



ADMISSION TO DOCTORAL STUDIES

Session September 2022

Field of doctoral studies: Electronics engineering, telecommunications and information technologies

Doctoral supervisor: Professor Mihai IVANOVICI

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Multidimensional image and signal analysis and processing*

Content / Main aspects to be considered

Mathematical morphology, complexity, entropy, fractal models and multi-scale analysis; color, multi- and hyper-spectral texture characterization; fractal image analysis and synthesis; feature extraction; color, multi- and hyper-spectral image segmentation; Knowledge extraction from multidimensional data; Applications of color texture and satellite image analysis (including Sentinel-2)

Recommended bibliography:

1. M. Ivanovici, "Color and Multispectral Texture Image Analysis – Models, Features and Applications", Editura Universităţii Transilvania din Braşov, ISBN 978-606-19-0587-4, 2015.

Prerequisites / Remarks:

BSc and/or MSc degree in the field of Electronics engineering, telecommunications and information technologies or strongly related.

TOPIC 2: *Real-time electronic systems for data/signal acquisition and processing for high-energy physics experiments*

Content / Main aspects to be considered

Real-time data acquisition and processing systems for the particle detectors of the ATLAS Experiment at LHC, CERN, Geneva or CBM Experiment at FAIR, GSI, Darmstadt, Germania; Packet processors, parallel/concurrent computing architectures and specific architectures for real-time large data volume processing; trigger processor, track reconstruction, data visualization.

Recommended bibliography:

1. M. Ivanovici, "Computer Network Emulation for Quality of Experience Assessment", Editura Universităţii Transilvania din Braşov, ISBN 978-606-19-0586-7, 2015
2. <http://cern.ch>
3. <https://www.cbm.gsi.de/>

Prerequisites / Remarks:

BSc and/or MSc degree in the field of Electronics engineering, telecommunications and information technologies or strongly related.

TOPIC 3: *Real-time electronic systems for color, multispectral or hyperspectral image acquisition, processing and analysis, implemented in FPGA/ASIC*

Content / Main aspects to be considered

Algorithms and architectures for the acquisition, processing and analysis of color, multispectral or hyperspectral images; microprocessors and system architecture; hardware description languages (Verilog, VHDL); artificial intelligence; applications: e.g. object detection/recognition.

Recommended bibliography:

1. M. Ivanovici et al, "VIPERA 1.0 – A Versatile Imaging Platform for Education, Research and Applications", International Symposium on Electronics and Telecommunications, 2018.

Prerequisites / Remarks:

BSc and/or MSc degree in the field of Electronics engineering, telecommunications and information technologies or strongly related.

TOPIC 4: *Big Data Analytics*

Content / Main aspects to be considered

Real-time big data visualization, analysis and processing algorithms and architectures; prediction; time series; data mining; knowledge extraction; Big Data applications

Recommended bibliography:

1. X. Wu, X. Zhu, G. -Q. Wu and W. Ding, "Data mining with big data", IEEE Transactions on Knowledge and Data Engineering, vol. 26, no. 1, pp. 97-107, 2014
2. M. S. Mahmud, J. Z. Huang, S. Salloum, T. Z. Emara and K. Sadatdiyov, "A survey of data partitioning and sampling methods to support big data analysis", Big Data Mining and Analytics, vol. 3, no. 2, pp. 85-101, 2020

Prerequisites / Remarks:

BSc and/or MSc degree in the field of Electronics engineering, telecommunications and information technologies or strongly related.

Doctoral supervisor,

Prof. Dr. eng. Mihai IVANOVICI

Signature



Coordinator of the field of doctoral studies,

Prof. Dr. eng. Mihai IVANOVICI

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