



University POLITEHNICA of Bucharest
Faculty of Automatic Control and Computers

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Ph.D. coordinator in "System Engineering" domain
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Research profile

Field of research

Control and Applied Informatics with appreciated achievements in: Identification and Digital Control, Computer Assisted Design in Automatic Control, Adaptive and Robust Control, Mathematical Programming and Optimization, Control and Decisions, Numerical Real Time Control Systems, Large Scale Systems.

Research activities developed at the research center Automation, Process Control and Computers (APCC) as director, and coordinator in the other laboratories of European Universities (LAMMI from Université de Savoie, LAG from INP Grenoble, LEE from Kahosch Gent, LAI from Torino and LAGIS from Lille, LSS SUPELEC from Paris).

Ph.D. coordinator since 1993

- 38 theses finalized;
- 5 theses undergoing.

Significant publications

- 21 books, university courses;
- 224 published articles in journal and proceedings volumes of conferences;
- 85 scientific research contracts and reports (project director in 56);
- 5 patents.

Significant research activities and experience in the management of European projects coordinated or realized in partnership:

- PAI-Brancusi bilateral project, Virtual Laboratory and Remote Control (2003-2005);
- ECONET, Réseau de recherche en Automatique Avancée (2006-2008);
- ARCUS, projet Grayshim en Automatique et Transport (2007-2010);
- CEEEX 97, Integrated systems for the efficient control of thermo-energetic processes (2006-2008);
- CANTI research platform, Advanced Control and New Informatics Technologies (2006-2008);
- CDA Socrates project, Joint Program for Advanced Academic Studies (2000-2002); Socrates Erasmus European academic program (2002-2012);
- EUREKA IKF RO project, Information Knowledge Fusion (2001-2003);
- CEC-WYS-FP6, Central European Center for Young Scientists, (2004-2006);
- EU-NCIT-FP6, National Center for Information Technology Leading to EU IST excellence (2005-2008).

National and international recognition

Member of the Romanian Society for Automation and Technical Informatics – SRAIT; member of the Technical IFAC/APC Committee, 1993-1999; member of the Technical IFAC/PC Committee, 2000-2003; member of the IFAC/CPC, TC 6.1 Committee, 2003-present; member of the IFAC/BIOC, TC 8.3 Committee, 2003-present.

IPC member of 20 conferences, symposia and international workshops: member of the CSCS International Conference, Bucharest 2005, 2007, 2009, 2011, 2013, member of the program committee, IFAC Conference, Large Scale Systems, Bucharest, 2001; member of the program committee, IMACS World Congress, Paris, 2005; member of the program committee, CIFA 2006, Bordeaux, 2006; member of the program committee, CESA 2006, Peking, 2008; member of the program committee, IFAC Conference, LSS, Gdansk, 2007; member of the program committee, IFAC Conference, MCPL, Sibiu, 2007; member of the program committee, International Conference, SOFA-Szeged, 2007, Gyula, 2009; member of the program committee, IFAC Conference, MCPL, Cambria, 2010; member of the program committee, MED 2010, 2011, Marrakesh, 2010, 2014.

Chairman of the IFAC Conference, System Structure and Control, SSC' 97, Bucharest, 24-27 October, 1997; chairman of the CIFA 2008 International Conference, UPB – Faculty of Automatic Control and Computer Engineering, 3-5 September 2008; chairman (invited session) of the International Workshop on Logistics, IFAC- ACCA Santiago, Chile, 24-27 December, 2008; chairman (invited session) of the IFAC World Congress Milano, September, 2011; chairman of the ICSCS Conference, Lille, 2012, 2013; co-chairman of the CSCS International Conference, Bucharest 2005, 2007, 2009, 2011.

Other titles and appreciations

- Founder and Director of the International Summer School “Advanced Control and Applied Informatics”, 1994-2015;
- associated professor of the National Technical Institute from Grenoble – INPG, ENSIEG – LAG, 1997;
- Member of the European Automatic Control Council-EUCA, 2008-2014;

- “Traian Vuia” Award of the Romanian Academy, 1998, and “Gheorghe, Cartianu” Award of the Romanian Academy, 2013 , on Control System Contributions;
- “Henry Coanda ‘’ Award of the Academy, 2015 and Odobreja Award of the Scientists Romanian Academy , for Applied Sciences Contributions;
- Member of The Automatic Control ad Computers Engineering Faculties Council; member of the UPB Senate, 2004-2012; dean of the Automatic Control ad Computers Science Faculty-UPB, 2004-2012; member of the European Control Association- EUCA, 2010- 2013;
- Corresponding member of the Romanian Academy of Technical Sciences -ASTR, 2012;
- Corresponding member of the Scientists Romanian Academy –AOSR, 2014.

Proposals for PhD research subjects

1. *Control of processes with distributed parameters for applications in thermo-energetics*

Description: Computation of the mathematical model for thermo-energetic processes with distributed parameters. Design of advanced control systems for temperature in processes with distributed parameters (experimentations are to be done with predictive control).

Objectives: a) improvement of the thermal energy transfer efficiency in processes with distributed parameters b) development of algorithms dedicated for digital implementation in industrial applications.

2. *Extremal control for photovoltaic panels*

Description: The development of an extremal control method is envisaged, for tracking the maximum generated power of photovoltaic sources. An identification of the mathematical model is done for the photovoltaic panel, the nonlinear characteristic of the system is estimated, the maximum generated power is calculated and a reference tracking system is developed.

Objectives: a) improving the energy conversion efficiency from solar to electric for photovoltaic generators b) contributions are to be brought to existing methodologies for designing and implementing robust control systems.

3. *Modeling and control of traffic for macroscopic configurations*

Description: A macroscopic configuration is considered for urban traffic and the dynamic behavior is estimated for traffic networks based on methods from hydraulic mechanics. Specific control algorithms are developed for compartmental networks expressed as dynamical positive systems for urban traffic control. Results are validated through adequate techniques in simulation and experimental platforms.

Objective: traffic fluidization from a macroscopic perspective and elimination of traffic congestion especially from busy intersections

4. *Design and implementation of an embedded architecture for industrial applications*

Description: The development of an embedded platform for microprocessor based systems is aimed, especially of ARM type, for real-time applications in control, estimation and diagnostic. The industrial applications targeted are with fast dynamics, specific to dc/dc

converters and stepper motors. The experimental platform will be validated in a Hardware In the Loop architecture.

Objectives: a) the development of an embedded real time platform which is microprocessor based b) the implementation of the proposed solution on rapid changing processes (like dc/dc converters and stepper motors).

5. Adaptive control for small sized wind generators, integrated in micro-grids

Description: The aim is to obtain a good mathematical model of a small scale wind turbine with a synchronous generator, structured on subsystems. Control algorithms are to be designed, with robust/adaptive traits that assure imposed performances towards random variations of environment parameters and nonlinearities of the turbine configuration. Validation will be done in simulation on dedicated software and on experimental platforms.

Objectives: a) estimation of a valid dynamic model with variable parameters for small scaled wind turbines b) robust algorithm design and implementation on embedded configurations.

Bucharest, 10.01. 2017

Professor Dumitru Popescu