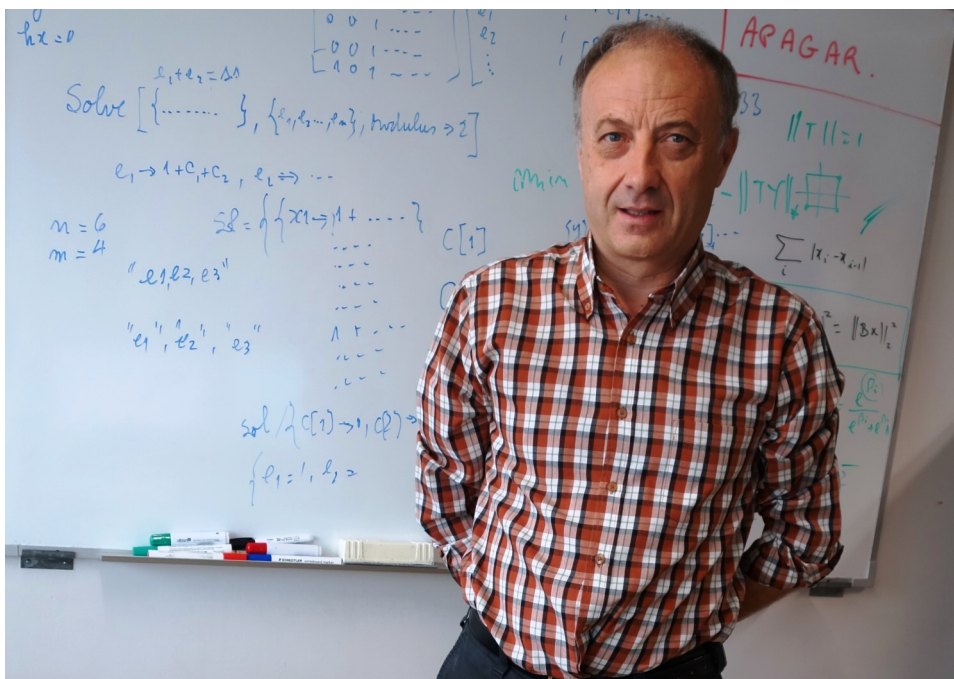


## José Bioucas elevated to IEEE Fellow



José Bioucas-Dias has been elevated to IEEE Fellow, with effectiveness from January 1 of 2017. According to the IEEE, the IT researcher was attributed this distinction “for his contributions to imaging inverse problems in remote sensing”. With this distinction, the total number of IEEE Fellows in IT is seven.

The IEEE – Institute of Electrical and Electronics Engineers is considered to be the world’s largest technical professional organization. The IEEE Fellow is a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. With 400k members from 160 countries, the number of elevations to IEEE Fellow each year cannot exceed 0,1% of the number of voting members, that is 1 in each 1,000.

José Bioucas-Dias, who joined IT in 1999 and has more than 20 years of teaching at the Instituto Superior Técnico, has introduced scientific contributions in inverse problems, signal and image processing, pattern recognition, optimization, and remote sensing. Back in 2015, he was one of the five Portuguese researchers to be on the Thomson Reuters list of Web of Science Highly Cited Researchers, which Thomson Reuters considers to represent the world’s most influential scientific minds.

## Editorial

Today I must come back to an administrative matter that, unless some urgent corrective action is taken by the Public Administration, will seriously undermine the efforts to modernize laboratory equipment in most R&D units.



As you all know most activities by Portuguese R&D units are funded by grants either from FCT, under the state budget, or from P2020, using structural funds. Accordingly all expenses paid through such grants must be justified and considered eligible.

Nowadays acquisition costs which were previously considered eligible are no longer eligible. Instead eligibility is reduced to depreciation costs (typically 1/5 of acquisition costs, per year). The change of rules imply a major effort on unit treasuries and, since most projects are unlikely to last for 5 years, a very serious practical difficulty. Efforts have been made by universities and by FCT but no solution has yet been found.

Hoping that Santa Klaus may bring a solution I wish you and your family a Merry Christmas and a very Happy New 2017.

Carlos Salema

## In this issue

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- ♦ A low-cost wheelchair for the “locked-in”
- ♦ Where are you now?
- ♦ Project Snapshot: Forensic Box for Quick Network-Based Security Assessments



By Pedro Inácio and Bernardo Sequeiros

IT is a private non-profit association of Universities (UA, UC, IST, UBI, UP, ISCTE-IUL), Polytechnic of Leiria, Altice Labs and Nokia, with a mission to create and disseminate scientific knowledge in telecommunications. IT hosts and tutors graduate and postgraduate students.

**Send your news and contributions for this newsletter to: [news@it.pt](mailto:news@it.pt)**

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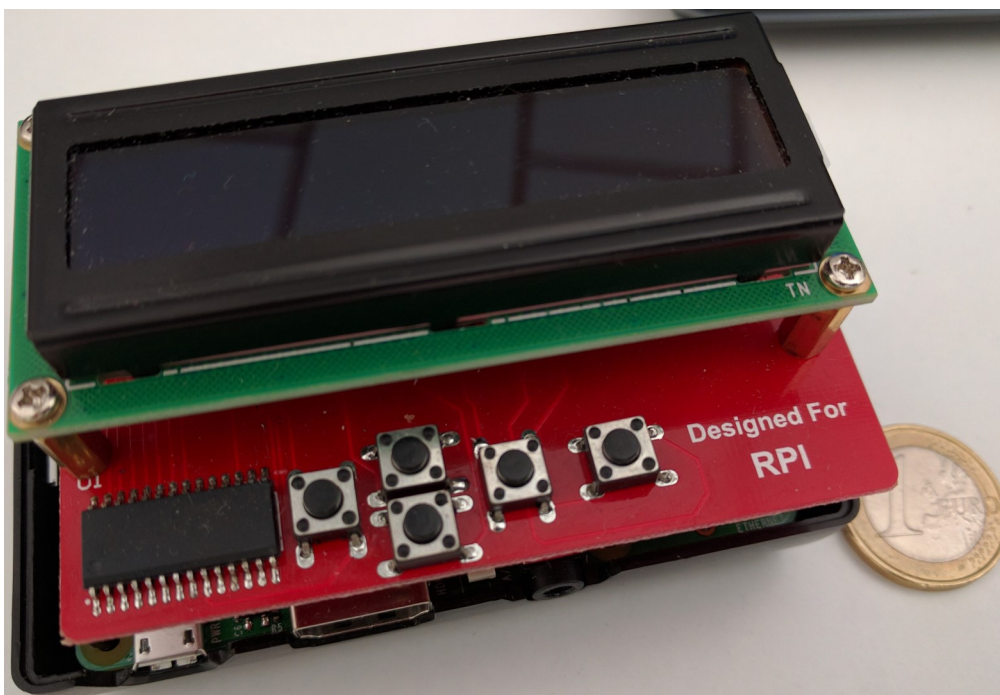
## Rui Aguiar is the new NetWorld2020 SB Chairman

Rui Aguiar, from IT in Aveiro, is the new Chairman of the Networld 2020 Steering Board, the European Technology Platform for communications networks and services. Besides being the first academic to lead the NetWorld 2020 SB, the IT researcher is also the first portuguese to ever be on the Board of this European Technology Platform. In Rui Aguiar's opinion "the portuguese scientific community may benefit from an increase of the international recognition of our work and they may now have an active voice on the international community regarding the development of the research in mobile communications". Furthermore, his election also shows that "it is possible to come from Portugal and to see our work recognized and being rewarded by the international community", says Rui Aguiar.



## PROJECT SNAPSHOT

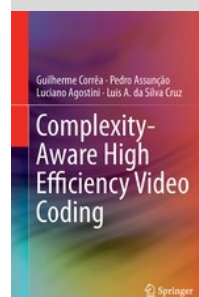
### Forensic Box for Quick Network-Based Security Assessments



The project named "Forensic Box for Quick Network-Based Security Assessments" was focused on the development of a small computer system capable of performing network-based security assessments in a seamless and mostly automated manner. It was developed within the scope of the masters project in Computer Science and Engineering of the University of Beira Interior (UBI) by Bernardo Sequeiros, under the supervision of Professor Pedro Inácio in the IT-branch of Covilhã and UBI. Apart from the aforementioned outcome, the main objectives consisted on the automation of the process behind a security audit. The system was to be plug-and-play, so as to reduce the need for technical knowledge and the burden associated with audits. A raspberry Pi 2 was used as the hardware base for the prototype. The project consisted of developing all the logic, scripts and interfacing between different auditing tools, with functionality from network scanning, traffic capture or web scanning. The delivered prototype is autonomous, requiring only that the device is connected to a network to start the audit and produce the reports. Reports are delivered as a web page, containing all information gathered for each host, namely the discovered potential vulnerabilities. The user can interact with the device both through hardware buttons and a small display on top of the

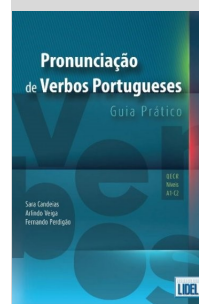
**The delivered prototype is autonomous, requiring only that the device is connected to a network to start the audit and produce the reports**

## Books



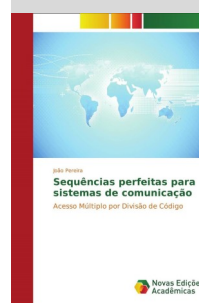
**Complexity-Aware High Efficiency Video Coding, by G. Corrêa, P. Assunção, L. Agostini and L. A. S. Cruz**

This book discusses computational complexity of High Efficiency Video Coding (HEVC) encoders with coverage extending from the analysis of HEVC compression efficiency and computational complexity to the reduction and scaling of its encoding complexity.



**Pronunção de Verbos Portugueses - Guia Prático, by S. Candeias, A. Veiga and F. Perdigão**

This guide presents a very structured, objective study of the irregularities in the pronunciation of Portuguese verbs, constituting a reference manual in this field. It also indicates examples of automated systems of pronunciation, which resulted from the authors' research in their scientific areas of work.



**Sequências Perfeitas para Sistemas de Comunicação, by J. Pereira**

This book presents several new sets of perfect sequences (orthogonal and pseudo orthogonal) which have a auto-correlation peak with null values. These can improve the existing communication systems CDMA (Code Division Multiple Access) and OCDMA (Optical Code Division Multiple Access)

(continues on page 3)



device, or through a web interface, where further tweaking of several tools and options are present. The report of the findings is also available via web interface. All the used or developed software is open-source and a pre-configured OS image for a Raspberry Pi 2 is readily available in <https://sourceforge.net/projects/automatedauditingssystem/>. The main novelty of the project comes from the scripts and programs developed to glue several already available security analysis tools into a well-structured flow. The scripts sense the network status, invoke the tools in a given sequence, collect and analyse their outputs and feed information into other tools, aligning the formats, and producing the report. To evaluate the prototype, several tests were performed, both in controlled environments, where the device was connected to a known network, containing hosts with vulnerable services, known beforehand, and in an uncontrolled environment, where the performance of the device was compared with that of a human auditor. This latter audit was performed on different servers from a production network. The device was able to detect the majority of the existing vulnerabilities, only failing on SQL injection detection.

**Pedro Inácio and Bernardo Sequeiros**

## A low-cost wheelchair for the “locked-in”

The Locked-in syndrome (Lis), a term first introduced in 1966 by Plum and Posner, is a rare neurological disorder where a fully functional brain is confined within a non-functional body. Individuals with Lis cannot consciously or voluntarily chew, swallow, breathe, speak, or produce any movements other than those involving the eyes or eyelids. They are conscious and awake, but have no ability to produce movements or to speak. Even though the first example of a “locked-in” patient in the medical literature dates back from the end of the 19<sup>th</sup> century, this disorder has only come to public awareness during the last 15 years. Most likely because of high-profile personalities that suffer from Lis, with the theoretical physicist Stephen Hawking probably being the most recognizable. Autonomous wheelchairs can mitigate Lis patients mobility difficulties, however, with prices that go from 10k€ up to 30k€, they can be unachievable for many. During the last four years, João Pereira from IT in Leiria has been



coordinating a project where he and his research team have been working on a low-cost wheelchair prototype which is controlled by speech and eye movements. As João Pereira told us, the goal is to build this chair with less than

400€. Currently on his second version, the model is composed of a conventional wheelchair, a portable PC, a data acquisition board, two engines, a microphone with speakers, two webcams and a helmet. This year, the research team is already working on a third version with the prototype being built from scratch, using low-cost electronics. “I am referring to a Raspberry Pi computer to replace the portable PC as well as Arduino microcontrollers that will replace the data acquisition board”, explained the IT researcher. Also, the majority of the plastic pieces on this wheelchair will be made on a 3D printer. For now, the prototype is being tested by the research team, to improve its driving based on eye movements, voice commands activation, remote driving via the Internet, driving following a coloured line glued to the ground and autonomous driving through GPS. According to João Pereira “All of these features need to be fine-tuned and improved before the prototype can be tested on real patients”.

## Newsflash

### IT wins all the URSI 2016 awards

IT researchers won all the awards in dispute at the X Congresso do Comité Português da URSI, held at the Microsoft Auditorium, Lisbon. Ricardo Correia, from IT in Aveiro, was the winner of the ANACOM-URSI Portugal Award with his work “Quadrature Amplitude Modulation Backscatter for Passive Wireless Sensors”. As for the Best Student Paper Award, the winner was Miguel Monteiro (IT in Lisbon), with Marta Veríssimo (IT in Lisbon) and Andreia Costa (IT in Aveiro) having won 2<sup>nd</sup> and 3<sup>rd</sup> place.

### IT researchers with the Best Non-Student Paper at the LAPC 2016

The work “A feasibility study on the extension of the point scatterer formulation to raised canopy forests”, from Nuno Leonor, Rafael Caldeirinha, Telmo Fernandes (all from IT in Leiria), and Manuel Sánchez (University of Vigo), was considered the Best Non-Student Paper at the Loughborough Antennas & Propagation Conference – LAPC 2016.

### IT work distinguished by IP Leiria

The IT in Leiria was recently distinguished with the 1<sup>st</sup> Award I&D+I IPLeiria “+Ciência” 2016. This annual award distinguishes the Research Unit of IP Leiria whose scientific performance stood out the most during the last year.

### IT with the best portuguese team at the IEEEExtreme 2016

A team of researchers from IT in Porto achieved the best result among the other 16 national present at the IEEEExtreme 24-hour Programming Competition. Among the 1823 teams from all over the world that were competing, André Moreira, Luis Pinto and Sidney Carvalho were ranked in the 254<sup>th</sup> place.

## Mohsen Koohestani

I initiated my Ph.D. at Instituto de Telecomunicações in 2011, a joint doctoral program hosted by Instituto Superior Técnico of Universidade de Lisboa and École Polytechnique Fédérale de Lausanne, Switzerland. I was being supervised by Professor António Moreira (IST/IT) and Professor Anja Skrivervik (EPFL). I spent one year of my Ph.D. in IT and 2 years in Switzerland working on “human body proximity effects on antennas”. During this period, I proposed two simple low-cost and effective techniques: one for mitigating the destructive body effects on printed ultra-wideband (UWB) antennas and the other one for mitigating the overlay of UWB system with existing narrowband radio services. My work on this research project also allowed me to develop the best low-profile and highly efficient UWB antenna appropriate for wireless body area network (WBAN) applications. I was also involved in other projects concerning antenna-body interactions such as experiments in transient analysis of wearable antennas in in/on/off-body environment.

Together with EPFL, IT provided me opportunities to publish my work, attend conferences, and in short, conditions to enter the international community in the field.

Right after my Ph.D. in 2014, I was offered a Post-Doc position at Institut d'Électronique et de Télécommunications de Rennes, Université de Rennes 1, France. I am working as postdoctoral fellow on biomedical applications of wireless power transfer systems, including design and analysis for wireless body-centric applications, design and characterization of human body models, dosimetry and exposure-level studies, and computational electromagnetic (time - and frequency-domain methods). I never lost contact with the IT people as I believe the knowledge I acquired at IT was a big help for me to be where I am now.



*Season's Greetings*



Holy Family With St Anne And The Infant St John The Baptist by Agnolo Bronzino (detail)