Novice Insights in Electronics and Telecommunications. SSET 2022

Student Symposium
on Electronics and Telecommunications

Simpozionul Studenţesc
de Electronică şi Telecomunicaţii

Cluj-Napoca,

Mai 2022

Novice Insights in Electronics and Telecommunications. SSET 2022

Student Symposium *on Electronics and Telecommunications*

Simpozionul Studenţesc de Electronică şi Telecomunicaţii

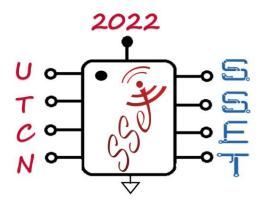Simpozionul Studenţesc de Electronică şi Telecomunicaţii

Facultatea de Electronică, Telecomunicaţii şi Tehnologia Informaţiei
https://etti.utcluj.ro/
Universitatea Tehnică din Cluj-Napoca,
Strada George Bariţiu nr. 26-28, 400027

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

Facultatea de Electronică, Telecomunicaţii şi Tehnologia Informaţiei

Simpozionul Studenţesc de Electronică şi Telecomunicaţii

2022

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ROMANIA CHAPTER

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EDITORS: Anca APATEAN, Lorant SZOLGA, Elena ȘTEȚCO

PUBLISHER: UTPRESS

Welcome SSET 2022

The Faculty of Electronics, Telecommunications and Information Technology has established a tradition, by organizing the Student Symposium on Electronics and Telecommunications (SSET), whose 17th edition is held on the 20th of May 2022.

The symposium aims to stimulate the creativity and originality of our students, providing them with a formal framework for presenting their most important achievements and results. It is also an excellent opportunity for students to practice and improve their presentation and communication abilities in front of a well-informed audience, as well as to promote their abilities and knowledge acquired during the years of study.

With every edition, this event strengthens the many existing links and generates new connections between the academic and the industrial environment, given the large number of representative companies that have become partners in the symposium.

Bringing together students, faculty, and representatives of the industry in such a high-quality professional environment is a key step in improving the quality of the educational process.

This scientific event is a complementary activity, besides the main didactic and research activities, directly contributing to the successful accomplishment of the mission of our faculty: "To contribute by advanced research to the knowledge development in electronics, telecommunications and information technology, as well as to train specialists able to develop, design, implement, and exploit electronics and telecommunications systems, with applications in the most various industrial, research, and domestic areas".

The high quality of the symposium cannot be achieved without the active involvement of the organizers: the SSET committee, as well as our industry partners, have made this event possible, and my thanks go out to them. I would also like to thank the faculty teaching staff who have encouraged the students to compete in this event and coordinated their scientific endeavours.

Good luck to all the students participating at the symposium!

Professor, Ph.D. *Ovidiu POP*
DEAN of ETTI, UTCN

Student **Symposium** *on Electronics and Telecommunications*

Faculty of Electronics, Telecommunications and Information Technology
https://etti.utcluj.ro/
Technical University of Cluj-Napoca,
26-28 George Barițiu street , 400027

ETTI Bachelor Programs (Programe Licență)

Electronică Aplicată,   https://etti.utcluj.ro/Fd/articles/EaFd.html

Electronică Aplicată (engleză),   https://etti.utcluj.ro/Fd/articles/EaEngFd.html

Tehnologii și Sisteme de Telecomunicații,   https://etti.utcluj.ro/Fd/articles/TstFd.html

Tehnologii și Sisteme de Telecomunicații (engleză),   https://etti.utcluj.ro/Fd/articles/TstEngFd.html

Inginerie Economică în Domeniul Electric, Electronic și Energetic,

                                                 https://etti.utcluj.ro/Fd/articles/IEcon.html

ETTI Master Programs (Programe Master)

Circuite și sisteme integrate,   https://etti-master.utcluj.ro/index.php/programe-de-studiu/#csi

Inginerie electronică,   https://etti-master.utcluj.ro/index.php/programe-de-studiu/#ie

Prelucrarea semnalelor și imaginilor (franceză),

                                                 https://etti-master.utcluj.ro/index.php/programe-de-studiu/#psi

Sisteme integrate de comunicații cu aplicații speciale,

                                                 https://etti-master.utcluj.ro/index.php/programe-de-studiu/#sicas

Tehnologii multimedia,   https://etti-master.utcluj.ro/index.php/programe-de-studiu/#tm

Tehnologii, sisteme și aplicații pentru eActivități,   https://etti-master.utcluj.ro/index.php/programe-de-studiu/#eact

Telecomunicații,   https://etti-master.utcluj.ro/index.php/programe-de-studiu/#tc

ETTI PhD Programs (Programe Doctorat)

Inginerie electronică, telecomunicații și tehnologii informaționale   https://etti.utcluj.ro/scoala-doctorala.html

Principalele direcții de cercetare în ETTI

În cadrul facultății există o serie de direcții de cercetare, care sunt sintetizate după cum urmează:

- Analiza și sinteza circuitelor electronice
- Microelectronica - circuite analogice și digitale VLSI
- Tehnici moderne de prelucrare a semnalelor
- Optoelectronică și comunicații optice
- Comunicații unificate în Internet
- Procesarea imaginilor și secvențelor video
- Recunoașterea automată a vorbirii, sinteza din text a vorbirii
- Prelucrarea și securitatea datelor
- Software pentru electronică și telecomunicații
- Radiocomunicații celulare și prin satelit
- Sisteme electronice de putere
- Sisteme electronice de monitorizare și control
- Energii regenerabile
- Senzori și sisteme de achiziție a datelor.

SSET 2022

Obiective

– implicarea studentilor in activitatile de cercetare stiintifica
– crearea unui cadru stimulativ de interacţiune, schimb de idei şi experienţe;
– afirmarea studenţilor cu preocupări deosebite pentru rezolvarea de probleme din domeniile electronică, telecomunicaţii şi domenii conexe.

editia XVII

ETTI

SSET 2022

**We make life easier,
safer and greener**

We are shaping the future

For an easier, safer and greener world

The digital revolution is transforming our world. We are playing a key role in shaping a better future with microelectronics that link the real and the digital world. Our semiconductors enable smart mobility, efficient energy management and the secure capture and transfer of data.

We make life easier
Smart functions like speech recognition, gesture control and 3D applications improve the usability and convenience of everyday items such as speakers, wearables and smartphone apps.
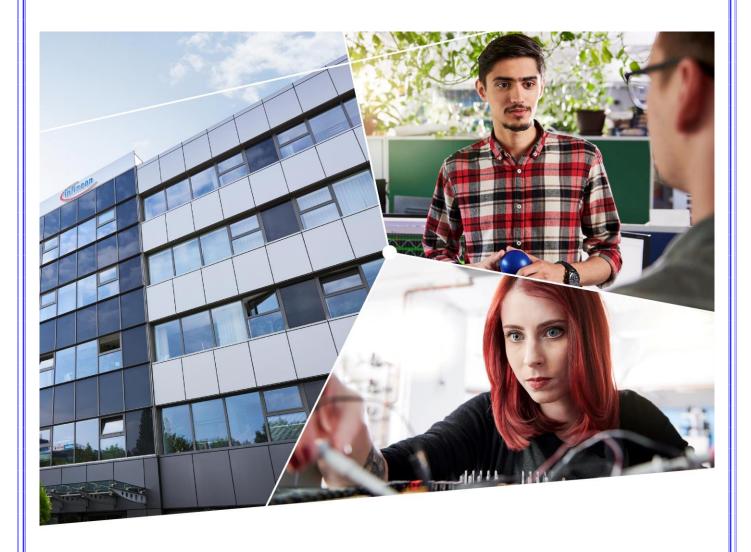
We make life safer
Our solutions make premiun-class automotive safety systems affordable in the mid-range and compact car classes.

We make life greener
Our technologies reduce energy consumption in cars, trains, industrial plants, consumer electronics and household appliances.

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BOSCH

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Grupul Bosch este un lider global în furnizarea de tehnologii şi servicii. Operaţiunile sale sunt structurate în patru sectoare de activitate: Soluţii de mobilitate, Tehnologie industrială, Bunuri de larg consum şi Tehnologie pentru construcţii şi energie. Lider în IoT, Bosch oferă soluţii inovatoare pentru **case inteligente, oraşe inteligente, mobilitate conectată şi industria 4.0**. Compania îşi foloseşte expertiza în tehnologia de senzori, software şi servicii, precum şi propriul cloud IoT, pentru a oferi clienţilor soluţii conectate integrate dintr-o singură sursă.

Obiectivul strategic al Grupului Bosch este de a facilita o **viaţă conectată** prin produse şi soluţii care conţin inteligenţa artificială (IA) sau care au fost dezvoltate şi produse cu ajutorul IA. Bosch sporeşte calitatea vieţii la nivel mondial prin produse şi servicii inovatoare şi care stârnesc entuziasm.

Centrul de Inginerie Bosch

De la înfiinţarea sa în anul 2013, Centrul de Inginerie Bosch joacă un rol esenţial în marea transformare a sectorului mobilităţii. Prin expertiza amplă în ingineria software, hardware & mecanică şi a fiabilităţii, dar şi în planificarea vânzărilor, centrul contribuie la dezvoltarea unor produse şi servicii excepţionale, şi a unor **soluţii inovatoare bazate pe inteligenţa artificială aplicate în domeniile conducerii automatizate, mobilitatea electrică şi conectată**. Mai multe informaţii:
https://www.bosch.ro/compania-noastra/bosch-in-romania/centrul-de-inginerie-bosch

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Invented for life

BOSCH

Ești pregătit să lucrezi #LikeABosch?

La Centrul de Inginerie Bosch Cluj & București vei contribui direct la soluții inovatoare în domeniul mobilității automatizate, electrice și conectate care urmăresc să îmbunătățească calitatea vieții.

Îți oferim **proiecte tehnice complexe** cu expunere internațională, **program de muncă flexibil**, o echipă de **experți** care te ajută să crești, și multe alte beneficii.

Descoperă oportunitățile care te așteaptă aici
https://www.bosch.ro/cariere

Work #LikeABosch

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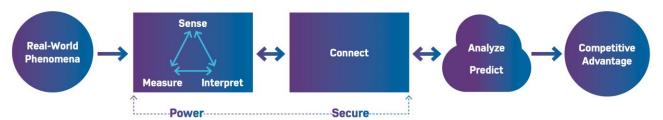
**TRANSFORM
YOUR FUTURE**

From analog to insight...

Analog Devices is the only electronics technology developer that converts the full complexity of real-world phenomena into precise, secure, real-time data, analytics and insights. From the rigors of space exploration to miniature health monitoring wearables, we've developed more measurements, with more precision, to meet our customers' hardware, software and algorithm demands. And thanks to our pioneering RF technology, we're able to connect that data, securely, to cloud-based communications – even in the harshest, most complex environments.

How ADI's expertise converts real-world phenomena into insight that transforms our customers' industries:

Real-World Phenomena → **Sense / Measure / Interpret** ↔ **Connect** ↔ **Analyze Predict** → **Competitive Advantage**

Power — Secure

What in the world do you need to monitor? Heart rate, temperature, light, motion, moisture, velocity, vibrations, volume, frequencies, power... whatever the signals, we have ways to sense and measure them.

ADI's suite of capabilities and cutting-edge technologies enable us to sense, measure and interpret signals with domain-relevant algorithms. Power and security are an integral part of developing smart solutions.

Our world-renowned leadership in RF and signal processing has put us at the forefront of 5G and beyond. Working across domains, from aerospace and autonomous machines to personal wearables, ensurs that ADI's expertise for optimal connectivity in the most challenging environments is second to none.

From the world to the "fog" or the "cloud," create real-time, actionable insights with ADI's robust analytics. Better quality data means more effective predictive systems, machine learning and artificial intelligence.

16,000	4,700+	125,000	55
Problem Solvers	Patents Worldwide	Customers	Years

Ahead of What's Possible

Analog Devices is a global leader in the design and manufacturing of analog, mixed signal, and DSP integrated circuits to help solve the toughest engineering challenges.

Analog Devices. Dedicated to solving the toughest engineering challenges.

Analog Devices: Profile

Corporate Snapshot

Founded: **1965**

Patents: **4700+**

R&D investment since 2008: **$4 billion**

Employees: **15,000 worldwide**

Global reach: **20+ countries**

Design Centers: **~45**

Listings: **Nasdaq:ADI**

Business Units

Aerospace and Defense

Automotive Electrification

Autonomous Transportation

Communications

Consumer

Energy

Healthcare

Industrial Automation

Instrumentation

Power

Capabilities

Sense: Capture precision data in demanding environments

Measure: Turn data points into actionable information

Interpret: Embed algorithms to enable insights

Secure: Embed security where data is born

Connect: Deliver reliable communication in challenging contexts

Power: System-level power management

Industry Recognition

Technology Leadership
Forbes:
Top 100 Global Digital Companies

Management Leadership
Wall Street Journal:
Management Top 250

Corporate Citizenship
Corporate Knights:
100 World's Most Sustainable Corporations

Employee Satisfaction
Forbes:
America's Best Large Employers

Romania Design Center

Founded: **2011**

Employees: **~50**

Location: **United Business Center Riviera, Cluj-Napoca**

Presence in over 20 countries to provide direct sales, field application engineers, distribution, design and technical support worldwide

▶ADI Careers

Many Opportunities. One Impactful Company.

Dare to dream it, and we'll help you make it a reality. At Analog Devices, we invest in our people, so they can engineer solutions that sense the world around us and make it better. Explore jobs at ADI where you have the freedom, training and opportunity to design solutions that transform our life experiences.

Available jobs, Cluj-Napoca location:

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Embedded Linux Software Engineer

FPGA/HDL Engineer

Hardware Engineer

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Software Engineer

UI & Middelware Software Engineer

LTspice Software Engineer

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https://careers.analog.com

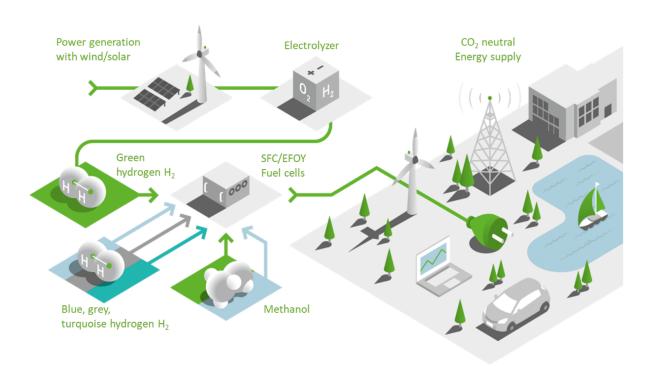https://www.linkedin.com/jobs/analog-devices-jobs

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Electrolyzer

CO_2 neutral Energy supply

Green hydrogen H_2

SFC/EFOY Fuel cells

Blue, grey, turquoise hydrogen H_2

Methanol

DIVISION Coils & Linear Drives

Products:

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- High precision **linear drives**
- **Co-development**
- High quality proven processes
- Single, bifilar & trifilar **Orthocyclic** winding
- **Foil** winding
- Coil **bending**
- Expertise in **water cooling** and thermal management

- **Pressure and flow** testing equipment
- **3D Measuring** capabilities
- **Automated testing** equipment

DIVISION Power Suppy Solutions

Products:

- Standard and semi standard **High Power platform design**
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- **Full custom** power supply solution

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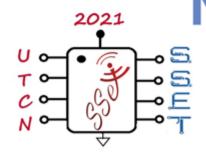# Previous Edition (SSET 2021)

Partners

Online Edition

SSET 2021 Sections:

Section 1 - ORAL Presentations: <u>Bachelor Student – TST-IM</u>
Dedicated to papers from *IET and IM* domains, with Bachelor authors;

Section 2 - ORAL Presentations: <u>Bachelor Student – EA-IM</u>
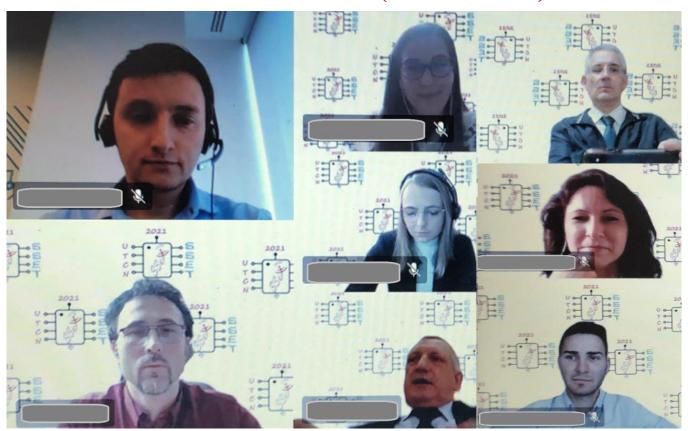Dedicated to papers from *IET and IM* domains, with Bachelor authors;

Section 3 - ORAL Presentations: <u>Master/Doctor (PhD) Student</u>
Dedicated to papers from *IET* and *IM* domains, with Master and PhD Students;

Simpozionul Studenţesc de Electronică şi Telecomunicaţii

Previous Edition (SSET 2021)

SSET 2021 Scientific Committee

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Professor Mircea VAIDA, PhD
Professor Mircea GIURGIU, PhD
Professor Emanuel PUȘCHIȚĂ, PhD
Associate Professor Raul MĂLUȚAN, PhD

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Professor Ioan CIASCAI, PhD
Professor Romulus TEREBEȘ, PhD
Professor Ramona GALATUȘ, PhD
Associate Professor Botond KIREI, PhD

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Assoc.Prof. Nicolae CRIȘAN
Assoc.Prof. Anca APATEAN
Assist.Prof. Lorant SZOLGA
Teach. Assist. Elena ȘTEȚCO
Eng. Angela RUSU

SSET 2021 STUDENT Competitions:

Section 1 - **ORAL Presentations:**   **Bachelor Student – TST + IEDEEE**
Section 2 - **ORAL Presentations:**   **Bachelor Student – EA + IEDEEE**
Section 3 - **ORAL Presentations:**   **Master/Doctor (PhD) Student**

Previous Edition (SSET 2021)

SSET 2021 Winners

TST Bachelor Student (Student în domeniul Inginerie Electronică și Telecomunicații / Inginerie și Management) :
ORAL Presentations

1st Prize	Rareș-Mihai PREDA	*„Measuring and Improving Throughput and Delay in Software Defined Networks"*	Virgil DOBROTĂ
2nd Prize	Darius CRIȘAN	*„Energy Consumption and Performance Monitoring of a Software-Defined Networking Infrastructure Using ONOS and Mininet"*	Virgil DOBROTĂ
3rd Prize	Cristian-Andrei BANTO	*„Monitoring Air Quality Using Raspberry Pi and Amazon Web Services"*	Paul-Simion CRECAN, Iustin IVANCIU
Honorable mention 1	Vlad-Andrei MONORANU	*„Device Level Programmability Using RESTCONF"*	Virgil DOBROTĂ
Honorable mention 2	Andra-Flavia SICOE	*„Using Ansible to Automate the Configuration of a Cisco Router"*	Virgil DOBROTĂ
Honorable mention 3	David GRUIAN	*„Web Application for the Management of an Automobile Repair Shop"*	Iustin IVANCIU

EA Bachelor Student (Student în domeniul Inginerie Electronică și Telecomunicații / Inginerie și Management) :
ORAL Presentations

1st Prize	Iulian SULAREA	*„A LDO Regulator with High PSRR"*	Cristian RĂDUCAN, Marius NEAG
2nd Prize	Valentin BELECA	*„A different approach for conditional stability in Cadence Virtuoso using Nyquist"*	Cosmin PLESA, Marius NEAG
3rd Prize	Andreea STAN	*„Maze solving robot"*	Liviu VIMAN
Honorable mention 1	Cosmin-Theodor NEGRU	*„Robot car"*	Ionel Horea BACIU
Honorable mention 2	Ciprian CIUCIU	*„Automated recycling arm"*	Laura IVANCIU
Honorable mention 3	Mark Eduard GROSS	*„Data monitoring and acquisition system for the I2C protocol"*	Dorin Marius PETREUȘ

IET Master/Doctor (Masterand/Doctorand în domeniul Inginerie Electronică și Telecomunicații) :
ORAL Presentations

1st Prize	George GROSU	*„A Python-based framework for advanced research and development on Spectrum Sensing for Cognitive Radio"*	Romulus TEREBEȘ
2nd Prize	Mihnea-Antoniu COVACI	*„Parallel PSO Case Studies: Various Optimization Strategies Overview"*	Lorant Andras SZOLGA
3rd Prize	Mirela OLTEANU	*„Research on energy management systems for Battery Electric Vehicles"*	Dorin Marius PETREUȘ
Honorable mention 1	Mihnea-Antoniu COVACI	*„Cryogenic Cooler Modeling and Optimization"*	Lorant Andras SZOLGA

Present Edition (SSET 2022)

Symposium Program

The event takes place on Friday, 20ᵗʰ of May, according to the below detailed timetable:

Starting Time	Events	(S1) TST-IM	(S2) EA-IM	(S3) Master/Doctor
08:10	Opening Speech			
08:30	ORAL Presentations	8:30 – 11:00 **Sala 359**	9:00 – 10:00 **Sala 367**	10:15 – 11:00 **Sala 367**
11:00	Partners Presentations	Infineon, Bosch, Analog Devices, SFC Energy		
12:00	Award Ceremony Closing Word			

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Dedicated to papers from *IET and IM* domains, with Bachelor authors;

Section 2 - ORAL Presentations: Bachelor Student – EA-IM
Dedicated to papers from *IET and IM* domains, with Bachelor authors;

Section 3 - ORAL Presentations: Master/Doctor (PhD) Student
Dedicated to papers from *IET* and *IM* domains, with Master and PhD Students;

SSET 2022 Scientific Committees:

TST-IM **STUDENT ORAL Presentations Committee**
Chairman: Professor Virgil DOBROTĂ, PhD
Professor Mircea GIURGIU, PhD
Associate Professor Raul MĂLUȚAN, PhD
Assistant Professor Cosmin STRILEȚCHI, PhD
Assistant Professor Camelia FLOREA, PhD

EA-IM **STUDENT ORAL Presentations Committee**
Chairman: Professor Dorin PETREUȘ, PhD
Associate Professor Marius NEAG, PhD
Associate Professor Cristian FĂRCAȘ, PhD
Associate Professor Albert FAZAKAS, PhD
Associate Professor Liviu VIMAN, PhD

MASTER/DOCTOR **ORAL Presentations Committee**

Chairman: Professor Corneliu RUSU, PhD
Professor Ioan CIASCAI, PhD
Professor Romulus TEREBEȘ, PhD
Professor Ramona GĂLĂTUȘ, PhD
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TeachingAssist. Elena ȘTEȚCO
Eng. Angela RUSU

SSET 2022 Chairman:
Prof. Ovidiu POP, PhD

SSET 2022 Co-Chairman:
Assoc.Prof. Nicolae CRIȘAN, PhD

Presentations – Section 1 (Student TST-IM)

8:30 - S1.1 *„Simulating the evolution of an epidemic using elements of probability",*
Simula Dan, Stefania Ramona Barburiceanu   Coordinator: Stefania Barburiceanu

8:45 - S1.2 *„Workflow Management Application",*
Bodis Tamás Balázs, Cosmin Striletchi   Coordinator: Cosmin Striletchi

9:00 - S1.3 *„Load Balancing Architecture using Traffic Manager Routing Methods in Microsoft Azure",*
Teodora-Bianca Barburiceanu, Virgil Dobrotă   Coordinator: Virgil Dobrotă

9:15 - S1.4 *„Security in Unified Communications with Cisco Unified Border Element (CUBE)",*
Vlad-Eusebiu Popa, Virgil Dobrotă   Coordinator: Virgil Dobrotă

9:30 - S1.5 *„Microservices-Based Web Application for Managing Kubernetes Clusters",*
Alin-Tudor Sferle, Robert Botez, Virgil Dobrotă   Coordinator: Virgil Dobrotă

9:45 - S1.6 *„Automated Deployment of a 5G Core Network with Open Source MANO and OpenStack",*
Andres-Gabriel Pașca, Robert Botez, Virgil Dobrotă   Coordinator: Virgil Dobrotă

10:00 - S1.7 *„An Open-Source Implementation of Software-Defined Wide Area Network",*
Vladut-Vasile Coman, Virgil Dobrotă   Coordinator: Virgil Dobrotă

10:15 - S1.8 *„Study and implementation of a system for speech anonymization using Machine Learning tools",*
Stefan-Ilie Huc, Mircea Giurgiu   Coordinator: Mircea Giurgiu

10:30 - S1.9 *„SMS server application based on AT commands and Huawei modem",*
Ciprian Istrate, Raul Măluțan   Coordinator: Raul Măluțan

10:45 - S1.10 *„Simulation of a V2X Scenario Using Eclipse SUMO and MOSAIC",*
Tudor Mircică, Iustin-Alexandru Ivanciu   Coordinator: Iustin Ivanciu

Presentations – Section 2 (Student EA-IM)

9:00 – S2.1 *„Smart Battery Charger",*
Cătălin Constantin Nandrea, Dorin Petreuș   Coordinator: Dorin Petreuș

9:15 – S2.2 *„PCB design in Altium for a data acquisition system",*
Voina Alexandru Valentin, Septiminiu Pop   Coordinator: Septimiu Pop

9:30 – S2.3 *„Comparison of three bandgap topologies implemented in standard CMOS technology with parasitic PNP bipolars",*
Emilia Gheorghiță, Iulian Câmpanu (Infineon), Raul Oneț   Coordinator: Raul Oneț

9:45 – S2.4 *„Sensor network with RS-485 communication",*
Hirceaga Cosmin-Daniel, Septiminiu Pop   Coordinator: Septimiu Pop

Presentations – Section 3 (Master/ Doctor)

10:15 – S3.1 *„Differences of class D and class AB audio power amplifier",*
Vlad-Claudiu Hanăș, Ovidiu Aurel Pop   Coordinator: Ovidiu Aurel Pop

10:30 – S3.2 *„Novel Thermal Shutdown Circuit for Automotive Power Management Applications",*
Grigorița Elena, Tomina Fabiola Sălăjan (Infineon),
Raul Oneț   Coordinator: Raul Oneț

10:45 – S3.3 *„Body posture analyzing, monitoring and improvement device",*
Mîndru Andrei, Adrian Călin Fărcaș   Coordinator: Adrian Fărcaș

Paper Summary

Section 1 (TST-IM)

S1-1 „Simulating the evolution of an epidemic using elements of probability", *Simula Dan, Stefania Ramona Barburiceanu*

Abstract—The truth of the matter is that epidemics and pandemics will always be a reality for humankind, and with the spread of globalization and travel in recent centuries, even more so, the recent pandemic only reminds us of this fact. This paper showcases an application aimed at simulating different scenarios regarding the evolution of one such epidemic and the many outcomes it could have depending on a variety of factors (spread, movement of people, population density, quarantine) in a bid to find the best outcome in the attempts to contain the epidemic. This paper uses Markov chains for simulating the evolution of a pandemic, with a generated database that tries to model real-world populations in an area.

Keywords—Markov chains, epidemic simulation

S1-2 „Workflow Management Application",
Bodis Tamás Balázs, Strileţchi Cosmin

Abstract— Developing a windows application for an air-conditioner installer. The main purpose of this project is to give for the workers in this domain a platform, to have better working conditions.

Keywords—workflow management, Java, SQL, Swing components

S1-3 „Load Balancing Architecture using Traffic Manager Routing Methods in Microsoft Azure",
Teodora-Bianca Barburiceanu, Virgil Dobrotă

Abstract—This paper presents the implementation of a load-balancing hierarchy set up in a Microsoft Azure environment. It contains a Traffic Manager profile which involves Domain Name System to deliver user requests to the proper Internet service endpoint relying on a routing scheme. To meet the demands of various applications and automated failover architectures, Traffic Manager offers a variety of routing algorithms and endpoint monitoring capabilities. Lower in the hierarchy, there were implemented load balancers which serve as the client's exclusive contact points. According to predefined health probes and load-balancing rules, the incoming traffic that arrives at the load balancer is distributed to Azure Virtual Machines. This architecture is proposed to achieve reduced latency, multi-geographical redundancy and internal load balancing.

Keywords—Load Balancing; Microsoft Azure; Traffic Manager.

S1-4 „Security in Unified Communications with Cisco Unified Border Element (CUBE)", *Vlad-Eusebiu Popa, Virgil Dobrotă*

Abstract— This paper presents a practical solution to secure the VoIP calls in a virtualized environment based on Cisco CSR1000V virtual routers (IOS XE17.03.05) running in VMware Workstation Professional. The novelty is related to the experience gained by involving the professional Cisco Unified Border Element (CUBE) to block untrusted users and to prevent attacks such as Telephony Denial of Service, toll fraud and eavesdropping. The real implementation included two different physical machines, each running a CUCME (Cisco Unified Communications Manager Express)-based PBX and serving SIP softphones.

Keywords— Cisco Unified Border Element; Cisco Unified Communications Manager Express; security; virtual routers.

S1-5 „Microservices-Based Web Application for Managing Kubernetes Clusters",
Alin-Tudor Sferle, Robert Botez, Virgil Dobrotă

Abstract— This paper presents a managed Kubernetes solution offered as a Python-based cloud-native web application, built on the top of the CloudUT's KubeUT service. This is a CLI-based automated Kubernetes clusters deployment tool to assist in faster management and configuration of Kubernetes clusters in cloud-based infrastructures. For the fulfilment of this managed service, the following tools were used: Flask, as web framework for building the web application, Terraform, for cloud resources provision and Ansible, for Kubernetes clusters deployment. With the introduction of this service, CloudUT's users will benefit from an automatic and simple to use solution for Kubernetes clusters deployment directly from their web browser.

Keywords—Ansible, Cloud Computing, Kubernetes, Python, Terraform

S1-6 „Automated Deployment of a 5G Core Network with Open Source MANO and OpenStack",
Andres-Gabriel Paşca, Robert Botez, Virgil Dobrotă

Abstract—Due to the demand for new high-performance services in the 5G era, such as low latency and high availability services and also the need for flexible support for business models, enabling rapid introduction of innovation to market as well as reducing the costs, the mobile core networks have been developing towards cloud native (CN) principles and will continue to do so. This implies a whole new approach to Network Function Virtualization (NFV), ensuring an evolution of Virtualized Network Functions (VNFs) running in Virtual Machines (VMs) being phased out in favor of Kubernetes-based Network Functions (KNF) running in containers and reflects how businesses are migrating from VM-based monoliths to Kubernetes-managed containers. In this paper, an open source 5G Core network, Free5GC, was deployed with Kubernetes on a private cloud orchestrated by OpenStack. Moreover, the Kubernetes nodes were deployed as VNFs and are managed by Open Source MANO, an NFV framework for management and orchestration. The 5G Network Functions were deployed as CNFs and are orchestrated by Kubernetes. The latter assured the high-availability and lifecycle management of the CNFs as shown by the results. We also demonstrated the advantages of using containers rather than VMs by measuring the restart time in case of failure for both cases.

Keywords—5G, Cloud Native, Kubernetes, NFV, OpenStack, Open Source MANO.

S1-7 „An Open-Source Implementation of Software-Defined Wide Area Network", *Vladut-Vasile Coman, Virgil Dobrotă*

Abstract— This paper presents a virtualized testbed which includes one Open Network Operating System (ONOS) Software-Defined Network controller (in the Control Plane), six Open vSwitches and four hosts (in the Data Plane). The virtual network devices are distributed across two distinct physical machines placed in different networks. This real implementation was realized with Mininet emulator and the devices communicate with each other using a full mesh infrastructure of Generic Routing Encapsulation tunnels between the Open vSwitches of the two networks.

Keywords— Mininet; ONOS; OpenFlow; Open vSwitch; Software-Defined Wide Area Network.

S1-8 „Study and implementation of a system for speech anonymization using Machine Learning tools",
Huc Stefan-Ilie, Giurgiu Mircea

Abstract— Why anonymization is important to us and why do we need in this moment, especially voice anonymization?

As the world is becoming more globalized in order to be interconnected across the globe, the personal privacy is eroded day after day by usual things such as our phones, our computers, our cars, of course (by connecting the computer board's car to Internet). The concept of voice anonymization is important because some people who want to be anonymous for reasons, especially on the Internet, where these persons could be taken by the intruders, hackers who wants to harass and to violate the personal life.

Keywords— anonymization, digital identity theft, filters, artificial intelligence, neural networks.

S1-9 „SMS server application based on AT commands and Huawei modem", *Ciprian Istrate, Raul Măluțan*

Abstract— The paper presents an application capable of sending Short Message Service (SMS) through Global System for Mobile Communication (GSM) technology and validating Subscriber Identity Module (SIM) accessibility by using a Huawei E220 modem that connects through the Computer's Communication Ports (COM). The modem must contain a functional 2G or 3G SIM card to be able to accept AT commands that are used to send SMSs

Keywords—AT commands, GSM/GPRS modem, SMS gateway

S1-10 „Simulation of a V2X Scenario Using Eclipse SUMO and MOSAIC", *Tudor Mircică, Iustin-Alexandru Ivanciu*

Abstract—This paper presents a Vehicle-to-everything (V2X) scenario, developed using Eclipse SUMO and MOSAIC, for determining the fastest of three routes between two given points in a city. The average speed of the vehicles travelling on each route is computed by the corresponding roadside unit (RSU). Based on this information, traffic routing can be performed in order to tackle congestion.

Keywords—MOSAIC, RSU, SUMO, V2X

Section 2 (EA-IM)

S2-1 „Smart Battery Charger",
Cătălin Constantin Nandrea, Dorin Petreuş

Abstract—Lithium-Ion batteries require a special charging circuit that can provide high charging rates without overcharging. There are multiple methods of charging, the most common being CC-CV because it offers the advantages of both constant current (CC) and constant voltage (CV) with minimal drawbacks. The circuit presented in this article consists of a buck converter with two separate control loops working in antiphase. Output voltage and charging current are adjustable using a microcontroller that also calculates and displays battery parameters on the user interface.

Keywords—battery, buck converter, charging, Li-Ion, micro-controller

S2-2 „PCB design in Altium for a data acquisition system",
Voina Alexandru Valentin, Septiminiu Sever Pop

Abstract— The project that I completed is the schematic and PCB for a data acquisition system that will gather data from a variety of sensors and display and analyze that data using this PCB.

S2-3 „Comparison of three bandgap topologies implemented in standard CMOS technology with parasitic PNP bipolars",
Emilia Gheorghiță, Iulian Câmpanu (Infineon), Raul Oneț

Abstract—This paper presents a comparison between three bandgap topologies that are based exclusively on the parasitic lateral PNP bipolar transistors in the CMOS technologies. A classical bandgap, the Kuijk topology, followed by recently proposed resistorless BGR are designed and compared considering noise, quiescent current, area and power supply rejection point of view. A sizing strategy for the resistorless BGR is also provided. The circuits were implemented in a standard 180nm CMOS process, targeting low noise and low power consumption.

Keywords—bandgap voltage reference (BGR), PTAT, CTAT, low noise, CMOS technology

S2-4 „Sensor network with RS-485 communication",
Hirceaga Cosmin-Daniel, Pop Septimiu Sever

Abstract—The project I realized is an intelligent sensor network incorporating 3 different sensors: a distance sensor, a photodiode and a NTC temperature sensor. Data from all these 3 sensors cand be obtained via only one wire connected to a computer using RS-485 communication.

Keywords—Smart sensors, network, Arduino , RS-485

Section 3 (Master/Doctor)

S3-1 „ Differences of class D and class AB audio power amplifier",
Vlad-Claudiu Hanăş, Ovidiu Aurel Pop

Abstract— This article shows the basic principles behind a class AB and class D amplifier. Class AB amplifier uses a BTJ (Bipolar Junction Transistor) that loses a lot of power through collector-emitter voltage drop and a class D amplifier that uses a MOSFET (Metal–Oxide–Semiconductor Field-Effect Transistor) that works in the ohmic region and has a very small power loss. For that reason, the efficiency of the class AB amplifier is 50-65% and for class D amplifier is 90-95%.

Keywords—amplifier, class D, class AB, MOSFET, BJT, PWM

S3-2 „Novel Thermal Shutdown Circuit for Automotive Power Management Applications",
Grigorița Elena, Tomina Fabiola Sălăjan (Infineon), Raul Oneț

Abstract—This paper presents a novel thermal-shutdown circuit that has been designed in a micronic BiCMOS process for automotive applications. The robustness of the proposed thermal shutdown circuit stands in its simple structure, that is based on temperature dependent currents comparison. Unlike most temperature sensing circuits used in industry, no resistors were used in implementing thermal hysteresis, thus process and tolerance variations were eliminated. With this novel implementation, an excellent temperature sensitivity is achieved, while having low quiescent current and reduced area. Moreover, the proposed solution shows a 50% smaller variation of temperature threshold with respect to the classical approach.

Keywords—thermal shutdown, BiCMOS, LDO, NMOS power stage

S3-3 „ Body posture analyzing, monitoring and improvement device", *Mîndru Andrei, Fărcaş Adrian Călin*

Abstract— This article describes the creation of a device that tries to solve a problem that affects more than half of the population of the modern world: "sitting". The approach targeted by the device is solving the root of the problem, by creating healthy and sustainable habits for people who tend to remain seated for long periods of time.

Keywords-PAMI, device, seating, posture, improvement, matrix, sensors