)</i></p> <p><b><u>KEYNOTE:</u>      <i>Computational Intelligence Approaches for Anomaly Detection in Activities of Daily Living</i></b>  <b>Prof. Ahmad Lotfi</b>  Nottingham Trent University, United Kingdom  <i>Session Chair: Dr. Jordan Bird</i></p>		
10:00-10:30	<p align="center"><b>Coffee Break</b> (remember to bring coffee coupons please)</p>		
10:30-12:30	<p align="center"><i>Room 1 (KERKYRA)</i></p> <p><b>Workshop W3: <u>NOTION Workshop</u></b>  <i>The Seventh Workshop on: Human Behaviour Monitoring, Interpretation and Understanding</i>  <i>Session Chair: Jordan J. Bird, Amir Pourabdollah</i></p> <p><b>W3-1</b> Generative Transformer Chatbots for Mental Health Support: A Study on Depression and Anxiety (12+3 min) Jordan J. Bird and Ahmad Lotfi</p> <p><b>W3-2</b> Explainable AI for Medical Image Processing: A Study on MRI in Alzheimer's Disease (12+3 min) Linda M. Duamwan and Jordan J. Bird</p> <p><b>W3-3</b> An Immersive Vr System to Assess Attention Using Embodied Cognition (12+3 min) Ashish Jaiswal, Aref Hebri, Hamza Reza Pavel, Mohammad Zaki Zadeh and Fillia Makedon</p> <p><b>W3-4</b> Toward a holistic elderly-centred behaviour monitoring solution: Achievements and Opportunities (12+3 min) Abdallah Naser, Ahmad Lotfi, Amir Pourabdollah and Jordan Bird</p> <p><b>W3-5</b> Employee Behavior Analysis Towards Multi-Label Classification of Customer Reviews (12+3 min) Alaeddin Türkmen, Barış Bayram and Gözde Aydın</p> <p><b>W3-6</b> An Integrated Development Environment for the Design of Fuzzy Human-centric System in accordance with IEEE Standard 1855-2016. (12+3 min) Bhavesh Pandya, Amir Pourabdollah and Ahmad Lotfi</p> <p><b>W3-7</b> Exploring the Role of Fear in Human Decision Making (12+3 min) Patrick Kelly, David Ada Adama, Isibor Kennedy Ihianle, Pedro Machado and Richard I. Otuka</p>	<p align="center"><i>Room 2 (NAUSICA)</i></p> <p><b>Session E: <i>Activity Recognition, Human Tracking and Localization</i></b>  <i>Session Chair: Antonis Argyros</i></p> <p><b>E-1</b> Gaze-based Attention Recognition for Human-Robot Collaboration (12+3 min) Pooja Prajod, Matteo Lavit Nicora, Matteo Malosio and Elisabeth André</p> <p><b>E-2</b> 3D Hand Shape and Pose Estimation based on 2D Hand Keypoints (12+3 min) Drosakis Drosakis and Antonis Argyros</p> <p><b>E-3</b> Design and development of a dashboard for supporting healthcare professionals in managing people with dementia (12+3 m) Federico Barbarossa, Giulio Amabili, Arianna Margaritini, Nicole Morresi, Sara Casaccia, Fabrizio Marconi, Yeh-Liang Hsu, Fong-Chin Su, Nathalie Stolwijk, Henk Herman Nap, Elvira Maranesi &amp; Roberta Bevlacqua</p> <p><b>E-4</b> Native interaction experience for computational maps with mobile devices (10+2 min) Anton Akusok, Leonardo Espinosa-Leal, Kaj-Mikael Björk and Renjie Hu</p> <p><b>E-5</b> Towards Safe Encounters between Pedestrians and Autonomous Driverless Vehicles: Comparing Adults and Children's Perceptions of External Human Machine Interface Design Features (12+3 min) Mohammad Awais Hameed, Fuwad Chaudhry, Fatema Tuz Sabiha &amp; Frode Eika Sandnes</p> <p><b>E-6</b> Technological Tools for Assisting People with Autism Spectrum Disorder (ASD), Intellectual Development Disorder (IDD) and Physical Disabilities (PD) (12+3 min) Mattys Gervais, Bruno Bouchard, Leoni Labreque, Virginie Tremblay, Julie Bouchard, Maud-Christine Chouinard, Carole Dionne, Kevin Bouchard and Sebastien Gaboury</p>	<p align="center"><i>Room 3 (ITHACA)</i></p> <p><b>Workshop W4: <u>CVIn4 Workshop</u></b>  <i>Workshop on Computer vision for Industry 4.0 applications</i>  <i>Session Chair: Antonios Gasteratos</i></p> <p><b>W4-1</b> Encoding Semantic Attributes - Towards Explainable AI in Industry (12+3 min) Sarah Schneider, Doris Antensteiner, Daniel Soukup and Matthias Scheutz</p> <p><b>W4-2</b> Achieving Zero Defected Products in Diary 4.0 using Digital Twin and Machine Vision (12+3 min) Fotios Konstantinidis, Vasiliki Balaska, Symeon Symeonidis, Foivos Psarommatis, Athanasios Psomoulis, Georgios Giakos, Spyridon Mouroutsos and Antonios Gasteratos</p> <p><b>W4-3</b> Anomaly Detection in the Metal-Textile Industry for the Reduction of the Cognitive Load of QC Workers (12+3 min) Tobias Arndt, Max Conzen, Ingo Elsen, Alexander Ferrein, Oskar Galla, Hakan Köse, Stefan Schiffer and Matteo Tschesche</p> <p><b>W4-4</b> Object detection and colour evaluation of multicoloured waste textiles using machine vision (12+3 min) Sebastian E. Schröder, Uffe L. Christensen, Mikkel Hessellund, Andreas L. Enevoldsen, Anders F. Mikkelsen and Morten Kristiansen</p> <p><b>W4-5</b> Analysis of EV Charging Infrastructure and its impact on Public Adoption (12+3 min) Safa Hamdare, Omprakash Kaiwartya, Manish Jugran, David Brown and Pratik Vyas</p> <p><b>W4-6</b> A vision-based application for container detection in Ports 4.0. (12+3 min) Maria Angeles Burgos Simon, Eduardo Garro Crevillen, Miguel Llacer Sanfernando, Francisco Blanquer, Tommi Leino and Fotios Konstantinidis</p>

12:30-14:00	<p style="text-align: center;"><b>Lunch Break</b></p> <p><i>(Lunch is included <u>for registered participants</u> staying at the main venue during the days of the conference; if at other hotels, the cost for lunch is €18 for students &amp; €24 for others. Lunch tickets can be obtained at the hotel front desk).</i></p>		
14:00-15:00	<p><b>Session F: Pattern Recognition in Assistive Technology Applications</b>  <i>Session Chair: Ankur Yadav</i></p> <p><b>F-1 Analyzing Arc Welding Techniques improves Skill Level Assessment in Industrial Manufacturing Processes (12+3 min)</b> Markus Laube, Georgios Sopidis, Bernhard Anzenberger-Tanase and Alois Ferscha</p> <p><b>F-2 An RGB-D Fusion System for Indoor Wheelchair Navigation (12+3 min)</b> Christos Sevastopoulos, Sneha Acharya and Fillia Makedon</p> <p><b>F-3 Machine Learning for Rhabdomyosarcoma Whole Slide Images Sub-type Classification (10+2 min)</b> Ankur Yadav, Ovidiu Daescu, Patrick Leavey and Erin Rudzinski</p> <p><b>F-4 Enhancing Action Recognition in Vehicle Environments with Human Pose Information (10+2 min)</b> Michaela Konstantinou, George Retsinas and Petros Maragos</p>	<p><b>Session G: Pervasive Systems for the Aged &amp; Smart Health Devices</b>  <i>Session Chair: Arno Appenzeller</i></p> <p><b>G-1 Usability for Data Sovereignty - Evaluation of Privacy Risk Quantification Interfaces (12+3 min)</b> Arno Appenzeller, Falk Balduf and Jürgen Beyerer</p> <p><b>G-2 Human Digital Twin-based interactive dashboards for informal caregivers of stroke patients (12+3 min)</b> Martin Wolfgang Lauer-Schmaltz, Israa Kerim, John Paulin Hansen, Gábor Máté Gulyás and Henning Boje Andersen</p> <p><b>G-3 Optimization of CT Lung Lobe Segmentation for Edge Inference (10+2 min)</b> Cristian Avramescu, Andrei Tenescu, Bogdan Bercean and Marius Marcu</p> <p><b>G-4 Development of a Real-Time Stress Detection System for Older Adults with Heart Rate Data (12+3 min)</b> Patrizia Di Campli San Vito, Gözel Shakeri, James Ross, Xiaochen Yang and Stephen Brewster</p>	<p><b>Workshop W5: <u>HD-THIS Workshop</u> Workshop on Human Digital Twins in Hybrid Intelligence Systems</b>  <i>Session Chair: Christoph Stahl</i></p> <p><b>W5-1 Preliminary Systemic Model for (Human) Digital Twin (12+3 min)</b> Yannick Naudet, Christoph Stahl and Marie Gallais</p> <p><b>W5-2 Exploring the Feasibility of Data-Driven Valence Modeling for Human Digital Twins (12+3 min)</b> Catarina Dias de Oliveira, Alireza Khanshan and Pieter Van Gorp</p> <p><b>W5-3 Challenges of learning human digital twin: case study of mental wellbeing (12+3 min)</b> Elena Vildjiounaite, Johanna Kallio, Julia Kantorovitch, Atte Kinnula, Simão Ferreira, Matilde Rodrigues and Nuno Rocha</p> <p><b>W5-4 TONIC: A teamwork simulator and digital twin for organizational innovation challenges (12+3 min)</b> Jiayuan Hu and Ioanna Lykourantzou</p>
20:30-22:30	<p style="text-align: center;"><b>GALA Dinner, BBQ, Greek Folk Dancing and Entertainment</b>  <i>By Hotel Main Pool (DC Students try to sit together)</i></p>		

**CONFERENCE DAY 3: July 07, 2023**

	<i>Room 1 (KERKYRA)</i>		
08:30-09:25	<b><u>KEYNOTE:</u>    <i>Enhancing Safety of Vulnerable Road Uses: Smartphone-Centered Approaches</i></b> <b>Prof. Ming Li</b> The University of Texas at Arlington, USA <i>Session Chair: Fillia Makedon</i>		
	<i>Room 1(KERKYRA)</i>	<i>Room 2(NAUSICA)</i>	<i>Room 3 (ITHACA)</i>
09:30-10:30	<b>Workshop W6: <u>CogTech Workshop</u></b> <i>Workshop on low-cost, non-invasive technologies for decision-making, cognitive wellness, and mental health</i> <i>Session Chair: Varun Dutt</i> <b>W6-1</b> Effects of Simulation Tools and Videos on People's Cognizance of Climate Change (12+3 min) Gitanshu Choudhary, Keshav Tadia and Varun Dutt  <b>W6-2</b> Learning channel attention for decoding of visual imagined text from multi-band EEG using metric learning (12+3 min) Gaurav Jaswal, Geetanjali Sharma, Varun Dutt and Arnav Bhavsar  <b>W6-3</b> An integrated framework for classifying mammograms according to BIRADS scale and breast tissue density (12+3 min) Ioannis Tzortzis, Stavros Sykiotis, Ioannis Rallis and Nikolaos Doulamis  <b>W6-4</b> Assessing stress, anxiety, and depression with social robots via conversational AI (12+3 min) Anuj Nandanwar and Varun Dutt	<b>Workshop W7: <u>PerInt Workshop</u></b> <i>5th Workshop on Pervasive Intelligence in Engineering</i> <i>Session Chair: Anastasios Doulamis</i> <b>W7-1</b> An interoperable and cost-effective IoT-based Framework for Household Energy Monitoring and Analysis (12+3 min) Sotirios Athanasoulas, Athina Katsari, Michail Savvakis, Stelios Kalogridis and Nikolaos Ipiotis <b>W7-2</b> Deep transformer networks for precise pothole segmentation tasks (12+3 min) Iason Katsamenis, Athanasios Sakelliou, Nikolaos Bakalos, Eftychios Protopapadakis, Christos Klaridopoulos, Nikolaos Frangakis, Anastasios Doulamis and Dimitris Kalogeras <b>W7-3</b> Real time road defect monitoring from UAV visual data sources (12+3 min) Iason Katsamenis, Nikolaos Bakalos, Eftychios Protopapadakis, Eleni Eirini Karolou, Georgios Kopsiaftis and Athanasios Voulodimos  <b>W7-4</b> Dynamically tangible cultural heritage monitoring from web video sources (12+3 min) Ioannis Kavouras, Rallis Ioannis, Nikolaos Doulamis and Anastasios Doulamis	<b>Workshop W8: <u>MeaVAB Workshop</u></b> <i>Workshop on Measuring Vital and Affective Biosignals</i> <i>Session Chair: Dimitri Kraft</i>  <b>W8-1</b> Visual detection of short-wave blood pressure fluctuations (12+3 min) Gerald Bieber, Angelina Schmidt, Dimitri Kraft and Michael Fellmann  <b>W8-2</b> Evaluation of Machine Learning based Pose Estimation of Surfers on River Waves (12+3 min) Michael Zöllner, Moritz Krause, Jan Gemeinhardt, Michael Döllinger and Stefan Kniesburges  <b>W8-3</b> Reliability factor for accurate remote PPG systems (12+3 min) Dimitri Kraft, Gerald Bieber and Michael Fellmann
10:30-10:50	<b>Coffee Break</b>		



10:50-12:35	<p><b>W6-5 Attention based 1D-CNN for mental Workload Classification using EEG (12+3 min)</b> Fiza Parveen and Arnav Bhavsar</p> <p><b>W6-6 Impact of Indian Classical Raga in Immersive Environments on Human Psycho-physiological Parameters (12+3 min)</b> Shilpa Chandra, Kulbhushan Chand and Varun Dutt 📺</p> <p><b>W6-7 The impact of Odissi dance and Yoga on stress, anxiety, and depression levels among young adults (12+3 min)</b> Ankita Garg, Kirti Tripathi, Shatakshi Goyal, Lakshmidhar Behera and Varun Dutt 📺</p> <p><b>W6-8 Prediction of decision-making performance post-longitudinal tDCS administration via EEG features and machine learning (12+3 min)</b> Akash K Rao, Zoha Fatma, Vishnu K Menon, Kulbhushan Chand, Arnav Bhavsar, Shubhajit Roy Chowdhury, Sushil Chandra and Varun Dutt 📺</p> <p><b>W6-9 Evaluating the Effectiveness of Mantra Meditation in a 360 Virtual Reality Environment (12+3 min)</b> Durgesh Ameta, Ankita Garg, Parveen Kumar, Laxmidhar Behera and Varun Dutt 📺</p> <p><b>W6-10 Predicting Adverse Childhood Experiences via Machine Learning Ensembles (12+3 min)</b> Akash K Rao, Gunjan Y Trivedi, Anshika Bajpai, Gajraj Singh Chouhan, Riri G Trivedi, Anita Kumar and Varun Dutt 📺</p> <p><b>W6-11 Does longitudinal, anodal tDCS improve working memory? A behavioral investigation (12+3 min)</b> Darshil Shah, Akash K Rao, Arnav Bhavsar, Shubhajit Roy Chowdhury, Sushil Chandra and Varun Dutt 📺</p>	10:50-11:50	<p><b>W7-6 An end-to-end system for transcription, translation, and summarization to support the co-creation process. A Health CASCADE Study. (12+3 min)</b> Georgios Balaskas, Homer Papadopoulos, Quentin Loisel, Dimitra Pappa, Georgios Efthimoglou and Sebastien Chastin 📺</p> <p><b>W7-7 Tensor-based embedding for graph-based semi-supervised approaches (12+3 min)</b> Ioannis Georgoulas, Eftychios Protopapadakis, Konstantinos Makantasis and Anastasios Doulamis 📺</p> <p><b>W7-8 Lightweight machine learning for privacy-preserving and secure networked medical devices: The SEPTON project use cases (12+3 min)</b> Sotiris Messinis, Nicholas Protonotarios, Ioannis Tzortzis, Ioannis Rallis, Dimitrios Kalogeras and Nikolaos Doulamis 📺</p>	10:35-11:20	<p><b>Workshop W9: <u>TOTAL Workshop</u></b> <i>Workshop on IoT fOr healTh and weLlbeing and how to level up indoor climate control systems to IoT augmented milieus for health and wellbeing</i> <i>Session Chair: Erik Wästlund</i></p> <p><b>W9-1 IoT for Health and Well-being: A case study and call for action (12+3 min)</b> Karint Ahlin, Agnieszka Kitkowska and Erik Wästlund 📺</p> <p><b>W9-2 Research agenda for IoT-based comfort management systems in open-plan office spaces (12+3 min)</b> Christoph Stahl, Benjamin Gateau, Yannick Naudet and Cedric Pruski 📺</p> <p><b>W9-3 Continuous eHealth monitoring ecosystem for bronchial asthma and air quality (12+3 min)</b> Sergio Escalona López, Miquel Alfaras Espinàs, Rosana Hernando Salvador, Luis Lores Obradors and Zouhair Haddi</p>
12:45-13:15	CONFERENCE CLOSING & AWARD CEREMONY				
13:15-14:45	Lunch Break				

		<b>Session V: Virtual Presentations (Over Zoom)</b>	
Day 01 July 05, 2023	11:00 – 12:30	<b>Session V-1: Multimodal Interfaces and Human-Computer Interaction</b> <i>Session Chair:</i> <b>V1-1 Leveraging Sensorimotor Realities for Assistive Technology Design Bridging Smart Environments and Virtual Worlds (15 min)</b> Radu-Daniel Vatavu <b>V1-2 Display and Use of Station Floor Plans on 2D Pin Matrix Displays for Blind and Visually Impaired People (15 min)</b> Gaspar Ramôa, Omar Moured, Karin Mueller, Thorsten Schwarz and Rainer Stiefelhagen <b>V1-3 Human digital twins in interaction design – from abstract to concrete (15 min)</b> Pertti Saariluoma, Mari Myllylä and Antero Karvonen <b>V1-4 Accessible Document Layout: An Interface for 2D Tactile Displays (12+3 min)</b> Omar Moured, Sara Alzalabny, Thorsten Schwarz, Bastian Rapp and Rainer Stiefelhagen <b>V1-5 Investigating the Potential and Impacts of Social Robots to Engage People with Advanced Dementia and their Caregivers: Early Insights from an Exploratory Ethnographic Study within a Protected Care Environment (12+3 min)</b> Elisabeth Raß, David Unbehaun, Volker Wulf, Jens Lüssem, Hannes Eilers, Gaby Lenz, Jutta Tandler, Seyed Nima Afzali and Beyza Eroglu <b>V1-6 How Social Robots can Influence Motivation as Motivators in Learning: A Scoping Review (12+3 min)</b> Heqiu Song, Shiyuan Huang, Emilia Barakova, Jaap Ham and Panos Markopoulos	
	14:00 – 15:30	<b>Session V-2: Telepresence, Virtual and Augmented Reality</b> <i>Session Chair: A</i> <b>V2-1 Gesture-based Interaction for AR Systems: A Short Review (12+3 min)</b> Despoina Gavgiotaki, Stavroula Ntoa, George Margetis, Konstantinos Apostolakis and Constantine Stephanidis <b>V2-2 Real-Time Activity Recognition for Surveillance Applications on Edge Devices (12+3 min)</b> Vasileios Tsinikos, Ioannis Pastaltzidis, Iason Karakostas, Nikolaos Dimitriou, Katerina Valakou, George Margetis, Constantine Stefanidis and Dimitrios Tzovaras <b>V2-3 Evaluation of Video Compression Methods for Network Transmission on Diverse Data: A Case Study (12+3 min)</b> Roman Strukov and Vassilis Athitsos <b>V2-4 Compacting MocapNET-based 3D Human Pose Estimation via Dimensionality Reduction (12 +3 min)</b> Ammar Qammaz and Antonis Argyros <b>V2-5 “It’s time!” A Portuguese application for helping seniors with their medicines: A preliminary Study (12+3 min)</b> Diana Carvalho, Arsénio Reis, João Barroso and Tânia Rocha <b>V2-6 Simplification of Geometry for the Browser-based Visualization Applications (12+3 min)</b> Alexander Sharmazanashvili, Nino Zurashvili, Vladimir Dolinski and Mariam Nozadze	
Day 02 July 06, 2023	10:30 – 12:00	<b>Session V-3: Reasoning systems and machine learning for assistive environments</b> <i>Session Chair: A</i> <b>V3-1 The DARLENE XR platform for intelligent surveillance applications (12+3 min)</b> Christos Ntoumanopoulos, Efstathia Martinopoulou, Iason Karakostas, Nikolaos Dimitriou and Dimitrios Tzovaras <b>V3-2 Cognitive Behavior Assessment based on Action Recognition (12+3 min)</b> Sayda Elmi and Morris Bell <b>V3-3 Introducing responsibly self-healing into the incident management lifecycle (10+2 min)</b> Alexandros Papanikolaou, Christos Ilioudis and Vasilis Katos <b>V3-4 Sounds of Play: Designing Augmented Toys for Children with Autism (12+3 min)</b> Maryam Jahadakbar, Carlos Araujo de Aguiar, Arman Nikkhah Dehnavi and Mona Ghandi	

		<b>V3-5 TOUCH: A Multi-sensory Communication System that Communicates Emotions (12+3 min)</b> Carlos Araujo de Aguiar, Zezhi Guo and Yuhe Cui <b>V3-6 Case study analysis of medical and pharmaceutical chatbots in digital marketing and proposal to create a reliable chatbot with summary extraction based on users' keywords. (12+3 min)</b> Alexios Kaponis, Alexios Kaponis and Manolis Maragoudakis
	14:00 -15:30	<b>Session V-4: Reasoning systems and machine learning for assistive environments</b> <i>Session Chair: A</i> <b>V4-1 Small Data, Big Challenges: Pitfalls and Strategies for Machine Learning in Fatigue Detection (12+3 min)</b> André Jeworutzki, Jan Schwarzer, Kai von Luck, Peer Stelldinger, Susanne Draheim and Qi Wang <b>V4-2 Towards Deriving Organizational Key Performance Indicators in a Metaverse Workplace: A Systematic Literature Review (12+3 min)</b> Elena Tsappi and George N. Papageorgiou <b>V4-3 Enabling People with Blindness to Distinguish Lines of Mathematical Charts with Audio-tactile Graphic Readers (12+3 min)</b> Gaspar Ramôa, Omar Moured, Thorsten Schwarz, Karin Müller and Rainer Stiefelhagen <b>V4-4 Emovo: A real-time anger detector on the smartphone using acoustic signal (10+2 min)</b> Yuang Tong, Wanying Mo and Yue Sun <b>V4-5 A Systematic Review of Interaction Approaches based on Visually Evoked Potentials (12+3 min)</b> Philipp Wolf and Timo Götzelmann <b>V4-6 Additive Manufacturing for Inclusive Games (10+2 min)</b> Khyati Priya and Pankaj Upadhyay
<b>Poster / Demo Presentations (Session P)</b>		
<b>P1. A Visualization Bookmarklet for Assessing the Readability of Texts on the Web.</b> Frode Eika Sandnes and Evelyn Eika <b>P2. An Intelligent and Accessible Wardrobe</b> Alexandra Plexousaki, Maria Korozi, Asterios Leonidis, Vasilios Kouroumalis, Nikolaos-Menelaos Stivaktakis, Theodoros Evdaimon, Emmanouil Stamatakis, Antonios Katzourakis and Constantine Stephanidis <b>P3. NeckWatcher: A Real-time Monitoring Tool for the Assessment of the Neck Posture</b> Iryna Trygub, Johanna Ahlf, Martina Campanale, André Jeworutzki and Jan Schwarzer <b>P4. Usability and feasibility of a computerized version of the Bath Adolescent Pain Questionnaire</b> Lisa Austin and Abbie Jordan		
<b>D1. Curating User Galleries in Europeana using Topic Modeling Technology</b> Medina Andresel, Sergiu Gordea and Srdjan Stevanetic <b>D2. The Projection Mapping Situational Layer: Tabletop Projection Mapping for Visualization of Real-time Geospatial Data</b> Costas Boletsis, Antoine Pultier and Ophelia Prillard		

## Organizing and Technical Arrangements Committee

Fillia Makedon (Conference Chair) – *University of Texas at Arlington, USA*  
Gaurav Nale (Conference Coordinator) – *University of Texas at Arlington, USA*

## Program Committee Chairs

Ming Li (Chair) - *University of Texas at Arlington, USA*  
Maria Kyrarini (Associate Chair) - *Santa Clara University, USA*  
Ismeni Lourentzou (Associate Chair) - *Virginia Tech, USA*

## Program Committee

Maher Abujelala - *Exact Sciences Corporation, USA*  
Mario Aehnelt - *Fraunhofer Institute for Computer Graphics Research IGD, Germany*  
Vassilis Athitsos - *University of Texas at Arlington, USA*  
Ashwin Ramesh Babu - *Hewlett Packard Enterprise, USA*  
Jenny Benois-Pineau - *Bordeaux University, France*  
Margrit Betke - *Boston University, USA*  
Gerald Bieber - *Fraunhofer Institute for Computer Graphics Research IGD, Germany*  
Bruno Bouchard - *University of Quebec at Chicoutimi, Canada*  
Nikolaos Boulgouris – *Brunel University, UK*  
Antonio Camurri – *University of Genova, Italy*  
Libertario Demi – *University of Trento, Italy*  
Michel Desmarais – *Polytechnique Montreal, Canada*  
Sanika Doolani – *Salesforce, USA*  
Anastasios Doulamis - *National Technical University of Athens, Greece*  
Nikolaos Doulamis - *National Technical University of Athens, Greece*  
Randa Elanwar - *Electronics Research Institute, Egypt*  
Nicholas Gans - *University of Texas at Arlington Research Institute, USA*  
Theodoros Giannakopoulos - *NCSR Demokritos, Greece*  
Timo Gotzelmann – *Nuremberg Institute of Technology, Germany*  
Wenqiang Jin - *Human University, China*  
Stasinos Konstantopoulos – *NCSR Demokritos, Greece*  
Oliver Korn - *Offenburg University, Germany*  
Dean Krusienski - *Virginia Commonwealth University, USA*  
Maria Kyrarini - *Santa Clara University, USA*  
Marco La Cascia - *University of Palermo, Italy*  
Ming Li - *University of Texas at Arlington, USA*  
Ahmad Lotfi - *Nottingham Trent University, United Kingdom*  
Ismeni Lourentzou - *Virginia Tech, USA*  
Taskin Padir - *Northeastern University, USA*  
Michalis Papakostas – *GN Group, USA*  
George A. Papadopoulos – *University of Cyprus, Cyprus*  
Panos Papapetrou - *Stockholm University, Sweden*  
Michael Prilla - *University of Duisburg-Essen, Germany*  
Akilesh Rajavenkatanarayanan – *General Motors, USA*  
Abdel-Badeeh M. Salem - *Ain Shams University, Cairo, Egypt*  
Tania Stathaki - *Imperial College London, UK*  
Konstantinos Tsiakas – *TU Delft, Netherlands*  
Giuliana Vitiello – *University of Salerno, Italy*  
Dajiang Zhu – *University of Texas at Arlington, USA*



Evi Zouganeli– *Oslo Metropolitan University, Norway*

## Secondary Reviewers

Youngtak Cho – University of Texas at Arlington, USA  
Evan Cornish – University of Texas at Arlington, USA  
Aref Hebri – University of Texas at Arlington, USA  
Asif Iqbal – University of Texas at Arlington, USA  
Ashish Jaiswal – University of Texas at Arlington, USA  
Adheesh Juvekar– Virginia Tech, USA  
Enamul Karim – University of Texas at Arlington, USA  
Amun Kharel– Virginia Tech, USA  
Krishna Kodur– Santa Clara University, USA  
Saurav Kumar– UT Arlington Research Institute, USA  
Yanjun Lyu – University of Texas at Arlington, USA  
Amarachi Mbakwe– Virginia Tech, USA  
Mohammad Zaki Zadeh – University of Texas at Arlington, USA  
Srinivasan Murali – University of Texas at Arlington, USA  
Harish Ram Nambiappan – University of Texas at Arlington, USA  
Makanjuola Ogunleye– Virginia Polytechnic Institute and State University, USA  
Hamza Reza Pavel – University of Texas at Arlington, USA  
Xavier Pleimling– Virginia Polytechnic Institute and State University, USA  
Christos Sevastopoulos – University of Texas at Arlington, USA  
Abhishek Sharma –Deepmind, USA  
Roman Strukov – University of Texas at Arlington, USA  
Muntasir Wahed– Virginia Tech, USA  
Chaowei Wang– University of Texas at Arlington, USA  
Xiaowei Yu– University of Texas at Arlington, USA  
Manizheh Zand– Santa Clara University, USA  
Lu Zhang– University of Texas at Arlington, USA  
Xiaona Zhou– Virginia Tech, USA  
Huadi Zhu– University of Texas at Arlington, USA

## Conference Proceedings and Editorial Committee

Gaurav Nale – University of Texas at Arlington, USA  
Enamul Karim – University of Texas at Arlington, USA  
Hamza Reza Pavel – University of Texas at Arlington, USA  
Ashish Jaiswal – University of Texas at Arlington, USA  
Sneh Acharya – University of Texas at Arlington, USA  
Aref Hebri – University of Texas at Arlington, USA

## Workshops Committee Chair

Maher Abujelala - Exact Sciences Corporation, USA  
Ashwin Ramesh Babu - Hewlett Packard Enterprise, USA  
Akilesh Rajavenkatanarayanan – General Motors, USA

## NSF Doctoral Consortium Chair

Sanika Doolani – Director of DC (Salesforce, USA)  
Mohammad Zaki Zadeh – Co-Director of DC (University of Texas at Arlington, USA)

## NSF Doctoral Consortium Students

1. Sneha Acharya - University of Texas at Arlington, USA
2. Sadjad Asghari-Esfeden - Northeastern University, USA
3. Joyce Ayoola – Santa Clara University, USA
4. Aref Hebri - University of Texas at Arlington, USA
5. Ashish Jaiswal - University of Texas at Arlington, USA
6. Enamul Karim - University of Texas at Arlington, USA
7. Harish Ram Nambiappan - University of Texas at Arlington, USA
8. Hamza Reza Pavel - University of Texas at Arlington, USA
9. Raagini Rameshwar - Worcester Polytechnic Institute, USA
10. Christos Sevastopoulos - University of Texas at Arlington, USA
11. Roman Strukov - University of Texas at Arlington, USA
12. Ankur Yadav- The University of Texas at Dallas, USA
13. Mohammad Zaki Zadeh- University of Texas at Arlington, USA
14. Manizheh Zand - Santa Clara University, USA

Please provide us with your feedback in our online survey:

[www.petrac.org/survey](http://www.petrac.org/survey)