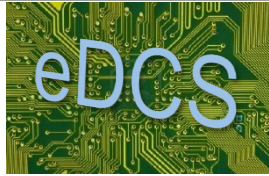
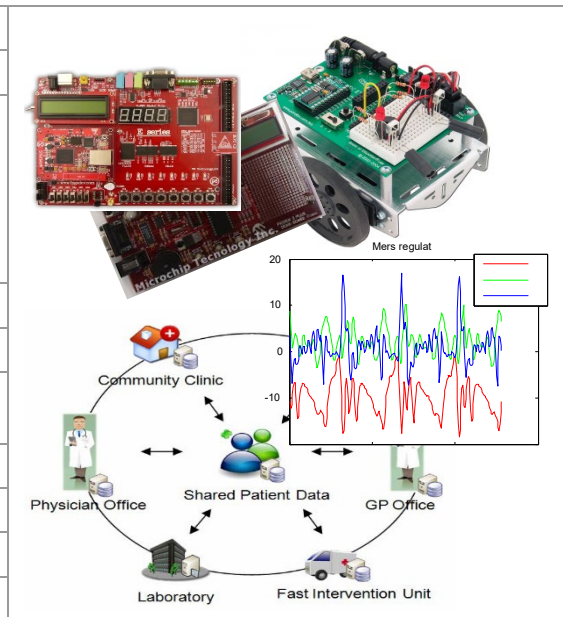


EMBEDDED AND DEDICATED COMPUTER SYSTEMS LABORATORY

Contact details

Name	Embedded and Dedicated Computer Systems
Acronym	eDCS
Logo	
Site	http://users.utcluj.ro/~sebestyen/eDCS.html
Address	26-28 G. Baritiu Str., 400027, Cluj-Napoca, Romania
Faculty Department	Faculty of Automation and Computer Science Computer Science Department
Telephone	+40 264 401489
Fax	+40 264 594491
Director	Prof. Dr. Eng. Gheorghe Sebestyen
e-mail	gheorghe.sebestyen@cs.utcluj.ro



Areas of expertise

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.

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

Real-time systems: Real-time systems modeling and design, scheduling strategies and simulation

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. Zoltan Czako, Eng. Simion Tatar, eng.Tamas Bakos, eng. Dragos Hofner, eng. Ioan Ticovan

Representative projects

Watergame - Smart Urban Water-Based on Community Participation Through Gamification, Proiect 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/DetaliuProiect/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. 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.
2. 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>
3. 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.

4. 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.
5. 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.
6. 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.
7. Claudiu Mihali, Anca Hangan, Gheorghe Sebestyen, and Zsolt 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.
8. 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
9. A. Suci, A. Hangan, A. Marginean, M. Joldos, G. Voicu and M. Echim, "Parallel implementation of a PIC simulation algorithm using OpenMP," 2020 15th Conference on Computer Science and Information Systems (FedCSIS), Sofia, Bulgaria, 2020, pp. 381-385, doi: 10.15439/2020F130.
10. G Kovács, G Sebestyen, A Hangan, "Evaluation metrics for anomaly detection algorithms in time-series", Acta Univ. Sapientiae 11 (2), 113-130, 2019
11. Neagu, M., Manich, S., Hardware Level Security Techniques Against Reading of Cache Memory Sensitive Data, capitol în cartea Advances in Microelectronics: Reviews, Book Series, Vol. 2, IFSA Publishing, ISBN 978-84-09-08160-8, pp. 307 - 362, Barcelona, Spain, 2019
12. Gheorghe Sebestyen, Anca Hangan, "Anomaly Detection Using System Identification Techniques", ICINCO 2018 - International Conference in Informatics in Control, Automation and Robotics, Porto, Portugal, 2018
13. G. Sebestyén, A. Hangan, G. Kovacs, Z. Czako, "A Platform for Anomaly Detection in Time-Series", SIP'2018, Budapest, 2018
14. Neagu, M., Time performance and power efficiency of Interleaved Scrambling Technique for cache memories, ACAM Journal: Automation, Computers, Applied Mathematics, ISSN 1221-437X, Vol. 27, Nr. 1, pp. 7 – 12, 2018
15. K. Marton, L. Pârvu, A. Suci, "The Impact of Post-processing Functions on Random Number Sequences", in Proceedings - 2018 IEEE 17th Roedunet International Conference, DOI: 10.1109/ROEDUNET.2018.8514140, 2018
16. Sebestyen, Gheorghe; Hangan, Anca; Czako, Zoltan; et al., "A Taxonomy and Platform for Anomaly Detection", 21st IEEE International Conference on Automation, Quality and Testing, Robotics (AQTR THETA) Location: Cluj Napoca, ROMANIA Date: MAY 24-26, 2018

Tools and platforms developed:

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

Platnova - 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 2023