

CURRICULUM VITAE

Personal data

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| Date of birth | 01.11.1980 |
| Driving license | BE and CE |

Work experience

December 2010 onwards: Research and development engineer at Terrasigna

Projects and tasks:

- development of software for the efficient phase unwrapping of InSAR images using triangulation and optimization algorithms (programming in C/C++ and Matlab);
- PSInSAR processing of satellite acquired SAR images using gamma and StaMPS (gamma, bash, Python, Matlab);
- TerraFirma certification project;
- detection of deformation profile types using signal processing techniques and machine learning (Python, Keras, Tensorflow, Matlab);
- PSTool application (concept, backend design and implementation using PostgreSQL, MapProxy, GeoServer);
- setup, testing and upgrading of permanent scatterers interferometry package StaMPS (scripts for the automation of the processing chain and some C and Matlab programming);
- setup and testing of ROI_PAC processing chain for along-track interferometry (scripts for the automation of the processing chain and some C and Matlab programming);
- other programming tasks (Matlab, Python and C);
- development of signal processing algorithms and radar systems;
- grant proposal writing;
- technical writing;
- project management.

September 2008 onwards: Associate professor at the Military Technical Academy “Ferdinand I”

Courses

- *Digital signal processing* - digital signal processing algorithms, Fourier transform, digital filters, digital and analog modulations, signal generators etc.
- *Digital signal processors* - audio processing and communications algorithms, C programming on Analog Devices BlackFin DSPs and TI C6000 family (baremetal, fixed point and floating point).
- *Biometric systems* (speaker recognition, speech modelling),
- *Programming languages* (C & Matlab).

Relevant research grants

AI4PSInSAR – Intelligent exploitation of nationwide PSInSAR infrastructure monitoring results (ro., Exploatare inteligentă a rezultatelor de monitorizare satelitară a stabilității infrastructurii la nivel național) – research grant project manager, contract 89PTE/2022 (2022-2023), UEFISCDI.

The objective of this project was to develop AI algorithms for extracting insights from deformation maps, create a cloud-compatible solution for the PSTool application, and enhance persistent scatterer interferometry (PSI) workflows.

My contributions to the project included:

- Concept development, grant proposal writing, and project management.
- Enhancement of signal processing algorithms for deformation profile analysis using MATLAB.
- Development of a piecewise linear model for deformation profile analysis in MATLAB.
- Automated extraction and analysis of natural disaster information from scanned documents of local authorities in Romania (using Python, PyTesseract, and spaCy) as well as from mass media sources.
- Specification drafting and testing of Docker files for the containerized version of PSTool.

WALLRAD - Through-the-wall radar imaging using a hand-held device – research grant project manager, contract 678PED/2022, UEFISCDI, 2022-2024 (<https://mta.ro/wallrad/>)

The objective of this project was to develop a handheld Synthetic Aperture Radar (SAR) system utilizing the Pulson P440 UWB radar. Three positioning systems were designed and evaluated: an optical stereo system using the Zed2 camera, a UWB-based system, and an inertial-based system. Among these, the optical stereo and UWB-based solutions demonstrated the best performance within the project's budget constraints. To mitigate positioning inaccuracies, autofocus techniques were implemented.

My contributions to the project included:

- Concept development, grant proposal writing, and project management.
- Configuration of optical stereo cameras and the Pulson P440 radar.
- Testing of UWB radio transceivers for both radar and localization applications, as well as SAR image focusing using backprojection (MATLAB, C).
- Development and testing of the experimental setup.

ODIN112 – Real time speech to text and emotion classification system for the 112 emergency number calls (ro., Sistem informatic de transcriere în timp real a vorbirii în text pentru limba română și recunoașterea stărilor emoționale în apelurile de urgență 112) 37SOL/2021, technical manager, UEFISCDI, 2021-2023 (<https://mta.ro/odin112/>)

The objective of the project is to develop an intelligent assistant for emergency number operators, integrating speech recognition, emotion classification, sound classification, an Interactive Voice Response (IVR) module, a call database, and decision-support modules.

My contributions to the project included:

- Technical management and grant proposal writing.
- Development of speech emotion recognition algorithms using MATLAB and Python.
- Development of sound detection algorithms using MATLAB and Python.
- Creation of audio datasets for emotion classification and speech-to-text applications.

S14Ro – Service for nation-wide infrastructure monitoring (2020 - 2022) – research grant project manager, contract 64PTE/2020.

The objective of the project was to develop a nationwide infrastructure monitoring service by automating the PSInSAR processing chain and enhancing PSTool as a web-based application. This platform facilitates the visualization of deformation maps and the analysis of Persistent Scatterer (PS) time-series data, including post-processing features such as seasonal variation detection and identification of sudden changes in deformation trends.

My contributions to the project included:

- Concept development and grant proposal writing.
- Design and implementation of the PSTool web application backend using GeoServer, PostgreSQL, and MapProxy.
- Development of signal processing algorithms for deformation profile analysis in MATLAB.
- Implementation of machine learning applications for deformation profile analysis using Python, Scikit-learn, and Keras.
- Specification drafting and testing of the PSTool application.

PSTool - Persistent Scatterers Time-Series Analysis and Post-processing Tool with Application to Infrastructure Threat Detection (2017 - 2019) – research grant project manager, contract 126/2017, ROSA. (<https://mta.ro/pstool/>)

The PSTool project introduced an innovative solution for the analysis and post-processing of Persistent Scatterer (PS) time-series data. It focused on developing state-of-the-art algorithms for the automated analysis of deformation profiles in Persistent Scatterer Interferometry (PSI) processing. Additionally, the project identified nonlinear deformation models that are characteristic of pre-collapse infrastructure, enhancing early warning capabilities for structural integrity monitoring.

My contributions to the project included:

- Concept development and grant proposal writing.
- Statistical modeling of deformation profiles using MATLAB.
- Analysis of deformation profiles using machine learning techniques in MATLAB and Python.
- Specification drafting and testing of the PSTool application.

Heimdallr - Key word spotting for real time surveillance in telephone conversations in Romanian (2017 -2018) – research grant project manager, contract PED229/2017. (<https://heimdall.racai.ro/>)

The objective of the project was to develop a keyword spotting (KWS) system for real-time surveillance of telephone conversations in Romanian, aimed at supporting homeland security efforts in combating organized crime and terrorism. The project built upon a proof-of-concept (TRL3) KWS system based on Hidden Markov Model (HMM) acoustic models and enhanced it by integrating advanced neural network-based acoustic models and near real-time processing capabilities.

My contributions to the project included:

- Concept development, grant proposal writing, and project management.
- Development of a near real-time experimental infrastructure, including GSM Gateway and VoIP PBX configuration.

- Adaptation of existing corpora for communication network environments, including the design of the adaptation system and implementation.
- Testing and evaluation of the keyword spotting (KWS) .

October 2016 – December 2018 R&D engineer at Beia Consult. (part-time)

Speech recognition and natural language processing application development. (Matlab, Java, Weka, Kaldi)

July 2014 – October 2015: R&D engineer – postdoctoral scholarship (Military Technical Academy).

Research and development of algorithms for radar signal processing (Matlab) – postdoctoral scholarship. Thesis: *Methods for increasing range resolution in pulse compression synthetic aperture radars.*

2012 (6 months, part-time): embedded software developer for Selex Communications. My job was to test fixed-point implementations of voice coding and decoding algorithms on C6455 TI DSP (programming in embedded C for C6455 DSP using Code Composer Studio & Matlab).

September 2004 – August 2008: IT infrastructure administrator in a military unit (MoD, Romania)

Duties: implementing MoD policies regarding IT system security, planning, and building computer networks, technical support for the IT infrastructure.

I oversaw teams of sizes ranging from 2 to 7 people.

Chair of the COMM2024 international conference (<https://comms.ro/>) and part of the COMM2010, COMM2012, COMM2014, COMM2016, COMM2018, COMM2020, COMM2022 organizing committees.

Technical Expertise

Programming languages

- Excellent C, Matlab programming skills.
- Python, the GNU tool chain.
- Familiar with HTML and Javascript. I designed the COMM 2010 conference website (<https://comms.ro/comm2010/>).
- Familiar with assembly language (PIC microcontrollers, Analog Devices Blackfin DSPs, Intel 8086).
- Scripting: MS-DOS batch scripting, bash.
- Basic knowledge of VHDL and Verilog.

Operating systems

- Linux (Ubuntu) and Windows.

Applications/Tools

- Tools: Electronic circuits simulation and design tools: Proteus.
- IDEs for embedded software development Visual DSP++, Code Composer Studio.
- IDEs for software development Eclipse, Visual Studio, Spyder.

- Proficient with Microsoft Office applications.
- Proficient with Doris, gamma, StaMPS, ROIPAC and SNAP InSAR processing software.
- Version control with git.

Education

2005 – 2011 PhD Degree

Thesis title: *Methods for increasing speech synthesis quality*

Advisor: *prof. Oancea Eugeniu*

Military Technical Academy, Romania.

2005 – 2007 Master's Degree in Radio communications, Microwaves and Optical communications

Thesis title: *Study on subjective codec evaluation for communication systems*

Advisor: *prof. Ion Marghescu*

"Politehnica" University of Bucharest, Romania.

1999 – 2004 Bachelor's (Dipl. Eng.) degree

Thesis title: *Implementation of a MIMO-Channelsounder for parameter acquisition in Multipath Indoor Radio Channels*

Advisors: *A. Knopp and prof. B. Lankl from Bundeswehr University, Muenchen, Germany*

Military Technical Academy, Bucharest, Romania.

1999 Baccalaureate, Mathematics-Physics

1994 – 1999 Alexandru Ioan Cuza' High-School (Bucharest, Romania).

Training Courses

- April – June 2017 - *Distance Learning Course: Webinar Series on SAR Data Processing and Applications organized by Working Group on Capacity Building & Data Democracy (WGCapD), Committee on Earth Observation Satellites (CEOS) during April 17 to June 05, 2017.*
- September 2011 – *GEOSS Summer School – Advancing Earth Observation Data Understanding for Disaster Management and Emergency Response – Romanian Space Agency (ROSA)*
- February – June 2011 – *Advanced course on logistics for officers, Military Technical Academy*
- April 2010 *Project Management course organized by S.C. European Project Consulting S.R.L.*
- April – June 2009 *German language course – National Defense University*
- October 2006 – February 2007 – *German language course – National Defense University*
- Various online courses (Coursera).

Languages

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| English | Speaking: Advanced, Reading: Advanced, Writing: Advanced |
| French | Speaking: Beginner, Reading: Beginner, Writing: Beginner |
| German | Speaking: Beginner, Reading: Beginner, Writing: Beginner |
| Romanian | Native language |