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Research profile:
Currently he is a professor in the Department of Automatic Control and Industrial Informatics, Faculty of Automatic Control and Computers, University POLITEHNICA of Bucharest. Between 2012 and 2016 Dan Popescu was vice-dean, responsible for research in the Faculty of Automatic Control and Computers. He is the head of the research Laboratory "Processes and Innovative Products to Improve the Quality of Life" in the PRECIS Research Center.

Research areas of interest are: the complex processing of images, parallel processing of images, multilevel wireless sensor networks, pattern recognition in medical imaging and remote imaging, signal processing by data fusion and consensus, environmental monitoring, management of wastewater, diagnosis based on images, multi-UAV systems for monitoring in precision agriculture and critical infrastructure.

He published many articles in the mentioned topics, together with PhD students and post doctoral researchers in ISI journals or ISI proceeding volumes of conferences. He organized special sessions at several international ISI conferences (TSP 2016, ICSTCC 2015 and 2016) with the main theme of image processing for monitoring, diagnostics and control.

Professor Popescu is a doctoral coordinator since 2009 with:
- 7 theses completed;
- 14 theses in progress.

Scientific publications:
- 25 monographs and book chapters;
- 60 journal papers and 160 conference papers.

Research projects – project director (last 10 years):

- System for Tracking, Localization And Data Acquisition Collection Of From Moving Objectives Through Mobile Sensor Networks (PNCDI 2 – Program 4) No. 11-040/14.09.2007, Beneficiary: CNMP, 2007-2010

- Cell-Based Processing Of Video and Medical Data Flows From Ambulance Network – EMERGMED, IBM Faculty Awards Program, 2008-2009

- Monitoring System for Indoor Air Quality Through Wireless Sensor Networks, UEFISCDI, CEC Innovation, C149/2012, 2012-2013

- Multisensory Robotic System for Aerial Monitoring Of Critical Infrastructure Systems, RDI Program – Star, Beneficiary: ROSA, 71/2013, 2013-2016

- Multi-Drone System for the Assessment Of The Flood Effects (Simul), Project Director, Bridge Grant – Program, Beneficiary: UEFISCDI, 2016-2018.

Others:
- IEEE member
- SRAIT member
- Editor special session at TSP 2016 – Vienna
- Scientific committee member at IWSSS (ECAI) 2014, 2015, 2016, IAFA 2015

Doctoral research themes proposal

1. *Processing of the complex images using correlated chromatic information*

By correlated analysis of all colour channels or spectral, the efficiency and accuracy of classification and segmentation may be increased substantially in the case of complex image types like fractal or texture.

The main goal is to find new methods and algorithms for calculating the features extracted from the inter-spectral concurrence matrix or colour fractals. Specific objectives are: a) Calculation of inter-spectral concurrence matrices. b) Choosing the best features based on performance criteria. c) Extracting fractal features considering the correlation between the colour channels. d) New criteria for classification and segmentation of complex images. e) Implementing parallel algorithms and neural networks for image segmentation in order to assess disasters such as floods and landslides.

2. Multilevel embedded network for complex indoor monitoring

Instead of a single large sensor network, the system integrates various smaller wireless sensor networks, clustered in an indoor area, delimited geographic and possibly interconnected by optical fibre via a control node (management node) with functions for switching or routing, protocol conversion and data processing. The goal is to develop a hybrid, multilevel sensor network, characterized by high speed, intelligence, scalable, with following tasks: data acquisition, identification, localization, communication, visualization and decision.

Objectives: a) Creating an integration technology of sensor networks in multi-level hierarchical structure like SoS. b) Development of methods and techniques on the network to configure itself to different levels of integration. c) Development of methods and algorithms to combine data from integrated networks, with dynamic topology of the nodes. d) Developing methods and adaptive mechanisms to secure data transmission through integrated networks. e) Design and implementation of integrated network functional model.

3. *Complex processing methods for medical image databases*

Creating an image database network, distributed in medical units and interconnected in a national system is of great importance both for medical diagnosis support services, research and for evaluations related to medical insurance systems. Methods for data mining and diagnosis based on images are investigated in such areas as retinal diseases, cancer, mammograms, stress, depression and so on.

4. *Intelligent management systems in the waste water treatment domain*

In the field of water treatment we distinguish two types of systems: 1) systems for treating water for feeding water parameters at the right level for human consumption and 2) installations for wastewater treatment designed to destroy various pollutant factors in order to safety flush the waters used for purposes household or industrial.

The goal of the research is to create an intelligent management of waste water treatment, with the following specific objectives: a) Inclusion of the equipment in the concept of SMART CITY; b) Creating an intelligent control system which takes into account historical data for more efficient control of processes; c) Reducing energy consumption; d) Reducing times for maintenance and ongoing analysis, real-time parameters to stipulate any facilities for events; e) Installation of intelligent sensors which communicate with a central control system for automatic metering of households and industrial consumers.

5. *UAV -WSN integrated system for intelligent monitoring of crops*

In terms of technical and scientific use of data from the drones and from the ground sensors in agriculture at low level, the subject is focused on an innovative method that can help to increase crop yields and reduction of chemical fertilizers and herbicides, which leads to profitability, human health and reducing environmental impact.

The purpose of research is to integrate the concepts of "wireless sensor network" and "unmanned aerial vehicles" in a collaborative system based on the fusion of data from the two sources. Specific objectives: a) Design and implementation of terrestrial network of sensors, b) Adapting a fixed type wing platforms - UAV - for flights over a surface and collect images or data from ground sensors. c) Creating a database specific for precision agriculture at local farming concerning data collected and processed and history of crop surfaces.

6. *Internet-controlled multi UAV system for the evaluation of flood effects*

The theme has as main objective to implement a multi-UAV system (fixed wing) to accurately assess the flooded zones in a specified area. The advantage of the multi-drone system is to increase area coverage and decrease operating time. The end result of the research will be a multi- drone system, controlled in a collaborative way, remotely via the internet, to carry out a the task of detection and assessment of flood disaster areas. Through simple configuration, the system can be used in other data (or images) gathering missions in areas affected by disasters.

Objectives: a) Implement communication modules between the drones; 2) Develop a package of processing software and image analysis for detecting, locating and assessing the size of flooded areas. c) Develop an experimental model of the ground control station (GCS) able to simultaneously control multiple drones, d) Implementing parallel algorithms and neural networks for image segmentation in order to assess air disasters such as floods and landslides, e) Implement and test a functional model containing two drones and two GCSs.