NEWSLETTER

October 2018

Pursuing Societal Engagement

Part of the CTS mission is to create value and societal impact with research results. This aim is aligned with the recommendations of the Foundation for Science and Technology (FCT) regarding the reinforcement of connection of R&D activities to the society. Most of CTS projects are on applied research and typically conducted in consortia involving enterprises and other societal entities. Furthermore, and as part of the CTS strategic objectives, during last months, we have intensified our involvement in various national activities aimed at facilitating the collaboration between the research and business worlds. Relevant examples include:

Participants at NOVA Science Day

• **Ciência 2018 (2-4 Jul)** – initiative of the Foundation for Science and Technology aiming "to stimulate … the interaction between researchers, the business sector and the general public". CTS contributed with 3 presentations in the areas of Good Health and Well-being, Affordable and Clean Energy, and Industry, Innovation and Infrastructure, all of them integrating contributions from multiple knowledge areas

• **NOVA science Day (10 Sep)** – first edition of an initiative of the Rectory of the NOVA University of Lisbon aiming at opening the university to society and promoting the research centers associated to NOVA. CTS was one of the centers present with a poster in the sector of Technologies. The event attracted more than 350 participants.

• **Open Day Industry (10 Oct)** – initiative promoted by FCT-NOVA in collaboration with AISET (Association of Industries of Setubal region). CTS was present with some demonstrations and a poster highlighting its competences and some relevant applied research cases. The event attracted about 100 enterprises and more than 400 participants.

Participants at the Open day industry

• Meeting with industry focused on robotics and automation (10 Oct) – event organized by the CTS Industry Liaison Officer that attracted about 20 SMEs to discuss collaboration possibilities. The meeting included a presentation of the CTS competencies and areas of activity, by the CTS Director, and a discussion of various national and European programs that fund joint research.

Participants at the CrossIdeas event

• **CrossIdeas (13 Oct)** – event organized at FCT-NOVA aimed at promoting the matching between SMEs and the research centers of the university. The main themes were circular economy, energy transition, and adaptation to climate change. CTS was present with several researchers, participating in various bilateral meetings with enterprises in order to discuss our potential contribution to the challenges proposed by those enterprises.

- **Colabs** – CTS is strongly involved in 3 CoLabs (Collaborative Laboratories) recently approved by the Foundation for Science and Technology. CoLabs is a new form of partnership with industry and society for market-driven innovation and skilled jobs creation. These partnerships involve research centers, academia, enterprises, and other societal actors. CTS is involved in:
  - **InnovPlanProtect** – which focuses on innovative solutions against plagues and agriculture diseases. Coordinated by NOVA university, it got a top classification of 15/15. CTS coordinates the launching of one of its units, involving the knowledge areas of collaborative networks, robotics and drones, and image processing.
  - **SFCoLAB** – which focuses on smart farms and high-tech solutions for horticulture-viticulture-fruticulture production sectors. This CoLab is coordinated by the Torres Vedras Municipality and involves the robotics, sensors, and collaborative networks knowledge areas of CTS. It also got a top classification of 15/15.
  - **AlmaScience** – which focuses on establishing the grounds for an electronic paper industry in Portugal. It is coordinated by INCM, got a classification of 14/15, and involves the competencies on electronics from CTS.
- **UN Agenda 2030** for <sustainable Development – CTS has been discussing its potential contributions to the challenges of this agenda. The process started with multiple parallel brainstorming sessions during our annual workshop (25 Jun 2018). As a follow-up, further discussions are now going on in thematic groups organized around some selected challenges. Each group involves researchers from different knowledge areas of CTS in order to promote interdisciplinarity with the aim of reaching more comprehensive solutions

A special "thank you" to all CTS members that enthusiastically contributed to this intense activity.

Luis Camarinha-Matos, CTS Director

Editorial

This third number focus on the societal engagement of every projects where CTS is involved. All the enumerated examples demonstrates the strong commitment of CTS to contribute to a positive societal impact. Without any value judgment it is important to mention the project IPSTERS, related with I.A. applied to satellite images.
In terms of upcoming events, it is highlighted the Seasonal School devoted to IIoT, that result from a close collaboration between CTS and local IEEE Chapters CAS and SSCS. Also, it is addressed the positive impact of DoCEIS past proceeding editions.
The newsletter editorial

João Martins
CTS Communication Officer

CONTENTS

Keynote Speech: Vehicular Communications using Visible Light Communication: Future Trends and Applications

Manuela Vieira

Manuela Vieira presented a keynote speech at the conference SENSORDEVICES 2018 (Ninth International Conference on Sensor Device Technologies and Applications) that was held in Venice, Italy, (September 16th – 20th), under the title "**Vehicular Communications using Visible Light Communication: Future Trends and Applications**".

Tutorial: Light Communications in Smart Road Infrastructures

Manuel Vieira

Manuel Augusto Vieira presented a tutorial session on the topic "Light Communications in Smart Road Infrastructures" at the conference SENSORDEVICES 2018 (Ninth International Conference on Sensor Device Technologies and Applications) that took place in Venice, Italy, (September 16th – 20th).

This tutorial addressed the main topic in four work areas focusing on "multimodality".

The first work area, "Admission regulation of traffic to improve public transport in urban areas" presents the travel speed balance of a bus, in a fixed route, and correlated it with the in-car volume controlled through traffic lights. Results show that, during the time period under study, benefits in bus travel speed were possible through a feed-back real time co-operative control between urban traffic control and Public transport vehicle location systems.

In the **second work area**, "Essays for optical communications" it is presented some tunable WDM converters, based on amorphous SiC multilayer photonic transducers. Those transducers combine the simultaneous demultiplexing operation with the photodetection and self-amplification. They are optimized for provide the high-sensitivity needed for low-light applications, such as medicine, lighting, sensing and measurement.

Positioning, also known as localization, is the process of determining the spatial position of an object or person. The leading technologies (GPS and mobile networks) are not suitable for use within buildings. In the third work area, "Indoor positioning using a-SiC:H technology" the SiC optical processor for indoor positioning is realized by using a SiC pin/pin photodetector. Additional parity logic operations are performed and checked for errors together.

Finally, in the **fourth work area**, "Connected cars: Road to vehicle communication through visible light" the communication between the infrastructures and the vehicles (I2V), between vehicles (V2V) and from the vehicles to the infrastructures (V2I) is performed through Visible Light Communication (VLC) using the street lamps and the traffic signaling LEDs to broadcast the information. Vehicle headlamps and taillights are used to transmit data to other vehicles or infrastructures allowing digital safety and data privacy

International Space Week – "Space goes to School"

Invited by Ciência Viva Agency, CA3-CTS research group members, André Mora and António Falcão gave two seminars, entitled "Detection of Solar Events for Space Weather" and "GAIA – the Milky Way in 3D", on local High Schools, Escola Profissional de Almada and Colégio Guadalupe on the 9th of October, 2018.

Best Paper Awards

Best paper Award for **António Abreu** (member of CTS), José Requeijo, J. M. F. Calado and Ana Dias with publication "**Control Charts to Support Trust Monitoring in Dynamic Logistics Networks**" at PRO-VE 2018 – 19th Working Conference on Virtual Enterprises, Cardiff, UK.

Abstract - Nowadays, companies to be competitive must develop capabilities that enable them to respond quickly to market needs. According to some managers, the strategy is the development of dynamic logistics networks based on a collaborative environment. However, the absence of mechanisms to detect and even anticipate potential opportunistic behaviour is an obstacle to the proliferation of this way of working. The article aims to understand the role of trust to sustainability of collaborative processes. The paper begins by discussing the trust properties. It is then discussed how statistical control charts can be used to support the trust monitoring of each member within a collaborative ecosystem. The control charts' tools suggested in this paper are the Z control charts for trust level monitoring and the Z_i capacity index. Finally, it is discussed how this approach can be applied to dynamic logistics networks within the context of a collaborative ecosystem.

Best Student Paper Award for **Thais Baldissera** (a PhD student at CTS) and Luis M. Camarinha-Matos with publication "**Services Evolution in Elderly Care Ecosystems**" at PRO-VE 2018 – 19th Working Conference on Virtual Enterprises, Cardiff, UK.

Abstract - The aging process typically requires personalized care services for each individual. In this context, a collaborative elderly care ecosystem can support the provision of integrated services that may combine contributions from multiple providers. Through composition of services a personalized solution, tailored to the individual customer, respecting her/his requests, preferences, lifestyle, and constraints, can be achieved. An additional issue the ecosystem must deal with is the problem of evolution, as individual's care needs are not static over time. Consequently, the care services need to evolve accordingly to keep the elderly's requirements satisfied. This process of services' adaptation is challenging since many services can be dependent on each other, and there are various constraints that need to be observed before adapting and enacting new services. In this paper, we exploit socio-technical aspects of service adaptation in the context of elderly care ecosystems. Starting with a service personalization method previously proposed, we introduce various cases of evolution of elderly care services in response to new requirements. An application example is then introduced to illustrate the approach.

Best Paper Award for **João Pedro Carvalho** (a PhD student at CTS), José Fonseca and André Mora with the publication "**UAV downwash dynamic texture features for terrain classification on autonomous navigation**", on the Doctoral Symposium on Recent Advances in Information Technology - Federated Conference on Computer Science and Information Systems, Poznan, Poland, 9-12 September 2018.

Abstract- The information generated by a computer vision system capable of labelling a land surface as water, vegetation, soil or other type, can be used for mapping and decision making. For example, an unmanned aerial vehicle (UAV) can use it to find a suitable landing position or to cooperate with other obots to navigate across an unknown region. Previous works on terrain classification from RGB images taken onboard of UAVs shown that only static pixel-based features were tested with a considerable classification error. This paper proposes a robust and efficient computer vision algorithm capable of classifying the terrain from RGB images with improved accuracy. The algorithm complements the static image features with dynamic texture patterns produced by UAVs rotors downwash effect (visible at lower altitudes) and machine learning methods to classify the underlying terrain. The system is validated using videos acquired onboard of a UAV

Best Paper Award for V. Fernão Pires, Armando Cordeiro, **A. J. Pires** (member of CTS), J. F. Martins, Hao Chen with the publication "**A Multilevel Topology Based on the T-Type Converter for SRM Drives**", on the 16th Biennial Baltic Electronics Conference (BEC2018) Tallinn, Estonia, October 8-10, 2018.

Best Demo Paper Award for Patryk Fraczek, **Andre Mora** (member of CTS) and Tomasz Kryjak with the publication "**Embedded vision system for automated drone landing site detection - a demo**", on DASIP 2018 - Conference on Design and Architectures for Signal and Image Processing, Porto, Portugal, 9-12 October 2018

CTS to get a new researcher

Dr. Milos Stankovic was successful in his application for a position of Assistant Researcher at CTS funded by FCT under the "Stimulus of Scientific Employment, Individual Support 2017 Call". Scholar Google page: https://scholar.google.co.uk/citations?user=R27_HMsAAAAJ&hl=en

CTS cooperation with semiconductor industry

Nano and Microelectronics

CTS, through its nano and microelectronics group will start, this year, a cooperation project/program with Xilinx on the field of high-speed electronics, in advanced CMOS technology nodes, for last generation Xilinx FGPA. Xilinx is the world market share leader in the Field Programmable Gate Arrays (FPGAs).
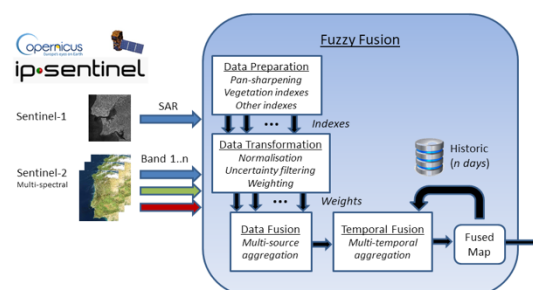
IPSTERS - IPSentinel Terrestrial Enhanced Recognition System

Project IPSTERS was presented by Rita Ribeiro on October 24th as part of the "A.I. Research. Public Administration" event. This type of projects are funded by the Foundation for Science and Technology (FCT) under the government program INCoDe.2030 - National Digital Competencies Initiative e.2030, which aims to reinforce the digital skills of all Portuguese society and which is being developed in the context of the National Reform Plan (PNR).

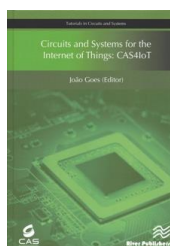The main goal of this project is to explore the applications and limitations of artificial intelligence (AI) algorithms with accelerated processing hardware capabilities, as a unit of the IPSentinel for the digestion of large volumes of remotely sensed data, to produce level-3 products for land applications with the least amount of human intervention. The project will explore two artificial intelligence approaches, one applying active learning techniques, and another based on fuzzy logic.

Seasonal School in Circuits and Systems for IIoT

The second Seasonal School in "**Circuits and Systems for the Industrial Internet-of-Things**" (**CAS4IIoT**) presents a joint academia-industry program in the field of IoT. It aims at preparing a group of 70+ post-graduate Students and design Engineers with the capacity to understand and design a broader range of circuits and systems, in the field of IoT, spanning from data converters for sensor interfaces to artificial intelligence, ensuring a good balance between academia and industry, combined with a judicious selection of worldwide distinguished Lecturers.

The Department of Electrical Engineering (DEE) at the Faculty of Sciences and Technology at NOVA University of Lisbon (FCT NOVA) together with the Centre of Technology and Systems (CTS) at UNINOVA Institute have organized this IEEE CASS and SSCS sponsored Seasonal School.

This 2-day intensive course will occur in the **29th and 30th of November 2018** and it will be structured in 8 modules. Our goal is to reach over 70 participants, among local and foreign MSc's, PhD's and Engineers from (multinational) semiconductor companies. In fact, this will be the 2nd edition of this Seasonal School on circuits and systems, after the success of 1st edition, in November 2016, (http://sites.ieee.org/portugal-btcasce/cas4iot/), in which, CAS4IoT prepared a group of 78 post-graduated students and design engineers (coming from 9 different countries: Portugal, France, Italy, India, Ireland, The Netherlands, Denmark, Poland, England) with the capacity to understand and design a broader range of circuits and systems, in the field of IoT. Due to the success of the first edition a book was edited with the contributions of all of the speakers. More information on http://sites.ieee.org/portugal-btcasce/cas4iiot

https://www.riverpublishers.com/series_search.php?val=CAS4iot

10th Advanced Doctoral Conference on
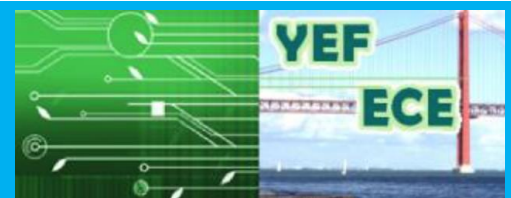Computing, Electrical and Industrial Systems

May 08 - 10, 2019
Caparica (Lisbon), Portugal

Technological Innovation for Industrial and Service Systems

The Advanced Doctoral Conference on Computing, Electrical and Industrial Systems is celebrating its **10th edition** (**DoCEIS 2019**) with a focus on Technological Innovation for Industrial and Service Systems. The industry and service sectors are going through profound transformation towards digitalization and integration of new levels of "smartness".

The idea of a **4th industrial revolution**, represented by terms such as Industry 4.0, Smart Manufacturing and Economy 4.0 are an expression of such transformation. This movement is characterized by an increasing digitalization and interconnection of systems, products, value chains, and business models. The interconnection between the physical and the cyber worlds – Cyber-Physical Systems and Internet of Things – and the integration of the so-called "exponential technologies", are central features of this innovation trend. DoCEIS 2019 provides an ideal venue for Doctoral Students, Researchers and Academicians from all over the world to meet, share, merge, and discuss their work and ideas in a multi-disciplinary context.
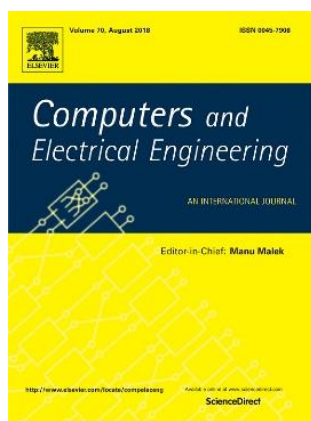

In conjunction with DoCEIS2019 it will take place the third edition of the **International Young Engineers Forum** (YEF-ECE). As usual, this event will be an unique opportunity for young engineers to connect with each other enabling experience's sharing and to become internationally active. Last year's edition counted with 17 presented papers, out of 44 submissions from 16 countries.

IMPORTANT DATES

14 Nov 2018	15 Dec 2018	19 Jan 2019	9 Feb 2019
Submission of abstract	Submission of full paper	Notification of authors	Submission of camera ready

Special Journal Issue

 Associated to DoCEIS 2019, in its 10th edition, there will be a special issue of **Computers and Electrical Engineering – An International Journal**, devoted to "Technological Innovation for Industrial and Service Systems"

The journal is indexed in Science Citation Index Expanded and Scopus.

The Call for the special issue is available at: https://www.journals.elsevier.com/computers-and-electrical-engineering/call-for-papers/technological-innovation-for-industrial-and-service-systems

The Impact of DoCEIS proceedings

The proceedings of DoCEIS, the doctoral conference organized by our doctoral program, have an excellent "performance" in comparison with other conferences of the area (data provided by Springer BookMetrix)

The Impact of DoCEIS proceedings

IFIP AICT 423 — Technological Innovation for Collective Awareness Systems

Citations vs. discipline average (2014–2018)

Downloads vs. discipline average (2014–2018)

IFIP AICT 450 — Technological Innovation for Cloud-Based Engineering Systems

Citations vs. discipline average (2015–2018)

Downloads vs. discipline average (2015–2018)

IFIP AICT 470 — Technological Innovation for Cyber-Physical Systems

Citations vs. discipline average (2016–2018)

Downloads vs. discipline average (2016–2018)

IFIP AICT 499 — Technological Innovation for Smart Systems

Citations vs. discipline average (2017–2019)

Downloads vs. discipline average (2017–2018)

IFIP AICT 521 — Technological Innovation for Resilient Systems

Citations vs. discipline average (2018–2019)

Downloads vs. discipline average (2018)

**** Since May 2018