

SMARTNESS Center Concludes First Year with Research Boosting 5G and 6G in Brazil



What is SMARTNESS 2030?

The SMARTNESS 2030 Engineering Research Center is devoted to studying and developing impact research on intelligent networks and services that will shape the future of telecommunications by 2030.

SMARTNESS is headquartered at the School of Electrical and Computer Engineering (FEEC) of the University of Campinas (UNICAMP). It receives funding through an agreement between FAPESP and Ericsson, one of the world's giants in the telecommunications sector. The Center also has the participation of researchers from the University of São Paulo (USP) and the Federal University of São Carlos (UFSCar).

The Center focuses on 5G and 6G technologies, covering the Internet of Senses and solutions for the Internet of Things (IoT), among additional visionary use cases. With a total investment of R\$56 million, the Center aims to position Brazil at the forefront of global technological innovation. Located on the UNICAMP campus, SMARTNESS 2030 promotes collaboration between academia and industry, driving research ranging from advanced network infrastructure to new applications that will transform the digital society. The initiative aims to improve connectivity and explore new technological frontiers that can revolutionize communication and data processing.

The SMARTNESS 2030 Engineering Research Center will also open opportunities for researchers and students, offering postdoctoral programs and promoting collaboration with other research institutions, both national and international. The initiative seeks to accelerate innovation in Latin America and contribute to developing solutions that can be implemented globally.

How did SMARTNESS come about?

In December 2022, the State University of Campinas (UNICAMP) established the SMARTNESS Engineering Research Center in collaboration with the São Paulo Research Foundation (FAPESP) and Ericsson. This cutting-edge research center is dedicated to developing advanced connectivity technologies, positioning Brazil at the forefront of the 6G internet.

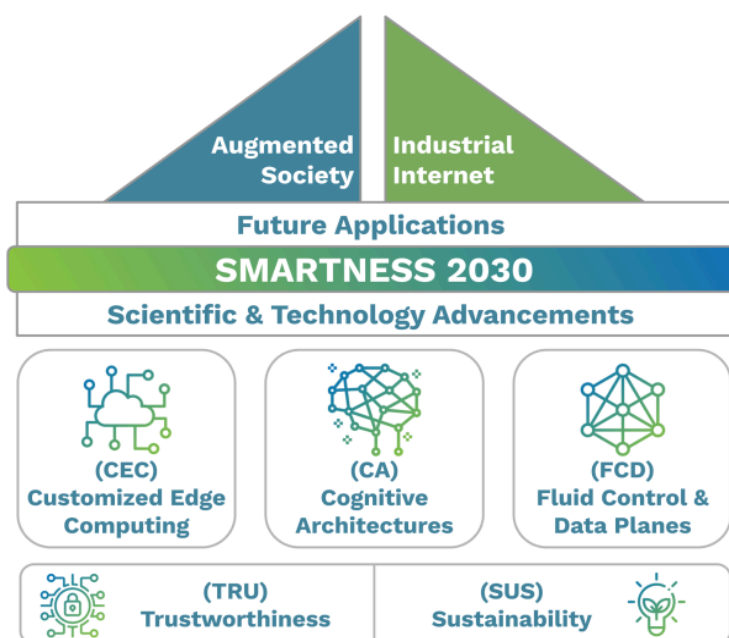
Representatives from UNICAMP, FAPESP, and Ericsson underscored the importance of this Center for Technological Innovation in the country. "The creation of SMARTNESS 2030 is a significant milestone for Brazil, not only for connectivity innovation but also for strengthening the partnership

between academia and industry", said Professor Fábio Luciano Verdi, one of the project coordinators. SMARTNESS involves partnerships with several universities and research centers, such as the State University of São Paulo (USP) and the Federal University of São Carlos (UFSCar) +15 institutions all over Brazil, and multiple international collaborations.

SMARTNESS Beyond the Hype?

The SMARTNESS Engineering Research Center aims to develop cutting-edge research in computer networks and digital application services in strategic areas where scientific and technological impacts can be achieved in collaboration with the cloud and networking research communities. With the deployment of 5G and the 6G system under development, the main challenges are designing and operating cloud computing infrastructures and networks with adequate capabilities to leverage the next generation of Internet services and applications.

In its first 12 months of activity, CPE SMARTNESS has achieved significant milestones in setting up its operations and establishing a series of management and communication workflows. Scientific progress was made through work packages in different lines of research, involving more than 50 researchers and students, supported by FAPESP and FUNCAMP. The center has gained national and international visibility through significant participation in events such as SBRC, IEEE NetSoft, and IEEE/IFIP NOMS, contributing to scientific presentations and short courses, among other activities. In addition, we can quantify SMARTNESS' scientific progress in its first year through the 10 active work packages distributed across 5 lines of research, involving more than 10 professors and more than 30 ongoing scholarships (03 post-doctorates, 15+ doctoral students, 10+ masters, 05+ scientific initiation), which have resulted in more than 15 scientific publications, multiple data and open source repositories, as well as invention disclosures. Check out more details about SMARTNESS and its results on the Center's website: <https://smartness2030.tech/>



SMARTNESS @ Ericsson Research Day 2024:



On September 4, Ericsson Brazil organized the Ericsson Research Day 2024 event at its headquarters in Indaiatuba.

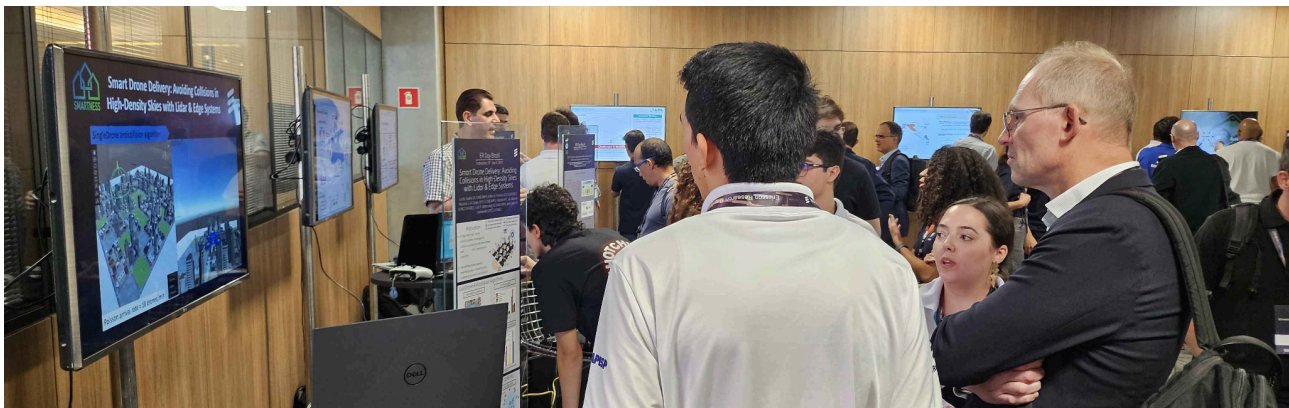
Dr. Maria Valéria Marquezini, Coordinator of collaborations with universities at Ericsson Research Brazil and deputy director of CPE SMARTNESS, presented the history of more than 25 years and the current scenario of Ericsson's research partnerships in Brazil. Dr. Mateus Santos, Head of Ericsson Research Brazil, highlighted the main areas of activity of the team of researchers based in Indaiatuba.

The event also featured a presentation of Ericsson Research's vision in 6G by Dr. Magnus Frodigh, VP and Head of Ericsson Research. Next, Generative AI for Telecom was the subject of the talk given by Dr. Aneta Vulgarakis, Sector Manager - Reasoning & Hybrid AI/ and Dr. Jörgen Gustafsson, head of the Research Area of Artificial Intelligence.



After the presentations by Ericsson Research, Prof. Christian Rothenberg, Director and Lead Researcher of CPE SMARTNESS, presented the vision and progress of the Center's activities after its first year of operations. Among other results, he highlighted the effective participation of CPE SMARTNESS in Ericsson Research Day 2024 with the five demonstrations below:

- **“Reproducing 6G Traces and Stateful TCP Sessions up to 100 Gbps with P4/Tofino”** focuses on high-fidelity test traffic based on P4/Tofino programmable hardware.
- **“DECOMPOSER: Functional decomposition and distributed execution of monolithic applications to heterogeneous resources in disaggregated environments”**, which aims to create a new abstraction in which it is possible to identify parts of a program that to be executed in heterogeneous computing environments, such as CPU, GPU, and FPGA.
- **“Smart Drone Delivery: Avoiding Collisions in High-Density Skies with Lidar & Edge Systems”**, taking advantage of edge computing and proposing algorithmic and machine learning strategies for collision avoidance.
- **“DCTPQ: Dynamic Cloud Gaming Traffic Classification and Prioritization Using ML and Multi-Queueing”**, designed to differentiate Cloud Gaming (CG) traffic from other types of traffic and guarantee an improved experience.
- **“Exploring the Content Steering Server for Adaptive Video Streaming in the Edge-Cloud Continuum”** demonstrated a testbed resource management environment, optimizing content steering strategies to improve video streaming quality.



Contact and Supervision?

Smartness' director is Professor Christian Esteve Rothenberg from the Department of Computer Engineering and Industrial Automation at FEEC-UNICAMP. The deputy director is Maria Valeria Marquezini, a researcher at Ericsson's Research and Development Center. For more information about the SMARTNESS 2030 Engineering Research Center and its activities, visit the UNICAMP website and contact the UNICAMP Innovation Agency (INOVA). You can also contact the communications team, through the website <https://smartness2030.tech/> or by email at cpe-smartness-l@unicamp.br.