

# DEPENDABLE SYSTEMS - DeSy

## Contact details

Name **Dependable Systems**

Acronym **DeSy**

Logo 

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Department **Automation Department**

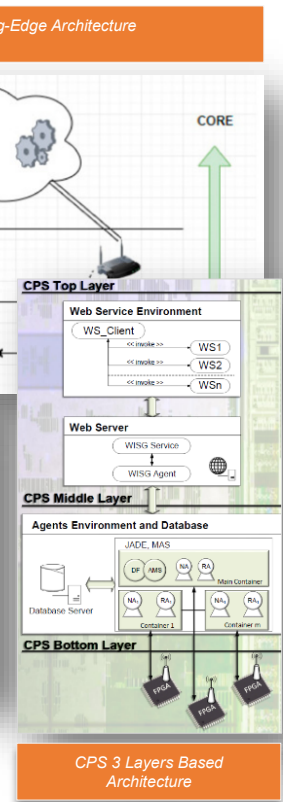
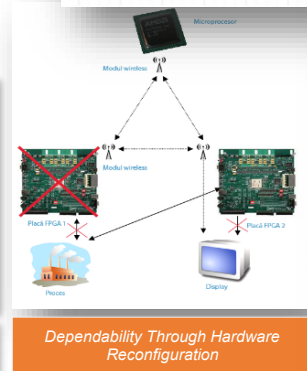
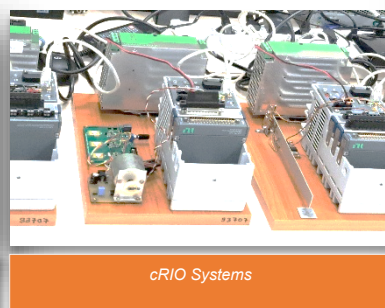
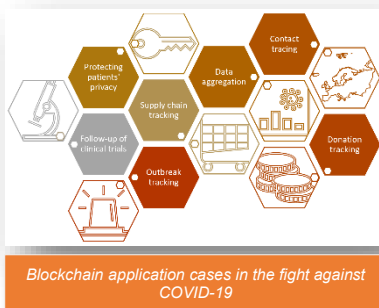
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## Block schemas and equipment elaborated/in use by the DESY group, over time



## Areas of expertise

**Dependability, Security** ► Development of intelligent techniques for dependability (availability, reliability, safety, security, integrity and maintainability), security (confidentially) and testing of information systems; ► Analysis, design, implementation and testing of information systems with dependability properties used in various fields (e.g. critical infrastructure - energy, water, environment, transport; medicine). **Cyber – Physical Systems (CPSs)** ► Development of abstractions, models, architectures and tools to allow implementation of reliable CPSs (including areas as cloud- fog-edge architectures) made from unsafe components and resistant CPSs at cyber or physical attacks; ► Development of the semantic basics for heterogeneous models' composition and for modelling languages that describe various physical processes of a CPS and their associated logic. **Intelligent Systems** ► Analyses, design, implementation and testing of intelligent real-time control and monitoring systems using artificial intelligence techniques (intelligent agents, fuzzy logic, machine learning, decision support systems, deep neural networks).

## Team

**Prof. Eng. Liviu MICLEA, PhD;** Prof. Eng. Honoriu VĂLEAN, PhD; Prof. Eng. Silviu FOLEA, PhD; Prof. Eng. Ovidiu STAN, PhD; Assoc. Prof Eng. ENYEDI Szilard, PhD; Assoc. Prof. Eng. Dan GOȚA, PhD; Lecturer Eng. Iulia ȘTEFAN, PhD; Lecturer. Eng. Cosmina CORCHEȘ, PhD; Lecturer Eng. Adela POP, PhD; Lecturer. Eng. Alexandra FANCA, PhD; Lecturer. Eng. Claudiu DOMUȚA, PhD; Assist. Eng. Marius MISAROȘ ► **PhD students:** Eng. Henrietta-Helena FUTO; Eng. Diana-Elena NIȚI, Alexandru STANCIU; Eng. Pavel-Alexandru BEJAN; Eng. Alexandru CIOBOTARU; Eng. Tudor COVRIG; Eng. Lucian FARMATHY-POP; Eng. Alexandra-Elena DOBRE; Eng. Vlăduț DOBRA; Eng. Andreea MUSCAN; Eng. Razvan DOLOGA; Eng. Bogdan DRĂGHICI; Eng. George FLUTUR; Eng Alexandru JIBOTEAN.

## Representative projects

### The most representative projects of the last 10 years

► 2024-2026 - "**Cybersecurity Seminars**" TUCN project , funded by the Google.org Cybersecurity Seminars Program ► 2024-2025 - **FortifyAI: Enhancing Efficiency, Reliability, and Security through Integrated HW-SW Co-Design for AI Algorithms**, Ro-Fr Bilateral Cooperation, École Centrale de Lyon ► 2021- 2023 - "**The Innovative European University of Technology (Inno-EU+)**", a HEI Initiative project aiming to enhance the innovation and entrepreneurial capacity of a new European University Alliance, the European University of Technology (EU+) ► 2018-2020 - **ROBIN - "Robots and Society: Cognitive Systems for Personal Robots and Autonomous Vehicles"**, PCCDI2018 ► 2014-2017 - **F2S, "SCADA Federation, Collaborative Instrument for Water Management – Somes River Pilot Application"**, National PN2- Partnerships project, ► 2013-2016 - "**Use of commercial drones for autonomous maintenance services in railways**", cooperation with Siemens company ► 2014-2015 - "**Cluj-Napoca: Next Generation Brained City - Software design for service monitoring at the level of the medical network, through innovative solution integration**", Sectoral Operational Programme "Increase of Economic Competitiveness" (POSCCE) project ► 2013-2017 - **ProSEco, "Collaborative environment for design of Aml enhanced product-services integrating highly personalised innovative functions with minimal ecological footprint along life cycle**

[and of their production processes based on collaborative environments](#), European FP7 project ►2013-2014 - **CyCloSe**, ["Designing Cloud-based Self-healing Cyber-Physical Systems"](#), Ro-It Bilateral Cooperation with Politecnico di Torino

## Significant results

### The most representative publications of the past 8 years

► Misaroş, M.; Stan, O.P.; Enyedi, S.; Stan, A.; Donca, I.; Miclea, L.C., ["A Method for Assessing the Reliability of the Pepper Robot in Handling Office Documents: A Case Study"](#), Biomimetics 2024, 9, 558., ► IC Donca, OP Stan, M, Misaros, A. Stan, L. Miclea, ["Comprehensive Security for IoT Devices with Kubernetes and Raspberry Pi Cluster"](#), Electronics, 2024, 13, 9, ► S. Gundala, MM Basha, V. Madhurima, OP Stan, ["Input Voltage-Level Driven Split-Input Inverter Level Shifter for Nanoscale Applications"](#), Electronics, 2024, 13 ► Roy, P.P.; Teju, V.; Kandula, S.R.; Sowmya, K.V.; Stan, A.I.; Stan, O.P. ["Secure Healthcare Model Using Multi-Step Deep Q Learning Network in Internet of Things"](#). Electronics 2024, 13, 669 ► Urs, P., Muresan, V., Hulea, M., Ştefan, I. (2024). ["Securing the <sup>18</sup>O Oxygen Isotope Separation Process: A Focus on Network Devices and Access Servers"](#). In: Cioboată, D.D. (eds) International Conference on Reliable Systems Engineering (ICoRSE) - 2024. ICoRSE 2024, vol 1129. Springer, Cham ► Sudhakar, M.V.; Stan, O.P. ["Implementation of High-Speed Compact Level-Up Shifter for Nano-Scale Applications"](#). Electronics 2023, 12, 5015A ► Stăncioi, C.-M.; Ştefan, I.A.\*; Briciu, V.; Mureşan, V.; Clitan, I.; Abrudean, M.; Ungureşan, M.-L.; Miron, R.; Stativă, E.; Nanu, M.; et al. ["Solution for the Mathematical Modeling and Future Prediction of the COVID-19 Pandemic Dynamics"](#). Appl. Sci. 2023, 13, 7971 ► Ventrapragada T., Sowmya K.V., Kandula S.R., Stan A., Stan O.P., ["A Hybrid Retina Net Classifier for Thermal Imaging"](#), Applied Sciences-Basel, Vol. 13, 14, 2023, ► M. Misaros, O.P. Stan, I. Donca, L. Miclea, ["Autonomous Robots for Services - State of the art, Challenges, and Research Areas"](#), Sensors, Vol. 23,10, , ► Stefan, I. et al. (2023), ["Technology and Education as Drivers of the Fourth Industrial Revolution Through the Lens of the New Science of Learning"](#), HCII 2023. LNCS, vol 14040. Springer ► I. M. Dobra, V. A. Dobra, A. A. Dobra, G. Harja, S. Folea and V. D. Gavra, ["Long-Range Network of Air Quality Index Sensors in an Urban Area,"](#) Sensors 23, 9001A ► O. Bunta, D. Festila, V. Muresan, T. Colosi, O. Stan, M. Unguresan, M. Baciut, ["Mathematical Modeling and Digital Simulation of Teeth Dynamics for the Approximation of Orthodontic Treatment Duration"](#), Applied Sciences-Basel, Vol. 13, 10, 2023 ► A. Pop, A. Fanca, D. Gota, H. Valean, ["Monitoring and Prediction of Indoor Air Quality for Enhanced Occupational Health"](#), Intelligent Automation & Soft Computing, Vol.35, No.1, pp. 925-940, 2023, ISSN: 2326-005X, 2022, ► Novac O.-C., M. C. Chirodea, C.M. Novac, N. Bizon, M. Oproescu, O.P. Stan, C.E. Gordan, ["Analysis of the Application Efficiency of TensorFlow and PyTorch in Convolutional Neural Network"](#), Sensors 22, no. 22: 8872 ► Donca, I.C., O.P. Stan, M. Misaros, D. Gota, and L. Miclea. ["Method for Continuous Integration and Deployment Using a Pipeline Generator for Agile Software Projects"](#) Sensors 22, no. 12: 4637. ► A. G Berciu, E. H Dulf, I.A. Stefan, ["Flexible Augmented Reality-Based Health Solution for Medication Weight Establishment"](#), 2022, Processes, vol. 10, 2, page 219 ► A. Ciobotariu, D. Gota, A. Pop, O. Stan, A. Fanca, C. Domuta, H. Valean, L. Miclea. ["Demographic Attributes Classification via Convolutional Neural Networks: A Proposed Solution"](#), Proc. of 2022 ICECET, 2022, Prague, pp. 1-6, Czech Republic, ISBN:978-1-6654-7087-2 ► C. Corches, M. Daraban, L. Miclea, ["Availability of a RFID Object Identification System in IoT Environment"](#), Sensors, ISSN 1424-8220, Vol 21, 18, Sep. 2021, ► H. Patel, D.S. Rajput, O. P. Stan, L. C. Miclea, ["A New Fuzzy Adaptive Algorithm to Classify Imbalanced Data"](#), CMC-Computers, Materials & Continua, Vol.70, No.1, pp. 73-89, 2022, DOI:10.32604/cmc.2022. 017114 ► C. Muresan, I. Birs \*, E. Dulf, D. Copot, L. Miclea, ["A Review of Recent Advances in Fractional Order Sensing and Filtering Techniques"](#), Sensors, ISSN 1424-8220, vol. 21, 17, article number: 5920, 2021 ► tan, O.P.; Enyedi, S.; Corches, C.; Flonta, S.; Stefan, I.; Gota, D.; Miclea, L., ["Method to Increase Dependability in a Cloud-Fog-Edge Environment"](#), Sensors 2021, 21, 4714 ► C. Corches, M. Daraban, O. Stan, Szilárd Enyedi, L. Miclea, ["Interconnection of Systems with Cloud-Fog-Edge architectures: Concept and Challenges"](#), Control Engineering And Applied Informatics, vol 23, 1, pp.60-71, 2021 ► I. Ştefan, L. Miclea and H. Vălean, ["Towards Testing Considerations Of Experimental Decision Support System Design"](#), " 2020 IEEE International Conference on Automation, Quality and Testing, Robotics (AQTR), 2020, pp. 1-6, doi: 10.1109/AQTR49680.2020.9129954, ► I. Muntean, G. D. Mois, S. C. Folea, ["Development and Analysis of a Low-Cost IoT Sensor for Urban Environmental Monitoring"](#), International Journal of Computers Communications & Control, Vol. 16, No. 5, 2021. ► A. Scurtu, C. Dehelean, S. Enyedi, L. Miclea, ["Using Cognitive Services within CPS/SCADA Systems Federations - Concepts, Research Areas and Challenges."](#) 2020 IEEE International Conference on Automation, Quality and Testing, Robotics (AQTR), Cluj-Napoca, Romania, 2020, pp. 1-4 ► O. Stan, L. Miclea, ["New Era for Technology in Healthcare Powered by GDPR and Blockchain"](#), MediTech, Cluj Napoca, Romania, OCT 17-20, 2018, Book Series: IFMBE Proceedings, Volume: 71, Pages: 311-317, Springer.

### Patents

J. Figueras, L. Miclea, G. Moiş, ["Method for the dynamic voltage scaling in an arithmetic-logic unit based on on-line error detection"](#), no. OSIM: 130282/30.03.2018

## The offer addressed to the economic environment

**Research & development** ► Abstractions definition, architectures design and tools implementation to achieve the development of highly dependable and secure CPSs; ► Expansion of artificial intelligence techniques in order to implement some modelling and control applications. ► Analysis, design, implementation and validation of dependable CPSs used in water resources management, electrical power generation and transport, cloud-fog-edge infrastructure; ► Analysis, design, implementation and validation of information systems applied in various fields; ► Application of artificial intelligence techniques in energy production, medicine, food quality control.

**Consulting** ► Consulting, research, design, development of dependable information systems and intelligent systems for industrial and scientific environment.

**Applied engineering services** ► Computer testing services ► Programming and software and hardware consultancy services ► Intelligent systems design and implementation services.

**Training: Dependability basics:** availability, reliability, safety, integrity and maintainability; ► **CPS basics:** hardware and software architecture, physical devices development and programming, decision support, historical databases design and management, historical data pre- and post-processing; ► **Software testing techniques:** functional testing, structural testing, use of software testing frameworks; ► **Artificial intelligence techniques:** AI agents, multi-agent systems, machine learning.

Last updated: January 2025