



**Dr. Rodrigo C. de Lamare,  
Centre for Telecommunications Research (CETUC),  
Pontifical Catholic University of Rio de Janeiro (PUC-  
Rio) Rio de Janeiro - Brazil**



**“Energy-efficient distributed and federated learning for IoT networks”**

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Helmholtzbau, H2501

Abstract: In this presentation, we will present an energy-efficient distributed learning framework using coarsely quantized signals for Internet of Things (IoT) networks. In particular, we develop distributed quantization-aware least-mean, recursive least-squares and federated learning algorithms that can learn parameters in an energy-efficient fashion using signals quantized with few bits while requiring a low computational cost. Moreover, we develop a bias compensation strategy to further improve the performance of the proposed learning algorithms. We carry out a statistical analysis of the proposed algorithms and derive analytical expressions for predicting the mean-square deviation. A computational complexity evaluation and a study of the power consumption of the proposed and existing techniques are then presented. Numerical results assess the proposed learning algorithms against existing techniques for parameter estimation tasks in IoT networks.

## Short biography

Dr. Rodrigo C. de Lamare, Professor Centre for Telecommunications Research (CETUC), Pontifical Catholic University of Rio de Janeiro (PUC-Rio) Rio de Janeiro - Brazil



Rodrigo C. de Lamare was born in Rio de Janeiro, Brazil, in 1975. He attended Colégio Santo Inácio and then studied electronic engineering at the School of Engineering of the Federal University of Rio de Janeiro (UFRJ). He received his Diploma in electronic engineering from UFRJ in 1998 and the MSc and PhD degrees in electrical engineering from the Pontifical Catholic University of Rio de Janeiro (PUC-RIO) in 2001 and 2004, respectively. He then worked as a Postdoctoral Fellow from January to June 2005 at the Centre for Telecommunications Studies (CETUC), PUC-RIO and from July 2005 to January 2006 at the Signal Processing Laboratory, UFRJ. Since January 2006, he has been with the Communications Group, Department of Electronics, University of York, United Kingdom, where he is a Professor. Since April 2013, he has also been a Professor at PUC-RIO. Dr de Lamare has participated in numerous projects funded by government agencies and industrial companies. He received a number of awards for his research work and has served as the general chair of the IEEE 7th International Symposium on Wireless Communication Systems (ISWCS) 2010, held in York, UK in September 2010, as the technical programme chair of ISWCS 2013 and WSA 2015 in Ilmenau, Germany, as the general chair of the 9th IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM) in Rio de Janeiro, Brazil, in July 2016, as the co-general chair of ISWCS 2018, held in Lisbon, Portugal, and as the general chair of the 21st IEEE Statistical Signal Processing Workshop (SSP) in 2020, in Rio de Janeiro, Brazil. Prof. de Lamare is a senior member of the IEEE, served as an elected member of the IEEE Signal Processing Theory and Method, and currently serves the IEEE Signal Processing for Communications and Networking technical committees of the IEEE Signal Processing Society. He served as editor for IEEE Transactions on Communications and IEEE Wireless Communications Letters. His research interests lie in communications and signal processing, areas in which he has published over 450 papers in international journals and conferences.