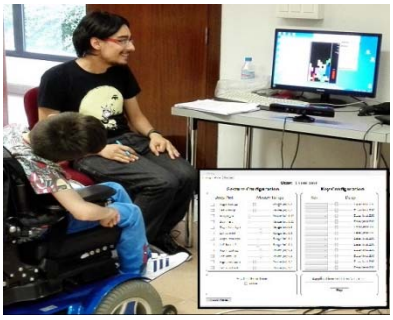
CITSEM Newsletter
October 2016

BEYOND THE STATE OF THE ART

In the field of natural interfaces for disabled persons, we are working in parallel on two applications. One is MoKey [1], a Motion Keyboard interpreter, created to use any off-the-shelf software with the aid of adjustable corporal movements. The other one is Blexer (Blender Exergames), an adaptive and intelligent exergaming environment for entertainment at home rehabilitation [2,3]. In both applications, the main aim is motivating the users to do daily exercises and easing their integration into society by enabling them to use the same applications as everyone else. Both environments use Kinect as input device. MoKey is in an advanced phase, and enables the use of simple applications like Tetris, Minecraft, Powerpoint or Skype with configurable movements of arms, legs and/or trunk, either standing or seated. The future work will be moving to the new Kinect One version and integrating facial movements as well. Blexer is on the way to be an adventure gaming environment created upon the Blender open source platform and aims at providing an entertaining and motivating way for young people with disabilities to move their bodies while playing as needed. Necessary exercises will be integrated into the gaming environment and the therapist will be able to configure and supervise them. The game will automatically adapt and react to the user's performance, in such a way that they never over- or under-exercise, and more importantly, never stop having fun! Both applications have been tested recently by kids and adults in wheelchairs, providing excellent feedback.



[1] M. Eckert, M. López, C. Lázaro, J. Meneses, J.-F. Martínez, "MoKey – A Motion based Keyboard Interpreter", IEEE International Symposium on Consumer Electronics (ISCE), 2015.

[2] M. Eckert, I. Gómez-Martinho, J. Meneses und J. F. Martínez, "A modular middleware approach for exergaming", International Conference on Consumer Electronics (ICCE), Berlin, 2016.

[3] M. Eckert, I. Gómez-Martinho, J. Meneses, J.-F. Martínez, "A Multi Functional Plug-in for Exergames", IEEE International Symposium on Consumer Electronics (ISCE), 2015.

NEWS

Researchers and Staff

Researcher from GRyS and deputy director of CITSEM **Prof. Dr. José Fernán Martínez Ortega** has been appointed as **Guest Editor** for the special issue *Sensing Technologies for Autonomy and Cooperation in Underwater Networked Robot Systems* of **Sensors (JCR Q1)**.

Researcher from GDEM **Prof. Dr. Fernando Pescador del Oso** is serving as **General Chair** for the **International Conference on Consumer Electronics (ICCE'17)**. This conference is scheduled for January 2017.

Researcher from GRyS **Néstor Lucas Martínez** has defended his Master Thesis dissertation obtaining a grade of *Summa Cum Laude*.

Students

Carlos Ignacio Pérez Sechi has defended his Final Degree Project dissertation obtaining a grade of *Summa Cum Laude*.

Research Groups

In January, the members of the **Gamma research group** started to work on automatic skin lesion segmentation and have participated in the segmentation part of the challenge: "*Skin Lesion Analysis Towards Melanoma Detection*" organized at the International Symposium on Biomedical Imaging (ISBI 2016). They have obtained an encouraging tenth place out of twenty eight participants and are working hard to improve results.

PUBLICATIONS

Cruz, H.; Eckert, M.; Meneses, J.; Martínez, J.-F. *Efficient Forest Fire Detection Index for Application in Unmanned Aerial Systems (UASs)*. **Sensors** 2016, 16, 893.
doi: 10.3390/s16060893

Cruz, H.; Meneses, J.; Eckert, M.; Martínez, J.-F. *Night Time and Low visibility Driving Assistance Based on the Application of Colour and Geometrical Features Extraction*. **First International Conference, Smart-CT 2016**, Malaga, Spain, Lecture Notes in Computer Science 9704, **Springer**, pp. 118-127, 2016.
doi: 10.1007/978-3-319-39595-1_12

Rubio, G.; Martínez, J.F.; Gómez, D.; Li, X. *Semantic Registration and Discovery System of Subsystems and Services within an Interoperable Coordination Platform in Smart Cities*. **Sensors** 2016, 16, 955.
doi: 10.3390/s16070955

Yuan, X.; Martínez, J.-F.; Eckert, M.; López-Santidrián, L. *An Improved Otsu Threshold Segmentation Method for Underwater Simultaneous Localization and Mapping-Based Navigation*. **Sensors** 2016, 16, 1148.
doi: 10.3390/s16071148

Chavarrías, M.; Pescador, F.; Garrido, M. J.; Sánchez, A.; Sanz, C. *Design of Multicore HEVC Decoders Using Actor based Dataflow Models and OpenMP*. **2016 IEEE International Conference on Consumer Electronics (ICCE)**, Las Vegas, NV, 2016, pp. 287-288.
doi: 10.1109/ICCE.2016.7430616

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RESEARCH GROUPS AND PROJECTS STATUS

Cyber-Physical Systems Engineering Labs (CPSE Labs) is a European Union-funded initiative (Horizon 2020) supporting European businesses. In this framework, innovation activities are funded so that businesses are connected to the world-class expertise of some of Europe's top Cyber-Physical Systems (CPSs) research institutes. CPSs are systems that link the physical world through e.g. sensors or actuators, with the virtual world of information processing. CPSs can, for example, improve efficiency and safety in buildings by monitoring and controlling heat or humidity, implement intelligent, efficient production systems and manufacturing lines, or support elderly people by detecting problems, illnesses or accidents and triggering the corresponding alarm automatically.

CPSE Labs consists of six Design Centres, which are research centres with a reputation for excellence and offering state-of-the-art expertise in different aspects of cyber-physical system engineering. These Design Centres, located in various European countries, develop and maintain a common strategic innovation agenda for building up novel and complete industrial value chains.

CPSE Labs primarily supports businesses by funding experiments (by means of open-calls) used to develop CPSs, and by delivering high quality expertise. The experience gained from the experiments will help creating a body of knowledge that will benefit current and future experimenters. The last brick will be the marketplace, also targeted within CPSE Labs.

The Spanish Design Centre is hosted by Technical University of Madrid (UPM), in conjunction with Indra Sistemas. Headquarters are at UPM Campus-Sur Arboleda Building (CITSEM facilities). The Design Centre is specialised in CPSs for smart cities.

Currently, the IWESLA experiment is being run. This experiment, led by the company A-CING, will build a CPS that will seek efficiency in water consumption. The IWESLA CPS will monitor water consumption behaviour, generate alarms when anomalous situations are detected, as well as automatically close or open the building water supply. Users, people working at Arboleda building, are actively participating. To accomplish its objectives, the IWESLA project will integrate devices such as water meters and electro-valve devices, making use of the Sofia2 platform, a communication and storage middleware provided by Indra, and a data analysis platform provided by Novelty. Once this development is finished, a similar system will be installed in two buildings in Rivas Vaciamadrid city, Madrid Autonomous Community. Indra and UPM are supporting the IWESLA project, and will be verifying the findings on the experiment, which include lessons learnt, obstacles found, and conclusions on the CPS architecture finally deployed.

GAMMA
Grupo de Aplicaciones Multimedia y Acústica

The research Group on Acoustics and MultiMedia Applications (**GAMMA**) was founded in December 2015 and has recently become a member of CITSEM. We are an interdisciplinary group comprising researchers with a Signal Processing, Acoustics and Business Administration background. Current research activities address gamification, medical image processing, virtual acoustics, psychoacoustics, speech signal processing, knowledge management and organizational learning.