

ACADÊMICO CALL FOR PAPERS – SESSION 1

This panel will present a set of scientific works that were submitted to the Call for Papers promoted annually by SET.

The selected works will be published in the SET International Journal of Broadcast Engineering (SET IJBE) an international scientific journal whose objective is the dissemination of knowledge about communications engineering, especially in the areas of broadcast and new media.

Moderator: Rangel Arthur - Professor at School of Technology in University of Campinas, Brazil

RADIO ADVERTISING AND AUDIENCE METRICS

Ticiane Pfeiffer Bronze - Superintendent - AERP - Paraná Radio and Television Association Brazilian radio stations are highly regulated, and due to specific rules and processes, bureaucracy has become a barrier to participation in national or state advertising campaigns, especially for stations outside large cities. Added to this is the competition with major internet players, with little or no regulation, in search of the same resources available for advertising campaigns. In this ecosystem, the requirement of audience metrics and reports of proof of placements is a reality that needs to be treated with precision and seriousness, in order to guarantee the good use of public funds and the good performance of the campaigns. The way that radio needs to go is to speed up the generation of such reports, matching large technology companies, which will place it in a prominent position, considering its capillarity and close proximity to the public. That said, this article intends to demonstrate, through a temporal report, how through the identification of an opportunity in the broadcasting sector, it was possible, through the use of streaming combined with a programmatic media solution, to develop a system that gives autonomy to the advertiser to place a request for direct commercial insertion into the broadcaster's commercial operations system. The placement takes place automatically, and then integrates audience research data, performs the accounting and automatic delivery of proof and performance report. A solution that makes the medium more efficient and makes it possible to broadcast national and state campaigns on all broadcasters in the state or country. With this unprecedented model, Nextdial and AERP, the Association of Radio and Television Broadcasters of the State of Paraná, foster business and drive the economy, reinforcing the broadcasters main attributes: creativity and credibility. Finally, after validating the model and presenting it to the Federal Government's Secom Media Center, the result was the creation of a new category

in MidiaCad, a system that integrates all media providers for the Federal Government, a category that was called the AERP Nextdial Radio Network.

COMPARISON OF THE PHYSICAL-LAYER PERFORMANCE BETWEEN ATSC 3.0 AND 5G BROADCAST

Sung-Ik Park - Principal Researcher & Project Leader - ETRI (Electronics and Telecommunications Research Institute)

This paper compares the physical-layer performances of ATSC 3.0 and 5G-Broadcast in providing mobile broadcasting services. The differences of physical-layer between ATSC 3.0 and 5G-Broadcast are discussed in terms of transmission efficiency, overheads, and BICM performance over mobile environments. The computer simulations show that ATSC 3.0 can provide more robust and enhanced physical-layer performance than 5G broadcast over mobile environments.

ADVANCES IN VIDEO COMPRESSION: A GLIMPSE OF THE LONG-AWAITED DISRUPTION?

Dr. Mickaël Raulet - CTO na ATEME

The consumption of video content on the internet is increasing at a constant pace, along with an increase of video quality. As an answer to the ever-growing demand for high quality video, compression technology improves steadily. About every decade, a new major video compression standard is issued, providing a decrease of bitrate by a factor two. Interestingly, the technology does not change radically between codec generations. Instead, the same block-based hybrid video coding scheme principles and ideas are re-used and pushed further. All along the video compression history, there were several attempts to depart from this model, but none achieved to be competitive. Following the latest codec generation, VVC, the research community has started focusing on deep learning-based strategies. Could it be the new contender to the classical hybrid approach? This presentation analyzes the benefits and limitations of deep learning-based video compression methods, and investigates practical aspects such as rate control, delay, memory consumption and power consumption. Overlapping patch-based end-to-end video compression strategy is proposed to overcome memory consumption limitations.

CONTRIBUTIONS TO TV 3.0 USING 5G-MAG REFERENCE TOOLS

Wesley Henrique Silva de Souza - Master's student and electrical engineer - Mackenzie Presbyterian University

The evolution of the evolved Multimedia Broadcast Multicast Service (eMBMS) to the Further evolved Multimedia Broadcast Multicast Service (FeMBMS) in Release 14 of 3GPP enabled broadcast transmission in a format 100% dedicated to user devices. As a result, the 5G standard for cellular networks expanded and began to be quoted in the broadcasting sector as 5G Broadcast. This standard is one of the quoted ones to integrate the TV 3.0 architecture in Brazil, being responsible for the physical layer. To be possible, this technology must meet some requirements, such as negative noise carrier ratio, MIMO antennas and channel bonding. In order to complement the tests carried out by the SBTVD Forum, this paper aims to evaluate and discuss the SNR and minimum signal level tests using an Open-Source

receiver called 5G-MAG that is managed by the group of the same name. The tests were performed using a Universal Software Peripheral Radio (USRP) Software Defined Radio (SDR) playing an I/Q file with 5G Transmission data with bandwidths of 3, 5, 6, 7 and 8MHz to transmit the signal via GNU Radio software and another USRP SDR as a receiver, interfaced with 5G-MAG.

SPECTRUM AVAILABILITY FOR THE DEPLOYMENT OF TV 3.0

Thiago Aguiar Soares - Head of Innovation & Regulation of Broadcasting Services - Ministry of Communications (MCom)

In this paper, we study the current and future spectrum availability of the VHF and UHF bands in Brazil for the deployment Next-Generation Digital Terrestrial Television Systems, which are being studied under the “TV 3.0 Project” initiative, coordinated by The Brazilian Digital Terrestrial Television System Forum (SBTVD Forum). Coverage simulations of all expected operating stations in Brazil were computed in different scenarios to estimate the spectrum availability over the Brazilian territory. Results indicate that hybrid approaches should be implemented to smoothly introduce new digital television systems.

CONVOLUTIONAL NEURAL NETWORK IMPLEMENTATION IN FPGA FOR IMAGE RECOGNITION

Fadi Jerji - Ph.D. Candidate and postgraduate Researcher - Mackenzie Presbyterian University, São Paulo, Brazil

Neural networks (NN) are being researched and improved to a degree that machines are able to closely resemble the capacity to execute complex tasks that only an intelligent animal is capable of, vision used in the interpretation and recognition of the environment is one of such tasks that is being researched so future technologies can simulate vision in autonomous vehicles to further improve self-driving capabilities, increasing driver convenience, help avoid accidents and even autonomous delivery, convolutional neural networks, inspired by the mechanics of animal vision, are utilized for the complex task of image recognition. Field Programmable Gate-Arrays (FPGA) recent developments have given it more parallel processing and processing speed making it a prime candidate for the implementation of NNs efficiently, with more processing capabilities and low response times compared with the alternatives. The objective of this work is to evaluate the performance viability of FPGA implementation of an image classification NN with acceptable accuracy and low response time.



Rangel Arthur - Professor at School of Technology in University of Campinas, Brazil

Rangel Arthur is a Professor at School of Technology in University of Campinas, Brazil. He received the Electrical Engineering degree from the State University of São Paulo, Brazil in 1999, MSc and PhD degrees in Electrical Engineering in 2002 and 2007, respectively, from University of Campinas, Brazil. His current research interest includes telecommunication systems, image processing and artificial intelligence. From 2011 to 2014, he was Coordinator and Associate Coordinator of the Technology Courses in Telecommunications Systems and Telecommunications Engineering at FT, which was created during his management. From 2015 to 2016 he was Associate Director of the Faculty of Technology (FT) at Unicamp. Since 2016 he has been an Advisor to the Innovation Agency (Inova) at Unicamp. He is a member of the Association of Innovation Environments of Limeira-SP, of the Business Incubator of Unicamp and of the Municipal Council of Science, Technology and Innovation of the Municipal Government of Campinas-SP.



Ticiane Pfeiffer Bronze - Superintendent - AERP - Paraná Radio and Television Association

Graduated in Business Administration from the Federal University of Paraná, Postgraduate in Marketing at FAE Business School, Postgraduate in Higher Education and Master in Business Administration in Strategy and Organizational Analysis at the Federal University of Paraná.



Sung-Ik Park - Principal Researcher & Project Leader - ETRI (Electronics and Telecommunications Research Institute)

Dr. Sung-Ik Park (IEEE Fellow) joined the Broadcasting System Research Group of Electronics and Telecommunication Research Institute (ETRI) in 2002, and he is in charge of terrestrial broadcasting standardization, HW/SW implementations, and laboratory/field tests. Dr. Park is a principal researcher and leading several broadcasting research projects. Dr. Park has more than 300 peer-reviewed journal and conference publications and various best paper and contribution awards for his work on broadcasting technologies. Dr. Park currently serves as an associate editor of the IEEE Transactions on Broadcasting and ETRI Journal, and a distinguished lecturer at the IEEE Broadcasting Technology Society.



Dr. Mickaël Raulet - CTO at ATEME

Dr. Mickaël Raulet is CTO at ATEME, where he drives research and innovation with various collaborative R&D projects. He represents ATEME in several standardization bodies: ATSC, DVB, 3GPP, ISO/IEC, ITU, MPEG, DASH-IF, CMAF-IF, SVA and UHD Forum. He is the author of numerous patents and more than 100 conference and journal scientific papers. In 2006 he received his Ph.D. from INSA in electronic and signal processing, in collaboration with Mitsubishi Electric ITE (Rennes, France).



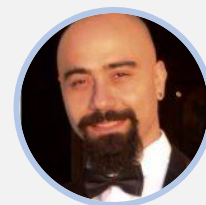
Wesley Henrique Silva de Souza - Master's student and electrical engineer - Mackenzie Presbyterian University

He is a Master's student in Electrical Engineering with research area in Telecommunications at Mackenzie Presbyterian University (MPU), holds a degree in Electrical Engineering with emphasis in Telecommunications, Electronics and Automation from the same institution (2020) and technical professional qualification in Electro-electronics from the Technical Institute of Barueri (TIB) since 2014.



Thiago Aguiar Soares - Head of Innovation & Regulation of Broadcasting Services - Ministry of Communications (MCom)

Thiago Aguiar Soares is graduated in electrical engineering from the University of Brasília (UnB), Brazil, post-graduated in telecommunications regulation from the National Institute of Telecommunications (INATEL), and currently pursuing a master's degree in electrical engineering at UnB. He worked for 12 years with the National Agency of Telecommunications (Anatel), coordinating projects on digital television, digital radio, broadcasting technical regulation, IT systems implementation, among others. Since 2020, he is Head of Innovation & Regulation of Broadcasting Services in the Brazilian Ministry of Communications. He is Vice-Chairman of the Study Group 6 (Broadcasting) of the Radiocommunication Sector of the International Telecommunications Union (ITU-R).



Fadi Jerji - Ph.D. Candidate and postgraduate Researcher - Mackenzie Presbyterian University, São Paulo, Brazil

FADI JERJI received a B.S. degree in computer engineering in 2010 and a M.S. degree in electrical and computation engineering from Mackenzie Presbyterian University, São Paulo, Brazil, in 2019. Acted as an assistant professor at the electrical and computation engineering department at Mackenzie Presbyterian University (2019-2021)

He is currently pursuing a Ph.D. degree in electrical and computation engineering at Mackenzie Presbyterian University.

Since 2017 he has been a postgraduate Researcher with the Digital TV Research Laboratory at Mackenzie Presbyterian University.