



## What is your field of expertise?

Once I met a colleague at a conference and I asked him: What is your field of work / expertise?

The answer was surprisingly bold: Any area in which there is money.

Certainly, research requires resources. In a highly competitive society, researchers are forced to spend a huge amount of time searching for funding opportunities and writing project proposals. Very often people need to “make adjustments” on their line of research to align with priorities

of funding agencies and increase the chances to get access to resources. And yet, our survival as researchers in the long term requires that we build a scientific reputation and become recognized worldwide as an expert in some field / knowledge area.

And here is the challenge. Constantly jumping from one topic to another according to the fast-evolving buzzwords and priorities of research agencies does not let one consolidate his/her level of expertise and recognition.

The challenge is thus “how to keep your long-term research field, on which you work hard to be recognized as an authority in that field, and at the same time ‘play the game of successful project proposal writing’ ”? Sometimes this requires some creativity in finding ways to “sell our expertise” as an essential enabler for some “priority” of a Call for Proposals and even “some recreation of the bid language”. But this should not make us lose perspective on our own long-term research agenda. On what topic do I want to be recognized as an authority? Being recognized in one area is crucial for success in the long run. What is your research field of expertise?

*Luis Camarinha-Matos (CTS Director)*

## Evaluation of CTS by Portuguese Foundation of Science and Technology



The Portuguese Foundation for Science and Technology (FCT) regularly organizes evaluation exercises of national R&D institutions. The evaluation system is based on periodic assessments carried out by panels of international experts. It is based on the evaluation of the activities carried out and the plan to be developed for the following period, as well as

direct contacts with researchers and institutions, triggered by visits to the units. These evaluation exercises result in a quality rating by the panel, which determines the volume of multi-annual funding to be allocated until a new evaluation or a mid-term evaluation is carried out. After the analysis of complaints by a specific international panel of independent experts, the final results of the exercise of 2017/2018 were recently published. As a result, CTS got the maximum score (5) in all evaluation criteria and a final grade of **EXCELLENT**.

# CONTENTS

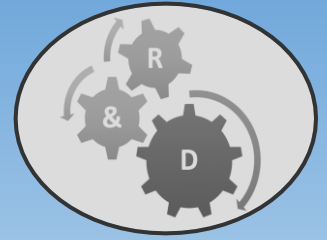
## Editorial

This first newsletter of 2021 shows the persistent activity of CTS, despite the limitations imposed by more than one year of a global pandemic. The new projects VESSEL AI, i4Q or Covoice-19 are good examples of this commitment.

As a sign of scientific recognition, CTS has been evaluated with a grade of EXCELLENT and it is now part of an associated laboratory of the LASI consortium.

Three CTS researchers were ranked among the top 2% of the world's most cited scientists. In addition to this, it is worth noting an Edmund Optics Education Award and a Student best paper award.

The newsletter editorial  
 João Martins  
 CTS Communication Officer



## WHAT IS YOUR FIELD OF EXPERTISE?

### R&D PROJECTS

- ETHNA ... 3
- VESSELAI... 4
- i4Q... 5
- Covoice-19... 5

### NEWS

- CTS researchers ...6
- Invited talks ...7
- Awards ...7
- PhD defense ...8

### UPCOMING EVENTS

- DoCEIS 2021 ...10
- YEF-ECE 2021 ...11
- CTS Seminars/Webinars ...11

## CTS is now part of consortium LASI

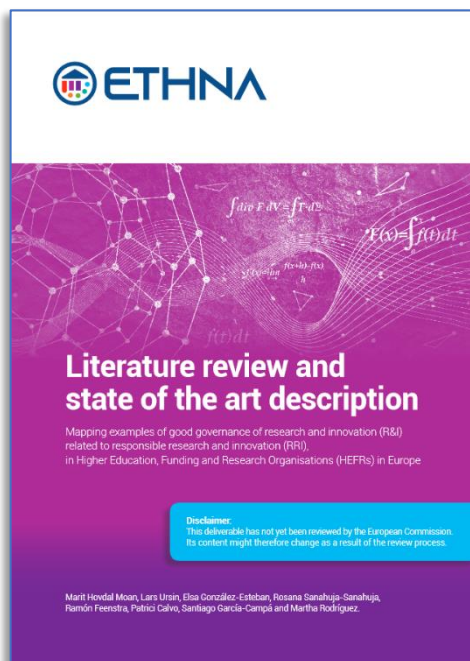
CTS is part of the consortium **Associated Laboratory of Intelligent Systems (LASI)** which recently received the status of Associated Laboratory by the Portuguese National Science Foundation, becoming the first Portuguese Associated Lab. focused on Artificial Intelligence. LASI integrates thirteen Research Units from eight Institutions geographically distributed throughout the country, namely: ALGORITMI, CISUC, CEBIT, 2Ai, LIACC, TEMA, CMUP, CTS, IPC, IEETA, UNIDEMI, CISTER, and GECAD.



## CTS publications in 2020

The total of 187 publications in 2020 are distributed among journals, conferences and books.

Journals	76	Conferences	95	Book chapters	10
Q1	37	A	10	Books	2
Q2	17	B	34	Book edition	4
Other	22	Other	51		
		<i>Indexed Scopus</i>	23	<b>Total:</b>	<b>187</b>
		<i>Not indexed</i>	28	Indexed:	145



Scientists working under the umbrella of the EU project ETHNA system have identified a comprehensive overview of good governance practices towards responsible research and innovation (RRI) in Europe.

The partners of the EU project ETHNA System have presented a literature review and state of the art description mapping examples of good governance of research and innovation (R&I) in European Higher Education, Funding and Research Organisations. “The findings form an essential basis for advancing our goal of developing a governance structure characterised by transparency, participation and co-responsibility”, said Elsa González Esteban, project coordinator and professor of the Department of Philosophy and Sociology of the Universitat Jaume I de Castelló (UJI).

The 82-page "Report on the state of the art and best practices" is the first publication of the project consortium involving ten partners from eight countries. Researchers at the ETHNA System partner institution Norwegian University of Science and Technology are the main contributors, in collaboration with project partners at UJI and Fundación Española para la Ciencia y Tecnología.

The report provides a comprehensive overview of governance theory and practices in the R&I sector related to the concept of Responsible Research and Innovation (RRI).

The report is based on findings from a review of the RRI literature, with a particular focus on the governance of research and innovation processes, a mapping of good governance practices in the research and innovation sector related to RRI in Europe, and interviews with 22 European-based experts on R&I governance in the area of RRI, or RRI-related topics. The purpose of the report has been to present some of the governance options - or building blocks - available when constructing the ETHNA system, both conceptually and practically speaking.

The selection of examples of governance practices in the R&I sector related to RRI has been guided by Arie Rip's conception of de facto governance, which proposes that governance is constituted to a large degree “by bottom-up actions, strategies and interactions ... [that] add up to outcomes at the collective level which function as governance arrangements”.

Following this approach, the consortium identified a broad variety of governance practices.

Applying the governance framework of the EC-funded project Res-A-Gora, the authors organised identified cases under the following three governance themes: ensuring quality of interaction, positioning and orchestration, and developing supportive environments.

Each of the governance themes are divided into three parts, which are referred to in the report as governance modules. The concept of governance modules was chosen to emphasise the idea that the governance themes can be understood as building blocks, which one can pick and choose from when constructing the ETHNA governance system. The cases organised under each module are meant to serve as an inspiration when reflecting on how a module could be adapted to a given institutional context.

The report does not indicate which of the selected cases qualify as good governance practices for the purpose of constructing the ETHNA system. However, the authors suggest that a selection of relevant practices could be guided by the overarching quality criteria for good governance in the R&I sector that underpin the ETHNA System project, which are those of ethical and effective.

**UNINOVA – CTS is a partner in this project, which is expected to provide substantial inputs towards developing a culture of Responsible Research and Innovation in our center.**

**According to the strategic plan submitted to the “Fundação para a Ciência e Tecnologia”, CTS is committed to perform its activities under the widely accepted principles of Research Ethics and Responsible Research. To prevent misconduct and bad practices, the “European Charter for Researchers” is followed, namely along the principles and recommendations regarding:**

- **Research Freedom**
- **Ethical Principles**
- **Professional Responsibility**
- **Professional Attitude**
- **Contractual and Legal Obligations**
- **Accountability**
- **Good Practices in Research**
- **Dissemination and Exploitation of Results**
- **Public Engagement**
- **Relationship with Supervisors**
- **Supervision and Managerial Duties**
- **Continuing Professional Development.**

**Specific training on these issues to Early-Stage Researchers and an effort to keep all researchers aware of these principles (awareness campaign) are planned. Furthermore, the Ethical Code of IEEE is amply disseminated among researchers.**

Informed by Habermas' theory of communicative action, an ethical governance system is defined here as one that promotes and facilitates on the one hand the inclusion of those immediately affected by it (i.e. R&I actors) in processes of discursive justification of the way in which the governance system is organised, and second, the inclusion of stakeholders (citizens, end-users, non-governmental organisations, business representatives, policy makers) in processes of critical examination and discursive justification of possible scenarios and potential impacts generated by research and innovation processes.

In addition to being ethical, the ETHNA System project holds that to qualify as good an R&I governance structure must also be effective. Informed by governance theory on public innovation, an effective governance structure in this context refers to one that accommodates and facilitates the form that R&I activities often take, namely the form of diverse, complex and dynamic networks.

Download the report:

[https://ethnasystem.eu/wp-content/uploads/2021/02/ETHNA\\_Report\\_state-of-the-art.pdf](https://ethnasystem.eu/wp-content/uploads/2021/02/ETHNA_Report_state-of-the-art.pdf)



## VesselAI Project official kick-off

Shipping is the lifeblood of global economy, but it is also one of the leading sources of greenhouse gases. Further, maritime shipping is one of the domains with higher incident risk, due to heavy traffic especially in congested waters. Hence, the maritime shipping sector faces escalating pressure for ship and crew safety, energy efficiency optimization and emissions reduction. The sector generates extremely large volumes of data, whose potential still remains untapped due to the involvement of enormous stakeholders and the sophistication of modern vessel design and operation. This fact, together with recent advances in AI, HPC and Big Data, as well as the application of the digital twin concept, provides the maritime shipping with a unique opportunity to address the increasing demands of the sector and bring a sea-change in the Maritime Industry.

VesselAI\* is a three-year EU-funded research project that aims to unlock this unexploited potential by developing, validating and demonstrating a framework for extreme-scale data and AI services for the maritime domain, facilitating the modelling and prediction of ships' behaviour. Using digital twin technology, the framework will fuse and assimilate large volumes of data, enabling accurate modelling as well as design and operation optimisation of ships and fleets under various dynamic conditions. VesselAI will also tap into the potential of artificial intelligence, cloud computing and high-performance computing, encouraging the digitalisation in the shipping industry. The framework will be demonstrated in four maritime industry-related pilots: global vessel traffic monitoring and management, globally optimal ship energy system design, short-sea autonomous shipping and global fleet intelligence.

UNINOVA-CTS will have a prevalent role throughout the project, as it is responsible for several Work Packages and tasks, namely, requirements' elicitation, research and business landscape review and design and development of high-performance computing solutions for extreme-scale Big Data storage and Artificial Intelligence methods and tools, digital twins and advanced visualizations and reporting engines.

\*The project has received funding from the European Union's Horizon 2020 research and innovation program under the Grant Agreement No. 957237

More information about the project can be found here:

<https://cordis.europa.eu/project/id/957237>

<http://vessel-ai.eu/>



## i4Q Project official kick-off

Manufacturing companies are continuously facing the challenge of redesigning and adjusting their systems to produce goods adapted to specific requirements and produced under the minimum required production rate, guaranteeing high quality and limiting the use of resources. Therefore, reducing waste, scraps and defects, as well as production costs and lead times is crucial to increase productivity. During the last decades, several manufacturing operations and manufactured products quality optimisation methodologies and tools, such as the use of sensors, automated processes and other zero-defect approaches, with the purpose of developing solutions to improve performance of process control.

The i4Q Project\* will provide a complete solution consisting of sustainable IoT-based Reliable Industrial Data Services (RIDS) able to manage large volumes of industrial data coming from smart, interconnected factory devices, supporting manufacturing online monitoring and control. The i4Q Framework will guarantee data reliability with functions grouped into five basic capabilities around the data cycle: sensing, communication, computing infrastructure, storage, analysis and optimisation; based on a microservice-oriented architecture for the end users. With i4Q RIDS, factories will be able to handle large amounts of data, tackling data accuracy, precision and traceability challenges and using the data for analysis and prediction as well as to optimise the process quality and product quality in manufacturing, leading to an integrated approach to zero-defect manufacturing.

The i4Q Framework will be validated and demonstrated in six industry-leading pilot scenarios: Smart Quality in CNC Machining, Diagnostics and IoT Services, White Goods Product Quality, Aeronautics and Aerospace Metal Parts Quality, Advanced In-line Inspection for incoming Prime Matter Quality Control and Automatic Advanced Inspection of Automotive Plastic Parts.

UNINOVA-CTS will have a substantial role throughout the project, as it is responsible for several tasks, such as i4Q Big Data Analytics Suite and Services and the i4Q Analytics Dashboards development. Furthermore, UNINOVA-CTS will actively support RiaStone in Pilot 5: Advanced In-line Inspection for incoming Prime Matter Quality Control, as the main technological and research partner.

\*The project has received funding from the European Union's Horizon 2020 research and innovation program under the Grant Agreement No. 958205

More information about the project can be found here:

<https://cordis.europa.eu/project/id/958205>

<https://www.i4q-project.eu/>

## COVOICE-19

The project “COVOICE-19 - Ferramenta de Apoio à Identificação, Diagnóstico e Prognóstico da Doença COVID-19 com recurso a Inteligência Artificial e Ciência dos Dados” was one of the 12 projects recommended for financing from the FCT call “AI 4 COVID-19: Ciência dos Dados e Inteligência Artificial na Administração Pública para reforçar o combate à COVID 19 e futuras pandemias – 2020”.



The project is coordinated by UNINOVA CTS members José Barata (PI) and Ricardo Peres (CoPI) in collaboration with the Hospital Egas Moniz (CHLO/HEM), whose participation is led by Dra Clara Capucho - Unidade de Voz, and includes Dr Kamal Mansinho and Dr Jaime Nina - Unidade de Infeciologia). Dra Clara Capucho and Dr Jaime Nina are also professors at NOVA School of Medicine.

The key objective of the COVOICE-19 project is the development of predictive models based on Artificial Intelligence, more specifically Machine Learning, to support the activities in the clinical contexts of rapid diagnosis and of prognosis in suspected or detected COVID-19 cases, respectively. These activities will be carried out based on a dataset collected and aggregated from different available sources during the initial stages of the project, leveraging the expertise and the close collaboration of the CHLO/HEM team. This dataset will be made openly available in order to promote the advancement of research efforts on the topic of COVID-19 carried out by the scientific community. In addition to this, web-based applications will be developed to operationalize the aforementioned models in



order to make them easily usable by both the general population and medical professionals alike, without requiring any prior knowledge of Machine Learning to do so.

The need for the research and development of novel forms of rapid testing as an alternative or complement to the current diagnosis method using RT-PCR have been declared as being of the utmost importance by both the World Health Organization and the national General Health Directorate. This is mostly due to the high turnaround times and costs associated with RT-PCR testing, which often needs to be carried out in specialized labs off-premises, as well as their generally low availability at a global scale, making it impossible to ensure the proper and thorough testing of the general population.

Additionally, the scenario of the current pandemic has led several healthcare systems to the brink of collapse due to the immense strain imposed by the rapid spread of COVID-19, making the prognostic and follow-up of the evolution of identified cases with resource to the visual interpretation of Chest X-Ray (CXR) or Computed Tomography (CT) scan imaging rather difficult. In these scenarios, healthcare professionals can be (and have been) forced to come face to face with extremely hard decisions involving the allocation of resources concerning for instance which patients should be given access to treatment based on a series of factors. A decision-support system, capable of providing a rapid and thorough analysis with additional insights into such cases can bring considerable added value to the table to aid in the decision-making process carried out by medical experts.

## NEWS

### Three CTS researchers in World's Top 2% Scientists List



**Luís M. Camarinha-Matos, Manuel D. Ortigueira and Rita A. Ribeiro**, integrated researchers at the Center of Technology and Systems (CTS), were ranked among the top 2% of the world's most highly cited scientists, in their respective fields, according to a new study published by Stanford University (USA).

Prof. John Ioannidis and his team from Stanford University, used Scopus to create a publicly available database of 100,000 top-scientists that provides standardized information on citations, h-index, co-authorship adjusted hm-index, citations to papers in different authorship positions and a composite indicator.

In this ranking, scientists are classified into 22 scientific fields and 176 sub-fields. Field- and subfield-specific percentiles are also provided for all scientists who have published at least 5 papers. The list includes 384 Portuguese researchers, of which 30 are from NOVA University of Lisbon, of which 22 are from the NOVA School of Science and Technology.

The study is available [here](#).



## Invited Talk

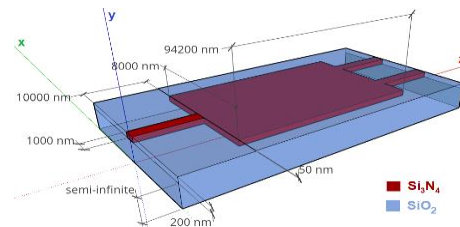
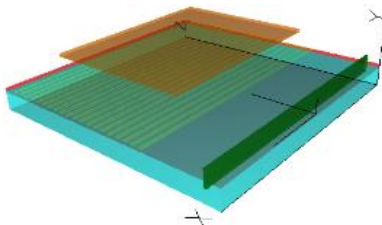
Prof. Luis Camarinha-Matos was an invited speaker at the Session on “Industry 4.0 and Digital Transformation: needs and challenges in education in the universities of the 21st century”, in the 1<sup>st</sup> Workshop PRINT, organized by the Federal University of Santa Catarina, Brazil, 15 Dec 2020.

*Abstract.* The presentation involved a discussion of the needed skills and training curricula at BSc, MSc, and PhD levels to address the requirements of new industrial contexts.



## Edmund Optics 2020 Educational Award

The research work being developed by CTS PhD student, Paulo Lourenço, regarding the development of a point-of-care detection platform prototype for the early diagnosis of the acute kidney injury (AKI) condition, has been distinguished with the bronze prize of the Edmund Optics 2020 Educational Award. This award seeks to promote outstanding optical based research programs in science, engineering and mathematics, held at public colleges and universities. The sensing platform prototype is based on a photonic integrated circuit, containing an array of interferometric plasmonic sensors to tackle the multiple biomarkers complexity, required for a reliable diagnostic of AKI.

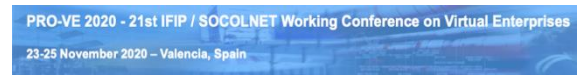


## Student Best Paper Award



Student Paula Graça (Supervisor: Luis M. Camarinha-Matos), received a best paper award for the work entitled “Evaluating and Influencing the Performance of a Collaborative Business Ecosystem – A Simulation Study”, present at the PRO-VE 2020 – 21<sup>st</sup> Working Conference on Virtual Enterprises, Valencia, Spain (online), 23-25 Nov 2020.

*Abstract:* In a Collaborative Business Ecosystem, organisations collaborate to acquire and accomplish more innovative and challenging market opportunities. But the sustainability of collaboration requires continuous performance improvement. To this end, well-defined performance indicators can be used to both assess the collaboration level



### Best Student Paper Award Certificate

for the paper  
**Evaluating and Influencing a Collaborative Business Ecosystem - A simulation study**

Authored by  
**Paula Graça and Luis Camarinha-Matos**

received at the  
**PRO-VE 2020**  
PRO-VE 2020 - 21st IFIP / SOCOLNET  
Working Conference on Virtual Enterprises  
held in Valencia (Spain), 23<sup>rd</sup>-25<sup>th</sup> November 2020

*Ángel Ortiz*  
Conference Chair



and act as an influence mechanism to induce an improvement in the collaborative behaviour of the participating organisations. By varying the importance (weight) of the adopted set of indicators, it is possible to study the variations in behaviour towards improvement, not only at organisations' level but also at the level of the ecosystem as a whole. In order to assess this hypothesis, this paper contains a case study based on simulation and agent-based modelling whose behaviour is shaped according to actual data on collaboration collected from three companies in the area of the IT industry. Various scenarios are simulated and described.

## PhD Defense

**Thesis: Improved terrain type classification using UAV downwash dynamic texture effect,**

*João Pedro Leal Abalada de Matos Carvalho*

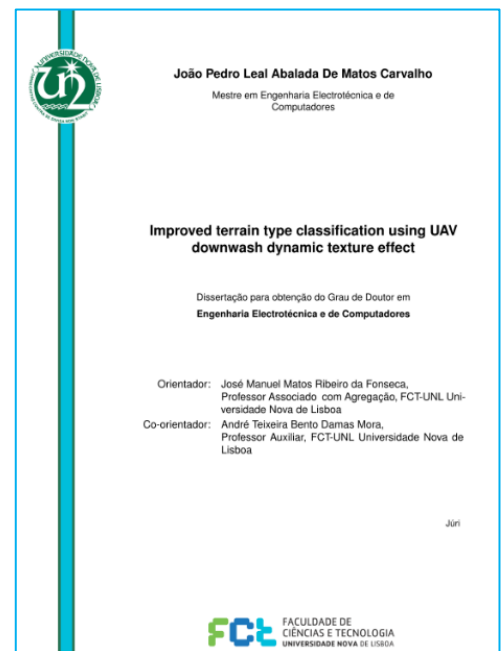
NOVA School of Science and Technology, 27 Jan 2021

The ability to autonomously navigate in an unknown, dynamic environment, while at the same time classifying various terrain types, are significant challenges still faced by the computer vision research community. Addressing these problems is of great interest for the development of collaborative autonomous navigation robots. For example, an Unmanned Aerial Vehicle (UAV) can be used to determine a path, while an Unmanned Surface Vehicle (USV) follows that path to reach the target destination. For the UAV to be able to determine if a path is valid or not, it must be able to identify the type of terrain it is flying over. With the help of its rotor air flow (known as downwash effect), it becomes possible to extract advanced texture features, used for terrain type classification.

This dissertation presents a complete analysis on the extraction of static and dynamic texture features, proposing various algorithms and analyzing their pros and cons. A UAV equipped with a single RGB camera was used to capture images and a Multilayer Neural Network was used for the automatic classification of water and non-water-type terrains by means of the downwash effect created by the UAV rotors. The terrain type classification results are then merged into a georeferenced dynamic map, where it is possible to distinguish between water and non-water areas in real time.

To improve the algorithms' processing time, several sequential processes were converted into parallel processes and executed in the UAV onboard GPU with the CUDA framework achieving speedups up to 10x. A comparison between the processing time of these two processing modes, sequential in the CPU and parallel in the GPU, is also presented in this dissertation.

All the algorithms were developed using open-source libraries, and were analyzed and validated both via simulation and real environments. To evaluate the robustness of the proposed algorithms, the studied terrains were tested with and without the presence of the downwash effect. It was concluded that the classifier could be improved by performing combinations between static and dynamic features, achieving an accuracy higher than 99% in the classification of water and non-water terrain.





## Thesis: Security Management Framework for the Internet of Things,

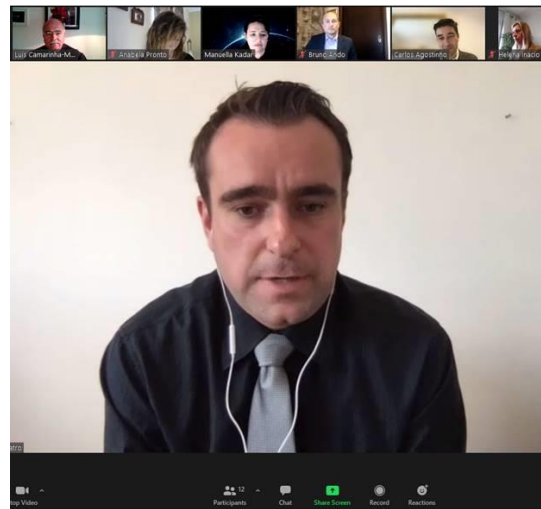
*Bruno Augusti Mozzaquatro*

NOVA School of Science and Technology, 18 Feb 2021

The increase in the design and development of wireless communication technologies offers multiple opportunities for the management and control of cyber-physical systems with connections between smart and autonomous devices, which provide the delivery of simplified data through the use of cloud computing. Given this relationship with the Internet of Things (IoT), it established the concept of pervasive computing that allows any object to communicate with services, sensors, people, and objects without human intervention. However, the rapid growth of connectivity with smart applications through autonomous systems connected to the internet has allowed the exposure of numerous vulnerabilities in IoT systems by malicious users.

This dissertation developed a novel ontology-based cybersecurity framework to improve security in IoT systems using an ontological analysis to adapt appropriate security services addressed to threats. The composition of this proposal explores two approaches: (1) design time, which offers a dynamic method to build security services through the application of a methodology directed to models considering existing business processes; and (2) execution time, which involves monitoring the IoT environment, classifying vulnerabilities and threats, and acting in the environment, ensuring the correct adaptation of existing services.

The validation approach was used to demonstrate the feasibility of implementing the proposed cybersecurity framework. It implies the evaluation of the ontology to offer a qualitative evaluation based on the analysis of several criteria and also a proof of concept implemented and tested using specific industrial scenarios. This dissertation has been verified by adopting a methodology that follows the acceptance in the research community through technical validation in the application of the concept in an industrial setting.



## Thesis: Reforço da Resiliência em Sistemas Ciber-Físicos,

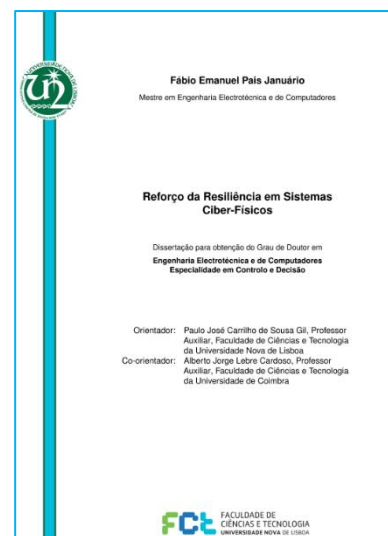
*Fábio Emanuel Pais Januário*

NOVA School of Science and Technology, 17 Feb 2021

Supervision and control systems have undergone significant improvements as a result of the technological evolution of network devices, which have increasingly presented greater processing and communication power. The interconnection of several subsystems spacially distributed through heterogeneous communication networks, including wireless sensor and actuator networks, which allow access to information in real time and in different locations, is a reality reinforced by the initiatives of the industry 4.0. The migration of these infrastructures to the cyberspace, where there is a clear combination between physical devices, computational software, and communication networks, gives rise to the so-called cyber-physical systems.

Cyber-physical systems are currently an integral part of most industrial environments, materializing the integration of control systems with information technologies. However, the increasing complexity of this type of systems brings in tandem new challenges, namely at cyberspace level and at physical level. Although some of these systems are designed to deal with physical problems, those that take into account the problems associated with cybersecurity and how they can directly influence the physical part of the infrastructure are still challenging. This new paradigm requires new ways of ensuring, in the event of unavoidable problems, a minimum level of operation/performance that allow these systems keeping stable and safe.

The work presented in this thesis addresses the study and development of new methodologies and techniques to improve resilience in complex cyber-physical systems, exploring some concepts and strategies, namely the use of multiagent topologies within a distributed middleware framework. For this, the vulnerabilities of this type of systems are considered, adapting the functions of the



agents to the devices where they are deployed, ensuring the context awareness. The approach is validated with data from different systems in simulation and laboratory environment experiments.

**Thesis: Design of High-Performance Low-Noise and Low-Power Mixed-Signal CMOS Circuits Employing Self-Biasing and Low-Voltage Techniques,**

*Somayeh Abdollahvand*

NOVA School of Science and Technology, 18 Feb 2021

This dissertation tries to address design of high-performance low-noise and low-power mixed-signal CMOS circuits by employing self-biasing and low-voltage techniques. The aim is to make the main building blocks, which are common at mixed-signal circuit implementation scaling-friendly.

Design of robust CMOS amplifiers combining advanced low-voltage and feedback techniques is introduced by using dynamic-threshold MOS (DTMOS) devices. The use of DTMOS in implementation of mixed signal circuit has been suggested before. However, either the authors have tried to avoid the effect of the parasitic lateral bipolar transistor (supplying the circuit with a voltage below 0.6 V) or they even have exploited the extra current produced by the associated parasitic device. The idea proposed in this thesis is entirely different. The DTMOS is used only in the input and in the cascode devices of the amplifier and it can be safely supplied with a nominal supply voltage of 1.2 V and the body voltage of the devices configured, as DTMOS will never exceed 0.6 V. There are several advantages when doing this: 1) in DC, the body-effect factor (BEF) of the modified devices is highly reduced since the threshold voltage of a given DTMOS transistor is properly adjusted taking into account the gate voltage; 2) since the threshold voltage is reduced, the device can be sized smaller for a given VDS saturation voltage, which translates in smaller area and lower parasitic capacitances; 3) by employing DTMOS can lead, for the same power dissipation to speed enhancements in the gain bandwidth product (GBW) of the order of 20-to-25 % (depending on how much the BEF is attenuated).

Ring oscillators are one of the most widely used blocks in communication and digital processing systems, mainly as clock generators for integrated frequency synthesizers. In this work a new self-biasing circuit to adjust the bias current of the inverters is proposed in order to implement ring-oscillator. The use of a global self-biasing circuit introduces a negative feedback mechanism, which continuously adjusts the value of the (common-mode) voltages. As a consequence, the biasing current supplied to the inverters is much more insensitive to temperature variations, and it also reduces the influence of other noise sources. Simulations show that the temperature variation is 56.64 ppm/°C and FOM at 10 MHz offset frequency is -163.5 dBc/Hz.



**TECHNOLOGICAL INNOVATION FOR APPLIED ARTIFICIAL INTELLIGENCE**

The Advanced Doctoral Conference on Computing, Electrical and Industrial Systems is celebrating its 12th edition (DoCEIS 2021) with a focus on Technological Innovation for Applied Artificial Intelligence Systems.

Artificial Intelligence (AI) is rebuilding and changing society's basic constructs - such as economy, health, education and lifestyle - through the implementation of intelligent algorithms on everyday applications and promoting technological advancements that allow for a better and more sustainable quality of life. AI techniques (e.g. machine learning and deep learning, automated planning, and reasoning) can be applied to several knowledge areas, from electronics and energy to the biomedical field and industrial collaborative networks, providing several advantages that make AI a paramount tool for both industrial and research innovation.

DoCEIS 2021 will target Applied Artificial Intelligence Systems, 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.

More information can be found here:

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

## YEF-ECE 2021 - 5th International Young Engineers Forum on Electrical and Computer Engineering



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.

The 2021 edition will be organized in association with the 12th edition of the DoCEIS 2021 conference. However, and considering the actual COVID-19 pandemic state, the event will be conducted in a virtualized (ONLINE), but still interactive way.

More information can be found here:

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

## CTS Seminars/Webinars

### Future Research Directions in Cognitive and Collaborative CPS

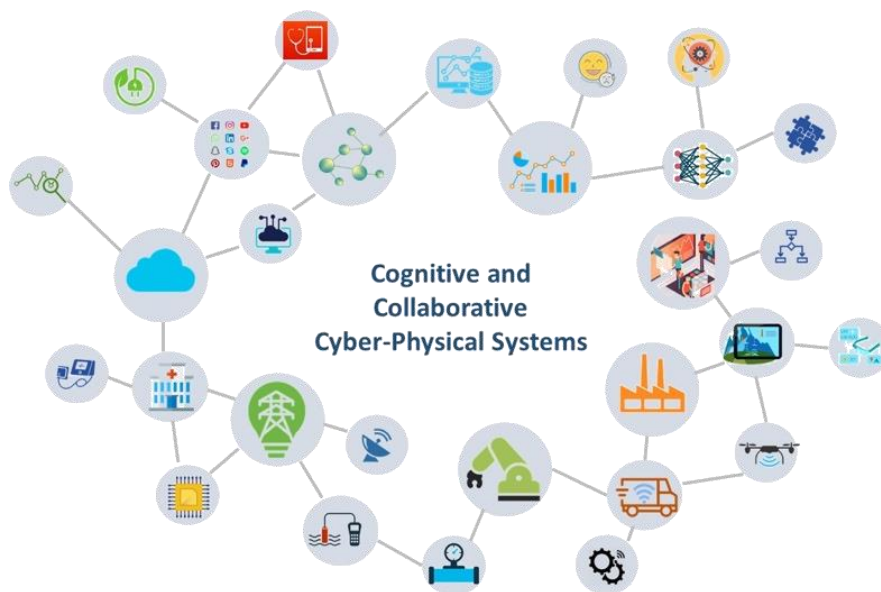
CTS will organize a set of seminars/webinars on the topic of cognitive and collaborative CPS. In each 1h30mx max duration webinar, a presentation will be given, including a brief overview of recent activities and a special focus on future research challenges and suggested directions, followed by a debate.

**Calendar**- Season 1: Wednesdays (mostly), 17:00-18:30 (via ZOOM platform)



**Topics and speakers**

- 17 Mar 2021 - *Ricardo Peres* Distributed Artificial Intelligence in Industry
- 31 Mar 2021 - *José M. Fonseca, André Mora* Remote Sensing
- 14 Apr 2021 - *Daniel Aelenei* CPS Contribution to Green and Comfortable Buildings
- 28 Apr 2021 - *Filipa Ferrada* Emotions in Collaborative Networks
- 12 May 2021 - *Sanaz Nikghadam* Computational Creativity to Design CPS
- 26 May 2021 - *Luis Gomes* Model-driven automatic generation of embedded controllers
- 09 Jun 2021 - *André Rocha* Distributed CPS in Smart Manufacturing
- 23 Jun 2021 - *Manuel Ortigueira* Spectral Analysis and CPS
- 01 Jul 2021 - *João Pedro Oliveira* Evolving the IoT towards a Multidisciplinary Cyber-Physical System
- 13 Jul 2021 - *António Abreu* The Hidden Power of Graph Theory in Collaborative Networks
- 21 Jul 2021 - *Rui Lopes* Unlocking energy flexibility to support energy transition.



ZOOM: 87284517427