NEWSLETTER

November 2024

Ambition

Striving for excellence should be the guiding ambition of anyone who has chosen an academic or research career. Excellence is not a singular milestone but a continuous journey. It is not something bestowed or handed out—it is earned through persistent hard work, unwavering commitment, and a dedication to advancing knowledge.

A research center needs to continuously pursue Excellence.

While securing funded projects is essential to generating research outcomes, these should not be seen as the ultimate goal. A project that fails to aim for impactful, sound scientific contributions risks being a misuse of valuable (and often public) resources. Your work should aspire to create a lasting legacy, advancing knowledge and making a tangible difference.

Are you building a legacy?

Which legacy achievements can you report from 2024?

Researchers have a responsibility to aim for the highest standards in their work, targeting top-tier publication channels, particularly Q1 journals, where impactful and rigorous research is most recognized. While conferences play a valuable role in fostering idea exchange, disseminating preliminary findings, and networking, the primary focus should remain on publishing in high-quality journals to ensure lasting contributions to the scientific community.

In an era full of predatory journals and conferences, researchers committed to excellence must exercise discernment in selecting reputable, high-quality channels for their work. It is equally crucial to uphold the highest ethical standards, avoiding practices such as "honorary authorship," "fabrication of results", "careless errors", "plagiarism", or "misappropriation". True excellence in research is inseparable from adhering to Responsible Research and Innovation (RRI) principles, ensuring integrity, transparency, and accountability in every aspect of scholarly activity.

Does your name appear as co-author on a paper without you making a genuine contribution?

Authorship is not merely a formality. Being listed as a co-author without contributing undermines the integrity of scientific work and violates ethical guidelines. Responsible research demands that all authors meet established criteria for contribution (e.g. the IEEE criteria for authorship), ensuring that credit is accurately and fairly distributed.

Do you have the ambition?

Luis Camarinha-Matos, Director of CTS

Let's Collaborate for Excellence

Editorial

The winter season often brings a time for reflection and invites us to look back on the accomplishments of the past year. As this is also a time for external evaluation, we find ourselves filled with pride and excitement for the future.

This year has brought several new projects focused on sustainability and leveraging advanced CPS technologies. The BLS-BIOMASS project, funded by ESA, is a perfect example of this dual commitment. By developing innovative methodologies to map belowground biomass density, litter biomass density and shrub biomass density, this project directly addresses climate change monitoring and wildfire prevention, two critical global challenges. This work leverages from previous projects, such as Sentinel, pushing the boundaries of Earth observation.

Beyond BLS-BIOMASS, other initiatives like MaaSAI and Cir4Fun demonstrate CTS commitment to agile manufacturing and circular economy principles within the furniture sector, underscoring contributions to a more sustainable future.

The success of these projects is a direct result of CTS' collaborative efforts. Whether it's the partnership with ISA-Forest Research Centre in the BLS-BIOMASS project or the diverse collaborations within ZDM4MS, which aims to revolutionize multi-stage manufacturing through AI and Digital Twin technology, teamwork is the key for success. CTS is constantly and actively fostering collaborations with other research institutions, industry partners, and government agencies, recognizing that the most impactful innovations often arise from shared expertise and perspectives.

Young scientists like Carlo Fantoni, representing Portugal at MOSTRATEC with his MADS project, exemplify the next generation of innovators we are promoting. Additionally, the selection of the NEFROLIGHT project for the "Caixa Impulse de Inovação em Saúde" showcases the practical applications of our research, making a real-world difference in healthcare.

As we move forward, we remain committed to innovation, collaboration, and addressing the world's most pressing challenges. Upcoming events like DOCEIS 2025, YEF-ECE 2025 and PRO-VE 2025 will provide additional opportunities for collaboration and knowledge sharing. Celebrating its 25th anniversary the PRO-VE community honoured Prof. Luis Camarinha-Matos, CTS director, for his long-term contribution to the field of Collaborative Networks.

João Martins, CTS Communication Officer

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Announcement

16th Advanced Doctoral Conference on Computing, Electrical and Industrial Systems
Caparica, Portugal – 2-4 Jul 2025
http://doceis.dee.fct.unl.pt/

Main theme: **Technological Innovation for AI-powered Cyber-Physical Systems**

Important dates:
- Abstract submission: 1 Feb 2025
- Full paper submission: 1 Mar 2025
- Acceptance notification: 14 Apr 2025
- Camera ready submission: 24 Apr 2025

YEF-ECE 2025
9th Young Engineers Forum on Electrical and Computer Engineering
4 Jul 2025   https://yef-ece.deec.fct.unl.pt/

BLS-BIOMASS

Below, Litter & Shrub BIOMASS density mapping combining optical, LiDAR and SAR Earth Observation data

New project funded by ESA

The main objective of this activity is the development of a novel methodology capable of mapping the Belowground Biomass Density (BGBD), Litter Biomass Density (LBD), and Shrub Biomass Density (SBD) combining Earth Observation (EO) data from the Sentinel and ALOS-2/PALSAR-2 missions. The large-scale mapping of this biomass pools is still not done, as the Aboveground Biomass Density (AGBD), since it usually relies in Airborne Laser Scanning (ALS) campaigns. Despite that the use of the current AGBD large-scale maps as a flagship indicator in the monitoring of climate change effects and carbon cycle dynamics, a more complete analysis can be achieved if the other biomass pools are not neglected. Therefore, an objective this project is the generation of total biomass maps, by integrating the ones here produced with Climate Change Initiative (CCI) Biomass AGBD map. In addition to the support on the climate change monitoring, it is going to provide important information for addressing the problem of wildfires. The biomass pool maps for Portugal and Spain will then be produced, using the proposed methodology, as a demonstration of its applicability. This innovative methodology will include image processing techniques and combine features sets, not commonly used for biomass mapping. The objective of this is to drastically decrease the amount of data needed to calibrate these variables regressors, enabling the use of sparse calibration sets or data from spaceborne LiDAR sensors.

Summing up, the objectives of this project are:

- Develop a machine learning methodology to perform BGBD, LBD, and SBD mapping by combining Sentinel-1, Sentinel-2, and ALOS-2 data;
- Integration with the CCI Biomass product, generating total biomass maps;
- Successfully use GEDI and ICESat-2 as calibration data for the regressors.

This project comes in line with both Research Centres activities that have being developed several projects in the scope of forestry, wildfire prevention, and carbon cycle monitoring. Namely, they recently developed methodologies that combine different EO assets for mapping the forest height, and methods to estimate the BGBD, LBD, and SBD, resorting to data from ALS campaigns.

The consortium is led by CTS/UNINOVA (André Mora, José M. Fonseca and João Pires) and includes a partnership with ISA-Forest Research Centre.

After the conclusion of the project, the methodology will be used to periodically map the biomass pools, for update on the reporting of the carbon cycle dynamics, and as a tool for the civil protection entities responsible for managing forest and wildfire prevention.

André Mora

MaaSAI & Cir4Fun

UNINOVA will start two new projects **MaaSAI** (Agile Manufacturing as a Service through AI Autonomous Agents) and **CIR4FUN** (Advancing European Industrial Sustainability and Competitiveness through Circular Design Strategies, Digital Product Passports, and Sustainable Product-Service Systems in the Furniture Sector), December 2024 and January 2025 respectively.

The goal of the **MaaSAI** project is to create a **MaaSAI** system, which is a comprehensive digital system to automate and facilitate interactions between suppliers of manufacturing systems (Providers) and manufacturing companies (Consumers) in a Manufacturing-as-a-Service (MaaS) ecosystem, in an agile, efficient and transparent manner. The **MaaSAI** System aims to revolutionise manufacturing and remanufacturing processes by facilitating access to flexible and decentralised capacities, through the MaaS business model, that extends the principles of the service-oriented economy to the manufacturing industry. The **MaaSAI** System will be demonstrated in 5 Pilots of European companies from different sectors: metal machining, gears and mechanical power transmission, biomaterials, food processing, and electronics manufacturing.

The **Cir4Fun** Project endeavours to transform the furniture industry by championing circular economy principles across the product life cycle. Through innovative strategies, DPP (Digital Product Passport) and digital solutions supporting mechanisms, it aims to enhance furniture sustainability, eco-labelling, and consumer engagement while aligning with relevant regulations and initiatives. Cir4Fun's approach involves creating a comprehensive circular economy roadmap, defining content for a Furniture DPP, developing circular business models and eco-design guidelines, and establishing new assessment methodologies for maintenance, reparability, refurbishment, remanufacturing and recyclability. All this knowledge will be integrated into a holistic Furniture Assessment System (FAS) that will support the furniture eco-scoring system and DPP. The project outcomes will be implemented and validated in 3 use cases addressing different value chains across Europe and the findings will be widely circulated across the furniture ecosystem in Europe.

José Ferreira

ZDM4MS Project Kick-off

The Centre of Technology and Systems (CTS) is pleased to announce its involvement in a new project titled ZDM4MS (Zero Defect Manufacturing for Multi-Stage systems), led by MUVU Technologies. This two-year initiative, running from October 2024 to September 2026, represents a collaborative effort to address challenges in industrial production by leveraging advanced technologies such as Artificial Intelligence (AI) and Digital Twin systems.

About the Project
The ZDM4MS project focuses on developing an integrated solution for monitoring and controlling multi-stage manufacturing systems. Unlike traditional approaches, which treat multi-stage production as a single system, ZDM4MS aims to identify and address defects at individual stages of the production line. By doing so, it enhances process quality and efficiency while minimizing waste.

Core Features of ZDM4MS
- Multi-Stage Quality Control: The project emphasizes granular monitoring, enabling the identification of variations and defects at each stage of the production process.
- Digital Twin Integration: A digital twin will be developed to mirror the physical production environment, providing real-time data and simulations for predictive and corrective actions.
- AI-Powered Insights: Advanced algorithms will facilitate predictive maintenance and defect detection, optimizing resource utilization and reducing production downtime.
- Sustainability Goals: By reducing waste and improving resource efficiency, the project contributes to achieving environmental sustainability objectives in alignment with the European Union's strategies.

Collaborative Framework
The project is a collaborative endeavour involving UNINOVA. Each partner contributes specialized expertise, from developing predictive algorithms to integrating methodologies that support ZDM principles in industrial environments.

Expected Impact
By addressing the challenges of defect propagation in multi-stage manufacturing, ZDM4MS aims to set new benchmarks in process efficiency and quality. The insights gained from this project will also contribute to broader discussions on integrating emerging technologies into industrial practices, fostering a culture of innovation and sustainability.
This project reinforces CTS's commitment to advancing state-of-the-art solutions that address real-world industrial challenges.

André Rocha

Awards

Best paper award for CTS researchers

HIS 2024:

S. Kalateh, I. Cardoso Oliveira, L. A. Estrada-Jimenez, S. Nikghadam Hojjati and J. Barata, "Emotional Elements in Scientific Publications' Abstracts: An Affective-Centric Experiment," *2024 16th International Conference on Human System Interaction (HSI)*, Paris, France, 2024, pp. 1-8, doi: 10.1109/HSI61632.2024.10613557.

CERTIFICATE

for the second best paper presentation at
THE 16TH INTERNATIONAL CONFERENCE ON
HUMAN SYSTEM INTERACTION, HSI 08—11.07.2024, PARIS

for track 5:
Generative AI & NLP

was attributed to the paper entitled:
Emotional Elements in Scientific Publications' Abstracts:
An Affective-Centric Experiment

by authors:
Sepideh Kalatehseifari, Inês Cardoso Oliveira, Luis Estrada-Jimenez,
Sanaz Nikghadam-Hojjati, Jose Barata

10.07.2024
DATE

PROF. MOUNÍM A. EL-YACOUBI, GENERAL CHAIR
INSTITUT POLYTECHNIQUE DE PARIS

MADS
Young scientist flies to Brazil to represent Portugal at Latin America's largest fair

From October 21 to 25, Brazil will welcome the best young scientists to MOSTRATEC - International Science and Technology Exhibition, the largest science and technology fair in Latin America. The Fundação da Juventude, which represents Portugal in this competition, is taking one of the winning projects from the National Science Exhibition 2024.

Carlo Fantoni, a student at the Faculty of Sciences of the University of Lisbon, accompanied by Professor Luís Fernandes and Alessandro Fantoni, developed MADS - MOBILE ATMOSPHERIC DATA SYSTEM, a system that maps urban areas in terms of atmospheric quality, using the Arduino universe as a starting point.

The project, which began at Camões Secondary School and was developed in the laboratories of the **CTS-ISEL** research center, won a prize in the National Competition for Young Scientists 2024, organized by the Youth Foundation, and will now be presented in New Hamburg and compete with around 800 projects by young scientists from 12 countries. MOSTRATEC is held annually by the Liberato Foundation in the city of Novo Hamburgo in Rio Grande do Sul (Brazil). The event showcases research projects in various areas of human knowledge carried out by young scientists. The 39th edition will attract around 30,000 visitors and participants.

https://www.fjuventude.pt/pt/noticias/fundacao/jovem-cientista-voa-ate-ao-brasil-para-representar-portugal-na-maior-feira-da-america-latina

NEFROLIGHT
Project involving CTS-ISEL, Nova Medical School, Hospital de Setubal, PI: Alessandro Fantoni
Selected for presentation at the final stage of the competition "CaixaImpulse de Inovação em Saúde - Fundação "la Caixa"
NEFROLIGHT is an optoelectronic setup, in a portable configuration, for on-site risk assessment of acute kidney injury (AKI), based on urine screening by a set of photonic techniques supported by a deep learning algorithm.

Alessandro Fantoni

Recent PhD thesis

Thesis: A conceptual framework for an effective technology transfer from research to industry
PhD Candidate: Elsa Maria Marcelino de Jesus
Supervisor: Ricardo Jardim-Gonçalves
FCT-NOVA, 25 Sep 2024

Nowadays, research plays a crucial role in global economic development. However, a significant challenge exists in effectively transferring research outcomes to the industry. Entrepreneurs often lack knowledge about supporting services and methodologies that can help them evaluate, improve, and validate their ideas or products. This lack of awareness may lead to a natural fear that their ideas, products, or services may not be viable, resulting in many research outcomes remaining unknown or untapped. Therefore, there is a need to create an efficient and effective framework that supports the transfer of technology from research to industry, ultimately benefiting the end consumer. In this context, the author contributes to this dissertation with a conceptual framework comprising a set of ideas, studies, guides, and methodologies to assist in the evaluation and validation of implementations and innovations before their launch into a project and the market. It ensures the development of project ideas in alignment with the initial plan, promoting continuous evaluations until a positive result is achieved. This approach facilitates effective exploration and implementation in relation to market needs while maintaining quality in technology transfer. As a result, the proposed framework integrates quantitative and qualitative economic models, learning techniques for project evaluation, and innovation mechanisms. This integration guides the creation, development, evaluation, validation, and exploration of research results efficiently and effectively, facilitating the transfer of technology from research to industry. The goal is to determine the success of the idea, product, or service in the market in advance, generating income for the industry and benefiting research, industry, and the end consumer. The proposed framework components have been successfully demonstrated and validated in various research projects co-financed by the European Commission and the Portuguese government, confirming the validity of all its stages.

PRO-VE 2024
25th IFIP/SOCOLNET Working Conference on Virtual Enterprises
25th Anniversary

Co-sponsored by CTS
Albi, France – 28-20 Oct 2024

Devoted to the theme "**Navigating Unpredictability: Collaborative Networks in Non-linear Worlds**", the conference provided a valuable platform to explore the evolving role of Collaborative Networks in today's VUCA (Volatile, Uncertain, Complex, and Ambiguous) environments.
One of the strong themes was the future of Human-AI collaboration, highlighting the rise of hybrid collaborative networks—a key research direction for the years ahead.

Being co-sponsored by CTS, this edition included several contributions from CTS researchers (9 papers and 1 poster).

Recognition

On this occasion the PRO-VE community honored Prof. Luis Camarinha-Matos, director of CTS, for his long-term contribution to the field of Collaborative Networks.
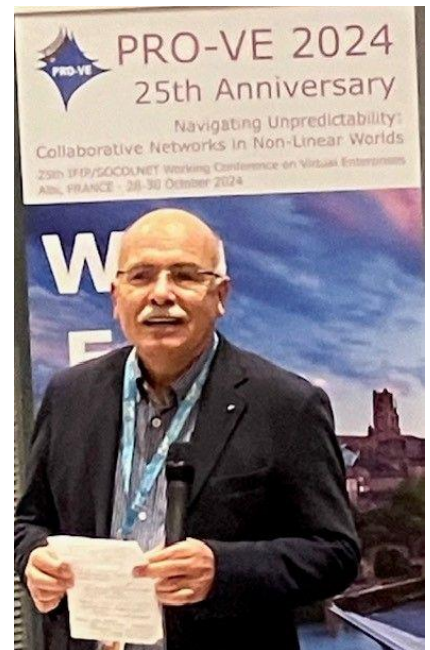
Next edition:

PRO-VE 2025
26th IFIP Working Conference on Virtual
Enterprises
Porto, Portugal – Oct 2025

Hybrid Human-AI Collaborative Networks

https://www.pro-ve.org/