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Research profile:

- Wireless sensor networks
- Distributed information processing
- Information systems for smart building modelling and control
- Statistical methods for data processing and learning for industrial applications
- Efficient algorithms for heterogeneous IoT systems

Ph.D. coordinator since 2019

Scientific publications: 82 ISI indexed articles out of which 5 in Q1/Q2 ranked journals
Recent publications, relevant for the current research profile:

- Stamatescu G., Entezari R., Romer K., Saukh O., Deep and Efficient Impact Models for Edge Characterization and Control of Energy Events, Proc. of the 25th IEEE International Conference on Parallel and Distributed Systems (ICPADS), Tianjin, China, December 2019.
- Stamatescu G., Dragana C., Stamatescu I., Ichim L., Popescu D., IoT-Enabled Distributed Data Processing for Precision Agriculture, Proc. of the 27th Mediterranean Conference on Control and Automation (MED), Akko, Israel, July 2019.
- Stamatescu G., Stamatescu I., Arghira N., Fagarasan I., Data-Driven Modelling of Smart Building Ventilation Subsystem, Journal of Sensors, vol. 2019, Article ID 3572019, 2019.
- Nichiforov C., Stamatescu G., Stamatescu I., Fagarasan I., Evaluation of Sequence Learning Models for Large Commercial Building Load Forecasting, Information 2019,10,189.
- Popescu D., Stoican F., Stamatescu G., Chenaru O., Ichim L., A Survey of Collaborative UAV-WSN Systems for Efficient Monitoring, Sensors 2019, 19, 4690.
- Fagarasan I., Iliescu S. S., Stamatescu G., Dumitru I., Arghira N., Intelligent Simulator for Industrial Processes, Request A 2009 00756/24.09.2009, Published 30.06.2011//6/2011, RO126447-A2, Awarded Patent 126447B1, 31.10.2018, OSIM.

- Popescu D., Dragana C., Stoican F., Ichim L., Stamatescu G., A Collaborative UAV-WSN Network for Monitoring Large Areas, *Sensors* 2018, 18, 4202.
- Nichiforov C., Stamatescu G., Stamatescu I., Fagarasan I., Iliescu S.St., Intelligent Load Forecasting for Building Energy Management Systems, *Proc. of the 14th IEEE International Conference on Control and Automation (ICCA)*, Anchorage, USA, 2018.
- Stamatescu G., Stamatescu I., Popescu D., Consensus-based Data Aggregation for Wireless Sensor Networks, *Journal Control Engineering and Applied Informatics*, Vol. 19, No. 2, pp. 43–50, 2017.
- Stamatescu I., Arghira N., Fagarasan I., Stamatescu G., Iliescu S.St., Calofir V., Decision Support System for a Low Voltage Renewable Energy System, *Energies*, Vol. 10, No. 1, pp. 118–128, 2017.

Research projects, grants (selection):

- Research grant Fulbright: „Pervasive Energy Monitoring and Control in Buildings through Reliable Wireless Sensor Networks (ENERGY-WSN)”, 2015-2016.
- Project PN-III Innovation cheque: “Multi-protocol gateway for open automation in smart buildings (OPENBMS)”; 73CI; July – December 2017;
- Research grant of the Austrian Academy of Sciences: „Data-driven modelling of complex manufacturing systems (DAMS)”, Joint Excellence in Science and Humanities (JESH), 2019.

Chairs, memberships in scientific organizations and committees, editorial boards, scientific awards

- Senior member, Institute of Electrical and Electronics Engineers (IEEE) – Chair of IEEE Romania Robotics and Automation Society Chapter. Chair of IEEE Romania Section Young Professionals (YP) Affinity Group 2017-2019; Volunteer Leadership Training (VoLT) 2018 program graduate;
- Member of the Association for Computing Machinery (ACM)
- Member of the Romanian Society of Automation and Technical Informatics (SRAIT)
- Member of the IFAC TC3.3. Telematics: Control via Communication Networks
- Editor *Journal of Sensors (ISI)* / Lead guest editor, Special issue: Sensing and Data-Driven Control for Smart Building and Smart City Systems
- Topic editor *Sensors (ISI)* / Lead guest editor, Special issue: Convergence of Intelligent Data Acquisition and Advanced Computing Systems
- Associate Editor *International Journal of Computing (SCOPUS)*
- General co-chair for the 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications IDAACS 2017, Bucharest, Romania
- Organizing committee member for the International Workshop on Systems Safety and Security (IWSSS) 2013-2020; Co-editor of the Springer volume: *Recent Advances in Systems Safety and Security*, 2016
- Best paper award at the conference IEEE CODIT 2018, Thessaloniki, Greece – Wireless Sensor Network Architecture based on Fog Computing
- DG-REGIO expert for the field: Intelligent specialization – Industry digitalization, Automation and Artificial Intelligence

Ph.D. research subjects proposed

1. Open information systems for energy management in large commercial buildings

Large commercial buildings offer significant economic and environmental incentives for improved energy management under growing urbanization tendencies in smart cities. Current monitoring and automation systems are mostly closed hardware-software solutions with high associated costs. The objective is to develop a new methodology for integration of open source components in the automation of modern buildings. This will bridge wired and wireless communication protocols such as Modbus, BACNet, ZigBee, hardware interfaces and software libraries, structured data representations and learning algorithms for modelling and control.

2. Efficient methods for multivariate time series processing for forecasting and anomaly detection

Many industrial processes are monitored through tens to thousands of continuous and discrete sensors producing rich data traces at various timescales. The objective is to first perform a critical evaluation among conventional time series modelling algorithms e.g. multivariate SARIMA, against new machine learning and deep learning models e.g. recurrent and convolutional neural networks, for forecasting and anomaly detection tasks in typical industrial scenarios. Second, the viability of online inference for these types of models will be investigated through targeted case studies e.g. multilevel direct and indirect energy measurement in smart buildings and production facilities.

3. Large scale monitoring by means of distributed sensor networks

Distributed sensor networks involve large numbers of sensing, computing and communication nodes that collaborate for joint observation of interest areas. Embedded consensus algorithms allow improved operation through data reduction and better quality of information. The objective is to develop new methods for distributed sensing in large scale applications that increase network lifetime, resilience and robustness for critical tasks. Implementation and benchmarking will be handled both in simulation and on a dedicated test bed infrastructure in connection to predefined KPIs.

4. Information extraction and in situ control for distributed systems of sensors and actuators

As the on-board resources of embedded sensing and actuation nodes increase, local extraction of relevant information becomes possible as well as embedded predictive control schemes that use this information. This leads to a flatter automation hierarchy composed of cooperating intelligent periphery and an on-demand cloud layer providing advanced control/optimization as a service. The objective is to develop and validate such approaches in both simulation (MATLAB/Simulink) and small scale pilot deployments (two/three tank system, flexible assembly line).

5. Convergence of complex information systems and automation systems within new paradigms such as IIoT and CPS

Modern automation systems increasingly leverage advanced information technologies and protocols for data access and exchange, security, visualisation and reporting. These in turn are being adapted to specific application domains in the industry using significant domain expertise. The objective is to identify first the key areas of overlap and differentiation and proposed a targeted approach that models this convergence, also known as IT/OT integration. A demonstrator platform will be built based on COTS technologies and components such as industrial development boards for monitoring and control, in order to validate the feasibility of the proposed solutions.