Center of Technology and Systems

NEWSLETTER

October 2022

New Academic Year

We are at the beginning of a new academic year. After the summer vacation period, this is a typical time to launch new initiatives and also to take a reflective look at previous results.

On this occasion it is important to reflect on important questions:

- Have we achieved the goals set for the previous period?
- What tangible scientific achievements have we contributed? Can we identify at least one or two fundamental research (low TRLs) achievements?
- Did we spend enough time on real research or was most of it devoted to engineering development? Or even bureaucracy?
- Considering our involvement in projects, were we able to reserve a reasonable slot of time for foundational research within these projects or were we totally absorbed with the development activities and bureaucracy associated with the project? Can we identify one or two truly scientifically significant results from each project?
- What impact-creating results did we achieved? What kind of impact? Scientific, societal problem solving, policy-oriented?
- Are our activities aligned with the strategic goals of the center? Namely to contribute to the scientific deepening of the area of cognitive cyber-physical systems? Do we have a clear focus?
- Are our activities aligned with the goal of pursuing interdisciplinarity and increasing collaboration with other areas of expertise within the center?
- Have our activities been fully governed by the principles of ethical and responsible research? Can we identify any aspects to improve?

After the long period of restrictions due to COVID, we are starting a new phase, primarily with in-person activities. This is an excellent opportunity to review our practices and our goals. We have gained new experiences in this period, notably of remote online collaboration. It is now important to explore hybrid solutions, which will certainly open up new opportunities.

We are also reaching the period of reporting results to FCT. Let us take this opportunity to define a set of ambitious goals for the next period where we put our energies into producing scientific results relevant to the area of cognitive and collaborative cyber-physical systems, with a focus on human-centered and socially relevant systems. Let us also make a more committed effort to strengthen internal collaboration and strive for excellence. Let's keep the focus and the scientific ambition! Through collaboration and with an aligned focus we can achieve a lot. Alone, each one may feel like the "emperor of the Berlengas", but then we leave no legacy. Let's start a real "new year"!

Luis Camarinha-Matos
Director of CTS

Editorial

The first article of this newsletter reminds us that we have entered a new post-pandemic phase with new challenges, namely, in terms of remote cooperation between researchers.

This collaborative R&D constitutes one of the strongest characteristics of CTS.

The newsletter editorial

João Martins
CTS Communication Officer

CONTENTS

R&D Projects

New ESA Project

CTS at UNINOVA Institute, recently won a large ESA project, together with ALTER TECHNOLOGY TÜV NORD S.A.U (ATN) and Alter Technology TUV Nord UK Limited (ATG UK), in response to an ESA Invitation-to-Tender "High-Speed High-Resolution QUAD-ADC for Science Instruments" (AO/1-11245/22/NL/CRS).

High-Speed and High-Resolution ADCs are key components for scientific payloads, especially for multi-channel instruments with challenging requirements regarding thermal stability, power consumption, electronic noise, volume, and mass such as the LISA mission. In particular, the LISA phasemeter requires a large number of channels and respective ADCs.

The usage of this 4-channel, 14-bit, 80 MS/s ADC would lead to an estimated reduction of power and mass of the LISA payload by 40 W respectively 12 kg compared to the existing single-channel options and greatly simplify the already complex phasemeter design. Additionally, this QUAD-ADC is a very generic component that will be available and useful for many other payloads.

The project started on the 10th. of October 2022, it has a duration of 18 months and an associated budget of 700 k€.

Team: João Goes, Nuno Paulino, Luis Oliveira, and João Pedro Oliveira.

ASER-Meta

The FCT has recently approved the project ASER-Meta: Optical switch based on an electrically reconfigurable amorphous silicon metamaterial, with a budget of 50.000€. The group of ISEL is the proponent entity, with Professor Alessandro Fantoni as the responsible researcher.

The project is presented as a multidisciplinary proposal, involving skills in photonics, nanotechnology, electronics, and computer science. The project's goal is to realize a prototype of a 2x4 reconfigurable optical switch, electrically controlled by an FPGA module. The resulting prototype is to be considered as a proof of concept for an active matrix MOS approach to control the behavior of an amorphous silicon MMI structure, where the refractive index of the semiconductor is a voltage controlled as a reconfigurable switched meta-material. A matrix configuration of an array of these switches would allow, for example, the fabrication of an optical tensor-core element, for use in GPU hardware, paving the way for a full optical layer in hardware dedicated to deep learning tasks, with potential for large-scale commercialization in upcoming future Virtual Reality applications.

PI: Alessandro Fantoni

Publication Highlights

Collaboration with PETSys Electronics

From this collaboration of CTS researchers with the company PETSys Electronics resulted an important communication at ESSCIRC, 19-22 Sep 2022, Milan, Italy:

A Full Current-Mode Timing Circuit with Dark Noise Suppression for the CERN CMS Experiment

Edgar Albuquerque, Ricardo Bugalho, Luis Oliveira, Tahereh Niknejad, Jose Silva, Alessio Boletti, João Varela

In this paper we present an analog circuit for the new MIP Timing Detector of the CMS experiment at CERN, featuring, for the first time, a silicon implementation of the Differential Leading Edge Discriminating technique to suppress SiPM dark noise. This technique also stabilizes the baseline, leading to a time resolution of 25 ps at beginning of life and 55 ps at end of life while dissipating less than 4 mW. The full analog front-end ASIC has 32 channels and has been designed in a CMOS 130 nm technology with a total die area of 8.5 x 5.2 mm2. The radiation tolerance of this design has been confirmed by radiation tests.

IFIP 60 years

IFIP — the International Federation for Information Processing —was founded in 1960 following the first World Computer Congress, and under the auspices of UNESCO. Soon after IFIP was founded, it established Technical Committees (TCs) and related Working Groups (WGs) to foster exchange and development with regard to the scientific and technical aspects of information processing.

As part of the commemoration of its 60th anniversary, IFIP published a book with invited contributions from its technical committees and working groups. https://link.springer.com/book/10.1007/978-3-030-81701-5

The Director of CTS co-authored one of these contributions:

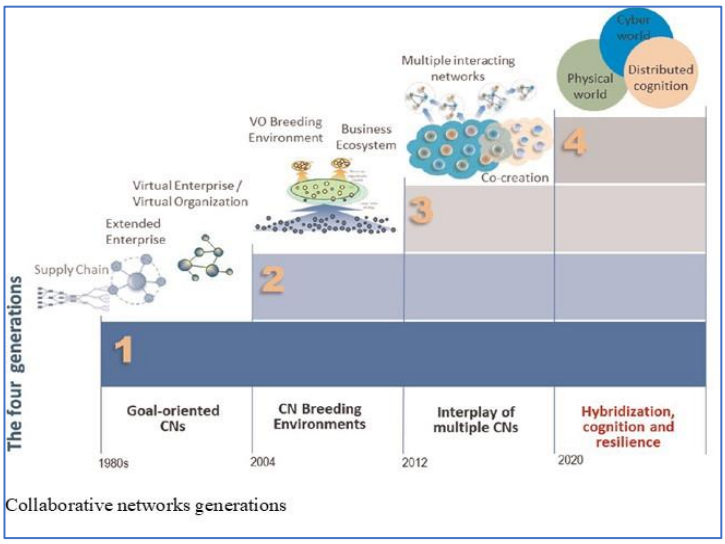
The Evolution Path to Collaborative Networks 4.0
Luis M. Camarinha-Matos, Hamideh Afsarmanesh

The last two decades have witnessed considerable boost in emergence of a networked society, reflecting the increasing growth in hyper-connectivity among the organizations, people, smart machines, and intelligent systems. This trend was enabled by advances in ICT and more specifically in computer networking. In this context, new forms of coworking and collaboration in networks, composed of distributed, autonomous, and heterogeneous entities have emerged, which first led to the formation of Collaborative Networks (CN) as a new discipline, and then followed by series of milestones leading to its gradual evolution.

Nowadays CNs play a key role in the ongoing process of digital transformation in industry and services. Although it is relatively young, a number of "generations" can be identified through the last decades for the CN discipline. We are now at the beginning of what can be identified as the Collaborative Networks 4.0, characterized by features such as: hybridization in CNs, collaboration between humans and intelligent autonomous systems, collaborative distributed cognitive systems, reflecting on collaborative accountability, handling ethics and coping with risks and disruptions faced in CNs, managing large amounts of collaborative data, monetization of collaboration, creating a collaboration culture, supporting collaboration creativity, handling mass collaboration, and supporting collaborative value creation through new business models, among others.

The IFIP WG 5.5, through its annual conference the PRO-VE has played a determinant role, along these two decades. It has contributed to shaping, promoting, and extending the CN research and development community and its practices; thus, consolidating this area, and identifying and introducing new directions and preserving it as an active research agenda.

This chapter aims to give an overview of the various types of CNs, a summary of current developments in the area, and a panorama of their evolution, and emerging directions and challenges.

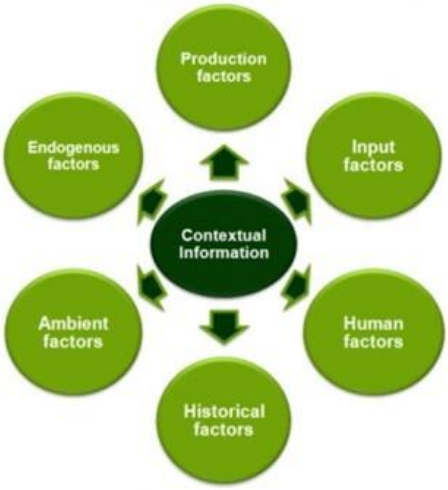


Collaborative networks generations

Decision Support Systems in the overall improvement of energy efficiency

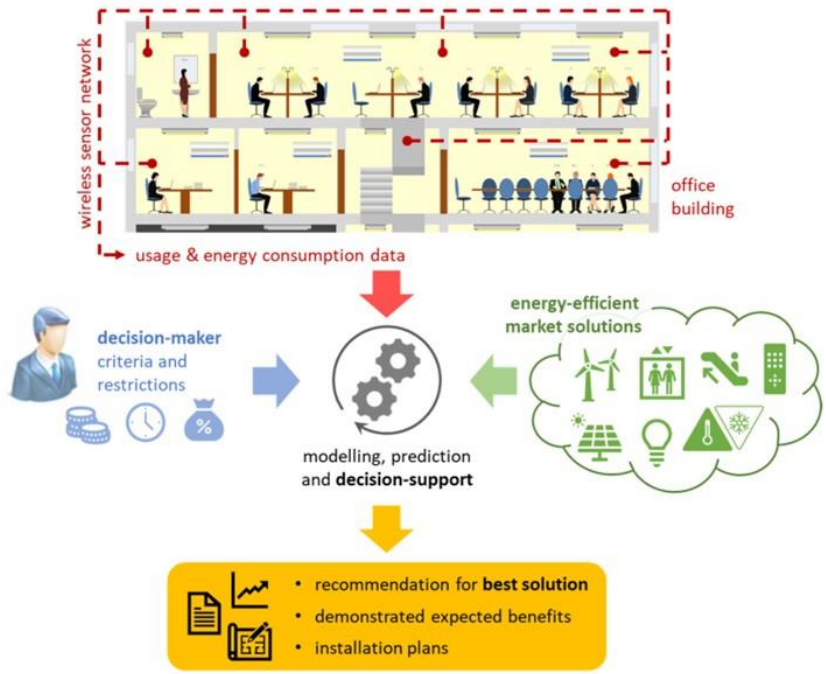
Global energy consumption has been steadily increasing and is expected to continue to do so in the coming decades. In this context of growing demand, the balance between consumption and production can only be achieved in two ways: (i) by increasing production, or (ii) by reducing the amount of energy consumed in processes already in operation, i.e., by eliminating superfluous consumption and/or increasing the energy efficiency of these processes.

Increasing production has been the primary way of responding to maintaining this balance. However, we should look at energy savings like an alternative way of producing energy and, in that sense, as the most sustainable source of energy. There is a large number of technical publications dedicated to improving energy efficiency in different sectors of economic activity, namely in manufacturing and buildings, and this task has been carried out by companies and citizens over the last few decades. However, there is a considerable untapped portion of the energy efficiency potential that depends on the specific context of the processes.



Two recent publications from CTS [1,2] address the use of Decision Support Systems to help explore this untapped potential in manufacturing and building industry sectors, both tested in real business cases.

The first one explores the influence of context, i.e., indirect and plant-specific factors, around the **manufacturing process** on energy consumption. By creating awareness of this influence in a quantified way, it is possible, via a structured decision support process, to find opportunities and derive solutions to improve energy performance. This article introduces a method developed in the scope of the LifeSaver project, which is based on the visualization of energy consumption data against benchmark/average values. The overall approach is supported by a software platform which offers a set of functionalities covering the complete approach, from the detection of the consumption pattern to the implementation of improvement solutions. Two aspects are explored in particular: the influence of the human factor on the energy performance; and finding opportunities on the selection of the plant operation point, and its impact on peak load management.



The second one targets the influence of the human factor in the energy efficiency potential of **building retrofitting processes**. This influence happens at two different levels: the actual building usage by its occupants; and the investor's expectations regarding the return on investment. The approach assumes that it is possible to improve the predictability of the post-retrofit scenario, both in energy and financial terms, using data gathered on how a building is being used. Simulation is used to estimate the impact of available energy-efficient solutions on future energy consumption, using actual usage data, collected by a wireless sensor network. The energy simulation of several alternative retrofit scenarios is then the basis for the decision support process to help the investor directing the financial resources. The overall process is supported by a software platform developed in the scope of the EnPROVE project.

Rui Neves-Silva & Luis M. Camarinha-Matos

[1] Neves-Silva, R.; Camarinha-Matos, L.M. Context-Based Decision Support System for Energy Efficiency in Industrial Plants. Sustainability 2022, 14, 3885. https://doi.org/10.3390/su14073885

[2] Neves-Silva, R.; Camarinha-Matos, L.M. Simulation-Based Decision Support System for Energy Efficiency in Buildings Retrofitting. Sustainability 2022, 14, 12216. https://doi.org/10.3390/su141912216

New book: Optimization Methodologies for the Automatic Design of Switched-Capacitor Filter Circuits for IoT Applications

Hugo Serra, Rui Santos-Tavares, Nuno Paulino

This book discusses the design of switched-capacitor filters in deep-submicron CMOS technologies. The authors describe several topologies for switched-capacitor filter circuits that do not require high-gain high-bandwidth amplifiers. Readers will also learn two analysis methodologies that can be implemented efficiently in software and integrated into optimization environments for the automation of design for switched-capacitor filters. Although the optimization examples discussed utilize low gain amplifiers, the demonstrated methodologies can also be used for conventional, high-gain high-bandwidth amplifiers.

- Enables design of switched-capacitor filters using low gain amplifiers to simplify implementation in advanced CMOS;
- Demonstrates fast and accurate analysis methodologies for switched-capacitor filters;
- Includes several analysis and optimization examples, validated through electrical simulations.

https://link.springer.com/book/10.1007/978-3-031-04184-6#about-this-book

Most cited authors - "World's Top 2% Scientists list"

CTS is proud to have 4 of its integrated members in the list of the **top 2% of the world's most highly cited scientists**, in their respective fields: **Luis M. Camarinha-Matos, Luis Gomes, João Martins, Manuel Ortigueira.**

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.
The latest update of this list was published on 4 Oct 2022:
https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/4

Another former member of CTS (now retired), **Rita Ribeiro** also continues in the list.

Awards

Project BioColor

Project **BioColor**, from the Instituto Superior de Engenharia de Lisboa, is the winner of the 1st edition of the Lisbon Polytechnic's ideas contest, ACE Challenge, an initiative integrated in the ACE - Academy of Innovation, Creativity, and Entrepreneurship. Winners are automatically selected to participate in the Born From Knowledge initiative, promoted by the National Innovation Agency. The business ideas presentation session took place on the 13th of July, at the IPL Presidency Services.

BioColor - Arrayed Enhanced Surface Plasmon Resonance for Biosensing Technology was the project presented by Rima Mansour, student of the Master's Degree in Informatics and Multimedia Engineering at ISEL and Caterina Serafinelli, PhD student in Electrical and Computer Engineering at Universidade Nova de Lisboa, developing the research work at the CTS pole at ISEL , which is one of the host institutions. The project involves the development of a detection system capable of determining the risk of air contamination by COVID-19, in closed spaces. The analysis is carried out through a continuous screening of the bioaerosol extracted from the humidity of the air.

This work is being carried out under the supervision of Alessandro Fantoni, Rui Jesus, Manuela Vieira and Elisabete Alegria.

Best paper awards

Best paper at ALLSENSORS 2022

"**Indoor Guidance Services through Visible Light Communication**" Manuela Vieira, Manuel Augusto Vieira, Paula Louro, Alessandro Fantoni, Pedro Vieira, presented at ALLSENSORS 2022, the Seventh International Conference on Advances in Sensors, Actuators, Metering and Sensing, held in Porto, Portugal during June 26 - 30, 2022 has been awarded as one of the top papers.


IARIA

International Academy, Research, and Industry Association

Best Paper Award

Indoor Guidance Services through Visible Light Communication

By

Manuela Vieira, Manuel Augusto Vieira, Paula Louro, Alessandro Fantoni, Pedro Vieira

Presented during ALLSENSORS 2022, The Seventh International Conference on Advances in Sensors, Actuators, Metering and Sensing, held in Porto, Portugal during June 26 - 30, 2022

IARIA Board


PRO-VE 2022 Working Conference on Virtual Enterprises

Student Best Paper Award

Paula Graça and Luis M. Camarinha-Matos

Best paper at PRO-VE 2022

"**Influence of Collaboration in Sustainable Manufacturing Networks**", Paula Graça, Luis M. Camarinha-Matos, Student Best paper award at PRO-VE 2022 – 23rd IFIP Working Conference on Virtual Enterprises, Lisbon, Portugal, 19-21 Sep 2022.

2020 Educational Award from Edmund Scientific

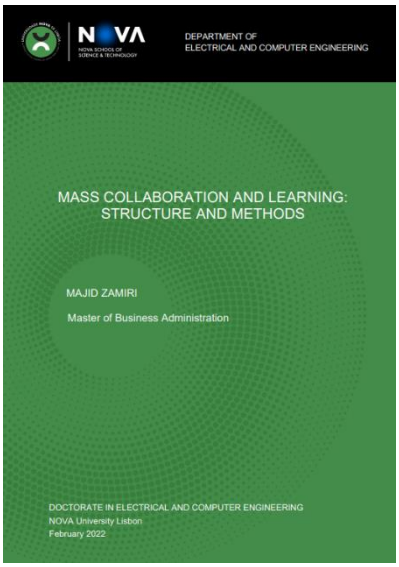
Paulo Lourenco was awarded the bronze 2020 Educational Award from Edmund Scientific, for the development of a point-of-care detection platform prototype for acute kidney injury, based on a photonic integrated circuit containing an array of interferometric plasmonic sensors. At the ISEL photonics laboratory, Paulo Lourenço received the award from Edmund Scientific and showed the facilities of the group to the company staff. This event took place in September 2022 instead of 2020 due to covid outbreak restrictions on travel and social contact.

APCA

Luis Brito Palma, member of CTS, was elected President of the Portuguese Society of Automatic Control (APCA) for the period 2023-2024. Congratulations!
APCA is a scientific and technical association, of a private nature, not for profit, founded on December 5, 1994, whose objective is **to promote and stimulate teaching,** a **scientific research** and **technological development** in the area of **automatic control and instrumentation** in Portugal. https://apca.pt/?lang=en

PhD Defense

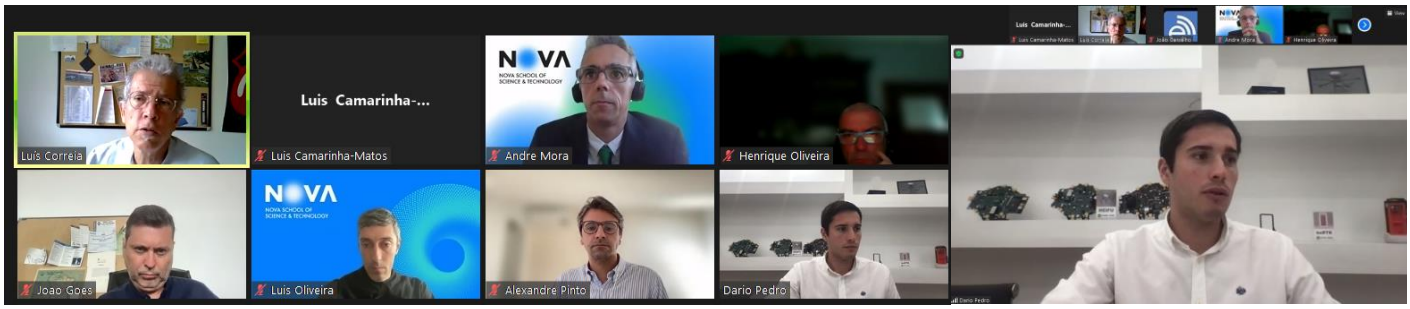
Thesis: **Mass Collaboration and Learning: Structure and Methods**
PhD Candidate: Majid Zamiri
Supervisors: Prof. Luis M. Camarinha-Matos
NOVA School of Science and Technology, 7 July 2022



The rapid emergence of social networks and collaborative communities supported by the Internet and associated innovative technologies, and the increasing demand for continuous improvement and fostering life-long learning have led to unprecedented waves of novelty in the ways people create and share knowledge in different spheres. In this regard, mass collaboration (MC) through Internet-based solutions has opened new windows of opportunity to collaborate massively and learn collectively in ways that seemed impossible even a few decades ago. Learning ecosystems can benefit from mass collaboration where large numbers of minds collectively drive intellectual efforts to learn in the form of knowledge building and sharing. Mass collaborative learning (MCL) is a new paradigm that represents a significant shift away from the traditional teacher-centered approach towards a self-directed model in virtual communities in which contributing members take on creative roles to maximize their learning and that of their peers. Furthermore, MCL provides greater opportunities for distributed contributors to engage in virtual global learning and take the advantage of powerful social communities of experts and counterparts. Even though MCL opens up an apparently limitless field for promoting social inclusion in effective learning, not all aspects, features, and characteristics of this phenomenon are quite clear and discovered at present. In order to design, implement, and exploit such a learning approach, influencing constituents should be identified, and appropriate conditions need to be provided. However, existing literature offers limited information, guidance, and support towards the creation, operation, coordination, and development of MCL initiatives. In this context, there are a number of identified critical issues, specific problems, gaps, and inconsistencies, and this thesis is correspondingly conducted to propose a Meta-Governance framework for MCL initiatives (MGF-MCL). This framework, by benefiting from various other related ideas, models, and methods, tries to give further insights into an integrated perspective of the most complex concerning issues and also some internal and external aspects of xii governance for the MCL initiatives. Furthermore, the MGF-MCL intends to provide some directions, guidance, and support for the implementation, operation, and development of MCL initiatives. In this thesis work, in order to (a) guide our research endeavor, (b) concretize our research design, (c) design, develop, validate, and apply the MGF-MCL, and (d) understand the practical value of our findings, we have followed the design science research process (DSRP) approach. We have evaluated the validity and applicability of the MGF-MCL through a mix of methods namely, case studies in EU projects, peer-review publication and, an MCL illustration case. A number of scenarios made within the case studies have brought together several industry and academic experts to evaluate the validity and applicability of MGF-MCL. The peer reviews of contributed publications also assessed the quality of the work and helped to establish the validity of MGF-MCL based on the expert knowledge of other researchers. The MCL illustration case provided empirical evidence, relying on observation and experimentation. In terms of research, the findings of our work offer direction and support towards the creation, operation, and implementation of MLC initiatives.

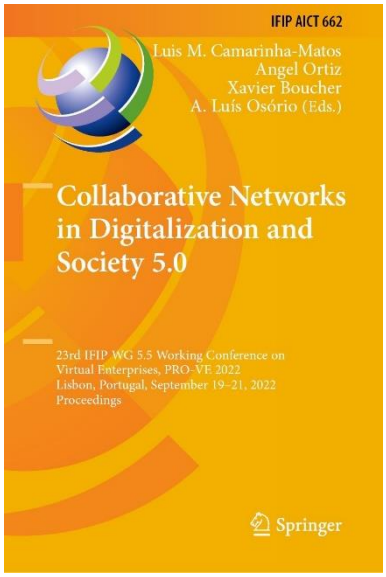
Thesis: **Collision avoidance on Unmanned Aerial Vehicles using Deep Neural Networks**
PhD Candidate: Dário Filipe Romana Pedro
Supervisors: Prof. André Damas Mora, Prof. José Manuel Fonseca
NOVA School of Science and Technology, 18 July 2022

Unmanned Aerial Vehicles (UAVs), although hardly a new technology, have recently gained a prominent role in many industries, being widely used not only among enthusiastic consumers but also in high demanding professional situations, and will have a massive societal impact over the coming years. However, the operation of UAVs is full of serious safety risks, such as collisions with dynamic obstacles (birds, other UAVs, or randomly thrown objects). These collision scenarios are complex to analyze in real-time, sometimes being computationally impossible to solve with existing State of the Art (SoA) algorithms, making the use of UAVs an operational hazard and therefore significantly reducing their commercial applicability in urban environments. In this work, a conceptual framework for both stand-alone and swarm (networked) UAVs is introduced, focusing on the architectural requirements of the collision avoidance subsystem to achieve acceptable levels of safety and reliability. First, the SoA principles for collision avoidance against stationary objects are reviewed. Afterward, a novel image processing approach that uses deep learning and optical flow is presented. This approach is capable of detecting and generating escape trajectories against potential collisions with dynamic objects. Finally, novel models and algorithms combinations were tested, providing a new approach for the collision avoidance of UAVs using Deep Neural Networks.
The feasibility of the proposed approach was demonstrated through experimental tests using a UAV, created from scratch using the framework developed.



RECENT EVENTS

PRO-VE 2022



23rd IFIP/Socolnet WG 5.5 Working Conference on Virtual Enterprises,
Lisbon, Portugal, September 19–21, 2022
With organizational co-sponsorship of CTS, the 23rd edition of PRO-VE was successfully held in Lisbon, 19-21 Sep 2022. The conference attracted around 90 participants from 20 countries. Although planned as a hybrid event, except for 2 or 3 participants, the absolute majority was on site, which allowed very lively discussions and exchanges of experiences.
The widespread digital transformation in industry and services is strongly enabled by the results achieved through more than two decades of research and development in the inter-disciplinary collaborative networks (CNs) area. The paradigm of Society 5.0, recently established, is rapidly gaining importance and awareness as a disruptive concept for most economic sectors. This 5.0 paradigm is having a direct impact on organizations, affecting their journey towards digital transformation, innovative working environments, and new organizational modes. The term "digitalization" still represents a major ongoing transformation in industry and services. 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.

Beyond Industry 5.0, this multi-dimensional perspective affects many other activity sectors. In all these fields, the integration of resilience, human factors, and sustainability represents the key challenge, leading to the development of Health 5.0, Agriculture 5.0, Cities 5.0, Logistics 5.0, Education 5.0, or even Tourism 5.0. The notion of Society 5.0 represents a comprehensive strategy on science, technology, and innovation aiming at a people-centric super-smart society. With an eye on these diverse application fields, PRO-VE 2022 provided a forum for sharing experiences, discussing trends, and identifying new opportunities together with innovative solutions to cope with challenges ahead towards a collaborative Society 5.0.

The program included 6 papers from CTS members and participation of CTS researchers in two panels. The CTS Director was the Program Chair of the conference. The Program Committee included 5 other members of CTS.

http://www.pro-ve.org

IFIP IoT 2022 - 5th IFIP International Cross-Domain Conference on Internet of Things

Amsterdam, The Netherlands, October 27–28, 2022

The program of the conference includes 4 papers from CTS members. The CTS Director is Program Chair of the conference. The Program also includes a special session on “Cybersecurity and IoT”, organized by 4 other members of CTS.

https://ifip-iotconference.org/index.html

VISITORS

An academic-industrial delegation from SENAI Santa Catarina, Brazil, visited NOVA School of Science and Technology and CTS on 3 Oct 2023.

The Director of CTS made a presentation of the center to the delegation and discussed different possibilities of collaboration.

DoCEIS 2023

The Advanced Doctoral Conference on Computing, Electrical and Industrial Systems is celebrating its 14th edition (DoCEIS 2023) with a focus on **Technological Innovation for Connected Cyber Physical Spaces**.

Due to the uncertainties related to the evolution of Covid-19 we consider the possibility of a hybrid event allowing remote participation only for those participants that are not legally allowed to travel.

We increasingly live in environments that connect physical and cyber spaces. Digital technologies have been boosting the integration and intertwining of these spaces with profound impact in all sectors of society including industry, energy, healthcare, services, etc. These include a large variety of technologies, e.g., Internet of Things, Cyber-Physical Systems, Sensing, Data Analytics and Machine Learning, Human-Machine Interfaces, Energy Harvesting, Smart Communications, among others. As systems become smarter, with increasing levels of cognition and autonomy there is a growing need to properly design and govern innovative collaborative environments populated by heterogeneous intelligent systems oriented to solve societal problems with a human-centric perspective. We invite potential authors to present their research contributions to this area and to discuss and learn from other experts at this edition of the DoCEIS conference.

DoCEIS 2023 will target Technological Innovation for Connected Cyber Physical Spaces, 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). Best papers will be considered for possible inclusion in a special journal issue.

DoCEIS 2023 is co-sponsored by CTS.

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

Submission of abstract:	**4 Feb. 2023**
Submission of full paper:	**4 Mar. 2023**
Notification of authors:	**17 Apr. 2023**
Submission of camera ready:	**28 Apr. 2023**

IFAC World Congress

The 22nd IFAC World Congress will be held in Yokohama, Japan, in July (9-14) 2023. One of the tracks, chaired by a CTS member (Paulo Gil), is intitled "**Machine Learning Techniques in Predictive Maintenance**".

Recent advances in manufacturing have been driven by the so-called Industry 4.0 paradigm and a model of production centred around the concept of circular economy. These two driving forces, altogether, have fostered the integration between physical and digital environments and people. As a result, large amounts of data containing information about the underlying processes, such as physical variables, states, and alarms, just to name out a few, are collected in a distributed way and shared among different players and devices.

Once data are available, relevant information about systems' status can be extracted by applying data-driven approaches, namely, Machine Learning (ML) techniques.

Given their inherent features, ML-based methodologies have been widely considered in condition-based maintenance (CBM) problems, aiming to guarantee and improve the availability of manufacturing systems and targeted throughputs, while reducing maintenance costs and promoting sustainability.

Knowing the health condition status of a set of components of a given system is invaluable to support optimal scheduling of Predictive Maintenance (PdM) tasks. This Special Session/Track intends to bring together researchers, engineers, and practitioner communities, to present and discuss the latest advances and challenges on ML-based PdM, with focus on data gathering, data processing and decision-making, including but not restricted to:

- Architectures for PdM
- Algorithms for PdM
- Sensing and cyber physical systems in PdM
- Condition monitoring
- Fault detection, prognosis, and Remaining Useful Life (RUL) estimation
- Maintenance as a service and reliable manufacturing
- Industry applications and case studies

https://www.ifac2023.org/submission/open-invited-track-list/#Machine-Learning%20Techniques%20in%20Predictive%20Maintenance

PETRI NETS 2023

With the organizational co-sponsorship of CTS, the 44th Annual International Petri Nets Conference will be organized in Lisbon, Portugal, 25-30 Jun 2023.

This conference series is the annual event for the Petri nets community and returns to Lisbon area twenty-five years after its first visit, which was also organized by CTS researchers.

Other than the main conference, where original research on application or theory of Petri nets will be presented, as well as contributions addressing topics relevant to the general field of distributed and concurrent systems or focused on applications of

concurrency to systems design, several workshops are planned. It is also possible to arrange Meetings and Courses related to Petri Nets.
The annual "Petri net Course" will occur from 25 to 27 June. It offers a thorough introduction to Petri nets in four half-day modules on Sunday 25 and Monday 26, and a full-day tutorial module on Tuesday 27. For successful participation in the entire course, including preparation and examination, three credit points (ECTS) will be awarded.
Following current practice in this conference series, several tutorials and a session on tools demos will occur on Wednesday 28.
The language of the conference is English, and its proceedings will be published by Springer-Verlag in Lecture Notes in Computer Science.

Website: https://petrinets2023.github.io/

ESSDERC / ESSCIRC 2023

CTS at UNINOVA Institute and NOVA School of Science and Technology, together with the University of Seville and the Institute of Microelectronics of Seville (IMSE-CNM), will be the main (Iberian) organizers of the IEEE 49th European Solid-State Circuits (ESSCIRC) and 53rd European Solid-State Devices Research (ESSDERC) joint Conference (ESSxxRC'23). This flagship European event will be mainly focused on the thematic "Semiconductors for an Electric and Digital World" and it will occur during September 11th-14th 2023.
Student papers are welcome. A special student session will be organized by ESSxxRC in 2023. The venue of the conference events, including workshops and tutorials, will be in Lisbon Congress Center (CCL). The Congress Center is located close to the river Tagus and the historical and cultural heritage of Belem, just a few minutes from the city center, in a prime area with a vast transport supply.
The aim of ESSCIRC and ESSDERC is to provide an annual European forum for the presentation and discussion of recent advances in solid-state devices and circuits. The level of integration for system-on-chip design is rapidly increasing. This is made available by advances in

semiconductor technology. Therefore, more than ever before, a deeper interaction among technologists, device experts, IC designers, system designers, MSc and PhD students in micro-and-nano electronics is of paramount importance.
Last but not the least, the recent health and supply crisis have demonstrated the importance of the Semiconductor sector for the EU Societal needs and Industrial base. The idea that their supply chain is just a commodity has finally shown its limit in case of major political or economic difficulties. However, the idea of a complete national or European autonomy in the electronics sector would have unbearable costs. The EU Chip Act is a response by the EU Commission and Member States to the current situation. This hot topic will be widely addressed during the ESSxxRC'23 Conference.
More info in: https://www.esscirc-essderc2023.org

Celebration of the Day of Photonics

The Day of Photonics is celebrated every year on the 21st October. On 21 October 1983, the General Conference of Weights And Measures adopted the value of 299,792.458 km/s for the speed of light. At occasion of the anniversary, every year hundreds of activities are voluntarily organized over more than 30 countries all around the world. The purpose is to promote photonics and inform the public of what are photonics technologies, why they are important and generally support this key enabling technology. The activities encompass all kinds of demonstrations and discussions on the impact of photonics on our day-to-day life.

This year we are going to join the celebration of the Photonics Day through the organization of open laboratory demos of photonic experiments (CTS group at ISEL), covering different topics from fundamental experiments with light to more advanced setups demonstrating applied technologies, such as optical biosensors and visible light communication.

Valencia, Spain – 27-29 Sep 2023

Resilient and Responsible Collaborative Networks

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CTS - Center for Technology and Systems
Campus FCT NOVA, 2829-516 Caparica, Portugal
http://www.cts.uninova.pt
Director: Luis M. Camarinha-Matos

CTS Newsletter is a publication of CTS-UNINOVA

Editorial team: João Martins
João Oliveira | João Rosas

cts_newsletter@uninova.pt