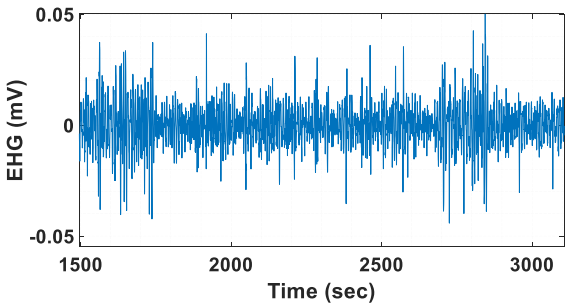
Center of Technology and Systems

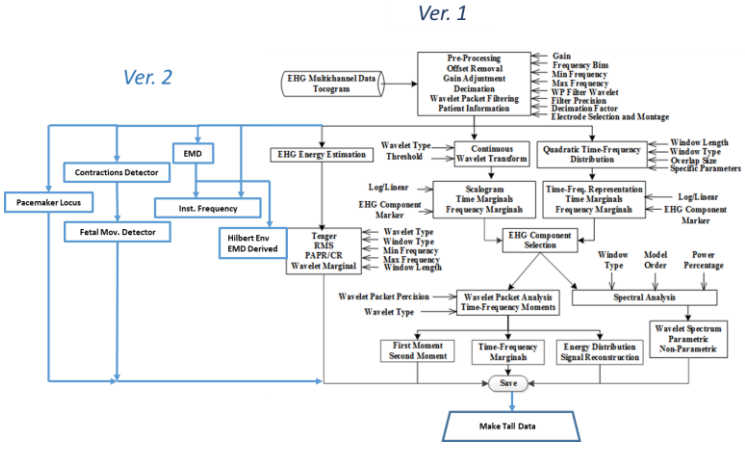
NEWSLETTER

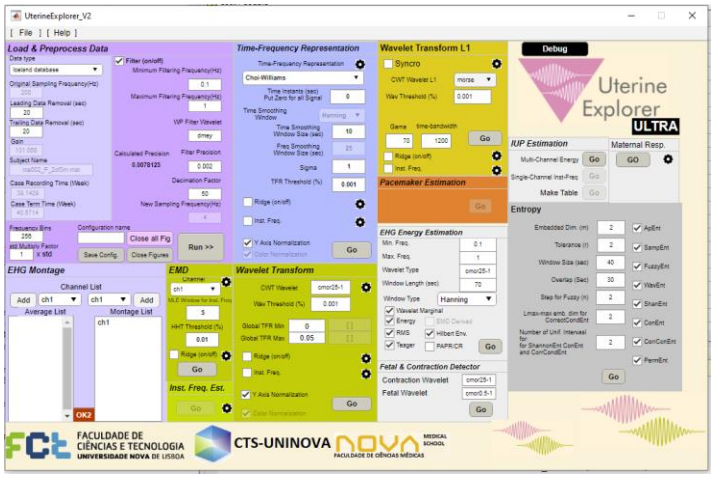
December 2021

The Uterine Explorer: A Tool for Pregnancy Monitoring & Uterine Electrophysiology Exploration

The uterine electromyogram, also called Electrohysterogram (EHG), is an electrical signal generated by the uterine contractile activity. The EHG has been considered a promising biomarker for labour and preterm labour prediction, for which there is a demand for accurate estimation methods. Preterm labour is a significant public health concern and one of the major causes of neonatal mortality and morbidity. Additionally, the EHG is a modern tool for pregnancy monitoring and myometrial electrophysiological studies. The Uterine Explorer (UEx) toolbox has been specifically designed for the EHG analysis and exploration in view of the characterization of its components. It is also a code repository platform. The starting point was the EHG multichannel scalogram or spectrogram representation from which frequency and time marginals, instantaneous frequency and bandwidth are obtained as EHG features. From this point, the detected components undergo parametric and non-parametric spectral estimation and wavelet packet analysis. Intrauterine pressure estimation (IUP) is obtained using the Teager, RMS, wavelet marginal and Hilbert operators over the EHG. These are only a subset of the Uex available tools. The software platform is Matlab®. Uex has been developed by a team of researchers and students at UNINOVA-CTS, Nova School of Science and Technology and the Nova Medical School since 2016 and is continually expanding in a modular, "under the same roof "architecture. A standalone application is easily deployed in each development step.







Arnaldo Batista, Filipa Esgalhado, Sara Russo, Fátima Serrano, Catarina R. Palma dos Reis and Manuel Ortigueira

Editorial

In line with the last editions, this newsletter of December 2021 shows the persistent and resilient activity of CTS despite the limitations imposed by the global pandemic.

The collaborative R&D constitutes one of the primary footprints of CTS, which is well exposed by the front-page article. It describes an advanced uterine electromyogram tool whose development and validation involve a multidisciplinary team.

Professor Luis Camarinha Matos was re-elected for a second mandate as director of CTS. Following the achievements obtained during the period 2018-2021, the second mandate action plan aims at reinforcing and consolidating the projection of CTS into the domain of R&D.

The newsletter editorial

João Martins
CTS Communication Officer

CONTENTS

CTS is now part of the LASI Associated Lab

CTS is part of the Associated Laboratory for Intelligent Systems (LASI), a laboratory recently approved by the Foundation for Science and Technology (FCT), for the area of Artificial Intelligence.

With more than 540 PhDs, LASI involves 13 units from six different institutions: the universities of Minho, Porto, Coimbra and Nova de Lisboa, the Polytechnic Institute of Cávado e Ave and the ISEP. The research units involved are: GECAD and CISTER (ISEP), ALGORITMI and IPC (UM), LIACC and CMUP (UP), IEETA and LEMA (UA), 2AI (IPCA), CISUC and CIBIT (UC) and **CTS** and UNIDEMI (UNL). All these research units, strongly consolidated in the Portuguese scientific panorama, have a rich relationship with the domains of artificial intelligence and data science, ranging from their theoretical foundations to their practical application. LASI will constitute the larger associated lab in the country, that will operate as a network.

Main thematic areas covered by LASI:

- Innovative and Sustainable Industries
- Smart Cities, Mobility and Energy
- Health and Well-being
- Infrastructures and Highly Connected Society
- Public Administration and Governance

The process of contract negotiation with FCT is in its final stage.

CTS : Brief Overview of Achievements 2018-2021

We live now in times of **very tough competition** in the scientific world, being a pre-requisite for success to reach world-level well-recognized scientific excellence. This is important at all levels, e.g., to access further resources, to facilitate the approval of our PhD programs by the A3ES accreditation agency, to have prestige inside our own academic institutions, namely in comparison to other centers of NOVA, and also to benefit our individual CVs. Such recognition depends primarily on the **level of the scientific achievements**, and not so much on the acquired projects and other forms of recognition and societal impact, as we could see in the various evaluations of CTS by FCT.IP.

CTS has a peculiar nature, comprising researchers from various institutions (FCT-NOVA, ISEL, IP Setubal, IP Beja, and more), and covering a wide spectrum of thematic interests. In other words, CTS is a kind of research and innovation ecosystem including researchers that have an employment contract with diverse institutions, which makes its organization and governance quite challenging. At the same time, this ecosystem offers a great diversity, which needs to be properly leveraged in order to play a prominent role in society. **A potential that we have the responsibility to nurture and guide towards its full realization**.

Despite COVID-19, which spread over half of this ending mandate, it was possible to achieve significant results of which we can be proud of. A brief sample:

- ***Productivity assessment model***. Following a mandate received from the general assembly of CTS, it was possible, for the first time, to implement a set of transparent criteria to assess productivity of individual members and decide on their status of "integrated" or "collaborator".
- ***Preparation for CTS evaluation in 2018***. With a strong involvement of all members and PhD students, it was possible to organize an effective preparation for the evaluation by FCT.IP and, for the first time in the history of CTS, the classification of **EXCELLENT** was obtained with the **maximum score** in all three criteria (5, 5, 5).
- ***Organization of information base***. Substantial progress was achieved on the organization of the information base of CTS, namely in terms of publications, projects, an PhD thesis.
- ***Internal communication***. Three important mechanisms were implemented and maintained: (i) web site, (ii) periodic newsletter, and (iii) series of seminars.
- ***Increased collaboration***. There are promising signs of more intense collaboration between "groups" (in terms of joint projects, publications, events), a proof that it is possible to "work as a center".
- ***Support to training***. The PhD program on Electrical and Computer Engineering, strongly supported by CTS, remains an excellent program, attracting a very good number of students. A high number of MSc theses were also supported. The associated Doctoral conference DoCEIS and the Young Engineers Forum (YEF-ECE) continued with successful annual editions (despite COVID).
- ***Strategic involvements***. CTS is part of the newly approved Associated Lab LASI, comprising 13 research centers from all over the country and devoted to smart systems / AI. CTS is also active member in 2 Co-Labs. Conversations started with COPELABS towards the potential integration of this center as a "branch" of CTS.

Many people contributed to these achievements, and I take the opportunity to thank you all for your contributions. We are still far from our maximum collective potential, and this should encourage us to pursue more ambitious goals in the next period.

Luis Camarinha-Matos

ROBUST - Oscillator-Based Entropy Sources in Secure IoT Systems

(EXPL/EEI-EEE/0776/2021)

Security is now a major concern, with the drastically increasing number of low-cost internet-of-things (IoT) interconnected devices. Since these electronics systems have strict power and area constrains, reliable, energy-efficient and cost-effective hardware security is of paramount importance.

High-entropy randomness is the cornerstone of the security platforms indispensable to provide encryption keys for secure communications, as well to generate unique digital identification (ID) for entity authentication.

True random number generators (TRNGs) and the physically unclonable functions (PUFs) require, respectively, dynamic and static entropies. TRNGs harvest dynamic entropy from natural physical phenomena, whereas PUFs are based on the intrinsic variations in semiconductor manufacturing processes of integrated circuits (ICs) to generate, respectively, a time-invariant key and an unique ID, to nominally identical devices.

In this project we will focus on the extraction of entropy, both dynamic and static, from integrated circuits CMOS oscillators, for TRNG and PUF implementations. A new class of TRNGs and PUFs will be developed, designed in deep nanoscale CMOS technologies, and tested. These ICs should extract dynamic and static entropy, with a much lower area and power, then state-of the art approaches.

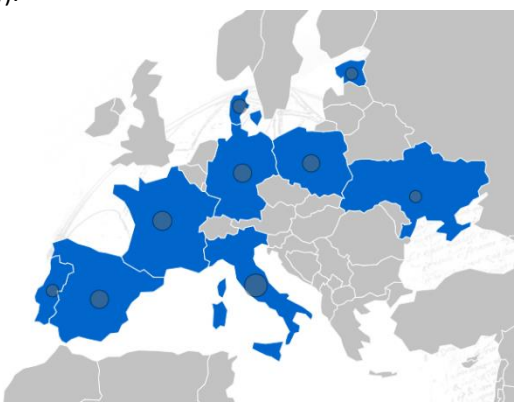
Team: Luis Oliveira (PI), João Goes, Nuno Paulino e João Pedro Oliveira, João Casaleiro (Co-IP).

ITN SMARTGYsum (SMART Green energY Systems and bUsiness Models)

This H2020 Marie Skłodowska-Curie Innovative Training Networks (ITN) project groups together leading European Universities and Institutions (the consortium is composed by 13 universities and 14 companies/institutions) with the aim to implement a multidisciplinary and innovative research and training program, bringing to enable a new generation of Early Stage Researchers (ESR) to foster a New Green Energy Economy in Europe. The general objective of SMARTGYsum is to drive the evolution of European Electric Energy Systems by integrating the knowledge on Powel Electronics, Electric Engineering and Information and Communication Technology as well as their socio-economical aspects with the creation of new Businesses Models to cover the green economy energy requirements (sustainability, efficiency, reliability and manageability).

ESR will acquire the knowledge, methods and skills across a wide range of disciplines around the Energy ecosystem, Renewable Electric Energy Systems and Business Models for the deployment of the Green Energy System. Trained ESR will have the technical and economical knowledge to break the barriers for the deployment of energy transition as market and social barriers (price distortion through externalities, low priority of energy issues, split incentives); financial barriers (investment, high up-front costs, lack of access to capital); information failures (lack of awareness, knowledge and competence); or regulatory barriers (restrictive procurement rules).

The project started in October 2021, with a duration of 4 years.



CTS participants: João Martins, Luis Camarinha-Matos.

DataCoLAB – Leveraging data-driven solutions for intersectoral innovation

On the 2nd of November, UNINOVA-CTS welcomed SGS Portugal at the research centre to kick-off the collaboration within the scope of the DataCoLAB. The DataCoLAB has been recognized as a collaborative laboratory by the Portuguese Foundation for Science and Technology (FCT) for a renewable period of five years following an evaluation by international experts. It is composed of multiple

parties, being led by SGS and copromoted by FI Group Portugal and Smartwatt. From the research side it counts with the participation of UNINOVA-CTS, Universidade do Porto, Universidade do Minho and Instituto Politécnico de Viana do Castelo.

The main goal of DataCoLAB is to create and promote research and development activities aimed at intersectoral innovation with multidisciplinary stakeholders, using data-driven solutions to redefine the way we produce, consume and live. In this context, Ricardo Silva Peres presented some of the data-driven solutions developed at UNINOVA-CTS encompassing three target sectors of activity for DataCoLAB, namely manufacturing and maintenance, healthcare and agri-food.

The presentation showcased the centre's expertise in combining data science and artificial intelligence to transform raw data into added value for stakeholders. More specifically, the presentation focused on three cases: automated quality inspections of industrial adhesive applications, crop yield estimation using deep learning for fruit detection and tracking, and finally non-invasive diagnosis support for COVID-19 patients using voice recordings.
With this, CTS will contribute with its expertise to design and develop innovative data-driven services for these sectors, leveraging the participation in this consortium to further bridge the gap between academia and the market, putting a strong emphasis on knowledge transfer and supporting the digital transformation.

Ricardo Silva Peres

NEWS

August 2021 data-update for "Updated science-wide author databases of standardized citation indicators"

Four researchers from CTS appear in the **world's top 2% researchers** list:

Luis M. Camarinha-Matos (both career-long and single-year)

Manuel D. Ortigueira (both career-long and single-year)

Rita A. Ribeiro (both career-long and single-year)

João Martins (single-year)

The list results from a study coordinated by John Ioannidis, professor at Stanford University. It identifies over 100,000 influential researchers from 149 countries, in 22 scientific areas and 176 disciplines, whose work has accelerated progress and productivity in their areas.
The study, now updated and recently released, resulted in two lists based on distinct categories: career-long impact and single-year impact. The ranking was supported by Scopus, an international online database of scientific articles, and respective citations, in different types, for academic journals and journals.
The work now released is based on more accurate standardized citation metrics, with the purpose of combating self-citation abuses. The number of citations allows us to assess the impact and consolidated influence of a given scientist or institution on the progress of scientific knowledge.

https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/3

KEYNOTE TALKS

Manuela Vieira presented a keynote speech at the Fifteenth International Conference on Sensor Technologies and Applications, SENSORCOMM 2021, November 14-18, 2021 , Athens, Greece, “Cooperative Self-localization and Wayfinding Services Through Visible Light Communication”.


CERTIFICADO
DE PARTICIPAÇÃO

Fatec São Paulo — Centro Paula Souza — GOVERNO DO ESTADO DE SÃO PAULO

A Faculdade de Tecnologia de São Paulo certifica que **Paula Louro** proferiu a palestra intitulada **“Dispositivos Optoeletrônicos para comunicação por luz visível: Desafios e aplicações”**, como parte dos eventos realizados na 22º Congresso de Tecnologia da Fatec São Paulo no dia 06 de outubro de 2021, às 08h30min, realizada de forma remota , com 2 horas de duração,.

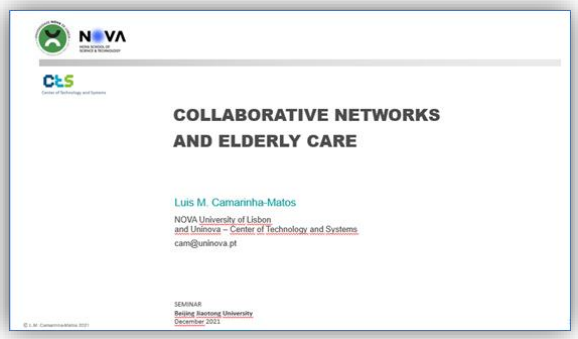
São Paulo, 06 de outubro de 2021

Prof. Me. Josué Souza de Gois
Diretor da Fatec-SP

Prof. Esp. Luiz Antonio de Almeida
Coordenador – 22º Congresso de Tecnologia

Paula Louro presented a keynote speech at 23º Congresso de Tecnologia da Faculdade de Tecnologia de São Paulo (FATEC-SP), simpósio Ciência e Tecnologia na Educação Digital, October 6-8, 2021, “Dispositivos optoelectrónicos para comunicação por luz visível: desafios e aplicações”.

Paula Louro presented a keynote speech at the workshop “Introdução aos Sensores”, IBERSENSOR, September 8-9, 2021, “Dispositivos optoelectrónicos para comunicação por luz visível: desafios e aplicações”.



Luis Camarinha-Matos gave an invited lecture (3 h) on "Collaborative Networks and Elderly Care" for the PhD students on Information Systems of Beijing Jiaotong University, China, on 16 Nov 2021.

PANELIST

Manuel Augusto Vieira and Paula Louro were invited to be part of the NetWare Experts Panel I with the theme: “Environmental Sensing: Difficulties for Sensing and Processing the Correct Data” in the NetWare 2021 Congress, held on Nov 14-18, 2021, in Athens, Greece.

NetWare Expert Panel I

Environmental Sensing: Difficulties for Sensing and Processing the Correct Data
(medium dependent, body sensing, sensing mobile targets, predictive maintenance, mission critical sensing, precision, failures, etc.)

Chair
Antonio L. L. Ramos, University of South-Eastern Norway (USN), Norway

Panelists
Anne-Lena Kampen, Western Norway University of Applied Sciences, Norway
Paula Louro, ISEL-IPL; CTS-UNINOVA, Portugal
Sandra Sendra, Escuela Politécnica Superior de Gandia/Universitat Politècnica de València, Spain
Manuel Vieira, CTS-UNINOVA, Portugal
Aurilla Aurelie Arntzen, University of South-Eastern Norway (USN), Norway

Awards

Best paper at ALLSENSORS 2021

CTS researchers won the best paper award at ALLSENSORS 2021 with the following paper:

"**Wayfinding Services in Crowded Buildings Through Visible Light**"
Manuela Vieira, Manuel Vieira, Paula Louro, Pedro Vieira, Alessandro Fantoni
ALLSENSORS 2021 - 6th International Conference on Advances in Sensors, Actuators, Metering and Sensing, Nice, France, 18 - 22 de Jul 2021

Best paper at PRO-VE 2021

CTS researchers won the best paper award at PRO-VE 2021 with the following paper:

"Designing a Collaborative Personal Assistance Model for Persons with Disabilities: The Portuguese Independent Living Case"
Patrícia Macedo, Filipa Ferrada, Ana Inês Oliveira, Rui Neves Madeira

PRO-VE 2021 - 22nd IFIP / SOCOLNET Working Conference on Virtual Enterprises
Saint Etienne, France, 22-24 Nov 2021

Altice International Innovation Award

Dário Pedro, PhD student in Electrical and Computer Engineering and student member of CTS, was awarded with the Academy prize for best Master's or Doctoral work with his project 'Collision Avoidance on Unmanned Aerial Vehicles using Deep Neural Networks', which aims to find a solution to avoid the collision of unmanned aerial vehicles through the use of Deep Neural Networks. Unmanned aerial vehicles can come to have multiple applications, such as transporting goods, security, or, in the long term, transporting people. This solution helps to solve the city's traffic problems, but since it requires a high level of safety and protection, Dário Pedro's work proposes a neural solution to prevent collision between static and moving objects, through use of artificial intelligence.
The work is a good example of partnership and knowledge transfer between academia and the business world. The work has been guided by Prof.s André Mora and José Manuel Fonseca, members of CTS, and also has the support of the company Beyond Vision under the supervision of Dr. Luis Campos.

IFIP, the International Federation for Information Processing, is celebrating its 60th anniversary. IFIP was founded in 1960 following the first World Computer Congress, and under the auspices of UNESCO. To celebrate this jubilee, various activities are taking place. One of them is the **IFIP 60 Faces** campaign which features IFIP members active in all parts of the organization. These "faces" are promoted through social media posts introducing them to a global audience. IFIP 60 Faces features a wide array of contributors to IFIP, from scientists to communicators and organizers, highlighting the diversity of ways in which IFIP's members make valuable contributions and the wide range of topics discussed within IFIP.
The director of CTS was included in this 60 Faces campaign.

https://twitter.com/ifipnews/status/1439864841800388608
https://twitter.com/ifipnews

CTS contributions to IFIP IoT 2021

CTS contributed to IFIP IoT 2021, 4th IFIP International Internet of Things conference, namely at the level of co-chairing the program committee (Luis Camarinha-Matos) and organizing a special session on **Cyber-Physical IoT Systems in Wildfire Context** (Luis Oliveira, André Mora). Two papers co-authored by CTS researchers were also presented.
Due to COVID-19, the conference was organized online, on 4-5 Nov 2021, and was attended by about 240 participants.

IFIP IOT

CTS contributions to PRO-VE 2021

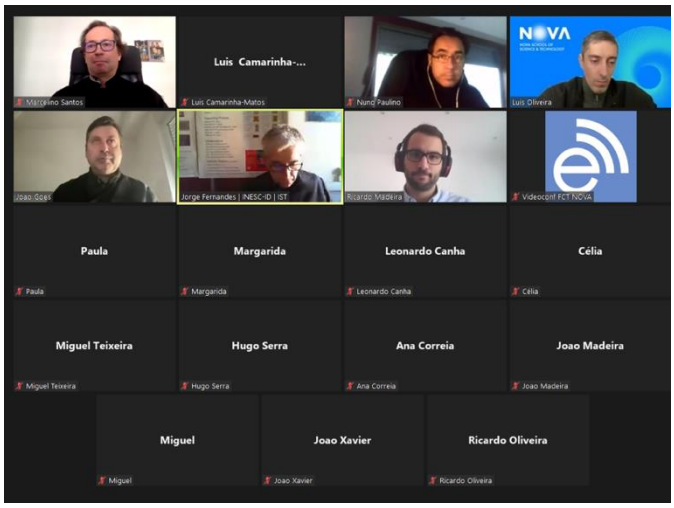
CTS was extensively represented at PRO-VE 2021, with a total of 7 papers, which are included in the proceedings published by Springer.

Several CTS researchers were also involved in the organization and program committee of the conference which took place on 22-24 Nov 2021, at the “Ecole des Mines” in Saint Etienne, France.

The conference was organized in a hybrid mode, with around 80 onsite participants and around 70 remote attendees.

PhD Defense

Thesis: **Design of a Fully Integrated Power Management Unit with a Multi ratio and Multi-cell Switched-Capacitor DC-DC Converter**,
PhD Candidate: Ricardo Madeira
Supervisors: Nuno Paulino, João Pedro Oliveira
NOVA School of Science and Technology, 2 Dec 2021



The Internet of things (IoT) smart nodes deployment have been increasing rapidly in recent years, in a wide range of applications. These nodes are typically inserted in Wireless Sensor Networks (WSN), ranging from a few numbers to hundreds of nodes. Solutions using System on Chip (SoC) have been proposed for the nodes implementation, due to their low production costs. One import block of these SoCs is the Power Management Unit (PMU) used to power the node. Since the available energy is limited, efficient energy conversion is crucial to reduce the maintenance costs. To this end, Switched-Capacitor (SC) DC-DC converters have been proposed, since they can be fully integrated in CMOS technology, and offer a good trade-off between efficiency and power density. This thesis describes the design and test of two PMUs Integrated Circuit (IC) prototypes in 130 nm bulk CMOS technology. The first is a 1 mW PMU composed by a multi-ratio SC converter with three voltage Conversion Ratios (CRs) 1/2, 2/3, and 1/1, covering an input voltage range of 1.1 V to 2.3 V, and generating a 0.9 V output voltage. It also includes a set of auxiliary circuits including a phase generator, a CR controller, the switch drivers, and a start-up circuit. The total circuit active area is 0.138 mm^2 and a peak efficiency of 80.4% was measured. The second prototype is a fully integrated 16 mW PMU which includes a multi-ratio 1+3 binary-weighted SC converter, including the same CR, and the same input voltage range and output voltage value of the previous prototype. The PMU is now completely fully integrated by removing the external decoupling capacitor and by integrating the voltage reference generator, both external in the first prototype. The decoupling capacitor was removed by employing a time interleaving scheme and by using capacitance modulation, according with the output power level and input voltage value, sensed through the clock frequency. The PMU includes the first prototype re-designed auxiliary circuits plus a cell controller and voltage reference generator. The total circuit active area is 5.12 mm^2 and a peak efficiency of 74.3% was measured.

Thesis: **Data Normalization in Decision Making Processes**,
PhD Candidate: Nazanin Vafaei
Supervisors: Rita Ribeiro, Luis M. Camarinha-Matos
NOVA School of Science and Technology, 6 Dec 2021

With the fast-growing of data-rich systems, dealing with complex decision problems is unavoidable. Normalization is a crucial step in most multi criteria decision making (MCDM) models, to produce comparable and dimensionless data from heterogeneous data. Further, MCDM requires data to be numerical and comparable to be aggregated into a single score per alternative, thus providing their ranking.
Several normalization techniques are available, but their performance depends on a number of characteristics of the problem at hand i.e., different normalization techniques may provide different rankings for alternatives. Therefore, it is a challenge to select a suitable normalization technique to represent an appropriate mapping from source data to a common scale. There are some attempts in the literature to address the subject of normalization in MCDM, but there is still a lack of assessment frameworks for evaluating normalization techniques.
Hence, the main contribution and objective of this study is to develop an assessment framework for analysing the effects of normalization techniques on ranking of alternatives in MCDM methods and recommend the most appropriate technique for specific decision problems. The proposed assessment framework consists of four steps: (i) determining data types; (ii) chose potential candidate normalization techniques; (iii) analysis and evaluation of techniques; and (iv) selection of the best normalization technique. To validate the efficiency and robustness of the proposed framework, six normalization techniques (Max, Max-Min, Sum, Vector,

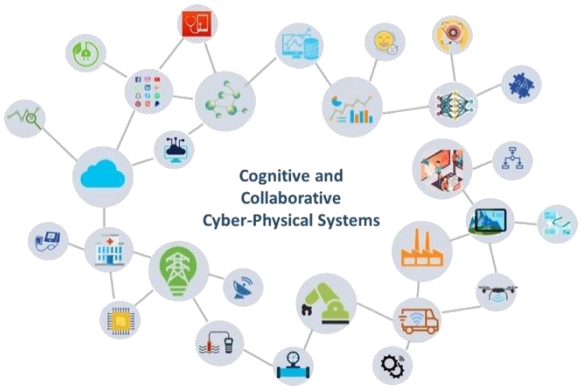
Logarithmic, and Fuzzification) are selected from linear, semi-linear, and non-linear categories, and tested with four well known MCDM methods (TOPSIS, SAW, AHP, and ELECTRE), from scoring, comparative, and ranking methods. Designing the proposed assessment framework led to a conceptual model allowing an automatic decision-making process, besides recommending the most appropriate normalization technique for MCDM problems. Furthermore, the role of normalization techniques for dynamic multi criteria decision making (DMCDM) in collaborative networks is explored, specifically related to problems of selection of suppliers, business partners, resources, etc.

To validate and test the utility and applicability of the assessment framework, a number of case studies are discussed and benchmarking and testimonies from experts are used. Also, an evaluation by the research community of the work developed is presented. The validation process demonstrated that the proposed assessment framework increases the accuracy of results in MCDM decision problems.

CTS Seminars/Webinars

Future Research Directions in Cognitive and Collaborative CPS

Following the success of the first series, CTS started a 2nd series of seminars on **Future Research Directions in Cognitive and Collaborative CPS**. In this series the following seminars were recently given:



27 Oct 2021: ***Raul Rato*** **– Quantum based physical layer security from a unified CPS/IoT perspective**

10 Nov 2021: **Naercio Magais (COPELABS) – Computing paradigms in connected vehicle networks**

19 Nov 2021: **Arnaldo Guimarães – Uterine Electromyography Processing for Pregnancy Monitoring**

6 Dec 2021: **Nuno Fachada (COPELABS) – Agent-based modeling and simulation**

Video records of these events as well as the ones in the first series are available at: https://cts.uninova.pt/events.html

UPCOMING EVENTS

DoCEIS 2022

The Advanced Doctoral Conference on Computing, Electrical and Industrial Systems is celebrating its 13th edition (DoCEIS 2022) with a focus on **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.

Proceedings are expected to be published by a **Springer**, IFIP AICT series (indexed in **Web of Science**, **SCOPUS** and **DBLP**).

Submission of abstract:	**8 Jan. 2022**
Submission of full paper:	**5 Feb. 2022**
Notification of authors:	**19 Mar. 2022**
Submission of camera ready:	**2 Apr. 2022**

DoCEIS 2022 is co-sponsored by CTS.

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

YEF-ECE 2022 - 5th International Young Engineers Forum on Electrical and Computer Engineering

Following the success of the previous editions we are proud to announce the organization of the **6th International Young Engineers Forum on Electrical and Computer Engineering - YEF-ECE 2022**.

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.

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 (indexed on SCOPUS and Web of Science).**

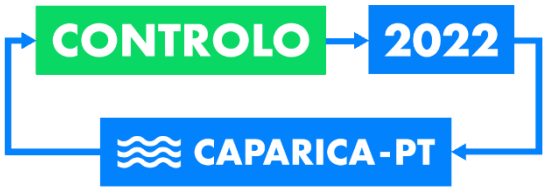
YEF-ECE 2022 will be co-located with the doctoral conference **DoCEIS 2022 and co-sponsored by CTS.**

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

Abstract submission:	**March 4, 2022**
Full paper submission:	**April 8, 2022**
Acceptance notification:	**May 9, 2022**
Final paper submission:	**June 3, 2022**

CONTROLO 2022

15th APCA International Conference on Automatic Control and Soft Computing



The organizing committee is pleased to invite you to participate in 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.

Technical co-sponsors: IFAC (International Federation of Automatic Control) and APCA (Portuguese Association of Automatic Control).
The proceedings will be published by Springer.

Organizers:
NOVA School of Science and Technology | FCT NOVA, APCA – Portuguese Association of Automatic Control, UNINOVA – CTS (Centre of Technology and Systems)

https://controlo2022.deec.fct.unl.pt/

Special Session Proposal: **January 4, 2022**

Paper Submission: **January 15, 2022**

Notification: **March 1, 2022**

Conference: **July 6-8, 2022**

CTS ACTION PLAN

Professor Luís Camarinha Matos was re-elected for a second mandate as director of CTS. This mandate will be guided by the following plan of action:

A. PLAN FOR CONTINUED SCIENTIFIC EXCELLENCE

- **Prepare for next evaluation by FCT.IP**
  This is a critical task right in the beginning of the next period. As always, this "moment" requires a profound introspection of "what we are". The goal should be to keep the classification of Excellent.

  Action 01: *Prepare reports and all components for the next evaluation (2022)*

- **Keeping / refining excellence targets**
  In a time of more complex societal challenges and increasing competition in the academic world, it is fundamental to refine and update objectives and their assessment indicators in order to affirm CTS as a center of excellence.

  Action 02: *Update and refine target objectives and indicators for scientific excellence.*

- **Leveraging best results**
  Many relevant research results ("diamonds") of CTS get lost just because the final stages of "polishing" are not done. This needs a change of culture.

  Action 03: *Promote the identification of potential "brute diamonds" in CTS research results and a culture to analyze them critically, reflect on the achievements, assess, generalize, and formalize new (emerging) knowledge (a kind of "research consolidation actions").*

- **Increase internal collaboration**
  For a long period, all CTS activities were carried out mostly inside "closed groups", with very little interaction with other "groups" (with a few exceptions). In the last period there was some increment in the "inter-group" collaborations. Some financial incentives at the level of budget allocation might have contributed a bit to this. The initiative "**CTS seminars**" started in 2021 also contribute to increase internal awareness of what each area is doing and thus facilitate the dentification of potential collaboration possibilities. This effort needs to be increased, although it requires a cultural change.

  Action 04: *Continue "CTS seminars" and create further incentives for internal collaboration.*

- **Forecasting trends / roadmapping**
  A dynamic research center needs to keep a renewed research agenda, accompanied by a continuous forecasting of trends and challenges, and periodic revision of strategic goals. Traditionally, this exercise is done inside small groups, but as a center it is only done when preparing for the periodic evaluation by FCT.IP. This is clearly insufficient and risks "sailing with the fashion waves" without well-defined targets.

  Action 05: *Promote a strategic research roadmapping exercise.*

B. PLAN FOR A RENEWED ORGANIZATIONAL AND GOVERNANCE STRUCTURE

- **What we have achieved and learned**
  Often, we discuss the organizational weaknesses of CTS. Some changes were initiated in the last period, but not all of them succeeded. Lack of secretarial support is chronic. The demographic structure also has an impact. Thus, a reflection is necessary.

  Action 06: *Elaborate a diagnosis of the organizational and governance structure of CTS.*

- **New organizational and governance structures**
  Based on the previous reflection and diagnosis, new organizational and governance structures that cope with the "ecosystem" nature of CTS and the availability of people shall be experimented. This shall also take into account potential extension with the incorporation of new "branches" (e.g., the application of COPELABS to join CTS, similar to the "branch" of ISEL).

  Action 07: *Promote new organizational and governance structures that better fit available resources and time availability (e.g., separating executive and strategic planning roles).*

- **Implementation of RRI policies**
  Having a system of ethical governance and compliance with the Responsible Research and Innovation (RRI) principles is nowadays recognized as a must to generate credibility and reliability/trustworthiness in our activities. We promised some steps in this direction on the last evaluation by FCT.IP. It is urgent to implement them.

  Action 08: *Promote and implement research ethics and RRI policies in alignment with European guidelines.*

- **Revise regulations**
  Internal regulations of CTS have not been updated for many years, to the point that they were even "lost", and recent governance has been solely based on "traditions" and the contract with FCT.IP. Like the other research centers, it is necessary to prepare an updated version of the regulations.

  Action 09: *Prepare updated internal regulations.*

- **Interaction with other entities**
  Being CTS a research and innovation ecosystem, it is necessary to organize and improve the interactions with multiple surrounding entities, namely the "employers" of CTS members, the funding agencies and policy makers, LASI (Associated Lab, in which CTS is now included), CoLabs, etc. Good success was achieved in many fronts thanks to the dedication of a few members, being now necessary to improve mechanisms and extend involvement of other members.

  Action 10: *Organize the interaction processes and promote the internal information flows.*

C. PLAN TO IMPROVE SOCIETAL INTERACTION

- **Interaction with Advisory Board**
  Although we have updated the list of members of the external advisory board, namely due to the COVID pandemic we have not been able to organize any interaction with them in the last years. Considering the approaching evaluation by FCT.IP, it is urgent to re-establish contact with this Board, as a report will be needed for the evaluation.

  Action 11: *Re-establish contact with the External Advisory Board and plan some joint action.*

- **Communication & dissemination**
  The various "groups" of CTS have performed a large number of dissemination actions but it is necessary to improve / increase the **joint** communication and dissemination in order to increase the visibility of the center as a whole. Internally, the **Newsletter** and the series of **seminars** have revealed to be a good instrument and should continue.

  Action 12: *Definition of a strategy for joint communication and dissemination; continuation of Newsletter and seminars.*

- **High-level training**
  The role of PhD students is fundamental for the research activities carried out in CTS. To a lesser extent, but also important in some cases, are the MSc theses.

  Action 13: *Continue supporting the work of PhD and MSc students.*

- **Opportunities for all researchers**
  Although to remain competitive CTS needs to keep demanding quality and productivity standards, it is important to help those researchers that at certain periods might have more difficulties. In this way, CTS could more effectively contribute to help its members improve their careers.

  Action 14: *Promote a mentoring program (by the most well-succeed researchers) to help the careers of those facing some difficulties at certain point. Additionally, structure and organize a solid post-doc program to help early-stage researchers.*

- **Impact creation**
  In addition to the scientific impact, which can be assessed by well-known indicators, it is necessary to organize and assess the process of societal impact, namely the contribution to the sustainability objectives.

  Action 15: *Continue promoting high-scientific impact. Elaborate a systematic system for societal impact creation and its assessment.*

Naturally, this plan of action can only succeed with the contribution of all CTS members. We have the potential.

Season Greetings !
Merry Christmas and
Happy New Year !

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