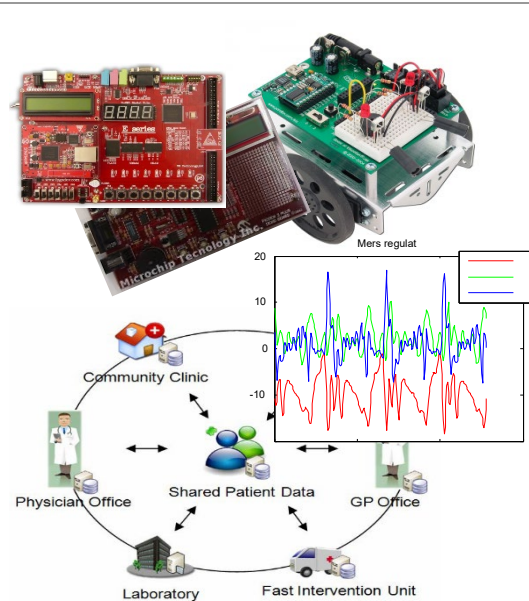


EMBEDDED AND DEDICATED COMPUTER SYSTEMS LABORATORY

Contact details

Name	Embedded and Dedicated Computer Systems
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Areas of expertise

IoT, IIoT, Industry 4.0, industrial networks, cyber-physical systems, Design of applications in the area of IoT, Industrial IoT and cyber-physical systems

Embedded systems, Dedicated digital systems, Modeling, design and implementation of hardware & software systems adapted for various applications in industrial, medical and security domains.

Anomaly detection, AI and signal processing methods used for detecting anomalies in different areas: industry, medical field, finance, etc.

Syber-security, methods and tools for malware detection and protection

eHealth systems: Design and implementation of distributed medical information systems and remote patient monitoring applications

Real random number generators and Cryptography: Design and implementation of Real random generators based on the exploitation of physical phenomena known for their intrinsic random nature (eg quantum phenomena).

Team

Prof. Dr. Eng. Gheorghe Sebestyen, Prof. Dr. Eng. Alin Suci, Assoc. Prof. Dr. Eng. Anca Hangan, Assoc. Prof. Dr. Eng. Lucia Vacariu, Senior Lecturer, Dr. Madalin Neagu, Senior Lecturer Dr. Eng. Kinga Marton, PhD students: eng. Codruta Serban, eng. Andrei Muntea, eng. Ioan Ticovan, eng. R. Portase

Representative projects, workshops, summer schools

VLDB Summer School, 2023, 2024,

Workshop -Enabling Machine Learning Operations for next-Gen Embedded Wireless Networked Devices

December 10, 2024

Watergame - Smart Urban Water-Based on Community Participation Through Gamification, Project experimental – demonstrativ – PED, 2020-2022

Members in the Development Team of CloudUT "Proiect: Cloud Cercetare UTCN – CLOUDUT"

Knowledge transfer on Sensor networks and RFID technologies, contract with CIA SA, Cluj, (2018-2019)

Anomaly detection in sensor networks, internal grant, 2017-2018

CyberWater, "Prototype Cyberinfrastructure-based System for Decision-Making Support in Water Resources Management", ", PNII PCCA (Joint Applied Research Project), <http://cyberwater.cs.pub.ro/drupal-7.17/> (2012-2015)

Jeopard, "Java Environment For Parallel Realtime Development", European FP7 project, http://www.jeopard.org/index.php?option=com_content&view=article&id=53&Itemid=58 (2007-2010)

PRO-INOVA, "Educational Program in Innovation Management", POSDRU/21/1.5/G/24239,

<http://platinova.utcluj.ro/DetaliiProiect/index.php> (2010-2012)

CryptoRand, "A High Performance System for Generation and Testing of Random Number Sequences for Cryptographic Applications", <http://cryptorand.utcluj.ro/> (2007-2010)

Significant results

The most representative publications of the past 5 years:

1. RM Portase, RL Portase, A Colesa, G Sebestyen, LEDA—Layered Event-Based Malware Detection Architecture, Publication Sensors, MDPI, 2024
2. CM Serban, G Sebestyen, A Hangan, ECG Data Classification with Privacy Preservation in the IoT Context, 2024 IEEE 3rd Conference on Information Technology and Data Science, 2024
3. RM Portase, A Colesa, G Sebestyen, SpecRep: Adversary Emulation Based on Attack Objective Specification in Heterogeneous Infrastructures, Publication Sensors, MDPI, 2024
4. RM Portase, AM Muntea, A Mermeze, A Colesa, G Sebestyen, Detection Strategies for COM, WMI, and ALPC-Based Multi-Process Malware, Sensors (Basel, Switzerland) 24 (16), 5118

5. CM Serban, G Sebestyen, A Hangan, Anomaly Detection in Water Consumption Patterns Using Prediction and Clustering Approaches, 2024 IEEE International Conference on Automation, Quality and Testing
6. IV Țicovan, G Sebestyen, Forensic Investigation of Data Storage Systems, 2024 IEEE International Conference on Automation, Quality and Testing, 2024
7. RM Portase, A Coleșa, G Sebestyen, Efficient Multi-Stage Detection of Malicious Windows Executable During Execution, 2023 IEEE 19th ICCP, 2023
8. Z Czako, G Sebestyen, A Hangan, Benchmarking Anomaly Detection Algorithms using Hyperparameter Optimization, 2023 IEEE 19th ICCP 2023
9. AD Hofnăr, T Bakos, G Sebestyen-Pal, Protecting Against Caller ID Spoofing Attacks Using In-band Signaling
10. 2023 IEEE 19th ICCP, 2023
11. Surdea-Blaga, T.; Sebestyen, G.; Czako, Z.; Hangan, A.; Dumitrascu, D.L.; Ismaiel, A.; David, L.; Zsigmond, I.; Chiarioni, G.; Savarino, E.; Leucuta, D.C.; Popa, S.L. Automated Chicago Classification for Esophageal Motility Disorder Diagnosis Using Machine Learning. *Sensors* **2022**, *22*, 5227.
12. Hangan, A.; Chiru, C.-G.; Arsene, D.; Czako, Z.; Lisman, D.F.; Mocanu, M.; Pahontu, B.; Predescu, A.; Sebestyen, G. Advanced Techniques for Monitoring and Management of Urban Water Infrastructures—An Overview. *Water* **2022**, *14*, 2174. <https://doi.org/10.3390/w14142174>
13. Czako, Z.; Surdea-Blaga, T.; Sebestyen, G.; Hangan, A.; Dumitrascu, D.L.; David, L.; Chiarioni, G.; Savarino, E.; Popa, S.L. Integrated Relaxation Pressure Classification and Probe Positioning Failure Detection in High-Resolution Esophageal Manometry Using Machine Learning. *Sensors* **2022**, *22*, 253.
14. A. Hangan, Z. Czako and G. Sebestyen, "IoT data collection and analysis services on CloudUT," 2021 IEEE 17th International Conference on Intelligent Computer Communication and Processing (ICCP), Cluj-Napoca, Romania, 2021, pp. 85-91, doi: 10.1109/ICCP53602.2021.9733537.
15. G. Sebestyen, A. Hangan and Z. Czako, "Anomaly detection in water supply infrastructure systems," 2021 23rd International Conference on Control Systems and Computer Science (CSCS), Bucharest, Romania, 2021, pp. 349-355, doi: 10.1109/CSCS52396.2021.00064.
16. A. Tosa, A. Hangan, G. Sebestyen and Z. István, "In-Storage Computation of Histograms with differential privacy," 2021 *International Conference on Field-Programmable Technology (ICFPT)*, Auckland, New Zealand, 2021, pp. 1-4, doi: 10.1109/ICFPT52863.2021.9609899.
17. Claudiu Mihali, Anca Hangan, Gheorghe Sebestyen, and Zolt István. 2021. The case for adding privacy-related offloading to smart storage. In *Proceedings of the 14th ACM International Conference on Systems and Storage (SYSTOR '21)*. Association for Computing Machinery, New York, NY, USA, Article 10, 1–11.
18. Zoltan Czako, Gheorghe Sebestyen, Anca Hangan, AutomaticAI – A hybrid approach for automatic artificial intelligence algorithm selection and hyperparameter tuning, *Expert Systems with Applications*, Volume 182, 2021, 115225, ISSN 0957-4174

Tools and platforms developed:

Water consumption data collection and processing system – set of services developed for Watergame project.

IoT data collection and analysis service on CloudUT - set of integrated services for the collection and analysis of data from IoT devices used for monitoring in cyber physical systems.

AutomaticAI – Platform for artificial intelligence (AI) processing and anomaly detection – assures automatic selection and tuning of the best AI algorithm for a given classification problem.

CARDIONET - Computerized healthcare system designed to provide tracking and management of patients with cardiovascular disease.

Platlnova - Platform type digital library for the acquisition, storage, processing and retrieval of information contained in patents

RTMultiSim - Integrated simulation and optimization of real-time systems on parallel and distributed structures

CryptoRand - Integrated high-performance system for generating and testing sequences of random numbers for cryptographic applications

The offer addressed to the economic environment.

Research & development	Anomaly detection techniques based on artificial intelligence Security of cyber-physical systems Efficient strategies for scheduling communication and tasks on real-time parallel and distributed architectures; integrated modelling, simulation and optimization of real-time systems. Advanced techniques for generating random numbers with applications in cryptography. Portable medical devices - for continuous monitoring of patients for prophylactic treatment of chronic diseases., Sensor networks for monitoring rivers
Consulting	Cyber-physical Systems, Cyber-Security, IoT, IIoT, Design of dedicated systems based on specialized processors. Development of real-time applications. Cryptography and random number generators Evaluating the quality of a random number generators. Evaluation of algorithms using random number generators Industrial Informatics, industrial networks, According to TRNG design and implementation of user specifications, wireless Sensor Networks
Training	Computer Architecture, Industrial Informatics, Parallel and Distributed Computing, Quality systems, Cryptography.

Last updated: January 2025