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Welcome day at FEEC 2024

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On March 2nd, the School of Electrical and Computer Engineering (FEEC) hosted its annual traditional welcome event, extending a warm invitation to new students, alumni, and the wider public. This event aims to show the community the current research topics on which professors, researchers, and postgraduate students are working.

During the visit to the Computer and Automation Laboratory (LCA), attendees could delve into the projects developed by master's and doctoral students from the Advanced Robotics Laboratory (AdRoLab), led by Professor Eric Rohmer. The presentation covered the group's ongoing research on assistive robotics to help people with motor difficulties regain mobility and autonomy.

Visit of H.IAAC researchers

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On March 7th, a delegation from the Hub de Inteligência Artificial e Arquiteturas Cognitivas (H.IAAC), composed of researchers Vinícius Fernandes Soares Mota (UFES), Antonio Loureiro (UFMG), Eduardo Cerqueira (UFPA), Allan Souza (IC/ UNICAMP), Leandro Villas (IC/UNICAMP), Doctoral student Wellington Lobato Jr (IC/UNICAMP), and Postdoc Joahannes Bruno (IC/UNICAMP), visited the CPE SMARTNESS 2030 facilities at FEEC/UNICAMP. On that occasion, the delegation was received by Prof. Christian Rothenberg, having the opportunity to learn about the structure and objectives of the center and follow some of the research work in progress.

We thank the researchers for the visit, hoping that it is just the first step of many opportunities for joint work and fruitful collaborations!

Scientific Report Year 1: Submitted!



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Upon SMARTNESS Executive Committee approval, the SMARTNESS Y1 Scientific Report was submitted to FAPESP for evaluation.

The document provides a comprehensive overview of the first year progress of the SMARTNESS ERC project, focusing on scientific aspects and adhering to FAPESP guidelines for annual reports. It includes a summary of the project's conception, objectives, and results. The core part of the report details achievements, engineering research, and activities within each Work Package and Research Strand. Institutional support, upcoming activity plans, participation in scientific events, publications, scholarship reports, abbreviations, and bibliography are also outlined, with technical details available in referenced scientific publications.

First Annual Workshop



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Watch the video!

SMARTNESS 2030 realized its inaugural workshop on April 18th and 19th, marking a significant milestone in fostering collaborative innovation. Hosted at FUNCAMP CPV meeting rooms, the internal event aimed to catalyze discussions and initiatives among associated researchers toward alignment of ongoing Work Packages and collaborative shaping of activities upfront.

UNICAMP, UFSCar, and USP, along with many other universities engaged in collaborative efforts, congregated to explore novel avenues of cooperation. Over two dynamic days, up to 60 participants (40 in-person + 20 remote) immersed themselves in the workshop agenda, which included a spirited Scientific Hackathon to leverage expertise to generate diverse papers, surveys, and demos.

New publication presented at WCNC

YouTube goes 5G: QoE Benchmarking and ML-based Stall Prediction

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Abstract—Given the dominance of adaptive video streaming services on the Internet traffic, understanding how YouTube Quality of Experience (QoE) relates to real 4G and 5G Channel Level Metrics (CLM) is of interest to not only the research community but also to Mobile Network Operators (MNOs) and content creators. In this context, we collect YouTube and CLM logs with 1-second granularity spanning a six-month period. We group the traces by their context, i.e., Mobility, Pedestrian, Bus/Railway terminals, and Static Outdoor, and derive key performance footprints of real 4G and 5G video streaming in the wild. We also develop Machine Learning (ML) classifiers to predict objective QoE video stalls by using past patterns from CLM traces. We release all datasets and software artifacts for reproducibility purposes.

Index Terms—5G, QoE, Machine Learning, YouTube.

1. INTRODUCTION

Mobile video traffic is continuously growing, thus adding an additional challenge for Mobile Network Operators

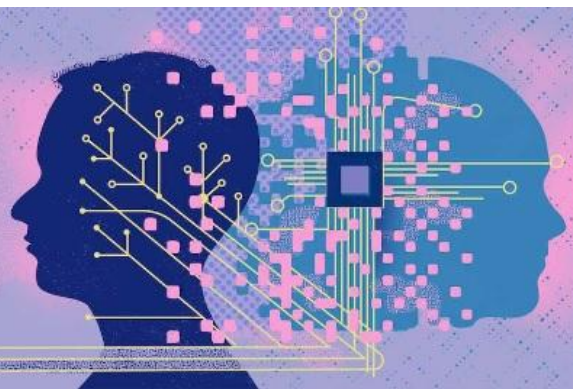
videos of diverse type (e.g., Nature, Animation, Movie, Brand Promotions) at different Frame Per Second (FPS) rates and under varying context scenarios: (i) Mobility, (ii) Pedestrian, (iii) Bus/Railway terminals, and (iv) Static Outdoor. Next, we study the relationship between the Channel Level Metrics (CLM) and objective QoE scores of YouTube. This study helps us to propose a QoE interruption (Stall) prediction method based only on CLM metrics. We carry out a rich 4G and 5G dataset collection campaign using commercial 4G and 5G networks, where we consider YouTube as a baseline for video streaming to collect CLM and YouTube QoE logs with 1-second granularity. All videos are selected from different categories such as Sports, Animated, Movies, Nature, etc. In addition, we consider videos with 4K quality and some that coded at 60 FPS. We provide detail of each video in [8]. Our contributions can be summarized as follows:

Christian Rothenberg, SMARTNESS PI Director, Raza Mustafa and Chadi Barakat (Inria, Université Côte d'Azur) have a new publication in the IEEE WCNC, 2024. The publication “YouTube goes 5G: QoE Benchmarking and ML-based Stall Prediction” is a result of a research collaboration between INTRIG / UNICAMP and INRIA on real 5G/4G performance and adaptive video streaming. Due to a VISA-related issue, the paper had to be presented by Rosario Patane from Université Paris-Saclay. Thanks!

Understanding how YouTube's Quality of Experience (QoE) relates to real 4G and 5G Channel Level Metrics (CLM) is of interest not only to the research community but also to Mobile Network Operators (MNOs) and content creators.

[Read more](#)

Interview: MobileTime Brazil and Latin America Magazine



Marina Martinelli, a doctoral researcher at UNICAMP and SMARTNESS 2030, was interviewed by Mobile Time Magazine. The topic of the interview was her survey, which highlighted that Brazil is the eighth country with the most patent applications filed involving 5G and extended reality in the world. She has made a mapping of patents and Mobile Time Latin America has reshared it.

Read the complete news entitled: “Brasil é oitavo país com mais patentes de 5G e realidade estendida” on Mobile Time Magazine and Mobile Time Latin America websites.

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Visit of VENTURUS



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On April 29th, the SMARTNESS research center received a visit from Dr. Eduardo Sartori, technology transfer manager of CPE SMARTNESS, Dr. Anderson Santos, a researcher in quantum technologies at VENTURUS, and Daniel Moraes, head of Emerging Technologies at VENTURUS. Students from UFPA involved in the C3LA-HTC work package also participated in the meeting.

During the visit, Prof. Dr. Christian Rothenberg introduced the SMARTNESS work package research strands, discussed the ongoing work carried out by the students present at the meeting, and discussed possible future approaches.

Visit of research team from UFPA



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From April 20th to May 18th, students from Smart and Sustainable Cities Laboratory (LACIS) at the Federal University of Pará (UFPA) involved in SMARTNESS C3LA – Holographic Type Communication (HTC) Work Packet were visiting the Electrical and Computer Engineering Faculty's (FEEC) Computing and Automation Laboratory (LCA) at Universidade Estadual de Campinas (UNICAMP).

During this time, PhD student Matheus Brito, MSc. student Kleber F. Vilhena, and undergraduate student Carlos H. A. Costa—all under Prof. Eduardo Cerqueira's (UFPA) supervision—joined Prof. Christian Rothenberg's (UNICAMP), PhD student Alan Teixeira, and MSc student Rafael Clerici in activities related to HTC research, which includes high-performance programmable switches and Meta Quest 3 VR/AR Oculus.

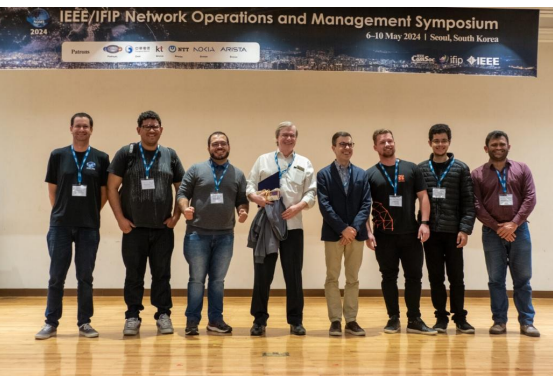
Participation at SBRC 2024, Niterói, Brazil



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SMARTNESS was present at the 42nd Simpósio Brasileiro de Redes de Computadores e Sistemas Distribuídos (SBRC), 2024 edition held at Federal Fluminense University (UFF), Niterói, Brazil. The SBRC symposium is an annual event held by the Brazilian Computing Society (SBC) and the Computer Networks Laboratory (LARC). Over the course of more than four decades, the SBRC has established itself as the most important national scientific event in computer networks and distributed systems, reaching international scope with the presence of researchers, technicians, and scientists from Latin America and other parts of the world.

Participation at NOMS 2024, Seoul, South Korea



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SMARTNESS was present at the IEEE/IFIP Network Operations and Management Symposium (NOMS) 2024 edition held in Seoul, South Korea. The theme of NOMS 2024 was “Towards Smart, Reliable and Sustainable Network and Service Management”, highlighting the importance of 5G networks, the emergence of 6G, and the convergence of networks in applications such as IoT, metaverse, smart cities, and autonomous vehicles.

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