ConfTele: what changed this year?

Instituto de Telecomunicações organized for the 10th time ConfTele, the Conference on Telecommunications.

This year, ConfTele was wrapped with TechDays and took place in Aveiro Expo – Parque de Exposições de Aveiro on September 16 and 17. Organized jointly by IT, Universidade de Aveiro (UA), Associação Empresarial INOVARIA and Polo de Competitividade TICE and with the collaboration of the Aveiro Council, TechDays arises as the largest technology exhibition and the biggest national technological display of Information, Communication and Electronic Technologies, where ConfTele was comprised. Several Groups from IT moved there more than 30 exciting demonstrators which were thoroughly visited by the IT International Advisory Board. In the words of a member of the Advisory Board, Instituto de Telecomunicações has been very successful on giving people role models by bringing researchers and companies together and on complementing Education with Innovation and vice-versa.

TechDays gathered 262 exhibitors, from start-ups to well established players, and received around 1300 visitors. In turn, Conftele had the usual format with plenary sessions, parallel thematic sessions and poster sessions. The invited speakers this year were Dr. H. Philip Stahl, from NASA and Dr. Onur Altintas from Toyota Infotechnology Center.

The main purpose was succeeded: Conftele and Techdays brought together universities and industry, tightening already existing bonds and opening the way for future collaborations.

Overall, the event was a success, demonstrating that technologies are much closer to companies, universities and people’s needs than common belief would anticipate.

---

In this issue

- Highly Cited Researchers
- Project Snapshot: Photovoltaic cells made of organic materials
- 2015 Applied Networking Research Prize to João Luís Sobrinho
- PhD Students

---

Editorial

Today I have some good news and some bad news.

First the good news: Conftele’2015, held in Aveiro, on September 17 and 18, and the associate technology exhibition - TECHDAYS - were a success. The exhibition occupied a huge pavilion (4000 square meters) and together with the conference and its panel meeting draw an audience of 1300 (over the two days). To organize and manage such a large event, was no mean feat and IT in Aveiro should be congratulated for such an accomplishment.

IT Advisory Committee who visited us during the conference and the exhibition was very favorably impressed. I am pretty sure that the prototypes and demonstrators were a highlight of the event and went a long way to demonstrate IT’s work in finding solutions for societal needs.

And now for some bad news: IT success rate in the last FCT call for projects was below expectations. Results show, quite clearly, that FCT now favors bio-related themes above all others and not all IT research efforts are in that area. The number of PhD scholarships (in non-FCT PhD courses) has been drastically reduced. During 2014 IT hosted 62 PhD students that successfully presented and defended their theses. From the 2015 FCT call, IT should get 6 scholarships (for non-FCT PhD courses).

Carlos Salema
Two “Highly Cited researchers 2015” are from IT

Thomson Reuters, the most prestigious source to evaluate the impact of scientific publications, researchers and institutions, has included Mário Figueiredo and José Bioucas Dias in its 2015 Highly Cited Researchers list.

Only five Portuguese researchers had this distinction in 2015, so it is a privilege for IT to host two of them. Mário Figueiredo received the same distinction in 2014, with only one other Portuguese researcher.

According to Thomson Reuters, “Highly Cited Researchers 2015 represents some of the world’s most influential scientific minds.

About three thousand researchers earned this distinction by writing the greatest number of reports officially designated by Essential Science Indicators as Highly Cited Papers — ranking among the top 1% most cited for their subject field and year of publication, earning them the mark of exceptional impact.”

PROJECT SNAPSHOT

Solar energy can come in many different ways

Solar cells represent a very important renewable electrical energy source. Silicon-based modules have been installed in solar farms and on the roofs of private houses. This technology has been around for quite a long time. However, a new player has come into action. Organic photovoltaics represent an emerging technology that can potentially provide attractive advantages in comparison with conventional photovoltaic silicon cells. The use of organic materials, namely semiconducting plastics, instead of silicon, enables to fabricate light-weight, mechanically flexible, thin, and semi-transparent power-generating modules by less expensive methods. The organic/active materials in such cells are processed as inks, through wet deposition methods, as ink-jet printing, spray coating, or roll-to-roll printing.

This allows us to design fascinating applications such as photovoltaics integrated into clothes, in wearable items (ex. bags), over vertical or curved walls, etc., therefore spreading the means by which we may profit from «green» energy.

Despite this pool of attractive and marketable applications, organic solar cells are still less efficient devices than those of silicon: while organic photovoltaic cells have reached power conversion efficiencies around 10%, reported values for silicon-based cells range from ca. 13% for amorphous silicon cells to ca. 21% for multicrystalline silicon cells. The “Organic Electronics Group” at IT (Lisbon) has been working on organic solar cells development through several projects, over the last six years.

One recent topic of research deals with the adequate choice of organic materials to enlarge the absorption range (of solar radiation) of the cells to enhance their efficiency. In other words, by extending the spectral range of light absorption of the photo-active layer, more photons are harvested and larger photocurrents can be generated.

Organic cells include a photo-active layer composed of a semiconducting organic polymer, and a fullerene (C60 or C70 nanoparticles). As fullerenes are poor absorbing materials (of sunlight), it is the polymer that absorbs most of the light that enters the cell. The strategy was to incorporate a second polymer to act as an “antenna” in previously studied polymer-fullerene binary systems. The “antenna” polymer absorbs the blue-green part of the visible light that is not absorbed by the

(continues on page 3)
2015 Applied Networking Research Prize to João Luís Sobrinho

João Luís Sobrinho was awarded the 2015 Applied Networking Research Prize (ANRP) with his work — DRAGON Distribute-Route Aggregation on the Global Network — which was presented at the Internet Research Task Force (IRTF) open meeting and the Internet Engineering Task Force (IETF) Routing Area open meeting in July.

His work aims at giving a solution to the Internet routing system scaling, which still faces a lot of difficulties nowadays, by comprising filtering strategy: DRAGON’s basic version can reduce the amount of routing information in every Autonomous System around 50% and the full version around 80%.

Given that, DRAGON provides a new direction in Internet scalability.

Unlike works developed until now, DRAGON is a distributed algorithm running across all Autonomous Systems: it is compatible with today’s Internet routing system and it can be deployed incrementally.

DRAGON was awarded one of the 5 Applied Networking Research Prize selected from 33 eligible nominations, after a review “by 3-5 members of the selection committee according to a diverse set of criteria”.

PROJECT SNAPSHOT — Solar energy can come in many different ways (continued from p. 2)

main polymer. This “extra” light can be used by the “antenna” polymer in two ways: to readily generate electric charges (if fullerene is around) and to transfer the collected energy to the main polymer. As the electric properties of the two polymers are different, an adequate match of the two polymers ratio has to be found in order to optimize the efficiencies. Under the project, laboratory prototype cells were fabricated and tested using several combinations of polymers, different polymer ratios, different fullerenes (C60 or C70), and different temperatures to modify the mixing of components in the cells photo-active layer. As a result, cells with efficiencies as high as 7.5 % (extracted electrons per 100 photons that hit the cell) were already demonstrated which represent an improvement of ca. 30 % in relation to the best-performing system with one polymer. The value of 7.5 % is high, once best known organic cells show efficiencies of ca. 10 %. In future work, the team will investigate the role of the two polymers inter-mixing in the cell operation and transfer that knowledge to highly efficient systems to raise their efficiencies and obtain very efficient cells.

Ana Charas, Joana Farinhas and Jorge Morgado

Newsflash

Best Paper Award delivered to three IT researchers in IEEE VTC-2015

João Guerreiro, Rui Dinis and Paulo Carvalho, were distinguished with the Best Paper Award for their contribution on “Optimum Performance and Spectral Characterization of CE-OFDM Signals” in the IEEE VTC-2015 Conference Fall of IEEE Vehicular Technology Society (VTS), held in Boston on September 6-9, 2015.

Filipe Condessa wins “Best Student Paper Award” in IGARRS

"Supervised Hyperspectral Image Classification with Rejection received the “Best Student Paper Award” in the IEEE International Geoscience and Remote Sensing Symposium (IGARSS), which took place in Milan, Italy, from 26 to 30 July this year.

IT Ocean Swarm in Exame Informática

Anders Christensen and Sancho Oliveira, both researchers from IT, have been developing a team of robot-boats that can detect fishery resources as well as contaminants. This has awakened the attention of Exame Informática Magazine, which published an article about the Ocean Swarm project in its September issue.


SMACD distinguishes a team of researchers from IT

Ricardo Martins, Nuno Lourenço, António Canelas, Ricardo Póvoa and Nuno Horta were distinguished in SMACD Conference (International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design, Istanbul, Turkey, September 7-9) with the work AIDA: Robust Layout-Aware Synthesis of Analog ICs including Sizing and Layout Generation.

Best Paper Award in the Brazilian Symposium of Telecommunications

Renam Silva, Fernando Pereira and Eduardo A. B. da Silva with their work “Studying the Compression Performance of Video Descriptors“, were distinguished with the Best Paper Award in the SBRT 2015 – Brazilian Symposium of Telecommunications, which took place in Juiz de Fora, Brazil.

Work developed at IT in Aveiro wins the EU Microwave Prize

“DIDO Behavioural Model Extraction Setup Using Uncorrelated Envelope Signals”, a work by Hossein Zargar, Ali Banai and José C. Pedro, won the best paper award in the European Microwave Conference, EuMC Microwave Prize. This is the second best conference in the area of RF and microwave technics and took place in Paris.

SMACD distinguishes a team of researchers from IT

Ricardo Martins, Nuno Lourenço, António Canelas, Ricardo Póvoa and Nuno Horta were distinguished in SMACD Conference (International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design, Istanbul, Turkey, September 7-9) with the work AIDA: Robust Layout-Aware Synthesis of Analog ICs including Sizing and Layout Generation.

Best Paper Award in the Brazilian Symposium of Telecommunications

Renam Silva, Fernando Pereira and Eduardo A. B. da Silva with their work “Studying the Compression Performance of Video Descriptors“, were distinguished with the Best Paper Award in the SBRT 2015 – Brazilian Symposium of Telecommunications, which took place in Juiz de Fora, Brazil.

Work developed at IT in Aveiro wins the EU Microwave Prize

“DIDO Behavioural Model Extraction Setup Using Uncorrelated Envelope Signals”, a work by Hossein Zargar, Ali Banai and José C. Pedro, won the best paper award in the European Microwave Conference, EuMC Microwave Prize. This is the second best conference in the area of RF and microwave technics and took place in Paris.
Latest concluded PhDs hosted by IT

Hugo Silva
Physiological Computing: New Methods and Biometric Applications
PhD in Electrical and Computer Engineering by IST, University of Lisbon, September 2015, supervised by Ana Fred.
The thesis proposes new tools, novel signal sources, and explores methodologies that further extend the potential of physiological computing in a multidisciplinary approach, having biometrics as application scenario.
Hugo is currently working as a researcher at IT - Instituto de Telecomunicações in Lisbon, Portugal.

Hana Khamfroush
Network Coding for Cooperation in Dynamic Wireless Networks
PhD in Telecommunications Engineering in MAP-Tele Program, University of Porto, November 2014, supervised by João Barros and Daniel Lucani.
The thesis focuses on network coding for cooperation in dynamic wireless networks and finding optimal network - coded cooperative packet transmission policies that can minimize the cost of reliable packet transmission in dynamic multicast scenarios.
Hana is currently conducting independent research as well as supervising PhD students in Penn State University, US.

Hamed Hasani
Multi-band Reflectarray Antennas in Ku and THz Frequency Bands
PhD degree in Electrical Engineering jointly by the University of Lisbon and the École Polytechnique Fédérale de Lausanne, September 2015, supervised by Custódio Peixeiro and Anja K. Skrivervik. The thesis proposed highly functional and low-cost printed reflectarray antennas, capable of independent dual-polarized performance at several closely separated frequencies while having a single layer structure in addition to a straightforward design procedure. Hamed will start working as a post-doc at the Laboratory of Electromagnetics and Acoustics, EPFL.

Amaury Pouly
Continuous-time computation models: from computability to computational complexity
PhD in Computer Science by École Polytechnique (France) and University of Algarve, July 2015, supervised by Olivier Bournez and Daniel Graça. The thesis focused on the relationships between analog models of computation and classical computability over the real numbers. It showed that both paradigms are equivalent at the complexity level, i.e. they solve the same problems at the same speed. Amaury is currently a Post-Doc at the University of Oxford.

Where are you now?

Sara Candeias

During my 6 years (2008-2014) as a post-PhD researcher at Instituto de Telecomunicações, in Coimbra, I worked for the Portuguese Speech Recognition and Text-to-Speech IT-Lab engines under development.
Coming from a PhD in linguistics I found at IT a possibility of sharing my knowledge on the structures of the language and helping with topics related to language modules as well as the multi pronunciation extension for Portuguese. The work done over that time resulted in several published articles and an R&D FCT Project concluded with success recognized internationally. The post-PhD fellowship and the position as a researcher at IT were experiences that I loved as much as the work place.
After my research work at IT, I decided to make a career shift and in May 2014 I joined Microsoft Language Development Center in Lisbon, as a Senior Speech Scientist responsible for all the topics related with the European and Brazilian Portuguese Language (such as upcoming Speech Recognition support for Cortana and XBoxOne and Text-To-Speech improvements), as well as a Science and Technology Project Manager for projects in the area of Human-Computer Interaction using multimodality.
I am very grateful for my time at Instituto de Telecomunicações – it was a time of growing scientifically and most of all, meeting great people.
Muito obrigada IT :-}