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EUROPEAN UNIVERSITY
OF TECHNOLOGY



Faculty of Electronics,
Telecommunications and
Information Technology

ETES

2026

May 22, 2026

Student Symposium on Electronics and Telecommunications

21st edition

NOVICE INSIGHTS IN ELECTRONICS AND
TELECOMMUNICATIONS



SSET 2026

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**EDITORS: Anca APATEAN
Lorant SZOLGA
DESIGN: Laura IVANCIU**

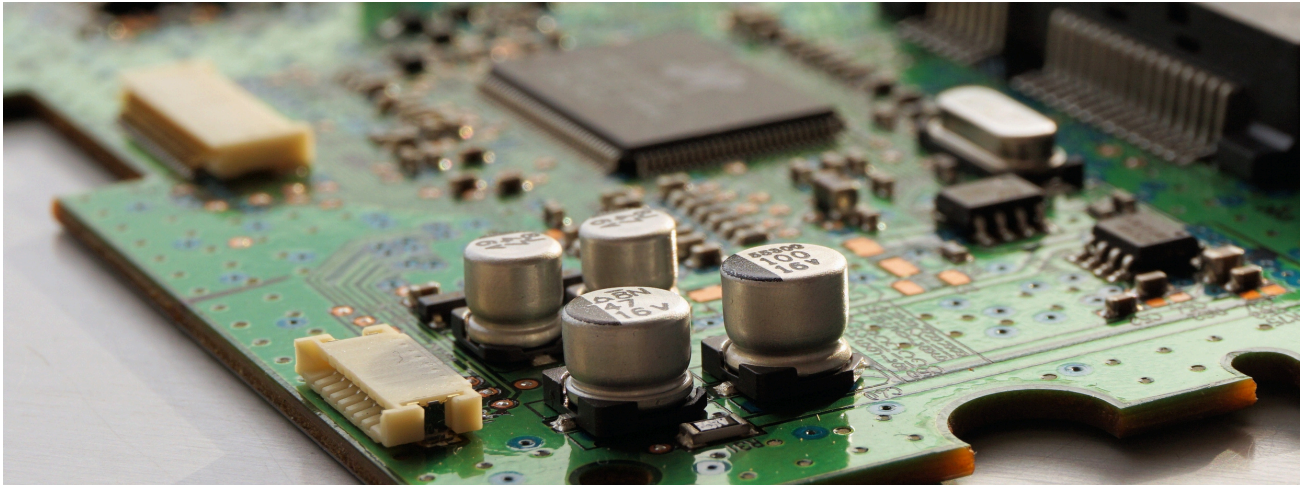
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**Faculty of Electronics, Telecommunications and Information Technology
Technical University of Cluj-Napoca, Romania
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Foreword

We are delighted to welcome you to the 21st edition of the Student Symposium on Electronics and Telecommunications (SSET), a prestigious event organized by the Faculty of Electronics, Telecommunications and Information Technology. For more than twenty years, SSET has brought together ambitious students, academic experts, and industry professionals, fostering a dynamic space for innovation and collaboration.

This year's symposium highlights the creativity, dedication and achievements of our students, offering them the opportunity to present their technical contributions and innovative ideas. More than a series of presentations, SSET provides a valuable platform for developing communication skills, exchanging perspectives, and engaging in meaningful discussions with experienced academics and industry specialists.

The 21st edition proposes two new initiatives: a workshop for student authors "How to write a scientific paper. Responsible use of AI in research.", held prior to the symposium, and a special section entitled "Rising stars", where individual students or student teams get to present their results and awards in competitions.

With 58 papers divided into three sections, SSET 2026 promises a dynamic and engaging program, with topics ranging from advanced communication technologies to cutting-edge research in artificial intelligence and semiconductor design. Participants will have the opportunity to discover innovative ideas, gain new perspectives and build meaningful professional connections.

Our institution remains firmly committed to supporting excellence in electronics, telecommunications and information technology. SSET contributes to the academic and professional development of our students, enriching the educational environment and encouraging participants to strengthen their technical competencies.

While the 2026 edition is set to be a memorable event, little would be possible without the effort of the organizing committee, the support of our industry partners, as well as dedicated faculty and staff members. We are grateful for everyone's contribution to the seamless unfolding of the event.

Have an inspiring day among junior and experienced scientists at SSET 2026!

Professor Ovidiu POP, PhD
Dean of ETTI

Bachelor, Master and PhD Programs at ETTI



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Bachelor programs (4 years, 240 ECTS):

- Applied Electronics (in Romanian and English)
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- Microelectronics, Optoelectronics and Nanotechnologies (in Romanian)
- Economic Engineering in the Electric, Electronic and Energetic Field (in Romanian)

Master programs (2 years, 120 ECTS):

- Integrated Circuits and Systems (in Romanian)
- Electronics Engineering (in Romanian)
- Artificial Intelligence and Signal Processing in Electronics and Telecommunications (in English)
- Traitement du Signal et des Images (in French)
- Integrated Communications Systems with Special Applications (in Romanian)
- Multimedia Technologies (in Romanian)
- Technologies, Systems and Applications for e-Activities (in Romanian)
- Telecommunications (in Romanian)

PhD program (4 years):

- Electronics, Telecommunications and Information Technologies



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SSET 2026 | 7

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- Software & System Engineering
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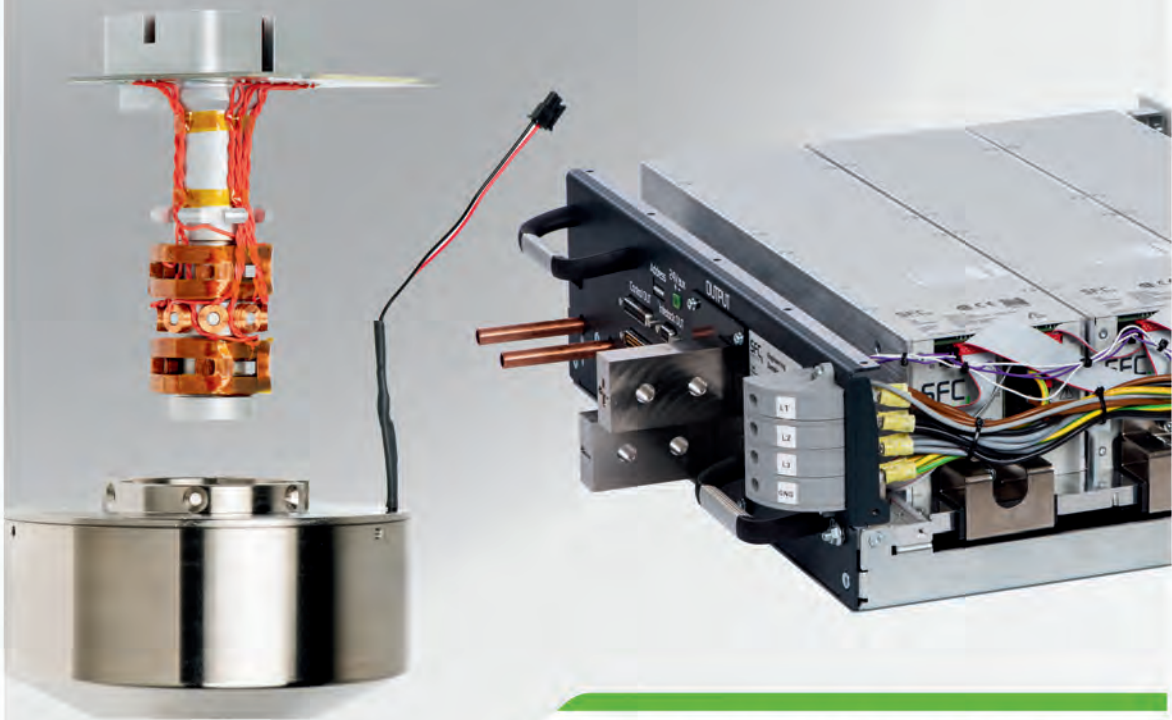
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SSET 2025 Awards

Student TST-IM

1st Prize - Andrei AXENTE, Prof. Mircea GIURGIU

"Robust Audio Deepfake Detection Using Deep Neural Networks and Pipeline Optimization"

2nd Prize - Mihai-Cristian FUFUZAN, Assist. Robert BOTEZ

"Enhancing Student Learning with a Retrieval-Augmented Generation Chatbot"

3rd Prize - Vasile-Alexandru IVAN, Assist. Prof. Ioana ILEA

"Target Recognition Algorithm, using Synthetic Aperture Radar Imaging"

1st Special Award - Ștefan-Darian CÎRNAT, Prof. Virgil DOBROTĂ

"Isolation Forest Anomaly Detection and Long Short-Term Memory Traffic Prediction"

2nd Special Award - Denis-Andrei TODORUȚ, Assist. Prof. Ioana ILEA

"Fire Risk Assessment Based on Texture and Color Information from Remote Sensing Images"

3rd Special Award - Daiana-Alexandra HORVATH, Assoc. Prof. Cosmin STRILEȚCHI

"A classical vs. AI comparative approach to image segmentation"

Student EA

1st Prize - Maria MIHAI, Assoc. Prof. Mihaela GORDAN

"A CT Scan-Based Multi-Slice Nodule Detection System with Volumetric Features and SVMs"

2nd Prize - Andra SIMEDRONI, Assoc. Prof. Lorant SZOLGA

"Mole Analyzer Based on ESP32-CAM"

3rd Prize - Cristian Valentin CHIRIAC, Prof. Dorin PETREUȘ

"Digitally Controlled High Performance DC Bench Power Supply"

1st Special Award-Major-Norbert APAI, Esteban FORESI, Valeria GÂRLEANU, Ovidiu Aurelian CIUPE, Assist. Prof. Ligia CHIOREAN

"Website for optimizing stock monitoring and measurements in Tenaris Silcotub company"

2nd Special Award - David-Sorin ROȘCA, Prof. Sorin HINTEA, Paul Gabriel POP, Assist. Claudia CORDOȘ

"Seismic activity measurement system based on FPGAs using SPI Engine"

3rd Special Award - Radu Bogdan SABĂU, Assist. Prof. Radu ETZ

"Speed Control of a Permanent Magnet Synchronous Machine"

Master-Doctor

1st Prize - Iulian-Teodor GOIA, Marius PETREUȘ, Assist. Prof. Raul ONET

"Area-Efficient Active Low-Pass Filter for Noise Reduction in Integrated Voltage References"

2nd Prize - Petru-Rareș MOLDOVAN, Cosmin-Sorin PLEȘA, George-Gabriel SIMEON, Assoc. Prof. Marius NEĂG

"Stability Analysis of Multi-Loop Voltage Regulators using Signal Flow Graphs and Driving Point Impedance: A Dual-Loop Case Study"

3rd Prize - Valentin-Dimitrie POPESCU, Prof. Mircea GIURGIU

"Quantized Residual CNN Edge Node for Real-Time Vibration Classification and Secure OTA Updates"

1st Special Award - Cătălin-Ionuț OPRIȚA, Octavian-Constantin AXINTE, Assoc. Prof. Mihai DĂRABAN

"Signal Integrity Analysis on a RGMIIv2.0 Interface"

Special Awards

Analog Devices:

Valentin-Dimitrie POPESCU, Cristian Valentin CHIRIAC, Laurențiu-Vlad BOBOCEA (Student EA)

SSET 2026

Program at a glance

Event	Section, time, location		
	Student TST-IEDEEE	Student EA-IEDEEE	Master-Doctor
Opening ceremony	8.00 - 8.30 room 359		
Presentations	8.30 - 10.30 room 359	8.30 - 10.30 room 41	8.30 - 9.30 room 368
Coffee break	10.30 - 10.45		9.30 - 9.45
Presentations	10.45 - 12.35	10.45 - 12.35	9.45 - 10.45
Partners presentations Rising stars Awards ceremony	13.00 - 14.30 room 359		



SSET 2026

Committees

Scientific committees

Section 1 - Student TST-IEDEEE

Chairman: Prof. Virgil DOBROTĂ, PhD

Members: Prof. Mircea VAIDA, PhD

Prof. Emanuel PUȘCHIȚĂ, PhD

Assoc. Prof. Raul MĂLUȚAN, PhD

Assist. Prof. Camelia FLOREA, PhD

Section 2 - Student EA-IEDEEE

Chairman: Assoc. Prof. Marius NEAG, PhD

Members: Assoc. Prof. Albert FAZAKAS, PhD

Assoc. Prof. Liviu VIMAN, PhD

Assoc. Prof. Mihai DĂRĂBAN, PhD

Assist. Prof. Călin FĂRCAȘ, PhD

Section 3 - Master-Doctor

Chairman: Prof. Corneliu RUSU, PhD

Members: Prof. Romulus TEREBEȘ, PhD

Prof. Ramona GĂLĂTUȘ, PhD

Assoc. Prof. Septimiu POP, PhD

Assoc. Prof. Botond KIREI, PhD

Organizing committee:

Assoc. Prof. Anca APATEAN, PhD

Assoc. Prof. Lorant SZOLGA, PhD

Assist. Prof. Rajmond JÁNÓ, PhD

Assoc. Prof. Laura IVANCIU, PhD

Chairman (coordinator): Prof. Ovidiu POP, PhD

Co-chairman: Assoc. Prof. Raul MĂLUȚAN, PhD

Financial officer: Eng. Angela RUSU

SSET 2026

Detailed program

Section 1 - Student TST-IEDEEE - room 359

8:30-8:40: Darius-Alexandru TĂNĂSESCU, Assist. Prof. Iustin IVANCIU – *“Portable Mesh Networking Solution for Off-Grid Communications based on the Meshtastic Protocol”*

8:40-8:50: Mădălin-Emiluş-Aniel GAVRILAŞ, Assist. Prof. Iustin IVANCIU – *“Secure and Highly Available Enterprise Network Infrastructure Using Cisco Packet Tracer”*

8:50-9:00: Szilárd-Károly SOMOGYI, Assist. Prof. Tudor BLAGA – *“Cross-Platform Mobile Security Auditing and Automated Hardening Framework”*

9:00-9:10: David-Adrian CIOLOCA, Assist. Prof. Tudor BLAGA – *“Implementing a Zero Trust Network Access Architecture Using Open-Source Frameworks and Enterprise Switching”*

9:10-9:20: Maria Alexandra CRIŞAN, Assoc. Prof. Mihaela GORDAN – *“Hypespectral Face Recognition By Local Ternary Patterns and Histograms of Oriented Gradients”*

9:20-9:30: Fabian Daniel BUDE, Assist. Prof. Camelia FLOREA – *“Vehicle detection in parking lot images”*

9:30-9:40: Rebeca-Veronica PĂŞCUŢĂ, Assist. Prof. Ioana ILEA – *“Face Recognition Algorithm Based on Local and Global Image Features”*

9:40-9:50: Diana-Andreea VLAD, Assoc. Prof. Raul MĂLUŢAN – *“A Transfer Learning Approach to Finger Vein Recognition with Image Preprocessing”*

9:50-10:00: Alexandru-Teodor RADU, Assist. Prof. Iustin IVANCIU – *“DevSecOps Architecture for Supply Chain Security Using Keyless Signing and Kernel Monitoring”*

10:00-10:10: Sergiu-Bogdan RUS, Assist. Prof. Iustin IVANCIU – *“Design and Implementation of VaultCoder: A Local Autonomous Programming Agent Using CoALA Architecture”*

10:10-10:20: Claudia-Angela JAKAB, Assoc. Prof. Cosmin STRILEŢCHI – *“Robust Music Identification Across Diverse Modalities”*

10:20-10:30: Delia VOICAN, Assist. Prof. Cristian CODĂU – *“Machine Learning-Based Detection of Jamming Attacks in 5G New Radio Networks”*

10:30 – 10:45 Coffee break

10:45-10:55: Mark-Aris GERGELY, Prof. Virgil DOBROTĂ – *“A Proof-of-Concept Implementation of Segment Routing over IPv6 with IS-IS Emulated in an EVE-NG Network Laboratory”*

10:55-11:05: Mihnea-Cristian ARSENI, Prof. Virgil DOBROTĂ – *“Automated Deployment of a V2N Testbed in EVE-NG for IPv6 Multi-Path Communications”*

11:05-11:15: Radu Ștefan ZEMORA, Prof. Virgil DOBROTĂ – *“Interactive Trace of Paths for Inter-Site Communications in TUCN”*

11:15-11:25: Vlad-Andrei VLAICU, Assoc. Prof. Daniel ZINCA – *“Automated Attack Surface Discovery with LLM Assisted Reporting”*

11:25-11:35: Ștefan-Daniel NASTAS, Assoc. Prof. Cosmin STRILEȚCHI – *“Satellite Sandboxing System for Certifying Legitimacy of Firmware Modules”*

11:35-11:45: Mihai-Alexandru ILIE, Assoc. Prof. Cosmin STRILEȚCHI – *“A Multi-Tenant Container as a Service Platform: The LXC Sentinel Web App”*

11:45-11:55: Lenuța-Maria OLARIU, Assist. Robert BOTEZ – *“Monitoring and Securing Cloud-Native Infrastructures using eBPF and Falco”*

11:55-12:05: Adrian VERDE, Assist. Prof. Tudor BLAGA – *“Automated Security Audit and Remediation Dashboard for AWS Environments”*

12:05-12:15: Mihai Alexandru MĂTUȘA, Assist. Prof. Tudor BLAGA – *“Password Policies Among Top Global and Local Websites”*

12:15-12:25: Luca-Ioan SIMUȚ, Assist. Prof. Tudor BLAGA – *“Endpoint Security Posture Management”*

12:25-12:35: Andreea-Cristina UNGUR, Assoc. Prof. Raul MĂLUȚAN – *“A CNN approach to the classification of dermatological skin lesions”*

SSET 2026

Detailed program

Section 2 - Student EA-IEDEEE - room 41

8:30-8:40: Alexandru CÎMPEAN, Assoc. Prof. Mihai DĂRĂBAN, Prof. Ovidiu POP – *“Predesign Power Distribution Network Analysis Using Hierarchical SPICE Modeling”*

8:40-8:50: Daniela-Ileana DRULE, Prof. Ovidiu POP – *“Automated Testing System Based on the LabVIEW Programming Environment”*

8:50-9:00: Nicoleta Elena BONDRIC, Assoc. Prof. Adrian TĂUT – *“A Matlab Platform for Control and Analyze of BLDC Motor Using Sensorless FOC”*

9:00-9:10: Diana-Elena BODEA, Andreea POPESCU, Georgiana ORDEAN, Assoc. Prof. Toma PĂTĂRĂU – *“Thyristor firing angle control”*

9:10-9:20: Ancuța-Georgiana PELIN, George-Gabriel SIMEON, Lei ZHANG, Assist. Prof. Raul ONEȚ – *“Computer Aided CAN Transmitter Design for Optimized Area”*

9:20-9:30: Sercan SERT, Assist. Prof. Raul ONEȚ – *“Analysis of class AB amplifiers for fast-transient capacitor-less LDO regulators”*

9:30-9:40: Marius-Erik DUMNICI, Petru Rareș MOLDOVAN, Mircea-Radu CIAMBUR, Assist. Prof. Raul ONEȚ – *“Split-Length Frequency Compensation for LDO PSRR Improvement”*

9:40-9:50: Rareș Cristian PETRIC, Rareș Ștefan TCACIU, Robert Gabriel TARNIȚĂ, Assoc. Prof. Paul FARAGO – *“Hardware-Assisted AES-128 Encrypted Communication Channel: A Didactic Implementation Using FPGA and ESP32”*

9:50-10:00: Daniel MARCHIȘ, Assoc. Prof. Paul FARAGO - *AlcoLock: “An ESP32-Based Breathalyzer Engine Interlock System with Real-Time IoT Monitoring”*

10:00-10:10: Cristian OPREAN, Assoc. Prof. Liviu VIMAN – *“Wireless Glove Teleoperation of a Robotic Arm”*

10:10-10:20: Andreea-Beatrice VEZAN, Assoc. Prof. Anca APATEAN – *“Raspberry Pi System for Real-Time Multiple-Choice Test Evaluation”*

10:20-10:30: Benjamin DÎRJAN, Rober-Gabriel TARNIȚĂ, Assoc. Prof. Laura IVANCIU – *“Design and Implementation of a Standalone 8x8x8 RGB LED Volumetric Display”*

10:30 – 10:45 Coffee break

10:45-10:55: Alexandra-Gabriela BROJBAN, Assoc. Prof. Laura IVANCIU – *“Detection and Classification of Through-Hole Technology Electronic Components using YOLOv11 and the ESP32-CAM-MB Module”*

10:55-11:05: Cezara-Patricia ALBINETZ, Assoc. Prof. Laura IVANCIU – *“ESP-Based Automated Recycling System with Image Processing and Multi-Sensor Detection”*

11:05-11:15: Sofia OȚET, Assist. Prof. Vlad BANDE – *“Intelligent Greenhouse Monitoring and Control System”*

11:15-11:25: Adina-Ioana COSTEA, Assist. Prof. Rajmond JÁNÓ- *“Design and Implementation of a Web-Based Classroom Reservation System for Academic Environments”*

11:25-11:35: Andrei-Daniel BOTA, Assist. Prof. Robert GROZA – *“Design and Implementation of an ECG Analog Front-End”*

11:35-11:45: Andrei Nicola REBELEȘ, Assoc. Prof. Emilia ȘIPOȘ – *“State Driven Geospatial Orchestration for Dynamic Route Optimization in Logistics”*

11:45-11:55: Adrian CHERA, Assist. Prof. Mihaela CÎȘLARIU – *“Skin Cancer AI Recognition”*

11:55-12:05: Raul CARDOȘ, Georgiana NAGY, Assoc. Prof. Mihaela GORDAN – *“Adaptive Hybrid Inpainting for Specular Highlight Removal in Colonoscopy Images”*

12:05-12:15: Andrei-Silviu HALIȚ, Assoc. Prof. Laura IVANCIU – *“BLE indoor positioning system using Kalman filter and Weighted Centroid Localization”*

12:15-12:25: Alexandra-Rebeca MAG, Assoc. Prof. Laura IVANCIU – *“Real-Time Meteor Detection in Night Sky Imagery Using YOLO26 with Oriented Bounding Boxes”*

12:25-12:35: Daria POP, Assoc. Prof. Laura IVANCIU – *“Automated System for Canine Emotion Classification using Mel-Spectrograms and Convolutional Neural Networks”*

SSET 2026

Detailed program

Section 3 - Master-Doctor - room 368

8:30-8:40: Petru-Rareş MOLDOVAN, George-Gabriel SIMEON, Cosmin-Sorin PLEŞA, Assoc. Prof. Marius NEAG – *“Dual-Loop Low-Power Nonlinear High-Precision Capacitorless 1.5V Voltage Regulator”*

8:40-8:50: Adrian BINDER, Assist. Prof. Ervin SZOPOS, Assoc. Prof. Botond KIREI – *“Self-Interference Assessment for an In-Band Full-Duplex Indoor Wireless Transmission”*

8:50-9:00: Iulian-Teodor GOIA, Marius-Claudiu PETREUŞ, Assist. Prof. Raul ONET – *“Area-Efficient Active Low-Pass Filter for Noise Reduction in Integrated Voltage References”*

9:00-9:10: Lucas Ştefan MANCIU, Prof. Dorin PETREUŞ – *“Comparative Study of Resonate Tank Design for LLC Converters”*

9:10-9:20: Daniel Andrei BULUGHEANĂ, Prof. Dorin PETREUŞ – *“Implementation of a general mathematic model for a PEM fuel cell”*

9:20-9:30: Lara MOGA, Prof. Dorin PETREUŞ – *“Sizing and Modelling for Proton Exchange Membrane Fuel Cells”*

9:30 – 9:45 Coffee break

9:45-9:55: Vlad VELICIU, Assoc. Prof. Liviu VIMAN – *“Low-Noise Voltage-Controlled Current Source Concept”*

9:55-10:05: Andrei-Alexandru EVTEI, Prof. Virgil DOBROTĂ – *“An eBPF/XDP Security Framework for Distributed Denial-of-Service Resilient Hybrid Clouds”*

10:05-10:15: Valentin-Dimitrie POPESCU, Prof. Mircea GIURGIU – *“Speech Enhancement using Teacher-Student Deep Learning for Embedded Hardware”*

10:15-10:25: Tudor-Gabriel PASCARU, Assist. Prof. Ştefania BENEĂ – *“Deepfake Video Detection using Sparse Frame Sampling and Logit Aggregation”*

10:25-10:35: Alexandru-Octavian BOGEANU-POPA, Prof. Romulus TEREBEŞ – *“Block-Hankel Structured Low-Rank Approximation for Localized Deepfake Artifact Detection”*

10:35-10:45: Alexandru-Octavian BOGEANU-POPA, Assoc. Prof. Paul FARAGO, Prof. Romulus TEREBEŞ – *“Applying Game Theory to Multimodal Deepfake Detection”*

Paper abstracts

Section 1 – Student TST-IEDEEE

1: Darius-Alexandru TĂNĂSESCU, Assist. Prof. Iustin IVANCIU - *Portable Mesh Networking Solution for Off-Grid Communications based on the Meshtastic Protocol*

Abstract—This paper covers the implementation of a portable and universal remote telecommunication solution, explaining the hardware, firmware, and software layers. The device integrates an ESP-32 as its core, complete with power delivery, a case and an 868 MHz LoRa antenna, running a modified version of the Meshtastic firmware and interfacing an Android application via Bluetooth Low Energy.

Keywords— Bluetooth Low Energy LoRa, Mesh Network, Meshtastic, Off-Grid Telecommunications.

2: Mădălin-Emiluş-Aniel GAVRILAŞ, Assist. Prof. Iustin IVANCIU - *Secure and Highly Available Enterprise Network Infrastructure Using Cisco Packet Tracer*

Abstract—This paper presents the design, implementation, and validation of a secure and highly available enterprise network using Cisco Packet Tracer. Transitioning from a standard baseline network model to a robust corporate infrastructure, the design integrates critical Layer 2 and Layer 3 protocols alongside perimeter security. Virtual Local Area Networks and Access Control Lists provide strict traffic segmentation. Perimeter defense is established using Cisco Adaptive Security Appliance firewalls with dual Internet Service Providers. High Availability is achieved through the Rapid Spanning Tree Protocol for loop-free logical topologies and the Hot Standby Router Protocol for gateway redundancy. Open Shortest Path First ensures dynamic routing. Simulation results validate the network's resilience against link failures and its ability to enforce stringent security policies.

Keywords— Cisco Packet Tracer, HSRP, Layer 3 Switching, Network Security, OSPF, RSTP, VLAN.

3: Szilárd-Károly SOMOGYI, Assist. Prof. Tudor BLAGA - *Cross-Platform Mobile Security Auditing and Automated Hardening Framework*

Abstract—As mobile devices become central to enterprise data processing, ensuring adherence to rigorous security standards is critical. This paper presents a software architecture capable of performing automated security audits on iOS and Android platforms using a unified interface. By leveraging the Android Debug Bridge and the libimobiledevice suite, the framework extracts low-level system configurations, evaluates them against established Center for Internet Security benchmarks, and provides a centralized dashboard for vulnerability management. The study explores the challenges of hardware abstraction, binary vendoring for environment portability, and the implementation of a reactive user interface for real-time security posture assessment.

Keywords— Mobile Security, CIS Benchmarks, Flask, Android, iOS, Hardware Abstraction, Automated Hardening.

4: David-Adrian CIOLOCA, Assist. Prof. Tudor BLAGA - *Implementing a Zero Trust Network Access Architecture Using Open-Source Frameworks and Enterprise Switching*

Abstract—Modern enterprise networks require robust security mechanisms to prevent unauthorized access and dynamically segment traffic based on user identity and device type. This paper presents the design and implementation of a comprehensive Network Access Control (NAC) system leveraging an open-source framework and enterprise edge switching infrastructure. The proposed architecture integrates standard port-based user-level authentication and Media Access Control (MAC) Authentication Bypass for headless devices. Initial testing on legacy hardware revealed critical limitations regarding Ternary Content-Addressable Memory (TCAM) exhaustion during dynamic filter allocation. Consequently, the edge architecture was migrated to a modern switch, enabling full dynamic virtual network assignment. Authentication is centralized via a virtualized server operating as a comprehensive Remote Authentication Dial-In User Service (RADIUS) implementation. The current progress demonstrates a fully functional security environment, resolving previous database corruption issues and establishing the foundational framework for secure client authentication.

Keywords— Network Access Control, Virtual LAN, Identity Management, Authentication, Zero Trust.

5: Maria Alexandra CRIȘAN, Assoc. Prof. Mihaela GORDAN - *Hyperspectral Face Recognition By Local Ternary Patterns and Histograms of Oriented Gradients*

Abstract—Hyperspectral imaging technology offers high accuracy in facial recognition systems due to the large number of spectral elements within a specific sub-band. It provides better recognition performance compared to the standard RGB imaging (especially under low-intensity or low contrast conditions) thanks to the invariance to global lighting of the spectral acquisition. However, using hyperspectral cubes for face recognition can be challenging due to the large volume of data per face image. This paper presents the implementation and experimental validation of a hyperspectral facial recognition method based on handcrafted feature extraction (using Local Ternary Patterns and Histogram of Oriented Gradients) followed by a K-Nearest Neighbor (KNN) classification, on a publicly available hyperspectral face dataset. Since the number of samples per individual is very limited (maximum three samples/subject) and the number of subjects is large (70), the performance is assessed through the Cumulative Matching Curves (CMC). Despite the relatively simple classification approach, the numerical results prove the effectiveness of the implemented method for face recognition/verification.

Keywords—hyperspectral images, face normalization, Sobel edge detection, LTP, HOG, KNN, CMC curves.

6: Fabian Daniel BUDE, Assist. Prof. Camelia FLOREA - *Vehicle detection in parking lot images*

Abstract—This paper presents the development of an automatic vehicle detection system for parking lot images. The project was carried out in two stages: initial training on the KITTI dataset for three classes, namely car, van, and truck, followed by fine-tuning on CNR-EXT parking lot images, where the camera perspective is different. Two detectors, YOLO-NASS and YOLOv8s, were trained and compared in order to obtain results as close as possible to real-world conditions. The system includes data preparation in YOLO format, training, evaluation, confidence threshold analysis, and ONNX export for inference.

Keywords—vehicle detection, YOLO-NAS-S, YOLOv8s, KITTI, CNR-EXT, ONNX, smart parking.

7: Rebeca-Veronica PĂȘCUȚĂ, Assist. Prof. Ioana ILEA - *Face Recognition Algorithm Based on Local and Global Image Features*

Abstract—Facial recognition represents a research field that has been intensively studied in recent years. The present paper studies the extraction of facial features using a method that efficiently simulates human perception and proves to be robust to some of the major challenges currently faced in this domain: illumination variations, facial expressions and occlusions. The descriptor integrates the local and global information contained in images by fusing Weber Vector Local Pattern and Neighbors to Center Difference Binary Pattern methods. The recognition process is then performed by using the K-Nearest Neighbor classifier based on the Chi-Square distance.

Keywords—face recognition, global and local information, WVLP, NCDBP.

8: Diana-Andreea VLAD, Assoc. Prof. Raul MĂLUȚAN - *A Transfer Learning Approach to Finger Vein Recognition with Image Preprocessing*

Abstract—This paper presents a finger vein recognition method based on image preprocessing and transfer learning. The proposed approach combines classical preprocessing techniques, including contrast enhancement, noise reduction, and region of interest extraction, with a pretrained convolutional neural network for classification. Data augmentation is applied to improve generalization. Experimental results show that the proposed method achieves robust performance, demonstrating the effectiveness of combining preprocessing with deep learning for finger vein recognition tasks.

Keywords—finger vein recognition, transfer learning, convolutional neural network, data augmentation, image preprocessing, biometric identification.

9: Alexandru-Teodor RADU, Assist. Prof. Iustin IVANCIU - *DevSecOps Architecture for Supply Chain Security Using Keyless Signing and Kernel Monitoring*

Abstract—This paper presents a DevSecOps architecture with the purpose of addressing various impactful cyberattacks related to supply chain security. The architecture combines different open-source projects such as Sigstore, in-toto, Kyverno, Tracee eBPF, Loki, Grafana and Argo. The goal is to have a Zero Trust model, where each image in a CI/CD pipeline needs to be approved by each verifying step, while providing immutable evidence in the process.

Keywords— cluster policy, DevSecOps, Github, Grafana, Kernel monitoring, keyless signing, LSM hooks.

10: Sergiu-Bogdan RUS, Assist. Prof. Iustin IVANCIU - *Design and Implementation of VaultCoder: A Local Autonomous Programming Agent Using CoALA Architecture*

Abstract— This paper presents the design and implementation of a programming agent using Go programming language and Ollama software. The project's memory architecture and integration with external applications are based on the CoALA concept. The goal is to develop a fast and precise programming assistant, hosted in a local environment or on local servers.

Keywords— CoALA, LLM, memory management, Ollama.

11: Claudia-Angela JAKAB, Assoc. Prof. Cosmin STRILEȚCHI – Robust Music Identification Across Diverse Modalities

Abstract—This research proposes a unified music recognition system that uses a modular pipeline and multi-engine API (Application Programming Interface) orchestration to achieve up to 96% accuracy in identifying songs from humming, lyrics, or noisy radio broadcasts.

Keywords—Music recognition, Music Information Retrieval, Digital Signal Processing, Noise Reduction, Speech-to-Text, API, Acoustic Fingerprinting, Humming Recognition.

12: Delia VOICAN, Assist. Prof. Cristian CODĂU - Machine Learning-Based Detection of Jamming Attacks in 5G New Radio Networks

Abstract—This paper evaluates support vector machine (SVM), random forest (RF), and convolutional neural network (CNN) for detecting barrage, pulse, and swept-tone (tone) jamming in 5G New Radio (NR) downlink signals. A synthetic dataset of 10,000 labeled in-phase/quadrature (IQ) samples (2,500/class) was generated in MATLAB with realistic physical downlink shared channel (PDSCH) parameters and variable signal-to noise ratio (SNR)/jamming-to-signal ratio (JSR). Forty handcrafted time-domain, frequency-domain, and statistical features were extracted per sample. The SVM achieved 90.4 %, the CNN 89.5 %, and the RF 89.2 % test accuracy, demonstrating tractable four-class physical-layer jamming classification.

Keywords—5G NR; jamming detection; machine learning; SVM; random forest; CNN; physical layer security.

13: Mark-Aris GERGELY, Prof. Virgil DOBROTĂ - A Proof-of-Concept Implementation of Segment Routing over IPv6 with IS-IS Emulated in an EVE-NG Network Laboratory

Abstract—Segment Routing over IPv6 (SRv6) is increasingly proposed as a replacement for MPLS-based traffic engineering in service-provider networks. As full lab-scale validation remains costly, this paper presents a proof-of-concept (PoC) implementation of SRv6 in an EVE-NG emulated environment. The testbed included five Cisco Catalyst 8000V virtual routers running IOS XE 17.12.5, with IS-IS used as Interior Gateway Protocol. We preferred IS-IS over OSPFv3 or BGP due to its native multi-protocol support, maturity of the IS-IS SRv6 extensions, as defined in RFC 9352 [5], and prevailing practice in operator deployments. There were two configurations: a pure IS-IS baseline, and a statically configured SR Policy on the headend that pins traffic to an explicit segment list. UDP traffic was generated with Cisco TRex, whilst per-path packet counters and on-router packet captures were used to verify correct segment ID list traversal and Segment Routing Header encapsulation/ decapsulation.

Keywords—Cisco TRex; EVE-NG emulator; IS-IS; SRv6.

14: Mihnea-Cristian ARSENI, Prof. Virgil DOBROTĂ - Automated Deployment of a V2N Testbed in EVE-NG for IPv6 Multi-Path Communications

Abstract—Reproducible network testbeds are essential to Vehicle-to-Network (V2N) research but provisioning them manually on a network emulator, such as EVE-NG, is slow and error-prone. This is happening especially when topologies mix Cisco routers with Linux QEMU nodes that do not accept startup-config. In this paper we propose a Python-based automation framework that deploys a fully

wired, IPv6-routed V2N lab on EVE-NG, from a single JSON specification. The framework wrapped the EVE-NG REST API through evengsdk, created and connected the nodes. Next, it delivered configuration through two paths: Cisco routers received their startup configuration through EVE-NG's virtual config drive, while Linux nodes were configured by typing their netplan into the QEMU VNC console using vncdotool. The framework reduced laboratory setup from a manual process spanning hours to a single command that was completed in roughly five minutes. Future work will extend the testbed with synthetic traffic generation using Cisco TRex and with machine-learning based traffic prediction across the multi-path topology.

Keywords—EVE-NG, IPv6 multi-path, JSON, network emulation, Python, V2N.

15: Radu Ștefan ZEMORA, Prof. Virgil DOBROTĂ - *Interactive Trace of Paths for Inter-Site Communications in TUCN*

Abstract—This paper presents a distributed network monitoring system focused on interactive, hop-by-hop traceroute analysis of paths between physically separated sites of Technical University of Cluj-Napoca (TUCN). Lightweight Python agents are deployed at each location to collect real-time metrics (latency, jitter, packet loss) using ICMP-based probing. A REST API layer enables cross-site probe execution, allowing a unified web dashboard to trigger traceroutes from any agent toward any reachable host. The interactive visualization builds the hop graph dynamically, color-coding each node by latency and displaying full per-hop statistics. Results show that local path latency stays below 50 ms, while cross-site paths reach up to 152 ms through institutional routing, with zero packet loss observed under normal operating conditions.

Keywords—Distributed agents, ICMP, InfluxDB, jitter, latency, packet loss, REST API, Streamlit, traceroute.

16: Vlad-Andrei VLAICU, Assoc. Prof. Daniel ZINCA - *Automated Attack Surface Discovery with LLM Assisted Reporting*

Abstract— Modern attack surface management increasingly relies on chaining multiple security tools (subdomain enumeration, port scanning, web crawling, technology fingerprinting), but the combined output is overwhelming: a single target can produce hundreds of raw findings, of which only a few are valid or actionable. This paper presents the implementation of a Docker orchestrated pipeline that addresses this signal-to-noise problem through a layered funnel: deterministic deduplication and filtering, vulnerability enrichment via the National Vulnerability Database (NDV), the Exploit Prediction Scoring System (EPSS) and the CISA Known Exploited Vulnerabilities (KEV) catalog, followed by rule-based prioritization. A planned Large Language Model (LLM) component will transform the prioritized findings into a human-readable report and resolve ambiguous cases that escape the deterministic rules.

Keywords—attack surface discovery, vulnerability scanning, vulnerability prioritization, large language models, security automation

17: Ștefan-Daniel NASTAS, Assoc. Prof. Cosmin STRILEȚCHI - *Satellite Sandboxing System for Certifying Legitimacy of Firmware Modules*

Abstract—Satellites are critical assets across numerous sectors, including telecommunications, scientific research, Earth observation, navigation, and defense. Hence, the security posture of these systems is essential, particularly during active mission operations where compromise can have significant operational impact. As satellite constellations expand and space hardware becomes increasingly accessible, protecting onboard subsystems within constrained hardware environments has become a growing cybersecurity challenge.

Keywords— cybersecurity, satellite, sandboxing, behavioral analysis

18: Mihai-Alexandru ILIE, Assoc. Prof. Cosmin STRILEȚCHI - *A Multi-Tenant Container as a Service Platform: The LXC Sentinel Web App*

Abstract—The rapid change of technology and cloud computing leads to a shift from traditional hardware-level virtualization to a lightweight operating-system-level virtualization technology. Container as a Service (CaaS) platforms offer the user advantages of fast deployment density, workload scalability, and resource utilization efficiency. This paper presents the architecture and implementation of LXC Sentinel Web App, a multi-tenant monitoring and management platform for Linux Containers (LXC) hosted on Proxmox Virtual Environment hypervisor.

Keywords—Linux Containers (LXC), Proxmox Virtual Environment, Multi-Tenancy, Cloud Computing, Container as a Service (CaaS), HTMX, Resource Allocation, Security Isolation, API Integration.

19: Lenuța-Maria OLARIU, Assist. Robert BOTEZ - *Monitoring and Securing Cloud-Native Infrastructures using eBPF and Falco*

Abstract—This paper presents a monitoring and security solution for containerized environments, based on Falco, eBPF, Falcosidekick, Loki and Grafana. This system detects suspicious activities such as network scanning, SQL injection tools, container escape attempts, sensitive file access and privilege escalation. The alerts are generated by Falco, forwarded to Loki through Falcosidekick and can be visualized using the designated dashboards in Grafana. The entire process has been automated using Docker, allowing all components to be deployed and tested in a controlled local environment.

Keywords—Docker, Loki, Grafana, eBPF, Kali Linux, Falco, Falcosidekick.

20: Adrian VERDE, Assist. Prof. Tudor BLAGA - *Automated Security Audit and Remediation Dashboard for AWS Environments*

Abstract—This paper presents the design and implementation of an automated security audit and vulnerability remediation system for Amazon Web Services (AWS) environments. As cloud infrastructure scales, manual security auditing becomes inefficient and prone to human error. The proposed solution addresses this by deploying a centralized web-based dashboard that continuously monitors, audits, and mitigates security misconfigurations in real-time. By leveraging Prowler for comprehensive vulnerability scanning and custom Python-based remediation bots, the system automatically resolves critical issues such as exposed EC2 security groups, public S3 buckets, and IAM users lacking Multi-Factor Authentication (MFA). The architecture provides a user-friendly Flask interface for triggering scans,

downloading consolidated reports, and executing one-click remediations, thereby drastically reducing the incident response time and enforcing cloud security best practices.

Keywords—AWS, Cloud Security, Automation, Prowler, Vulnerability Remediation, Python.

21: Mihai Alexandru MĂTUȘA, Assist. Prof. Tudor BLAGA - Password Policies Among Top Global and Local Websites

Abstract—This paper analyzes the password composition policies of 90 high-traffic global and local websites to evaluate their compliance with modern security standards, such as NIST SP 800-63B. Our analysis reveals that a significant portion of these websites still fail to implement robust blocklists, allowing common passwords such as "password123" or "qwerty123". Furthermore, while many platforms hinder the user experience with outdated complexity requirements (such as mandatory special characters or digits), there is a notably low adoption rate of effective password strength meters. The results suggest a persistent gap between authentication guidelines and industry practices, highlighting the urgent need for a transition toward user-centered security measures that prioritize resistance to guessing attacks over arbitrary complexity rules.

Keywords—Password Compositions Policies, Credential Guessing, NIST SP 800-63B, Password Blocking, Comparative Analysis.

22: Luca-Ioan SIMUȚ, Assist. Prof. Tudor BLAGA - Endpoint Security Posture Management

Abstract—This paper presents the implementation of an endpoint security monitoring and auditing system utilizing open-source tools. The primary challenge addressed is the lack of real-time visibility into system configurations and the security posture of workstations within a network. The proposed solution employs an osquery agent to collect telemetry as structured SQL tables, with data centrally orchestrated through the Fleet DM platform. The results are aggregated into a log pipeline via Loki and visualized through dynamic dashboards in Grafana. The current system is monitoring resource utilization, security product status, and policy compliance. The results demonstrate that thresholds and automated alerts make for instantaneous detection of vulnerabilities, providing an efficient auditing mechanism with minimal resource consumption on the monitored systems.

Keywords—osquery, endpoint monitoring, security auditing.

23: Andreea-Cristina UNGUR, Assoc. Prof. Raul MĂLUȚAN - A CNN approach to the classification of dermatological skin lesions

Abstract—This paper presents a system for automatic classification of dermatological lesions using Deep Learning models and advanced image processing methods. Considering the artifacts that are present in dermoscopic images, the DullRazor algorithm was introduced to eliminate the pilosity and smooth the images, followed by elements of data augmentation to compensate for the imbalanced classes. The feature extraction process was performed using a CNN model, EfficientNetB0. By including Transfer Learning elements, the proposed model achieved high rates of accuracy for the HAM10000 dataset, making it a viable and a modern solution.

Keywords—dermatological lesions, melanoma, CNN, DullRazor, Transfer Learning, EfficientNet, HAM10000.

Section 2 – Student EA–IEDEEE

1: Alexandru CÎMPEAN, Assoc. Prof. Mihai DĂRĂBAN, Prof. Ovidiu POP - *Predesign Power Distribution Network Analysis Using Hierarchical SPICE Modeling*

Abstract—In order to obtain valuable information during the early stages of the design process, within a short amount of time and with considerably reduced computational resources, SPICE models represent a solid and practical solution. Power Distribution Network (PDN) analysis is performed by gradually including each element of the PDN ecology and visualizing its individual effect on the overall system behavior. This article highlights the ease and the accuracy of the approach, proposing it as an essential step before complex simulations or final layout implementation.

Keywords—Power Distribution Network, target impedance, segmentation method, interposer.

2: Daniela-Ileana DRULE, Prof. Ovidiu POP - *Automated Testing System Based on the LabVIEW Programming Environment*

Abstract—This paper proposes the implementation of an automated testing system for an electronic circuit based on the LabVIEW programming environment, an Arduino development board, and an NI USB-6001 data acquisition system. The system is designed to monitor the parameters of a PWM-controlled LED, collecting real-time data to compare against a set of reference values. The proposed architecture allows for the automatic detection of LED color or anomalies through voltage and current analysis. The use of virtual instruments and dedicated acquisition makes this system ideal for quality control and rapid diagnostics applications in electronics laboratories.

Keywords—LabVIEW, Arduino, USB-6001, automated testing, data acquisition.

3: Nicoleta Elena BONDRIC, Assoc. Prof. Adrian TĂUT - *A Matlab Platform for Control and Analyze of BLDC Motor Using Sensorless FOC*

Abstract—This paper develops a way to control the speed of a brushless DC motor, without using expensive hardware components, for a response that is as fast and sustainable as possible over time using the MATLAB/Simulink development environment. This control can be tested by any user through a graphical interface from which the performance of the motor and of the algorithm can be modified to observe the behavior of the FOC control.

Keywords—BLDC, FOC, SMO, PI, SVPWM, MATLAB.

4: Diana-Elena BODEA, Andreea POPESCU, Georgiana ORDEAN, Assoc. Prof. Toma PĂTĂRĂU - *Thyristor firing angle control*

Abstract—Thyristors are power electronic devices that can be controlled using either analog or digital methods. This paper presents an analog approach for controlling the firing angle of thyristors. The proposed method includes functional blocks responsible for power line synchronization, phase control, and thyristor triggering. The generated control signal is used to drive a thyristor-based rectifier bridge. By adjusting the firing angle, the power delivered to the load can be effectively regulated.

Keywords—thyristor, control, firing angle, bridge rectifier.

5: Ancuța-Georgiana PELIN, George-Gabriel SIMEON, Lei ZHANG, Assist. Prof. Raul ONEȚ - Computer Aided CAN Transmitter Design for Optimized Area

Abstract—This paper presents a Python tool for optimal area sizing of the output stage of a CAN transmitter. In this way a global and local optimization are used. A human designer sizing main steps are also presented. The developed sizing algorithm performance is compared against manual sizing. The proposed tool uses a sizing algorithm whose efficiency is proven by obtaining smaller areas with 32% for local optimization and 22% for global optimization, fulfilling the voltage requirements in the same time.

Keywords—CAN (Controller Area Network) transmitter, optimal area sizing, Python tool.

6: Sercan SERT, Assist. Prof. Raul ONEȚ - Analysis of class AB amplifiers for fast-transient capacitor-less LDO regulators

Abstract—This paper analyzes the performance of two OTA error amplifiers with class AB output stages: a standard class symmetrical OTA with standard class AB output stage and folded cascode OTA with Monticelli class AB output stage. The two amplifiers are used in capacitor-less low-dropout regulators for achieving fast response to load variations. The LDOs are supplied from 1.8V and outputs a voltage of 1.2V for a load current ranging from 1mA to 100mA. The circuits were designed in a standard 180nm CMOS process. The measured settling time for both LDOs ranges from 1.07 μ s to 1.14 μ s when the load varies from minimum to maximum and vice-versa in 1 μ s, and a undershoot and overshoot of 283.56mV and 313.89mV with a quiescent current of 130.6mV for the symmetrical OTA, as well as 457.87mV and 264.72mV with a quiescent current of 132.6mV for the folded cascode OTA.

Keywords— capacitor-less low-dropout regulator, fast-transient, class AB.

7: Marius-Erik DUMNICI, Petru Rareș MOLDOVAN, Mircea-Radu CIAMBUR, Assist. Prof. Raul ONEȚ - Split-Length Frequency Compensation for LDO PSRR Improvement

Abstract— This paper presents a comparative study of two different frequency compensation techniques used in low dropout (LDO) regulators: Miller compensation and SplitLength compensation. The comparison is performed considering the phase margin and PSRR, area and transient response, while maintaining the same error amplifier, symmetrical OTA, and pass transistor size. Simulations indicate that split-length compensation obtains a better PSRR compared to Miller compensation, with a reduced silicon area, while the Miller compensation provides increased phase and gain margin.

Keywords— LDO, frequency compensation, Miller, SplitLength, Symmetrical OTA.

8: Rareș Cristian PETRIC, Rareș Ștefan TCACIUC, Robert Gabriel TARNIȚĂ, Assoc. Prof. Paul FARAGO - Hardware-Assisted AES-128 Encrypted Communication Channel: A Didactic Implementation Using FPGA and ESP32

Abstract—This document is a “proof of concept” regarding hardware encrypted telecommunication channels, custom user-defined transmission protocols and real-time transmission monitoring tools. It serves as a didactic exploration of real secure channel architecture and implementation.

Keywords—hardware encryption, transmission protocols, FPGA, channel monitoring tools, AES-128, end-to-end encryption, ESP32.

9: Daniel MARCHIȘ, Assoc. Prof. Paul FARAGO - *AlcoLock: An ESP32-Based Breathalyzer Engine Interlock System with Real-Time IoT Monitoring*

Abstract—Drunk driving remains a leading cause of road fatalities worldwide. Commercial ignition interlock devices (IIDs) exist but are expensive, proprietary, and inaccessible for research or customization. This paper presents AlcoLock, a low-cost and open-source IID prototype built on the ESP32-S3 microcontroller. The system uses an MQ-3 alcohol sensor to estimate blood alcohol concentration (BAC) and blocks engine start if the measured value exceeds a configurable threshold. A touchscreen interface built with the LVGL (Light and Versatile Graphics Library) provides real-time driver feedback. Engine control is handled by a secondary ESP32 WROOM-32 node, which receives pass/fail commands via the ESP-NOW protocol and actuates a relay on the ignition line. Remote monitoring and push notifications are provided through the Blynk platform. I validated the system with over 40 controlled measurements across four BAC levels and achieved 97.5% pass/fail decision accuracy. AlcoLock demonstrates that a fully integrated, multi-node IID can be built with accessible components and serves as a viable open platform for research and education.

Keywords—breath analyzer, ESP32, MQ-3, LVGL, ESPNOW, embedded systems, vehicle safety.

10: Cristian OPREAN, Assoc. Prof. Liviu VIMAN - *Wireless Glove Teleoperation of a Robotic Arm*

Abstract—This paper proposes an implementation of a wireless teleoperation system that utilizes a sensory glove to control a robotic arm having six degrees of freedom. As the user moves their hand and fingers, sensors integrated into the glove capture these motions. An onboard microcontroller processes and transmits this data directly to the robotic arm using a high-speed wireless link based on the ESP-NOW protocol. This direct connection minimizes latency, ensuring the robotic arm replicates human hand movements in real time.

Keywords—teleoperation, sensory glove, robotic arm, wireless communication, real-time control, wearable interfaces.

11: Andreea-Beatrice VEZAN, Assoc. Prof. Anca APATEAN - *Raspberry Pi System for Real-Time Multiple-Choice Test Evaluation*

Abstract— The integration of OCR (Optical Character Recognition) with OMR (Optical Mark Recognition) provides a new approach for automating and improving the educational assessment process. By using Raspberry Pi 4, Camera Module 3, Tesseract OCR, and OpenCV for data acquisition and real time visualization, the system improves traditional test grading methods. These tools play an important role in the process: OpenCV performs the Warp Perspective transformation to minimize camera imperfections, while Tesseract OCR extracts scores directly from the answer key, and SQLite ensures local data storage. OMR algorithms were used to analyze pixel density in order to detect and interpret the answers selected by students. By combining these technologies, the system enabled real-time grading, including the display of scores with decimal values. At the same time, the system provides audio feedback and detailed statistics, contributing to increased objectivity in the evaluation process and reducing the workload of teachers.

Keywords—Raspberry Pi, Camera Module 3, OCR, OMR, OpenCV, Tesseract.

12: Beniamin DÎRJAN, Robert-Gabriel TARNIȚĂ, Assoc. Prof. Laura IVANCIU - *Design and Implementation of a Standalone 8x8x8 RGB LED Volumetric Display*

Abstract—This paper describes the design and implementation of a standalone 8×8×8 RGB LED volumetric display, consisting of 512 individually controllable LEDs and 1,536 color channels. The primary challenge of driving this many outputs from a single microcontroller is addressed through a combination of cascaded DM13A constant-current driver chips and Serial Peripheral Interface (SPI), chained data transmission, paired with a layer scanning multiplexing scheme and 4-bit Bit Angle Modulation (BAM) for smooth color rendering. An ESP32-S3 microcontroller manages the display refresh rate, ensuring stable, flicker-free output, regardless of animation complexity. A TFT touchscreen interface provides real-time user control over brightness and animation selection. The result is a compact, self-contained 3D display platform suitable for further experimentation with volumetric graphics.

Keywords—LED cube, volumetric display, multiplexing, ESP32-S3, SPI, Bit Angle Modulation, TFT.

13: Alexandra-Gabriela BROJBAN, Assoc. Prof. Laura IVANCIU - *Detection and Classification of Through-Hole Technology Electronic Components using YOLOv11 and the ESP32-CAM-MB Module*

Abstract—The exponential growth of electronic waste (e-waste) and the need for efficient reuse of electronic components in both industrial and educational environments have created an increased demand for intelligent, real-time detection and sorting systems. This paper presents the design and implementation of an intelligent system that detects and classifies Through-Hole Technology (THT) electronic components using the You Only Look Once (YOLO)-V11 object detection model and an ESP32-CAM-MB camera module, operating within a controlled, diffused-light inspection enclosure. The system uses a custom dataset of 1749 images to identify resistors, capacitors, and diodes. Image annotation and dataset management were performed using the Roboflow platform. Despite the low-cost hardware constraints, the implemented solution achieves a mean Average Precision (mAP) of 98.3%, a Precision of 97.5%, a Recall of 95.5%, and an F1-score of 96.5%. The detection results are presented in a Python-based Graphical User Interface (GUI) for real-time visual feedback.

Keywords—YOLO-V11, object detection, THT electronic components, ESP32-CAM, e-waste, industrial environment, educational environment, Roboflow, Python GUI.

14: Cezara-Patricia ALBINETZ, Assoc. Prof. Laura IVANCIU - *ESP-Based Automated Recycling System with Image Processing and Multi-Sensor Detection*

Abstract—This article presents a solution for the automated identification and classification of recyclable containers, including aluminum cans, plastic bottles, and glass bottles. The proposed system employs image processing and pattern-matching techniques to detect the returnable packaging symbol on the examined containers. In addition, a set of sensors is integrated to determine the material composition of each object. An inductive sensor is used to identify aluminum cans, and a capacitive sensor is designed to distinguish between plastic and glass bottles.

Keywords—recycling, image processing, sensors.

15: Sofia OȚET, Assist. Prof. Vlad BANDE - *Intelligent Greenhouse Monitoring and Control System*

Abstract—This paper presents the design and implementation of an intelligent IoT-based system for greenhouse monitoring and control, aimed at enhancing sustainable agriculture. At the core of the system is the ESP32 development board, which interfaces the data acquisition system with the parameter control unit. To collect data, sensors are used to measure specific environmental parameters:

temperature, humidity, and light. The active components of the system include a fan, a water pump, and an LED strip, which are used to emulate an ideal growing environment by maintaining parameters within the desired ranges. For data transmission and storage, a Wi-Fi connection is utilized, facilitating real-time communication through a user interface. Additionally, the project focuses on optimizing energy consumption. Experimental results obtained from a functional prototype validate the system's ability to maintain optimal growing conditions and ensure reliable real-time data logging via Wi-Fi.

Keywords—agriculture, IoT, sensors, energy, ESP32, signal.

16: Adina-Ioana COSTEA, Assist. Prof. Rajmond JÁNÓ- *Design and Implementation of a Web-Based Classroom Reservation System for Academic Environments*

Abstract—This paper proposes a novel classroom/meeting room reservation system. The solution implements an authenticationless and accountless reservation system which allows users to reserve rooms without creating or logging into an account, while still validating the reservation (and limiting access) via a one-time e-mail code and a list of accepted e-mail address domains.

Keywords — React.js, ASP.NET Core, Entity Framework Core, SQLite.

17: Andrei-Daniel BOTA, Assist. Prof. Robert GROZA - *Design and Implementation of an ECG Analog Front-End*

Abstract—This paper presents the design, simulation, and layout of an Analog Front-End (AFE) for electrocardiographic (ECG) signal acquisition, in compliance with IEC 60601-1 and IEC 60601-2-25 safety and performance standards. The proposed architecture features a robust frontend protection stage capable of withstanding ESD and defibrillation pulses. The signal chain comprises an instrumentation amplifier (INA) and a Right Leg Drive (RLD) circuit to enhance Common-Mode Rejection Ratio (CMRR). The analog processing stage is optimized for a 0.05 Hz to 150 Hz bandwidth, incorporating high-pass, low-pass, and a 50 Hz notch filter for power-line interference attenuation. Performance metrics were obtained via Spice simulation and Monte Carlo analysis to assess component tolerance effects. The results confirm the system's viability for clinical grade biopotential monitoring while ensuring patient safety. The system targets an accessible price point, positioning it as a viable solution for home-based cardiac monitoring.

Keywords— ECG, AFE, IEC 60601, Spice, RLD, PCB.

18: Andrei Nicola REBELEȘ, Assoc. Prof. Emilia ȘIPOȘ - *State Driven Geospatial Orchestration for Dynamic Route Optimization in Logistics*

Abstract— Dynamic logistics planning requires robust systems capable of processing complex spatial data and continuously recalculating constraints. The architecture is based on an “Execution Manifest” as a Single Source of Truth, decoupling the front end interface from the complex geospatial processing in the back end. By integrating dynamic spatial query (via GeoPackages), OpenRouteService routing algorithms, and an AI agent is taking decisions as a support module that evaluates telemetry data autonomously trigger spatial search zones and localized spatial buffers. The system provides fault tolerance, state persistence and modularity, demonstrating a highly scalable approach to real world geospatial engineering in logistics.

Keywords— Geospatial Processing, Single Source of Truth, Spatial Buffers, State-Driven Architecture, AI Agent.

19: Adrian CHERA, Assist. Prof. Mihaela CÎȘLARIU - Skin Cancer AI Recognition

Abstract—This paper presents a skin lesion classification system based on the InceptionV3 convolutional neural network architecture. The model was trained and evaluated using the HAM10000 dermoscopic image dataset, containing seven classes of skin lesions. Image preprocessing, data augmentation, and transfer learning techniques were applied to improve classification performance. The proposed model achieved 94.39% validation accuracy and 93.53% test accuracy. Additional metrics such as precision, recall, and F1 score confirmed the stability of the model. A graphical interface developed using Gradio was also implemented for real time image classification.

Keywords— skin cancer, deep learning, InceptionV3, medical image classification, convolutional neural networks.

20: Raul CARDOȘ, Georgiana NAGY, Assoc. Prof. Mihaela GORDAN - Adaptive Hybrid Inpainting for Specular Highlight Removal in Colonoscopy Images

Abstract— Specular highlights caused by the endoscope light source degrade texture information in colonoscopy images, adversely affecting deep learning-based polyp segmentation. Existing methods apply fixed dilation radii and rely on a single inpainting model for all regions. We propose an adaptive hybrid pipeline combining DUCKNet-based specular detection, per-component adaptive dilation, and dual inpainting using LaMa and MAT, selecting the better result per region via boundary gradient discontinuity and LAB color consistency. Evaluated on 798 images across five benchmark datasets, the pipeline yields consistent segmentation improvements for domain-agnostic models – SAM and SAM-Med2D gain +7 pp in weighted mean Dice – while domain-specific models trained on the target distribution remain largely unaffected, confirming preprocessing benefits scale inversely with model specificity.

Keywords— colonoscopy, specular highlight removal, inpainting, DUCKNet, polyp segmentation.

21: Andrei-Silviu HALIȚ, Assoc. Prof. Laura IVANCIU – BLE indoor positioning system using Kalman filter and Weighted Centroid Localization

Abstract—This project presents an indoor localization and device monitoring system based on Bluetooth Low Energy (BLE). The system uses multiple ESP32 nodes to scan for nearby devices, collect RSSI measurements, and estimates the position using Weighted Centroid Localization (WCL) algorithm. To improve signal stability, a Kalman filter was applied to raw RSSI values before localization. Experiments conducted in a 3x7 m room showed that the filtering reduced RSSI fluctuations and improved the consistency of the localization results. The WCL method achieved an average positioning error of 0.68 m across four test points, with better accuracy near the nodes and larger errors near the room edges. The results confirm that the proposed approach can provide practical room-level localization, while also highlighting the impact of node placement and indoor propagation effects on accuracy.

Keywords—Bluetooth Low Energy, indoor localization, Kalman Filter, Weighted Centroid Localization, ESP32, wireless sensor nodes, device monitoring.

22: Alexandra-Rebeca MAG, Assoc. Prof. Laura IVANCIU – *Real-Time Meteor Detection in Night Sky Imagery Using YOLO26 with Oriented Bounding Boxes*

Abstract—In the context of meteor detection, traditional bounding box geometries capture excessive background noise, confusing standard object detectors. To solve this issue, this study proposes the novel You Only Look Once (YOLO26) architecture utilizing Oriented Bounding Boxes (OBB), driven by tightly fitted geometric labels. Through an ablation study on bounding box framing, results indicate that minimizing the padding margin to 7 pixels maximizes true positive rates by filtering irrelevant pixels. Finally, the optimized model was deployed within a lightweight Python Graphical User Interface (GUI), enabling efficient, real-time meteor detection for amateurs without requiring advanced hardware.

Keywords—Meteor Detection, Oriented Bounding Box (OBB), Deep Learning, YOLO.

23: Daria POP, Assoc. Prof. Laura IVANCIU – *Automated System for Canine Emotion Classification using Mel-Spectrograms and Convolutional Neural Networks*

Abstract—This paper presents an automated system for classifying canine vocalizations into four emotional categories. The system acquires 1D audio signals and transforms it into 2D Mel-spectrograms. To overcome the limited datasets constraints, extensive data augmentation was used. A self-developed Convolutional Neural Network (CNN) was trained and tested using various online audio samples and personal recordings. The experimental results demonstrate that the proposed system achieves accuracy of 98% across different regularization configurations. A comparative analysis reveals that varying the dropout rates impacts the model's capability of generalization, with higher regularization reducing the gap between training and validation performance. This ensures robustness against unseen acoustic data.

Keywords—canine vocalizations, Mel-Spectrograms, CNN, data augmentation, dropout regularization.

Section 3 – Master-Doctor

1: Petru-Rareş MOLDOVAN, George-Gabriel SIMEON, Cosmin-Sorin PLEŞA, Assoc. Prof. Marius NEAG - *Dual-Loop Low-Power Nonlinear High-Precision Capacitorless 1.5V Voltage Regulator*

Abstract—This paper presents a 1.5 V LDO employing a nonlinear dual-loop control architecture designed to improve both static precision and dynamic load-step behavior. The outer regulation loop is optimized for high DC gain and the system therefore achieves 2mV load regulation across the whole load current domain. The nonlinear inner loop ensures minimal under and overshoots (100 nA→10 mA 221mV undershoot) while maintaining a worst case quiescent current of 2.1 uA at 85°C and low load current.

Keywords—Voltage Regulator, dual-loop, nonlinear, low-power.

2: Adrian BINDER, Assist. Prof. Ervin SZOPOS, Assoc. Prof. Botond KIREI – *Self-Interference Assessment for an In-Band Full-Duplex Indoor Wireless Transmission*

Abstract—In-Band Full Duplex (IBFD) communication has emerged as a promising technology to enhance spectral efficiency by allowing simultaneous transmission and reception on the same frequency channel. However, the practical implementation of IBFD is hindered by significant self-interference (SI) from the local transmitter. This paper assesses the self-interference level in the propagation domain in an indoor wireless transmission scenario by deploying three different antenna configurations: an omnidirectional dipole antenna, a directional patch antenna, and a compact monopole antenna. Measurements were conducted at 2.45 GHz and 5 GHz bands. The results demonstrate that while omnidirectional antennas suffer from high SI levels, directional patch antennas combined with cross-polarization techniques can provide substantial physical isolation, significantly reducing the interference floor.

Keywords—IBFD, Self-Interference, Adalm Pluto SDR, Antenna Isolation, Polarization.

3: Iulian-Teodor GOIA, Marius-Claudiu PETREUŞ, Assist. Prof. Raul ONET – *Area-Efficient Active Low-Pass Filter for Noise Reduction in Integrated Voltage References*

Abstract— This paper presents an area-efficient active low-pass filter (LPF) designed for noise reduction in integrated voltage reference circuits. The proposed architecture combines a T-network resistor topology with a temperature-compensated giga-ohm pseudo-resistor, achieving a 9X reduction in on-chip area compared with a conventional passive RC implementation. The filter draws only 1.5 μ A, while preserving the accuracy of the reference voltage and providing a substantial 6X noise attenuation over the 200 Hz–20 kHz band of interest. To mitigate the long settling time typically associated with such low cut-off frequencies, a dedicated start-up circuit is incorporated to accelerate the transient response of the filtered reference. The design was implemented and fabricated on a test-chip in a standard submicron CMOS technology, demonstrating an attractive area–noise trade-off for area-constrained analog and mixed-signal systems.

Keywords—low noise, low pass filter (LPF), low power, low area, CMOS technology, giga-ohm resistor.

4: Lucas Ștefan MANCIU, Prof. Dorin PETREUȘ - Comparative Study of Resonant Tank Design for LLC Converters

Abstract—In this paper, different types of resonant tanks have been analyzed for full-bridge LLC converters with synchronous rectifiers, considering the influence of the transformer design and its role in constructing the resonant tank. In particular, the effect of planar transformers has been discussed. For the first design, a non-ideal transformer has been used in which the resonant inductance is made by parasitic parameters such as leakage inductance, limiting controllability and increasing losses. The second design utilizes a low-loss transformer, but it requires an extra inductor connected in series. The third design utilizes the magnetizing and leakage inductances within the resonant tank using a planar transformer.

Keywords—DC/DC Converter, LLC, Resonant Tank, Comparative Study, Planar Transformers.

5: Daniel Andrei BULUGHEANĂ, Prof. Dorin PETREUȘ – Implementation of a general mathematic model for a PEM fuel cell

Abstract—This paper presents a mathematic model for a PEM (Proton Exchange Membrane) fuel cell, based on the fundamental mathematical equations that describes the operation of this type of system. The model includes the main physicochemical aspects specific to the fuel cell, ensuring an accurate representation of its behavior (the polarization curve), using basic mathematical blocks for easy implementation in various simulation environments.

Keywords—PEM, fuel cell, equation, activation losses, concentration losses, clean energy, Hydrogen.

6: Lara MOGA, Prof. Dorin PETREUȘ – Sizing and Modelling for Proton Exchange Membrane Fuel Cells

Abstract—Proton exchange membrane fuel cell stacks have been subject to substantial research, partly directed toward development of mathematical and electrochemical models. A sizing methodology is extended into an optimization algorithm, built on the equations which describe the electrochemical model of the cell. An alternative approach in LTspice is further presented, which may serve as a simulation tool when estimating output voltage, power and efficiency based on load current, using the functional parameters of the stack. When considering integration of fuel cell stacks in more complex green energy systems, this approach of modelling can lead to higher accuracy in simulation and design.

Keywords—Proton Exchange Membrane Fuel Cells (PEMFC), dynamic model, sizing optimization, polarization curve, MATLAB, LTspice simulation.

7: Vlad VELICIU, Assoc. Prof. Liviu VIMAN – Low-Noise Voltage-Controlled Current Source Concept

Abstract—This paper presents a low-noise, bipolar voltage-controlled current source for biasing magnetoresistive (MR) sensors up to 500 mA. The design uses a cascaded operational amplifier topology with a current mirror to achieve high compliance range. MOSFET- and BJT-based implementations are compared in terms of $1/f$ noise, efficiency and temperature stability. Simulations results show noise densities down to $7.6 \text{ nA}/\sqrt{\text{Hz}}$ at 10 Hz and efficiencies up to 98%, with BJT variants offering better low-noise and thermal performance. The proposed solution is suitable for precise MR sensor characterization.

Keywords—Magnetoresistive sensor, Voltage-controlled source, Low-noise design, Precision design.

8: Andrei-Alexandru EVTEI, Prof. Virgil DOBROTĂ – *An eBPF/XDP Security Framework for Distributed Denial-of-Service Resilient Hybrid Clouds*

Abstract—Volumetric Layer 7 Distributed Denial-of-Service attacks severely degrade hybrid cloud infrastructures due to the CPU-intensive, late-stage packet processing of legacy firewalls. This paper presents a cross-layer defense architecture bridging sidecar-less application observability with hardware-adjacent mitigation. By integrating Cilium’s extended Berkeley Packet Filter (eBPF) telemetry with an asynchronous control loop, the system dynamically enforces eXpress Data Path (XDP) rules directly at the Network Interface Card driver level. Experimental results demonstrated a preliminary value of 2.58-microsecond decision latency and a drastic reduction in hypervisor SoftIRQ overhead from 50.75% to 7%, effectively shielding the infrastructure without penalizing legitimate traffic.

Keywords—Cilium, DDoS, eBPF, Kubernetes, OpenStack, SoftIRQ, XDP.

9: Valentin-Dimitrie POPESCU, Prof. Mircea GIURGIU - *Speech Enhancement using Teacher-Student Deep Learning for Embedded Hardware*

Abstract—This research proposes a new framework for teacher-student knowledge distillation applied for low-power speech enhancement: the MP-SENet is used as a high-quality teacher model, while the students are explicitly designed for causal inference on embedded hardware. The teacher is built on the MP-SENet architecture and is locally adapted through mixed fine-tuning on DNS5 and VoiceBank+DEMAND speech datasets. The students use dedicated low-power architecture: a causal STFT front-end, a three-layer unidirectional GRU, and a spectral-mask head followed by ISTFT reconstruction. Four experimental scenarios are evaluated on narrow band (NB), wide band (WB), FP32 and quantization aware training (QAT). The selected NB QAT student has 514,018 parameters, 51.21M MAC/s, 510,656 bytes of INT8 weights, and 164,272 bytes of peak SRAM. It obtains PESQ 2.38 on the combined runtime test and 3.49 on the VoiceBank+DEMAND speech dataset, with estimated MCU power of 23 mW.

Keywords—speech enhancement, teacher-student, knowledge distillation, QAT, narrowband, wideband, MCU.

10: Tudor-Gabriel PASCARU, Assist. Prof. Ștefania BENEĂ – *Deepfake Video Detection using Sparse Frame Sampling and Logit Aggregation*

Abstract—This work evaluates a frame-level deepfake detection baseline on FaceForensics++ videos. Sparse segment-based frame sampling, face cropping and an Xception frame classifier are combined with video-level logit aggregation. Results show strong real-versus-fake performance, minor gains from weighted loss and persistent difficulty detecting certain forgery methods due to sparse frame evidence patterns.

Keywords—forged videos, frame feature extraction, deepfake.

11: Alexandru-Octavian BOGEANU-POPA, Prof. Romulus TEREBEȘ – *Block-Hankel Structured Low-Rank Approximation for Localized Deepfake Artifact Detection*

Abstract—As generative architectures become increasingly sophisticated, macroscopic visual deepfake detection methods are failing. However, synthetic generation and localized manipulation techniques, such as blending seams and block splicing, disrupt the intrinsic low-rank structure of natural images.

This paper presents a mathematically rigorous, unsupervised anomaly detection pipeline utilizing Block-Hankel with Hankel Blocks (BHHB) matrices and Cadzow alternating projections. By embedding local image patches into a structured high-dimensional space and enforcing a strict rank constraint, we isolate structural anomalies. Our results demonstrate that corruptions strictly increase the reconstruction anomaly score, enabling precise spatial localization of manipulated regions via sliding-window analysis.

Keywords—Deepfake Detection, Structured Low-Rank Approximation, Block-Hankel Matrix, Cadzow Alternating Projections, Image Forensics.

12: Alexandru-Octavian BOGEANU-POPA, Assoc. Prof. Paul FARAGO, Prof. Romulus TEREBEȘ – *Applying Game Theory to Multimodal Deepfake Detection*

Abstract—The rapid evolution of generative models has exposed a critical generalization gap in deepfake detection, where static supervised learning fails against unseen adversarial attacks. This paper proposes a Game-Theoretic Framework to transition media forensics from reactive mitigation to proactive robustness. The framework formalizes the forensic arms race as an optimization problem at Nash Equilibrium through three modules: a Zero-Sum Regularization Game employing Shapley values to enforce generalization, a Multimodal Signaling Game modeling audio-visual synchronization as a costly signal, and a Stackelberg Security Game for optimizing identity watermarking against rational removal attacks. By reframing detection as a strategic interaction, this work provides a mathematical formalism for adversarial robustness.

Keywords—Deepfake Detection, Game Theory, Adversarial Robustness, Stackelberg Security Games, Zero-Sum Games.

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