4TH EXPERIMENT@ INTERNATIONAL CONFERENCE

EXP.AT'17

ONLINE EXPERIMENTATION

June 6th - 8th, 2017
Faro, Portugal

UNIVERSITY OF ALGARVE

exp.at'17
4th Experiment@ International Conference
Online Experimentation

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4th Experiment@ International Conference

The Experiment@International Conference 2017 (**exp.at'17**) is the 4th event of a conference series (after Lisbon 2011, Coimbra 2013, S. Miguel, Azores 2015).

exp.at'17, a joint organisation of the University of Porto and the University of Coimbra, is held at University of Algarve, Portugal, with its collaboration and the technical support of the Portuguese Engineers Association and of IEEE (IEEE Industrial Electronics Society and IEEE Education Society).

exp.at'17 continues the biennial event dedicated to Online Experimentation (OE), contributing to extend the world capabilities in this particular area and to develop collaborative work in emergent technologies, bringing together engineers, researchers and professionals from different areas. OE comprises remote and virtual experiments as identifiable and accessible objects and their virtual representations in the Internet of Everything structure and is aided by emergent technologies as those supporting remote experiments, 2D or 3D virtual experiments, augmented and virtual reality experiments and their interaction with sensorial devices, live videos and other tools, which promote the user immersion in virtual environments recreating the real experience and training activities in many different areas.

exp.at'17 provides a three-day (with pre- and post-conference days) forum of discussion and collaboration between academics, researchers, industry and medicine professionals, trying to bridge the gap between academic applications and the real world needs and experiences in the era of smart societies. It offers the participants an opportunity to present their recent work and to take part in technical sessions, workshops, demo sessions, discussion tables and thematic visits in the beautiful region of Algarve.

Conference Topics

- Online Experimentation
- Remote & Virtual Labs
- Remote Sensing, Sensor Networks and Internet of Everything
- Remote Monitoring
- Mobile Sensing
- Intelligent Learning Systems
- Intelligent Web-based Learning
- Web Design
- Collaborative Tools
- Gamification & Serious Games
- Augmented Reality
- Virtual Reality
- Haptic Interfaces & Sensorial Devices
- Online Health Training Systems
- Devices for Online Rehabilitation
- Communication Systems
- Geoinformatics & Hydroinformatics
- Monitoring of Marine Life
- Monitoring of Oceans and Coasts
- Telemedicine and Remote Health Monitoring
- Smart Cities and Smart Societies
- Smart Transportation
- Smart Home and Community
- Environment and Urban Monitoring
- Smart Sensor Technology and Measurement Systems
- Smart University and Smart Education

SPECIAL TRACK DEMOS'17 TOPICS "Demonstration of Online Experimentation"

- Online Experimentation
- Remote Monitoring
- Remote Sensing
- Remote & Virtual Labs
- Online Learning Systems
- Serious Games
- Haptic Interfaces
- Augmented Reality
- Virtual Reality
- Collaborative Tools
- Intelligent Learning Systems
- Intelligent Systems
- Intelligent Web-based Learning
- Web Design
- Mobile Computing
- Communication Systems

SPECIAL TRACK OEEE'17 TOPICS "Online Experimentation in Science and Engineering Education"

- Remote, Virtual, On-Site, Augmented, Smart and Hybrid Laboratory Experiments
- Innovative Technologies and Infrastructures for Online Learning with Labs
- Novel Methods, Practices, and Approaches of Laboratory Teaching & Learning
- Developing Knowledge, Skills and Competencies in Engineering Laboratories
- Learning Objectives, Activities, and Assessment for Lab Work
- Future Capabilities and Constraints of Engineering Education Labs
- Horizontal Issues, Emergent Technologies, Future Impacts
- Mobile Sensing, Crowd Sensing and Mobile Crowd Sensing

SPECIAL TRACK OEC'17 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 SOetBE'17 TOPICS "Simulation and Online Experimentation in Technology Based Education"

- Distance learning solutions and accessible solutions to practical problems via simulation, virtualisation or experimentation
- Success stories, adapting technology vendor content to

engage learning via simulation, virtualization or experimentation
- Using alternate technologies as tools for teaching technology concepts
- Pedagogical enhancement of technology teaching via simulation, virtualisation or experimentation
- Linking unrelated learning environments
- Exploring pedagogy, andragogy and heutagogy underpinning experimentation within technology based education
- Exploiting social media as a technology focused 'simulation or experimentation' tool

SPECIAL TRACK REMO'17 TOPICS "Remote Experiments in Marine Observations"

- Online Experimentation
- Remote Sensing, Sensor Networks and Internet of Everything
- Remote Monitoring
- Remote Experiments
- Communication Systems
- Geoinformatics & Hydroinformatics
- Monitoring Marine Life
- Monitoring Oceans and Coasts
- Environment Monitoring
- Smart Sensor Technology and Measurement Systems

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Message from the Chairmen

Welcome to the 4th Experiment@International Conference (**exp.at'17**) at the University of Algarve , June 6-8, 2017, Faro, Portugal.

exp.at'17 is a biennial event devoted to online experimentation, as remote experiments and smart sesnsing, 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, which promote the user immersion in virtual environments recreating the real experience and training activities in many different areas.

exp.at'17 will provide a three-day (with additional pre- and post- conference days) 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'17**!

Alberto Cardoso
Maria Teresa Restivo

1. Lethes Theatre
2. Faro Municipal Museum
3. Hotel Faro
4. Hotel Eva
5. University of Algarve (Gambelas Campus)
6. Faro Airport
7. Faro City Centre

General Information

exp.at'17 conference will take place on the Gambelas Campus of the University of Algarve (UAlg), Faro, a state university located in the south-eastern part of Portugal.

UAlg has four campi. **exp.at'17** will take place at Gambelas Campus (GPS Coordinates: 37°02'34.9"N 7°58'15.6"W; Google Map Location), in the "Green" Amphitheatre (basement, building #8).

The UAlg campus is located at a distance of about 7 km from the centre of Faro (12 minutes by car or 20 minutes by bus).

The city centre can be reached in about 10 minutes by taxi from the Faro International Airport.

Local Information

Located in South Portugal, the Algarve is a well-known touristic region. With a Mediterranean climate, it is perfect for summer holidays. Some of the best and most beautiful beaches in the world can be found here, making the Algarve a favourite location for holiday makers.
Information about Faro is available in the Municipality of Faro website where a promotional video can also be watched.

Some useful links with Information about Algarve

- Visit Portugal (Algarve) (https://www.visitportugal.com/en/destinos/algarve)
- Visit Algarve (http://www.visitalgarve.pt/?idioma=uk)
- Visit Faro (http://www.cm-faro.pt/pt/menu/600/visit-faro-in-english.aspx)

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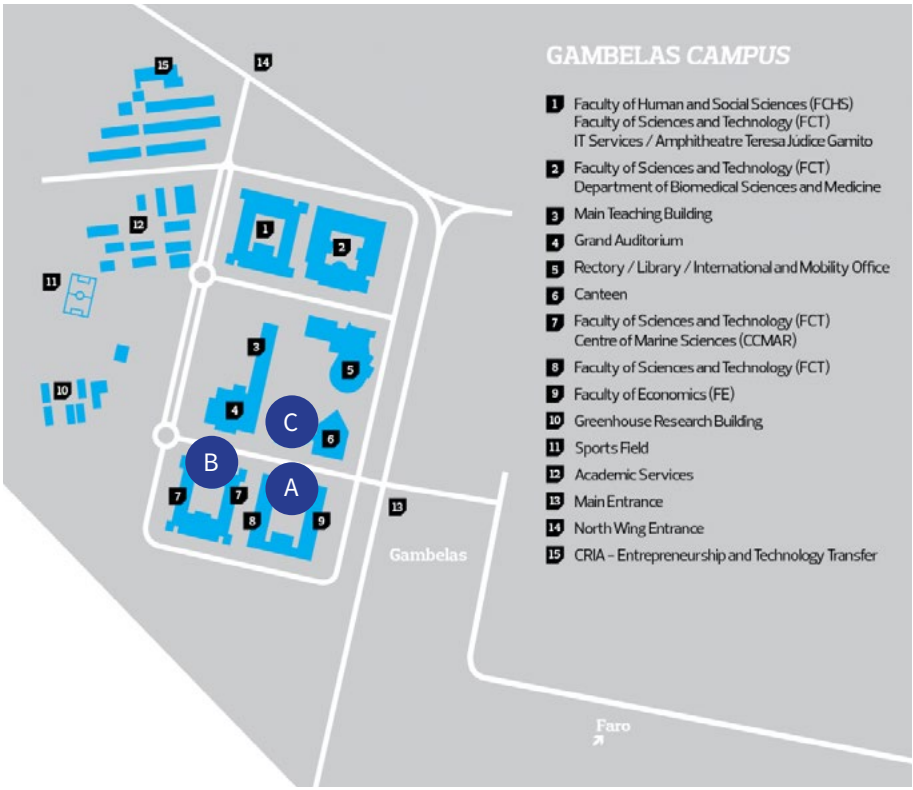
Gambelas Campus Map



A. exp.at'17 Venue (FCT Building 8)
B. CIMA Labs (FCT Building 7)
C. Canteen (Building 6)

Sessions Program

Monday, June 5, 2017 (Pre-Conference)

Registration		UAlg Atrium	09:00 - 12:00
Mon1A: Parallel Activity	VISIR+ Project Meeting	UAlg Room 1.55	09:00 - 12:30
Mon1B: Parallel Activity	PILAR Project Meeting	UAlg Room B	10:00 - 12:30
Registration		UAlg Atrium	13:30 - 17:30
Mon2A: Parallel Activity	Technical visit to Faro Airport (Departure from UAlg Bus Stop)	Faro Airport	14:00 - 15:30
Mon2B: Parallel Activity	VISIR+ Project Meeting	UAlg Room A	14:00 - 15:30
Coffee break		UAlg Atrium	15:30 - 16:00
Parallel Activity	Technical visit to Faro Airport (Departure from UAlg Bus Stop)	Faro Airport	16:00 - 17:30
Mon3B: Parallel Activity	VISIR+ Project Meeting	UAlg Room A	16:00 - 17:30
Mon3C: Parallel Activity	PILAR Project Workshop	UAlg Room B	16:00 - 17:30
Social Programme Activity (Faro, meeting point at Hotel Eva)		Faro, Hotel Eva	18:30

Tuesday, June 6, 2017 (Conference)

Tue0: Activity	VISIR+ Project Meeting	UAlg Room A	08:00 - 10:00
Registration		UAlg Atrium	09:00 - 15:30
Welcome Coffee		UAlg Atrium	09:00 - 10:00
Tue1: Opening Session	**António Branco**, Rector of University of Algarve **Doru Ursutiu**, President of IAOE **Armando Inverno**, Representative of President of OE **Rogério Bacalhau**, Mayor of Faro **Maria Teresa Restivo**, exp.at'17 General Co-Chair, University of Porto **Alberto Cardoso**, exp.at'17 General Co-Chair, University of Coimbra	UAlg Green Aud.	10:00 - 10:30
Tue2A: Parallel Session	"VISIR Remote labs" Chairs: **Mikulas Huba** and **Katarina Zakova** Papers: **#19**, **#37**, **#45**, **#53**, **#71**, **#77**	UAlg Room A	10:40 - 12:40
Tue2B: Parallel Session	"Web Platform Components for OE" Chairs: **Pavol Bistak** and **David Lowe** Papers: **#28**, **#34**, **#36**, **#39**, **#74**, **#103**	UAlg Room B	10:40 - 12:40

Lunch break		UAlg Canteen	12:40 - 14:00
Tue3A: Parallel REMO'17 Special Session	"Remote Experiments in Marine Observations" Chairs: **Juan J. G. Dominguez** and **M. Graça Rasteiro** Papers: **#93**, **#94**, **#95**	UAlg Room A	14:00 - 15:00
Tue3B: Parallel Session	"Collaborative and Immersive Environments" Chairs: **Alexander Kist** and **Manuel R. Barbosa** Papers: **#15**, **#79**, **#89**	UAlg Room B	14:00 - 15:00
Move to Lethes Theatre (Faro)		UAlg Bus Stop	15:15
Coffee break		Lethes Theatre	16:00 - 16:30
Tue4: Plenary Session	"Consumers, providers and prosumers, what is there outside of research?" Keynote Speaker: **Javier García-Zubía** (Spain) Chair: **Mario Bochicchio**	Lethes Theatre	16:30 -17:20
Tue5: Plenary Session	"MATLAB as a Tool for Online Experimentation" - **Alex Tarchini**, MathWorks Chair: **Manuel Castro**	Lethes Theatre	17:30 - 18:00
Welcome Reception at "Faro Municipal Museum"		Faro Old Town	19:00

Wednesday, June 7, 2017 (Conference)

Registration		UAlg Atrium	08:30 - 16:30
Wed1: Exhibition Session (Demos'17)	"Online Experimentation Demos I" Chairs: **Alexander Zimin** and **Tiago Faustino Andrade** Demos: **#01**, **#06**, **#08**, **#17**, **#18**, **#22**, **#31**, **#38**, **#40**, **#42**, **#46**, **#55**, **#64**, **#86**, **#88**, **#92**, **#102**, **#104**	UAlg Atrium	09:00 - 10:30
Coffee break		UAlg Atrium	10:30 - 11:00
Wed2: Exhibition Session (Demos'17)	"Online Experimentation Demos II" Chairs: **Paulo Abreu** and **Tobias R. Ortelt** Demos: **#02**, **#03**, **#04**, **#05**, **#07**, **#20**, **#27**, **#41**, **#43**, **#48**, **#58**, **#62**, **#87**, **#90**, **#97**, **#98**, **#105**	UAlg Atrium	11:00 - 12:30
Lunch break		UAlg Canteen	12:30 - 14:00

Wed3A: Parallel Session	"Augmented Reality & Image Recognition" Chairs: **Bogdan Deaky** and **Zorica Nedic** Papers: **#65**, **#67**, **#96**	UAlg Room A	14:00 - 15:00
Wed3B: Parallel Session	"Serious Games and Gamification" Chairs: **Sonia B. Concari** and **Hélia Guerra** Papers: **#32**, **#35**, **#59**	UAlg Room B	14:00 - 15:00
Wed4: Plenary Session	"User Experience for Live Experimentation in AR and VR Settings: Synergetic Effects between Computer Science and Games" Keynote Speaker: **Gudrun Klinker** (Germany) Chair: **Paulo Menezes**	UAlg Green Aud.	15:10 - 16:00
Coffee break		UAlg Atrium	16:00 - 16:30
Wed5A: Parallel Round Table	"Augmented Reality - a technology of the future or just a momentary hype?" Guest Speakers: **Paulo Menezes**, **James Wolfer**, **Joerg Rett**, **Alexander Kist** and **Tobias Ortelt** Chair: **Maria Teresa Restivo**	UAlg Green Aud.	16:30 - 18:00
Wed5B: Parallel Activity	Erasmus+/Tempus Projects Meeting	UAlg Room A	16:30 - 18:00
Wed5C: Parallel Activity	IEEE Meeting	UAlg Room B	16:30 - 18:00
Wed5D: Parallel Activity	VISIR+ Project Meeting	UAlg Room C	16:30 - 18:30
Social Programme Activity (Concert of Portuguese guitar)		Lethes Theatre	21:30 - 22:30

Thursday, June 8, 2017 (Conference)

Registration		UAlg Atrium	08:30 - 17:00
Thu1A: Parallel SOet-BE'17 Special Session	"Simulation and Online Experimentation in Technology Based Education" Chairs: **Wlodek Kulesza** and **Celina P. Leão** Papers: **#25**, **#33**, **#66**, **#76**	UAlg Room A	09:15 - 10:30
Thu1B: Parallel Session	"Environment Monitoring" Chairs: **Paulo Abreu** and **Frode Sandnes** Papers: **#11**, **#14**, **#91**	UAlg Room B	09:15 - 10:30
Coffee break		UAlg Atrium	10:30 - 11:00

Thu2A: Parallel OEEE'17 Special Session	"Online Experimentation in Science and Engineering Education" Chairs: **Horácio Fernandes** and **Radojka Krneta** Papers: **#23**, **#30**, **#63**, **#69**, **#72**	UAlg Room A	11:00 - 12:30
Thu2B: Parallel OEC'17 Special Session	"Online Experimentation in Control" Chairs: **Andreas Pester** and **Luciano A. Mendes** Papers: **#24**, **#44**, **#54**, **#60**	UAlg Room B	11:00 - 12:30
Lunch break		UAlg Canteen	12:30 - 14:00
Thu3A: Parallel Session	"Control Systems" Chairs: **Vule Reljić** and **Olga Dziabenko** Papers: **#49, #12, #47, #57, #81**	UAlg Room A	14:00 - 15:30
Thu3B: Parallel Session	"Sensing Systems" Chairs: **Ricardo Costa** and **Unai H. Jayo** Papers: **#68, #70, #10, #21, #51**	UAlg Room B	14:00 - 15:30
Thu4: Plenary Session	"Digitalization in Process Industries - Integrated Engineering and Integrated Operations" Keynote Speaker: **Steeve Baudry** (Siemens, Germany) Chair: **Sebastián Dormido**	UAlg Green Aud.	15:40 - 16:30
Coffee break		UAlg Atrium	16:30 - 17:00
Thu5: Closing Session	**Maria de Lurdes Cristiano**, Director of FCT of the University of Algarve **Manuel Castro**, IEEE **Maria Teresa Restivo**, exp.at'17 General Chair, University of Porto **Alberto Cardoso**, exp.at'17 General Chair, University of Coimbra	UAlg Green Aud.	17:00 - 17:30
Gala Dinner and Awards		Hotel Faro	20:00

Friday, June 9, 2017 (Post-Conference)

Fri1: Technical Visit	Visit to the CIMA Labs	UAlg CIMA Labs	09:30 - 11:00
Coffee break		UAlg CIMA Labs	11:00 - 11:30
Departure to Ria Formosa trip		UAlg Bus Stop	11:30
Trip through Ria Formosa			12:00
Lunch and Free time			13:30
Return to Faro			17:00

Invited Speakers

Javier García-Zubía
University of Deusto, Bilbao, Spain

Tuesday, June 6, 2017
Tue4: Plenary Session
Lethes Theatre
16:30 - 17:20

Javier García-Zubía is full professor of the University of Deusto (Bilbao, Spain). His research is mainly focused on remote experimentation (also in programmable devices) and technology enhanced learning. He has been responsible for the WebLab-Deusto platform in remote experimentation for more than 10 years. He has edited several books on remote experimentation, including research of many research groups in this area, and has published and presented technical papers in journals and conferences.
Currently he is the President of the Spanish Chapter of IEEE Education Society.

Consumers, providers and prosumers, what is there outside of research?

In general, all of us are involved in research (plus teaching, managing, etc.) asking some questions like: what is the best solution for a particular remote experiment? can I apply the IoT in remote experimentation? how can I improve the user experience? how can I measure the learning effect?
But sometimes we forget to answer the question why are we designing remote experiments? Who is the consumer? where is the consumer? can I provide him/her with a good remote experiment? can I assure her/him QoS? how?
Maybe there is a primary question, is there a market for remote experimentation? If the newspapers, policy makers, institutions, organizations, reports, etc are speaking about the Digital Classroom, why is the remote experimentation not taken into account? are we losing the train? what train?
I will try to present (and answer) some questions coming from outside the research in remote experimentation.

Gudrun Klinker
Technical University of Munich, Germany

Wednesday, June 7, 2017
Wed4: Plenary Session
UAlg Green Aud.
15:10 - 16:00

Prof. Gudrun Klinker studied computer science (informatics) at the Friedrich-Alexander Universität Erlangen, Universität Hamburg (Diplom) and Carnegie-Mellon University (Ph.D.) in Pittsburgh, PA, USA, focusing on research topics in computer vision. In 1989, she joined the Cambridge Research Laboratory of Digital Equipment Corporation in Boston, MA, working in the visualization group on the development of a reusable tele-collaborative data exploration environment to analyze and visualize 3D and higher-dimensional data in medical and industrial applications. Since 1995, she has been researching various aspects of the newly emerging concept of Augmented Reality, first at the European Computer-industry Research Centre, then at the Fraunhofer Institute for Computer Graphics, and since 2000 at the Technical University of Munich. Here, her research focus lies on developing approaches to ubiquitous augmented reality that lend themselves to realistic industrial applications.
Prof. Klinker is a member of the steering committee of the International Symposium of Augmented Reality (ISMAR). She has served on numerous program committees such as VR, VRST, 3DUI, and UIST. She is author and co-author of more than 150 reviewed scientific publications.

User Experience for Live Experimentation in AR and VR Settings: Synergetic Effects between Computer Science and Games.

As new display and tracking technology for virtual and augmented reality is emerging in great strides, it becomes increasingly important to investigate the usability and their user experience in applications. Gaming provides many very good scenarios for testing novel user experiences. Via gamification, these may be brought back into a wide range of applications. This presentation will discuss and analyze opportunities and challenges of providing user experiences for live experimentation in AR and VR settings.

Steeve Baudry
Siemens, Germany

Thursday, June 8, 2017
Thu4: Plenary Session
UAlg Green Aud.
15:40 - 16:30

Steeve Baudry is in charge of developing the Industrie 4.0 and Digital Transformation strategies for Process-oriented customers in Siemens. He has been working in var- ious industries in an advisory role for new technologies integration, change man- agement and new business models development. He is also leading the Siemens Global Digitalization Consulting team for Process Industries, which supports glob- ally Siemens customers in their digital transformation.

Digitalization in Process Industries - Integrated Engineering and Integrated Operations

One of the most critical drivers of the industry is increasing productivity in order to stay competitive. Siemens is one of the pioneers for the preceding phases of industrialization and has a large portfolio for electrification and automation, including holistic solutions for Integrated Energy Management and Integrated Automation Management.
We, at Siemens, see Digitalization as the next level for productivity. With the recent technological innovations driving digitalization, such as computing power, storage costs or bandwidth increase, a big leap towards higher productivity in process industries can be achieved.
The Siemens "Digital Enterprise" approach for Process Industries addresses key features of Industrie 4.0 focusing on Integrated Engineering and Integrated Operations, supporting our customers to respond with significant speed, flexibility and efficiency improvements.

Abstracts

Tuesday, June 6, 2017
Parallel Session: "VISIR Remote Labs"
Chairs: Mikulas Huba and Katarina Zakova
Papers: #19, #37, #45, #53, #71, #77

#19

Tue2A

UAlg Room A
10:40 - 12:40

A teacher training workshop to promote the use of the VISIR Remote Laboratory for electrical circuits teaching

Carlos Arguedas, Sonia Concari, Javier García-Zubía, Susana Marchisio, Unai Hernández, Gustavo R. Alves, Iñigo Uriarte-Canivell, Marco Conejo, Ingvar Gustavsson and Fernando Ureña Elizondo

The learning of Physics involves building up and using lab experiments. In turn, teachers must be trained in experimenting and using several resources that enable them to design valuable teaching strategies and learning activities. Thanks to Information and Communication Technologies (ICT), virtual and remote labs can provide a framework where physical experiments can be developed. Although remote labs have been in use for over a decade now in several countries and levels of education, its use at secondary schools in Latin America has not been reported yet. The Virtual Instruments System in Reality (VISIR) is one of these remote labs, suitable to practice in the area of electrical circuits. This paper aims at describing how this remote lab was used in a training workshop for secondary school level teachers of Physics in Costa Rica.

#37

Tue2A

UAlg Room A
10:40 - 12:40

The VISIR+ Project – Helping Contextualize Math in an Engineering Course

Natércia Lima, Marcelo Zannin, Clara Viegas, Arcelina Marques, Gustavo R. Alves, Manuel C. Felgueiras, Ricardo Costa, André Fidalgo, Juarez Silva, María I. Pozzo,Elsa Dobboletta, Ingvar Gustavsson and Francisco José García Peñalvo

The long-term goal of engineering education is to prepare students to work as engineers. Being a practical profession, laboratories play a crucial role in illustrating concepts and principles as well as improving technical skills. In the last decades the use of online resources (simulators and remote labs) has been growing, either as a complementary and/or as an alternative way of developing experimental competences.

In the scope of the VISIR+ Project, this work presents the first results of a didactical implementation using simultaneously the remote laboratory VISIR (Virtual Instrument Systems in Reality), simulation and calculus in a Math Course at the Federal University of Santa Catarina (UFSC). The preliminary results indicate that the use of several resources increases students' performance, boosting their learning and competence development.

#45

Tue2A

UAlg Room A
10:40 - 12:40

Science Education at High School: a VISIR Remote Lab Implementation

Ignacio Evangelista, Juan Farina, Elsa Dobboletta, María Isabel Pozzo, Javier García-Zubía, Unai Hernández, Susana Marchisio, Sonia Concari, Gustavo R. Alves and Ingvar Gustavsson

Experimentation is crucial in science teaching at any education level. Students' motivation and collaborative work are also essential in order to achieve positive learning outcomes. This article portrays the implementation of remote experimentation using VISIR in a Physics subject at high-school level. Qualitative and quantitative data were analyzed for this particular case study in order to shed light on the influence of VISIR on students' motivation. Results showed that VISIR remote lab is a powerful tool to arouse interest in electronic circuit topics.

#53

Tue2A

UAlg Room A
10:40 - 12:40

Starting the Study of Electronic Circuits with VISIR. College students' viewpoints in a Pilot Test in Argentina

Susana Marchisio, Federico Lerro, Claudio Merendino, Miguel Plano, Sonia Concari, Gastón Saez de Arregui, Javier García Zubía, Unai Hernández Jayo, Gustavo R. Alves and Ingvar Gustavsson

This paper aims at introducing the first intensive use of a remote lab named as VISIR by lecturers and students from Facultad de Ciencias Exactas, Ingeniería y Agrimensura, Universidad Nacional de Rosario. The research was carried under the VISIR + project. It is a pilot test in which 17 students from the third year of an Electronic Engineering degree took part.

The pilot test was developed in order to bring forward possible difficulties, assess successes and failures and eventually suggest other possible ways of curricular incorporation of VISIR in the teaching of the Physics of Electronic Devices subject. VISIR was used as a complement to hands-on lab, after the last experimental design activity of basic circuits with bipolar transistor. The students carried out an individual lab work. Then, they were asked to answer an opinion poll made up of 20 items, 1-4 Likert scale. Descriptive statistical analysis and summary of cases were carried out in order to conclude about four dimensions of analysis linked to the students' viewpoint. They are: perceived learnings, VISIR acceptance, perceived teachers' guidance and time and technical restrictions.

#71

Tue2A

UAlg Room A
10:40 - 12:40

VISIR federation: Initial building steps

(PILAR experience – work in progress)

Ramona Georgiana Oros, Andreas Pester, Christian Kreiter, Manuel Castro, Andre Fidalgo, Gustavo R. Alves and Ingvar Gustavsson

Collaborative working as well as sharing resources and knowledge represent key points in today's development in all fields, including education. Know-how transfer and collaboration in learning and teaching are aspects promoted and sustained by institutional management as well as the European initiatives. Thus, leading to the idea of a federation which will facilitate engineering education. A consortium formed by five European universities decided to join efforts to provide to the community a federation, which could be used by different stakeholders interested in teaching, learning or developing new skills in the field of electronics. The proposed remote system, Virtual Instruments System in Reality, or VISIR in short, offers the possibility of working with real equipment and obtaining the real-world/real-time measurements.

By developing such a VISIR federation some of the constraints of using remote labs, the ones associated with development and maintenance costs, and scalability, will be minimized. This paper aims to present the initial steps for developing a VISIR Federation, which is also the primary goal of PILAR - Platform Integration of Laboratories based on the Architecture of VISIR project.

#77

Tue2A

UAlg Room A
10:40 - 12:40

A Federation of VISIR remote laboratories through the PILAR Project

Wlodek Kulesza, Ingvar Gustavsson, Arcelina Marques, Andre Fidalgo, Gustavo R. Alves, Unai Hernandez-Jayo, Javier Garcia-Zubia, Christian Kreiter, Ramona Georgiana Oros, Andreas Pester, Danilo Garbi-Zutin, Michael Auer, Carla Garcia-Hernandez, Ricardo Tavio, Kati Valtonen, Felix Garcia Loro, Alejandro Macho, Elio Sancristobal, Gabriel Diaz and Manuel Castro

This paper describes how a new Erasmus Plus project, PILAR, (Platform Integration of Laboratories based on the Architecture of visiR), is being developed and how the startup of the partnership and the project is reinforcing the VISIR (Virtual Instrument Systems in Reality) network and the Special Interest Group of VISIR under the Global Online Laboratory Consortium (GOLC) of the International Association of Online Engineering (IAOE). The Spanish University for Distance Education (UNED) coordinates the project that aims to federate the existing (or new) VISIR systems in order to use the resources more effectively and in a more efficient way, making transparent to the final user the election of the shared resources.

— End of Session Tue2A —

Tuesday, June 6, 2017
Parallel Session: "Web Platform Components for OE"
Chairs: Pavol Bistak and David Lowe
Papers: #28, #34, #36, #39, #74, #103

#28

Tue2B

UAlg Room B
10:40 - 12:40

Using Cloud Web Services to Intermediate Communication in ISA / ELSA

Luciano Antonio Mendes, Thiago Schaedler Uhlmann and Dani Juliano Czelusniak

Remote experimentation has long conflicted with security policies imposed by networks administrators. To provide external access to experiment servers in a university, security measures are demanded. Such leads to an excessive dependency on the IT departments for services configuration and maintenance. In the present work, modifications in ISA/ELSA architecture are proposed to circumvent those problems. By locating proxies in the cloud, the communication between user interface and laboratory experiment avoids the need for a laboratory server, which now acts like a polling client of the cloud web service. Configurations for single-user and cooperative remote experiments are discussed. In tests, requests processing time was less than 250ms, enough to support a great amount of remote experiments.

#34

Tue2B

UAlg Room B
10:40 - 12:40

Automatic Generation of Web Client Interfaces for Remote Execution of Matlab Simulations

Christian Kreiter and Danilo Garbi Zutin

Matlab is a widely used tool in industry and education for numerical computation of mathematical problems. Former versions of Matlab had a built-in Web server which was used to run scripts over the web browser. Newer versions of Matlab lack this functionality. However, recent versions of Matlab allow users to interact with REST-based web services.

Considering the above, this paper does not only illustrate a new possibility on how to build up a communication between a web client in a browser and a Matlab script with the use of the iLab Service Broker and the Experiment Dispatcher, but also shows how a GUI for a web client can be generated dynamically, with basic information of the script encoded as a JSON string. With this approach developers can run their scripts from a web browser and do not need any knowledge of web languages like HTML or JavaScript.

#36

Tue2B

UAlg Room B
10:40 - 12:40

Semantic Web Thing Architecture

Andriy Mazayev, Jaime Martins and Noélia Correia

As the Internet of Things evolves and matures, the number of connected devices and the amount of generated data grows exponentially. Integrative standards and API design patterns are required to deal with this fast growth, while easing machine to machine communication and promoting ubiquitous computing. This paper discusses the W3C Web of Things model that is currently in the process of standardization, and presents our overview and implementation of this model.

#39

Tue2B

UAlg Room B
10:40 - 12:40

Assisting Students in Online Experimentation

Hugh Considine, Zorica Nedic and Andrew Nafalski

With the advancement of technology and universities' aspiration to reach more students including students studying in distance mode, remote laboratories are gaining popularity and becoming a common feature of STEM programs. Remote laboratories make laboratory equipment more accessible to both on-campus and off-campus students. However, assistance to students experimenting outside the scheduled supervised classes is hard to provide and therefore usually not available in remote laboratories.

With the advancements in software engineering and intelligent systems, it is a natural step forward to develop intelligent tutoring systems that will assist students in online experimentation when a human tutor is not available. In this article, we present our work in this direction.

#74

Tue2B

UAlg Room B
10:40 - 12:40

Web Physics Ontology

Vladimir Cvjetkovic

Relationships among physical quantities (PQs) express fundamental laws of the Universe. Physics equations represent relationships among PQs and therefore encode the basic knowledge of physics. System of PQs is the natural framework of physics and can be used as a guideline for informational modelling of various scientific aspects of physics. Relationships among PQs can be used for creation of semantic web ontologies that model the knowledge of physics. Leading semantic web ontologies in physics today are based on system of units which directly relies on system of PQs. This paper describes interactive online web application based on symbolic computational ontology (SCO) that models knowledge of physics and which is based on system of PQs primarily, not units. Main SCO design principles can also be applied to other existing physics ontologies and for ontologies in other sciences using formulas. Interactive SCO based web application (SCO-BWA1) illustrates dynamic generation of physics equations and numerical calculations.

#103

Tue2B

UAlg Room B
10:40 - 12:40

Tackling common task with synchronizing different datasources

Alex Tarchini and Gareth Thomas

In this short communication we will show with MATLAB how easy it is to tackle common tasks when overlapping data from different sources.

These aspects include Creating Timetables, Clean Timetable with Missing, Duplicate, or Nonuniform Times, Resample and Aggregate Data in Timetable and Combine Timetables and Synchronize Their Data. We will use data from UPorto Meteorological station and temperature from the Lab to illustrate this.

— End of Session Tue2B —

Tuesday, June 6, 2017
Parallel REMO'17 Special Session: "Remote Experiments in Marine Observations"
Chairs: Juan J. G. Dominguez and M. Graça Rasteiro
Papers: #93, #94, #95

#93

Tue3A

UAlg Room A
14:00 - 15:00

Collection and dissemination of data from environmental monitoring systems in estuaries

Erwan Garel

Environmental monitoring stations providing high frequency data over a multiyear time frame are not common in estuaries. These systems are designed to record extended time-series at high frequency that are of great value for decision makers and the scientific community. However, the continuous acquisition of good quality data at estuaries is generally challenged by harsh environmental conditions. This contribution describes the main issues for continuous valid data (water quality and currents) acquisition in 2008-2014 with a monitoring station deployed at the Guadiana Estuary and how both near real-time and post-processed data were disseminated using web interfaces.

#94

Tue3A

UAlg Room A
14:00 - 15:00

Improving the response to operational pollution in the South Iberian coast

João Janeiro, Augusto Neves, Francisco Campuzano and Fávio Martins

Although for the general public marine oil pollution happens when an oil tanker sinks in the ocean or an accident occurs in an oil platform, most of the oil entering the world ocean does it along less obvious paths. This research work focus on operational spills. It provides a first indication of the uncertainty associated to backtracking simulations using solutions from several operational models available on the internet for the South Iberia region. The suitability of using a Super-Ensemble approach as a way of minimizing the uncertainty was also investigated. The methodology was validated using drifting buoys available for the region.

Results show the advantages of using the Super-Ensemble while pointing out the importance of the atmospheric forcing in this region due to its characteristic mesoscale activity. The absence of more trajectories sparse in time and geographic coverage was a limitation found.

#95

Tue3A

UAlg Room A
14:00 - 15:00

Collection, analysis and on-line experimentation of ocean color remote sensing data

Davide D'Alimonte, Tamito Kajiyama, Carolina Sá and Vanda Brotas

This document concerns the collection, analysis and on-line experimentation of ocean color data off the Western Iberian Peninsula. Field measurements have been acquired during the BIOMETORE field campaign in summer 2016 to evaluate and enhance Earth observation capabilities of the Copernicus program. Deliverables of the Ocean and Land Colour Instrument on board the Sentinel-3 satellite of the European Space Agency are of specific interest. Preliminary evaluations confirm the quality of the in situ measurements to address the match-up future analysis of radiometric values and derived data products. On-line experimentation undertaken with the Web-Enhanced Service To Ocean Color demonstrates the feasibility of enabling in a transparent way the user's access to complex functionalities such as neural network applications.

— End of Session Tue3A —

Tuesday, June 6, 2017
Parallel Session: "Collaborative and Immersive Environments"
Chairs: Alexander Kist and Manuel R. Barbosa
Papers: #15, #79, #89

#15

Tue3B

UAlg Room B
14:00 - 15:00

Collaborative BIM environment as a support in conflict analysis in building design

Alcinia Zita Sampaio and Edgar Berdeja

The reference to Building Information Modelling (BIM) methodology includes the combination of a set of technologies related to the generation of the model and with the handling of a large amount of data. BIM supports the ability to promote a high level of interdisciplinary collaboration, desirable in the development and analysis of the project, contributing to achieve better productivity and quality in the design, construction and maintenance of buildings. BIM tools support the process of geometric modeling based on parametric objects and advanced levels of 3D realistic visualization abilities, but additionally incorporate other capabilities, namely, conflict detection features. Once created a 3D/BIM model, with information considered relevant, generated and added throughout the development of the project, an analysis of conflict detections concerning the overlap and the proximity of elements (inconsistency between specialty projects) can be applied. Current BIM tools admit the overlap of three disciplines, architecture, structures and systems and support the definition of each component by direct analysis of conflicts identified by the BIM-based tool with the issue of inconsistency. The modeler adjusts the modelling process to every conflict situation. The analyses of conflict detections concerning inconsistency between specialty projects is described in the present text.

#79

Tue3B

UAlg Room B
14:00 - 15:00

Immersive VR for Real Estate - its evolution in Bluemind Software

Bogdan Deaky and Luminita Parv

This paper presents the results of the VR4RE (Virtual Reality for Real Estate) project, which aims at saving time and money for both real estate sellers and buyers by employing modern technologies. VR4RE is one of the innovative projects developed by Bluemind Software and it is in an advanced state. This paper also illustrates the history of in-house technological attempts at creating appropriate presentation tools for real estate properties with 3D and VR (Virtual Reality).

#89

Tue3B

UAlg Room B
14:00 - 15:00

Improving robot teleoperation experience via immersive interfaces

Luís Almeida, Paulo Menezes and Jorge Dias

This paper investigates approaches capable of inducing sensations of tele-presence in robotic tele-operations. Operator's control actions are simpler, if he feels being in the remote environment. The goal is to replicate some conditions of the remote environment to let operator's perception behaviours approximate the natural ones. Since immersion aims at providing stimulus to trick the sensory system, we pursue a consistency between outside sensory feedbacks and inside sensory proprioceptive, vestibular information and cognitive models. Seeking operations enhancement, we explore the embodiment concept by virtually placing the operator inside the robot. This research develops and evaluates natural-based interfaces for immersive tele-operation. The results indicate a decrease in cognitive workload with gains in task performance.

— End of Session Tue3B —

Tuesday, June 6, 2017
Plenary Session: "MATLAB as a Tool for Online Experimentation"
Chair: Manuel Castro

MATLAB as a Tool for Online Experimentation

Tue5

Lethes Theatre
17:30 - 18:00
Alex Tarchini,
MathWorks

MATLAB actually encompasses a family of more than 80 products: they all share MATLAB as a common foundation and address specific engineering domains.

One area where MATLAB expresses its value is Model-Based Design: by modelling and simulating dynamic systems, engineers understand how they behave and what are the best techniques to control them. Operating inside a virtual environment allows to refine the representation of the system through repeated runs of experiments and, once the model has been fully tested, C code can be automatically generated for an embedded system.

And once you have your system running in real-time, what will you do with the data that it is collecting from the physical world? Welcome to the world of engineering driven data analytic, where yet another set of MATLAB tools will help you to release a complete AI system.

— End of Session Tue5 —

Wednesday, June 7, 2017
Exhibition Session (Demos'17): "Online Experimentation Demos I"
Chairs: Alexander Zimin and Tiago Faustino Andrade
Demos: #01, #06, #08, #17, #18, #22, #31, #38, #40, #42, #46, #55, #64, #86, #88, #92, #102, #104

#01

Online application for EEG-based drowsiness detection

Wed1

UAlg Atrium
09:00 - 10:30

Daniel Ribeiro, Alberto Cardoso and César Teixeira

Taking a look at the number of road accidents, it's noticed that a significant part of these is due to the driver falling asleep at the wheel. This paper will descrive a Web-based plataform capable of storing, processing and analyzing eletroencephalogram (EEG) signals, thus descriving the ability to detect drowsiness that could prevent the occurrence of accidents related to driving. This Web-based platform will allow the user to test various possibilities with the use of different EEG signals, filters, window's sizes and steps, delays and classifiers, in order to find the best combination for the detection of drowsiness while driving.

#06

An online collaborative environment for rehabilitation using instrumented devices

Wed1

UAlg Atrium
09:00 - 10:30

Rafael Tavares, Paulo Abreu and Maria Teresa Restivo

This work reports on the integration of different instrumented devices in the development of CORe, a Collaborative Online Rehabilitation Environment. This collaborative environment aims to support intelligent monitoring devices to be used in online rehabilitation and occupational therapy, further allowing the deployment of wide monitoring solutions for society supporting the health, ageing and rehabilitation fields. Several monitoring devices, such as instrumented gloves, a system for hand rehabilitation among other devices showcase some of the main features of this environment.

#08

Analysis and pattern identification on smart sensors data

Wed1

UAlg Atrium
09:00 - 10:30

António Mendes Lopes,
Paulo Abreu and
Maria Teresa Restivo

This work exemplifies the use of a data analysis technique applied to indoor air quality data obtained in a laboratory. The environment data is acquired with a wireless sensor system, NSensor. The sensing system, developed at the Faculty of Engineering, University of Porto (FEUP), is used for indoor environment monitoring, with the capability to store, in a remotely accessed database, air quality parameters such as temperature, relative humidity, pressure, illuminance, carbon dioxide and volatile organic components. For the current study, temperature and relative humidity data was selected and a period of ten months was considered. The data analysis uses Fourier transforms to identify patterns on the acquired data. For the temperature data, five main patterns were possible to identify. This work explores the potential of using data analysis techniques for big data sets in the field of indoor air quality evaluation. To make use of this data, further developments must be carried out in order to be possible to go from monitoring and identification to the phase of controlling indoor environment.

#17

Online Identification of Unknown System in Adaptive Filtering Laboratory

Wed1

UAlg Atrium
09:00 - 10:30

Đorđe Damnjanović,
Radojka Krneta and
Dušan Živković

This paper presents realization of adaptive filtering laboratory aimed to identification of unknown system. Whole process is realized by using LabVIEW software package and it can be controlled online through CEyeClon viewer. Application provides learning curves for used adaptive algorithm and records all results in the form of Excel report on the server side of experiment.

Report can be sent automatically to the e-mail address defined by user at the beginning of experiment. Whole documentation of experiment is provided to the user within CEyeClon viewer.

#18

Wed1

UAlg Atrium
09:00 - 10:30

The remote lab "Nexys 2 FPGA platform" aimed for learning design of digital circuits

Vanja Luković, Aleksandar Peulić, Radojka Krneta and Đorđe Damnjanović

The application of remote lab "Nexys 2 FPGA platform" for learning digital circuits design is described in this paper. The experiment requires installation of Xilinx ISE Design Suite software on students' PCs for designing digital circuits and generating .bit file. There are three ways of designing digital circuits in Xilinx ISE Design Suite software: by programming in VHDL language, by programming in Verilog language or by using schematic diagrams. Working environment of the remote lab consists of Digilent Nexys 2 FPGA platform that is connected with PC. Students connect with the remote lab PC through CEyeClon viewer which also needs to be installed on their PCs together with .Net Framework 4.5. Generated .bit file is loaded through Digilent Adept2 software that is installed on the remote lab PC and used for the FPGA programming. The usage of this experiment enable engineering students to achieve practical experiences and skills for designing and simulating digital circuits using FPGA and to better understand and learn theory of designing digital circuits.

#22

Wed1

UAlg Atrium
09:00 - 10:30

Remote Control of Pneumatic Circular Manipulator Using CEyeClon Platform

Vule Reljić, Brajan Bajči, Jovan Šulc, Dragan Šešlija and Slobodan Dudić

Pneumatic circular manipulator is an experimental setup which is designed and developed at Faculty of Technical Sciences in Novi Sad, Serbia.

It is controlled via Internet, using CEyeClon platform. The goal of realization of the manipulator is ability of participants to remotely use it as a test bed for testing various types of pneumatic control. Remote participants are mainly students of technical faculties that are learning about pneumatic control or energy efficiency of pneumatic systems. Also, users of such a system can be engineers would like to learn more about pneumatic systems in industry.

#31

Wed1

UAlg Atrium
09:00 - 10:30

Programming and Testing a PLC to control a Scalable Industrial Plant in Remote Way

Marco Márquez, Andrés Mejías, Reyes Herrera and José Manuel Andújar

This paper presents a scalable industrial plant which puts plug and label to bottles. It is controlled by a commercial programmable logic controller (PLC). To do that, the plant has two conveyor belts. The first one goes from the origin to the place where the plug is put to the bottle and the second one goes from that place to where the label is put (the end of the route). The element which puts the plug is virtual, implemented using augmented reality (AR) techniques, and the labeler is a real element. Moreover, the plant is a combination of real and virtual elements. The presented plant is accessed from internet (both the PLC to be programmed and the plant to test the control program). It has been proposed to make a practical class in several subjects at the University of Huelva.

#38

Wed1

UAlg Atrium
09:00 - 10:30

Mixed Reality Voice Training for Lecturers

Laura Lenz, Daniela Janßen and Valerie Stehling

An often underestimated challenge for lecturers is a considerate use of their voice in teaching auditoriums. Even experienced lecturers are challenged by speaking in front of large classes or in new surroundings for the first time.

Universities therefore often offer special voice trainings in which lecturers can be trained to use their voice correctly by a professional voice coach. Those trainings, however, often do not offer a realistic simulation of the lecturers' everyday teaching life. The project "ELLI" (Excellent Teaching and Learning in Engineering Sciences), funded by the federal ministry of education and research in Germany, aims at solving exactly this problem: It will give teachers the opportunity to practice their vocal capabilities in a special Mixed Reality Voice Lab. Within this lab, lecturers are able to participate in immersive voice trainings. Those trainings are adaptable to the lecturers' specific needs and environments and can therefore differ in terms of class size, stereoscopic vision and sonic interaction. The trainings are guided by professional vocal coaches. Currently, a first prototype of the Voice Lab that offers two different settings has been developed. The scenarios will be continuously improved based on user feedback and serve as a basis for the development of a wide range of adjustable settings. In order to generate the specific settings, that match the individual needs of the lecturers, real-life auditoriums have been acoustically measured by using specific professional microphones. The visual representation has been realized by using 360° cameras. In the long run, the immersive Mixed Reality Voice Lab will be deployable to other universities and contexts where it will offer lecturers the opportunity to practice their voice in environments that represent a realistic simulation of their actual teaching scenarios in terms of sound and vision. Additionally, lecturers will also be able to experience their own teaching in replay out of a students' perspective. This allows for a deeper self-reflection of their own vocal performance and serves to foster the learning process.

#40

Wed1

UAlg Atrium
09:00 - 10:30

RoboBlock: A Remote Lab for Robotics and Visual Programming

Javier Garcia-Zubia, Ignacio Angulo, Iñigo Uriarte and Gabriel Martinez-Pieper

Robotics is part of K12 curricula in different subjects and countries because it is exciting and formative. To teach, the teacher and the school need a laboratory with robots, and this is a challenge because they are not cheap and they need to be maintained. In this scenario the use of a remote lab for robotics is a good solution. There are several remote labs for robotics, the main advantage of RoboBlock is that it offers in the same interface the robot and a visual tool based on Blockly to program the robot.

#42

Wed1

UAlg Atrium
09:00 - 10:30

Low cost air levitation remote lab

Jacobo Sáenz Valiente, Jesús Chacón, Luis De La Torre and Sebastian Dormido

Online experimentation has become a common resource in education since the virtual and remote labs (VRLs) allowed the users to interact with a system without being in a laboratory environment. The science and engineering areas needs to teach their students in experimental practices and this implies, in most cases, costly and complex systems. This work shows how new technologies allow a low cost online laboratory.

#46

Wed1

UAlg Atrium
09:00 - 10:30

Design and instrumentation of a magnetic field micro-probe mapper

Hugo Alves, Diogo Carvalho, Tiago Pereira and Horácio Fernandes

The magnetic field experimental study is a difficult task as quantitative magnetic experiments are not so common in schools mostly due to the necessary instruments sensitiveness. In this experiment we devise an apparatus capable of tracing the local 3-D magnetic field vector components.

The main objective of this device is to allow the understanding of the field's magnetic vector nature and letting the student distinguish between field lines and contour lines of equal magnitude.

#55

Affordable LTE Network Benchmarking Based on Transport Fleets

Wed1

UAlg Atrium
09:00 - 10:30

Rogério Dionísio, Paulo Marques, Hugo Marques, Tiago Alves, Luis Pereira, Fernando Silva and Jorge Ribeiro

To gain competitive advantage in today's mobile market, cellular network testing, monitoring and improving customer experience is crucial. Today independent benchmarking companies are hired by mobile operators to run drive tests in a certain geographical areas. The high cost for running these tests results in a low frequency of execution, typically this benchmarking is executed no more than two or three times per year, which is not sufficient to follow the dynamics of an LTE network in a dense urban area. The majority of the drive testing costs come from the car, driver, and the in-car technician. Another approach is to take advantage of existing transportation companies to carry on network benchmarking services to Mobile Network Operators. Unattended measurement nodes can be deployed in existing transportation fleets without the need for dedicated field personnel, reducing the cost of testing up to 70%. This demo uses nodes placed in buses, available in several cities in Europe, to create and validate an automatic LTE network benchmark. The tool allows an easy comparative analysis of mobile network quality of service and quality of experience parameters based on the operators raw data.

#64

Wed1

UAlg Atrium
09:00 - 10:30

Action Learning-Based MOOC to Enhance Laboratory Learning Outcomes

Alexander A. Kist, Andrew Maxwell, Lindy Orwin, Ananda Maiti, Peter Albion, Hannah Jolly and Victoria Terry

Teaching in laboratories plays an integral role in education. This includes both proximal as well as remote laboratories. The MOOC for Enhancing Laboratory Learning Outcomes (MELLO) is designed to assist educators at all levels, from school to university, to improve the quality of laboratory experiences in STEM (Science, Technology, Engineering, and Mathematics) education. Experienced educators seeking to review and revise current practices or beginning educators are all welcome to participate. This demonstration introduces the course and shows how two modes of participation are being supported. This covers both face-to-face as well as technology-mediated laboratories.

#86

Wed1

UAlg Atrium
09:00 - 10:30

Virtual Reality as a Training Tool For Human Interactions

Fernando Pais, Bruno Patrão and Paulo Menezes

With the increasingly globalisation of the world, interaction with people from different cultures than ours is more likely than ever. Knowing how to correctly approach and interact with people that have different social norms than us is a necessary condition to live in this multicultural world. This project provides a tool to learn how to adapt the way we behave. This is achieved using a virtual reality environment as a way to train interactions, with focus on the interpersonal distances we take.

#88

Wed1

UAlg Atrium
09:00 - 10:30

Puzzle Time - VR Runner

Nuno Gouveia, Bruno Patrão and Paulo Menezes

In this demonstration we present a 3-D Virtual Reality Runner Game that serves as a tool for improving visuomotor coordination of young people, in particular children suffering from dyspraxia.

To further improve the immersion of the user, the proposed demo was implemented using an instrumented object (a cube). The object's tracking was done through a hybrid system, that fuses inertial sensing with a vision based marker detector, providing a smoother and bias corrected estimation of the object's pose.

#92

Wed1

UAlg Atrium
09:00 - 10:30

Development of a FEM-Lab for the virtual experimentation in forming processes

Joshua Grodotzki, Tobias R. Ortelt and A. Erman Tekkaya

In nowadays engineering, the ability to use and understand Finite-Element-Method (FEM) simulation software has become a crucial skill. If applied correctly, it can provide insight into various processes, such as forming operations, without the need to actually perform the real experiment. A novel, fully virtual FEM-Lab is currently under development at the Institute of Forming Technology and Lightweight Components of TU Dortmund, giving access to undergraduate students so they can learn about forming processes in detail by actively changing the process parameters. Fundamental knowledge about Finite-Element-Analysis (FEA) is provided during numerical experimentation such that previous knowledge is not necessary for using this kind of virtual laboratory.

#102

Wed1

UAlg Atrium
09:00 - 10:30

Application of virtual reality techniques to a birth simulation

Sérgio Pinto, Renato Natal Jorge, Mariana Petterson, Polyana Costa, Paulo Jansen, Daniela Costa, Anselmo Paiva and Marco Parente

This project arises from the need of developing an immersive method to visualize and interact with biomechanical simulations, using virtual reality, namely with online and remote applications. This particular case illustrates a human birth through the vaginal canal. The present research refers the process used to achieve the tridimensional object, in order to create in future projects a tool with training purposes for professionals in the medical area.

#104

Counting Cars and Analyzing Traffic with a Raspberry Pi, a Webcam and ThingSpeak

Wed1

UAlg Atrium
09:00 - 10:30

Alex Tarchini and Gareth Thomas

In this IoT project, we use a Raspberry Pi, a web cam and ThingSpeak, to count cars on a busy highway. We deploy a car-counting algorithm to the Raspberry Pi device, and we analyze and visualize the traffic patterns with ThingSpeak, a data aggregator. This project stores data in channel 38629 on ThingSpeak. Analytics are everywhere in the Internet of Things (IoT) occurring at: (1) The edge node, (2) Offline on the desktop, (3) In the cloud. At the station you will see three aspects how to pull and analyze data offline using MATLAB, see and understand the Simulink model that counts cars and uploads the data to the IoT platform and finally the number of cars passing in front of the MathWorks headquarters.

— End of Session Wed1 —

Wednesday, June 7, 2017
Exhibition Session (Demos'17): "Online Experimentation Demos II"
Chairs: Paulo Abreu and Tobias R. Ortelt
Demos: #02, #03, #04, #05, #07, #20, #27, #41, #43, #48, #58, #62, #87, #90, #97, #98, #105

#02

Wed2

UAlg Atrium
11:00 - 12:30

A web GIS-based platform to assist authorities in emergency response using VGI and sensor data

Diogo Fontes, Cidália Fonte and Alberto Cardoso

In order to assist civil protection authorities in emergency response situations, a web GIS-based platform was developed to integrate Volunteered Geographic Information (VGI) alongside with physical sensor data and official information, so that all these data can be integrated into one system and complement each other.

#03

Wed2

UAlg Atrium
11:00 - 12:30

An IoT remote lab for seismic monitoring in a programming course

Hélia Guerra, Arturo Montalvo Garcia, Luis Mendes Gomes and Alberto Cardoso

Emergent technologies combining online labs with IoT devices and real physical world situations have a high potential to promote innovation in higher educational programming courses. The adoption of IoT low cost devices can stimulate students to actively participate in the process of making their own remote labs. Following a project-based approach, we intend to improve CS2 students programming skills, with experiences in a laboratory to monitor seismic activity, in order to overcome their difficulties, to increase their motivation, to emphasize interaction with the external world through practical examples, as well as encourage them to self-study and problem solving.

#04

Web-based Platform for River Flood Monitoring

Wed2

UAlg Atrium
11:00 - 12:30

Alexandra Ribeiro, Alberto Cardoso, José Alfeu Marques and Nuno Simões

River floods are a major challenge. Here we demonstrate a web-based dissemination and sharing platform that brings together the essential information on river floods under a single user interface. The system contains various types of flood related information such as water levels, flows and rainfall, collected by geosensor networks, as well other kinds of relevant information. The platform can serve as an information channel between experts and authorities, to improve communication and collaboration, and as a web-based source of information for the public, satisfying their need of being timely informed on water and flooding conditions.

#05

Device for hand rehabilitation in online collaborative environment

Wed2

UAlg Atrium
11:00 - 12:30

Fernando Carneiro, Rafael Tavares, Paulo Abreu and Maria Teresa Restivo

This work presents a system for hand rehabilitation that makes use of an instrumented device and a virtual environment to provide augmented force and movement feedback to a patient, and data to a therapist. This system is aimed for use in occupational therapy, enabling remote and collaborative rehabilitation, as the environment allows recording of device data and remote streaming of the exercises.

#07

Adding augmented reality to online experimentation

Wed2

UAlg Atrium
11:00 - 12:30

José Rodrigues, Tiago Andrade, Paulo Abreu and Maria Teresa Restivo

This work proposes the use of augmented reality (AR) in laboratory experiments as a way to enrich the user experience in conducting the required procedures as well as reinforcing students' skills in the use of emerging technologies. Three examples are described of implementing an AR application, running on an Android smartphone, dealing with one haptic device and with two remote operated laboratory experiments.

The first AR application allows direct access to a video showing how the haptic device is assembled. The second AR application, ARNsensor, uses a marker to access in real time the data provided by a wireless sensor network used to monitor the laboratory indoor environment. The third application not only can access data from an online experiment, but also interact with the experiment. In this case, as the experiment involves controlling the level of a water tank, the user can control the water pump through a virtual command provided by the AR application. The three AR applications developed for an android smartphone are fully functional and are available for trial.

#20

Wed2

UAlg Atrium
11:00 - 12:30

An educational kit to teach and learn Operational Amplifiers

Ricardo Costa, Paulo Portela and Gustavo R. Alves

Operational Amplifiers are widely used for implementing simple and complex electronic circuits in electronic engineering. As a contribution to improve the way this integrated circuit is included in electronic engineering courses' curricula, this paper presents a prototype of an educational kit comprising a simulation tool and a reconfigurable hardware platform with the OpAmp uA741. It enables the simulation and experimentation of several electronic circuits constructed with the OpAmp uA741.

#27

Wed2

UAlg Atrium
11:00 - 12:30

Blockly experiments for EjsS laboratories

Daniel Galan, Ruben Heradio, Luis de La Torre, Francisco Esquembre and Sebastián Dormido

Science, technology, engineering and mathematics (STEM) disciplines require practical experimentation. In traditional education, this experimentation has been performed in laboratories, which are rooms with instrumentation connected to a real plant.

However, in online education, computers are the main, and more reasonable, tool for carrying out experiments. Simulations or virtual laboratories and remote laboratories (VRLs) were born from the necessity of performing experiments under the online education methodology. The benefits and utility of these type of laboratories have been extensively studied: they reduce costs associated with equipment, space, and maintenance staff, they support experimentation about unobservable phenomena and avoid health risks, such as radioactivity, chemical reactions, or electricity.

#41

Wed2

UAlg Atrium
11:00 - 12:30

Demonstration of Deep Drawing Experiments in a Remote Lab Environment

Joshua Grodotzki, Alessandro Selvaggio, Tobias R. Ortelt and A. Erman Tekkaya

Understanding fundamental process limits is a crucial skill for all types of engineers. In mechanical engineering, this especially applies to the field of metal forming. To have the students understand the different limits of the commonly used deep drawing process, e.g. the influence of the clamping force, a tele-operative testing cell was developed at the Institute of Forming Technology and Lightweight Components of TU Dortmund. The live experiments that can be conducted using this testing cell are included in different lectures as well as in remote labs which are accessible online for students around the world.
In either case, the experiments are used to have the students realize on their own what different types of limits exist and when they occur.

#43

Wed2

UAlg Atrium
11:00 - 12:30

A New Open-Source and Smart-Device Accessible Remote Control Laboratory

Julián Bermúdez-Ortega, Eva Besada-Portas, José A. López-Orozco and Jesús M. de La Cruz

In this paper we show a new remote lab software architecture for Automatic Control Education. This architecture is based on Node.js and Easy Java/JavaScript Simulations, which make it lightweight and accessible from smart devices like smartphones or tablets. It is easily adaptable to different types of controllers and experiments, as the existing labs at the University Complutense of Madrid show.

#48

Wed2

UAlg Atrium
11:00 - 12:30

Virtual Lab for Material Testing using Oculus Rift

Tobias R. Ortelt and Eric Ruider

A virtual lab with different material testing experiments in the field of forming technology is presented. Within a virtual environment, developed for the Oculus Rift, users can interact with the virtual test equipment to setup and conduct a tensile as well as a deep drawing test. The user can choose to hide different objects to gain an unobstructed view on the forming process which is impossible in actual experiments due to nontransparent machine parts. A variety of parameters can be altered in order to simulate different aspects of the depicted experiments.

#58

Wed2

UAlg Atrium
11:00 - 12:30

Experiments on Optical Spectrometry in the Virtual Remote Lab

Lars-Jochen Thoms and Raimund Girwidz

The analysis of spectra is fundamental to our modern understanding of wave optics and color perception. Every student should have the opportunity to conduct their own optical emissions experiments.

Since spectrometers are expensive and accurate calibration is necessary to achieve high quality spectra, we developed a remote lab for optical spectrometry. The Virtual Remote Lab combines the remote lab implementation with a similar-looking virtual lab version and is freely accessible for everyone.

#62

VENTI: experimental controller for inline duct fan

Wed2

UAlg Atrium
11:00 - 12:30

Paulo Abreu, Tiago Andrade, Rafael Tavares, Fernando Carneiro, Vasco Peixoto de Freitas and Maria Teresa Restivo

This demo exemplifies the use of a special built controller for an inline duct fan. This controller uses the temperature and humidity data, from the interior and exterior environment to implement programmable control strategies based on differential vapor pressure. The controller is able to operate the fan with variable velocity. The data from the sensors and the implemented control action are stored in a database so that it can be remotely accessed through the internet. This controller is an experimental platform to support current studies on demand-controlled ventilation and on control strategies with impact on indoor air quality and comfort.

#87

Exploring Avatar Interactions to Trigger Social Identity-Related Responses

Wed2

UAlg Atrium
11:00 - 12:30

Fernando Pais, Bruno Patrão and Paulo Menezes

With the increasingly immersive environments becoming available, one can't help but wonder the possibilities they unlock. Not only the worlds themselves, but also the avatars that populate them are becoming increasingly more complex. How people can use these developments has been a topic of discussion in the past few years.

In this demonstration we use a Virtual Reality Environment (VRE) as a tool to better understand our social identity, particularly underlying bias towards determined situations. We do so by comparing what the person thinks about themselves with actual physiological data collected in specific scenarios.

#90

Virtual transportation for immersive systems

Wed2

UAlg Atrium
11:00 - 12:30

Bruno Patrão and Paulo Menezes

This paper presents a demonstration of another solution for enabling user realistic control of displacements in a VR system. Aiming to provide the user with tools that allow him to navigate through endless virtual environments without feeling motion sickness. Observing the world with our focus on travelling mechanisms, we could identify situations where information captured from visual and vestibular system doesn't match and in general people don't feel nauseous, such as driving a vehicle or riding a bicycle. Our hypothesis is that if we can anticipate or control the movement coupled with visual cues we will not experience motion sickness.

#97

A Simple Browser-based 3D-Sketching Framework for Novice and Infrequent Users

Wed2

UAlg Atrium
11:00 - 12:30

Frode Sandnes and Yuriy Lianguzov

Modelling in 3D is considered time-consuming and difficult, requiring special training. There are currently no 3D modelling user interface conventions. This paper thus presents a framework for simple 3D modelling based on 2D drawings of height maps. The framework is intended to be quick and easy to use for untrained users and no special software is needed as the application runs in the browser.

#98

Wed2

UAlg Atrium
11:00 - 12:30

An immersive Virtual Reality interface for Civil Engineering dissemination amongst pre-university students

Fábio Dinis, João Poças Martins, Bárbara Rangel and Ana Guimarães

Game-based interfaces and Virtual Reality (VR) environments have shown encouraging results regarding Engineering and educational applications. In the Architecture, Engineering and Construction (AEC) sector, several developments have been made regarding the application of games and VR experiences. Simultaneously, Engineering Education is gradually adapting new practices for improvising transferability of knowledge amongst students, which also entail gaming and VR-based applications. This paper includes a description of an immersive VR interface developed under the scope of an ongoing educational programme. The developed VR interface allows participants to explore a 3D model of one of the campus' buildings, simultaneously discovering the different disciplines of Civil Engineering.

#105

Wed2

UAlg Atrium
11:00 - 12:30

Solving a Maze with your iPhone through MATLAB

Alex Tarchini and Gareth Thomas

Given the increasing usage of Mobile devices in different industries such as the Medical devices, this station will show how one can use MATLAB Mobile to control MATLAB with an example that takes the sensor data from the accelerometer and controls an APP in MATLAB. The example is easy to use and interactive, where the user has to solve a maze. The key learning here is how to stream data from a mobile phone directly to MATLAB.

— End of Session Wed2 —

Wednesday, June 7, 2017
Parallel Session: “Augmented Reality & Image Recognition”
Chairs: Bogdan Deaky and Zorica Nedic
Papers: #65, #67, #96

#65

Wed3A

UAlg Room A
11:00 - 12:30

Ananda Maiti,
Andrew Maxwell
and Alexander Kist

Using Marker based Augmented Reality and Natural User Interface for Interactive Remote Experiments

Remote Access Laboratories (RALs) use computer based platforms to deliver educational goals for engineering and scientific laboratories. To pursue more effective user interfaces, RAL can now be integrated with Augmented and Virtual Reality features to enhance users’ interactions and control features. A Natural User Interface (NUI) is one way to implement advanced input methods to capture data from users’ natural movement. These methods aim to enable interactions with greater options and flexibility. This paper introduces a method to use augmented reality and a natural user interface to create interactive laboratory experiments. In this case, experiments have a virtual object which is downloaded at the users’ location. The users use a NUI device to interact with the virtual object. Interaction with this object is translated to operational commands which are performed on the real hardware in a remote location through the Internet. The paper presents both, an overall architecture to support such environments and an example RAL experiment using this method, in form of a Gearbox, to show the practical relevance of the approach within RAL. The new system permits hands-on-experience with virtual objects as a part of the RAL activity.

#67

Wed3A

UAlg Room A
11:00 - 12:30

Potential for Utilising Head-Mounted Displays (HMDs) for Augmenting Laboratories

David Lowe and Ziyu Liu

Laboratory-based experiments are an important learning tool in many disciplines. These experiments involve students exploring physical phenomena. In many cases however these phenomena are not directly visible (e.g. magnetism, heat, etc.) The recent emergence of augmented reality technologies provides us with a way to change the way in which we perceive the real world. It can therefore be postulated that augmented reality may be able to be used to change the way in which students perceive reality whilst undertaking real-world experimentation, and hence to improve the educational process and outcomes. In this work we evaluate the potential for utilising Augmented Reality (AR) technology in a laboratory context. We consider a range of illustrative scenarios for enhancing the laboratory experience, such as: annotations to the experimental configuration; making visible phenomena that are otherwise invisible; and changing the actual laboratory configuration. We then use these scenarios to propose a classification of laboratory augmentation types.

#96

Wed3A

UAlg Room A
11:00 - 12:30

Offline and Online Deep Learning for Image Recognition

Nguyen Huu Phong and Bernardete Ribeiro

Image recognition using Deep Learning has been evolving for decades though advances in the field through different settings is still a challenge. In this paper, we present our findings in searching for better image classifiers in offline and online environments. We resort to Convolutional Neural Network and its variations of fully connected Multi-layer Perceptron. Though still preliminary, these results are encouraging and may provide a better understanding about the field and directions toward future works.

— End of Session Wed3A —

Wednesday, June 7, 2017
Parallel Session: “Serious Games and Gamification”
Chairs: Sonia B. Concari and Hélia Guerra
Papers: #32, #35, #59

#32

Wed3B

UAlg Room B
14:00 - 15:00

Educational games for children with special needs: preliminary design

João Salgado, Filomena Soares, Vítor Carvalho, Demétrio Matos and Celina P. Leão

This paper is focused on the problems and limitations that children with special needs have while playing. These problems can be mental or physical, and both types cause several barriers in the moment of play. The objective of this paper is the development of an educational game, using a microcontroller and some derived components. This solution can transmit to the player different sensations and levels of playability keeping the child focused and interested in the game. Also, all plays made by the child will be registered and presented to the therapist/parents on a computer or smartphone, making the toy a useful tool to analyze child’s evolution. The game will be controlled by an Arduino microchip and the communication to the device will be performed by an ESP8266 Wi-Fi module. Playing the game, children will be able to exercise specially their arms and hands muscles and to stimulate their mind.

#35

Wed3B

UAlg Room B
14:00 - 15:00

Communication Model of Open Government Data Gamification Based on Ukrainian Websites

Oleksandr Blazhko, Tetiana Luhova, Sergey Melnik and Viktoriia Ruvinska

The article defines and characterizes the information-communicative model of gamification of the governmental open data web portals as well as defines the factors that contribute to the effective functioning of an open database in computer games of various types.

The integration of Ukrainian governmental websites, containing open statistics data, into a public open data portal is described. The article provides the rules for selecting the data suitable for gamification and gives an example of the design of arcade-type games with open data sets.

#59

Wed3B

UAlg Room B
14:00 - 15:00

A Serious Game Concept to Enhance Students' Learning of Statistics

Celina P. Leão, Filomena Soares, Vitor Carvalho, Sérgio Lopes and Ivo Gonçalves

In this ongoing work, the team intends to present a conceptual serious game as an educational tool to promote and demonstrate the applicability of statistical concepts in day-to-day life and in the decision-making process. The serious game will provide learning content in a game-based environment where students/players interact by applying knowledge in Statistics. There will be no right or wrong answers. Based on the students' answers and choices, the serious game, by a design mechanism, will lead them to different challenges until they reach the end. Students' answers must use concepts acquired in the classroom.

— End of Session Wed3B —

Thursday, June 8, 2017
Parallel SOetBE'17 Special Session: "Simulation and Online Experimentation in Technology Based Education"
Chairs: Wlodek Kulesza and Celina P. Leão
Papers: #25, #33, #66, #76

#25

Thu1A

UAlg Room A
14:00 - 15:00

Application of remote experiments in a secondary school using the MOOC approach

Olga Dziabenko and Dominique Persano Adorno

This paper presents first attempt to incorporate remote and virtual experiments in MOOC environment for the secondary school instruction. In case study the VISIR+ remote experiment of the WebLab-Deusto was used. The basic topic of physics "Resistors in series" was suggested for the mentioned above experiment. The open edX platform was employed to build the MOOC for the school lesson - we named it 'micro-MOOC'. The results could be helpful for secondary school sector representatives, education instructors, parents and policy makers to respond to current and future education needs.

#33

Thu1A

UAlg Room A
14:00 - 15:00

Remote Renewable Energy Laboratory-Green Electric Energy Park (GEEP)

Nazanin Mohammadi, Geoffrey Hsiung and Iain Murray

Distributed teaching of engineering subjects requires the accessibility of equipment and devices over the Internet The authors have developed an effective environment for remote renewable engineering laboratories and distance learning. This paper covers the background, methods, evaluation and analysis of remote laboratory model designed and implemented to consolidate data, video and audio feeds gathered from Curtin University's Green Electric Energy Park (GEEP) facility into a VMWare virtual machine, accessible through NDG's NETLAB+ platform.

The model was designed with the desire of reducing the bandwidth overheads when attempting to access particular feeds and stable connectivity in a secure manner to provide Curtin international partner students with the same laboratory environment as local students.

#66

Thu1A

UAlg Room A
14:00 - 15:00

Evaluation of on-line simulation tools to teach Chemical Processes

Maria Graca Rasteiro and Diana Urbano

Engineering educators have been driven to develop practical approaches to supplement scientific background to further develop the capacity for autonomous and critical thinking in students, which has to lead to new teaching methodologies. In 2009, the University of Coimbra has made available on-line a virtual platform with a wide scope, directed towards the learning of Chemical Processes. The platform is divided into four different sections: Unit Operations and Separations, Chemical Reaction, Process Systems Engineering and Biological Processes. These sections include simulators, applications and case studies to better understand the chemical/biochemical processes. This paper presents an assessment of the use of that platform by two different groups of students: a group of students from the 3rd year of the 1st cycle of Chemical Engineering, and another group from a Project Design course (2nd year of the 2nd cycle degree, MSc, of Chemical Engineering), both from the University of Coimbra. The results presented reveal that the students are willing to use and feel positive and interested in using the platform.

#76

Thu1A

UAlg Room A
14:00 - 15:00

Cloud Ecosystem for Supporting Inquiry Learning with Online Labs: Creation, Personalization, and Exploitation

Denis Gillet, María Jesús Rodríguez-Triana, Ton de Jong, Lars Bollen and Diana Dikke

To effectively and efficiently implement blended science and technology education, teachers should be able to find educational resources that suit their need, fit with their curricula, and that can be easily exploited in their classroom. The European Union has supported the FP7 Go-Lab Integrated Project (2012- 2016) and then the H2020 Next-Lab Innovation Action (2017- 2019) to develop and disseminate inquiry learning spaces as open educational resources integrating online labs. This paper presents the technical ecosystem supporting these initiatives and combining loosely-coupled cloud services and platforms. The golabz.eu sharing platform is a repository offering online labs, scaffolding apps, and inquiry learning spaces created by teachers for teachers. The graasp.eu authoring platform is a social media enabling collaborative creation, agile personalization and secure exploitation at school, as well as exchange of best practices between teachers.

— End of Session Thu1A —

Thursday, June 8, 2017
Parallel Session: "Environment Monitoring"
Chairs: Paulo Abreu and Frode Sandnes
Papers: #11, #14, #91

#11

Thu1B

UAlg Room B
09:15 - 10:30

Integration of VGI and sensor data in a Web GIS-based platform to support emergency response

Diogo Fontes, Alberto Cardoso and Cidália C. Fonte

The major goal of this work is to develop a web GIS-based platform integrating geographic information from different sources to provide additional information to civil protection entities. It will integrate official geographic information (GI), Volunteered Geographic Information (VGI) and physical sensors data. This paper presents an analysis on how the VGI data from multiple sources and with different structures can be acquired and reorganized to be compiled in a single system.

#14

Thu1B

UAlg Room B
09:15 - 10:30

Geosensing-Based Platform for Supporting Operational River Flood Forecast

Alexandra Ribeiro, Alberto Cardoso, José Alfeu Marques and Nuno Simoes

Up-to-date information is fundamental for monitoring and managing large-scale river floods efficiently. Geosensors (or environmental sensors) ranging from water gauges to weather stations are nowadays used to gather such information. This data must be available in near real-time to feed hydrological and hydraulic models used to predict river flows and water levels. These predictions provide guidance when to take an action such as the issuing of a warning. Real-time decision support systems, frequently designated as flood forecasting and warning systems, are used to organize the complex process of coupling data and models in real-time.

In this work is presented the first construction steps of such a system at a local level, focusing on the data sensor collection and management. The prototype platform is applied to the Mondego River nearby Coimbra City, Portugal.

#91

Thu1B

UAlg Room B
09:15 - 10:30

Temperature time series: pattern analysis and forecasting

Manuel Barbosa
and Antonio Lopes

This paper uses time-frequency methods and neural networks for the analysis and forecasting of indoor temperature time series. In a first phase, the time series are processed by means of the Fourier transform and the empirical mode decomposition methods to unveil temporal patterns embedded in the data. In a second phase, neural networks are adopted for forecasting future values. The results obtained illustrate the effectiveness of the tools used and motivate further developments based on time-frequency techniques for designing the NN forecasting approach.

— End of Session Thu1B —

Thursday, June 8, 2017
Parallel OEEE'17 Special Session: "Online Experimentation in Science and Engineering Education"
Chairs: Horácio Fernandes and Radojka Krneta
Papers: #23, #30, #63, #69, #72

#23

Thu2A

UAlg Room A
11:00 - 12:30

Remote Control of Plasma Diagnostics System for Tokamak Facility

Vadim Krupin, Gennady Notkin, Vladislav Troynov and Alexander Zimin

The report addresses a remote molecular diagnostics system for studies of the edge plasma inT-10 tokamak at National Research Centre Kurchatov Institute. Web control of a monochromator and a CCD camera based on Internet technologies was used to monitor radiation. The structure and communications chart of the software components implemented in the system are described. A special web application has been developed to visualize, identify and analyze protium and deuterium molecular spectra. It is accessible to remote users through their private accounts during and after a remote control session. The system allows researchers located far away from the unique high-temperature plasma test facility to take an active part in experiments.

#30

Thu2A

UAlg Room A
11:00 - 12:30

An Internet of Laboratory Things

Timothy D. Drysdale, Nicholas St.J. Braithwaite and The Openstem Lab Team

By creating "an Internet of Laboratory Things" we have built a blend of real and virtual laboratory spaces that enables students to gain practical skills necessary for their professional science and engineering careers. All our students are distance learners. This provides them by default with the proving ground needed to develop their skills in remotely operating equipment, and collaborating with peers despite not being colocated.

Our laboratories accommodate state of the art research grade equipment, as well as large-class sets of off-the-shelf work stations and bespoke teaching apparatus. Distance to the student is no object and the facilities are open all hours. This approach is essential for STEM qualifications requiring development of practical skills, with higher efficiency and greater accessibility than achievable in a solely residential programme.

#63

Thu2A

UAlg Room A
11:00 - 12:30

Browser-Enabled Distributed Crowdsensing

Mario Alessandro Bochicchio, Antonella Longo, Lucia Vaira, Marco Zappatore and Lorenzo Cazzella

Mobile Crowdsensing is often used for involving large number of persons in distributed sensing experiments. In some cases, (e.g., online games, online sensing of sensitive data, etc.) privacy and security issues arise. Peer-to-peer networks can be effectively used to guarantee anonymity and solve the above mentioned issues. In this scenario, we describe an experiment of browser-based peer-to-peer approach for mobile crowdsensing for the specific field of noise pollution monitoring.

#69

Thu2A

UAlg Room A
11:00 - 12:30

Comparison of the effectiveness of Logisim software tool and remote experiments based on Nexys 2 FPGA platform in learning digital circuits design

Vanja Lukovic, Aleksandar Peulic, Radojka Krneta, Đorđe Damnjanovic, Ana Vulović, Christos Dimopoulos and Konstantinos Katzis

This paper describes the findings from our study on the parallel usage of Logisim software tool and remote experiment based on Nexys 2 FPGA hardware platform for learning digital circuits design and computer architecture by students of the first and the second-year of Electrical, Computer and Mechatronics Engineering undergraduate study programs at the Faculty of Technical Science Čačak, University of Kragujevac.

For the purpose of comparison of the effectiveness of these two learning tools, a survey was conducted between students who used these tools in learning digital circuits design within the course Foundations in Computer Technics 2 during the winter semester of the academic year 2016-2107. Based on analysis of given results some conclusions were drawn regarding to parallel usage of Logisim software tool and remote experiments based on FPGA hardware platform in learning digital circuits design.

#72

Value of remote experiments

Thu2A

UAlg Room A
11:00 - 12:30

Diana Urbano, Maria de Fátima Chouzal and Maria Teresa Restivo

Online experimentation available through web collaborative platforms is a valuable tool for students in science and engineering courses looking for skills to be part of the driving force behind Industry 4.0. However, the user's virtual presence on this type of tools demands that their educational value be carefully assessed. This work presents a case study in which students of a Mechanical Engineering program evaluated Remote Experimentation resources. For this purpose, a questionnaire to measure latent variables such as Interest and Perceived Importance was used. The results were analyzed using multiple regression models and causal effects of some motivational factors on others are hypothesized and tested. One of the conclusions that can be drawn is that the interest students have for Remote Experimentation and the importance they attribute to it depend on the interest they have for the contents of the course and on the importance they think the course has on their engineering training. Moreover, ease of use and help provided also play a significant role in the interest and perceived importance of Remote Experimentation.

— End of Thu2A —

Thursday, June 8, 2017
Parallel OEC'17 Special Session: "Online Experimentation in Control"
Chairs: Andreas Pester and Luciano A. Mendes
Papers: #24, #44, #54, #60

#24

Thu2B

UAlg Room B
11:00 - 12:30

Ball & Beam experiment control with current sensing

João Oliveira, Samuel Balula and Horácio Fernandes

One of the most typical experiments in control is the classical Ball & Beam apparatus. An electrical measurement of the ball position is traditionally used to perform control. The metallic ball makes an electrical contact across the two Cr-Ni rails in which it circulates. The current injected in one of the rails creates a measurable voltage difference between the terminals of the second one, linearly dependent on the ball position. The measurement noise is filtered out using both analog and digital techniques. By also measuring the beam tilt angle with a digital protractor, the system becomes observable. Using two cascaded digital PID controllers the position of the ball is kept around the set point with a standard deviation of 10mm. The experiment performs correctly allowing deep study of the noise influence on the controller and its mitigation techniques. The control board is connectable to a single-board computer enabling remote operation of the experiment. Integration on a remote control laboratory such as e-lab is straightforward.

#44

Thu2B

UAlg Room B
11:00 - 12:30

Simple Experiment Integration into Modular Online Laboratory Environment

Matej Rábek and Katarína Žáková

The paper contributes to the area of remote laboratories. It describes an implementation of a particular remote laboratory system and reviews its design and key features. The paper discusses several adopted technologies and the motivation behind their use.

To emphasize the advantages of a modular remote laboratory application, the paper illustrates the process of adding a new remote experiment by connecting a real device to the system. This process is broken down into several steps and each is explained in more detail. The paper concludes with a rundown of other additional features which increase the overall user-friendliness of this web application.

#54

Thu2B

UAlg Room B
11:00 - 12:30

Experimenting with Constrained Dead Time Compensators for FODT Systems

Mikulas Huba and Katarina Zakova

Plant approximations by the first order plus dead time systems represent the most frequently used plant models in control design. The paper describes experimental environment enabling to demonstrate by virtual and real time experiments all aspects of a successful dead time compensator design. The batch of possible experiments includes verification of control constraints impacts, phenomena related with control of unstable plants, input and output disturbances and measurement & quantization noise. By a series of such experiments it is possible to demonstrate, when continuous-time solutions are not satisfactory and some discrete-time implementations have to be used, or when a filtered Smith predictor does not represent the optimal solution and an alternative disturbance observer based compensator has to be chosen instead.

#60

Thu2B

UAlg Room B
11:00 - 12:30

Simulation Tool for Time Sub-Optimal Control of Time-Delayed Systems with Input Saturation

Pavol Bistak and Mikulas Huba

The paper describes a simulation tool that compares different time sub-optimal controllers applied for the second order time-delayed systems with integral character.

Thus the controlled system is modeled by two integrators with a time-delay. Depending on the desired closed loop poles various time suboptimal controllers are derived. They represent hybrid solutions with dynamics ranging from the relay minimum time systems to linear pole assignment ones. In contrast to the other known solutions the controllers derived are appropriate also for extremely fast application and easy to tune by a procedure that generalizes the well-known method by Ziegler and Nichols. The simulation tool designed in the Matlab/Simulink environment easily enables to use the designed controllers, change their parameters and apply them to the controlled system. The developed simulation tool provides comparison of applied controllers and can be easily accessible via the Internet.

— End of Session Thu2B —

Thursday, June 8, 2017
Parallel Session: "Control Systems"
Chairs: Vule Reljić and Olga Dziabenko
Papers: #49, #12, #47, #57, #81

#49

Thu3A

UAlg Room A
14:00 - 15:30

Ultrasonic indoor positioning for smart environments: a mobile application

Edel Diaz, Mª Carmen Perez, David Gualda, Jose Manuel Villadangos, Jesus Ureña and Juan Jesus Garcia

In this paper we present a mobile application and solution for accurate smart indoor positioning. Smart society applications do normally require user location, specifically, in indoor environments high accuracy can enrich augmented or virtual reality, gaming, in-building guidance or support for ambient assisted living. We use encoded ultrasonic signals and TDMA protocol to obtain fine-grained distance measurements. Signals are emitted from a set of low cost ultrasonic local positioning systems, operating around 41kHz. An acquisition module, based on a MEMs microphone and a microcontroller, digitizes at 100kHz the incoming signals and sends them over an USB protocol to the mobile device for their processing. We have implemented an Android Application that computes the Time Difference of Arrival (TDOA) to estimate the current position and display it in the mobile screen. Several users can compute their positions autonomously and user privacy is protected. The application can be configured for different encoding techniques and modulation schemes according to the environment requirements. Absolute error below 5 cm is achieved in a 5x6m complex environment in 85% of the cases for an average position refresh period of 200ms.

#12

Thu3A

UAlg Room A
14:00 - 15:30

Flood Management in Urban Drainage - Contributions for the Control of Water Drainage Systems using Underground Barriers

Joaquim Leitão, Alberto Cardoso, José Alfeu Marques and Nuno Simoes

In this work an alternative and innovative usage for urban drainage systems was explored, in which barriers were installed and controlled in upstream underground conduits. This approach intends to use such components to retain water in upstream sections of a given drainage system, reducing water flows that reach its downstream sections and, consequently, their overload degree. The developed rule-based control system monitors the drainage system by acquiring data from different locations and performs the necessary control actions on a set of installed barriers. This control system was applied in drainage systems with a given set of properties, subjected to rainfall events with specific characteristics. With the developed control system, it is possible to prevent flood events within certain limits. When this task becomes impossible water withdrawals to external retention basins can be promoted, avoiding the need to perform any intervention. These results suggest the feasibility of the proposed approach for remote monitoring of drainage systems, accommodating the effects of climate changes.

#47

Thu3A

UAlg Room A
14:00 - 15:30

A demonstration circuit to support (e-) learning control systems engineering

Carlos Felgueiras, Andre Fidalgo, Clovis Petry, Luis Schlichting, Gustavo R. Alves and Ricardo Costa

Concepts of Control Systems are important as they are present in the operation of a broad set of systems in all engineering branches. Sustainability issues have led to an intensive use of these concepts on systems.

However teaching / learning of Control Systems Engineering has always been a difficult subject not only for the underlying theoretical part, but also for the few examples that are traditionally possible to illustrate in laboratory classes. Shortcomings are revealed at a later time when students have to understand subjects that include stabilization mechanisms or even when they need to develop control solutions based on digital technology, such as microcontrollers.
The present work presents a circuit based on analog electronics that was designed to carry out local laboratory experiments. The circuit is designed to create evidence for the student and allows the comparison of the values obtained experimentally with those expected theoretically. The requirements were included in the project to allow experiments to be performed remotely when integrated into an appropriate platform.

#57

Control System for a Self-Balancing Robot

Thu3A

UAlg Room A
14:00 - 15:30

Ricardo Martins and Francisco Nunes

The control of a self-balancing robot has been studied for many years and, despite several achievements, there are still open issues. The aim of this project is to study the efficiency of different control algorithms, as Proportional, Integral and Derivative (PID), pole placement, adaptive control, among others, in a home-made robot called Bimbo. It was also tested an algorithm, applied to the position. The robot was constructed with the modules for movement and position control. It was applied a Kalman filter to get the Roll angle from the Inertial Measurement Unit (IMU). Furthermore, the mechanism to read encoders and to control the two motors was implemented.

It was built a mechanism to control system variables through Bluetooth communication, which allows to continuously monitor any robot variable, allowing to test the system and the control variables in real-time. The selected solution implements a PID, continuously changing the reference by a “position algorithm”. A human control interface was created to command Bimbo navigation direction.

#81

WEB PLC Simulator for ST Programming

Thu3A

UAlg Room A
14:00 - 15:30

Luis Brito Palma, Vasco Brito, João Rosas and Paulo Gil

In this paper, the main functionalities of a WEB Programmable Logic Controller (PLC) Simulator for programming in Structured Text (ST) language, in the context of industrial automation and control, are presented. The available ST identifiers, expressions and statements are described, and some code examples are given. The simulator provides digital input/output channels, analog input/output channels and also the interaction with a dynamic process model of type autoregressive type with exogenous input (ARX). The main contributions are a new environment for teaching, for remote learning, as also one more way to motivate the students and to obtain feedback from them.

— End of Session Thu3A —

Thursday, June 8, 2017
Parallel Session: "Sensing Systems"
Chairs: Ricardo Costa and Unai H. Jayo
Papers: #68, #70, #10, #21, #51

#68

Thu3B

UAlg Room B
14:00 - 15:30

Creative developments in LabVIEW student training (Creativity Laboratory – LabVIEW Academy)

Doru Ursutiu, Cornel Samoila and Vlad Jinga

In Transylvania's University - Creativity Laboratory we try to do complex trainings of students and high school children's - connected with the their preparation for LabVIEW (Laboratory Virtual Instrumentation Engineering Workbench) Academy examinations. The graphical nature of LabVIEW makes it easier to develop working code faster - quickly drag and drop built-in functions to simplify acquisition, analysis, control, and data sharing so you can spend less time on syntax errors and more time on creative development of your application. In this paper we present how we put together: industrial cooperation (developed in cooperation with industry), complex system development and fast implementation, LabVIEW training and student/children's creativity development (learning by doing). It is a good exercise to increase creativity starting from a concrete application that allows multiple solutions. This diversity allows students to compare, to do critically appreciation one another, to understand the role of communication and exchange of experience in creating new solutions and to have finally the satisfaction of one achievement, made on their own, under the guidance of professor and in collaboration with colleagues.

#70

Thu3B

UAlg Room B
14:00 - 15:30

Analog computing with Pocket Labs

Andreas Pester and Thomas Klinger

This paper describes the experience in using pocket labs, in our case the NI myDAQ, also for interdisciplinary projects in engineering mathematics, electrical engineering and circuit design for first year students.

#10

Thu3B

UAlg Room B
14:00 - 15:30

EEG-based drowsiness detection platform to compare different methodologies

Daniel Ribeiro, Alberto Cardoso and César Teixeira

Over the years it has been observed that drowsiness appears as one of the factors of the occurrence of road accidents. By focusing the study on sleep stage 1, transition period between awakeness and sleepiness, it's possible to create a system capable of detecting drowsiness. In this paper we describe an electroencephalogram (EEG)-based platform capable of detecting drowsiness. This platform consists of the processing and analysis of EEG signals, using several methods to select the most promising features, serving these as input for the creation of different classifiers. Thus, it is possible to study the most appropriate methodology for the development of a prototype capable of detecting drowsiness. The best result was obtained with the use of delays, specifically with 012, where we used three epochs, one from the present as well as the previous two epochs from the past, obtaining a classifier with an accuracy of 93.24%, with the delay 23, where only the second and third previous epochs were used, similar results were obtained, 93.20%.

#21

Thu3B

UAlg Room B
14:00 - 15:30

Towards the use of commercial wrist wearables in education

Francisco de Arriba-Pérez, Manuel Caeiro-Rodríguez and Juan M. Santos-Gago

This paper is about the use of commercial wrist wearables in education, more specifically, about how to support smart education in the context of new smart universities. Wrist wearable devices such smartwatches or smartbands include a variety of sensors that can be used to collect physiological and activity-related data about a subject, for example a learner or a teacher, and estimate insightful features about him.

This paper reviews the current state of the art of projects and initiatives based on the use of these devices, the types of wearables available nowadays and the main problems and issues involved for educational purposes: data collection, data integration, sensor accuracy, etc. In the paper, we also introduce our developments towards the provision of sleep and stress indicators taking advantage of these devices. We distinguish among services for students, for teachers and for developers.

#51

Thu3B

UAlg Room B
14:00 - 15:30

Sensory System for the Sleep Disorders Detection in the Geriatric Population

Mauro Cruz Alberto, M. Ángel Herrero Ramiro, Ana Jiménez Martín, J. Jesús García Domínguez, Edel Díaz and M. Graça Ruano

This paper introduces the proposal of a remote sensory system for the detection of sleep disorders in geriatric outpatients. Although the most accurate solution would be an indepth study in a sleep clinic, it is not a realistic environment for the elderly. The objective is that the patient stays at home, and without changing their daily routines, the clinicians get objective information in order to make a correct diagnosis of the sleep disorders. As a first step towards achieving a home remote monitory system, this work introduces a Body Sensor Network (BSN) to monitor various vital signals as Electrocardiogram (ECG) and Electromyogram (EMG) in order to collect enough information for sleep disorder diagnosis, focusing on the detection of obstructive sleep apnea. This work proposes an algorithm to infer obstructive sleep apnea (OSA) based on power spectral analysis of ECG signals from a single-lead electrocardiogram, demonstrating the feasibility of BSN to detect OSA with around 85% sensitivity.

— End of Session Thu3B —

Program Overview

Monday, June 5, 2017 (Pre-Conference)

Registration		UAlg Atrium	09:00 - 12:30
Mon1A: Parallel Activity	VISIR+ Project Meeting	UAlg Room 1.55	09:00 - 12:30
Mon1B: Parallel Activity	PILAR Project Meeting	UAlg Room B	10:00 - 12:30
Registration		UAlg Atrium	13:30 - 17:30
Mon2A: Parallel Activity	Technical visit to the Faro Airport (Departure from UAlg Bus Stop)	Faro Airport	14:00 - 15:30
Mon2B: Parallel Activity	VISIR+ Project Meeting	UAlg Room A	14:00 - 15:30
Coffee break		UAlg Atrium	15:30 - 16:00
Parallel Activity	Technical visit to the Faro Airport (Departure from UAlg Bus Stop)	Faro Airport	16:00 - 17:30
Mon3B: Parallel Activity	VISIR+ Project Meeting	UAlg Room A	16:00 - 17:30
Mon3C: Parallel Activity	PILAR Project Workshop	UAlg Room B	16:00 - 17:30
Social Programme Activity		Faro, Hotel Eva	18:30

Tuesday, June 6, 2017 (Conference)

Tue0: Activity	VISIR+ Project Meeting	UAlg Room A	08:00 - 10:00
Registration		UAlg Atrium	09:00 - 15:30
Welcome Coffee		UAlg Atrium	09:00 - 10:00
Tue1: Opening Session		UAlg Green Aud.	10:00 - 10:30
Tue2A: Parallel Session	"VISIR Remote labs" Papers: **#19**, **#37**, **#45**, **#53**, **#71**, **#77**	UAlg Room A	10:40 - 12:40
Tue2B: Parallel Session	"Web Platform Components for OE" Papers: **#28**, **#34**, **#36**, **#39**, **#74**, **#103**	UAlg Room B	10:40 - 12:40
Lunch break		UAlg Canteen	12:40 - 14:00
Tue3A: Parallel REMO'17 Special Session	"Remote Experiments in Marine Observations" Papers: **#93**, **#94**, **#95**	UAlg Room A	14:00 - 15:00
Tue3B: Parallel Session	"Collaborative and Immersive Environments" Papers: **#15**, **#79**, **#89**	UAlg Room B	14:00 - 15:00
Move to Lethes Theatre (Faro)		UAlg Bus Stop	15:15
Coffee break		Lethes Theathre	16:00 – 16:30

Tue4: Plenary Session	"Consumers, providers and prosumers, what is there outside of research?" Keynote Speaker: **Javier García-Zubía** (Spain)	Lethes Theatre	16:30 -17:20
Tue5: Plenary Session	"MATLAB as a Tool for Online Experimentation" - **Alex Tarchini**, MathWorks	Lethes Theatre	17:30 - 18:00
Welcome Reception at "Faro Municipal Museum"		Faro Old Town	19:00

Wednesday, June 7, 2017 (Conference)

Registration		UAlg Atrium	08:30 - 16:30
Wed1: Exhibition Session (Demos'17)	"Online Experimentation Demos I" Demos: **#01**, **#06**, **#08**, **#17**, **#18**, **#22**, **#31**, **#38**, **#40**, **#42**, **#46**, **#55**, **#64**, **#86**, **#88**, **#92**, **#102**, **#104**	UAlg Atrium	09:00 - 10:30
Coffee break		UAlg Atrium	10:30 - 11:00
Wed2: Exhibition Session (Demos'17)	"Online Experimentation Demos II" Demos: **#02**, **#03**, **#04**, **#05**, **#07**, **#20**, **#27**, **#41**, **#43**, **#48**, **#58**, **#62**, **#87**, **#90**, **#97**, **#98**, **#105**	UAlg Atrium	11:00 - 12:30
Lunch break		UAlg Canteen	12:30 - 14:00
Wed3A: Parallel Session	"Augmented Reality & Image Recognition" Papers: **#65**, **#67**, **#96**	UAlg Room A	14:00 - 15:00
Wed3B: Parallel Session	"Serious Games and Gamification" Papers: **#32**, **#35**, **#59**	UAlg Room B	14:00 - 15:00
Wed4: Plenary Session	"User Experience for Live Experimentation in AR and VR Settings: Synergetic Effects between Computer Science and Games" Keynote Speaker: **Gudrun Klinker** (Germany)	UAlg Green Aud.	15:10 - 16:00
Coffee break		UAlg Atrium	16:00 - 16:30
Wed5A: Parallel Round Table	"Augmented Reality - a technology of the future or just a momentary hype?"	UAlg Green Aud.	16:30 - 18:00
Wed5B: Parallel Activity	Erasmus+/Tempus Projects Meeting	UAlg Room A	16:30 - 18:00
Wed5C: Parallel Activity	IEEE Meeting	UAlg Room B	16:30 - 18:00
Wed5D: Parallel Activity	VISIR+ Project Meeting	UAlg Room C	16:30 - 18:30
Social Programme Activity (Concert of Portuguese guitar)		Lethes Theatre	21:30 - 22:30

Thursday, June 8, 2017 (Conference)

Registration		UAlg Atrium	08:30 - 17:00
Thu1A: Parallel SOet-BE'17 Special Session	"Simulation and Online Experimentation in Technology Based Education" Papers: **#25**, **#33**, **#66**, **#76**	UAlg Room A	09:15 - 10:30
Thu1B: Parallel Session	"Environment Monitoring" Papers: **#11**, **#14**, **#91**	UAlg Room B	09:15 - 10:30
Coffee break		UAlg Atrium	10:30 - 11:00
Thu2A: Parallel OEEE'17 Special Session	"Online Experimentation in Science and Engineering Education" Papers: **#23**, **#30**, **#63**, **#69**, **#72**	UAlg Room A	11:00 - 12:30
Thu2B: Parallel OEC'17 Special Session	"Online Experimentation in Control" Papers: **#24**, **#44**, **#54**, **#60**	UAlg Room B	11:00 - 12:30
Lunch break		UAlg Canteen	12:30 - 14:00
Thu3A: Parallel Session	"Control Systems" Papers: **#49**, **#12**, **#47**, **#57**, **#81**	UAlg Room A	14:00 - 15:30
Thu3B: Parallel Session	"Sensing Systems" Papers: **#68**, **#70**, **#10**, **#21**, **#51**	UAlg Room B	14:00 - 15:30
Thu4: Plenary Session	"Digitalization in Process Industries - Integrated Engineering and Integrated Operations" Keynote Speaker: **Steeve Baudry** (Siemens, Germany)	UAlg Green Aud.	15:40 - 16:30
Coffee break		UAlg Atrium	16:30 - 17:00
Thu5: Closing Session		UAlg Green Aud.	17:00 - 17:30
Gala Dinner and Awards		Hotel Faro	20:00

Friday, June 9, 2017 (Post-Conference)

Fri1: Technical Visit	Visit to the CIMA Labs	UAlg CIMA Labs	09:30 - 11:00
Coffee break		UAlg CIMA Labs	11:00 - 11:30
Departure to Ria Formosa trip		UAlg Bus Stop	11:30
Trip through Ria Formosa			12:00
Lunch and Free time			13:30
Return to Faro			17:00

exp.at'17 is a joint organization of the University of Porto and the University of Coimbra with the collaboration of the University of Algarve and with the technical support of IEEE and the Portuguese Engineers Association. This fourth edition is held at the University of Algarve, Faro, Algarve, Portugal.

exp.at'17 continues the biennial event dedicated to Online Experimentation (OE), contributing to extend the world capabilities in this particular area and to develop collaborative work in emergent technologies, bringing together engineers, researchers and professionals from different areas. OE comprises remote and virtual experimentation as identifiable and accessible objects and their virtual representations in the Internet of Everything structure and is aided by emergent technologies as those supporting remote experiments, 2D or 3D virtual experiments, augmented reality experiments and their interaction with sensorial devices, live videos and other tools, which promote user immersion in virtual environments recreating the real experience and training activities in many and different areas.

exp.at'17 provides a three-day (plus pre- and post-conference days) forum of discussion and collaboration between academics, researchers and industry and medicine professionals, trying to bridge the gap between academic applications and the real world needs and experiences. It offers to the participants an opportunity to present their recent work and to take part in technical sessions, workshops, exhibition sessions, discussion tables and thematic visits in the beautiful region of Algarve.

http://expat.org.pt/expat17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