## COMMUNICATIONS NETWORKS AND PROTOCOLS RESEARCH LAB

**Contact details**

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| Name | **Communications Networks and Protocols Research Lab** |
| Acronym | **LabRPC** |
| Logo | Communications Networks and Protocols Research Lab |
| Site | https://cnp.utcluj.ro/ |
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**Areas of expertise**

**Computer and communication networks, Communication protocols**
- development of frameworks for efficient data transmissions within hybrid computer networks optimizing the use of available bandwidth; - design and implementation of Quality of Service aware frameworks; software defined networks; - security and virtualization

**Wireless Sensor Networks**
- development of new methods for routing within sensor networks and IoT, efficient use of resources and secure access to WSNs; - development of specific secure applications with WSNs, IoT, Sensors-Cloud systems, SDN and NFV

**Grid communications**
- grid based applications development (intensive computing, specific management)
- development of smart communication protocols, integration of real-time decision-making algorithms

**Software products**
- hybrid software and hardware computer networks, wireless and sensors communication, adaptive routing, secure communications, software networks, benchmarking, IoT architectures

**Applied IT&C technologies in different domains**
- data acquisition and data management, environmental monitoring, strategic communication

**Team**

**Prof. Dr. Eng. Vasile Teodor DADARLAT**, Assoc. Prof. Dr. Eng. Emil CEBUC, Assoc. Prof. Dr. Eng. Adrian PECULEA, Assoc. Prof. Dr Eng. Bogdan IANCU, Dr. Eng. Sorin BUZURA, Drd. Eng. Rudolf KOVACS

**Representative projects**

**Cloud Cercetare UTCN – CLOUDUT,** UTCN**,** Operational Program "Competitivitate 2014-2020" (POC), Manager infrastructure and acquisitions: Assoc. Prof. Dr. Eng. Emil CEBUC.

**Study of security solutions for FinTech communications networks,** categ. contracts with economic agents, 2020-2021, project coordinator: Assoc. prof. dr. ing. Bogdan IANCU.

**Theoretical and experimental research on the development of sustainable employability of future IT engineers through cooperation with the business environment,** Contract no. 12106 / 21.05.2020, Research-Development-Innovation Contract - RDI categ. contracts with economic agents, project coordinator: Assoc. prof. dr. ing. Adrian PECULEA.

**Interconnection WSN (Wireless Sensor Network) networks for precision agriculture. Hybrid models of classification, recommendation and learning**; Internal Competition for Research, Development, Innovation Grants UTCN CICDI 2017-2018, project coordinator: S.I. dr. ing. Bogdan IANCU.

**Brained City:** Innovative Development through Computerization of the Cluj-Napoca Urban Ecosystem ", innovative project of the ClujIT Cluster financed on POSCCE / Operation 1.3.3**,** subproject **"E-Health WSN Middleware:Middleware for adapting heterogeneous medical equipment and existing patients using an infrastructure WSN "** UTCN/AC project coordinator: Prof. dr. ing. Vasile-Teodor DADARLAT.

**" Analysis and taxonomy of compromise solutions between security and the quality of services for wireless and mobile IP communications"**, postdoctoral project POSDRU/159/1.5/S/137516, 2014-2015, project coordinator: S.I. dr. ing. Adrian PECULEA.

**GREEN-VANETS - Improving transportation using Car-2-X communication and multi agent systems**, **Intern** CDI research project at Technical University of Cluj-Napoca, 2013 - 2014, member: Senior Lecturer Dr Eng. Bogdan IANCU.

**QAF - "Quality of Service aware frameworks for networks and middleware",** CNCSIS PNII Idei nr. 328, 2007 – 2010, project coordinator: Prof. dr. ing. Vasile-Teodor DADARLAT.

**CG-UTCN, Technical University of Cluj-Napoca GRID Center,** POS CCE Axa 2; Project 195, Op. 2.2.3, http://cgutcn.utcluj.ro/index.php (2009-2011), project coordinator: Assoc. Prof. dr. ing. Emil CEBUC.

**Significant results**

**The most representative publications of the past 5 years:**

1. S. Buzura, A. Peculea, B. Iancu, E. Cebuc, V. Dadarlat, R. Kovacs, A Hybrid Software and Hardware SDN Simulation Testbed, Sensors, vol. 23, no. 1, 2023.
2. Boca, L.L.; Ciortea, E.M.; Boghean, C.; Begov-Ungur, A.; Boghean, F.; Dădârlat, V.T. An IoT System Proposed for Higher Education: Approaches and Challenges in Economics, Computational Linguistics, and Engineering. Sensors 2023, 23, 6272. https://doi.org/10.3390/s23146272
3. S. Buzura, M. Lehene, B. Iancu, V. Dadarlat, Extendable Software Architecture for Mitigating ARP Spoofing-Based Attacks in SDN Data Plane Layer, Electronics, 11(13), 1965, 2022.
4. N. N. Kaashki, X. Dai, T. Gyarmathy, P. Hu, B. Iancu, A. Munteanu, Automatic and Fast Extraction of 3D Hand Measurements using a Deep Neural Network, 2022 IEEE International Instrumentation and Measurement Technology Conference (I2MTC), 2022.
5. V. Lazar, S. Buzura, B. Iancu, V. Dadarlat, Anomaly Detection in Software Defined Wireless Sensor Networks Using Recurrent Neural Networks, 2021 IEEE 17th International Conference on Intelligent Computer Communication and Processing (ICCP 2021).
6. I. Iancu, B. Iancu, Designing Mobile Technology for Elderly. A Theoretical Overview, Technological Forecasting and Social Change, ISSN: 0040-1625, https://doi.org/10.1016/j.techfore.2020.119977
7. V. Lazar, S. Buzura, B. Iancu, V. Dadarlat, Anomaly Detection in Software Defined Wireless Sensor Networks Using Recurrent Neural Networks, 2021 IEEE 17th International Conference on Intelligent Computer Communication and Processing (ICCP 2021)
8. B. Oniga, L. Denis, V. Dadarlat, and A. Munteanu, “Message-Based Communication for Heterogeneous Internet of Things Systems,” Sensors, vol. 20, no. 3, p. 861, Feb. 2020.
9. P. Hu, N.N. Kaashki, V. Dadarlat, A. Munteanu, Learning to estimate the body shape under clothing from a single 3-d scan, IEEE Transactions on Industrial Informatics 17 (6), 3793-3802, 2020.
10. S. Buzura, V. Dadarlat, B. Iancu, A.Peculea, E. Cebuc, R. Kovacs, Self-adaptive Fuzzy QoS Algorithm for a Distributed Control Plane with Application in SDWSN, International Conference on Automation, Quality and Testing, Robotics (AQTR), Cluj-Napoca, 2020.
11. B. Iancu, I. Illyes, V. Dadarlat, A. Peculea, Pollution Probes Application: the impact of using PVDM messages in VANET infrastructures for environmental monitoring, 2019 IEEE 15th International Conference on Intelligent Computer Communication and Processing, Cluj-Napoca, 2019.
12. B. Oniga, S. H. Farr, A. Munteanu and V. Dadarlat, "IoT Infrastructure Secured by TLS Level Authentication and PKI Identity System," 2018 Second World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4), London, 2018, pp. 78-83.
13. A. Bumb, B. Iancu, E. Cebuc, Extending Cooja simulator with real weather and soil data, IEEE 17th RoEduNet Conference: Networking in Education and Research Technical University of Cluj-Napoca,September 6, 2018 – September 8, ISSN:2068-1038, pp.40-44,2018.
14. B. Oniga, V. Dadarlat, E. De Poorter and A. Munteanu, "A secure LoRaWAN sensor network architecture," 2017 IEEE SENSORS, Glasgow, 2017, pp. 1-3.

**Significant solutions:**

1. Drafting, development and implementation of a novel end-to-end quality of service sensitive framework for heterogeneous networks with admission control and self-adaptive bandwidth reconfiguration
2. Elaborating and proposing a new method for bandwidth organizing and dynamic allocation of bandwidth between classes in an autonomous system, to assure end-to-end QoS guarantees
3. Prototyping infrastructure for Software-Defined Networks and Software-Defined Wireless Sensor Networks solution development and testing

**Products and technologies:**

1. Data Center Room (str. Baritiu 26-28): HVAC system and hosts site grid with 512 core and 12 Terrabytes storage

**Awards**

1. B. Iancu, A. Peculea, V. Dadarlat – Diploma of Honour at: International Exhibition of Research, Innovation and Technological Transfer “Inventica”, Iaşi, 2011
2. B. Iancu, A. Peculea, V. Dadarlat - Excellence Award and Silver Medal at: International Exhibition of Inventions ‘ProInvent’, Cluj-Napoca, 2011
3. B. Iancu, A. Peculea, V. Dadarlat - Silver Medal at: 3rd European Exhibition of Creativity and Innovation ‘Euroinvent’, Iaşi, 2011
4. Peculea, B. Iancu, V. Dadarlat - Excellence Award and Gold Medal at: International Exhibition of Inventions 'ProInvent', Cluj-Napoca, 2010
5. A. Peculea, B. Iancu, V. Dadarlat - Bronze Medal at: International Exhibition of Inventions 'Inventika' Bucureşti, 2010

**The offer addressed to the economic environment**

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| **Research & development** | Network administration; QoS services implementation<br>Software-defined networks and network function virtualization<br>Wireless and sensors communications in Internet of Things (IoT)<br>Algorithms for power consumption in WSNs; QoS aware routing in hybrid networks<br>Applications to different domains: data acquisition, VANETs, smart grids, environmental monitoring, etc.<br>Software products: wireless and sensors communications, adaptive routing, secure communications |
| **Consulting** | Network administration; Network design and testing<br>QoS services implementation |
| **Training** | CCNA, CCNP, Security essentials, CyberOps<br>Advanced issues in computer networks; Advanced issues in wireless sensor networks |

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