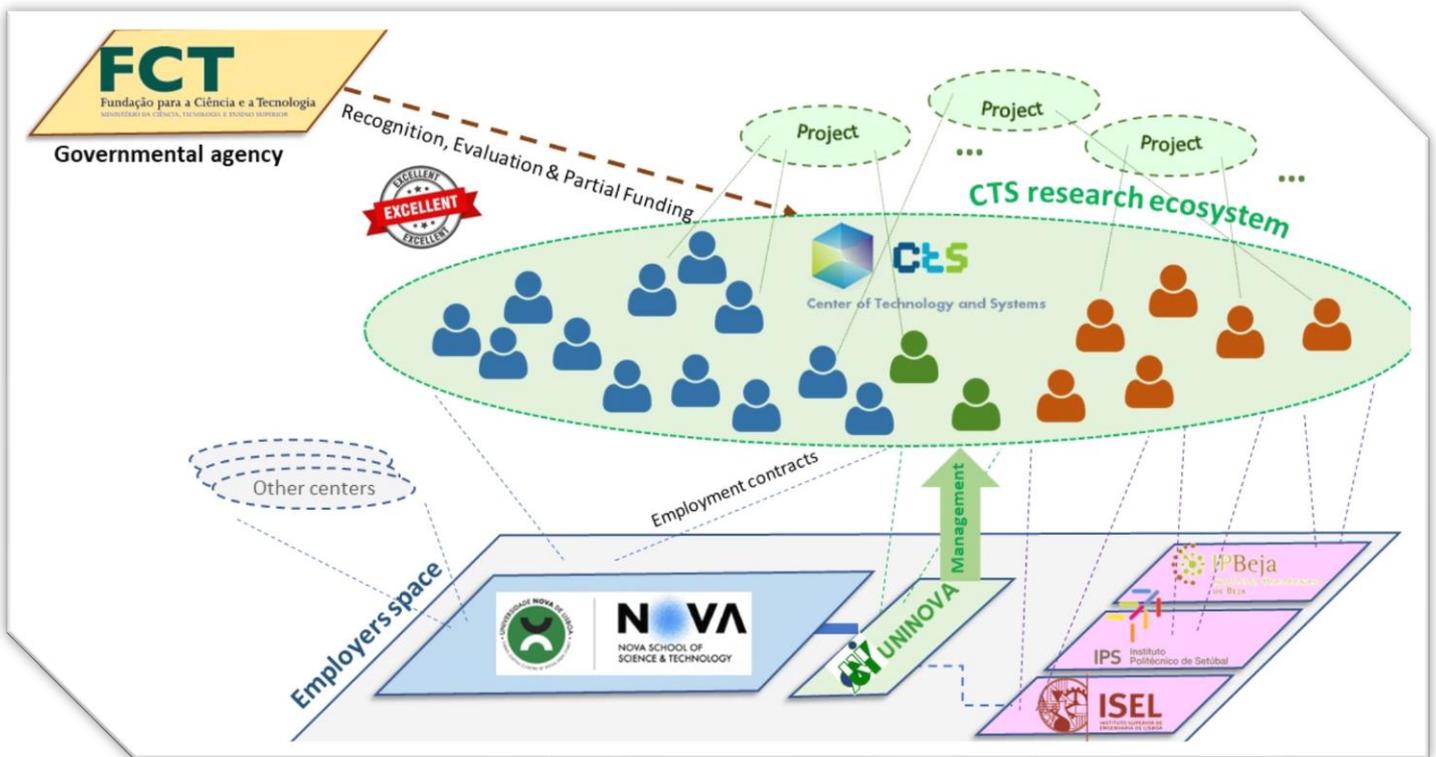




CTS Research Ecosystem



CTS is a research ecosystem including researchers that have an employment contract with one of the following entities: NOVA School of Science and Technology (a faculty of the NOVA University of Lisbon, to which most members are linked), ISEL/Lisbon School of Engineering, Polytechnic Institute of Setubal, Polytechnic Institute of Beja, and other academic institutions. These members are part of the academic staff of the mentioned institutions, where they teach, but they (voluntarily) perform their research activities in the context of CTS based on a cooperation agreement.

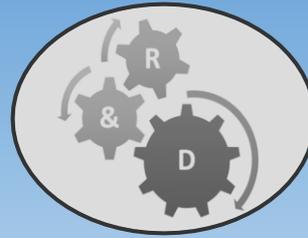
Research at CTS is typically organized in projects, which are mostly funded by International (e.g., European Commission) and national programs. These projects are usually done in consortia involving academic and industry partners.

In this issue, the group located at ISEL and some of its activities are particularly focused.



Luis Camarinha-Matos (CTS-Director)

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CTS Seminars/Webinars

Future Research Directions in Cognitive and Collaborative CPS

The following online seminars were recently given:

- 16 Mar 2022: **Helena Fino – Nanoelectronics challenges and opportunities for CPS**
- 30 Mar 2022: **Paula Louro - Visible light communication: perspectives and applications**

Video recordings of the sessions are available at:
<https://cts.uninova.pt/events.html>



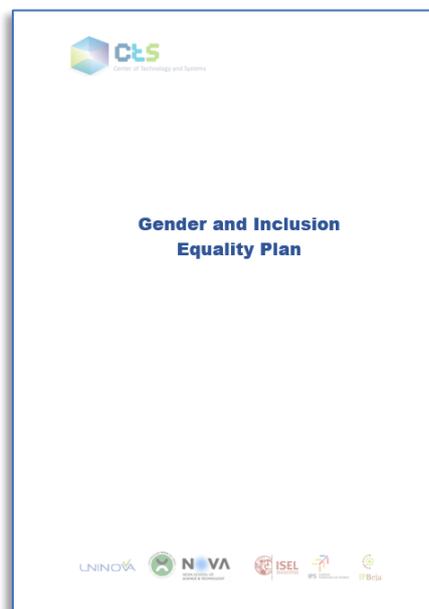
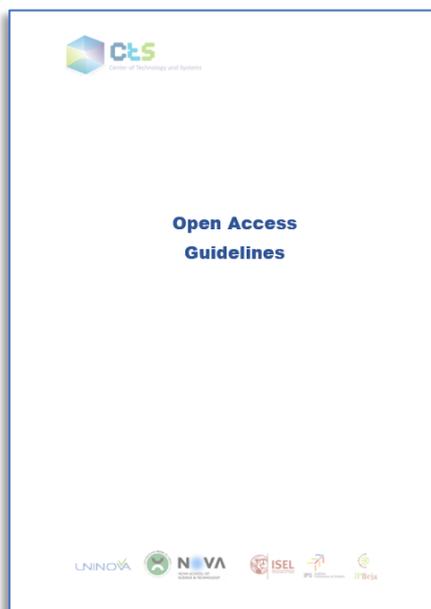
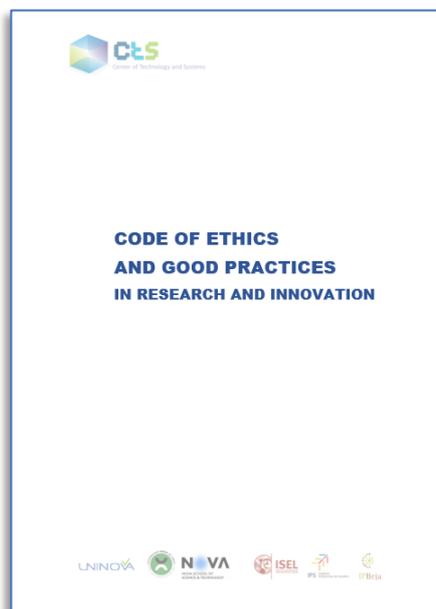
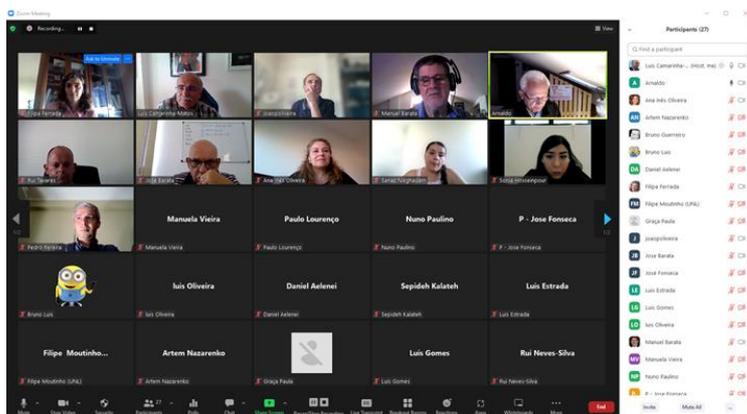
Ethics & Responsible Research and Innovation

In line with our commitments with the Foundation for Science and Technology, CTS launched a working group that has prepared some preliminary documents with general RRI principles and mechanisms applicable to our center. These documents, based on the ETHNA System guidelines, have been discussed in a number of iterations within a small group and a general discussion with all CTS members started recently.

Date: **22 June 2022** - 17:00-18:30

ZOOM: <https://videoconf-colibri.zoom.us/j/87284517427>

Presenters: Luis Camarinha-Matos, Filipa Ferrada, Inês Oliveira



CTS Governance and Committees

Director: Luis Camarinha-Matos

Executive Board: Luis Camarinha-Matos, Paula Louro, João Martins, Luis Oliveira

Strategic Advisory Board: José Barata, Luis Camarinha-Matos, João Goes, Luis Gomes, Ricardo Jardim-Gonçalves, João Martins, Manuel Ortigueira, Manuela Vieira

External Advisory Board:

- Academia: Arturo Molina (Mexico), Weiming Shen (Canada), Leopoldo G. Franquelo (Spain)
- Industry: João Manuel Melo (Portugal), Christoph Hanisch (Germany), TBD

Task Force on RRI: Luis Camarinha-Matos, Filipa Ferrada, Ana Inês Oliveira, Luis Oliveira, Pedro Pereira

Mentorship program

One aim for CTS is to help "collaborator members" to increase their scientific productivity to rapidly move to "integrated members". We guess this is also the ambition of most of you, if not all. But experience shows that sometimes the lack of tangible results such as publications is not necessarily a synonym of less work but rather that researchers, for some reason, get stuck at some point. In fact, it can be observed that some collaborator members have been involved in many activities such as:

- projects, out of which certainly new ideas were generated and experimented, but not turned into a journal publication;
- supervision of MSc theses, where some new ideas were also tested, but not integrated into a journal publication;
- even new developments of educational material and tools, that could deserve wider dissemination.

But it is quite easy to "fall in the routine" of the daily activities, teaching, developing project deliverables, etc., and then one of the most significant outcomes of the research activity --- i.e., journal publications --- are continuously postponed. After a while, the researcher might even face psychological doubts about the quality of his/her work and feel paralyzed, not even trying to prepare a journal paper...

Having an "external push" can be very helpful in these situations. As such, some colleagues with a very good record of publications agreed to form a pool of potential mentors to help colleagues that face the difficulties mentioned above. At this moment this "pool" includes Luis Camarinha-Matos, Luis Gomes, Luis Oliveira, Manuel Ortigueira, Manuela Vieira, Paula Louro. The group might increase. The idea is to pair a CTS collaborator with a mentor in order to give a push to the career of the collaborator.

What the mentor can do:

- Discuss with the collaborator member the works that he/she has done in order to identify elements that are worth publishing or that can quickly be expanded to a publication level.
- Perhaps jointly identify possible inputs from the work area of the mentor to enrich the work (in a multi-disciplinary perspective).
- Help in structuring the paper and give hints / advice on how to "tell the story".
- Revise the paper draft and possibly extend it with his/her own inputs.
- Help identify suitable journals for submission.
- And above all, put some pressure on the collaborator member to produce results in a short time.

This process can be effective if those colleagues are really interested. Sometimes it is also difficult to do this inside a group and thus a multi-disciplinary approach is encouraged, for instance getting help from a mentor from a different area. In this case, together they can produce a joint paper that is richer.

Even if some colleague currently does not have any results that can be turned into a paper, then a mentor could also help in preparing a literature survey paper (as a first step of new research), for instance following the SLR methodology.

We could then have a kind of "bilateral contract" between the collaborator member and a mentor aiming at producing 2 joint journal papers in 1 year, i.e., 2 publications in journals indexed in the Science Citation Index (and Scopus), level Q1 or Q2. This is feasible and it is also very important for the targeted researchers in order to guarantee the conditions for them to supervise / co-supervise PhD students (to be a supervisor/co-supervisor in our PhD program it is necessary to have 2 journal publications indexed in Science Citation Index in the last three years).

If you are willing to accept this challenge, please inform the CTS Director about your interest. It would also be good if you could briefly mention areas in which you might have some research results that could be used, some results from MSc theses that you supervised, some results related to education, or, in case none of this applies, if you would be interested in developing a sound literature review.

Please take this opportunity.

New facilities of GIAMOS

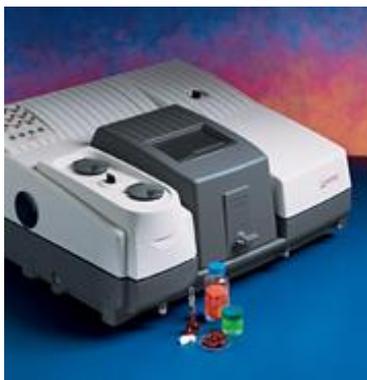
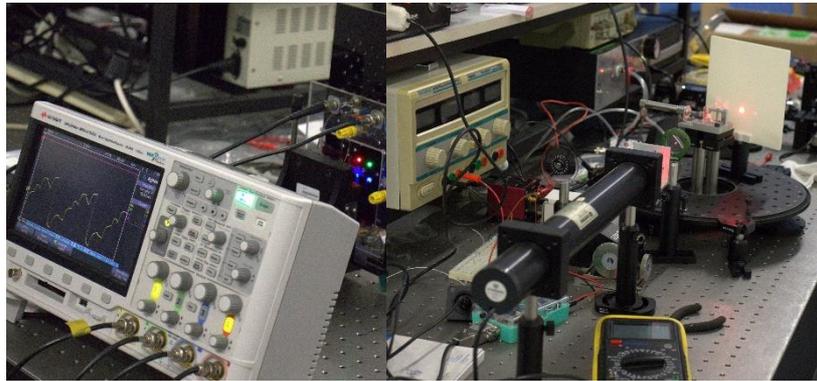
GIAMOS (“Grupo de Investigação Aplicada em Microeletrónica, Optoeletrónica e Sensores”) is a R&D group established at ISEL with activities currently focused on the fields of micro-nano-optoelectronics and photonics. CTS members from ISEL in this area are part of GIAMOS, constituting the ISEL’s branch of CTS.



Recently, GIAMOS has renewed and expanded the laboratories that support its research and experimental activities. Six different areas make up the new research laboratories:

- Laboratory of Optoelectronics I, for Visible Light Communication research activities;
- Laboratory of Optoelectronics II, dedicated to students pursuing MSc and PhD degrees;
- Laboratory of Characterization, equipped with advanced scientific apparatus for device and materials characterization;
- Laboratory of Photonics, focused on lasers, plasmonic structures and biosensors;
- Laboratory of Nano Materials;
- Laboratory of Semiconductors, for the production of thin films and devices based on a-Si:H.

The facilities at GIAMOS also include offices for MSc and PhD students, a workshop, and a PCB room.



Postgraduate course on Optoelectronics and Photonics Engineering

In the micro-nano-optoelectronics and photonics group's research activities, valences were developed that enabled the design of a post-graduation course on Optoelectronics and Photonics Engineering in ISEL. It will be launched in the next academic year.

The proposed program of the course is aligned with similar European programs. In Portugal, however, there is no specific course focused on photonics, which makes it unique within the country. The course duration is one year with 60 ECTS, and all lectures will be given in English, in an attempt to broaden the students pool and

promote internationalization. A strong collaboration with private companies (LusoSpace, Sphere Ultrafast Photonics, HBK FiberSensing, Amplitude Portugal, Bosch Car Multimedia, Where ness) with core business in these fields is also promoted.

POSTGRADUATE COURSE OPTOELECTRONICS AND PHOTONICS ENGINEERING

PHOTONICS is a key technology for the future society. It is the science that studies the technologies of light generation, manipulation, modulation, transmission, amplification and detection. Used in a wide variety of industries, such as telecommunications, medicine, military, manufacturing, sensors, and electronics, PHOTONICS will be the dominant technology of the 21st century. The postgraduate course in Optoelectronics and Photonics Engineering gives solid scientific and technological knowledge to address this high tech challenge.

PARTNERS
 Calsonic & Camenzind Indústria | LusoSpace | HBK | APOIC | PRR | ESTADÍSTICA PORTUGUESA

ADMISSION REQUIREMENTS
 Bachelor or Master degree in Engineering or in Applied Physics or an related field
 Applicants with relevant professional CV

BRIDGING PHYSICS, ENGINEERING AND PHOTONICS
 We offer students a challenging engineering programme that combines core photonics courses with multidisciplinary modules. This application driven approach, combined with high-level training in labs and a strong connection with company partners, boosts the employment prospects of our graduates in innovative industries and research domains.

MAIN TOPICS

- Optical communications
- Biophotonics and sensors
- Photonic materials and structures
- Lasers and light sources
- Experimental project

SPECIALIZATION FIELDS

- Optoelectronics
- Photonics
- Nanotechnology

CAREER OPPORTUNITIES
 High-tech companies, research centers, universities and public and private healthcare sector.

STAKEHOLDER OPINION
LusoSpace is very interested in this new course. Optics is our principal field and there is a lack of training in this area in Portugal.
 Ivo Yves Vieira (CEO, LUSOSPACE)

ISEL POSTGRADUATE COURSES

The postgraduate courses offered by ISEL are based on a long tradition of collaboration with renowned companies and institutions on the job market: a constant scientific and pedagogical dynamism; a commitment to lifelong learning.

Our postgraduate courses provide, within 1 year, a professional development that will improve career prospects.

- ✓ Scholarships
- ✓ Innovative syllabus
- ✓ Unique in Portugal
- ✓ Interaction with high-tech companies
- ✓ Greater employability and better career opportunities

TEACHING | INNOVATION | EMPLOYABILITY

ISEL
 INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

MORE INFO
 ISEL - Serviço de Relações Externas
 e internacionalização
 @isela.comunicacao@isel.pt
 +351 21 871 076

CTS Director visits ISEL

A visit to the new facilities of GIAMOS was made by the director of CTS, Prof. Luís Camarinha-Matos, on May 25th. As a result, he became familiar with the new lab spaces, as well as the scientific equipment and laboratory set ups dedicated to several research activities.

This visit was the catalyst for a stronger collaboration between ISEL and the other CTS groups in terms of research, participation in projects, and involvement in the PhD program at FCT-UNL.



Invited Talk

Prof. João Martins gave an invited keynote speech at the 3rd International Conference on Smart Grid and Renewable Energy, organized by Texas A&M University at Qatar, on 22 March 2022. Other keynote speakers were John D. McDonald, P.E., Smart Grid Business Development Leader, GE Renewable Energy, USA; Frede Blaabjerg, Professor, Aalborg University, Denmark; Thomas J. Overbye, Professor, Texas A&M University, USA; and Santiago Bañales, Managing Director, Iberdrola Innovation Middle East (ME), Doha, Qatar.



Can sustainability be achieved with energy flexibility?

The world is experiencing the highest penetration of renewable energy but, at the same time, there is an increasing electrification of the energy demand. These changes pose new challenges in terms of electrical systems management. On the end user side, the drastic variations in loads over the course of a day or the increased use of energy in the so-called peak periods poses more complex control problems requiring

faster decision times and smaller error margins. Energy flexibility is being regarded as a valuable tool towards a more sustainable electrical system. This tool combined with new paradigms, such as the establishment and operation of energy communities, will provide flexibility, interconnectivity, bi-directionality and complementarity with advantages either to consumers either to the energy grid itself. This talk addressed the use of energy flexibility as a tool to achieve a more sustainable electrical system.

POCITYF

CTS group installs the very first equipment of H2020 POCITYF project in lighthouse city of Évora. UNINOVA installed the first Wi-fi Data Acquisition System at Évora University. This is the first of nine other systems that will be installed at different locations of Évora's Positive Energy Blocks (PEBs). This solution allows the real-time monitoring of several environmental variables, providing information on temperature, humidity, atmospheric pressure, UV radiation, luminosity, noise, CO2 and irradiance.

The Wi-fi Data Acquisition Systems (real-time monitoring of several environmental variables, providing information on temperature, humidity, atmospheric pressure, UV radiation, luminosity, noise, CO2 and irradiance) will be used to achieve two main goals:

- Provide Évora's citizens, and other stakeholders, with multiple variables from 10 different locations in order to increase awareness of local environmental conditions, while allowing local authorities to act, based on real-time data, in case some location is not complying with defined environmental specifications.
- Support the operation of other solutions that will be deployed within POCITYF, such as the Flexibility Control Algorithms, that will use the collected variables to predict weather conditions and associated renewable generation profiles.



Participation @ CIENCIA 2022

CTS contributed with 2 invited presentations and 1 demonstration for the annual SCIENCE 2022 forum.



ENCONTRO
COM A CIÊNCIA
E TECNOLOGIA
EM PORTUGAL

16-18 maio

Cyber-Physical Systems for Healthcare Monitoring

Alessandro Fantoni, Arnaldo Batista

A key aspect for the advance of global healthcare systems relies in the development of effective and affordable Point-Of-Care (POC) methods for medical screening and early diagnosis. On the other hand, in places where the access to a hospital infrastructure is limited by large distances and economic reasons, POC methods are critical to provide healthcare to the population. Lab-On-Chip (LOC) platforms are miniaturized analytical devices which integrate all functionalities on a single chip, from fluid handling, sample preparation, target detection, transducer readout, and signal processing. The development of a portable, easy-to-use and highly sensitive portable LOC platform for real-time diagnosis could offer significant advantages for future POC applications, entering in the daily routine of patients in a decentralized setting. Under this scope we present a recent development of a novel plasmonic device for Acute Kidney Injury (AKI) early diagnostic and the Uterine Explorer software application. The developed prototypes aim to overcome the relatively high cost of the traditional diagnostic methods without compromising reliability and opening avenues for telemedicine applications. Regarding pregnancy monitoring a platform for the uterine electromyographic signal acquisition has been set up. These software and hardware set-ups are developed at CTS (FCT-NOVA and ISEL).

#ciencia2022PT
encontrociencia.pt

3 GOOD HEALTH AND WELL BEING

Cyber-Physical Systems for Healthcare Monitoring supporting personalized medicine and early diagnostics

Hardware Layer
Whole of Care Systems

Software Layer
Remote Computing

Case Study 1: Acute Kidney Injury (AKI)

- AKI is an **abrupt loss of kidney function**, strongly related with the development of chronic kidney disease

REQUIREMENTS:

- Need for a **multiplexed parallel biosensor** for the detection of a set of 5 AKI biomarkers
- Need for a **Point-of-Care system**, to bring the biomarker analysis outside the clinical laboratory
- Need for a low **Level Of Detection**

PROPOSED SOLUTION: Plasmonic Biosensors:

- BIOCOLOR:** Localized surface plasmons (LSPs) in metal nanoparticles
- PIC4PHOTOAKI:** Surface plasmon polaritons (SPPs): propagating along a planar dielectric-metal interface

Case Study 2 : Pregnancy Monitoring

From the electrical signal from the Uterus is possible to investigate pregnancy monitoring methods. This electrical signal is ideal for telemedicine and Cyber-Physical Systems development

PV SPREAD: an ecosystem for disseminating photovoltaic plants under prosumer paradigms

João Murta-Pina, Fernando Monteiro, André Mora, João Rosas, Francisco Oliveira, Higino Vieira, Ana Domingos, Jorge Ruivo, Miguel Santos, Pedro Santos

The end of Feed-in-Tariffs added new challenges to the photovoltaic (PV) design, particularly when self-consumption schemes are considered. Unlike in the previous business models, where all the locally produced energy was sold to the grid, exploring the investments now depends on the continuous net energy balance between the photovoltaic generation and the prosumer demand, and not only on the former. Those balances must be predicted in the design stage for the whole investment horizon.

The optimal design of PV plants requires diverse knowledge, besides electrotechnics and mechanics, e.g., economic analysis of investments, multiobjective optimisation, and risk analysis. It often requires the availability to run multiple simulations in reference software packages.

This demanding, multidisciplinary design optimisation hinders the availability of PV suppliers for promoting these investments near potential clients, in a market mostly composed of micro- and small companies that design, supply, and provide maintenance for those plants. The design process must be simplified and pragmatic, and clients are often unable to assess the quality of the proposed investments.

In this work, an ecosystem for addressing and solving the previous challenges, named PV SPREAD, is described. It consists of a hardware and software technological framework.

Collaborative Modular Cyber-Physical Production System (DEMO)

André Rocha

Demonstrator where it is possible to explore the design of modular cyber-physical production systems. The demonstrator is composed of modules that communicate with each other in order to create an intelligent society of agents that works collaboratively. These systems allow you to develop and deliver more resilient, optimized, and reconfigurable ecosystems.



Podcast / interview

Dario Pedro, a PhD student member of CTS, gave an interview of about 1 h (in Portuguese) to the show "Tenho Média Pa'Isto", series "Best student ever". (<https://www.youtube.com/watch?v=jiUTnXLZ-U8>)



Dario is currently CEO of **Beyond Vision**, a drone development company.

Beyond Vision was the recipient of the "Start-up of the year in 5G" first-place award in the Building the Future - Ativar Portugal event, 2022 edition.

Dario Pedro is currently waiting for the ceremony of public defense of his PhD thesis.

Visit of delegation from the State University of Paraíba, Brazil

A delegation of the **State University of Paraíba (UEPB)** visited various Universities in Portugal, including NOVA University of Lisbon. On that occasion, they also visited CTS on 27 May 2022 to explore potential collaboration opportunities. Prof. Camarinha-Matos, director of CTS made a brief presentation of the Center and Prof. Misael Morais, the general coordinator of NUTES research center (<https://nutes.uepb.edu.br/>), also made a presentation of his center and R&D activities on biomedical systems. Collaboration possibilities were briefly discussed. The delegation was led by the Rector of the State University of Paraíba (UEPB), Prof. Celia Regina Diniz, and included the Chief of Staff of the Rector, Prof. Luciano Albino.



New Postdoc

With support from FCT (Fundação para a Ciência e Tecnologia), CTS got a new Postdoc researcher: Houda Harkat. **Houda Harkat** received her Ph.D. degree in Engineering Sciences, Physical Sciences, Mathematics and Computer Science in 2018 from University Sidi Mohamed Ben Abdellah, and the Engineering degree in Telecom and Network Engineering, in 2013. During her Ph.D. she spend two years as a researcher in the University of Algarve, Faro, Portugal.



Currently, she is Researcher at Sidi Mohamed Ben University, Fez, Morocco and at the UNINOVA-CTS, Nova University of Lisboa, Portugal. Before joining CTS she was a Postdoc in Instituto de Telecomunicações, Lisboa, Portugal.

She has authored or co-authored several scientific publications in leading international journals and conferences. Organized several event(s). Participates and/or participated as PhD Student Fellow and Post-doc Fellow in several projects.

She works in the area(s) of Electronics and Informatics with emphasis on Telecommunications, image processing and machine learning. In her curriculum *Ciência Vitae* the most frequent terms in the context of scientific, technological and artistic-cultural output are machine learning; deep learning; data inversion; Airborne Fire Detection; Firefront Forecast; Decision Support Information Systems; Wildfire; Segmentation; Atrous Spatial Pyramid Pooling; Dilated Convolution; antenna radiation patterns; Ground penetrating radar; and beam ground radar.

Recent PhD theses

Thesis: DIN Spec 91345 RAMI 4.0 compliant data pipelining: An approach to support data understanding and data acquisition in smart manufacturing environments

PhD Candidate: [Kevin Nagorny](#)

Supervisors: José Barata, Armando Walter Colombo
NOVA School of Science and Technology, 2 Mar 2022



Abstract: Data scientists in the manufacturing domain face a number of challenges associated to data understanding, data acquisition as well as data processing, including the extraction of valuable information to support both, the work of the manufacturing equipment and the manufacturing processes behind it. Various communication standards, protocols and technologies for transmitting and storing heterogeneous data in this domain make it hard to understand, find, access and extract data from the sources depending on the use cases and applications. Different data types and data models, not always related to each other, produced in different volumes and velocities, saved and transferred in form of data buckets and continuous or event-based data streams, using different communication protocols, languages and interfaces are today normal conditions in manufacturing environments and one of the reasons why data understanding, selection and extraction is an increasing time intensive activity.

In order to support data understanding and data acquisition in this domain, the doctoral work proposes a DIN Spec 91345 RAMI 4.0 compliant data pipelining approach which is built on a semantic model that describes smart manufacturing environments, their assets, as well as access to their data along their life-cycle. Basis for the semantic model is the Reference Architectural Model Industry 4.0 (RAMI 4.0) as one of the most popular reference architectures in Industry 4.0. The semantic model is further supplemented by standards used to describe manufacturing environments at a metadata level in a standardised way. An additional part describes the access to available data which enables the overall data pipelining approach to extract needed data by using traditional data pipelining solutions.

The results of the doctoral work contribute on a research level a combination of the ongoing semantic standardisation and unification processes in manufacturing with data pipelining approaches to push data exploitation in industrial brownfields and greenfields. On an innovation level it contributes a generic prototype, configurable for individual use

cases in (smart) manufacturing environments. The outcomes are applicable and replicable in use cases where data structuring, classification and access is needed in heterogenous (smart) manufacturing data environments and where humans need easily to understand, find and use data for sub-sequent forwarding, transformation and/or processing. Overall, the results contribute to research areas that deal with data management in smart manufacturing systems and deliver ideas to build, handle and exploit self-descriptive smart manufacturing environments based on semantic models and to link these models with available data along life-cycles of assets located in such environments.

Thesis: Multi-source Big Data Fusion Driven Proactivity for Intelligent Mobility

PhD Candidate: [Paulo Alves Figueiras](#)

Supervisors: Ricardo Gonçalves, João Moura Pires

NOVA School of Science and Technology, 17 Mar 2022

Abstract: Human population is increasing at unprecedented rates, particularly in urban areas. This increase, along with the rise of a more economically empowered middle class, brings new and complex challenges to the mobility of people within urban areas. To tackle such challenges, transportation and mobility authorities and operators are trying to adopt innovative Big Data-driven Mobility- and Traffic-related solutions. Such solutions will help decision-making processes that aim to ease the load on an already overloaded transport infra-structure. The information collected from day-to-day mobility and traffic can help to mitigate some of such mobility challenges in urban areas.

Road infrastructure and traffic management operators (RITMOs) face several limitations to effectively extract value from the exponentially growing volumes of mobility- and traffic-related Big Spatiotemporal Data (MobiTrafficBD) that are being acquired and gathered. Research about the topics of Big Data, Spatiotemporal Data and specially MobiTrafficBD is scattered, and existing literature does not offer a concrete, common methodological approach to setup, configure, deploy and use a complete Big Data-based framework to manage the lifecycle of mobility-related spatiotemporal data, mainly focused on geo-referenced time series (GRTS) and spatiotemporal events (ST Events), extract value from it and support decision-making processes of RITMOs.

This doctoral thesis proposes a data-driven, prescriptive methodological approach towards the design, development and deployment of MobiTrafficBD Frameworks focused on GRTS and ST Events. Besides a thorough literature review on Spatiotemporal Data, Big Data and the merging of these two fields through MobiTrafficBD, the methodological approach comprises a set of general characteristics, technical requirements, logical components, data flows and technological infrastructure models, as well as guidelines and best practices that aim to guide researchers, practitioners and stakeholders, such as RITMOs, throughout the design, development and deployment phases of any MobiTrafficBD Framework.

This work is intended to be a supporting methodological guide, based on widely used Reference Architectures and guidelines for Big Data, but enriched with inherent characteristics and concerns brought about by Big Spatiotemporal Data, such as in the case of GRTS and ST Events. The proposed methodology was evaluated and demonstrated in various real-world use cases that deployed MobiTrafficBD-based Data Management, Processing, Analytics and Visualisation methods, tools and technologies, under the umbrella of several research projects funded by the European Commission and the Portuguese Government.



Conferences

15th APCA International Conference on Automatic Control and Soft Computing

The 15th APCA International Conference on Automatic Control and Soft Computing (CONTROLO'2022), to be held in Caparica, Lisbon-Region, Portugal, from 6 to 8 of July 2022, will provide an opportunity for presenting new research results and to discuss the latest developments in the fields of control, automation, robotics and soft computing. This edition of the conference has been organized by the first time in Caparica, Portugal.

The three days of the conference accommodate a rich technical program including 3 keynote speakers, 2 panel discussions and the presentation of technical papers.

We are fortunate to benefit from having three outstanding invited keynote speakers from academia:

- Prof. Davide Scaramuzza, from University of Zurich, Switzerland, offering a talk on “Learning to Fly Agilely”;
- Prof. Carlos Balaguer, from University Carlos III of Madrid (UC3M), Spain, delivering a talk entitled “Intelligent Humanoids: From Labs to Real World”;
- Prof. Rita Cunha, from Instituto Superior Técnico, University of Lisbon, Portugal, presenting a talk entitled “Advances in Motion Control of Aerial Vehicles”.

Technical co-sponsors: IFAC - International Federation of Automatic Control, CEA - Comité Español de Automática, SBA - Sociedade Brasileira de Automática, SPR - Sociedade Portuguesa de Robótica, SPEE - Sociedade Portuguesa para a Educação em Engenharia, and ISA - International Society of Automation, Portugal section.

The proceedings will be published by Springer.

Website: <https://controlo2022.deec.fct.unl.pt/>

Organizers:

NOVA School of Science and Technology | FCT NOVA

APCA – Portuguese Association of Automatic Control

UNINOVA – CTS (Centre of Technology and Systems)

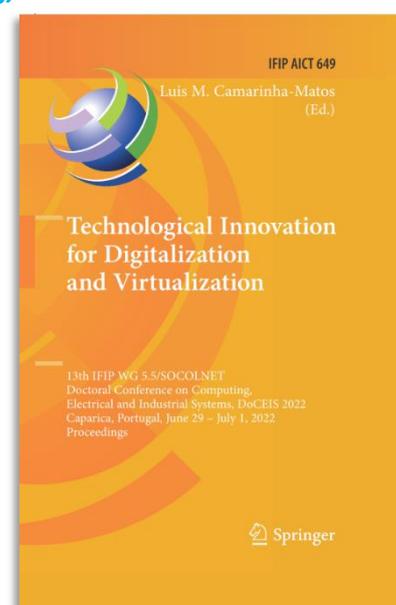
DoCEIS 2022 – 13th Advanced Doctoral Conference on Computing, Electrical and Industrial Systems (29 Jun – 1 July 2022 – Monte Caparica, Portugal)

<http://doceis.dee.fct.unl.pt/>

Technological Innovation for Digitalization and Virtualization

The ongoing 4th industrial revolution is characterized by an intense digitalization and digital transformation of all sectors of society. This encompasses the adoption and integration of a variety of new information and communication technologies for the development of more efficient, flexible, agile, and sustainable solutions. On the other hand, the recent pandemic forced millions of people to work or study from their homes, which created an immediate challenge for the organizations that were not prepared for this scenario. This led to a fast virtualization of the interactions and work environment. As a result, to effectively support digitalization and virtualization many different knowledge areas are coming together leading to the creation of various innovative technologies and tools, while also motivating new research directions.

DoCEIS 2022 will target Digitalization and Virtualization, providing a forum where Doctoral Students, Researchers, and Academicians have the opportunity to share and discuss their work and ideas in a multidisciplinary context, while creating collaborative opportunities for future work and research.



Invited keynotes:

- **Mindful sociotechnical systems: connecting human and artificial intelligence in organizations**
 - *Isabel Ramos, University of Minho, Portugal*
- **Architecting Industrial Cyber-Physical-Human Systems : theories and applications**
 - *Damien Trentesaux, Université Polytechnique Hauts-de-France, France*
- **Sustainable Smart Manufacturing – current reality and future prospect**
 - *Yang Liu, Linköping University, Sweden*

Accepted papers:

Smart Systems Thinking

Modelling Mutual Influence Towards Sustainable Energy Consumption - *Kankam O. Adu-Kankam, Luis M. Camaricha-Matos*

Assessing the Benefits of Renewable Energy Communities: A Portuguese Case Study - *Humberto Queiroz, Rui Amaral Lopes, João Martins, Luís Fialho, João Bravo Dias, Nuno Bilo*

Open Innovation Association with Feeling Economy - *Sepideh Kalateh, Sanaz Nikghadam Hojjati, Luis Alberto Estrada-Jimenez, Terrin Pulikottil, Jose Barata*

Creating Meaningful Intelligence for Decision-Making by Modelling Complexities of Human Influence: Review and Position - *Paulo Pina, Rui Neves-Silva*

Cyber-Physical Systems

Asynchronous Communication between Modular Cyber-physical Production Systems and Arduino based Industrial Controllers - *Fábio M. Oliveira, André Rocha, Duarte Alemão, Nelson Freitas, José Barata*

Mechanisms for Service Composition in Collaborative Cyber-Physical Systems - *Artem A. Nazarenko, Luis M. Camarinha-Matos*

Hippo-CPS: Verification of Boundedness, Safeness and Liveness of Petri net-based Cyber-Physical Systems - *Marcin Wojnakowski, Mateusz Poplawski, Remigiusz Wiśniewski, Grzegorz Bazydło*

Estimation of the End-to-End Delay in 5G Networks through Gaussian Mixture Models - *Diyar Fadhil, Rodolfo Oliveira*

Health-related Digitalization

Towards Digital Twin in the Context of Power Wheelchairs Provision and Support - *Carolina Lagartinho-Oliveira, Filipe Moutinho, Luís Gomes*

Real-Time PPG-Based HRV Implementation Using Deep Learning and Simulink - *Filipa Esgalhado, Arnaldo Batista, Valentina Vassilenko, Manuel Ortigueira*

Neuromotor Evaluation of the Upper Limb During Activities of Daily Living: A Pilot Study - *Patrícia Santos, Cláudia Quaresma, Inês Garcia, Carla Quintão*

Gesture-based Feedback in Human-Robot Interaction for Object Manipulation - *Leandro Filipe, Ricardo Silva Peres, Francisco Marques, Jose Barata*

Electric Systems and Machines

Exploring Electric Vehicles Energy Flexibility in Buildings - *Daniel Dias, Rui Amaral Lopes, João Martins*

A Rule-based Method for Efficient Electric Vehicle Charging Scheduling at Parking Lots - *George Konstantinidis, Emmanouel Karapidakis, Alexandros Paspatis*

A Novel Photovoltaic Maximum Power Point Tracking Method using Feedback Conductance Integral Compensation - *Sergio André, J. Fernando Silva, Sónia F. Pinto, Pedro Miguens Matutino*

Reduction of Air-Gap Flux Density Distortion for a 20 kW HTS Induction Motor - *Masoud Ardestani and Hamid Reza Izadjfar*

Smart Devices

Rib Waveguide Plasmonic Sensor for Lab-On-Chip Technology - *Daniel Almeida, João Costa, Alessandro Fantoni, Manuela Vieira*

An Energy-Efficient Wideband Input-Buffer for High-Speed CMOS ADCs - *David Leonardo, João Goes*

Novel Graphene Electrode for Electromyography using Wearables based on Smart Textiles - *Manuel H. Herrera Argiró, Cláudia Quaresma, Hugo Plácido Silva*

Control and Digital Platforms

PLC as the Main Controller for Additive Manufacturing Machines - *Gerson Fabio da Silva, Marcosiris Amorim de Oliveira Pessoa, Paulo Eigi Miyagi, Ahmad Barari, Marcos Sales Guerra Tsuzuki*

Dynamic and Efficiency Study Applied to Automotive Vehicles - *Sergio André, Nelson Santos, Gonçalo O. Duarte, Paulo Almeida, Pedro M. Fonte, Rita Pereira*

Digital Platform for Environmental and Economic Analysis of Wire Arc Additive Manufacturing - *Samruddha Kokare, Radu Godina, João P. Oliveira*

Organizers:

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YEF-ECE 2022 – 6th International Young Engineers Forum on Electrical and Computer Engineering (1 July 2022 – Monte Caparica, Portugal)

<https://sites.uninova.pt/yef-ece>



Following the success of the previous editions we are proud to announce the organization of the 2022 International Young Engineers Forum on Electrical and Computer Engineering - YEF-ECE 2022.

Accepted papers will be submitted for inclusion into IEEE Xplore subject to meeting IEEE Xplore's scope and quality requirements. Papers from previous editions are available on the IEEE Xplore digital library.

The International Young Engineers Forum looks for the latest developments and innovative applications in electrical and computer engineering, dealing with systems' design and utilization, looking forward to efficient devices and systems with appropriate control algorithms to meet the needs of business and industry in a global economy. This event will be a unique opportunity for young engineers to connect with each other enabling experience's sharing and to become internationally active.

YEF-ECE 2022 will be co-located with the doctoral conference DoCEIS 2022.

Accepted papers:

Electronics, Networks and Grids

A Software Defined Radio Implementation of Physical Layer Security Using MIMO-SVD

João Madeira, João Guerreiro and Rui Dinis

An electrical model characterization of an electronic nose chemical sensor using a programmable system-on-a-chip based AFE

João J. M. Santos, Susana I. C. J. Palma, Carina Esteves, João Pedro Oliveira, Hugo Gamboa and Ana C. A. Roque

Configurable Mapping of EtherCAT field-level devices to OPC UA

Balakrishna Balakrishna, Alexander Barth and Alexander Willner

B2G (Buggy-to-Grid): Vehicle-to-Grid (V2G) concept in microgrids with strong penetration of electric vehicles

Guilherme Santos, João Murta-Pina and Ricardo Belém

True Random Number Generator Implemented in 130 nm CMOS Nanotechnology

Pedro Monteiro and Luís Oliveira

Measurement and Sensors

Low-Cost Multi-Frequency Eddy Current Coating Thickness Measurement System

Ana C. Santos, André Barrancos, Luís S. Rosado and Fernando M. Janeiro

Preliminary Analysis of Core Losses and Performance of an Axial Flux Motor with High Temperature Superconducting Tapes on the Rotor

João Pinto, Fábio Gregório, Roberto de Oliveira, Xavier Granados and João Murta-Pina

Assessment of a Sonic Sensor for Measuring AC Losses in Superconducting Devices

Ricardo Walker, Diogo Durão, Diogo Dias, Isabel Catarino, João Murta-Pina and Roberto Oliveira

Coverage Characterization of LoRaWAN Sensor Networks for Citrus Orchard Monitoring

Bruno Mendes, Dário Passos and Noélia Correia

IoT and Networks

IoT Based Targeting System - Airsoft Use-Case

Martim Vieira, João Pedro Matos-Carvalho, Sérgio D. Correia and Rui Tavares

A scalable incremental algorithm for computing the evolution of structural virality in social networks

Rodrigo Calzada Haro, Félix Cuadrado Latasa and Javier Andión Jiménez

Proposal of an IoT Architecture for Greenhouse Monitoring

Victor Lisnic, Filipa Ferrada and Patricia Correia

GloFood: A Community-oriented System for Knowledge Sharing and Collaboration

Pedro Alves, Luis M. Camarinha-Matos and Majid Zamiri

Extending the Synoptics of Things (SoT) Framework to Manage ISoS Technology Landscapes

Bruno Serras, Carlos Gonçalves, Tiago Dias and Luís Osório

Control Systems

Applying Deep Neural Networks to Improve UAV Navigation in Satellite-less Environments

Ricardo Santos, João P. Matos-Carvalho, Slavisa Tomic, Marko Beko and Sérgio D. Correia

Indoor location infrastructure for time management tools: a case study

André Teixeira, Rui Esteves Araújo and Hélder Silva

Simulation and Control of a Cyber-Physical Elevator Prototype

Duarte Santos, Luis Brito Palma and Vasco Brito

Irrigation Management System using Artificial Intelligence Algorithms

Gonçalo Mestre, João Pedro Matos Carvalho and Rui Tavares

Adhesion estimation based novel approach to control wheel slip in electric locomotives

Shikha Saini and Ganga Singh Bhawaria

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PRO-VE 2022 – 23rd Working Conference on Virtual Enterprises (Lisbon, PORTUGAL, 19-21 Sept 2022)

<http://www.pro-ve.org>

Collaborative Networks in Digitalization and Society 5.0

The term “digitalization” represents a major ongoing transformation in industry and services where the adoption and integration of a large variety of novel information and communication technologies leads to more efficient, flexible, agile, and sustainable systems. Digitalization became one of the key aspects of Industry 4.0. Current trends towards Industry 5.0 introduce a complementary view, targeting a **sustainable, human-centric, and resilient** industry. The notion of **Society 5.0** represents an even more comprehensive strategy on science, technology and innovation aiming a **people-centric super-smart society**.

As demonstrated in recent editions of PRO-VE, collaborative networks play a central role in these transformative processes. In fact, such ambitious goals can only be achieved through collaboration among multiple stakeholders, collaboration among intelligent / autonomous systems, and collaboration among human and systems.

PRO-VE 2022 aims to be a forum for sharing and discussing current developments and experiences regarding the role of collaborative networks in digitalization as well as identifying and discussing challenges ahead towards a collaborative Society 5.0.

Invited keynotes:

- **Cognitive Digital Twins: connecting the dots of Closed-Loop Lifecycle Management**
 - *Dimitris Kyritsis, EPFL, Switzerland*
- **Collaborative Potential of AI and Human Ingenuity in Co-creating Value in Society 5.0**
 - *Massimiliano Luca Dragoni, European Commission*
- **Is resilience enough? Collaborative Networks towards antifragility**
 - *Salvatore Ammirato, University of Calabria, Italy*

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