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Message from the Chairmen

We are sincerely pleased to welcome all participants to the 5th Experiment@ International Conference (**exp.at'19**) at the University of Madeira, June 12-14, 2019, Funchal, Madeira Island, Portugal.

exp.at'19 is traditionally a biennial event devoted to online experimentation, as remote experiments and smart sensing, also exploring innovative tools based on serious games and virtual and augmented reality applications interacting with sensorial devices.

Its evocative name, Experiment@, is adequate to turn it into an itinerant forum to foster the expansion and association of online experimentation in order to enlarge the world capabilities in this particular area, contributing to collaborative work in emergent technologies.

Online Experimentation comprises remote and virtual experimentation as identifiable and accessible objects and their virtual representations in the Internet of Everything structure. Aided by emergent technologies as those supporting remote experiments, 2D or 3D virtual experiments, augmented and virtual reality applications and their interaction with sensorial devices, live videos and other tools, all together they have the potential to promote training activities in many different areas by user immersion in virtual environments recreating the real experience.

University of Coimbra and University of Porto have been sharing with other Portuguese Universities this technical and scientific itinerant Forum, offering Portuguese Academic environments to better potentiate the work outputs. This year, the University of Madeira is receiving **exp.at'19**, which provides an excellent opportunity for bringing our community to its Rectory and its beautiful building and to the amazing atmosphere of one of our world-known Islands.

After a pre-conference day, **exp.at'19** will provide a three-day forum of discussion and collaboration between academics, researchers, STEM and industry, highlighting engineering and medical applications, as well as industrial training and lifelong learning.

Enjoy **exp.at'19**!

Alberto Cardoso
Maria Teresa Restivo

Conference Topics

MAIN CONFERENCE
"Online Experimentation"
&
 SPECIAL TRACK DEMOS'19 TOPICS
"Online Experimentation Demos"

- Online Experimentation
- Remote & Virtual Labs
- Remote sensing, sensor networks and Internet of Everything
- Remote Monitoring
- Augmented Reality
- Virtual Reality
- Haptic Interfaces & sensorial devices
- Mobile sensing
- Gamification & Serious Games
- Intelligent Learning Systems
- Smart University and Smart Education
- Collaborative Tools
- Geoinformatics & Hydroinformatics
- Monitoring marine life
- Monitoring oceans and coasts
- Smart Cities and Smart Societies
- Smart Home and Community
- Environment and Urban Monitoring
- Smart Sensor Technology and Measurement Systems
- Online health training systems
- Devices for online rehabilitation
- Telemedicine
- Internet of Healthcare Things (IoHT)

SPECIAL TRACK AQM'19 TOPICS "Air Quality Monitoring"

- Technologies for Air Quality Monitoring (AQM): Low-Cost Sensors, Electronic Systems
- Methodologies for AQM: Data Analytics, Machine Learning Applied to Data Processing of Low Cost Sensors, Remote and Virtual Experiments, Integration of Air Quality Modelling and Monitoring Methods
- Accuracy of low cost sensors: Assessment of Uncertainties in Air Quality Data, Results of Measurement Campaigns in the Field
- Platforms for Air Quality Data Management: Web Platforms, Mobile Applications, Real-time Systems for Air Monitoring, Distributed Systems, Smart Environments, Citizen Awareness and Participation in Air Quality Monitoring, IoT in air quality monitoring

SPECIAL TRACK EAC'19 TOPICS "Experiments for Automotive Control"

- Electromobility
- Online experiments in automotive control
- Automotive Control and computer vision
- Internet based automotive control education
- Internet of Things in automotive control
- Mobile applications in automotive control
- Interactive control automotive applications
- Navigation systems
- Smart cities

SPECIAL TRACK IS3'19 TOPICS "Immersive Systems and Sensorial Stimulation"

- New Immersive Interaction Styles and Technologies
- (Tele)Presence and Embodiment in Remote and Virtual Experiments
- Co-presence, shared spaces and cooperation in Virtual Environments
- Interactive robots and avatars
- Affective computing
- Emotional Interaction
- Emotion recognition
- Sensorial stimulation: visual, olfactory, auditory, haptic, …
- Augmented and virtual reality
- Smart Environments, Environment augmentation
- Stimulating and Responsive environments
- Applications in Psychology and Ageing
- Industrial Applications of augmentation technologies
- Educational and scientific use of immersive systems

SPECIAL TRACK MLAiE'19 TOPICS "Machine learning applications in engineering – trends and best practice"

- Deep Learning and image processing
- Machine learning and control systems
- Machine learning in health engineering
- Machine learning and prediction of source use (electricity, water etc.)
- Smart Sensor Systems
- Machine learning methods for edge computing
- Statistical learning
- Classical methods of machine learning (k-nearest, svm, decision trees, etc.)
- Artificial neural networks
- Convolutional neural networks
- Generative neural networks
- LSTM / GRU and other recurrent models
- Reinforcement Learning
- Parallel and distributed learning
- Data Acquisition methods
- Data Augmentation
- Model deployment
- Data labelling
- Label assessment
- Models for unbalanced data
- Hardware acceleration for machine learning
- Performance assessment
- Visualization
- Machine learning education

SPECIAL TRACK OEC'19 TOPICS "Online Experimentation in Control"

- Online experiments in control
- Control and machine learning
- Control and computer vision
- Remote control and measurement technologies
- Internet based control education
- Internet of Things in control
- Mobile applications in control
- Interactive control applications

SPECIAL TRACK OEEE'19 TOPICS "Online Experimentation in Science and Engineering Education"

- Learning Objectives, Activities, and Assessments for Experimental Work
- Studies of effectiveness of different kinds of labs
- Technological answers to pedagogical questions
- Laboratory Experiences and students' opinions about Remote, Virtual, On-Site, Augmented, and Hybrid Laboratories
- Developing Knowledge, Skills and Competencies in Engineering Laboratories
- Command of technology as learning objective for preparing students for future challenges
- Integrating Novel Modes and pedagogical Topics into Lab Work (e.g. Inverted Classroom, Problem-Based Learning, Employability, Sustainability, Creativity, Responsibility, Social Inclusion, etc.)
- Future Capabilities and Constraints of Labs in Engineering Education

SPECIAL TRACK OM'19 TOPICS "Ocean Monitoring"

- Development of ocean and coasts monitoring devices
- Educational resources for ocean monitoring related applications
- Material proprieties for

Ocean applications
• Sensors for ocean monitoring
• Ocean robotics
• Mission planning for Autonomous Underwater Vehicles
• Ocean modelling
• Remote sensing
• Ocean energy systems

SPECIAL TRACK ORBE'19 TOPICS "Online Resources in Biomedical Engineering"

• New biomedical engineering technologies in eHealth
• IoT in Biomedical applications
• Security of Biomedical technologies for eHealth
• New trends in Biomedical education using online resources
• Remote and Virtual laboratory technologies
• eHealth technologies and services
• Melo and Color therapy

SPECIAL TRACK RADP'19 TOPICS "Remote and digital pneumatics: Learn and control from distance"

• Digital pneumatics
• Augmented Reality applications in learning pneumatics
• Remote control of pneumatic devices
• Industry 4.0 and pneumatics
• Software applications for digital pneumatics
• Remote measurement in pneumatics
• Remote monitoring for maintenance purposes in pneumatics
• Predictive maintenance

in pneumatics
• Energy-efficiency assessment and experiments in pneumatics
• Simulation tools for learning digital pneumatics
• Laboratory pneumatic experiments with remote access

SPECIAL TRACK STIMHA'19 TOPICS "Smart Technologies and Interactive Media for Health Applications"

• Virtual and enhanced environments
• Balance, posture and mobility
• Input devices, sensors and actuators
• Motor rehabilitation
• Serious Games and Exergames
• Clinical assessment
• Cognitive Stimulation
• Biosignals, Neuroimaging and Biodevices
• Sensory impairment
• Medical systems
• Multi-user systems for user interaction
• Computer access
• Virtual humans
• Communications aids
• Signal Processing in Human Movement
• Sport Performance and Support Technology
• Product design, testing and prototyping
• Training tools
• Augmented reality applications
• Human factors
• Rehabilitation robotics
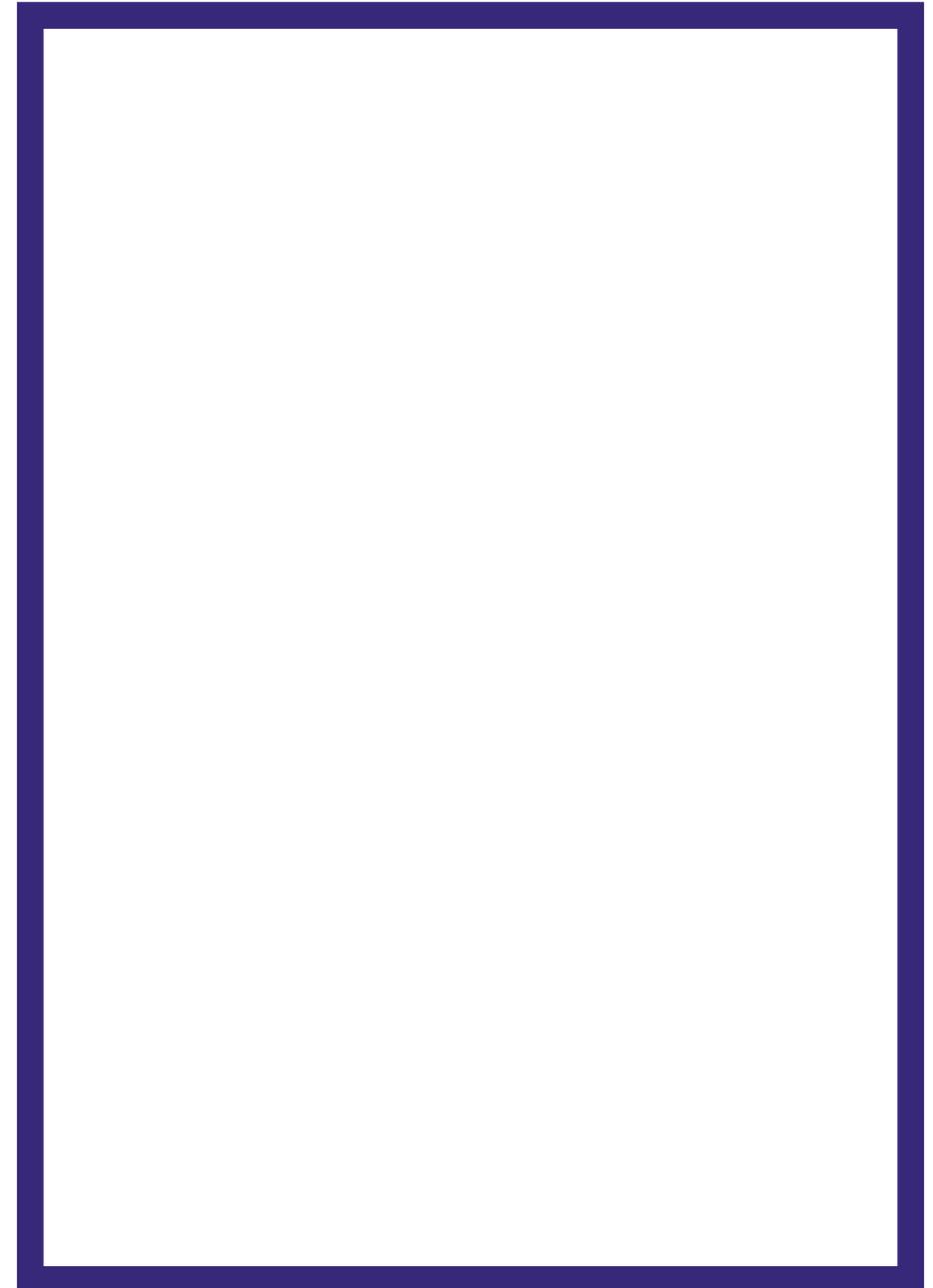
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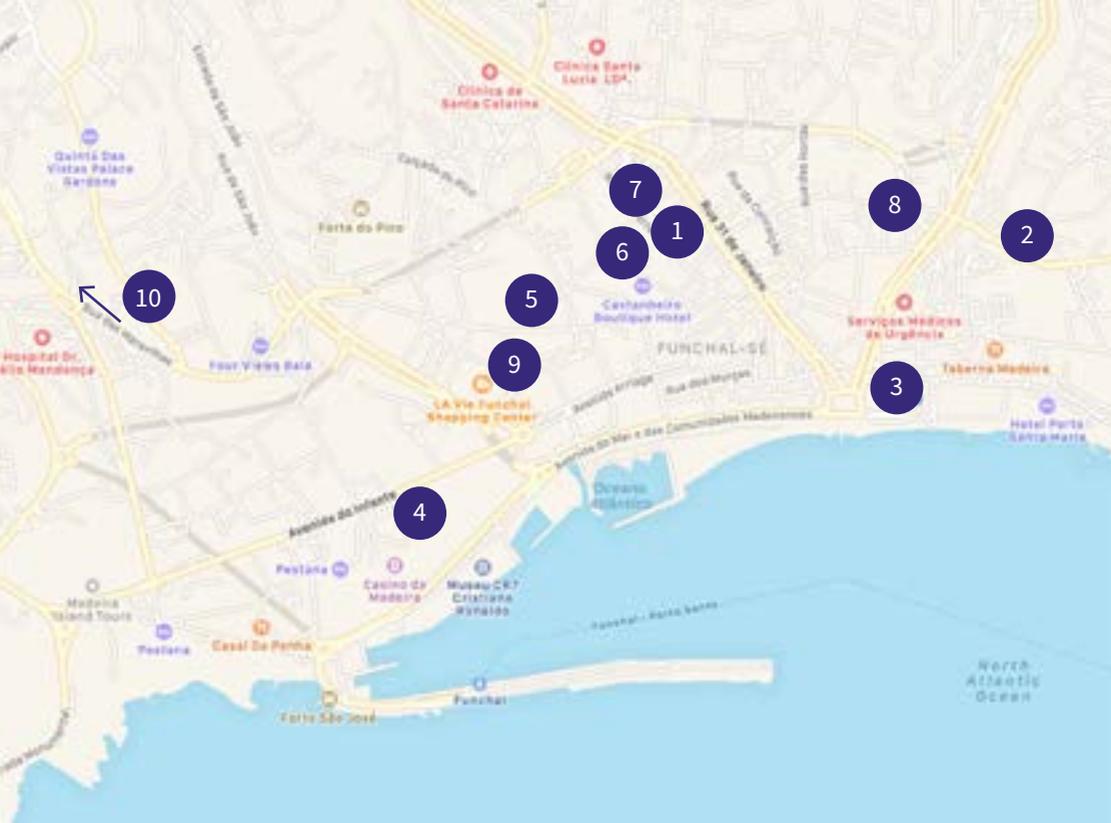
Rectory Building of the University of Madeira (UMa-R) Plan
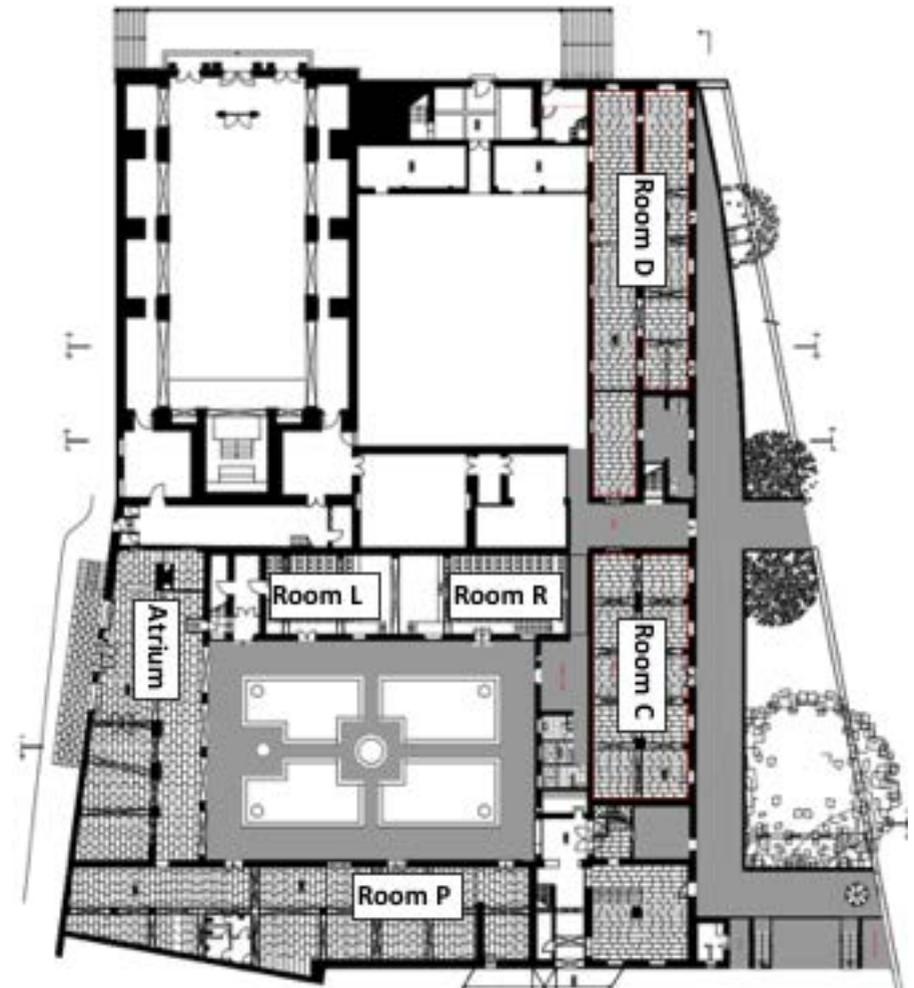
Conference Map

Funchal city center

1 – Rectory Building of the University of Madeira, Rua dos Ferreiros, 105
2 – Engineering Order – Region of Madeira, R. Conde Carvalhal, 23
3 – Museu da Eletricidade – Casa da Luz, Av. Arriaga, 73
4 – "Quinta Vigia", Av. do Infante, 1
5 – "Espaço Funchal", Rua da Carreira, 147
6 – Castanheiro Boutique Hotel, R. do Castanheiro, 31
7 – Hotel Orquídea, R. dos Netos, 69-71
8 – Hotel do Carmo, Trav. Rego, 10
9 – Hotel Madeira, Rua Ivens, 21
10 – "Adega da Quinta", Quinta do Estreito, R. José Joaquim da Costa

Conference General Information

The main activities of the **exp.at'19** conference will take place on the Rectory Building of the University of Madeira (Colégio dos Jesuítas – Rua dos Ferreiros), in the center of Funchal, Madeira Island, Portugal.

The Madeira island is in the Atlantic Ocean, about 520 km (320 miles) from the African coast and 1000 km (620 miles) from the European continent.
A flight to Madeira takes about 1h30 from mainland Portugal and just over 3h from the main European airports.
Madeira Airport is located in Santa Cruz, 16 km (10 miles) from the city of Funchal.
It takes approximately 20 minutes to get to Funchal by car.

Local Information
The Madeira island is a well-known touristic region and has a mild climate, because of it privileged geographical position and mountainous relief. Very mild average temperatures, 25 ºC in the summer and 17 ºC in the winter, and a moderate level of humidity, confer upon the island exceptional subtropical features. The seawater temperature is also very mild, because of the influence of the warm Gulf current, presenting averages of 22 ºC in the summer and 18 ºC in the winter.

Some useful links with Information about Madeira
— Visit Portugal (https://www.visitportugal.com/en/destinos/madeira)
— Visit Madeira (http://expat.org.pt/expat19/venue/www.visitmadeira.pt/en-gb)
— Visit Funchal (http://expat.org.pt/expat19/venue/www.visitfunchal.pt/en/)

Registration Desk Contacts
Alberto Cardoso, alberto@dei.uc.pt
Maria Teresa Restivo, trestivo@fe.up.pt

Invited Speakers

Rui Caldeira
ARDITI-Madeira, Portugal

Wednesday, June 12, 2019
Wed2: Plenary Session I
UMa-R Room R
09:40 - 10:30

Rui Caldeira completed his PhD at University of California, Los Angeles (USA) in September 2002. During the PhD he studied the oceanographic processes around Catalina Island, located in the Southern California Bight. Prior to that he completed a B.Sc. and a Master degree at the University of Plymouth in the United Kingdom, on Ocean and Applied Marine Sciences. Two post-doctoral experiences followed the completion of the PhD, one at the University of New South Wales, in Australia (2003-2004); and one at the Instituto Superior Técnico at Lisbon Technical University (2006-2007), both focused on the use of numerical models to study ocean circulation patterns around small islands. Between 2008-2014, Rui held a prestigious FCT contracted Research position at CIIMAR – Interdisciplinary Centre of Marine and Environmental Research, University of Porto, while concurrently serving as guest lecturer (2007-2012), at the Physics Department of the 'Universidad de Las Palmas, Gran Canaria (ULPGC)', followed by an Adjoint Professor position (2013-2015) in Physical Oceanography at 'ICBAS – Instituto de Ciências Biomédicas Abel Salazar (U.Porto). Currently, Rui is a Principal Research Scientist at the Madeira 'Regional Agency for the Development of Research, Innovation, and Technology - ARDITI. He has coordinated two European funded initiatives, one focused on Geophysical Fluid Dynamical laboratory studies of island induced flows, which took place in the Coriolis rotating table in Grenoble, France (2008), in the scope of HYDRALAB-III; and one airborne campaign funded by the EUFAR-European Facility of Airborne Research, both were competitive 'Integrating European Activities', financed by the European Commission under FP5/FP6/FP7 programs. He has also a coordinated a Marie-Curie HR initiative that funded the implementation of Data Assimilation techniques in an ocean forecasting system. Nationally, Rui has participated in several funded research projects, including the construction of the first Iberian Ocean Observatory, (2011-2013: http://

www.marnaraia.org) and he's currently the co-founder and Director of the Oceanic Observatory of Madeira (https://oom.arditi.pt). Rui has been involved in the implementation of supercomputing facilities and data services that often serve public ocean observatories.

Virtual Coastal Observatories: a vision for the future

The Coastal region is where the land meets the sea and where 40% of the world population lives, according to UN. This anthropogenic pressure has significant impacts both on land as well as at sea. Tourism, fishing, international trade and resource exploitation is what attracts people to live at the coast, thus eight of the top ten largest cities in the world are coastal. Nevertheless, coasts remain poorly monitored on a global scale and yet to understand changes that affect them and to provide adequate information to decision-makers we need to depend on systematic observations. Digital sensors concurrently measuring the ocean and the atmosphere on an hourly basis during several years, generate large data sets, thus in order to make sense of it all there is a need to create tools that facilitate data-extraction and data-visualization of this 'Big Data'.

The Oceanic Observatory of Madeira (OOM) has been involved in collecting information and producing forecasts for the islands. Observations, data and models integrate a multiplatform approach that includes measurements from satellites, ships, moorings, drifters and high-frequency radars. Data available through an online platform as well as three-dimensional visualizations are the building blocks of the virtual-atmosphere and of the virtual-oceans affecting urban areas. Thus, urban Observatories are the primary drivers of these river-city-coastal systems which can lead to the adequate i) measurement the effect of coastal shipping activity on coastal air and sea pollution; ii) measurement of the effect of anthropogenic activity carried in the river system affecting coastal pollution and subsequent effect on coastal ecosystems; iii) modelling the impact of extreme events in future coastal cities development scenarios. In brief, Observatories can influence a change of working practices towards an environmentally conscientious development of the (smart) coastal cities of the future.

Susan Zvacek
Consultant, USA

Thursday, June 13, 2019
Thu3: Plenary Session II
UMa-R Room R
12:00 - 12:50

Dr. Susan M. Zvacek (SMZTeaching.com) is an independent consultant, speaker, and online teacher, focused on cultivating learning-centered teaching in higher education. Her disciplinary interests include online learning, engineering education, and instructional design. Susan's speaking experience is diverse, with keynote addresses and workshops in the Czech Republic, Austria, Costa Rica, Estonia, Slovakia, Cyprus, England, Portugal, China, Germany, and throughout the United States. She has had two Fulbright appointments (Prague, CZ and Porto, PT) and has served as an NSF reviewer for the past three years. Her 25+ years of experience in higher education included teaching, dissertation advising, and administration. She is an IEEE Distinguished Lecturer and a Distinguished Speaker for the Association for Computing Machinery (ACM). Her publications are on topics such as course design, online learning, remote labs, and higher order thinking, including co-authoring Teaching and Learning at a Distance (currently in its 7th edition) and the original Blackboard for Dummies, as well as numerous articles, book chapters, and newsletter columns.

Every Click You Make: Who Is Watching You?

The use of remote and virtual labs can be a valuable component of engineering education, providing increased availability for student use, access to equipment too expensive for a single institution to own, user safety, and the ability to customize scenarios. Along with these benefits comes a secondary result with the accumulation of student data as they interact with the system. Every keystroke, every decision, and every outcome are possible data points available for analysis through a process known as learning analytics, and while using this information to improve instruction has significant potential, there are big-picture ethical issues to consider, as well. This interactive presentation will explore those questions and examine how we might begin to think about both the opportunities and the challenges ahead.

Rui Calçada
University of Porto, Portugal

Thursday, June 13, 2019
Thu5: Plenary Session III
M. Eletric. Aud.
17:15 - 18:00

RUI CALÇADA Current position: Full Professor of the Civil Engineering Department of Faculty of Engineering of the University of Porto (FEUP); Head of the Structural Division; President of IC – Institute of Construction from FEUP. Academic background: Civil Engineer Degree from FEUP (1992); Master Degree in Civil Engineering Structures from FEUP (1995); PhD Degree from University of Porto in Civil Engineering field (2003). Years of relevant experience: 20. Main research interest/expertise: advanced models for train-infrastructure dynamic interaction; wayside (track, bridges, transition zones) and on-board condition monitoring systems; advanced algorithms for condition monitoring systems. Main activities: Principal Investigator of 12 research projects and member of the team of 10 research projects in the area of railways; supervisor of 16 PhD thesis; author of more than 300 scientific and technical publications. Other relevant information: Director of the PhD program iRail-Innovation in railway systems and technologies; Member of the board of PFP – Portuguese Railway Platform; Member of the editorial board of the International Journal of Railway Technology; Responsible for the participation of FEUP on European projects CAPACITY4RAIL, MAXBE, IN2RAIL, RISEN, IN2TRACK2 and SHIFT2RAIL Joint Undertaking.

More information: http://orcid.org/0000-0002-2375-7685

Assessment and monitoring of the dynamic bhaviour of high-speed railway infrastructure

The introduction of high-speed systems across the world has brought new problems to railway engineering namely because of the significant amplification of train-infrastructure vibrations at high speeds which can compromise the safety and stability of the infrastructure. The vibrations induced by traffic can also reach buildings nearby the railway infrastructure that can annoy inhabitants and/or prevents the regular usage of some facilities.

This lecture provides an overview about the most relevant aspects related to the assessment and monitoring of the dynamic behavior of high-speed railway infrastructure, seeking to enhance its potential for condition assessment over its lifecycle.

To make a rigorous analysis of the dynamic behavior of high-speed railway infrastructure advanced methodologies for numerical and experimental analysis of the train- infrastructure dynamic interaction, developed by the centre of competence in railways of the Faculty of Engineering of the University of Porto (CSF-FEUP), are described.

Subsequently, several case studies developed by CSF-FEUP are presented, showing the efficiency and the usefulness of the developed methodologies and enabling the achievement of different objectives, such as:

- The running safety assessment of trains moving over long bridges subjected to earthquake or wind actions;
- The fatigue damage assessment of railway bridges;
- The running safety assessment of trains for settlement of the backfill at transition zones to railway bridges;
- The assessment of the critical speed of track-embankment-ground systems;
The assessment of vibrations induced in buildings by surface or underground railway traffic.

Mario Bochicchio
University of Salento, Lecce, Italy

Friday, June 14, 2019
Fri4: Plenary Session IV
UMa-R Room R
12:10 - 13:00

Mario Bochicchio is associate professor of *Database* at the Engineering School of the University of Salento (Lecce, Italy). He also teaches at the School of Performing Arts and at the School of Business. He is national coordinator of the *Digital Health Working Group* of CINI (the *Consorzio Interuniversitario Nazionale per l'Informatica*, involving 45 public Italian universities) and scientific director of the Research Center on Digital Humanities of University of Salento. His research is mainly focused on digital health, including smart health, remote patient monitoring and Internet of Health Things, but he is also actively involved in research projects on online experimentations, technology-enhanced learning and teaching STEM at school.

You Are What You Breathe

Raising awareness on environment and health through smart tech and sensor networks.
Pollutants can create big problems for our health, not only if we live in industrial districts or in high-traffic urban areas, but even at home or at our workplace.
According to the WHO (World Health Organization, home page, March 2019), 91% of the world's population lives in places where air quality exceeds WHO guideline limits and pollutants represent a primary concern for our health, with dramatic effects on our quality of life, even in the short term!
Smart technologies, sensor networks, embedded systems, and crowdsensing approaches can effectively help to raise our awareness on how pollutants work, where they come from and how we can improve our safety, and schools can play a key role in this process.
In this sense, suitable social engineering techniques must be properly used to pave the road for more safe and friendly smart living places.
I will try to present (and answer) some questions coming from outside the research in remote experimentation.

Friday, June 14, 2019
Fri6: Plenary Session V
UMa-R Room R
16:50 - 17:50

Alexander A. Kist
University of Southern Queensland, Australia

Alexander A. Kist is an Associate Professor (Telecommunications) and the School Coordinator (Learning and Teaching) with the School of Mechanical and Electrical Engineering, Faculty of Health, Engineering, and Science at the University of Southern Queensland Australia. His expertise includes Remote Access Laboratories, the Internet of Things, Engineering Education and Computer Networking. He has authored and co-authored more than 140 peer-reviewed research papers. He is an elected member of the USQ Academic Board, and he has served as Education Committee member, elected Deputy Chair and Acting Chair of the USQ Academic Board. He is member of the Australian Tertiary Education Quality and Standards Agency (TEQSA) Register of Experts, and he is an Elected Executive Member of the International Association of Online Engineering. Alexander A. Kist has a keen interest in learning and teaching quality, both from an institutional quality assurance perspective as well as from a delivery perspective through online education and remote access laboratories. He has won institutional as well as national teaching awards and grants.

Paulo Menezes
University of Coimbra, Portugal

Paulo Menezes is a Tenured Assistant Professor in the Department of Electrical and Computer Engineering of the University of Coimbra, where he is the responsible for the courses of Computer Graphics and Augmented Reality, Interactive Systems and Robotics, and Computer Architecture. He is a senior researcher of the Institute of Systems and Robotics where he develops research activities in the areas of Computer Vision, Human-Robot Interaction, Human Activity Analysis, Augmented Reality and Telepresence Systems and Robotics and Virtual Agents for Supporting Elderly People. He directs the newly created Immersive Systems and Sensory Stimulation Laboratory where different are developed projects that range from the use of AR/VR for industrial applications and psychological therapies, virtual characters for physical exercise stimulation, and social/human aware-robot interaction. He is a member of the IEEE Societies for Robotics and Automation and Systems, Man and Cybernetics. He maintains collaborations with several international research institutes and universities, due to the involvement in research and technology transfer projects, and co-supervision of MSc and PhD students.

Dynamic interactive Keynote

Towards Mixed Reality for Online Experimentation

Mixed reality technologies - augmented and virtual - are seen as potential game changers in many Industries. In training and education, they have the potential to provide new opportunities to acquire and practice relevant skills. In research and data analysis mixed reality tools are used to visualise intricate structures and data-sets. Guidance and directory applications, including airport guides, augmented city tours but also guidance for industrial maintenance are making their way into the mainstream. In the context of building and design, mixed reality technologies are commonplace, allowing virtual tours of planned buildings or shoppers to experiment with new (virtual) furniture in their home, for example.

Online experimentation and remotely accessible experiments have been widely discussed in recent years. While much has been said about their potential, examples that have been successful in engaging users are limited. Remote experiments often provide rich data and offer excellent building blocks for mixed reality systems. Augmented reality is undoubtedly a hot subject, attracting students, professionals and the public as well. Going beyond the display of static virtual objects or repetitive animations on top of videos is a must for users to adhere to its use and find added value. As for any innovation, purpose and user benefits need to be front and centre - mixed reality has to solve a problem or provide a measurable benefit.

This dynamic interactive session will build on the expertise of the audience and will explore recent trends in mixed reality and remote laboratories. Our aim is to show how these technologies can complement each other to create useful and engaging systems.
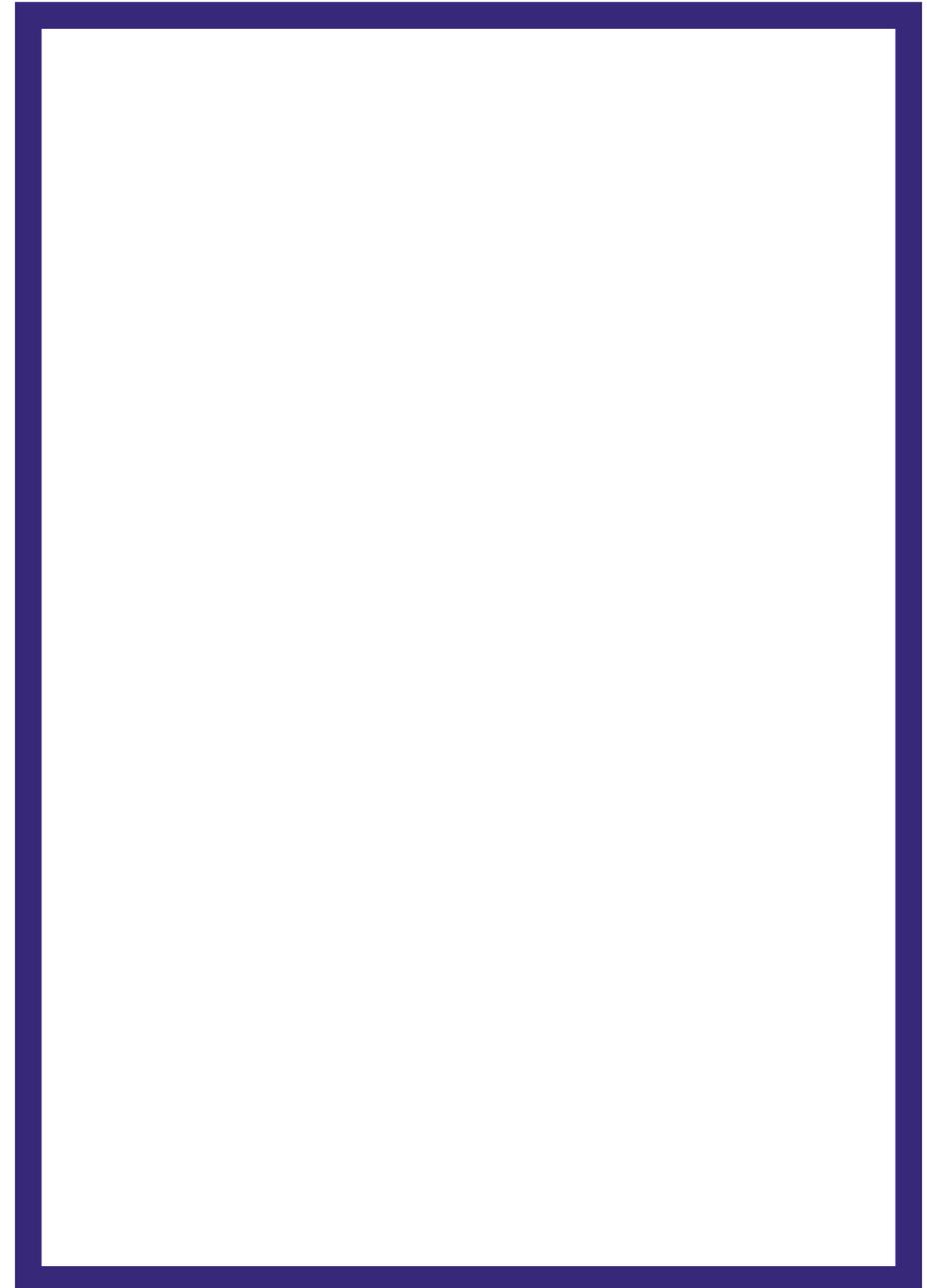
Workshops

Workshop #1

World Pendulum Alliance Workshop Using a constellations of pendulums in an immersive inquiry -based learning built on dimensional analysis

› **Horácio Fernandes**, IST, UL, (**Tue2**, UMa-R Room P, 14:00-15:40, June 11)

In this workshop an alternative approach to the finding of the pendulum equations is foreseen instead of simply presenting established facts or portraying a path to general knowledge. Based on a constellation of remote controlled pendulums build on the World Pendulum Alliance – a federated initiative of several universities – it is demonstrated how to deduce the simple pendulum equation based on the diversity of measurements made available.
The workshop should resume the possible approaches to the learning process, raising the most relevant issues in relation to the model obtained by dimensional analysis of the pendulum equations. The activity is expected to introduce reasonable questions and explore how students shall improve their attitude to physics experimentation and posing a critical behaviour to laboratory questions.

Workshop #2

Guidelines for Assignments Using Remote and Virtual Labs: Building the Instructional Framework

› **Susan Zvacek**, Consultant, USA, (**Tue3A**, UMa-R Room R, 16:00-17:50, June 11)

Do your engineering students participate in lab work? Are you interested in using online experimentation for those learning activities? This workshop will give you the opportunity to learn about and provide input on a new framework, in draft format, that can serve as a template for designing learning activities in the lab environment. These guidelines are based on validated instructional design processes and are aligned with accreditation criteria for engineering education programs, but they are in need of polishing. Although the framework was built with remote and virtual labs in mind, feedback is welcome from anyone who has taught in a lab setting – or who has even done lab activities as a student.   You'll leave with the guidelines in hand — as they are and what they become during the workshop. (Please note that this workshop is about teaching, not technical specifications for online experimentation.)

Workshop #3

Introduction to PILAR as VISIR federation and Multiplier event of the PILAR Project

› **Felix Garcia-Loro** (UNED, Spain), **Manuel Castro** (UNED, Spain), **Wlodek Kulesza** (BTH, Sweden), **Susana Marchisio** (UNR, Argentina), **Federico Lerro** (UNR, Argentina), (**Tue3B**, UMa-R Room L, 16:00-17:50, June 11)

Remote Laboratories (RLs) reflect the social movement of providing educational resources easily available to learners from any location via the web. There are several factors to promote RLs, but its availability, which has neither temporal nor geographical restrictions, has been a key factor for its deep impact in educational institutions. VISIR (Virtual Instrument Systems In Reality) remote laboratory is a system on top of the state-of-the-art for online wiring and measuring electronic circuits. It has been awarded as the best remote lab in the world in 2015 by the International Association of Online Engineering - Global Online Laboratory Consortium (IAOE-GOLC). There are VISIR systems installed in seventeen different Higher Education Institutions (HEI) from twelve different countries (Argentina, Austria, Brazil, Canada, Costa Rica, Germany, Georgia, India, Morocco, Portugal, Spain and Sweden) and it has been successfully integrated at different educational levels and types of courses: lower secondary, upper secondary, undergraduate, postgraduate, MOOCs (Massive Open Online Courses), life-long learning, professional development, etc.

Workshop #4

Internals and full access to the PILAR Federation Workshop

› **Felix Garcia-Loro** (UNED, Spain), **Manuel Castro** (UNED, Spain), **Wlodek Kulesza** (BTH, Sweden), **Susana Marchisio** (UNR, Argentina), **Federico Lerro** (UNR, Argentina), (**Tue4A**, UMa-R Room L, 18:00-19:00, June 11)

Remote laboratories are the result of a social movement which promotes accessible educational resources anywhere and anytime through the Internet in order to foster lifelong learning and support online/distance education. A remote laboratory is a real laboratory using real equipment, on which measurements are made through real instruments and which is controllable remotely. The VISIR (Virtual Instrument Systems In Reality) remote laboratory is a system on top of the state-of-the-art for online wiring and measuring electronic circuits. The PILAR (Platform

Integration of Laboratories based on the Architecture of visiR) Erasmus Plus project aims for the federation of five of the existing VISIR nodes, for sharing analog electronics experiments and empowering capacity and resources of each partner, as well as providing access to other educational institutions to a VISIR remote lab through the PILAR consortium. This workshop will allow the attendees to interact with VISIR remote lab, and to be introduced in PILAR framework and joining policies as well as remote lab federation benefits both for VISIR system owners and consumers.

Workshop #5

Real-Time Air Quality Monitoring via an Online Platform Supported by Low-Cost Nanosensors

› **Esther Hontañón** (ITFI-CSIC, Spain), **Filipe Araújo** (CISUC-DEI-UC, Portugal), **Jesús Lozano** (EII-UEx, Spain), **Philippe Menini** (LAAS-CNRS, UPS-T3, France), **Lionel Presmanes** (CIRIMAT UMR CNRS 5085, UPS-T3, France), (**Tue4B**, Portuguese Engineers Order – Madeira Region, R. Conde Carvalhal, 23, Funchal, 18:00-19:30, June 11)

Air quality is a very important and actual worldwide issue that has been considered in recent years by governments, companies, environmental associations and society in general. In particular, the European Commission has defined a Clean Air Programme for Europe (EC COM 918, 2013), which incentives the EU member states to develop and implement air quality management plans to ensure the EU directives for air quality (Air Quality Directive 2008/50/EC, 2008), until 2020. Furthermore, the latest air quality reports of the European Environment Agency (EEA, Air quality in Europe, 2016 and 2018) show that the indicators of various contaminants (i.e. PM10, PM2.5, NO2, O3) in the air exceeded the limit and target values established by the EU, in several regions of the European Union. In this context, the ongoing SUDOE NanoSen-AQM project aims to develop and validate an air quality monitoring system using an online platform supported by low-cost nanosensors, providing a system where data is accessible to the public by a mobile application and pollution alerts can be generated based on the prediction generated by machine learning methodologies. This workshop includes the presentation of the main objectives of the NanoSen-AQM project and the main current achievements in the development of nanosensors, the electronic components, the online platform based on a cloud system and the mobile application, followed by demonstrations of the current prototypes. It is expected that these presentations could promote the discussion about the use of this system in different scenarios and the possibility of incorporating data from other existent sensors of environmental monitoring systems.

Workshop #6

Image Processing with Raspberry PI Pocket Labs

› **Thomas Klinger**, **Andreas Pester**, **Christian Madritsch**, Carinthia University of Applied Sciences (CUAS), (**Fri1A**, UMa-R Room P, Friday 08:00-08:50, June 14)

The Raspberry PI is a single-board microcomputer with a Linux operating system and the possibility to connect with a high-resolution camera. Due to its compactness, students can take it with them, finish their exercises at home, later return to the University, and present their results.
In this workshop, we are going to present the Raspberry PI as a compact, easy to use image processing system for education. The algorithms and programs will be created with the Python 3 programming language and the open-source image processing library OpenCV version 4. Participants of the workshop will create a short program that is able to detect faces in images. The program will use the Viola-Jones algorithm, which is based on methods as Haar features, integral images, Adaboost, and cascading. Additionally, if there is remaining time, the same algorithm can be used to detect also the eyes in the previously detected faces.

Workshop #7

Instrumented Devices for e-Health and e-Rehabilitation

› **Paulo Abreu**, FEUP, University of Porto (**Fri1B**, UMa-R Room L, Friday 08:00-08:50, June 14)

This workshop will focus on current developments on instrumented devices for health and rehabilitation.
It will be shortly discussed the main requirements that these devices must address, different approaches for their development and mains constraints in their deployment.
Based on the experience of the work being carried out at LIM- FEUP, it will be presented and available for testing some devices such as a bodygrip, an instrumented device for hand rehabilitation (SHARE) and others.

Abstracts

Wednesday, June 12, 2019
Parallel Session: "Augmented and Virtual Reality"
Chairs: Silvia Pizzoli and Dominik May
Papers: #29, #39, #78, #112, #114

#29

Wed3A

Do you want to live forever? Virtual Humans and Digital Immortality

UMa-R Room R
10:50 - 12:50

This paper presents the preliminary findings from a study that created a Virtual Persona which models an individual's personality traits. This was evaluated, and the findings indicate that users engaged with the Virtual Persona but sometimes held ambivalent views towards it. Trust in the technology, and in the accuracy and appropriateness of answers it provided, underpinned the themes relating to the level of engagement, sense of the uncanny, and sentience and expectations. It is argued that this system offers the possibility for the development of a Virtual Persona that learns post-death.

Maggi Savin-Baden, Victoria Mason-Robbie, David Burden

#39

Wed3A

Applying Augmented Reality to New or Existing Remote Access Laboratories

UMa-R Room R
10:50 - 12:50

Augmented reality and remote access laboratories unions are currently very limited. For the end-user, the experience must be about the execution of the experiment and understanding the significance of the lesson. Most educational institutions practical hands-on experiments have been developed many years ago and remained static. These systems may have only been revisited as a result of technological upgrades. Remote access laboratories have driven new thought processes on how to deliver content effectively to students.

Mark Smith, Ananda Maiti, Andrew Maxwell, Alexander A. Kist

Developing effective remote access configurations can suffer from weary developer syndrome, where proper development cycles are ignored and once a system is functional, the development ceases. Little regard is taken on how to continue the improvement cycle or even if it is required. Adding augmented reality may be outside of the capabilities of many facilities due to a lack of understanding surrounding the technology. What augmented reality is, what its capabilities are and how it can be implemented are key questions for management, developers and end-users alike.

#78

Wattom: Ambient Eco-feedback with Mid-air Input

This paper presents Wattom, a highly interactive ambient eco-feedback smart plug that aims to promote a more sustainable use of electricity in the home. This paper describes our latest implementation of the Wattom plug, and three system applications. The first enables Wattom to power a connected device, and provide real-time feedback on the amount of electricity in the grid from renewable sources. The second enables users to schedule power events from their smart watches. Finally, the third application uses non-intrusive load monitoring (NILM) to provide users with personal consumption information on multiple devices connected to a single Wattom plug. The paper concludes by presenting insights into the development and use of various iterations of the Wattom plug.

Wed3A

UMa-R Room R
10:50 - 12:50

Augusto Esteves, Filipe Quintal, Fábio Caires, Vítor Baptista, Pedro Mendes

#112

A Study of Contactless Human Computer Interaction with Virtual Environments

Currently applications and use of virtual environments is a major growth area. The different ways of interacting with these environments allow us to perform various tasks and uses of them. However, new users regularly face problems

Wed3A

UMa-R Room R
10:50 - 12:50

Yahir Hernandez-Mella, Antonio Marin-Hernandez, Ericka Rechy-Ramirez, Luis Felipe Marin-Urias

when using some devices for these environments. In this paper is studied and analyzed the contactless interactions of new users with a virtual environment. Particularly, this study proposes to analyze the frustration levels of users when they are learning and adapting. Frustration levels are acquired from an EEG reader and used to evaluate their performance and compromise, for a simple task of taking and arranging objects. Two modes of interaction have been tested: in one mode, people interact with the environment using their hands, and in the other mode, people interact with the environment using a physical tool. Both modes of contactless interaction will rely on the Leap Motion Controller. Preliminary results show relations between dispersion of levels of frustration, going from data highly dispersed to normal distributions when user is more adapted.

#114

Virtual Reality in the Study of the Male Urinary System

The male urinary system has a unique physiology and plays a complex role in the everyday life of the human male body. It can be affected by diverse pathologies which disrupt the normal behaviour of the patient, such as urinary incontinence, benign prostatic hyperplasia and oncological diseases. The common treatment for these pathologies has some outcomes which are not fully understood yet. In this context, virtual reality can become an important tool for both educational and research purposes. The suggested approach, which integrates the Oculus Rift and the Leap Motion devices, allows the user to interact directly with the anatomical structures and manipulate the organs and tissues using its own hands in virtual scenarios, allowing the practise of surgical procedures, viewing the anatomical models from any perspective, including from within the tissues, compare more than one case at the same time or store the temporal evolution of a patient-specific medical case.

Wed3A

UMa-R Room R
10:50 - 12:50

Sérgio Pinto, António André, Pedro Martins

— End of Session Wed3A —

Wednesday June 12, 2019
Parallel OEEE'19 Special Session I - "Online Experimentation in Science and Engineering Education"
Chairs: Claudius Terkowsky and David Boehringer
Papers: #8, #13, #30, #33, #44, #45

#8

Evaluating the effectiveness of virtual environment experiments to change conceptual knowledge in the context of non-formal learning

Wed3B

UMa-R Room L
10:50 - 12:50

The effectiveness of virtual environment experiments in changing conceptual knowledge is presented and discussed. Two different online experimental activities were carried out within the context of non-formal learning approach at secondary school level. The combination of virtual environment experimentation with a pre- post- test strategy resulted in a good conceptual knowledge gain.

Diana Urbano, Maria De Fátima Chouzal, Maria Teresa Restivo

#13

A framework for interpreting experimental errors in VISIR

Wed3B

UMa-R Room L
10:50 - 12:50

Students usually do errors while performing experiments. In traditional, hands-on labs, instructors are able to help students surpass those errors. In non-traditional labs, like virtual labs or simulations, the support is usually provided by built-in mechanisms that prevent erroneous actions or that provide some sort of online assistance. In remote labs, like the Virtual Instruments Systems in Reality (VISIR) remote lab, the same principle applies. This paper describes the very initial stage of a framework for interpreting experimental errors done in VISIR. It considers the course syllabus of electrical circuits and situates the work done till the moment, in relation to that syllabus. Future work is also addressed.

Javier Garcia-Zubia, Gustavo Alves, Unai Hernández-Jayo, Jordi Cuadros, Vanessa Serrano, André Fidalgo

#30

Open Digital Lab for You – Remote and virtual laboratories in higher education, research and qualification

Wed3B

UMa-R Room L
10:50 - 12:50

This paper describes the intention to integrate Internet of Things (IoT) and Industry 4.0 related learning resources in a remote and virtual lab-based environment for higher education and research. The objective of this concept is to provide a laboratory environment as integral part of the curriculum at universities and as, in equal measure, an industryrelated service for researchers. The educational aim of the lab focusses on the development of competences to meet current and future professional industrial requirements. The paper describes the challenges which need to be tackled for the technical integration and the design of the learning environment and it is structured into three main chapters: (1) Description of the intention for the project and outline of the idea for an Industry 4.0-/IoT-Lab platform. (2) Presentation of the didactical approach and description of the implementation based on three scenarios. (3) Presentation of key findings and first results as well as current tasks.

Anke Pfeiffer, Dieter Uckelmann

#33

Dashboard for the VISIR remote lab

Wed3B

UMa-R Room L
10:50 - 12:50

The VISIR dashboard (VISIR-DB) is a learning analytics tool connected with the VISIR remote lab. In VISIR, every action performed by a student from the interface over the remote laboratory and back is logged and recorded. VISIR-DB helps visualizing, in a fast and deep way, the recorded logs from this communication. Using this tool, a teacher can analyze and understand better how the students are using the remote lab during their learning process on analog electronics. With this information, the VISIR platform can be improved and the use of remote labs can be better understood.

Javier Garcia-Zubia, Jordi Cuadros, Vanessa Serrano, Unai Hernández-Jayo, Ignacio Angulo, Aitor Villa, Pablo Orduña, Gustavo Alves

#44

Analytics on the accesses to contents in e-lab remote control laboratories

To better understand the characteristics and necessities of e-lab users, it is crucial to analyse the traffic of e-lab wiki website - an extensive set of online pages dedicated to experimental physics that serves as a support for the remote laboratory e-lab. The website's traffic was carefully monitored during a 7 month period, covering variation of page views with time, most relevant pages, a demographic study of its users and the types of devices used to access the contents. The results showed a huge importance of non developed countries, specially India and Brazil, to the overall traffic. E-lab wiki has been accessed from more than 100 countries around the world, mainly through the use of mobile devices. Regarding accessed content, pages related to the determination of Planck's constant composed the majority of the registered traffic.

#45

A MOOC with an e-lab remotely controlled experiment: student behaviour analysis

A careful analysis regarding the characteristics and behaviours of the participants enrolled in the MOOC "Experimental Physics: Electromagnetism" was performed. This MOOC T´ecnico course related to electromagnetism differs from the remaining courses because it includes a strong laboratorial component which challenges students to understand and analyse experimental data collected during the course. With the present analysis, we intended to study the participants' background, understand what they aim to achieve by enrolling the course and how the nature of its contents and activities affects their overall success. In more detail, we determined how the inclusion of activities such as hands-on experiments, operation of remote laboratories and open questions with peer review evaluations affect the

Wed3B

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10:50 - 12:50

Rúben Cardoso,
Manuel Santos,
Horácio Fernandes

Wed3B

UMa-R Room L
10:50 - 12:50

Rúben Cardoso,
Manuel Santos,
Horácio Fernandes,
Victor Negîrneac,
Ana M. Santos

dropout rates and the evaluations obtained by the students. This information is crucial to tailor the course to the student's needs, ultimately improving the course quality and the student's learning experience. To achieve this, data regarding the students characteristics and the number of active participants for the different course stages was collected. The results showed a large participation of people from outside the T´ecnico Lisboa (IST) community (enrolled students, teachers, researchers, staff, alumni) and a high variety of academic paths inside it. These also made clear that a considerable amount of the enrolled participants dropped out of the course as soon as the proposed tasks became more demanding. However, the remaining students continued committed and completed the following exercises, independently of their nature or complexity. These students were mostly able to complete the course with a good final evaluation and receive the final certificate.

— End of Session Wed3B —

Wednesday, June 12, 2019
Parallel OEC'19 Special Session I: "Online Experimentation in Control"
Chairs: Dionísio Barros and Wlodek J. Kulesza
Papers: #18, #68, #96, #99, #103, #111

#18

ELSA-SP – Through-the-cloud subscribe-publish scheme for interactive remote experimentation under iLab Shared Architecture and its application to an educational PID control plant

The present paper depicts a remote experimentation lab server architecture, ELSA SubscriberPublisher (ELSA-SP), which prioritizes rapid message exchanging through the cloud between the server on the lab side and the user client application. It was designed to work under iLab Shared Architecture (ISA) and relies upon the dynamic communication protocol MQTT and the JSON format. In tests with a ball height position PID control remote experiment, the architecture best performance was registered with a message size of 8KB, reaching a throughout of 94,2 KB/s, which allows for a broad range of applications.

Wed3C

UMa-R Room P
10:50 - 12:50

Thiago S. Uhlmann,
Henrique D. Lima,
André L. Luppi,
Luciano A. Mendes

#68

A WebLab Control Experiment using the Ball and Beam System and Multiobjective Optimization

By associating active learning methodologies and digital media as a form to improve educational quality, the diversity of experimentations in engineering education has been motivating researches in many areas with possibilities of increasing both students' knowledge and skills. Control engineering is an area where educational laboratories are usually costly, thus the use of virtual laboratories for remote experimentation became an interesting approach. In this work, it is presented a remote experimentation procedure for the ball and beam system, which is a nonlinear and unstable open loop process.

Wed3C

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10:50 - 12:50

Ricardo M. Kagami,
Guinther K. Costa,
Luciano A. Mendes,
Roberto Z. Freire

Considering the advanced control topic, multiobjective optimization was introduced in the experiment in order to tune Proportional-Integral-Derivative (PID) controllers. Through the description of the system model, the multiobjective optimization technique, and the experiment configuration, students can simulate and test their controllers remotely in a real plant.

#96

On an IFAC Online Pilot Survey For A First Course On Control

The paper introduces aims and objectives of the IFAC survey for a first course on control and discusses some its basic features.

Wed3C

UMa-R Room P
10:50 - 12:50

Mikulas Huba, John A. Rossiter, Katarina Žáková, Atanas Serbezov, Antonio Visioli

#99

Introductory experiments for a stable plant control

The paper gives examples of learning objects devotedtointroductorystepsstartingwithmodelingandstaticfeedforward control of a stable nonlinear plant. Then, an extension by a stabilizing feedback yielding two modifications of P control is shown. These learning objects offer to students broad range of tasks for development and mastery of relevant terminology and competencies from the related areas of modeling (including use of Matlab/Simulink), control design, experimental evaluation and remote access to processes.

Wed3C

UMa-R Room P
10:50 - 12:50

Mikulas Huba, Pavol Bisták, Matej Rábek, Katarina Žáková

#103

 Integration of new control experiments to online environment

An online laboratory system in the area of control engineering should provide a way to test control algorithms on a variety of devices using multiple simulation environments.

Wed3C

UMa-R Room P
10:50 - 12:50

Matej Rábek,
Katarína Žáková

The online laboratory system solution described in this paper, builds on this functionality and enhances it even more .It allow sits users to declare variables inside their block diagrams, upload them to the system and later initialize them within the system's user interface. The aim of this paper is to provide an outline of this system connected to a thermo-opto-mechanic device, which was designed for control algorithm verification and remote control education. The uploaded block diagrams can be created using both MATLAB 2018b and Scilab 6.0.1 software. The emphasis is put on passing the arguments defined by the user to the simulation schema controlling the device.

#111

3D Three-Tank Remote Laboratory Based on Matlab and Websockets

Wed3C

UMa-R Room P
10:50 - 12:50

Pavol Bisták

This paper presents a new architecture for remote laboratories that is based on Matlab and websockets. The Matlab sever uses the MatlabWebSocket library and then the client can be realized in JavaScript. Moreover, the visualization of the remote laboratory on the client side is realized in 3D using Three.js JavaScript library. As an example, the three-tank real hydraulic system has been modeled in 3D and this model has been connected via Internet to the real system. This allows users to perform different control strategies on the real hydraulic system with 3D visualization of its dynamical behavior. The main advantage of a newly developed remote laboratory in comparison with the previous Matlab based laboratories consists in the fact that using the websocket technology the client interface can be run within the Internet browser and no dedicated application is needed.

— End of Session Wed3C —

Wednesday, June 12, 2019
Parallel Session: "Remote Monitoring, IoT and Smart Homes"
Papers: #1, #6, #49, #107, #108
Chairs: Paulo Abreu and Jan Steinbrener

#1

Toward Solar Energy Harvesting for Small Cell Networks: Technology, Feasibility, and Challenges

Wed4A

UMa-R Room R
14:30 - 16:10

Rachad Atat,
Rubayet Shafin,
Erchin Serpedin

Extreme densification is one of the key technologies to get to high data rates in future 5G networks. In this paper, we consider a solar energy harvesting model for small cell base stations (SCBSs). We use the solar energy resource data (http://rredc.nrel.gov/solar/new data/confrrm/) by the Cooperative Network for Renewable Resource Measurements. The data set includes measurements for solar irradiance, mainly global horizontal irradiance (GHI), along with a set of predictor variables. The data set spans multiple states including Florida, Oregon, Texas, Mississippi, North Carolina, Georgia, New Mexico and West Virginia. Using the data set in North Carolina, we explore the feasibility and reliability of using solar energy to power SCBSs. In this paper, we test the hypothesis that we can accurately predict the availability status of SCBSs, defined as having sufficient power to provide service to end-users, if the GHI value is within a certain range.

#6

Smart Home Energy Management Supported by Cloud Computing

Wed4A

UMa-R Room R
14:30 - 16:10

Joaquim Leitão, Paulo Gil, Bernardete Ribeiro, Alberto Cardoso

The current work studies optimal management of electrical appliances in smart homes. An appliance scheduling problem is addressed via optimisation approaches with the goal of minimising the overall energy bill over a week. Scheduling of electrical appliances must take into account non-controllable domestic demand, grid prices and local energy production by photovoltaic panels. Here, a preliminary cloud architecture is proposed to support smart home

sensor data collection, storage, processing and scheduling computation. Optimal schedules achieve a balance between local energy production and grid prices, exploring periods of higher generation to attenuate non controllable demands and favouring night periods (during which energy is cheaper) for controllable appliances operations.

#49

Experimental NFT hydroponics system with lower energy consumption

Precision agriculture nowadays has great importance as it brings together the knowledge acquired through traditional cultivation techniques with precision and technological automation. One of the inherent techniques of precision agriculture is hydroponics, with plants growing using aqueous solutions and without soil availability. Although NFT (Nutrient Film Technique) systems are already well-developed systems, there is a big difference between home projects and highly automated processes, which in turn require high investment values. Among other things, in this work, the aim was to study and developed algorithms that allow the efficient recirculation of water, allowing electricity savings to be around 40% compared to more traditional systems.

Wed4A

UMa-R Room R
14:30 - 16:10

Carlos Ramos, Leonel Nóbrega, Karolina Baras, Luís Gomes

#107

Extended Reality (XR) in IoT Scenarios: Concepts, Applications and Future Trends

The multiple branches of Extended Reality (XR) are pioneering new ways to interact with digital content, both in real and virtual worlds. The Internet of Things (IoT) is also pioneering new real-world scenarios and use cases by taking advantage of sensed data and automation. These technologies are bridging the gap between the real world and the digital world. In this paper we present XR and IoT technologies, explaining their concepts, popular devices and challenges. We then provide a study on the current applications

Wed4A

UMa-R Room R
14:30 - 16:10

Daniel Bastos, Tiago Andrade

of XR technologies in IoT scenarios. These include visualization of IoT data in Virtual Reality (VR), network management of IoT devices in Augmented Reality (AR) or 3D visualization of smart buildings and cities. In order to tackle the challenge of incorporating IoT data into XR applications, we propose a data communication model that allows translation of IoT data into XR objects, events or scenarios. We conclude by discussing future trends for XR and IoT.

#108

Remote Precipitation Monitoring Using a Microwave Link

Correct measurement of precipitation over a wide area is important for accurate predictions of flash floods or for water resource management. Today, the three main rainfall monitoring systems are rain gauges, weather radars and satellites. However, they all have limitations such as spatial resolution, mountain blockade and price, respectively. A new approach uses commercial telecommunications links to monitor precipitation. However, there are places where the density of commercial connections is low or they belong to private companies, which makes it difficult to obtain the data. In this work is presented a low-cost, in-house built 24 GHz link to study the influence of weather in signal quality. Preliminary results are presented, which show that there is a direct relation with temperature and that it is possible to detect precipitation.

Wed4A

UMa-R Room R
14:30 - 16:10

Sofia Inácio, Filipe Santos, Joaquim Azevedo

— End of Session Wed4A —

Wednesday, June 12, 2019
Parallel OEEE'19 Special Session II: "Online Experimentation in Science and Engineering Education"
Papers: #19, #25, #37, #63, #76
Chairs: Diana Urbano and Javier Garcia-Zubia

#19

Is a Remote Laboratory a Means to Develop Competences for the 'Working World 4.0'? A Brief Tentative Reality Check of Learning Objectives

Wed4B

UMa-R Room L
14:30 - 16:10

The demands of so-called Industry 4.0 are reshaping the working world of future engineers. Therefore, it is very likely that these technological developments soon will affect higher education institutions with increasing intensity. For years, there has been a vivid discussion on the respective competence students would need to develop in order to face emerging technology changes. To slightly tackle this question of what might be expected of future engineers, a German technical university analyzes one of its remote labs to identify technological potential for future-oriented teaching and learning in light of the required competences for the 'Working World 4.0'. In a first step, based on current scientific studies, relevant Industry 4.0 competences are identified and summarized in a structuring grid. In a second step, the selected remote laboratory is analyzed as an example case with regard to explicit and implicit learning objectives, which address the identified competence requirements of the structuring grid. It could be shown that this didactic setting has the potential to recognize the complexity of the Working World 4.0 and 'digitization' in the form of a remote laboratory, opening up a multitude of possibilities. However, the results also show that in the examined case example laboratory only a few competences of the technical competence area are addressed in the context of Industry 4.0, since the lack of interdisciplinarity significantly limits the promotion of these competences. This shows possibilities for future critical research and constructive development in this area.

Claudius Terkowsky,
Silke Frye,
Dominik May

#25

Collaborative development of plasma physics MOOC in the context of a PhD curricular unit

Wed4B

UMa-R Room L
14:30 - 16:10

"Outreach and teaching skills" is a curricular unit (CU) of every doctoral program at Instituto Superior Técnico (IST). In the physics department it is a project oriented CU where students shall develop didactic content of any kind to support bachelor/master courses or any other learning framework. Besides conventional studies, IST has a growing offer of Massive Open Online Courses (MOOC), MOOC Técnico. Taking into consideration the lack of a MOOC on plasma physics at IST, the development of such course by the cohort of plasma physics students provided a consistent and integrated work within the scope of the CU. In close collaboration with the Professor responsible for the plasma physics course at IST, the students took upon themselves the task of developing scripts, storyboards and other didactic content for the online course. This contribution details the steps and procedures taken, and reports of the experience acquired by turning a doctoral CU into a collaborative effort to broaden the reach of plasma physics education.

Rui Calado, Ricardo Ferreira, Rui Torres, Duarte Gonçalves, André Torres, Emanuel Ricardo, Vasco Guerra, Horácio Fernandes

#37

From laboratory education to laboratory edu-action: evaluation of a redesigned lab course for prospective technology teachers and resulting demands for cyber-physical 'remotification'

Wed4B

UMa-R Room L
14:30 - 16:10

Laboratory courses have become an integral part of engineering education worldwide. Moreover, 'megatrends' such as globalization, demographic change, and increasing digitalization are key drivers of flux in the areas of people, technology, and organization and thus also have an impact on laboratory education, especially in the field of engineering. These fast moving changes require that prospective workers

Judyta Franuszkiewicz, Sabrina Heix, Silke Frye, Tobias Haertel, Claudius Terkowsky

as well as teachers possess a higher level of independency and responsibility. This raises the question how the related needed self-learning competencies can be nurtured and developed during study time. The paper presents first results of a qualitative evaluation of a redesigned laboratory course for prospective technology teachers based on essential principles of modern laboratory didactics in order to allow students to experiment more actively and learn in a more self-directed way. As evaluation method, guided expert interviews were chosen as the most appropriate approach. The main result is that self-directed laboratory learning helps students to learn taking over more responsibility for their own learning processes and successes. Moreover, it can increase students' motivation to learn. Finally, to reduce students' attendance obligation and to foster self-directed learning as a precondition for lifelong learning, the deployment and implementation of VISIR, a remotely accessible online experimentation facility, will take place during the first quarter of 2019. The paper closes with further research questions on the digital transformation and its impact on designing online experimentation learning by deploying cyber-physical 'remotification'.

#63

The use of technology in education: Just-In-Time (JiTT) teaching methodology and remote laboratory

Wed4B

UMa-R Room L
14:30 - 16:10

Luane Campos, Julia P. Leite, Gabriel Silva, Fernando Valencia, Alice M. Ribeiro

Increasingly, society is going through moments of transformation that have consequences for communities. Many of the profound changes in society are due to the growing influence of technological resources and to the exponential advance of Information and Communication Technologies (ICTs). ICTs directly affect information and communication, but these are increasingly affecting and promoting transformations in educational activity. In this way, our work seeks to discuss two information and communication technologies adapted to education at the University of Brasilia:

the Just-in-Time Teaching (JiTT) methodology modified in classrooms and the ongoing construction of a laboratory remote.

#76

Fostering the Comprehension of the Object-Oriented Programming Paradigm by a Virtual Lab Exercise

Wed4B

UMa-R Room L
14:30 - 16:10

Veronika Thurner

While object-oriented programming offers an almost unlimited number of possibilities to solve a certain task, only a small subset of these solutions is really adequate from a technical perspective. Novices in the art usually find it rather hard to realize which of the design decisions they took are good, and which violate the principles of object-orientation and thus will lead to low quality code on the long run. To support students in learning to truly comprehend the object-oriented programming paradigm, we designed a virtual lab session that visualizes the effects of different design and implementation decisions. This immediate visual feedback is easy to understand in an intuitive way. Thus it allows students to realize for themselves which aspects or their solution are adequate, and to identify any problems that they still have to resolve. Three years of experience with this virtual lab session indicate that its design is well suited to provoke, and thus make visible, typical misconceptions and error patterns that occur at early stages of learning the object-oriented programming paradigm.

— End of Session Wed4B —

Wednesday, June 7, 2017
Parallel OEC'19 Special Session II: "Online Experimentation in Control and Automotive Control"
Papers: #73, #89, #93, #102, #124
Chairs: Luciano Mendes and Pavol Bisták

#73

PuzzlEx: an Online Experimentation Environment for Control Engineering Labs

This work presents PuzzlEx, an experimentation environment for control engineering virtual and remote labs. This environment not only allows students to make interactive use of the lab but also to define and run customized experiments. For this purpose, an intuitive visual programming language that communicates internally with the laboratory is used. The main advantage of this environment is that it enables the use of interactive laboratories already created without the need to rewrite their code. Students acquire a broader knowledge of the plant or model used and experience in handling problems like those found in real life thanks to the possibility of programming their own experiments. Also, teachers can offer new tasks to students that cover more curricular competencies using the same interactive labs. Two experiments are presented with a Furuta pendulum system used by control engineering students to demonstrate the usefulness and possibilities offered by the environment.

Wed4C

UMa-R Room P
14:30 - 16:10

Daniel Galan, Rubén Heradio, Dictino Chaos, Luis de la Torre, Ernesto Aranda

#89

Online Control of Microgrids Islands Connected by Eletrical Submarine Cable

The present paper introduces a description of the use of online systems for real-time monitoring, control and management of power grids. Following the Smart Fossil Free Island project, which aims to make Porto Santo Island an intelligent, self-sustaining, and free of harmful gases emissions Island, or, in other words, to produce energy without using

Wed4C

UMa-R Room P
14:30 - 16:10

Luís Gouveia, J. Dionísio Barros

fossil fuels, arises the possibility to interconnect the electricity grids of Madeira and Porto Santo Islands through a submarine high voltage cable. This is an innovative project, since it intends to interconnect two isolated microgrids from two Islands with small dimensions, through a submarine electric cable installed at about 2300 m depth. This allows to partially or totally power Porto Santo Island electrical grid from the electro producing system of Madeira Island. In order to analyze the viability of this connection, a comparative study between a High Voltage Alternating Current (HVAC) system and a High Voltage Direct Current (HVDC) system has been carried out. The client impositions require a bidirectional system, given the possibility of installing, on Porto Santo Island, a wind farm able to power this Island and transfer a considerable percentage of the electric energy needed to power Madeira Island. This project uses online systems to monitor, manage and control the frequency, voltage, active and reactive power of the two Islands from Madeira, regulating the transfer of power between them, in order to ensure the continuity of service and all parameters of electrical quality.

#93

Electronic Automotive Control

In the development of the project Electronic automotive control of an internal combustion engine, the various components of the engine are presented, and is described its principle of operation. The operation of the engine is described, detailing the operation of a four-stroke engine. Using two Arduino processors, an electronic system was developed which can measure the magnitudes of the motor (rotation and vacuum) using sensors. Based on these parameters the automotive operation is adjusted, namely the moment of the spark and duration of the fuel pulse by first processor, and the opening of the air intake by the second processor. The online experimentation result show that is

Wed4C

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14:30 - 16:10

J. Dionísio Barros, Eduardo J. N. Spinola, Filipe E. Sousa Santos

possible to improve the adjustment of the machine operating rotation by 4%, with and without load. The electronic control improves 11% the torque, presenting for different tests. The average consumption decreased from 1,5 L/h to 1,3 L/h. This represents an improvement of approximately 13% over the original control.

#102

Learning Objects and Experiments for Active Disturbance Rejection Control

Wed4C

UMa-R Room P
14:30 - 16:10

The paper introduces examples of learning objects dealing with introductory design of controllers with integral action based on disturbance observer. This state-space based approach is presented in forms denoted as conventional stateobserver based reconstruction and compensation, or newer Active Disturbance Rejection Control. Both they use the so called Extended State Observer established by extending the plant state by a new state corresponding to an equivalent disturbance. This learning objects offer students development and mastery of the relevant terminology and competencies from the related areas of modeling (including use of Matlab/Simulink), control design, observer design, initial verification by appropriate hands on experiment and possibility of an extended work supported by a remote access to processes.

Mikulas Huba,
Maria Hypiusova,
Peter Tapak

#124

Web presentation of quarter car model

Wed4C

UMa-R Room P
14:30 - 16:10

The aim of the paper is to present a new developed web application that deals with the active suspension system for a simplified quarter car model. The computation running in the background of the whole online application is realized in Scicoslab simulation environment that is available via web service. The application can be used as an interactive tool for students in the first control courses. It enables to improve own skills mainly in controller design.

Marcel Boldis,
Katarina Žáková

— End of Session Wed4C —

Wednesday, June 12, 2019
Parallel Session: "Online Experimentation and IoT in Engineering Education"
Papers: #5, #47, #55, #95, #118
Chairs: Anke Pfeiffer and Manuel Gericota

#05

Improving the Usability of Interactive Systems by Incorporating Design Thinking into the Engineering Process: Raising Computer Science Students' Awareness of Quality versus Quantity in Ideation

Wed5A

UMa-R Room R
16:30 - 18:10

Traditional engineering methods are considered unsuitable for the development of usable and engaging interactive systems such as online experimentation and simulation software. For systems involving users, user-centric design approaches are more appropriate. The ideation stage of design involves exploring the space of opportunities. One commonly held view in design disciplines is that quantity leads to quality. Yet, for related non-design disciplines such as engineering, quantity is often regarded as a negative characteristic associated with low quality. Focusing on quality alone may lead to inferior user experience and ineffective systems. This study describes an initiative to (1) collect empirical evidence to support the design-belief that quantity leads to quality and (2) to use the activity and its results as part of a pedagogical strategy to enhance students' awareness of the connections between quantity and quality during ideation. A class of 100 computer science students was divided into two groups. Both groups were given the same task to design a textinput strategy for individuals with motor disabilities but with different focuses: one group was asked to focus on quality of ideas and the other group on the quantity of ideas. The results show that the students who focused on quantity of ideas produced better quality concepts compared to the students that focused on quality. The results were presented to and discussed with the students as a part of the learning process.

Frode E. Sandnes,
Evelyn Eika, Fausto O. Medola

#47

Agile approach to a CS2-based course using the Jupyter notebook in lab classes

In introductory programming courses, there is a need for a change in teaching strategies for practicing programming, which must be influenced by productive learning experiences connected with real world scenarios and methodologies. The abundance of data from different sources, online experimentation, and simulators and virtual/remote labs should also play a fundamental role when we think in new teaching strategies for these courses. In this paper, we show how agile methodologies, widely used in industry and manufacturing, combined with online experimentation, can be both applied to a CS2-based course in the era of data engineering. And, then, a new approach of teaching lab classes in CS2-based course is introduced, benefiting from the Scrum framework, to student-centered learning activities on lab classes, and from the concept of Jupyter notebook to online experimentation.

Wed5A

UMa-R Room R
16:30 - 18:10

Hélia Guerra, Luís M. Gomes, Alberto Cardoso

#55

Improving the use of remote laboratories. The case of VISIR at Universidad Nacional de Rosario

The present work originates in the Project "Educational Modules for Electric and Electronic Circuits Theory and Practice following an Inquiry-based Teaching and Learning Methodology supported by VISIR", carried out with the support of the Erasmus+ Programme. Remote labs can provide a framework where physical experiments can be developed for STEM (Science, Technology, Engineering and Mathematics) education. Although remote labs have been in use for over a decade now in several countries and levels of education, their use is not yet being generalized in Latin America. Through the VISIR+ International Cooperation Project from the Erasmus+ Programme, five higher education institutions from Latin America have incorporated de VISIR remote

Wed5A

UMa-R Room R
16:30 - 18:10

Federico Lerro, Susana Marchisio, Sonia Concari, Miguel Plano, Claudio Merendino, Gastón S. Arregui, Javier García-Zubía, Unai H. Jayo, Gustavo Alves

lab in order to carry out experiments with electric and electronic circuits. In the present work the results of the study developed at Universidad Nacional de Rosario within the framework of the aforementioned project are shown.

#95

Automation of Basic Supervision Tasks in a Remote Laboratory – Case Study NetLab

Remote laboratories provide students with online access to real equipment from anywhere at any time. However it is impossible to provide 24/7 human assistance to students performing experiments. It is envisaged that an online tutor will be a useful addition to almost any remote laboratory. Providing an online tutor is not as much of a problem as providing a "good" online tutor that will maximize student learning outcomes in the remote laboratory. In this paper we showcase the initial development of software to automate some tasks normally carried out by a human laboratory tutor. Created based on the analysis of students' activities during typical experiments, the software detects wiring mistakes made by students performing an experiment in a remote laboratory. The software also detects any results from the laboratory equipment that do not match results expected from theory. This work is an important step in designing a quality online tutor that will assist students in the way a good teacher would guide them through the discipline knowledge.

Wed5A

UMa-R Room R
16:30 - 18:10

Hugh Considine, Zorica Nedic, Andrew Nafalski

#118

Teaching Internet of Things in a Collaborative Laboratory Environment

Internet of Things (IoT) is a network-based system of devices exchanging different kinds of data for decision making. It has multi-disciplinary facets which make it tricky to teach as a university course. Students must be provided with practical learning opportunities to understand the complexities of

Wed5A

UMa-R Room R
16:30 - 18:10

Ananda Maiti, Alexander Kist, Terry Byrne

the Internet of Things applications. This can be challenging as IoT has evolved rapidly with time. This paper introduces a collaborative learning activity that allows students to use real sensors and systems in a laboratory environment. A smart farming based agricultural application is a use case for the laboratory coursework. Real sensors and nodes are used to build a working farm IoT system. It covers sensor-based end-node design, communication, system design, data presentations, and collaborative discussions.

— End of Session Wed5A —

Wednesday, June 12, 2019
Parallel Session: "Remote and Virtual Experimentation"
Papers: #7, #21, #36, #54, #64
Chairs: Vanessa Mai and Alexander Zimin

#07

Wed5B

UMa-R Room L
16:30 - 18:10

Online Simulation of Methods to Predict the Remaining Useful Lifetime of Aircraft Components

Daniel Azevedo,
Bernardete Ribeiro,
Alberto Cardoso

This work explores the creation of an online tool where the user can simulate a Prognostics and Health Management (PHM) system, by creating and submitting a specific machine learning experimental scenario in order to predict the Remaining Useful Lifetime (RUL) of aircraft subsystems that were affected by a system fault. In this interface, the user can choose a public dataset from the proposed ones and a specific machine learning method to be applied to the dataset. After submitting the selected configuration the system runs it and the output, i.e., the predicted RUL, is presented in the form of a graph with the possibility of exporting the results in a .txt file. The suggested datasets are made of data retrieved from aircraft sensors and the proposed methods represent different alternatives for RUL prediction. There is also the possibility to choose more than one method and then graphically compare the results. Since the methods are executed remotely, the use of this tool is not computational demanding for the user. The main aim of this work is to create a simple and user-friendly interface, allowing the users to make their own experiences online, simulating a PHM system applied to a given dataset.

#21

Wed5B

UMa-R Room L
16:30 - 18:10

Upgraded Plasma Spectroscopy Internet Laboratory

Alexander Zimin,
Vladislav Troynov,
Ivan Zemtsov

This paper presents a remote-access plasma spectrometry laboratory, designed to provide the students of classical and technical universities with opportunities to practice hands-on skills in plasma diagnostics by spectroscopic methods.

A newly developed interactive automatic system for atomic/ molecular spectra recognition and processing with an online capacity is described. A ZigBee technology has been applied to enable turning a radiation source under study on and off remotely during a hands-on training via the Internet.

#36
Remote experimentation in the teaching of physics in Costa Rica: First steps

There is no doubt that experimental work is fundamental in the teaching of physics, however neither the accurate spaces nor the equipment for its fulfillment are always available. Taking into account the range of Remote Labs (RL) as resources for teaching and learning, the Open State University (UNED) from Costa Rica has started the Remote Testing Lab to develop and encourage the use of RLs in the institution as well as boosting its use in other university and high school institutions within the country. The present work shows the first steps of this project in terms of courses at UNED in which RL was used, its use in physics teacher training workshops and its use in high school.

Wed5B
UMa-R Room L
16:30 - 18:10

Carlos Arguedas-Matarrita, Pablo Orduña, Lucas M. Carlos, Marco Conejo-Villalobos, Sonia Concari, Fernando Ureña-Elizondo, Juarez B. Silva, Javier García-Zubía, Luis Rodriguez-Gil, Unai Hernandez-Jayo, Susana Marchisio, João B. Alves

#54
Remote monitoring and control of winemaking parameters

This paper presents an automatic system that measures the glucose concentration and phenolic compounds concentration during winemaking for white wines and red wines. In the first stage of development the system integrates a potentiostat for electrochemical measurements on screen printed electrodes based on sampling/conditioning modules controlled by a specific software. The glucose concentration is decreasing faster according to temperature peaks and fermentation process. Remote monitoring become very important as the human operator in winery cannot perform full day local service.

Wed5B
UMa-R Room L
16:30 - 18:10

Petru Epure, Doru Ursutiu, Cornel Samoila

#64
Online experimentation at the GOLEM tokamak

The GOLEM tokamak offers students and other interested parties the opportunity to gain "hands-on" experience through online experimentation in the field of plasma physics and controlled thermonuclear fusion in tokamaks. A typical online experiment scenario is outlined. The new web application facilitating safe, easy and efficient online experimentation, including a live, real-time view of the experiment is described in detail. Simple access to the open and extensive database of experimental results is demonstrated. Finally, the wide range of possible experimental topics from past -and applicable to future online experimentation sessions is reported.

Wed5B
UMa-R Room L
16:30 - 18:10

Vojtech Svoboda, Ondrej Grover, Jan Stockel

— End of Session Wed5B —

Notes:

Notes:

Thursday, June 13, 2019
"Online Experimentation DEMOS Session I"
Demos: #10, #15, #40, #48, #58, #60, #65, #67, #79, #83, #105, #115, #119
Chairs: Horácio Fernandes and Thomas Klinger

#10

Dynamic Repository of Experimental Results

Thu1

UMa-R Room D
08:30 - 10:00

Saša Gavrilović,
Jovan Kovačević,
Milan Matijević

This work presents the content and structure of designed web portal for supporting to dynamic repository of experimental results which are organized for engineering education purpose. The most illustrative experimental results for demonstration of relevant phenomena in engineering education are organized through I/O data and sets of short video clips and diagrams per one experiment. Namely, a realization of a laboratory experiment is divided into short time sequences or phases of laboratory exercise, but their monitoring can be organized jointly or/and separately. At the same time, all phases of a laboratory exercise are demonstrated. At this manner, a beneficiary can understand demonstration of a laboratory exercise much faster and more completely. Moreover, the approach to the web site is individualized, and a beneficiary can choose one of the offered sets of parameters for experimental realization. One experimental realization means approach to real experimental data (which are consisting of experimental parameters and experimental measurements) and visualization of experimental data through supervision via diagrams and videos. Beneficiaries can activate a few experiments in order to compare experimental results with different experimental parameters. The site includes appropriate guides and contents for basic theory, descriptions of experimental setups, and problem-based education.

#15

Interactive Content Objects as GOLDi-Lab Services

Thu1

UMa-R Room D
08:30 - 10:00

Karsten Henke,
Heinz-D. Wuttke,
René Hutschenreuter,
Detlef Streitferdt

Interactive content objects (ICOs) are immersive digital tools (e.g., simulations or real interactive experiments) that students can use to generate responses, analyse data, etc. and allows learners to explore the learned content with given or own created examples [1]. Within the framework of the GOLDi remote lab [2], we offer the students such ICOs as new services, which are used for the digital support of learning processes in computer science. We realized a collection of such interactive tools as new services of our lab to teach from the systematic approach up to methods of designing digital systems. They are intended to show in particular the connections between different methodical approaches of design procedures and provide students a tool to design virtual and remote-controlled laboratory experiments. On the other hand, they allow individual practice-oriented learning through flexible access to experiments at different locations and times. In our online demonstration, we want to present some of these new ICO services and show how to use them to provide a deeper understanding of interrelationships between different theoretical approaches - from very simple basics to complex digital control designs.

#40

Web-based tool for Predicting the Remaining Useful Lifetime of Aircraft Components

Thu1

UMa-R Room D
08:30 - 10:00

Daniel Azevedo,
Bernardete Ribeiro,
Alberto Cardoso

This work aims to present and describe a web-based tool, which enables the simulation of a Prognostics and Health Management (PHM) system where the goal is to predict the Remaining Useful Lifetime (RUL) of specific aircraft components using different machine learning techniques. This tool is accessed online and provides the user with the possibility of creating a specific experimental scenario. The user selects a specific dataset from amongst the proposed datasets

and a specific machine learning method to apply to the dataset. When submitting the setup configuration, the results, regarding the calculated RULs of the test dataset, will be displayed in the form of a graph. The suggested datasets are made of synthetic data received from aircraft sensors and the proposed methods represent different methodologies for the RUL calculation. The web interface should be easy to use and be a helpful tool for simulating and comparing different machine learning methods for RUL prediction.

#48

Smartly Water: Interaction with a smart water network

The Internet of Things has become a reality over the last few years, such that new devices that were developed, allow the user to control and get information about his home remotely. There are several kinds of devices available on the market, some of which are difficult to interact with, sometimes due to the fact that they are out of sight or out of reach. This demo focuses on the interaction with a smart water network using Alexa, the virtual assistant by Amazon, as well as through a mobile application and a website. To assess the interaction, a smart water network was deployed at four different sites so that consumption data could be collected. Usability studies were conducted to asses all three types of interaction.

#58

Interactive Demonstration of a Energy Efficient YOLOv3 Implementation in Reconfigurable Logic

In this interactive demonstration we present the usage of a state-of-the-art object detector, YOLOv3, in a CPU+GPU+FPGA heterogeneous platform for embedded systems. Profiles of each function were analysed in order to achieve the most energy efficient solution in the design space.

A camera is used to collect the frames, a board runs the algorithm and a monitor shows the labels of the detected objects attached to the image. The main purpose of this demo is to demonstrate to the conference attendees a functional version of an object detector in a low-power platform. In addition, we also intend to encourage the development of applications in this type of devices.

#60

Immersive Serious Games for Post-Stroke Motor Rehabilitation

This article describes a demonstration of an ongoing research work that explores the extents of how immersive systems may support serious games development for post-stroke upper limb rehabilitation. Beyond the entertainment that is expected from games, the focus goes towards the exploitation of embodiment that should contribute to reinforce the patient engagement, what is known to contribute to the faster and deeper recovery, but also the sensory stimulation that is crucial to the development of new neural pathways.

#65

Remote demonstration of the GOLEM tokamak

The GOLEM tokamak serves as an educational device in the field of tokamak physics, technology, diagnostics and operation in the scope of the wider field of thermonuclear fusion. The typical scenario of a remote demonstration of the GOLEM tokamak is described. The new remote control and live status web interface in its mobile-ready form is presented.

#67
Serious Game for reading and spelling skills

This work describes an interactive child-friendly application focused on spelling, intended to promote sensibility to Portuguese orthography. A description of the game and its particularities are given, as well as preliminary results obtained in school environment.

Thu1

UMa-R Room D
08:30 - 10:00

Ana Sucena, Ana F. Silva, Cristina Garrido, João F. Carneiro, Paulo Abreu, M. Teresa Restivo

#79
Edge Computing: A Neural Network Implementation on an IoT Device

This demonstration showcases the use of reconfigurable logic to implement edge computing for IoT devices able to provide specific information from raw data produced from some sensor, e.g. a camera or microphone, instead of the raw data itself. In what concerns the embedded processing capabilities, the focus is image processing using convolutional neuronal networks (CNN). This approach is clearly distinct from the current trends in IoT devices of using cloud computing to process the collected data. We intend a twist on the established paradigm and pursue an edge computing approach. Since we are targeting small and simple devices, we need some low power solution for the CNN computation. The demonstration will be made on a Terasic DE1 (SoC) reconfigurable system, with a field programmable gate array (FPGA), and hardwired ARM processor to build the IoT device. The collected data from the CNN computation, is transmitted using an IoT protocol to a broker.

Thu1

UMa-R Room D
08:30 - 10:00

Ricardo Barreto, Jorge Lobo, Paulo Menezes

#83
Musiquence: a serious game customization system for dementia

Dementia is a neurodegenerative disease that leads to impairment of cognitive and emotional faculties and makes patients dependent on performing activities of daily living.

Thu1

UMa-R Room D
08:30 - 10:00

Luís Ferreira

Due to limited effects of pharmaceutical approaches, the seek of alternatives has been growing. Music and reminiscence related activities appear to be promising approaches to stimulate people with dementia (PwD). The usage of serious games (SG) has also been proposed as a valid manner to stimulate PwD. However, most SG are not designed and adapted to the profile of individuals who are diagnosed with dementia. Thus, here we will demonstrate a framework that allows customization of activities in terms of content and technology while capitalizing the benefits of music and reminiscence related approaches within gamified activities.

#105
Custom-made exergames for older people: New inputs for multidimensional physical

In this article, we provide an overview of the design and features of a portable exergaming platform with augmented reality components whose intention is to fight the sedentary lifestyle and promote active aging for older people. Exergames are projected on the floor, and the user' movements and gestures are tracked by motion-sensing technology while interacting with the games. By playing the exergames, older adults can work on their physical fitness while training the cognitive function through a rich diversification of stimuli.

Thu1

UMa-R Room D
08:30 - 10:00

Honorato Sousa, Élvio Gouveia, Mónica Cameirão, Afonso Gonçalves, John Muñoz, Teresa Paulino, Hugo Simão, Ricardo Nunes, Alexandre Bernardino and Sergi B. i Badia

#115
Interactive DEMOnstration of Medical Simulations using a Virtual Reality approach: Application to the Male Urinary System

The objective of this demonstration (DEMO) is to create an interactive environment where any user-irrespective of his/her scientific and cultural background-will be able to interact with scientific simulations (3D Finite Element Simulations) of the Male Urinary System. The user is immersed into a Virtual Reality experience (using Oculus Rift), where all

Thu1

UMa-R Room D
08:30 - 10:00

Pedro Martins, Sérgio Pinto and António André

navigation and interaction will be carried out using his bare hands (using a Leap Motion sensor). The experience mixes medical science and engineering, thus allowing a multi-level experience, ranging from the non-specialized user to the medical or engineering professional. The interactive environment has a library of simulations organized hierarchically. The approach can be extended to any scientific simulation(s) that can be discretized into a set of sequential frames. It can display codified simulation data in terms of shape (geometry) and/or color (intensity).

#119

Integral Remote laboratory for Programmable Logic

The paper presents a new remote laboratory for the development of programmable logic experiments that allows to perform all the workflow included in the development of digital systems through programmable devices from an Internet browser. The architecture of the laboratory facilitates the deployment of multiple instances of experimentation that make possible the use of the laboratory in courses with numerous students.

Thu1

**UMa-R Room D
08:30 - 10:00**

Ignacio Angulo, Javier Garcia-Zubia, Pablo Orduña, Luis Rodriguez-Gil, Aitor Villar

— End of Session Thu1 —

Thursday, June 13, 2019
"Online Experimentation DEMOS Session II"
Demos: #3, #4, #12, #32, #43, #50, #51, #52, #85, #104, #113, #116
Chairs: Leonel Nóbrega and David Boehringer

#03

Travelling in a virtual city: a physical exercise promoting game

This work looks at the potential of the use of virtual reality for rehabilitation and occupational therapy. An application, developed using the Oculus Rift and touch controllers, together with a 3D model of a virtual city and an instrumented pedal system, aims to promote the engagement of users with physical exercises for occupational therapy, namely during long periods of immobilization in elderly stages.

Thu2

**UMa-R Room D
10:20 - 11:50**

José Rodrigues, Paulo Menezes, M. Teresa Restivo

#04

Industrial IoT Smartbox for the Shop Floor

Constant search for efficiency and productivity has led to innovation on the factory shop floor, representing an evolution of the current production systems combined with new technologies of industrial automation and information technology. This work presents an experimental demo of a smartbox for Industry 4.0 scenarios, allowing sensing, monitoring and data acquisition. We have tested two different approaches, depending on the communication protocol used for real time applications: OPC UA or MQTT. Raspberry Pi's platform act as an OPC UA server or MQTT broker, respectively. From the measurements, data stored in a cloud server can be accessed remotely with improved security and visualized from a computer dashboard. One of the conclusions that can be drawn is that both protocols allow data from the smartbox to be stored and easily monitored from a smartphone application or a computer web interface. MQTT is a good option in communications requiring very low bandwidth. However, there is a lack of suitable libraries to program alarm features for OPC UA Servers.

Thu2

**UMa-R Room D
10:20 - 11:50**

Sérgio Malhão, Rogério Dionísio, Pedro Torres

#12

PILAR: A Federation of VISIR Systems for Analog Electronics

Remote laboratories are the result of a social movement which promotes accessible educational resources anywhere and anytime through the Internet in order to foster lifelong learning and support online/distance education. A remote laboratory is a real laboratory using real equipment, on which measurements are made through real instruments and which is controllable remotely. The VISIR (Virtual Instrument Systems In Reality) remote laboratory is a system on top of the state-of-the-art for online wiring and measuring electronic circuits. The PILAR (Platform Integration of Laboratories based on the Architecture of visiR) Erasmus Plus project aims for the federation of five of the existing VISIR nodes, for sharing analog electronics experiments and empowering capacity and resources of each partner, as well as providing access to other educational institutions to a VISIR remote lab through the PILAR consortium. This workshop will allow the attendees to interact with VISIR remote lab, and to be introduced in PILAR framework and joining policies as well as remote lab federation benefits both for VISIR system owners and consumers.

Thu2

UMa-R Room D
10:20 - 11:50

Felix G. Loro,
Manuel Castro

#32

A Remote Laboratory in Transmission Line Theory with VISIR

This demo describes and shows an exercise in the field of transmission line theory with the VISIR virtual lab platform. It measures the behavior of a 100m long coaxial wire, including propagation velocity, characteristic impedance using termination resistors, and frequency inversion. The corresponding paper will be presented at EDUCON 2019, Dubai.

Thu2

UMa-R Room D
10:20 - 11:50

Thomas Klinger,
Christian Kreiter,
Andreas Pester,
Christian Madritsch

#43

Augmenting Shared Spaces in Psychotherapy Contexts

The ongoing growing of computational power of small portable devices allow the emergence of new forms of Augmented Realities, such as, virtual shared spaces. In this work, we will explore the use of this technology to improve the collaborative work between people in the same physical space or in remote locations sharing virtual contents. The idea is to have a scene shared between several people where everyone can see and interact with it. Those live interactions can improve the quality of collaborative work by presenting in real time ideas and thoughts of any participant directly on top of the 3D model. Our main goal is to apply this concept to psychological therapies, specially to exposure therapies, where it is very important for the therapist to control and manipulate the scene that the patient is exposed to in order to obtain the desired results.

Thu2

UMa-R Room D
10:20 - 11:50

Bruno Patrão,
Paulo Menezes,
Nuno Gonçalves

#50

The importance of speaker specific features for emotion recognition

The recognition of emotions is an inherent ability possessed by humans, which has long intrigued many researchers. Primarily due to the possibility of its successful emulation and integration in independent systems. Further, speech, being a mixture of utterances conveying a state of mind, proves to be a suitable candidate from which emotionality can be inferred, due to its many feature variations. This is corroborated by human beings themselves using this modality for extraction of emotionality clues. Another important aspect has to do with communicational register adaptation and the skill to discern different emotions in different speakers. Sure enough, the same emotional utterance may be interpreted divergently for two different people, meaning emotionality specific information is present in a speaker's personal register. As a demo, we propose a real-time automatic emotion

Thu2

UMa-R Room D
10:20 - 11:50

Gustavo Assunção,
Paulo Menezes,
Fernando Perdigão

recognition system from speech, based on the use of the well-established VGG-like convolutional neural network speaker recognition model VGGVox, trained with over 100,000 utterances from the VoxCeleb1 dataset on speaker recognition, for emotional feature extraction and feeding to state of-the-art classifiers for accurate recognition of emotional states. Positive supporting results have been captivating enough to spark interest in the technique.

#51
A framework for remote labs supported by Visual Programming Language, Arduino and analytics

This work describes a remote lab model to teach programming by accessing Arduino boards remotely. This proposal introduces a framework for programming supported by open-source technologies using Visual Programming Language (VPL) to control an Arduino assisted by analytics tools. In addition, it also promotes STEM areas and introduces robotics and basic electronic in basic education.

Thu2

UMa-R Room D
10:20 - 11:50

Hamadou Saliah-Hassane, Lucas M. Carlos, José Pedro S. Simão, Juarez B. Silva, João B. Alves

#52
A Hybrid Application For Real-Time Air Quality Monitoring

With the raising concerns for the environment, interest in monitoring air quality is likely to increase in the near future. However, most data come from a limited number of government-owned sensors, which can only capture a small fraction of reality. Improving data coverage thus involves reducing the cost of sensors and make data widely available. For this, we will use a very high number of low-cost sensors as the basis for an air quality monitoring platform, capable of collecting, aggregating, storing and displaying data. This platform will use stream-based technologies capable of scaling for large numbers of sensors and users. The resulting NanoSen-AQM platform will provide vast amounts of air quality data to the public, with the aim of improving public health.

Thu2

UMa-R Room D
10:20 - 11:50

Jorge Silva, Pedro Lucas, Filipe Araújo, Catarina Silva, Paulo Gil, Alberto Cardoso, Joel Arrais, Bernardete Ribeiro, Daniel Coutinho, Pedro Salgueiro, Luís Rato, José Saias, Vítor Nogueira

#85
World Pendulum Alliance

Some experiments related to Earth's geophysical characteristics need a globally distributed data acquisition, especially those depending on geographic factors such as latitude. The World Pendulum Alliance is a federated initiative of several universities to create a network of "latitude providers" to allow the mapping of local gravity across the globe. In parallel, a dissemination project encompasses training initiatives to educate local agents in view of physics teaching. The World Pendulum experiment is already in production at e-lab, in Instituto Superior Técnico – Universidade de Lisboa, and the reproduction of 20 primary experiments, located at partner universities, and 120 secondary experiments, to be deployed by partner universities, is foreseen in the next two years.

Thu2

UMa-R Room D
10:20 - 11:50

Manuel Santos, Carlos Rodriguez, Celia Anteneodo, Cristina Marlasca, Gesil Segundo, Joao Loureiro, Juan Collantes, Manuel Escobar, Orlando Allard, Ruben Cardoso, Rui Neto, Vojtech Svoboda, Yeny Erazo, Horácio Fernandes

#104
Augmented Reality for Accessible Digital Mental Healthcare

It is estimated that one person dies every 40 seconds due to suicide and there are indications that for each fatal suicide attempt conducted by an adult, there may be more than 20 other suicide attempts. Public healthcare resources to support individuals who are at risk of mental ill health are increasingly thinly stretched. This calls for new ways of disseminating mental health knowledge and support to those who need, but lack it. In this demonstration, we present an interactive Augmented Reality (AR) system for mental health information dissemination and self-assessment. The advantage of the system is that it provides direct pathway to relevant mental health resources and offers a positive incentive and interventions for at-risk users.

Thu2

UMa-R Room D
10:20 - 11:50

Victoria Lush, Christopher Buckingham, Stephen Wileman, Suzanne Edwards, Ulysses Bernardet

#113

The Virtual Human Breathing Relaxation System

A number of health-related issues can be attributed to occupational and chronic stress. Interactive immersive Virtual Reality (VR) environments have been shown to be beneficial in healthcare and mental wellbeing by enabling effective interventions such as stress management and behavioural therapy. Our goal is to build an automated breathing relaxation system that is based on a closed-loop, implicit interaction and that harnesses known mechanisms of physiological synchrony found in human-human interaction. In this demo, we will show the Virtual Human Breathing Relaxation System where the user's breathing rhythm is influenced using an ecologically valid physiological signal, i.e. the breathing behaviour of a virtual human. By continuously adapting the virtual human's breathing rhythm the system aims to bring the participants breathing behaviour to a rhythm that allows them to feel more relaxed.

Thu2

UMa-R Room D
10:20 - 11:50

Sanobar Dar,
Victoria Lush,
Ulysses Bernardet

#116

Web Interface for River Hydrodynamics Simulation

Due to economic, environmental and social issues, water resources management, including river processes, is increasingly important and dependent on appropriate and efficient tools. In educational terms, is relevant to have web based tools that facilitate the learning process on river hydrodynamics and that offer the possibility of simulating different river conditions. This work presents a Web interface, supported by a Jupyter Notebook, which provides functionalities to configure a hydrodynamic river model and simulate its behavior. This approach considers the Mondego River as a case study and allows the use of different datasets for different meteorological conditions. This tool also provides access to real data, such as water levels and stream flows, collected by geosensors located in the considered area.

Thu2

UMa-R Room D
10:20 - 11:50

Alexandra Ribeiro,
Alberto Cardoso,
Alfeu S. Marques,
Nuno E. Simões

— End of Session Thu2 —

Notes:

Notes:

#35   **Fri2A**

UMa-R Room R
09:00 - 10:20

A preliminar analysis and comparison of international projects on mobile devices and mHealth Apps for heart failure

Mobile health applications hold great potential to facilitate self-care, which is associated with improved health outcomes, reduced readmission rates, and health care costs in several chronic health conditions. Among others, Heart Failure is able to represent at the highest level this paradigm since it is the final pathway of many cardiac diseases and its prevalence increases exponentially for aged people (>70 years). While a great number of Apps and technologies exist to assess such condition and to support its management, few clinical studies and referred projects have been carried out to transform such Apps into tools accepted from the medical community and used for approved care. In this scenario, we present a review of 13 clinical trials and 3 European projects dealing with Apps for Heart Failure and a public App collection recognized by UK authorities to help researchers, physicians, and App designers to make their ideas well accepted for the medical community.

Mario Bochicchio, Lucia Vaira, Andrea Mortara, Renata de Maria

#87   **Fri2A**

UMa-R Room R
09:00 - 10:20

Usability Evaluation of an Integrative Exergaming System for the Senior Population

Laboratory courses have become an integral part of engineering education worldwide. Moreover, 'megatrends' such as globalization, demographic change, and increasing digitalization are key drivers of flux in the areas of people, technology, and organization and thus also have an impact on laboratory education, especially in the field of engineering.

Teresa Paulino, Sergi B. i Badia, Mónica Cameirão

These fast moving changes require that prospective workers as well as teachers possess a higher level of independency and responsibility. This raises the question how the related needed self-learning competencies can be nurtured and developed during study time. The paper presents first results of a qualitative evaluation of a redesigned laboratory course for prospective technology teachers based on essential principles of modern laboratory didactics in order to allow students to experiment more actively and learn in a more self-directed way. As evaluation method, guided expert interviews were chosen as the most appropriate approach. The main result is that self-directed laboratory learning helps students to learn taking over more responsibility for their own learning processes and successes. Moreover, it can increase students' motivation to learn. Finally, to reduce students' attendance obligation and to foster self-directed learning as a precondition for lifelong learning, the deployment and implementation of VISIR, a remotely accessible online experimentation facility, will take place during the first quarter of 2019. The paper closes with further research questions on the digital transformation and its impact on designing online experimentation learning by deploying cyber-physical 'remotification'.

#92

Reh@City v2.0: a comprehensive virtual reality cognitive training system based on personalized and adaptive simulations of activities of daily living

Cognitive impairments are among the most common age-related disabilities worldwide. Literature has shown that cognitive training using Virtual Reality (VR) systems can be a valid and effective solution for cognitive rehabilitation. Virtual environments can be easily customized to deliver very specific training by controlling the presentation of stimuli and keeping track of the user responses. Reh@City (RC) is a virtual reality simulation of a city where patients can train a variety of cognitive skills while performing simulated activities of daily living. An initial prototype of this city with four environments was clinically validated with a stroke

Fri2A

UMa-R Room R
09:00 - 10:20

Teresa Paulino, Ana Faria, Sergi B. i Badia

sample, and the encouraging results motivated further iterations and improvements in the RC, in terms of its tasks, interaction with the content, and task adaptation. This paper presents the efforts of creating RC v2.0, a VR-based software system for cognitive rehabilitation that presents different cognitive training tasks that take place in 8 realistically modeled 3D environments, that are personalized to the patient clinical profile and also implements automatic difficulty adaptation.

#94

Exergames and their benefits in the perception of the Quality of Life and Socialization on institutionalized older adults

Benefits of augmented reality games in physical and cognitive dimensions have been demonstrated before but not many works have addressed the social dimensions which are quite important for the overall quality of life. The objective of this work is to assess the impact of a recently developed platform for senior exercise with augmented reality games (exergames) in the perception of quality of life and socialization of older adults institutionalized in nursing homes. We describe a 3 months study with 18 participants (85.28 ± 6.02 years) divided into three groups of different functional abilities (Group-1 n=6, Group 2 n=5, Group 3 n=7), with a weekly session of exergames of approximately 90 to 120 minutes. Our study shows significant improvements under World Health Quality of Life Scale in domains like Social Relations and also in Friends Satisfaction domain of the Satisfaction with Social Support Scale. Differences between groups were also found regarding Satisfaction with Social Activities. Some positive and significant correlations were found between the number of group sessions attendance and the perceived quality of Social Relations and System Usability. We, thus, conclude that our exergame sessions have several benefits for quality of life perception and social relations.

Fri2A

UMa-R Room R
09:00 - 10:20

Heitor Cardoso, Alexandre Bernardino, Luísa loureiro, Mafalda Sanches

— **End of Session Fri2A** —

Friday, June 14, 2019
Parallel AQM'19 Special Session I: "Air Quality Monitoring"
Papers: #2, #42, #86, #109
Chairs: Lionel Presmanes and Begoña Artiñano

#02

Using a variable buoyancy system for energy savings in an AUV

Fri2B
UMa-R Room L
09:00 - 10:20

The energy requirements of thruster driven autonomous underwater vehicle (AUV) missions have been growing in recent years. Their complexity and length are continuously increasing due to the growth of undersea exploration. The use of variable buoyancy systems (VBS) can potentially lead to energy savings since consumption is only required for buoyancy changes. As such, energy is only spent during limited periods of time, as opposed to thruster driven systems, where consumption is typically continuous. In this work, an energetic comparison between thruster and VBS driven devices is performed for a specific mission profile and a defined set of parameters. The influence of the mission parameters is studied in order to determine which system leads to the lowest energy consumption. For the case study presented, it is shown that the use of VBS over thrusters can lead to considerable energetic savings.

João F. Carneiro, João Pinto, Fernando G. Almeida, Nuno Cruz

#42

Chemiresistive Sensors based on Electrospun Tin Oxide Nanofibers for Detecting NO2 at the sub-0.1 ppm level

Fri2B
UMa-R Room L
09:00 - 10:20

In this work, chemiresistive devices based on electrospun nanofibers of tin oxide are developed and their performance for detecting low levels of nitrogen dioxide in air is assessed. The influence on the sensor detection properties of the operation temperature, the load of tin oxide nanofibers and the presence of graphene in the active layer is investigated. It is found that tin oxide nanofibers are highly sensitive towards nitrogen dioxide and the optimal operation temperature lies in the range of 150-200 °C, while the addition of graphene leads to improved sensitivity at temperatures below 100 °C.

Esther H. Lavín, Sergio Masa, José Pedro Santos, Isabel Sayago, Jesús Lozano

#86

Personal electronic systems for citizen measurements of air quality

Fri2B
UMa-R Room L
09:00 - 10:20

This paper addresses the development of a series of miniaturized wireless sensing modules for a personal use in air quality detection. The proposed prototypes have been developed as an instrumentation system for different commercial gas sensors: analog gas sensors (MiCS-4514, MiCS5526 and MiCS-5914 from SGX-Sensortech) and digital gas sensors (BME680 from Bosch Sensortech, CCS811 from Cambridge CMOS (ams), iAQ-Core from Applied Sensors (ams) and SGP30 from Sensirion). The architecture of the electronic system is based on the use of a microcontroller, combined with the use of the appropriate conditioning system for the gas sensors, a power supply and battery charger and a Bluetooth communication module.

Jesus Lozano, Patricia Arroyo, José Ignacio Suárez, Félix Meléndez

#109

An Online Platform For Real-Time Air Quality Monitoring

Fri2B
UMa-R Room L
09:00 - 10:20

The interest in the quality of air is likely to increase, as the public concern for health and environmental issues is on the rise. So far, most data available comes from a small number of government-owned sensors, lacking a wide coverage of the entire reality. Improving the amount of data available thus involves reducing the cost of sensors and make their readings accessible to the public. The NanoSen-AQM project aims to do precisely that. Create and use vast numbers of low-cost nano-sensors, to make their data accessible for the public. To achieve such an ambitious goal, the project will use state-of-the-art techniques from Machine Learning and mobile and web development frameworks. As a result, the NanoSen-AQM platform should provide free access to the public and low-cost of entry for sensor owners willing to share their data.

Jorge Silva, Pedro Lucas, Filipe Araújo, Catarina Silva, Paulo Gil, Alberto Cardoso, Joel Arrais, Bernardete Ribeiro, Daniel Coutinho, Pedro Salgueiro, Luís Rato, José Saias, Vítor Nogueira

— End of Fri2B —

Friday, June 14, 2019
Parallel MLAiE'19 Special Session: "Machine learning applications in engineering – trends and best practice"
Papers: #34, #97, #98, #123
Chairs: Katarina Žáková and Hélia Guerra

#34

Object detection with Raspberry Pi3 and Movidius Neural Network Stick

Object detection and classification is an increasingly important field of research in machine learning. Currently, powerful GPUs (Graphics Processing Units) are used to perform the computation-intensive operations in the shortest possible computing time. However, these systems are associated with high costs. In this paper a system for object detection and classification is developed, which gets by with less resources. This should minimize the costs while keeping the performance acceptable for the target application. To keep the costs low, a Raspberry Pi3 is used as development platform in connection with a Movidius stick for the outsourcing of the ANN. After explaining the theoretical basics of object detection and ANNs, this paper shows the implementation process of the selected hardware and software. For the evaluation of this system the algorithms YOLO and Mobile Net are used and pre trained models are used as basis. Based on the MSCOCO data set, both the quality of the object classification and the computing time are evaluated.

Fri2C

UMa-R Room P
09:00 - 10:20

Andreas Pester,
Michael Schrittesser

#97

A Biomedical Motif for Teaching Applied Deep Learning

Deep Learning, the revival of artificial neural networks, is having a significant impact in computing, engineering, and medicine among other fields. In an effort to expose students to domain-specific knowledge outside their discipline, and to focus attention on real-world, socially relevant projects, this work in progress describes the background and infrastructure for embedding an Applied Deep Learning class in a medical motif or context.

Fri2C

UMa-R Room P
09:00 - 10:20

James Wolfer

#98

A Matlab Tool for Solving Linear Goal Programming Problems

This work describes a MATLAB tool developed in the context of a didactic application toolbox that implements some advanced optimization and decision support methodologies, intended for use by undergraduate students. The particular module addressed in this paper solves linear goal programming problems, not only analytically, but also graphically if the number of decision variables is less than three. Although this toolbox was designed to support students in the study of a specific course unit in this area, once appropriately tested it can be made available to other students through the creation of a web version.

Fri2C

UMa-R Room P
09:00 - 10:20

Teresa Rocha, Ana Borges, Simão Paredes, André Pinho

#123

Comparison of Deep Learning Architectures on Embedded Devices and Generalized Fixed-point Conversion Algorithm

In recent years, deep neural networks have become the state of the art for a variety of tasks such as image classification, object detection and localization, and speech recognition. Due to the significant computational load, deep neural networks are traditionally trained on high-power CPU or GPU systems while inference can be performed on less powerful hardware. However, deployment of trained deep neural networks on low-power embedded hardware remains challenging. This is because state-of-the-art deep neural networks have a large memory footprint and require many floating point operations, and because efficient compression schemes – while being effective – require custom datatypes and compilers which limit their applicability. In this article, we present a benchmark comparison of common deep learning architectures and a novel architecture for deployment on different embedded platforms showing that further gains in accuracy and speed-up can be achieved

Fri2C

UMa-R Room P
09:00 - 10:20

Jan Steinbrener,
Pratik Desai

with an optimized network design. We also propose a generalized fixed-point conversion scheme that does not require custom datatypes or compilers. Both are of interest for engineering applications as computational power in applications and expert knowledge about efficient neural network implementations are typically limited.

— End of Session Fri2C —

#23

Comparison of relaxation techniques in virtual reality for breast cancer patients

Fri3A

UMa-R Room R
10:40 - 12:00

A number of studies demonstrated that virtual reality (VR) featuring pleasant scenarios and relaxing narratives is effective in promoting relaxation in users, both in healthy and pathological contexts. One important field for application of relaxing VR is breast cancer, because of therapy-related distress and changes in body imagine experienced by patients during the care process. However, comparisons between different relaxation techniques adapted to virtual reality are rare. In the present study, the same virtual environment has been integrated with audio narratives designed according to two different relaxation techniques (respiration control and body scan). As initial exploration, 16 breast cancer patients have been exposed to the two versions of the virtual environment to evaluate effectiveness, pleasantness, overall satisfaction with the technique and sense of presence, as well as the impact on the emotional dimensions of valence, arousal and control. Discussion offers recommendations for the content properties of VR for relaxation for breast cancer patients.

Silvia F. M. Pizzoli, Stefano Triberti, Dario Monzani, Ketti Mazzocco, Emanuela Kufel, Marta Porebiak, Gabriella Pravettoni

#61

iACTwithpain - Online platform for helping Chronic Pain Patients

Fri3A

UMa-R Room R
10:40 - 12:00

The main objective of this multidisciplinary project is to think up and build a digital application that joins health to engineering and design. IACTWITHPAIN is a web-platform and mobile application which aims to help chronic pain patients, by providing tools to improve their life quality.

M. Rita Nogueira, Bruno Patrão, Paulo Menezes, Sérgio Carvalho, Paula Castilho

The platform will make it available a set of different digital tools and exercise plans inspired on pain self-management strategies. As IACTWITHPAIN is targeted to a specific range of people which are commonly anxious and more vulnerable to stress, the application should be dynamic and have particular attention to User Experience details. Consequently, will require a whole array of specific functionalities as a chronic patient needing as an end-user. For this reason, the aim of this article is to disclose the research concept as the core focus to provide a personalized user experience design in an intuitive and user-friendly environment. The platform and this research project are being developed in ISR - Institute of Systems and Robotics of Coimbra and CINEICC - Centre for Research in Neuropsychology and Cognitive Behavioral Intervention of Coimbra. Index Terms—Psychotherapy, Online Health support, User Experience, Usability, Mindfullness, Chronic Pain.

#69

Musiquence: a framework to customize music and reminiscence cognitive stimulation activities for the dementia population

Due to the limitations of pharmaceutical related approaches for people with dementia (PwD), there has been a need to find complementary methods. Within non pharmaceutical approaches music and reminiscence-based activities appear to bring advantages to PwD: (1) it is easy to implement, (2) does not lead to side effects, (3) PwD appear to have an intact music memory even at later stages of the disease, among other benefits. However, literature is mixed regarding the long-term benefits of music and reminiscence related approaches in PwD. Another approach that has gained much attention over the years are serious games. However, the usage of technologies and the lack of customizable content may provide an additional challenge to health professionals and family caregivers to utilize such an approach in in PwD.

In this article, we present a framework called "Musiquence", which is allows customization of gamified activities in terms of technology and content, with special emphasis on music and reminiscence-based activities. Here we discuss the functionalities of the platform, the activities designed for PwD and future implementations for the platform.

— End of Session Fri3A —

Fri3A

UMa-R Room R
10:40 - 12:00

Luís Ferreira

Friday, June 14, 2019
Parallel Session: "Serious Games, Gamification and Robotics"
Papers: #56, #75, #84, #120
Chairs: Dragan Šešlija and Zorica Nedic

#56

Mixed Reality Games in Engineering Education

The Paper addresses a current polylemma in engineering education. Based on existing theories and findings on mixed reality and game-based learning it demonstrates – initially on a conceptual level – a possibility for diversity oriented, application-related, experience-oriented engineering education. In a second step it describes the development and design of a specific learning environment, a solution space, which is developed by experimenting and creative exploration as well as on the basis of strong theory: In a Mixed Reality simulation in the first semester of an engineering study program, students will have the opportunity to experience the digital transformation in a production company. In a virtual production plant, they will be working together in a network of engineering consultant teams and acquiring necessary methodological and technical knowledge in various modular units. They get familiar with up-to-date automation technologies, work out a state of the art [1], pitch for "budgets" for their projects to reach the next level etc. In the modular production unit students will choose appropriate technologies and plan a modular manufacturing shop floor. In addition, methodological and technical topics are linked and reflected in real hands-on project work. Virtual, augmented and real settings are combined in one Mixed Reality Game. The design offers the opportunity to be interlinked and practiced in higher project modules.

Fri3B

UMa-R Room L
10:40 - 12:00

Anja Richert, Vanessa Mai, Hanna Mengen, Susanne Wolf

#75

First steps in robotics using Crumble as a friendly platform

Educational robotics is an interdisciplinary teaching environment based on the use of robots and electronic components as a common thread to enhance the development of children's skills and competencies. It works especially in the STEAM disciplines, although it can also cover other areas such as linguistics, geography and history. The main entry barriers to the use of educational robotics could be to answer the questions: which platform is best to use, which platform allows me to travel more in the learning process, how much effort do I need to devote to prepare educational content with the platform I choose, and how much budget do I need for my students to develop their skills with educational robotics? Throughout this article we present Crumble as a platform commonly used in educational robotics. We also include the results obtained through educational experiences based on the use of this platform. Finally, throughout the conclusions, we give answers to the questions posed above.

Fri3B

UMa-R Room L
10:40 - 12:00

Pedro Plaza, Elio Sancristobal, German Carro, Manuel Castro, Manuel Blazquez, Félix García-Loro

#84

An Adaptive Serious Game of Statistics: project development and mechanisms

An adaptive serious game on Statistics is being under development in the framework of higher education. The main objective of this serious game is to promote and explain the applicability of statistics concepts in day-to-day life and in the decision-making process. The present work stresses the project development and mechanisms including the storyboard and game scenarios. The storyboard is based on a mystery where the clues and answers are defined in terms of statistics knowledge (probabilities, confidence intervals, hypotheses tests). The game scenarios were developed using open source tools and using as reference scenario the

Fri3B

UMa-R Room L
10:40 - 12:00

Tiago Barbosa, Sérgio Lopes, Celina P. Leão, Filomena Soares, Vítor Carvalho

university campus. By doing this, the student/player are integrated in a "familiar" environment. It is expected to increase the students' proficiency on Statistics.

#120

Fri3B

A Serious Game for Post-Stroke Motor Rehabilitation

UMa-R Room L
10:40 - 12:00

Post-stroke rehabilitation should start as soon as possible, once the patient's condition is considered stable. As rehabilitation must be intensive and repetitive, this can lead to problems with patient motivation and engagement. This paper proposes an immersive tool that intends to aid the traditional motor rehabilitation therapies, in order to both motivate and encourage the patients to perform therapeutic exercises, by having them distracted from their handicaps. Since different people have different needs, the game dynamically adapts to the user, by increasing or decreasing its level of challenge. Following the proposed solution principles, a serious game was implemented and evaluated with positive results.

Bruno Ferreira,
José Lourenço,
Paulo Menezes

— End of Session Fri3B —

Friday, June 14, 2019
Parallel Session: "Web based and Collaborative Approaches for Education"
Chairs: Veronika Thurner and Milan Matijević
Papers: #66, #70, #82, #90

#66

Fri3C

Pendulum as an Educational Remote Experiment: Feasible guidelines for using the World Pendulum Alliance experiments network

UMa-R Room P
10:40 - 12:00

Pendulum motion as a prolific experimental scenario has been used by physics teachers and researchers at least since the 17th century. The variability of pendulum models allows the study of several mechanical phenomena and gives the opportunity to validate distinct mathematical features of the dynamical and kinematic event. These experimental setups could be used remotely, in a way it could teach physics to students in the pre-university and university level, regardless budget limitations of the particular institution accessing the experiment. The World Pendulum Alliance experimental network as a gravity mapper, presents a strong basis to address students in a non-conventional way, empowering them inside an inquiry learning space.

Manuel J. Escobar,
Horácio Fernandes,
Orlando Allard,
Yeni Erazo

#70

Fri3C

Massive Open Online Labs (MOOLs): An Innovative Solution to Achieving SDGs in the Global South

UMa-R Room P
10:40 - 12:00

In engineering education, laboratories represent an important academic resource as they provide practical training in addition to the fundamental theories. However, the acquisition of new machinery and the maintenance of the equipment imply a large investment that only a limited number of universities can afford. This paper represents innovative online education activities through a collaborative widespread network with the global south countries, deploying remote laboratories in electrical, mechanical and control engineering at a large scale within MOOC infrastructures.

Fariba Moghaddam,
Aldo Vaccari, Thomas
Moniquet, Christophe
Salzmann, Yves
Piguet, Samer Saab,
Rayana Jaafar, Amir
A. Suratgar, Qobad
Shafiee, Nomaou
Dan Lamso, Hassane
A. Mayaki, Hassan A.
Barkad, Hamadou S.
Hassane, Denis Gillet

#82

A pedagogical platform for metaheuristic optimization

Regardless the engineering scientific areas wherein one develops research and training, it is often necessary not just to find a solution for a specific problem, but to find its optimal solution according to a set of predefined objectives and constraints. Therefore the introduction and familiarization to optimization techniques is an important topic that may be explored as soon as essential engineering concepts and behavioral characteristics are apprehended. Bearing this perspective in mind, this work presents a platform with pedagogical purposes for the optimization process learning in the context of metaheuristic techniques. This paper presents some of the platform functionalities, considering a very recent technique, the stochastic fractal search.

Fri3C

UMa-R Room P
10:40 - 12:00

Ana Filipa Mota,
Amélia Loja

#90

e-Engineering: Remote Labs in an Electronics and Optics e-Learning for Embedded Systems Course

Despite being around for a long time and notwithstanding the many examples that may be found in the specialized literature, the use of remote laboratories has been restricted to blended-learning approaches, usually as a complement of face-to-face laboratory classes. In a time of higher education massification, it is necessary to find solutions that enable universities to accommodate a fast-growing number of students within their limited budgets. For courses in electrical and electronics and related engineering fields, the solution proposed in this paper is the development of e-Engineering courses, courses that use remote laboratories in combination with e-learning methodologies to deliver an effective training experience. The effectuality of this approach and the willingness to extend it is supported in the results of two projects that are presented in this paper.

Fri3C

UMa-R Room P
10:40 - 12:00

Manuel Gericota,
Paulo Ferreira, André
Fidalgo, Guillaume
Andrieu, Claire Dalmay

— End of Session Fri3C —

Friday, June 14, 2019
Fri5A – Parallel RADP'19 Special Session: "Remote and digital pneumatics: Learn and control from distance"
Papers: #11, #16, #17, #22, #24, #71
Chairs: Mikulas Huba and João Carneiro

#11

Remote experiments with pneumatic circuit using a double rod cylinder

This paper presents a remote operated pneumatic system for teaching purposes. The system comprises a double rod pneumatic cylinder controlled with an electrical valve, coupled with data monitoring of pneumatic pressure, limit positions, air temperature and acceleration. The system allows the remote control of the electrical valve and the operating pressure. The description of the control and data monitoring system is presented, focusing on the control architecture and user interface. A set of remote experiments implemented with the developed system are presented. Experimental results illustrate the use capabilities and its novelty training potential to explore the dynamic behaviour of a double rod pneumatic cylinder under distinct pneumatic operating pressures. Further developments centred on validated instructional design methodologies and in accreditation standards for engineering degree programs, will be considered in the future integration of this remote lab within the Moodle platform to enlarge its usability.

Fri5A

UMa-R Room R
14:30 - 16:30

Paulo Abreu, M.
Fátima Chouzal,
Jacobo S. Valiente,
Luis de La Torre, M.
Teresa Restivo

#16

Augmented Reality as an Advanced Learning Tool for Pneumatic Control

This paper presents an advanced augmented reality smartphone application for learning pneumatic control. The application is developed with the aim to make easier for students to understand the basic principles of this field of engineering. It is developed for the Android platform and

Fri5A

UM-R Anf R
14:30 - 16:30

Brajan Bajči, Dragan
Šešlija, Vule Reljić,
Slobodan Dudić, Ivana
Milenković, Jovan Šulc

enhances the pneumatic control workbook with additional digital content. This digital content is in form of 3D animations, simulations and also, the application redirect the user to different web pages.

#17

Concept of remotely controlled digital pneumatic system in accordance with Industry 4.0 approach

This paper presents the idea and the development of a remotely controlled digital pneumatics system. The system is designed to meet the requirements of critical conditions, i.e. to enable lifting of the heaviest workpiece with the highest possible speed. Remote software reconfiguration of the system parameters is enabled for complying with the changes of the workpieces entering into the system, especially in cases where it is necessary to achieve the maximum productivity (the shortest operating time) or the maximum energy efficiency (minimum compressed air consumption). The motion control is enabled using PWM and the flow regulation (speed control) or pressure regulation (force control) is enabled using a remotely controlled one-way flow control valve or pressure regulator, respectively.

Vule Reljić, Dragan Šešlija, Ivana Milenković, Brajan Bajči, Slobodan Dudić, Jovan Šulc

#22

Mathematical Model of the Festo Terminal

The FESTO Motion Terminal is a system with high level of adaptability and flexibility. This system is in line with the philosophy of the Industry 4.0. Terminal is realized by a bridge circuit that is made up of four 2/2-way valves that allows performing a wide range of conventional valve functions using a single terminal. This paper describes a detailed mathematical model of the FESTO Motion Terminal and a way for improving it with additional valve for enabling the interconnection of actuator chambers for the purposes of energy-efficient control. The effects of nonlinear flow and

Vladislav Blagojevic, Sasa Randjelovic, Predrag Jankovic

air-compressibility were most carefully taken into consideration. At the end of the paper the properties of the proposed mathematical model of motion terminal have been verified by computer simulations.

#24

An Electro-pneumatic Prototype to Support the Teaching of Industry 4.0 Concepts

The appearance of industry 4.0 and the internet of things allowed to shorten the gap between the consumer and the product industry, with the introduction of new digital processes. With this in mind, a project of an electro-pneumatic laboratory prototype tosupporttheteachingoftheindustry4.0conceptswas proposed. For the construction of the laboratory system was developed a typical industrial electro-pneumatic process (at scale), for which some support components were constructed using 3D modelling. For the automation part of this system, the control platform of the programmable logic controller, type of programming language and creation of the code were developed. For the supervision system and remote digital control, the human machine interface is based in web pages using a common web browser, with the possibility of decentralized access in every tablet and smartphone. This prototype was simulated and tested, and it will help in the teaching of the 4.0 industry concepts.

Miguel Francisco, Mário Mendes, João Calado

#71

A Simulation Tool Using AI Technics and Karnaugh Maps for Learning and Control Digital Pneumatics

This paper describes a software, developed in PROLOG, called ISEPCPC (Intelligent System for Electric and Pneumatic Control of Pneumatic Circuits). It uses PROLOG clauses, Artificial Intelligence (AI) techniques (an Expert System), and Karnaugh Map's methodology. The main objective is to compute the set of optimized logic equations that enables

António F. Silva, Adriano A. Santos

either an electric or a pneumatic control of any, but mainly complex pneumatic circuits. As the complexity of the circuit increases, as the result of a combinatorial explosion generated by the increase in the number of cylinders involved, the more difficult it becomes to obtain the control equations (often requiring the use of auxiliary memories). This software automatically obtains the equations which will yield minimized circuit configuration. These equations, can be used either in electro or pneumatic control. A practical application example of the software will be shown to prove its applicability. The minimum number of equations required to control the circuit will be used in programming a PLC that will control the circuit.

— End of Session Fri5A —

Friday, June 14, 2019
Parallel AQM'19 Special Session II: "Air Quality Monitoring"
Papers: #38, #41, #57, #72, #74, #77
Chairs: Jesus L. Rogado and Catarina Silva

#38

Air quality monitoring in scholar environments

Fri5B

UMa-R Room L
14:30 - 16:30

Begoña Artiñano, Francisco J. Gomez-Moreno, Elias Diaz, Elisabeth Alonso-Blanco, Marcos Barreiro, Alfonso J. Fernandez, Alejandro Rubio, Javier Fernández, Ibai Figuero

Children are one of the population groups more vulnerable to health effects associated to urban air pollution. Children exposure estimations require knowledge of pollutant concentration levels in these particular environments, where they spend a great part of their time for many years. This study presents an experimental approach for air quality monitoring in schools including different measurement and monitoring techniques. Pollutant concentrations from nearby stations belonging to the urban air quality monitoring networks may not be representative. Therefore, local measurements, static and dynamic modes, can result more adequate to document actual pollution levels in scholar environments. This study analyzes experimental data obtained at three primary schools located in three districts of Madrid (Spain). Results from different measurement techniques show the rather different environmental conditions in each and also the influence of the schools themselves on the local air quality. As an example of this, it can be highlighted the influence of traffic emissions related to scholar transport on NO2 and PM10 levels measured in the school vicinity, that points at the main entrance of the school as a clear hot spot of local air pollution. Other anthropogenic activities such as distribution of goods and proximity of shopping centers also exert a significant influence on local traffic and therefore on air quality, which is relevant for exposure estimation. The indoor/outdoor study shows the infiltration process of gaseous and finest particle pollutants (NO2, black carbon, ultrafine particles), more related to traffic emissions. Scholar activities in the classroom have a greater influence on coarser particulate matter by resuspension processes.

#41

Field assessment of low-cost Particulate Matter sensors against reference methods

During 2018 and 2019 an assessment of five Clarity® low-cost particle matter sensors has been performed in our Research Centre in the city of Madrid. The instruments performance has been evaluated in different ambient conditions during the study period. The parameters reference bias, time drift, particle composition effect, reproducibility between sensors and meteorological influence over the sensors data have been evaluated in order to determine their importance in the analytical results. Both composition of the atmospheric particles and drift have proved to be influential factors in the performance of these instruments.

Elias Diaz Ramiro, Begoña Artiñano, Alejandro Rubio, Ibai Figuero, Marcos Barreiro, Javier Fernandez

#57

Measurement of PM10 and PM2.5 from Silice carbide particles with real time cascade impactor based on Surface Acoustic Wave

Surface acoustic wave sensors consisting of delay lines built on quartz are used for measuring PM10 and PM2.5 particle concentration. The sensors operating at 125 MHz are based on Love waves and use silica as guiding layer. Particles separation based on their aerodynamic sizes was achieved using a 3 Lpm custom-designed cascade impactor. Filtered particles impact on the acoustic sensor's surface causing a gravimetric effect that modifies the acoustic wave propagation conditions. This induces a phase down-shift which allows the measurement of the mass deposited on the sensor. Our SAW sensors proved to be able to detect PM10 and PM2.5 particles from candle fumes in the 0-400 µg/m3 concentration range. In this paper, we present real time measurements of calibrated Silicon Carbide (SiC) particles with our dedicated cascade impactor.

Virginie Blondeau-Patissier, Fatima Ezzahraa Dbibih, Meddy Vanotti, Valérie Soumann, William Daniau, Jean-Marc Cote, Lyes Djoumi

#72

Ga doped ZnO thin films deposited by RF sputtering for sub-ppm NO2 sensing

Ga doped ZnO thin films have been deposited by Radio–Frequency (RF) magnetron sputtering on fused silica substrates. The structural analysis of the n-type sensitive material showed a preferential orientation in the [00l] direction. The microstructure of the thin film indicated an increasing grain size with the increase of the thicknesses. The micro sensor platforms have been fabricated with ZnO:Ga thin film deposited using a reliable stencil mask onto interdigitated electrodes containing micro-hotplates. The as fabricated micro sensor allowed to sense sub-ppm concentration (500 ppb) of nitrogen dioxide under cycled temperature mode. This system revealed promising sensing performance with a response R/R0 up to 18 at low temperature step (50 °C).

Lionel Presmanes, Vignesh Gunasekaran, Yohann Thimont, Inthuga Sinnarasa, Antoine Barnabe, Philippe Tailhades, Philippe Menini

#74

Evaluation of CoxFe3-xO4 cobaltites as ethanol sensing material

CoxFe3-xO4 oxide powders were synthesised by an oxalate decomposition process. Microstructural analysis like X-ray fluorescence spectroscopy confirmed the composition of the prepared powders. These powders were then deposited onto alumina substrates in order to study their response under ethanol gas pulses. The gas sensing experiment was carried by a defined test protocol and several characteristics were tracked. Results showed a direct link between the proportion of cobalt and gas sensing performances.

Vignesh Gunasekaran, Lionel Presmanes, Inthuga Sinnarasa, Yohan Thimont, Thi M. C. Dinh, Antoine Barnabé, Phillippe Thailhades, Philippe Menini

#77

Low-Cost sensors for urban air quality monitoring: preliminary laboratory and in-field tests within the TECNAIRE-CM project

Low-cost sensor technology can potentially make revolutionary changes in our current air pollution monitoring paradigm in urban areas. However, the widespread adoption of

Begoña Artíñano, Adolfo Narros, Elías Diaz, Francisco J. Gómez, Rafael Borge

low-cost sensor technology is still not feasible due to a number of limitations regarding sensitivity, accuracy and comparability. In this study we report the results from pre-liminary laboratory and in-field tests carried out within the TECNAIRE-CM project for commercial NO2 and O3 sensors including both, solid-state and electrochemical technologies. The ultimate goal is to understand the current capabilities of this technology and the prospects to incorporate it in both research and routine measurement or urban air quality. We found significant performance differences although none of the devices tested could provide satisfactory results in real-world conditions. We conclude that unit-specific advanced statistical calibration methods are needed to obtain reliable results with the low cost sensors devices in urban areas.

— End of Session Fri5B —

#20

Fri5C

Old Musical Instruments and Meloterapy

UMa-R Room P
14:30 - 16:30

Doru Ursutiu, Cornel Samoila, Petrica Mihoc

This paper initiates the study of old instruments (especially Stave (Portative) Organ) and how these can be integrated into research done inside the - Master of Music Therapy - from "TRANSILVANIA" University of Brasov. In the first stage of the research, it was seen one possible link between the 415 Hz Stave (Portative) Organ tuning and Passive Music Therapy. We have noticed etymological, constructive and sound aspects to integrate Portative Organ into practical applications.

#27

Fri5C

A Telemonitoring Solution Applied to Dynamic CVD Risk Assessment: LookAfterRisk

UMa-R Room P
14:30 - 16:30

Simão Paredes, Jorge Henriques, Teresa Rocha, Paulo Carvalho, Daniel Oliveira, João Morais, Rita Carvalho, Catarina Ruivo

Cardiovascular disease (CVD) risk assessment models usually do not incorporate any dynamic information. In fact, the risk of a specific CVD event (e.g., death and rehospitalization) of a patient is assessed exclusively based on the values of a set of features at a given moment not considering the impact of their evolution. The LookAfterRisk project intends to overcome this aspect, through the integration into the CVD risk assessment of data collected at the patient's home during a certain period of time. Thus, the developed models are applied at hospital admission, in patients with a first episode of acute myocardial infarction (MI) and are continuously updated during the follow-up period when the patient returns home. A technical platform comprising low cost home-mobile technologies must also be developed to obtain the required patient's data as well as to provide the respective risk level to the physicians. Therefore, the main goal is the development of dynamic models for CVD risk

assessment of acute events integrating data from remote monitoring, in order to stratify patients according to their care needs (management of MI patients). In parallel, recent advances in medicine and in technology infrastructures allow the collection of important information. As result, three main scientific challenges will be addressed in this project: i) extraction of knowledge from recent datasets using data mining approaches; ii) integration of this knowledge with clinical evidence in a meaningful and interpretable way; iii) update of risk level based on data periodically collected at home during the follow up period. From the technical perspective, a platform should be implemented in order to accomplish three main requirements: i) integration of the developed data analysis algorithms; ii) access to the patient's data stored in the Hospital Information System as well as to assure the interaction with the physician (provide the risk level/risk evolution); iii) integration of the mobile application to monitor the blood pressure and heart rate. The validation of initial models is performed in the hospital admission using the largest MI Portuguese dataset (N=16000), provided by the Portuguese Society of Cardiology (PSC). The second phase is based on a home telemonitoring observational study (9 months), involving 50 patients (admitted with a first episode of acute MI at the Leiria Hospital Centre).

#46
Blood pressure measurement

Fri5C

UMa-R Room P
14:30 - 16:30

A blood pressure measurement system can provide different measurements types, either absolute discrete values such as systolic and diastolic pressure or continuous monitoring pulse pressure waveform. The apparatus and methods for examining blood pressure over the human body's arterial system is done, whether through an invasive or non-invasive approach. An invasive test requires the use of a hypo dermic needle to puncture the skin and penetrate the artery to continuous monitor the blood pressure. The other type

Daniel Badran, Paulo Abreu, M. Teresa Restivo

of examination, the non-invasive, supports a system placed on the surface of an underlying artery of a patient to collect the fluctuations in blood pressure. Many devices and methods have been developed over the years to accomplish high accuracy and continuous monitoring. A device under development for screening purposes of cardiac problems, through the identification of the pulse pressure waveform with a force sensor is described and initial results presented.

#81
Few Perspectives and Applications of Emotion-Induced Music

Fri5C

UMa-R Room P
14:30 - 16:30

Fulvia A. Constantin and Stela Dragulin

The subject of music induced emotion is less discussed in the scientific world, mostly because it was only recently investigated from emotionally and cognitively perspectives. There are explored the induction of emotion during music listening and playing as well as the influences of musical preference and assimilation on induced emotion. Preference for classical music is known to be influencing specificity and intensity ratings and instrumental music appears effective for the induction of basic emotions to listeners and players. The aim of this paper is to link the psychological theory to music therapy applications in order to show that music has an effect, its functions lead to mood modification and emotional regulation, relaxation or, on contrary, attention and concentration. Basically, we show that music help the emergence of emotions and also help regulating their manifestation and control.

#117
Coherent Raman as standoff optical diagnostic for biomedical applications

Fri5C

UMa-R Room P
14:30 - 16:30

Arthur Dogariu

We present a series of applications of coherent Raman spectroscopy for remote investigation, monitoring, detection, and identification of biomedical molecular targets. Using a novel Coherent Anti-Stokes Raman Scattering (CARS) technique, we can record the vibrational spectrum from picoliters of whole blood in milliseconds.

This method allows real-time, in vivo, blood monitoring. A modified hybrid standoff coherent anti-stokes Raman scattering technique is used for detection of anthrax-type spores in real time based on their chemical fingerprints. Specifically, we demonstrate that CARS can be used to successfully identify spores with high accuracy and high selectivity in less than 50 ms. The same laser-based technique allows for investigating vibrational peaks in malignant and healthy breast tissues. The increase in vibrational peak ratios are consistent with pathological criterion of nucleus-to-cytoplasm ratio increase for infiltrating carcinoma. We are also presenting preliminary results from an ongoing double-blind study for the detection and identification of skin carcinoma performed on biopsy samples.

#125

The Use of Music Therapy for Adults' Anxiety Relief

No doubt, anxiety represents the body's natural response to stress. It appears as a feeling of fear or apprehension about unknown present or future events. Translated as nervousness, extreme fear or worry, the specialists consider the anxiety disorder as being a psychiatric disorder that includes forms as generalized anxiety disorder, social anxiety disorder, panic attacks, separation anxiety, and specific phobias. Also, there are considered to be related to anxiety, obsessive – compulsive disorder and posttraumatic stress disorder. Based on the results obtained in our research, we have noticed the influence music has solely, but also in combination with dance, on people accusing stress and /or anxiety. Overlapping the research with a brief analysis of the chosen music, we emphasize through this article, on one hand, the role of music therapy in treating the spectrum of anxiety disorders, and on the other, the importance of choosing the proper music in terms of characteristics (melody, rhythm, harmony, text so on) for the most effective results.

Fri5C

UMa-R Room P
14:30 - 16:30

Stela Dragulin,
Fulvia A. Constantin,
Ioana Rucsanda

— End of Session Fri5C —

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Sessions Program

Tuesday, June 11, 2019 (Pre-Conference)

Registration		UMa-R Atrium	09:30 - 18:00
Tue1: Activity	Pendulum Alliance Project Meeting Chair: **Horácio Fernandes**	UMa-R Room P	09:30 - 13:00
Tue2: Workshop #1	"World Pendulum Alliance Workshop Using a constellation of pendulums in an immersive inquiry-based learning built on dimensional analysis" Chair: **Horácio Fernandes** (IST-UL, Portugal)	UMa-R Room P	14:00 - 15:40
Coffee break		UMa-R Room C	15:40 - 16:00
Tue3A: Workshop #2	"Guidelines for Assignments Using Remote and Virtual Labs: Building the Instructional Framework" Chair: **Susan Zvacek** (Consultant, USA)	UMa-R Room R	16:00 - 17:50
Tue3B: Workshop #3	"Introduction to PILAR as VI- SIR federation and Multiplier event of the PILAR Project" Chairs: **Felix Garcia-Loro** (UNED, Spain), **Manuel Castro** (UNED, Spain), **Wlodek Kulesza** (BTH, Sweden), **Susana Marchisio** (UNR, Argentina), **Federico Lerro** (UNR, Argentina)	UMa-R Room L	16:00 - 17:50
Tue3C: Activity	Pendulum Alliance Proj- ect Meeting (cont.) Chair: **Horácio Fernandes** (IST-UL, Portugal)	UMa-R Room P	16:00 - 17:50
Tue4A: Workshop #4	"Internals and full access to the PILAR Federation" Chairs: **Felix Garcia-Loro** (UNED, Spain), **Manuel Castro** (UNED, Spain), **Wlodek Kulesza** (BTH, Sweden), **Susana Marchisio** (UNR, Argentina), **Federico Lerro** (UNR, Argentina)	UMa-R Room L	18:00 - 19:00

Tue4B: Workshop #5	"Real-Time Air Quality Monitoring via an Online Platform Supported by Low-Cost Nanosensors" Chairs: **Esther Hontañón** (IT-FI-CSIC, Spain), **Filipe Araújo** (CISUC-DEI-UC, Portugal), **Jesús Lozano** (EII-UEx, Spain), **Philippe Menini** (LAAS-CNRS, UPS-T3, France), **Lionel Presmanes** (CIRIMAT UMR CNRS 5085, UPS-T3, France)	Eng. Order-RM, Aud	18:00 - 19:30
Pre-conference Dinner		Restaurant "Espaço Funchal"	20:00

Wednesday, June 12, 2019 (Conference)

Registration		UMa-R Atrium	08:30 - 18:00
Wed1: Opening Session	**José Manuel Carmo** (Rector of the Univ. of Madeira), **Maria Teresa Restivo** (University of Porto), **Alberto Cardoso** (University of Coimbra)	UMa-R Room R	09:00 - 09:30
Wed2: Plenary Session I	"Virtual Coastal Observatories: a vision for the future", **Rui Caldeira** (ARDITI-Madeira, Portugal) Chairs: **João Carneiro** and **Esther Hontanón**	UMa-R Room R	09:40 - 10:30
Coffee break		UMa-R Room C	10:30 – 10:50
Wed3A: Parallel Session	"Augmented and Virtual Reality" Papers: **#29, #39, #78, #112, #114** Chairs: **Silvia Pizzoli** and **Dominik May**	UMa-R Room R	10:50 - 12:50
Wed3B: Parallel OEEE'19 Special Session I	"Online Experimentation in Science and Engineering Education" Papers: **#8, #13, #30, #33, #44, #45** Chairs: **Claudius Terkowsky** and **David Boehringer**	UMa-R Room L	10:50 - 12:50
Wed3C: Parallel OEC'19 Special Session I	"Online Experimentation in Control" Papers: **#18, #68, #96, #99, #103, #111** Chairs: **Dionísio Barros** and **Wlodek J. Kulesza**	UMa-R Room P	10:50 - 12:50
Lunch break		UMa-R Room C	13:00 - 14:30

Wed4A: Parallel Session	"Remote Monitoring, IoT and Smart Homes" Papers: **#1, #6, #49, #107, #108** Chairs: **Paulo Abreu** and **Jan Steinbrener**	UMa-R Room R	14:30 - 16:10
Wed4B: Parallel OEEE'19 Special Session II	"Online Experimentation in Science and Engineering Education" Papers: **#19, #25, #37, #63, #76** Chairs: **Diana Urbano** and **Javier Garcia-Zubia**	UMa-R Room L	14:30 - 16:10
Wed4C: Parallel OEC'19 Special Session II	"Online Experimentation in Control and Automotive Control" Papers: **#73, #89, #93, #102, #124** Chairs: **Luciano Mendes** and **Pavol Bisták**	UMa-R Room P	14:30 - 16:10
Coffee break		UMa-R Room C	16:10 – 16:30
Wed5A: Parallel Session	"Online Experimentation and IoT in Engineering Education" Papers: **#5, #47, #55, #95, #118** Chairs: **Anke Pfeiffer** and **Manuel Gericota**	UMa-R Room R	16:30 -18:10
Wed5B: Parallel Session	"Remote and Virtual Experimentation" Papers: **#7, #21, #36, #54, #64** Chairs: **Vanessa Mai** and **Alexander Zimin**	UMa-R Room L	16:30 -18:10
Welcome Reception		"Quinta Vigia"	19:00

Thursday, June 13, 2019 (Conference)

Registration		UMa-R Atrium	08:30 - 13:00
Thu1	"Online Experimentation DEMOS Session I" Demos: **#10, #15, #40, #48, #58, #60, #65, #67, #79, #83, #105, #115, #119** Chairs: **Horácio Fernandes** and **Thomas Klinger**	UMa-R Room D	08:30 - 10:00
Coffee break		UMa-R Room C	10:00 - 10:20
Thu2	"Online Experimentation DEMOS Session II" Demos: **#3, #4, #12, #32, #43, #50, #51, #52, #85, #104, #113, #116** Chairs: **Leonel Nóbrega** and **David Boehringer**	UMa-R Room D	10:20 - 11:50

Thu3: Plenary Session II	"Every Click You Make: Who Is Watching You?", **Susan Zvacek** (Consultant, USA) Chair: **Mario Bochicchio** and **James Wolfer**	UMa-R Room R	12:00 - 12:50
Lunch break		UMa-R Room C	13:00 - 14:30
Move to "Museu da Eletricidade – Casa da Luz" by walking		UMa-R Atrium	14:30
Thu4: "Industry Session" I	**Ismaél Gomez** and **Rui Bazenga** (Via Litoral), **Nuno Pereira** (Águas e Resíduos da Madeira), **Luís Nuno Rodrigues** (Nave Portugal, E.P.E) Chairs: **Beatriz Jardim** (Eletricidade da Madeira) and **Alcibíades Guedes** (INEGI)	M. Eletric. Aud	15:00 - 16:10
Thu5: "Industry Session" II	"Bridging the gap between Academy and the real world applications: INEGI case study" **Alcibíades Soares Guedes**, (Institute of Science and Innovation in Mechanical and Industrial Engineering, University of Porto) Chair: **Andrea Pester** and **Manuel Castro**	M. Eletric. Aud	16:10 - 16:45
Coffee break		M. Eletric.	16:45 - 17:15
Thu6: Plenary Session III	"Assessment and monitoring of the dynamic behaviour of high-speed railway infrastructure", **Rui Calçada** (University of Porto, Portugal) Chair: **Paulo Menezes** and **Alexander Kirst**	M. Eletric. Aud	17:15 - 18:00
Social Activity: Piano Recital	*Szöcs Botond (Faculty of Music, Transilvania University of Brasov, Romania)* Chair: **Stela Dragulin** and **Doru Ursutiu**	UMa-R	21:00

Friday, June 14, 2019 (Conference)

Registration		UMa-R Atrium	08:30 - 18:00
Fri1A: Workshop #6	"Image Processing with Raspberry PI Pocket Labs" Chairs: **Andreas Pester** and **Thomas Klinger**	UMa-R Room P	08:00 - 08:50

Fri1B: Workshop #7	"Instrumented Devices for e-Health and e-Rehabilitaion" Chairs: **Paulo Abreu**	UMa-R Room L	08:00 - 08:50
Fri2A: Parallel STIM-HA'19 Special Session I	"Smart Technologies and Interactive Media for Health Applications" Papers: #35, #87, #92, #94 Chairs: **Maggi Savin-Baden** and **Daniel Bastos**	UMa-R Room R	09:00 - 10:20
Fri2B: Parallel AQM'19 Special Session I	"Air Quality Monitoring" Papers: #2, #42, #86, #109 Chairs: **Lionel Presmanes** and **Begoña Artiñano**	UMa-R Room L	09:00 - 10:20
Fri2C: Parallel MLAiE'19 Special Session	"Machine learning applications in engineering – trends and best practice" Papers: #34, #97, #98, #123 Chairs: **Katarina Žáková** and **Hélia Guerra**	UMa-R Room P	09:00 - 10:20
Coffee break		UMa-R Room C	10:20 - 10:40
Fri3A: Parallel STIM-HA'19 Special Session II	"Smart Technologies and Interactive Media for Health Applications" Papers: #23, #61, #69 Chairs: **Karolina Baras** and **Sergi Badia**	UMa-R Room R	10:40 - 12:00
Fri3B: Parallel Session	"Serious Games, Gamification and Robotics" Papers: #56, #75, #84, #120 Chairs: **Dragan Šešlija** and **Zorica Nedic**	UMa-R Room L	10:40 - 12:00
Fri3C: Parallel Session	"Web based and Collaborative Approaches for Education" Papers: #66, #70, #82, #90 Chairs: **Veronika Thurner** and **Milan Matijević**	UMa-R Room P	10:40 - 12:00
Fri4: Plenary Session IV	"You Are What You Breathe", **Mario Bochicchio** (University of Salento, Italy) Chairs: **Filipe Araújo** and **Frode Sandnes**	UMa-R Room R	12:10 - 13:00
Lunch break		UMa-R Room C	13:00 - 14:30
Fri5A: Parallel RADP'19 Special Session	"Remote and digital pneumatics: Learn and control from distance" Papers: #11, #16, #17, #22, #24, #71 Chairs: **Mikulas Huba** and **João Carneiro**	UMa-R Room R	14:30 - 16:30

Fri5B: Parallel AQM'19 Special Session II	"Air Quality Monitoring" Papers: **#38, #41, #57, #72, #74, #77** Chairs: **Jesus L. Rogado** and **Catarina Silva**	UMa-R Room L	14:30 - 16:30
Fri5C: Parallel ORBE'19 Special Session	"Online Resources in Biomedical Engineering" Papers: **#20, #27, #46, #81, #117, #125** Chairs: **Stela Dragulin** and **Denis Gillet**	UMa-R Room P	14:30 - 16:30
Coffee break		UMa-R Room C	16:30 - 16:50
Fri6: Plenary Session V	"Towards Mixed Reality for Online Experimentation", **Alexander A. Kist** (University of Southern Queensland, Australia) and **Paulo Menezes** (University of Coimbra, Portugal) Chairs: **Susan Zvacek** and **James Wolfer**	UMa-R Room R	16:50 - 17:50
Fri7: Closing Session	**José Manuel Carmo** (Rector of the Univ. of Madeira), **Manuel Castro** (IEEE), **Maria Teresa Restivo** (University of Porto), **Alberto Cardoso** (University of Coimbra)	UMa-R Room R	18:00 - 18:15
Move to the Gala Dinner by bus		UMa-R	19:30
Gala Dinner		"Adega da Quinta"	20:00

Saturday, June 15, 2019 (Post-Conference)

Departure for the Madeira Tour by bus	UMa-R	09:00
Social Activity: Madeira Tour - Trip to different places on Madeira Island with lunch (at Santana)	Madeira Island	09:00 - 17:00
Social Activity: Musical Firework Show of the Atlantic Festival	Funchal Marina	22:00