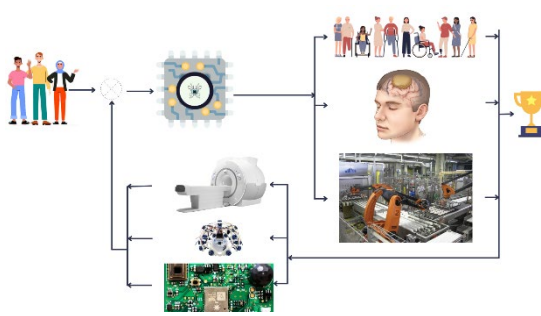
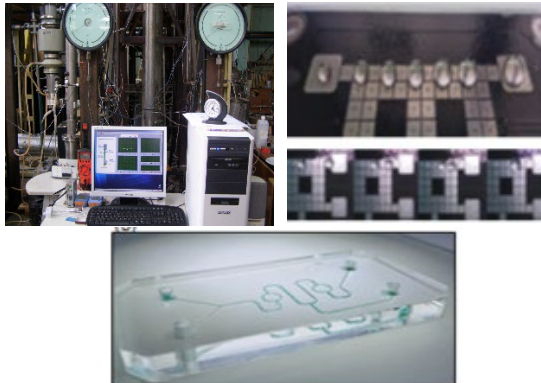


ADVANCED PROCESS CONTROL METHODS

Contact details

Name	Advanced Process Control Methods	
Acronym	ADAPTED	
Logo		
Site	https://control.utcluj.ro/	
Address	2 Observatorului Str., 400489, Cluj-Napoca, Romania	
Faculty Department	Faculty of Automation and Computer Science, Automation Department	
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Areas of expertise

Complex process modelling and simulation

- Detailed models and simulations of various industrial, biotechnological and medical processes;
- Modelling and simulation for personalized medicine.

Tuning, design and testing of various control solutions including advanced control algorithms such as predictive, fractional, fault-tolerant or robust control

- Conceptual design of various control loops from classical PID to advanced control algorithms;
- Control strategy implementation;
- Control optimization.

Particular advanced monitoring, supervising and control methods for non-conventional processes and technologies

- Conceiving of new, efficient technologies in nonconventional processes;
- Modelling, monitoring and control of biochemical and biomedical processes;
- Improved efficiency based on optimization; process maintenance;
- Engineering in diagnosis and personalized medicine.

Team

Prof. Habil. Eng. Eva H. Dulf, PhD; Prof. Eng. Clement Festila, PhD; Prof. Eng. Cristina I. Muresan, PhD; Assoc. Prof. Eng. Roxana Rusu-Both, PhD; Assoc.Prof.Eng. Ioana Nascu, PhD; Lecturer Eng. Isabela Birs, PhD, Eng. Daniel Timis, PhD

PhD students: MSc.eng. Alex Danku, Msc.Eng. Andrei Kovari, MSc Eng. Andrei Tulbure, MSc Eng. Noemi Lorenzovici, MSc Eng. Elisabeta Kozma, MSc.Eng. Alexandru Berciu, MSc.Eng. Marcian Mihai, MSc Eng. Erwin Hegedus, MSc.Eng. Paul Pintea, MSc.Eng. Nicoleta Badau, MSc.Eng. Sebastian Manase, MSc.Eng. Loredana Buliga

Master students: Eng. Teodora Popescu, Eng. Andreea Todea, Eng. Diana Dobocan, Eng. Denisa Santa, Eng. Ada Tudor, Eng. Alin Malita, Eng. Roland Bistrischi, Eng. Dana Rus, Eng. Thomas Zareczky

Representative projects

Centre of Excellence in Computer Assisted Systems for Drug Dosing Control and Optimisation, PNRR-III-C9-2022-I8 (2023-2026), <https://control.utcluj.ro/projects/optimdruug/>

Nanovaccinal Approaches for Colon Cancer, PN-III-P2-2.1-PED-2019-0844 (2020-2022), <https://nanovacol.wixsite.com/home>

Development of an intelligent combined imagistic-cytologic-molecular system to guide the diagnosis, risk stratification and the management of thyroid cancer, PN-III-P2-2.1-PED-2019-2536 (2020-2022), <https://tircitogen.wixsite.com/home>

Solid-State Bioprocess Development and Optimization for the Sustainable Production of Powerful Antioxidants from Grape Pomace using Filamentous Fungi, PN-III-P2-2.1-PED-2019-1660 (2020-2022), <https://bioantox2020.wixsite.com/home>

Novel Fractional Order Autotuners for Poorly Damped Systems to Ensure Improved Safety and Comfort, PN-III-

P1-1.1-TE-2019-0745 (2019-2021), <http://cristina-muresan.com/research/te1432020>

A sedation patient simulator for patient-individualised optimal drug dosing in general anaesthesia, PN-III-P2-2.1-PED-2019-0322 (2019-2021), <http://cristina-muresan.com/research/552ped2019/>

SWEETCONOMY - Functional collaboration model between public research organizations and the economic environment for the provision of high-level scientific and technological services in the field of bio-economy, PNIII-P1-1.2 PCCDI 2018, (2018-2020) <https://sweetconomy.com>

Significant results

The most representative publications of the past 5 years:

1. Lorenzovici, N., Silaghi, H., Dulf, E.H., Braicu, C., Silaghi, C.A. (2026). Advanced AI-Powered System for Comprehensive Thyroid Cancer Detection and Malignancy Risk Assessment. *Life*, 16(1), 38
2. Danku, A.E., Dulf, E.H., Berciu, A.G., Lorenzovici, N., Mocan, T. (2025). Colorectal Cancer Detection Tool Developed with Neural Networks. *Applied Sciences*, 15(15), 8144
3. Keyser, R.D., Birs, I.R., Muresan, C.I. and Ionescu, C.M., (2025). Revisiting the impulse response creates an improved PID autotuner. *Scientific Reports*, 15(1), p.36203.
4. Berciu, A.G., Dulf, E.H., Jurj, D., Czumbil, L., Micu, D. (2024). Energy Pulse: Competitive and Accessible Application for Monitoring Electricity Consumption. *Perspectives in Dynamical Systems I — Applications* (pp. 107-117). Cham: Springer Nature Switzerland.
5. Orzan, R. I., Santa, D., Lorenzovici, N., Zareczky, T. A., Pojoga, C., Agoston, R., Dulf E.H.*, Seicean, A. (2024). Deep Learning in Endoscopic Ultrasound: A Breakthrough in Detecting Distal Cholangiocarcinoma. *Cancers*, 16(22), 379.
6. Timis, D. D., & Dulf, E. H. (2024). Unmanned Aerial Vehicles: State of the Art on Swarm Control. *Journal of Control Engineering and Applied Informatics*, 26(4), 69-80.
7. Muresan, C. I., Hegedüs, E. T., Mihai, M. D., Othman, G. B., Birs, I., Copot, D., Dulf E.H., deKeyser R., Ionescu C., Neckebroek, M. (2024). Fractional-Order Modeling of the Depth of Analgesia as Reference Model for Control Purposes. *Fractal and Fractional*, 8(9), 539.
8. Gonciar, D., Berciu, A. G., Dulf, E. H., Orzan, R. I., Mocan, T., Danku, A. E., Lorenzovici N., Agoston-Coldea, L. (2024). Computer-Assisted Algorithm for Quantification of Fibrosis by Native Cardiac CT: A Pilot Study. *Journal of Clinical Medicine*, 13(16), 4807.
9. Timis D.D., Muresan C.I., Dulf E.H.* (2022) Design and Experimental Results of an Adaptive Fractional-Order Controller for a Quadrotor, *Fractal and Fractional*, 6 (4), 204
10. Tulbure, A. A., Tulbure, A. A., & Dulf, E. H.* (2022). A review on modern defect detection models using DCNNs—Deep convolutional neural networks. *Journal of Advanced Research*, 35, 33-48

Significant solutions:

Monitoring, modelling and control of complex processes (chemical, biomedical applications)

Fractional order control strategies for time delay and MIMO processes

Modelling and control of physiological systems

Products and technologies:

1. Mathematical models of complex chemical and biochemical processes
2. Medical applications
3. Special transducers designed for isotope separation columns
4. Advanced control strategies for ^{13}C cryogenic isotope separation column and a separation cascade

Patents:

1. R.A. Munteanu, E.H. Dulf, C. Festila, R. Munteanu, G. Todoran, "Analogue electronic transducer for measuring power in direct current circuits, RO-128666/2018
2. Experimental unit for studying the fractional order characteristics of non-Newtonian fluids, Romanian patent proposal no. A00389/31.05.2018
3. Process for tuning fractional controllers for multivariable processes with deadtimes, RO132450-A2/2016
4. Platformă integrată pentru generarea de date sintetice și instruirea în anestezie prin simulare, A00544/20.11.2025

The offer addressed to the economic environment

Research & development	Identifying fundamental principles and methodologies that enable systems to exhibit intelligent, goal-oriented behaviour, and developing innovative instruments to monitor, manipulate, and control systems; Tuning, design and testing of various control solutions using advanced control algorithms, such as predictive, fractional or robust control; Modelling biochemical and biomedical processes.
Consulting	Consulting in simulation, design, implementation and maintenance of control systems for multiple industrial field; Consulting in structural and nonlinear modelling of complex processes; Consulting in process management using different simulation environment.
Training	Complex process modelling and simulation; Tuning, design and testing of various control solutions including advanced control algorithms such as predictive, fractional or robust control; Biomedical engineering.

Last update on January 2026