



ADMISSION TO DOCTORAL STUDIES

Session September 2024

Field of doctoral studies:

Doctoral supervisor:

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

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

Contents / 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; Artificial Intelligence models; Applications of color texture and satellite image analysis (including Sentinel-1, Sentinel-2, PRISMA), data fusion in the context of the AI4AGRI European project:

<https://ai4agri.unitbv.ro>

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.

Scientific Doctorate (full-time only)

Professional Doctorate – in the fields of Music and Science of sport and physical education (full-time or part-time)

without tuition fee (state budget funded)

with tuition fee or with funding from other sources than the state budget

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

Contents / 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 in the context of the national project entitled „The ATLAS Experiment at LHC”.

Recommended bibliography:

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

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

Contents / 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/computational intelligence models implemented in hardware; applications: e.g. object detection / recognition, texture / image classification.

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.

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TOPIC 4: *Big Data Analytics*

Contents / Main aspects to be considered

Real-time big data visualization, analysis and processing algorithms and architectures; including Artificial Intelligence, prediction; time series; data mining; knowledge extraction; Big Data applications in the context of the AI4AGRI European project: <https://ai4agri.unitbv.ro>

Recommended bibliography:

1. C. Florea, L. Florea, „Inteligență Artificială”, Editura Universității Transilvania din Brașov, 2023

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Doctoral supervisor,

Prof. Dr. eng. Mihai IVANOVICI

Signature

Coordinator of the field of doctoral studies,

Prof. Dr. eng. Mihai IVANOVICI

Signature