

Program

Remote Engineering &
virtual instrumentation

June, 23rd–25th
Düsseldorf, Germany

REV 2008

editorial

Remote solutions based on Internet technology are being increasingly deployed in numerous areas of research, science, medicine and education. With further growth in Internet access, increasing bandwidth and improved security, remote technologies [RT] will continue to spread and will form a key factor in the efficient use of a globalised ICT. Examples of RT include remote engineering, remote service and diagnosis, telemedicine and telemonitoring, remote control, remote training labs and telerobotics. The REV2008 conference takes up the topics in its variety and discusses the state-of-the-art and future trends in Remote Technology. REV2008 received contributions from academic and industry researchers in 25 countries and 6 continents. It is a great pleasure for me to welcome all authors, invited speakers and remaining conference participants that are coming to Duesseldorf to share the result of this effort. Welcome to REV2008!

Reinhard Langman
Department of Electrical Engineering
University of Applied Sciences Düsseldorf
 Professor, REV2008 Conference Chair

Online Engineering is one of the future directions for advanced teleworking/e working environments not only in engineering and science but also in all other fields affecting society. In the last years, considerable advances have been made regarding the design and development of remote and virtual laboratories. These advancements have been possible because of the growing technical capacity of the internet (bandwidth) and new models of e- and distance learning and e-work. Remote Engineering and Virtual Instrumentation are core technologies in the field of Online Engineering and the organizational framework for a global networking of experts is the International Association of Online Engineering (IAOE). The annual conference of the IAOE is the »International Conference on Remote Engineering and Virtual Instrumentation« (REV). I am sure the REV2008 will again be a successful event on a high scientific level and with a good mix of theory and practice. My deep thankfulness goes to Reinhard Langmann and his team for the organization of the conference.

Michael E. Auer
Carinthia Tech Institute Villach and
International Association of Online Engineering
 Professor, President and CEO

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Contact
 Prof. Reinhard Langmann
 University of Applied Sciences Düsseldorf
 Phone +49 211 4351 308
 Fax +49 211 4351 303
 telelabor@fh-duesseldorf.de

program survey

Monday, June 23rd

9:00–17:00
 H57/Reception

Registration

10:00–11:00

Workshop 1
WS 11: Experience in an applied training strategy on an actual factory model on a scale of 1:20
 Workshop by Michael Ermer [SIEMENS AG]
 Room M14

Tutorial 1
TUT 11: Electronic support for the course Constrained PID Control
 Workshop by Prof. Mikulas Huba [STU Bratislava]
 Room V200

11:00–11:30

Coffee Break
 Areaway
 Building M

11:30–13:00

Workshop 1
WS 12: Experience in an applied training strategy on an actual factory model on a scale of 1:20
 Continuation
 Room M14

Tutorial 1
TUT 12: Electronic support for the course Constrained PID Control
 Continuation
 Room V200

13:00–14:30

Lunch
 Atrium
 Building E

14:30–16:00

Workshop 2
WS 21: Using NI ELVIS as a Multidisciplinary Engineering Platform
 Workshop by Ingo Knoblich [National Instruments]
 Room V200

Workshop 3
WS 31: Augmented Reality for the Development Process of Mechatronic and Self-Optimizing Systems
 Workshop by Dr. Rafael Radkowski [Heinz Nixdorf Institute]
 Room M14

EU-1
 EU proposals workshop
 Room M1

16:00–16:30

Coffee Break
 Areaway
 Building M

16:30–17:30

Workshop 2
WS 22: Using NI ELVIS as a Multidisciplinary Engineering Platform
 Continuation
 Room V200

Workshop 3
WS 32: Augmented Reality for the Development Process of Mechatronic and Self-Optimizing Systems
 Continuation
 Room M14

EU-2
 EU proposals workshop
 Room M1

18:00–20:00

Welcome Reception
 »with Düsseldorf Alt«
 [special beer] and a string quartett«
 Atrium
 Building E

Tuesday, June 24th

8:00–17:00 H57/Reception	Registration			
9:00–9:15 V200	Opening Session			
9:15–10:00 V200	Keynote 01, Secure Remote Collaboration Among Members of Small Groups Keynote address by Prof. Lambertus Hesselink [Stanford University, USA]			
10:00–10:30	Coffee Break, <i>Areaway Building M</i>			
10:30–11:15 V200	Keynote 02, Asset Management and Maintenance for Process Analyzers Keynote address by Dr. Norbert Kuschnerus [NAMUR, Germany]			
11:15–12:45	Session 1 Online Experiments & Remote Labs SES 01.1 SES 01.2 SES 01.3 Room V200	Session 2 eCollaboration SES 02.1 SES 02.2 SES 02.3 Room M14	Session 3 Mobile Learning SES 03.1 SES 03.2 SES 03.3 Room M15	Session 4 Remote Experiments SES 04.1 SES 04.2 SES 04.3 Room H1.15
12:45–13:45 Atrium Building E	Lunch			
13:45–14:15 Hallway Building M	Poster presentation POS 01			
14:15–15:45	Session 5 Remote Labs in Microelectronics SES 05.1 SES 05.2 SES 05.3 Room V200	Session 6 Virtual Instrumentation SES 06.1 SES 06.2 SES 06.3 Room M14	Session 7 Networked Virtual & Remote Labs SES 07.1 SES 07.2 SES 07.3 Room M15	Session 8 Applications & Experiences SES 08.1 SES 08.2 SES 08.3 Room H1.15
15:45–16:15	Coffee Break, <i>Areaway Building M</i>			
16:15–17:00 V200	Keynote 03, Development of Remote Education in China Keynote address by Prof. Guoxing Huang [East China Normal University, China]			
18:00–22:00	Conference Dinner The conference dinner takes place during a trip on the river Rhine on shipboard MS Stadt Düsseldorf			

wednesday, June 25th

8:00–17:00 H57/Reception	Registration			
9:00–10:30	Session 9 Telerobotics SES 09.1 SES 09.2 SES 09.3 Room V200	Session 10 Virtual & Remote Labs SES 10.1 SES 10.2 SES 10.3 Room M14	Session 11 Learning in 3D SES 11.1 SES 11.2 SES 11.3 Room M15	Session 12 Remote Control & Measurement SES 12.1 SES 12.2 SES 12.3 Room H1.15
10:30–11:00	Coffee Break, <i>Areaway Building M</i>			
11:00–11:45 V200	Keynote 04, Virtual Instrumentation throughout the Years: From GPIB to PCI to Multicore & Real-Time Keynote address by Rahman Jamal [National Instruments, Central Europe]			
11:45–12:30 V200	Keynote 05 Limitations for the implementation of Telemedicine and Telehealth Projects: Based on the Ecuadorian experience. Keynote address by Maria Teresa Mijares Pisano [Ecuadorian Foundation for Telemedicine and Telehealth]			
12:30–14:00 Atrium Building E	Lunch			
13:30–14:30 M1	IAOE: Annual Meeting of the IAOE			
14:00–14:30 Hallway Building M	Poster presentation POS 02			
14:30–16:00	Session 13 Learning & Education SES 13.1 SES 13.2 SES 13.3 V200	Session 14 Online Engineering SES 14.1 SES 14.2 SES 14.3 Room M1	Session 15 Telemedicine SES 15.1 SES 15.2 SES 15.3 Room M14	Session 16 Remote Lab Environments SES 16.1 SES 16.2 SES 16.3 Room H1.15
16:00–16:30	Coffee Break, <i>Areaway Building M</i>			
16:30–17:00 V200	Keynote 06, Joyful automation Keynote address by Ruediger Theis [Wiesemann & Theis, Germany]			
17:00–17:30 V200	REV2008 Best Paper Award and closing session			

Monday, June 23rd

Workshop 1
WS 11 / 12
10:00–11:00
11:30–13:00
Room M 14

Experience in an applied training strategy on an actual factory model on a scale of 1:20
Presenter: Michael Ermer, Siemens, Germany, Session Chair: Christian Geiger

Introducing the segment structure at SIEMENS E&C PS2., how do we do our recruiting with our special requirements on our staff for reaching our goals in the Field Service Level 2 or IBS for all kinds of automation systems, the first experiences with the successful story of the internal PS2 University V1 / V2 over the last 8 years, first step of using a Totally integrated Automation - Training Facility which was build by the SIEMENS Professional Education, implementing an concept for an own Training Facility according to our issues for practical training with Factory and Process Automation, not based on toys but on real technics and plant parts, history of the organization, planning, construction and commissioning of the plant, internal fair in december 2007 [film], concept of more practical trainings together with didactic university, start of the Trainings Activities, issues and experiences in the first 5 Courses [7-Steps Modell], first experiences from the field after Siemens employees passed out training plant and concept called ATHEN

Tutorial 1
TUT 11 / 12
10:00–11:00
11:30–13:00
Room V 200

Electronic support for the course Constrained PID Control
Mikuláš Huba, Martin Kamenský, Peter Tapák, Slovak University of Technology, Session Chair: Harald Jacques

PID control represents an engineering discipline with almost one century old tradition. Despite its apparent simplicity and long tradition, it has still not reached a steady state that is evident by a high number of newly appearing papers. So, a potential student or researcher in this topic is confronted by a huge amount of available resources. To get a fast overview of a potential impact of particular approaches it is useful to have simulation, analysis and control design tools enabling an easy verification of the particular method. Such tools are integrated with a unique approach to the analysis and design of the PID control within the e-course Constrained PID control. Tutorial will present broad spectrum of different electronic tools used within the course. It will focus on the electronic support that plays the dominant feature of the course. Based on the »Learning by Doing«, or »Learning by Experimenting« strategies in an quasi-authentic context, it adopts the constructivist philosophy of the student-centered e-, or blended learning.

Workshop 2
WS 21 / 22
14:30–16:00
16:30–17:30
Room V 200

Using NI ELVIS as a Multidisciplinary Engineering Platform
Presenter: Ingo Knoblich, National Instruments, Germany, Session Chair: Carlos Alberto Reyes Garcia

The goal of the workshop is the understanding of the advantages of using one integrated pc-based laboratory platform for a variety of disciplines in University lab experiments and vocational training. NI ELVIS, an educational design and prototyping platform based on NI LabVIEW graphical system design software, is a leading tool for teaching concepts in areas such as instrumentation, circuits, control, communication, and embedded design in a hands-on, interactive manner. This workshop shows how NI ELVIS can be used from lower-division freshman classes to advanced senior classes to help students learn concepts from circuit design to telecommunications. The workshop deals with following topics: Circuit Design and Simulation, SPICE Simulation of analog and digital circuits; instrumentation/measurement, verification and comparison of real circuit and simulated counter part; control, concept, design and test of PID control loops; communication, introduction to modulation/demodulation concepts.

Workshop 3
WS 31 / 32
14:30–16:00
16:30–17:30
Room M 14

Augmented Reality for the Development Process of mechatronic and Self-Optimizing Systems
Presenter: Rafael Radkowski, Helene Waßmann, Heinz Nixdorf Institute, Germany, Session Chair: Christian Geiger

Augmented Reality (AR) is gaining popularity as an engineering design tool and is increasingly used in the product development process. In the last years, many applications arise, that promise a benefit for the product development process. The aim of this workshop is to provide an over-view about the latest AR applications for the development of mechatronic and self-optimizing systems. Participants will get to know possible applications and benefits of AR inside the product development process. We will present and discuss over 20 application examples from all phases of the product development process like draft, design, feasibility, simulation, etc. Attention is laid to the integration of the application examples into the product development process, as missing integration is one reason for the low acceptance of AR applications by industrial developers. The workshop will last three hours; it will be split into two parts. In part one, a brief introduction into AR is provided as well as a presentation of hardware systems and software tools for AR applications. In the second part, a rough product development process is presented and different AR applications for particular development steps will be discussed. At the end, we will present some suggestions for everyone, planning to use AR in an industrial context. The workshop is addressed to researchers and engineers from industries, who want to get to know the latest applications potentials for AR in an industrial context.

EU 1 / 2
14:30–16:00
16:30–17:30
Room M1

EU proposals workshop
Session Chairs: Hartmut Haehnel, Reinhard Langmann

INTELIRIG – Intelligent Irrigation Systems
Co-ordinator: Technical University »Gh. Asachi« of Iasi, Romania

European e-Laboratory Network of Physics Remote Experiments
Co-ordinator: Tomas Bata University, Czech Republic

EUREMOTE – European Center for Remote Technology
Co-ordinator: University of Applied Sciences Düsseldorf

Draft of FP7 proposal – on the interoperability between Online Labs and LMS/LCMS
Co-ordinator: University Jean Monnet of Saint-Etienne, France

KEY 01
9:15–10:00
Room V200

Secure Remote Collaboration Among Members of Small Groups
LAMBERTUS HESSELINK, STANFORD UNIVERSITY, USA
Session Chair: Reinhard Langmann



In this keynote talk we discuss our recent work on connecting multiple devices into a Personal Private Network (PPN) where members can securely and simply collaborate and remotely access all their data, content and applications. The system is commercially available as an offspring of the iLabs work at Stanford University. We will address key issues of security, interfacing of laboratory applications, collaboration and simplicity of use. Finally we address the opportunity for distributed computing and storage in the PPN.

KEY 02
10:00–10:45
Room V200

Asset Management and Maintenance for Process Analyzers
NORBERT KUSCHNERUS, NAMUR, GERMANY
Session Chair: Reinhard Langmann



Process Analyzers are crucial for the production processes of the chemical industry. Therefore more and more online analyzers are used in order to get timely information about the chemical composition on different stages of the production process. This includes aspects such as product quality, yield, energy efficiency, production capacity, waste water and environmental control and safety. Highly available analysis values require automated analyzer systems with maintenance concepts based on asset management. Analyzer automation and asset management including system self diagnosis with detail visualization provides:

- early maintenance request messages to reduce system failures
- a minimum of personnel required for preventive maintenance
- trouble shooting support
- remote access and status information for efficient first level failure qualification

The presentation describes the concept of automation and asset management for process analyzers based on examples and gives an idea of the added value of this concept

SES 01
11:15–12:45
Room V200

Online Experiments & Remote Labs
Session Chair: Michael E. Auer

SES 01.1 **From online experiments to smart devices**
Christophe Salzmann, Denis Gillet, École Polytechnique Fédérale de Lausanne, Switzerland

Online experiments have been available for more than a decade. The integration of online experiments to collaborative environments is more recent. The wealth of client application/environments, the versatility of possible interaction protocols/technologies and the needs for more autonomous actions impels the evolution of online experiments to the smart device concept. This paper reviews the evolution of an electrical drive experiment and presented the requirement for turning online experiment into smart devices.

SES 01.2 **OpenLabs Security laboratory - The online security experiment platform**
Johan Zackrisson, Blekinge tekniska högskola, Ronneby, Sweden

Online experiments have been available for more than a decade. The integration of online experiments to collaborative environments is more recent. The wealth of client application/environments, the versatility of possible interaction protocols/technologies and the needs for more autonomous actions impels the evolution of online experiments to the smart device concept. This paper reviews the evolution of an electrical drive experiment and presented the requirement for turning online experiment into smart devices.

SES 01.3 **A new remote laboratory for the photovoltaic cells study**
Petru Adrian Cotfas, Daniel Tudor Cotfas, Doru Ursutiu, Cornel Samoila, Transylvania University of Brasov

Understanding and using the alternative energies represents a priority at European and world level. Thus, the establishment of laboratories dedicated to the research of alternative energies becomes an important perspective in education. In this context, the present paper represents the implementation of a remote controlled lab dedicated to the study of PV cells.

The experiments included in this lab study the important parameters of the PV cells: short circuit current, open circuit voltage, maximum power, series and shunt resistance, efficiency, etc.

The parameters are studied function of the illumination levels, the incidence angle of the radiation, the temperature. The system used comprises of: two different solar cell, stepper, light source, automatic system for the I-V characteristic raising, thermostat, NI-ELVIS with a DAQ board and LabVIEW. The lab implemented allows the students to remotely study the aspects related to understanding PV cells - an alternative energy source.

SES 02
11:15–12:45
Room M14

eCollaboration
Session Chair: Cornel Samoila

SES 02.1 **From the Collaborative Environment of Remote Laboratories to the Global Collaboration**
Jan Machotka, Zorica Nedic, University of South Australia, Adelaide, Australia

The remote laboratory (RL) can be considered as a modern collaborative learning environment, where students acquire skills required for efficient collaboration and communication on a local and global scale, both today and in the near future. The majority of current existing RLs are not constructed to allow the involved participants to collaborate in real time. This paper describes the collaborative RL NetLab, developed at the University of South Australia (UniSA), which allows up to three onshore and/or offshore students to conduct remote experiments at the same time as a team. This allows the online RL environment to become very similar, if not nearly identical to its real laboratory counterpart. The collaboration in the real laboratory is replaced by the "global" online collaboration.

SES 02.2 **Coping with collaborative and competitive episodes within collaborative remote laboratories**
Christophe Gravier, Jacques Fayolle, Bernard Bayard, University Jean Monnet of Saint-Etienne, France

In this paper, we provide an original approach to the support of group awareness within collaborative remote laboratories. Computer Supported Collaborative Learning sessions present successively collaborative and emulation episodes. The idea developed here is the elaboration of an architecture for dealing with those two aspects of collaborative sessions for practical remote hands-on approaches. Our purpose is to manage and enhance the learning experience brought to the students who are using collaborative remote laboratories by managing several synchronous accesses made on the remote laboratories platform itself. This contribution relies on an original domain ontology and the associated knowledge management system.

SES 02.3 **Trends in Discrete Event Simulation**
Eduard Babulak, Ming Wang, Fairleigh Dickinson University- Vancouver, Canada

Discrete event simulation technologies have been up and down as global manufacturing industries went through radical changes. The changes have created new problems, challenges and opportunities to the discrete event simulation. On manufacturing applications, it is no longer an isolated model but the distributed modeling and simulation along the supply-chain. In order to study the hybrid manufacturing systems, it is critical to have capability to model human performance with different level of skills and under various working conditions. On service applications, the most critical part is to model knowledge workers and their decision making process. This paper reviews the discrete event simulation technologies; discusses challenges and opportunities presented by both global manufacturing and the knowledge economy.

SES 03
11:15–12:45
Room M14
Mobile Learning
Session Chair: Michael Callaghan

SES 03.1 **Design and Implementation of Mobile Clients for Remote Labs**
Michael E. Auer, Danilo Garbi Zutin, Carinthia University of Applied Sciences, Villach, Austria, A.Y. Al-Zoubi, Princess Sumaya University for Technology, Amman, Jordan

The purpose of the proposed research is to design and implement a LabVIEW-based remote lab client to run on a TCP/IP enabled PDA [Personal Digital Assistant] device, thus teaching using this wireless mLearning system will not be limited by time and location. In addition, resources and equipments can be integrated and shared to the extent that safety events can be monitored and handled in time. An environment will be created to train students to handle factory automation, data acquisition, data management, and manufacturing process using mobile devices. Furthermore, the integration and sharing of teaching equipments via the Internet are emphasized through an environment which promotes learning interests and efficiency using mobile devices.

SES 03.2 **Author Tool to Create Tutoring Systems for Mobile Devices with Adaptability to Multi-Intelligence Types**
Ramón Zatarain, Lucía Barrón-Estrada, Eduardo Urías-Barrientos, Moisés Osorio-Velázquez, Instituto Tecnológico de Culiacán, México, Carlos Alberto Reyes García, Instituto Nacional de Astrofísica, Óptica y Electrónica [INAOE], Puebla, México

Tailoring material for mobile learners represents a major challenge. Most of the current work in mobile intelligent tutoring systems [ITS] is more related with personalized systems because, commonly, they do not support any artificial intelligence technique for implementing the adaptive parts in the applications. In this paper, we present an author tool to facilitate the creation of adaptive learning material to be used in handheld devices. The adaptive material uses a pedagogical approach based on the theory of Multiple Intelligences and Fuzzy Logic. Our main contribution is a new author tool which allows instructors to systematically build tutoring systems for groups of mobile learner; everything under a graphic and visual environment. The domain module of each ITS is built by importing SCORM learning objects or other standard file documents. The tool has been tested by producing different types of mobile ITSS. In the paper we present several examples of applications.

SES 03.3 **m-learning, mobile experimentation and telepresence with cell phones and PDAs**
Andreas Bischoff, University of Hagen, Germany

Mobile devices such as notebooks and PDAs are very interesting tools for web-based teaching and distant teaching today. We have adapted Web-based remote laboratory environments to mobile devices like PDAs and smartphones to remotely control a Pioneer 3 AT mobile robot.

SES 04
11:15–12:45
Room H1.15
Remote Experiments
Session Chair: Sergio Daniel Cano Ortiz

SES 04.1 **Remote experiment on diffraction for determining dimensions of microobjects and quantum physics phenomena**
Miroslava Ožvoldová, University of Trnava, Slovak Republic, František Schauer, Tomas Bata University in Zlín, Czech Republic, František Lustig, Charles University, Prague, Czech Republic

In this paper we introduce the remote e-laboratory built on the system ISES - Internet School Experimental System – [see both on www.ises.info], on the example of the experiment on diffraction, built on Java applets and using server-client approach. The arrangement enables to explain the Fraunhofer's diffraction phenomena, to measure the distribution of the radiation intensity behind the slit and to transmit the data to the client. The experiment may be used for the determination of the dimensions of micro-objects and in quantum physics for the elucidation of the behaviour of photons and finding of one of the most basic physical constants – Planck constant, and the verification of the Heisenberg uncertainty principle.

SES 04.2 **Real-world experiments over the Internet: the solar energy e-learning laboratory experience**
Ioannis MICHAELIDES, Polyvios ELEFThERIOU, Cyprus University of Technology, Lemesos, Cyprus

This paper presents the experience from the operation of the solar energy e-learning laboratory in Cyprus, (<http://e-lab.hti.ac.cy>), and demonstrates the benefits of remote engineering in the field of solar energy. The aim of solar energy e-learning laboratory (Solar e-lab) is to use the Internet as a tool to make the laboratory facilities accessible to engineering students and technicians located outside the e-lab premises. In this way, the solar energy e-learning lab, its equipment and experimental facilities are available and shared by many people, thus reducing costs and widening educational experiences.

SES 04.3 **Remote Scientific Experiments across Internet – the Technology for Reinforcing Partnerships in Education**
Franz Schauer, Tomas Bata University in Zlín, Czech Republic, Miroslava Ozvoldova, University of Trnava, Slovak Republic, Frantisek Lustig, Charles University, Prague, Czech Republic

The paper describes how remote experiments across the Internet may be built using the server-client approach and software ISES WEB CONTROL and the Intelligent School Experimental System (ISES) hardware (www.ises.info). All communication is through Internet, using web services on the client side with browser. This approach enables the simple construction of remote experiments without building any hardware and virtually no programming, working with paste and copy approach of typical blocks as camera view, controls, graphs and displays. We set up and operate at present 7 experiments (visit www.ises.info). The system is prepared for the starting the network of universities covering the basic set of physics experiments.

POS 01
11:15–12:45
Hallway Building M

Poster presentation

Remote microcomputer system in lieu simulator

Darko Fuduric, Mario Žagar, Predrag Obravec, University of Zagreb, Croatia

A Lab AHU Control System

Jie Zhang, Zhizhong Huang, Yiqun Pan, Tongji University, Shanghai, China

Low-cost Remote Controlled Experiments—Cost and Market Issues

Martyn Cooper, Open University, Milton Keynes, UK

New Technology Used in Remote Laboratories

Doru Ursutiu, Dragos Iordache, Petru Adrian Cotfas, Daniel Tudor Cotfas and Cornel Samoila, Transylvania University of Brasov, Rumania

Remote Laboratories based on LXI

Javier García-Zubía, Unai Hernandez, Ignacio Angulo-Martinez, Pablo Orduña, University of Deusto, Bilbao, Spain

Ultralow Consumption Teleservice System: The EUT2 Project

Javier García-Zubia, Ignacio Angulo, Unai Hernandez, Pablo Orduña, University of Deusto, Bilbao, Spain

Virtual instrumentation for study of the Crystal Violet Mineralization in Water by the Electro-Fenton Method using an automated system

Carmen Alexandru, Marius Branzila, Ilie Siminiceanu, Cristina Schreiner, Technical University »Gh. Asachi« Iasi, Romania

Illustrating e-learning: from static pictures up to universal applets

Mikulas Huba, Pavol Bahník, Slovak University of Technology in Bratislava, Slovakia

Haptic device in telerobotic system

Riko Safaric, Andro Glamnik, University of Maribor, Slovenia

Universal web development system for implementation of controllers for remote real systems

Vladimir M Cvjetkovic, Milan Matijevic, Miladin Stefanovic, University of Kragujevac, Serbia

One approach to increase of noise immunity of multimedia transmitting by the Internet in real-time mode

Viktor Krisilov, Dmytryj Chepelev, Odessa Polytechnic University, Ukraine

TCP/IP Communication between Server and Client in Multi User Remote Lab Applications

Michael E. Auer, Danilo Garbi Zutin, Andreas Pester, Carinthia University of Applied Sciences, Villach, Austria, Andre Carvalho Bachiao Martins, Juanjo Fernandez, Juan Antonio Ortega, Eva Rodriguez,

SES 05
14:15–15:45
Room V200

Remote Labs in Microelectronics

Session Chair: Eduard Babulak

SES 05.1 Remote Laboratory for Testing Microelectronic Circuits on Silicon Wafers under a Microscope

Aaron Mohtar, Zorica Nedic, Jan Machotka, University of South Australia, Adelaide, Australia

Over the last decade, there has been a move towards using remote laboratories in engineering education. The majority of these laboratories are static, involving limited user controlled mechanical movements. The University of South Australia has developed one such laboratory, NetLab that has been successfully utilized for both on-campus and off-shore teaching of electrical and electronics engineering students. Following this success, we are now developing a remote laboratory for microelectronic fabrication. The first stage of the development is the remote laboratory for testing electronic circuits directly on the silicon wafer under a microscope which is normally conducted in a cleanroom. The major challenge of this project is the requirement of micro-probes to be accurately positioned over the internet. This paper presents the development of this new remote laboratory with a carefully designed graphical user interface for a reliable and stable user control of the microprobe movements.

SES 05.2 Low Cost Remote Lab for Microcontrollers: WebLab-DEUSTO-PIC

Javier García-Zubia, Ignacio Angulo, Unai Hernandez, Pablo Orduña, University of Deusto, Bilbao, Spain

This paper describes how to design and to implement a remote laboratory under a new architecture which principal characteristics are that the main server disappears and that it is based on low cost microservers. The final architecture is thin and cost effective, and allows a simple installation in other universities. The paper presents the implementation of the WebLab-DEUSTO-PIC under this new architecture and the results obtained of its deployment in a real subject during the second semester of the second year of the **Telecommunications Engineering at the University of Deusto: Digital Electronic Systems**.

SES 05.3 An SDRAM test education package that embeds the factory equipment into the e-learning server

J. M. Martins Ferreira, University of Porto, Portugal, Ana Leao, Centre of Competence on High Performance Test, Qimonda, Vila do Conde, Portugal

SDRAM (Synchronous Dynamic Random Access Memory) demand has grown exponentially since the 1980s, as a result of technological factors and new areas of application. SDRAMs represented in 2007 c. 20% of the total semiconductor business and are a strategic area in the western and far-eastern economic communities. SDRAM test education is therefore an important subject, but very high purchase and maintenance costs keep test equipment beyond reach of most universities. This paper presents a pilot project developed jointly by Qimonda and the University of Porto (FEUP), where the company offers remote access to one of its Advantest SDRAM production testers. Access to this ATE was embedded into a Moodle e-learning server that supports a new course entitled Electronic Systems Testing, belonging to an Integrated Masters degree offered at FEUP. The excellent feedback received from students encouraged us to extend this cooperation into an educational network, which is also introduced in this paper.

SES 06
14:15–15:45
Room M14

Virtual Instrumentation

Session Chair: J.M. Martins Ferreira

SES 06.1 Controller Choise and Tuning for Experimentally Identified Plants Using Virtual Instrumentation

Nicoleta Stefania HULEA, CET S.A Power Plant, Iasi, Romania, »Gh. Asachi« Technical University, Iasi, Romania, Iosif OLAH, Lucian MASTACAN, »Gh. Asachi« Technical University, Iasi, Romania, Octavian Costel VORNICU, Rom Star Tehnica S.A., Iasi, Romania

In order to increase the precision of the identification of the plants, on the basis of the experimentally obtained step response, a method of identification based on the approximate numerical integration of the experimentally obtained curve (that characterised the respective plants) was implemented by means of Virtual Instrumentation. Using the identification's results, the controller type is chosen, the controller parameters are setup and, still using Virtual Instrumentation, some experiments are carried out using the control loop. The results of some experimental identification, made on thermal plants presented in this paper, illustrate the usefulness of the attempts made, concerning theoretical and experimental research.

SES 06.2 An Automated Sorting System based on Virtual Instrumentation Techniques

Ioan Gavril Tarnovan, Rodica Holonec, Technical University, Cluj-Napoca, Romania

The application presented in this paper represents an experimental model and it refers to the implementing of an automated sorting system for pieces of same shape but different sizes and/or colors. The classification is made depending on two features: the color and the weight of these pieces. The system is a complex combination of NI Vision hardware and software tools, strain gauges transducers, signal conditioning connected to data acquisition boards, motion and control elements. The system is very useful for the students to learn and experiment different virtual instrumentation techniques in order to be capable to develop a large field of applications from inspection and process control to sorting and assembly

SES 06.3 Integrating and Reusing of Virtual Labs in Open Source LMS

Elio Sancristobal Ruiz, Manuel Alonso Castro Gil, S. Martín, R. Gil, G. Diaz, E. Ruiz, J. Peire, UNED, Madrid, Spain

nowadays there are a great number of universities and organizations working on developing virtual labs. These virtual labs allow students to carry out their experiments and acquire practical knowledge. At the same time these universities are using one or several learning management systems that allow professors to display and organize theoretical content.

Why not use learning management system and virtual labs together? That is what we are going to describe in this paper. We are working on a architecture that allows using the LMS's services together with the virtual labs

SES 07
14:15–15:45
Room M15

Networked Virtual & Remote Labs

Session Chair: Riko Safaric

SES 07.1 Grid Supported Virtual Laboratories with Collaboration in Engineering Education

Christian Schmid, Ruhr University Bochum, Germany

In this paper, Grid technologies are introduced to build e-learning environments for virtual laboratories. Service-oriented Grids open new fields of applications, the Learning Grids. The learning services concept and their deployment through Grid technologies are excellent means to integrate virtual laboratories into collaborative e-learning environments for engineering education. Example applications from a virtual laboratory demonstrate the advantages of a Grid over classical solutions

SES 07.2 Design and Verification of Application-Specific Integrated Circuits in a Network of Remote Labs

Danilo Garbi Zutin, Carinthia University of Applied Sciences, Michael E. Auer, Carinthia Tech Institute, Austria, A.Y. Al-Zoubi, Princess Sumaya University for Technology, Amman, Jordan

A solution to implement a remote laboratory for testing and designing analog Application-Specific Integrated Circuits of the type (ispPAC10) is presented. The application allows electrical engineering students to access and perform measurements and conduct analog electronics experiments over the internet. PAC-Designer software, running on a Citrix server, is used in the circuit design in which the signals are generated and the responses are acquired by a data acquisition board controlled by LabVIEW. Three interconnected remote labs located in three different continents will be implementing the proposed system.

SES 07.3 Towards a Distributed Architecture for Remote Laboratories

Javier García-Zubia, Pablo Orduña, Ignacio Angulo, Jaime Irurzun and Unai Hernández, University of Deusto, Bilbao, Spain

Traditionally, Remote Laboratories have been focused on specific solutions for specific problems. We can find a wide range of Remote Laboratories in the literature [1], assisting very different types of subjects (electronics, robotics, optics, fluids mechanics...), but commonly bound to those restricted set of requirements. Because of this, little attention has been paid on working on a scalable, maintainable, secure, open architecture that addresses the requirements of a wide set of experiments, and that could be open enough to support or adapt itself to new experiments. In this paper we propose an open architecture for Remote Laboratories, based on the experience of the development, deployment and use by students of the newest version of the Remote Laboratory of the University of Deusto (WebLab-Deusto v. 3.0), which applies the Service Oriented Architecture to the Remote Laboratories design, protocol-agnostic scalable secure solution for a wide range of experiments.

SES 08
14:15–15:45
Room H1.15

Applications & Experiences

Session Chair: Ingo Knoblich

SES 08.1 Research of Sharing Remote Education Resources Based on Ethernet & INTERBUS System

Yuwei Dai, Liu Jing, Tianjin Light Industry Vocational Technical College, China

As the member of Phoenix Contact remote education network -EduNet, we integrate Fieldbus Laboratory into industrial Ethernet system and then connect it to campus network and Internet, so that the share of EduNet internal resources is possible. There're in total 8 units in the laboratory, which are constituted with pneumatic and hydraulic equipments, sensors, actuators, drive system, etc. The industrial Ethernet system is based on the foundation of INTERBUS system, which includes one central controller "ILC 350 ETH" and nine sub-system. Each sub-system is controlled by small decentralized controller "ILC 200 UNI" and exchange data with central controller by INTERBUS cyclically. The central controller is connected to local network via industrial switch »FL SWITCH SF 8TX«. Kingview software is used to create SCADA system and visulization homepages are launched to Internet using WEB function. Every EduNet member can establish the connection with us and share the resources.

SES 08.2 **A Summarizer for Document Retrieval on the Web**
 Satoru Satake, Denis Vazhenin, Satoru Ishikawa, Vitaly Klyuev, University of Aizu, Japan

Application development is challenging but very complex activity, especially if we talking about information retrieval application. Nowadays index database of search engines increasing significantly, thus amount of time to find and download relevant to the end user document is also increasing. Another problem lies within current capabilities of nowadays search engines. As a result they usually give a user small snippets consisting of parts of sentences which includes the query words or phrases and cannot show contents of each web site. To eliminate such drawbacks of current search engines we have developed a model of an application, which would solve these and related to them problems. To prove usefulness and usability of the approach we have developed a prototype. Using which we have collected testing results, made an evaluation of the acquired statistics and finally were able to prove rightfulness and usefulness of the approach, thus proving necessity of developing a full version.

SES 08.3 **Enhancement of nonlinear control education using custom software tools**
 Martin Ondera, Slovak University of Technology in Bratislava, Slovak Republic

The aim of this paper is to present two custom software tools for use with MATLAB and Maple environments, which are freely available to general public and can be used to improve education in university courses on nonlinear control systems. An e-learning course dedicated to the topic based on WebCT learning management system, which has for several recent years been used together with the software tools as a complementary form of education to regular courses on nonlinear control taught at the Faculty of Electrical Engineering and IT of Slovak University of Technology in Bratislava, is also discussed.

KEY 03 **Development of Remote Education in China**
 16:15–17:00 HUANG GUOXING, EAST CHINA NORMAL UNIVERSITY, CHINA
 Room V200 Session Chair: Christian Schmid



This keynote talk introduces the development of remote education in China during the recent 30 years. At the middle of 90's last century, Chinese government, China Central Radio and TV University (CCRTVU), the university networking college, make great contribution in pushing remote education in China. We analyzed remote education structure, running model and work flow, and gave some statistic data concerning the education process. At finally we show some feedback from different level of the peoples.

SES 09 **Telerobotics**
 09:00–10:30 Session Chair: Harald Jacques
 Room V200

SES 09.1 **A Telemanipulator for Remote Wiring of Electrical Circuits**
 Ingvar Gustavsson, Josef Ström Bartunek, Blekinge Institute of Technology, Sweden

Nowadays, students want extended access to learning resources and increased freedom to organize their learning activities. Remote access to laboratories enables students to perform physical experiments on their own 24/7. It is easy to control most electronic instruments remotely but some kind of telemanipulator is often required. The Signal Processing Department [ASB] at Blekinge Institute of Technology [BTH] has created an online lab workbench for electrical experiments, mimicking and supplementing workbenches in traditional laboratories. It is used concurrently with on-site ones in regular, supervised lab sessions. A virtual breadboard is used to control a relay switching matrix performing the circuit wiring. Together with virtual front panels depicting the front panels of the desktop instruments it gives distant students the impression that they are working in the real laboratory. In this paper the virtual breadboard/switching matrix combination is described.

SES 09.2 **Teleoperated Visual Inspection and Surveillance with Unmanned Ground and Aerial Vehicles**
 Sebastian Blumenthal, Thorsten Linder, Viatcheslav Tretyakov, University of Applied Sciences Bonn-Rhein-Sieg, Peter Molitor, Hartmut Surmann, Fraunhofer Institute for Intelligent Analysis and Information Systems [AIS], Sankt Augustin, Germany

This papers presents a novel approach to realize teleoperated applications on a semi-autonomous mobile robot [VolksBot] by combining Unmanned Ground Vehicles [UGV] and Unmanned Aerial Vehicles [UAVs]. The two different systems allow the surface-to-air exploration of the environment. To achieve better results during surveillance we present [A] a new mobile device based remote control [B] two new 360° vision systems and [C] a quadcopter for the air surveillance.

SES 09.3 **Evaluation of Cost-Sensitive Wireless Transmission Systems for Time Critical Mobile Systems**
 Malte C. Berntssen, Hartmut Haehnel, University of Applied Sciences, Düsseldorf, Germany

This paper evaluates low-cost wireless communication systems to control a mobile robotic system while at the same time receiving data from this system. Criteria are complexity, transmission speed [e.g. latency] and reliability using standard components currently available on the market. Therefore analog and digital technologies for a Zepelin airship are presented and compared.

SES 10 **Virtual & Remote Labs**
 09:00–10:30 Session Chair: Thomas Zimmer
 Room M14

SES 10.1 **RobUaLab.ejs: a new tool for robotics e-learning**
 Carlos Alberto Jara, Francisco Andrés Candelas, Fernando Torres, University of Alicante, Spain

Virtual and remote laboratories have improved learning and training in the academic community. They allow students to acquire methods, skills and experience related to real equipment in an intuitive and cost-effective way. The purpose of this paper is to present the development and the implementation of an e-learning environment in the field of Robotics. This application allows students to simulate and to teleoperate a robot arm in an easy and user-friendly way. The application has been developed using Easy Java Simulations [EJS], an open-source tool for people who do not need complex programming skills.

SES 10.2 **A LabVIEW based Remote DSP Laboratory**
Athanasios Kalantzopoulos, Dimitrios Karageorgopoulos, Evangelos Zigoris,
University of Patras, Greece

Remote laboratories provide the students with the capability to perform laboratory exercises exploiting the relevant equipment any time of the day without their physical presence. Furthermore, providing the ability to use a single workstation by more than one student, they contribute to the reduction of the laboratory cost. Turning to advantage the above and according to the needs of post graduate modules in the fields of DSP Systems Design and Signal Processing Systems with DSPs, we designed and developed a Remote DSP Laboratory. A student using a Web Browser has the ability via internet to turn to account the R-DSP Lab and perform experiments using DSPs [Digital Signal Processors]. For now, there is the opportunity to carry out laboratory exercises such as FIR, IIR digital filters and FFT as well as run any executable file developed by the user. In any case the observation of the results is carried out through the use of specially designed Graphical User Interfaces [GUIs].

SES 10.3 **Remote Automation Laboratories**
Jose Luis Medina, Joaquim Ros Florenza, Universitat Politècnica de Catalunya (UPC),
Terrassa, Spain,

The remote laboratory for Industrial Automation is based on a server computer with operating system Linux in which it has installed a platform Moodle, which allows the record of the users (teachers and students) and to guard the contents in objects of learning SCORM in order that teacher organizes the contents of the subject depending on his needs. A program realized in PHP language, allows to the user to realize an hourly reservation in a module of the Moodle for each of the working stations of the laboratory. Every working place is composed by a computer, with the software adapted for the control of a Schneider Electric's PLC M340, two models that simulate industrial processes for accomplishment of practices and a webcam, which allows to the student to visualize and to control how the process is executed. The student, by means of the moodle's application, can connect remotely to the working station and realize the practices as if he was in front of the equipment.

SES 11
09:00–10:30
Room M15
Learning in 3D
Session Chair: Ian Grout

SES 11.1 **Authoring of 3D and AR Applications for Educational Purposes**
Jörg Stöcklein, Christian Geiger, Gundula Dörries, Henning Zabel, University of Applied
Science Düsseldorf, Germany

We present an authoring framework dedicated to the design of multimodal 3D and Augmented Reality applications. The main focus of the presented examples that have been developed with this approach is the design of experiments for a virtual physics lab and its use for classroom lectures. We present the core elements of our HYUI framework and the development of a set of physical experiments.

SES 11.2 **Experiential based learning in 3D Virtual Worlds: Data capture and visualization in Second Life**
Michael Callaghan, Jim Harkin, Giorgio G. Scibilia, Filippo Sanfilippo, Shane Wilson,
Kerri, University of Ulster, Northern Ireland

Increasingly web based distance education courses are on offer augmented by the provision of remote experimentation laboratories. Recently there has been significant growth in the number of virtual worlds for everyday use. These immersive 3D virtual worlds offer the ability to create complex simulations using existing or in-world modeling techniques and scripting tools while offering the functionality to link to the real world and capture data which can be visualized in near real time. This paper investigates the use of the popular virtual world, Second Life, to create experiential based learning experiences in a 3D immersive world for teaching computer hardware and electronic systems. In particular, the paper presents a number of approaches to capturing, displaying and visualizing real world data in such 3D virtual environments.

SES 11.3 **Remote experiment will sustain the development of the creativity**
Cornel Samoila, Doru Ursutiu, Petru Cotfas, Daniel Cotfas, Sorin Zamfira,
Transylvania University of Brasov, Romania

The question raises in the paper is the fact that in the design process of the remote experiment, is necessary to take into account some new rules with the destination to reveal and to improve the creation assets of the students. The actual methodology in teaching/learning is based on the »convergent thinking«. Guilford pointed out that the most important factors of the creation process are synthesized in the »divergent thinking« which supposes more than one output. What should be considered when a remote experiment will be design? What should be the teacher and student role in this process? All of answers will be pointed out in the paper with the hope that the creation process will become a part of the teaching/learning process based on the remote experiment.

SES 12
09:00–10:30
Room H1.15
Remote Control & Measurement
Session Chair: Doru URSUTIU

SES 12.1 **Design of a Web-Interface and Novel Control Technology for Remote Hardware Experiment on Separately Excited DC Motor and Generator**
Jagadeesh Chandra A. P, R.D Sudhaker Samuel, S.J College of Engineering, Mysore, India

Laboratory based courses play a critical role in technical education. Stand-alone approaches in remote learning have grown tremendously in the past several years. One of the important components of remote learning in technical environment is the virtual laboratory tool integrated to perform real hardware tasks in near real time. This paper presents a web interface and a novel control technology for remote experimentation using new generation Internet based instrumentation tools. Virtual Instrumentation [VI] tools and Internet technologies have been used for developing graphics oriented client-end applications linked to practical laboratory hardware. It describes the ongoing research in this area exploiting current telematics techniques, which supports remote experimentation with real hardware via the Internet.

SES 12.2 **Distributed Control System for a Cogenerative Power Plant**
Florin Hartescu, National Institute for R&D in Informatics, Ion Miciu, IPA SA–Automation
Engineering, Bucharest, Romania

The paper presents a distributed control system for the realization of cogenerative supply of electricity and heat and, in given case, for their combination with waste heat recovery, particularly in combined [gas-steam] cycle industrial power plants. Modern electric power plants are large complex systems with many processes whose operations need to be optimized. The electrical networks are designed for transmission, repartition and distribution of electrical energy, so that they present various structures. An optimization problem is usually a mathematical model, where we wish to minimize a numerical value that represents something like costs, energy losses, risks, errors etc or maximize something like profit, quality, efficiency. The implementation of these functions is usually and objectively based on a trusted model that uses a trusted architecture, which is the platform of the security architectures.

SES 12.3 **Hydraulic Plant Remote Laboratory**
Vladimír Žilka, Pavol Bisták, Peter Kurčík, Slovak University of Technology in Bratislava,
Slovakia

In our work we present use of remotely controllable hydraulic plant for use in remote virtual laboratories. Our setup is based on client-server architecture, while we use 2 different approaches and compare advantages and disadvantages of each of them. First approach is based on Java Server application, in which the control algorithm is implemented on server side. Second algorithm uses PC-independent network card which runs its own TCP server and the control algorithm is implemented on client side.

KEY 04
11:15–11:45
Room V200

**Virtual Instrumentation throughout the Years:
From GPIB to PCI to Multicore & Real-Time**
RAHMAN JAMAL, NATIONAL INSTRUMENTS, CENTRAL EUROPE
Session Chair: Sergio Daniel Cano Ortiz



The success of Virtual Instrumentation began in the laboratories. The focus had been on instrument control. Through GPIB we achieved time improvements for test. Later on, the power of the PC increased and now all analysis and control took place there. Moore's law helped to increase the power of the entire system. But lately Moore's law reached its limits as the speed of processors could not increase any further. At this time, multicore systems emerged. Engineers face the challenge to take the full advantage of the performance of such architectures. Graphical system design can help to develop effective test and measurement systems. The same design paradigms can be applied to real-time and embedded systems. This keynote will take us from the past to our present time and on to the future of Virtual Instrumentation.

KEY 05
11:45–12:30
Room V200

**Limitations for the implementation of Telemedicine and Telehealth Projects:
Based on the Ecuadorian experience**
MARIA TERESA MIJARES PISANO, ECUADORIAN FOUNDATION FOR TELEMEDICINE
AND TELEHEALTH
Session Chair: Sergio Daniel Cano Ortiz



The use of Telemedicine and Telehealth has proven advantages and results at a world-wide level. It started with applications for government and defense departments; however at the present time it has expanded, to integrate its usage for rural areas, because of its benefits for the inhabitants of isolated regions, where basic services such as water, electricity, health and communication are almost absent. Ecuador does not want to remain outside of this wave of benefits and concrete solutions or applications, for that reason and with a realistic point of view; we have analyzed and determined the limitations that have prevented our Country to utilize this trend at a wide national level. Additionally, to intent to solve this limitations, we would like to present in this Keynote speech, some suggested solutions that include the fact that our future work, must be a result of joint efforts between non governmental organizations such as our foundation, private and public institutions, international organizations and their experiences, hand by hand with the governmental agencies. With this approach, we expect to be able to generate cost-effective, measurable and applicable solutions at a complete National level, and especially sustainable in long periods of time with the support and participation of the local communities which are the main beneficiaries of these applications.

POS 02
14:00–14:30
Room
Areaway Building M

Poster presentation

Configuring the ILC150ETH controller with PCWorX as an IEC61131-3 standard language.
Wilfred L. O. Fritz, Cape Peninsula University of Technolog, South Africa

Applying the Transfer Matrix Method for Supervising Lines in a Network Grid
Carlos Guillén Galván, Institute National of Astrophysical Optical and Electronic, Pueblao, Benemerita Universidad Autonoma de Puebla, Mexico, Erika Vera Cervantes, Carmen Cerón Garnica, Guillermo De Ita Luna, Benemerita Universidad Autonoma de Puebla, Mexico

**From Available-to-Promise [ATP] to Keep-the-Promise [KTP]:
An Industrial Case of the Business Intelligent System**
Eduard Babulak, Ming Wang, Fairleigh Dickinson University- Vancouver, Canada

A Web Based Experiment on Fuzzy Logic Control Structures
Cristina Temneanu, Cristian Fosalau, Mihai Albu, Technical University of Iași, Romania

CompactRIO system used in Mössbauer spectrometer as a velocity PID controller
Jiri Pechousek, Roman Prochazka, Miroslav Mashlan, Palacky University, Olomouc, Czech Republic

Electronic Practical Course via the Web in a Virtual Laboratory
Hassene MNIF, Ahmed FAKHFAKH, Salwa SAHNOUN, Fatma HDIJI, National School of Engineers, Sfax, Tunisia, Didier GEOFFROY, Michel BILLAUD, Noelle LEWIS, Thomas ZIMMER, Université Bordeaux, Talence, France

New configuration of the data acquisition system for cryogenic process analyses with LabView 8
Carmen Maria Moraru, Iuliana Stefan, Ciprian Bucur, Ovidiu Balteanu, Anisia Bornea, Liviu Stefan, Ioan Stefanescu, National Institute of Research, Valcea, Romania

PLC Control of an industrial process using LabVIEW
Ciprian SORANDARU, Andreea SFASIE, Sorin MUSUROI and Nicola-Valeriu OLARESCU, »Politehnica« University of TIMISOARA, ROMANIA

Integrating Teleexperiments into the Moodle Environment
Luboš Čírka, Michal Kvasnica, Miroslav Fikar, Pavol Bisták, Mikuláš Huba, Slovak University of Technology in Bratislava, Slovakia

Computer Supported Collaborative Social Environment for Education, Training and Work
Frederico Menine Schaf, Carlos Eduardo Pereira, Universidade Federal do Rio Grande do Sul, Brazil, Dieter Müller, Friedrich W. Bruns, University of Bremen, Germany

Web-Based Control Education in Matlab
Katarina Zakova, Slovak University of Technology in Bratislava

Mobile Remote Engineering System for Aircraft Inspections using Agent
Clemens Westerkamp, Juergen Wuebbelmann, University of Applied Sciences Osnabrück, Germany

SES 13
14:30–16:00
Room V200

Learning & Education Session Chair: Andreas Pester

- SES 13.1 **Undergraduate / postgraduate student project work to support the teaching and learning of remote laboratory design**
Ian Grout, University of Limerick, Ireland

In this paper, consideration is given to the types of skills required by engineers who would be tasked with designing, developing, implementing and maintaining remote engineering laboratories. In this, the engineer would be required to have a broad range of electronic hardware, computer software and IT skills that are brought together in order to develop and support remote laboratories. The paper will consider these skills, along with the acquisition of these skills at primarily undergraduate level to acquire the basic skills, but also postgraduate level to acquire the advanced skills.

- SES 13.2 **Reflecting Professional Reality in Remote Laboratory Experiences**
David Lowe, Steve Murray, Dikai Liu, University of Technology, Sydney, Australia,
Euan Lindsay, Chris Bright, Curtin University of Technology, Perth, Australia

An ABET Colloquy in 2002 described a core set of thirteen objectives for Engineering laboratories. An implicit theme amongst these objectives is the development of an understanding of real-world Engineering. Often this will have occurred through exposure to commercial tools, equipment and processes, as well as realistic problems. Whilst remotely accessible laboratory infrastructure is becoming more common, the question of how these affect student perceptions of reality is salient - a question which has barely been considered in the literature. The only related work is some discussion on the fidelity and/or authenticity of the experience. In this paper we discuss these issues. In particular, we consider the factors within a laboratory experience which potentially affect the students' interpretation of the industrial or professional »reality« of the experience. We then discuss whether remote laboratories help or hinder in the development of this professional reality.

- SES 13.3 **Mixed Learning Environment for the Real-Time Communication System PROFINET**
Prajaks Jitngernmadan, Burapha University, Chon Buri, Thailand, Norbert Stuhmann,
Reinhard Langmann, University of Applied Sciences Düsseldorf, Germany

REMOTE PRESENTATION FROM THAILAND

Within the field of knowledge transfer technology, the concepts of eLearning have been developing continuously. The innovative learning methods are required for global market. The web-based eLearning provides the multifunctional learning environment that can be accessed at anytime and from anywhere, with low expenses and limitations. Even collaborative learning is being provided.

PROFINET is used in the automation technology as a communications system for exchanging process data among devices. It uses the standard Ethernet technology with some extended parts to communicate.

This paper discusses an implementation of a didactical concept creating a multimedia eLearning system for PROFINET that is based on web technologies. The idea of Learning by Doing has been realized. There is the part called LiveLab in which the users can work at a PROFINET system across the Internet by using an appropriate web browser.

SES 14
14:30–16:00
Room M14

Online Engineering Session Chair: Christophe Gravier

- SES 14.1 **One size fits all! Multidisciplinary Engineering Platform for On-Campus and Remote Labs.**
Ingo Knoblich, Philipp Krauss, National Instruments, Munich, Germany

Balancing constantly changing curriculums and budget constraints on one hand and increasing technology complexity and limitation of lab time on the other hand is a challenge most educators face on a daily basis.

The laboratory platform NI ELVIS from National Instruments combines the hands-on experience known from traditional instruments with the benefits of a modern pc-based virtual instrumentation platform. Students can "touch" real components when building a circuit, manually set parameters for the function generator with knobs and dials and place probes of the oscilloscope at different points in the circuit. Limitations of the traditional box instrument approach can be overcome by driving the teaching platform from the PC. A frequency sweep can be parameterized by using the mouse, advanced analysis can be applied to the measured data when necessary and custom displays or new measurement routines will be created from scratch in order to adapt the system to current requirements.

- SES 14.2 **Rapid Prototyping Modules for Remote Engineering Applications**
Karsten Henke, Heinz-Dietrich Wuttke and Tobias Braune, Technical University of Ilmenau, Germany

This contribution describes the concept and implementation of an integration process for microcontroller and FPGA based Rapid Prototyping Modules into a remote lab system. This implementation enables a Web-based access to hardware models.

A student uploads a source file implementation to the remote lab server in order to test an implementation directly within a hardware environment. The remote lab server offers the interfaces to integrate specific project and hardware plug-ins. These plug-ins access a hardware specific software environment to automatically compile and program the resulting firmware. To stimulate this design, the remote lab server exchanges digital signals via a serial interface.

To allow the student to compare architectures of various controllers using the same hardware model, a specific controller using the remote lab interface can be selected. For this, a multiplexer provides the control connection between the respective controller and the hardware model.

- SES 14.3 **Virtual Environment for Designing Real Embedded Applications**
Nicusor Birsan, Military Technical Academy, Bucharest, Romania, Shekhar Sharad, National Instruments, USA

Computer-based embedded systems have been designed for many decades in a variety of industrial domains, but their economic importance has grown exponentially recently as electronic components have made their way into everyday-use devices. The productivity cannot be substantially improved without new methods and tools.

In this context virtual instrumentation could have an essential role helping designing of such heterogeneous systems from requirements and modeling to final qualification tests. The graphical system design can modify the entire development cycle, reshaping it from »V« to a »Y« life-cycle through automated code generation, and further, as articulation point into a platform based design paradigm, to a »T« one. At the same time, the environment has effects in teaching the multidisciplinary domain of embedded systems by giving the opportunity to switch from lecture-experimentation to a laboratory-lecture order into a hands-on approach.

SES 15
14:30–16:00
Room M15

Telemedicine

Session Chair: Carlos Alberto Reyes Garcia

SES 15.1 WebSA on Cry: Web-Based Technology Applied to the Cry Analysis

S. D. Cano Ortiz, F.V.Duvergel, S.Guerra Fernandez, O.Bordies, D.I.Escobedo Beceiro, A. Subert Semanat, C.A.Reyes Garciaz CENPIS, Universidad de Oriente, Stgo de Cuba, Cuba

In this work the design of a Web-based platform for Infant Cry Analysis is proposed in order to get an effective exchange of research experiences and information sharing among the researchers within cry community. The paper presents as contribution regarding its previous equivalent site [SIU Cry Archive] the access to a Cuban Cry database via two-level user's authentication. Another supplementary attributes and services are included as follow: breakdown news on cry analysis, and links to important web sites concerned with the cry analysis. Finally an approach among different research focus, standardization of cry-based methodologies and procedures could be achieved as a result of the use of this Webbased platform.

SES 15.2 Virtual Diagnosis in Medicine using e-Healthcare

Cristian Ravariu, Patricia Tuhari, "Politehnica" University of Bucharest, Romania, Marius Ciprian Branzila, Technical University, Iasi, Romania, Florina Ravariu, National Institute for R&D in Microtechnologies, Bucharest, Romania, Rodica Botan, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania

A new challenge in the biomedical engineering is the remote patient monitoring. But this implies a strong collaboration among an engineering group, physicians and patients. The graduating students from the electronics faculty get the experience and those investigation tools necessary to produce IT applications, like telemedicine, web-assisted medical information, virtual labs or healthcare points. In this way, a new job has arisen in the last time – bioengineer – as an ideal interface in the searching of the electronic diagnosis between patients and remote investigations performed by clinicians. The paper presents a software developed at master studies at Microsystems Department in the last year, regarding a web-assisted diagnosis page, useful for human medicine. The HTML application is described, besides the medical links.

SES 15.3 A prototype of web-e-nose device used in medicine fields

Marius Branzila, Cristina Schreiner, Cristian Ravariu, Marius Pislaru, Stefan Ursache, Technical University Gh. Asachi, Iasi, Romania

A web-based system used in olfactory illness patients at home and their physician was developed. A web browser plug-in simplifies the process of capturing virtual odours and transferring it to a web site for novice computer users. The design of the virtual odours capture plug-in can be reused to acquire and securely transfer any type of data over the web. For example, readings samples from Web-E-Nose device, which can be connected directly to the Internet, can be transferred to a home E-Medicine web site. Both patients and doctors can access this web site.

SES 16
14:30–16:00
Room H1.15

Remote Lab Environments

Session Chair: Eduard Babulak

SES 16.1 Remote laboratory environment suitable for video stream management

Darko Fuduric, Mario Žagar, University of Zagreb, Croatia

System suitable for remote video stream capturing and transmission is proposed. Hardware and software architecture suitable for these functions is discussed. Different possible parameter sets according to the existing requirements are proposed. Compatibility with existing networks and laboratory framework environment is mandatory, so common TCP/IP stack layer is used. Remote laboratory based on embedded systems and video stream monitoring of these systems is selected for practical work evaluation. It is suitable for teaching microcontroller fundamentals, providing automatic exercise work scoring and tracking users' actions and results through practical work.

SES 16.2 Remote Laboratory Java Server for Data Exchange with Matlab Automation Server

Pavol Bisták, Slovak University of Technology in Bratislava, Slovakia

This paper describes the control of real laboratory systems via Internet that is often called remote control laboratory. Remote laboratories are becoming a standard part of education and research. The principle of this remote laboratory is based on Matlab and COM technology for data exchange within the Windows operating system. Usually a control algorithm runs on a PC with Matlab that controls the real plant. This is the server side. For the purpose of a remote control a Java client server application has been developed. It covers communication and offers an user friendly interface for control of the remote plant and visualisation of measured data.

SES 16.3 Automated User Support in Remote Experimentation Laboratories

Michael Callaghan, Jim Harkin, Martin McGinnity, Liam Maguire, University of Ulster, Northern Ireland

Increasingly web based distance education courses are on offer augmented by the provision of remote experimentation laboratories. Developments in recent years have addressed many of these issues as this constant innovation has necessitated educational institutions and other training providers to continually reassess the content and delivery of engineering curricula in the context of this developing field. However autonomous learning environments by their very nature offer minimal educator assistance, and from a student's perspective, it is inevitable that at some stage of the experimental process, context specific help will be required. This paper seeks to address this issue in relation to the practical aspect of web based engineering related courses and presents an intelligent help system to support students in the practical use of autonomous learning environments for remote experimentation.

KEY 06
16:30–17:00
Room V200

Joyful automation

RUEDIGER THEIS, WIESEMANN & THEIS, GERMANY

Session Chair: Reinhard Langmann



As »automators« we pursue the goal of ensuring predictable processes and giving the operator absolute control over the equipment. Naturally the automator is overjoyed when he or she succeeds in constructing a new piece of equipment along the above lines. But does this apply as well to the operator of the equipment? Is the rugged predictability not simply too boring over the long run? Is it enough to counter the boredom by making use of remote control to monitor many systems at a time from a single master display? To understand how the division of work is optimally accomplished between man and an automated system, we need to know not only the possibilities of the machines, but also how people tick. Much discussion is devoted to the limitations and mistakes made by people, but too little to the question of what actually makes us happy as human beings. As engineers we need here systematic criteria for developing a piece of equipment or system that also gives joy to the operator. Recent research on the brain is providing the first clues to the human happiness mechanisms. One ingredient seems also to be the element of surprise. So allow yourself to be surprised about what specific possibilities for »joyful automation« have occurred to the author.

Authors

A P, Jagadeesh Chandra – apjchandra@yahoo.com
Albu, Mihai – malbu@ee.tuiasi.ro
Alexandru, Carmen – cialexandru@yahoo.com
Al-Zoubi, A.Y. – zoubi@psut.edu.jo
Angulo, Ignacio – iangulo@eside.deusto.es
Auer, Michael E. – M.Auer@cti.ac.at

Babulak, Eduard – babulak@ieee.org
Bahník, Pavol – bahnik.pavol@atlas.sk
Barrón-Estrada, Lucia – luciabarron@gmail.com
Bayard, Bernard – bernard.bayard@univ-st-etienne.fr
Berntssen, Malte C – malte.berntssen@fh-duesseldorf.de
Billaud, Michel – billaud@labri.fr
Birsan, Nicusor – nicbirsan@yahoo.com
Bischoff, Andreas – andreas.bischoff@fernuni-hagen.de
Bisták, Pavol – pavol.bistak@stuba.sk
Blumenthal, Sebastian – sebastian.blumenthal@smail.inf.fh-bonn-rhein-sieg.de
Botan, Rodica – rodica.botan@gmail.com
Branzila, Marius – branzila@ee.tuiasi.ro
Braune, Tobias – tobias.braune@stud.u-ilmenau.de
Bright, Chris – c.g.bright@curtin.edu.au
Bruns, Friedrich W. – bruns@artec.uni-bremen.de

Callaghan, Michael – mj.callaghan@ulster.ac.uk
Candelas, Francisco Andrés – Francisco.Candelas@ua.es
Carvalho Bachiao Martins, Andre – A.CarvalhoBachiaoMartins@fh-kaernten.at
Castro Gil, Manuel Alonso – mcastro@ieec.uned.es
Cervantes, Erika Vera – eevc_v@hotmail.com
Chepelev, Dmytryj – Dmytryj.Chepelev@gmail.com
Claesson, Ingvar – ingvar.claesson@bth.se
Cooper, Martyn – M.Cooper@open.ac.uk
Cotfas, Daniel – dtcotfas@unitbv.ro
Cotfas, Petru Adrian – pcotfas@unitbv.ro
Cvjetkovic, Vladimir M – vladimir@kg.ac.yu

Dai, Yuwei – qijun1969o614@yahoo.com.cn

Eleftheriou, Polyvios – polyvios.eleftheriou@cut.ac.cy
Ermer, Michael – michael.ermer@Siemens.com

Fakhfakh, Ahmed – ahmed.fakhfakh@isecs.rnu.tn
Fayolle, Jacques – jacques.fayolle@univ-st-etienne.fr
Fernandez, Juanjo – JuanjoFernandez@edu.fh-kaernten.ac.at
Ferreira, J. M. Martins – jmf@fe.up.pt
Fosalau, Cristian – cfosalau@ee.tuiasi.ro
Fritz, Wilfred L. O. – fritzwo@cput.ac.za
Fuduric, Darko – darko.fuduric@fer.hr

G.Scibilia, Giorgio – giorgioscibilia@gmail.com
Galván, Carlos Guillén – cguillen@ccc.inaoep.mx
Garbi Zutin, Danilo – D.GarbiZutin@fh-kaernten.at
García-Zubia, Javier – zubia@eside.deusto.es
Garnica, Carmen Cerón – mceron@cs.buap.mx
Gausemeier, Jürgen – j.gausemeie@hni.upb.de
Geiger, Christian – geiger@fh-duesseldorf.de
Geoffroy, Didier – geoffroy@creea.u-bordeaux.fr
Gillet, Denis – denis.gillet@epfl.ch
Glamnik, Andro – andro.glamnik@siol.net
Gravier, Christophe – christophe.gravier@univ-st-etienne.fr
Grout, Ian – Ian.Grout@ul.ie
Gustavsson, Ingvar – ingvar.gustavsson@bth.se

Haehnel, Hartmut – hartmut.haehnel@web.de
Håkansson, Lars – lars.hakansson@bth.se
Harkin, Jim – jg.harkin@ulster.ac.uk
Hartescu, Florin – flory@ici.ro
HDJJI, Fatma – hadijifatma@yahoo.fr
Henke, Karsten – karsten.henke@tu-ilmenau.de
Hercog, Darko – darko.hercog@uni-mb.si
Hernandez, Unai – uhernand@eside.deusto.es
Holonec, Rodica – rodica.holonec@mas.utcluj.ro
Huang, Zhizhong – zzhuang@mail.tongji.edu.cn
Huba, Mikulas – mikulas.huba@stuba.sk
Hulea, Nicoleta Stefania – nhulea@yahoo.com

Iordache, Dragos – dragosh.iordache@yahoo.com
Iruzun, Jaime – jaime.iruzun@gmail.com
Ishikawa, Satoru – m5112102@u-aizu.ac.jp

Jara, Carlos Alberto – cajib@dfists.ua.es
Jezernik, Karel – karel.jezernik@uni-mb.si
Jitngernmadan, Prajaks – prajaks@gmx.de

Kalantzopoulos, Athanasios – kalan@upatras.gr
Karageorgopoulos, Dimitrios – dimitriskarageorgopoulos@gmail.com
Knoblich, Ingo – Ingo.Knoblich@ni.com
Krauss, Philipp – Philipp.Krauss@ni.com
Krisilov, Viktor – krissilovva@mail.ru
Kurcík, Peter – peter.kurcik@stuba.sk

Lagö, Thomas – thomas.lago@axiom-edutech.com
Langmann, Reinhard – reinhard.langmann@fh-duesseldorf.de
Leao, Ana – Ana.Leao@qimonda.com
Lewis, Noelle – noelle.lewis@ims-bordeaux.fr
Linder, Thorsten – thorsten.linder@smail.inf.fh-bonn-rhein-sieg.de
Lindsay, Euan – E.Lindsay@curtin.edu.au
Liu, Dikai – dikai.liu@eng.uts.edu.au
Lowe, David – david.lowe@uts.edu.au
Luboš, cirka – lubos.cirka@stuba.sk
Luna, Guillermo De Ita – deita@cs.buap.mx
Lustig, František – fl@plk.mff.cuni.cz

Machotka, Jan – jan.machotka@unisa.edu.au
Maguire, Liam – lp.maguire@ulster.ac.uk
Mashlan, Miroslav – miroslav.maslan@upol.cz
Mastacan, Lucian – lmastacan@ac.tuiasi.ro
Matijevic, Milan – matijevic@kg.ac.yu
McGinnity, Martin – tm.mcgininity@ulster.ac.uk
Medina Garcia, Jose Luis – medina@eel.upc.edu
Michaelides, Ioannis – ioannis.michaelides@cut.ac.cy
Michal, Kvasnica – michal.kvasnica@stuba.sk
Miciu, Ion – ionmiciu@ipa.ro
Mikuláš, Huba – mikulas.huba@stuba.sk
Miroslav, Fikar – miroslav.fikar@stuba.sk
Mnif, Hassene – hasene.mnif@isecs.rnu.tn
Mohtar, Aaron – aaron.mohtar@unisa.edu.au
Molitor, Peter – peter.molitor@iais.fraunhofer.de
Moraru, Carmen Maria – mcarmen@icsi.ro
Müller, Dieter – mueller@artec.uni-bremen.de
Murray, Steve – stevem@eng.uts.edu.au
Musuroi, Sorin – ciprian.sorandaru@gmail.com

Nedic, Zorica – zorica.nedic@unisa.edu.au
Nilsson, Kristian – kristian.nilsson@bth.se

Obracevic, Predrag – predrag.obracevic@gmail.com
Olah, Iosif – iolah@ac.tuiasi.ro
Olarescu, Nicola-Valeriu – ciprian.sorandaru@gmail.com
Ondera, Martin – Martin.Ondera@stuba.sk
Orduña, Pablo – pablo@ordunya.com
Ortega, Juan Antonio – ortegar@eel.upc.edu
Ortiz, Sergio Daniel Cano – scano@fie.uo.edu.cu
Osorio-Velázquez, Moisés – rzatarain@itculiacan.edu.mx
Ožvoldová, Miroslava – mozvoldo@truni.sk

Pajonk, Michael – m.pajonk@gmx.de
Pan, Yiqun – yiqunpan@mail.tongji.edu.cn
Pavol, Bisták – pavol.bistak@stuba.sk
Pechousek, Jiri – pechous@prfnw.upol.cz
Pereira, Carlos Eduardo – cpereira@ece.ufrgs.br
Pester, Andreas – A.Pester@cti.ac.at
Pislaru, Marius – mpislaru@ee.tuiasi.ro
Prochazka, Roman – prochazka.romik@seznam.cz

R D, Sudhaker Samuel – sudhakersamuel@yahoo.com
Radkowski, Rafael – rafael.radkowski@hni.upb.de
Ravariu, Cristian – cr6820o3@yahoo.com
Reyes Garcia, Carlos Alberto – kargaxxi@inaoep.mx
Rodriguez, Eva – eva.rodriquez@edu.fh-kaernten.ac.at
Rojko, Andreja – andreja.rojko@uni-mb.si
Ros Florenza, Joaquim – rosf@ee.upc.edu
Ruiz, Elio Sancristobal – Elio@ieec.uned.es

Safaric, Riko – riko.safaric@uni-mb.si
Sahnoun, Salwa – sahnounsalwa@yahoo.fr
Salzmann, Christophe – christophe.salzmann@epfl.ch
Samoila, Cornel – csam@unitbv.ro
Sanfilippo, Filippo – filippo.sanfilippo@tiscali.it
Satake, Satoru – m5112101@u-aizu.ac.jp
Schaf, Frederico Menine – frederico.schaf@ufrgs.br
Schauer, Franz – fschauer@ft.utb.cz
Schmid, Christian – cs@atp.rub.de
Schreiner, Cristina – cschrein@ee.tuiasi.ro
Sevcenko, Michal – sevcenko@vc.cvut.cz
Sfasie, Andreea – ciprian.sorandaru@gmail.com
Siminiceanu, Ilie – siminic@ch.tuiasi.ro
Sorandaru, Ciprian – ciprian.sorandaru@gmail.com
Stefanovic, Miladin – miladin@kg.ac.yu
Stöcklein, Jörg – ozone@upb.de
Stuhrmann, Norbert – norbert.stuhrmann@fh-duesseldorf.de
Surmann, Hartmut – hartmut.surmann@iais.fraunhofer.de

Tarnovan, Ioan Gavril – ioan.tarnovan@mas.utcluj.ro
Temneanu, Cristina – ctemneanu@ee.tuiasi.ro
Torres, Fernando – fernando.torres@ua.es
Tretyakov, Viatcheslav – viatcheslav.tretyakov@smail.inf.fh-bonn-rhein-sieg.de
Tuhari, Patricia – patricia_tuhari@yahoo.com

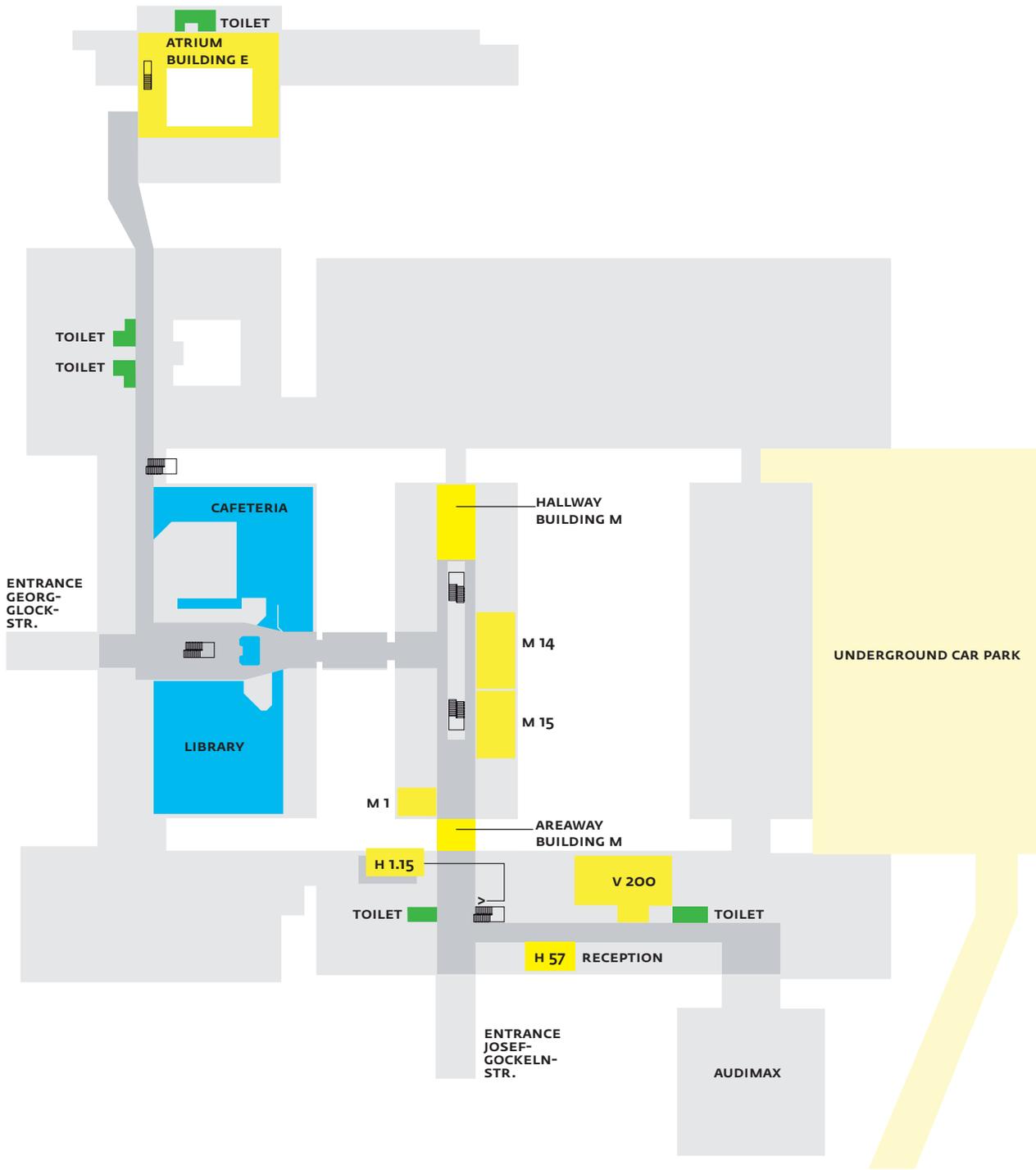
Urías-Barrientos, Eduardo – rzatarain@itculiacan.edu.mx
Ursache, Stefan – sursache@ee.tuiasi.ro
Ursutiu, Doru – udoru@unitbv.ro

Vazhenin, Denis – m51122o1@u-aizu.ac.jp
Vornicu, Octavian Costel – clauv2oo5@yahoo.com

Wang, Ming – wang6o4@fdu.edu
Waßmann, Helene – helene.wassmann@hni.upb.de
Wilson, Shane – s.wilson@ulster.ac.uk
Wuttke, Heinz-Dietrich – dieter.wuttke@tu-ilmenau.de

Zackrisson, Johan – johan.zackrisson@bth.se
Žagar, Mario – mario.zagar@fer.hr
Zakova, Katarina – katarina.zakova@stuba.sk
Zamfira, Sorin – zamfira@unitbv.ro
Zatarain, Ramón – rzatarain@itculiacan.edu.mx
Zhang, Jie – zhangjieabcd1984@163.com
Zigouris, Evangelos – ez@physics.upatras.gr
Zimmer, Thomas – thomas.zimmer@ims-bordeaux.fr

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