



# SOFA 2022

*The 10<sup>th</sup> International Workshop on  
Soft Computing Applications (SOFA 2022)*

*Arad-Romania*

<https://2022.sofa-org.eu/>

## PROGRAM

November 21-23, 2022

ARAD - ROMANIA



## **WELCOME MESSAGE**

SOFA 2022 hosted by Aurel Vlaicu University is the 10<sup>th</sup> International Workshop on Soft Computing Applications. The aim of this conference is to provide an internationally respected forum for scientific research in the broad area of intelligent systems, computational intelligence, signal processing, and all associated applications of AIs.

Our pleasant duty is to gratefully acknowledge the support provided by the sponsors and co-sponsors of the SOFA 2022 conference to thank the reviewers for their work and all those involved in the preparation of the workshop and the program. Finally, we would like to thank the authors for their valuable contribution!

The General Co-Chairs wish all participants a pleasant stay in Arad and a successful workshop!

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Rector of “Aurel Vlaicu” University of Arad, Romania

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<https://2022.sofa-org.eu/committees/>

# GENERAL INFORMATION

## Venue

The 10<sup>th</sup> edition of the International Workshop on Soft Computing Applications (SOFA 2022) will take place at Hotel Continental Forum, in Arad, Romania <https://continental-forum-arad.continentalhotels.ro>. The conference room will be Astoria, at the ground floor of the hotel.

## Registration desk

A registration desk will be open all throughout the event where participants can register and receive information on the event in Astoria conference room at ground floor.

## Language

The official language of the workshop is English.

## Presentations

Presentations can be made by using data projectors. All authors are kindly requested to take their presentation on a USB and upload it on the workshop laptop during the break before their session. Each presentation will be a maximum of 15 minutes. For virtual sessions authors must be in time and present their papers

## Internet

There will be free of charge internet facilities for the participants.

## Social programs

- A **Welcome Conference Dinner** will take place on the evening of the 1<sup>st</sup> day at Mondo Restaurant, at the ground floor of the hotel.
- **Wine Tasting and Dinner** in Minis-Maderat vineyard, an old vineyard that dates back to 1023, now Balla Geza Winery, Minis, Arad, will take place on the afternoon of the 2<sup>nd</sup> day.
- **The Conference Dinner** will take place on the evening of the 3<sup>rd</sup> day at Mondo Restaurant, at ground floor of the hotel.

**Insurance**

The Organizers of the workshop do not provide insurance and do not take responsibility for any loss, accident or illness that might occur during the workshop or during travel to or from the meeting site. It is therefore the responsibility of the participants to check their coverage with their insurance provider.

**Voltage**

The electricity supply is 220 V AC (50 Hz).

**Weather**

In Arad, November is generally a cold and rainy month, with maximum daytime temperatures around 11°C (51°F) and nighttime temperatures around 2°C (36°F)

**Parking fee:** 30 RON / 24 h. Guarded parking 24 hours a day.

Our hotel is equipped with a charging station for electric cars. This service is free of charge for our hotel guests, up to a limit of 100KW, using a code received at reception.

**Taxi companies**

Taxi Verbita : 0040741 200 300

Taxi Europa : 0040257 275 555

# Program

## SOFA 2022

*Monday, November 21<sup>st</sup>*

**08:30 – 09:00 Registration: Hotel Continental, ground floor**

*The registration desk will be open all throughout the conference*

**09:00 – 09:10 Opening Ceremony**

Opening address by the Honorary Chairs and General Co-Chairs.

**09:10 – 11:10 Keynote presentations I, II, III & IV**

*Chair: Florin Filip*

**9:10 – 9:40 Janusz Kacprzyk (Poland)**

*Human centric decisions and choice using pros-and-cons analyses via a fuzzy approach to bipolarity in intentions, judgments, and evaluation*

**9:40 - 10:10 Marc M Van Hulle (Belgium)**

*Coordinated finger movements predicted from intracranial brain activity*

**10:10 – 10:40 Violeta Tulceanu (Belgium)**

*Security and the mind: open research directions*

**10:40 – 11:10 Chee Peng Lim (Australia)**

*Development and Application of Soft Computing Models*

**11:10 – 11:30 Coffee break**

**11:30 – 13:00 Doctor Honoris Causa awarding**

to Acad, Janusz Kacprzyk (Poland) and Acad, Marc M. Van Hulle in the presence of the Rector of Aurel Vlaicu University of Arad Dr. Ramona Lile

**13:00 – 14:00 Lunch break**

Mondo Restaurant – ground floor, Hotel Continental Forum Arad.

## 14:00 – 16:00 Parallel Sessions

Session 1 - 21 November 2022

Chair Session: Sergio Correia

566	Sergio Correia, João Matos-Carvalho, Slavisa Tomic and Marko Beko. Embedded Artificial Intelligence for Fall Detection Wearable Sensors
5675	Dana Rad, Nicolae Paraschiv and Csaba Kiss. A scoping review on Polygraph automated scoring systems
3568	Flavius-Maxim Petcuț, Mihaela Popa and Daniel Alexuță. Low-Cost Photovoltaic Panel Emulator
2464	Doru Anastasiu Popescu, Nicolae Bold and Ovidiu Domsa. Developing a model of generation of assessment tests using machine learning
2742	Doru Anastasiu Popescu and Mariana Madalina Nastase. Model for Checking the Similarity of Answers among Students to Detect Cheating Practices
2186	Perna Rai, Bhaskar Bhuyan and Hiren Kumar Deva Sarma. Reliable Data Delivery in Software Defined Networking using Taylor Aquila Optimizer
5749	Violeta Tulceanu, Sarah Muys and Bart Preneel. Small data: fuzzy emotional memory brainwave authentication
7577	Oana Geman, Iuliana Chiuchisan and Dragos Vicoveanu. Wearable Biometric Sensing System for Neurodegenerative Disorders Patient Rehabilitation
8201	Poornima D, Arulselvi G, Praylashyry S and Daniel Alexuta. Energy-Efficient Precision Agriculture using Wireless Sensor Networks and Internet of Things (IoT) cloud computing
1978	Ngoc Anh Nguyen Thi, Vijender Kumar. Solanki, Viet Hoang Vu, Anh Tuan Nguyen and Thanh Chau Do Thi. Short-term electricity load forecasting using Heat Index by Neural Basis Expansion Analysis and LSTM for multiple time series



**16:00 – 17:10 Keynote presentations V & VI**

*Chair: Dana Rad*

**16:00 – 16:30 Csaba Kiss (Romania)**

*Threats to national security - the role of the Polygraph technique in the discovery and mitigation of these threats*

**16:30 – 17:00 Dana Rad (Romania)**

*Machine Learning in psychological data analysis – A cognitive systems engineering approach*

**17:00 – 17:10 Coffee break**

**17:10– Keynote presentation VII, VIII, IX & X**

*Chair: Marius M. Balas*

**17:10 – 18:00 Moshe Vardi (USA)**

*Machine Learning and Logic: Fast and Slow Thinking*

**18:00 – 18:30 Jason Gu (Canada)**

*Robotics and Artificial Intelligence: Now and Future*

**18:30 – 19:00 Marius Balas (Romania)**

*The Top-down Approach in Systems Engineering and Education*

**19:00 – 19:30 Cornel Barna (Romania)**

*Fusion methods for information sources*

**19:30 – 21:30 The Welcome Conference Dinner**

will take place at Mondo Restaurant, at the ground floor of the hotel.

*Tuesday, November 22<sup>nd</sup>*

**9:00 – 11:00 Keynote presentations XI, XII, XIII, XIV, XV, XVI & XVII**

*Chair: Valentina E. Balas*

**9:00 – 9:30 Praveen Kumar Khosla (India)**

*Challenges of Scaling Telemedicine to Meet Global Needs: a case study*

**9:30 – 10:00 Dan Rosenberg (Romania)**

*The Impact of AI in Smart Home and Smart Care*

**10:00 – 10:30 Mostafa Ezziyyani (Morocco)**

*Smart system for predicting climate degradation for monitoring the adaptation of agriculture to climate change*

**10:30 – 11:00 Valeriu Ungureanu (Republic of Moldova)**

*Pareto-Nash-Stackelberg game and control theory: present state of things and trends of development*

**11:00 – 11:15 Coffee break**

**11:15 – 11:45 Valeriu Beiu (Romania)**

*A Brave New World ... Manufactured with Atomic Precision*

**11:45 – 12:20 Shahnaz Shahbazova (Azerbaijan)**

*Lotfi A.Zadeh's life and his scientific legacy. Our scientific activities after his 5-year death*

**12:20 – 12:50 Shahnaz Shahbazova (Azerbaijan)**

*Problems Difficulties in Recognizing Flat Figure*

**12:50 – 13:20 Sayooj Aby Jose (India)**

*Mathematical Modeling on Co-infection: Transmission Dynamics of Zika Virus and Dengue Fever*

**13:00 – 14:00 Lunch break**

Mondo Restaurant – ground floor, Hotel Continental Forum Arad.

**14:00 – 17:00 Parallel Sessions**

**Session 1 – 22 November 2022****Session Chairs: Tsu-Yang Wu and Chien-Ming Chen**

8765	Ankang Shao and Tsu-Yang Wu. <i>Power Predicting Based on Support Vector Machine with Tumbleweed Optimization Algorithm</i>
9738	Haonan Li and Tsu-Yang Wu. <i>A New Method of Stock Price Prediction Based on Long Short-Term Memory Network Optimized by Phasmatodea Population Evolution Algorithm</i>
9609	Shu-Chuan Chu, Xiaomeng Yang, Jeng-Shyang Pan, Zhongjie Zhuang and Xiaoqing Zhang. <i>Hybrid parallel gannet optimization algorithm and differential evolution algorithm for low light image enhancement</i>
3190	Shu-Chuan Chu, Ruhai You, Jeng-Shyang Pan, Zhi-Chao Dou and Anhui Liang. <i>Binary Gannet Optimization Algorithm of Deep Neural Network Architectures for Image Classification</i>
2669	Jeng-Shyang Pan, Huaijian Xu, Shu-Chuan Chu, Xiao Sui and Yundong Guo. <i>A Parallel Compact Rafflesia Optimization Algorithm for Application in Multi-threshold Image Compression</i>
2074	Huiyou Sun, Xingsi Xue, Shuangyuan Li and Yan Liu. <i>A Pseudo Label Generation Method for Self-Supervised Object Detection</i>
6595	Zhenzhou Zhang and Chien-Ming Chen. <i>Mining Highly Quantized Periodic Patterns Common to a Set of Sequences</i>
4444	Shu-Chuan Chu, Zhi-Yuan Shao, Jeng-Shyang Pan and Shuang-Yuan Yang. <i>Food Digestion Algorithm</i>
1262	Shi Lv and Chien-Ming Chen. <i>Two-layer heuristics algorithm for waitable time-varying multi-depot green vehicle routing problem</i>
177	Xiaoliang Ma, Dequan Du, Congjian Deng and Guoxin Zhang. <i>Few-Shot Learning in Customer Service Keywords Extraction Technology</i>
5045	Yunting Xian, Lu Lu, Xuanrui Qiu and Jiahong Yu. <i>A Collection of Ship Images and A Ship Identity Re-recognition Method</i>
8521	Wenru Lin, Xingsi Xue and Lei Liu. <i>Efficient Large-Scale Ontology Partitioning and Alignment</i>

1619	Yongsong Chen, Yuxian Wang, Junhong Feng and Jian-Hong Wang. <i>Matching Large-Scale Ontologies Through Compact Binary Cuckoo Search Algorithm</i>
9444	Sifeng Zhu, Yu Wang, Hai Zhu, Rui Qiao, Hao Chen and Hui Zhang. <i>Study on offloading decision optimization based on MOEA/D algorithm in Internet of Vehicles scenario</i>

## Session 2 – 22 November 2022

Session Chairs: Vijender Kumar Solanki and Barnali Dey

387	Punit Gupta. <i>Light Weight Fraud Classification and Prediction Algorithm Using Random Forest Classifier</i>
2878	Punit Gupta. <i>Sentiment Analysis For Patient Review Analysis Using Hybrid Approach</i>
6546	Ankit Mundra. <i>Hybrid Crowd Counting and Crowd Density estimation using Scale Driven Cascade CNN</i>
6819	Ankit Mundra. <i>An Intelligent approach for authenticated communication in Internet of Vehicles</i>
4281	Ankit Mundra. <i>Identification of Hate Speech and Offensive Content for English Language</i>
6026	Ankit Mundra. <i>An Empirical study: Personalized Cancer Diagnosis using Machine Learning approaches</i>
7741	Shikha Mundra and Vivek Kumar Verma. <i>Hybrid Deep Transfer Learning-Based Model for Plant Leaf Disease Detection</i>
221	Shikha Mundra. <i>Speech Emotion Recognition using Convolutional Neural Networks on Spectrograms and Mel-frequency Cepstral Coefficients Images</i>
4852	Viet-Manh Do, Vijender Kumar Solanki, Duc-Tan Tran and Duc-Nghia Tran. <i>The effect of sensor position deflection on behavior classification performance</i>
8431	Jo Cheriyan, Jyothisha Nair and Valentina Emilia Balas. <i>An Epidemic Model for Coupled Dynamics in Complex Networks</i>

9373	Yegnanarayanan Venkataraman, George J Barnabas, Tania Bogdana Gavrila and Valentina E.Balas. Concerning Coloring of Certain Prime Distance Graphs
1850	Yegnanarayanan Venkataraman, Kalaiselvi T, Jeyaraj Jane Rubel Angelina and Valentina E.Balas. A New Concept on Domination Number of Graphs, Part I
7058	Yegnanarayanan Venkataraman, Kalaiselvi T, Dana Rad and Valentina E.Balas. A New Concept on Domination Number of Graphs, Part II
1858	Yegnanarayanan Venkataraman, George J Barnabas and Bogdana Tania Gavrila. On Measure Theory Treatment of Distance Graphs
8438	Yegnanarayanan Venkataraman, Anitha M and Cornell Barna. Computation of Structural Parameters of a Collaboration Graph from a social network-SN, Part II
9938	Yegnanarayanan Venkataraman, Padma Karthika, Indira Krishnaperumal and Dicu Anca Mihaela. On achro-grace Graphs
9128	Yegnanarayanan Venkataraman, George J Barnabas and Dragu Daniel. About Coloring Certain Special Distance Graphs
4900	Gábor Kiss and Peter Bakucz. Decision-making of autonomous vehicles in the event of an unavoidable accident
6502	Punit Gupta. Heart Disease Prediction and Embedded Pacemaker
1387	Punit Gupta. Mathematical Modeling for Mapping Program Objectives with Course Learning Outcomes in Higher Education
8630	Prisilla Jayanthi and Muralikrishna Iyyanki. Machine Learning Models For Predicting Indian COVID-19 Cases
1234	Sanjiban Sekhar Roy, Tapan Kumar Das and Valentina E. Balas. Neural network inspired fuzzy approach for predicting cancerous tumours
6502	Punit Gupta. Heart Disease Prediction and Embedded Pacemaker
1387	Punit Gupta. Mathematical Modeling for Mapping Program Objectives with Course Learning Outcomes in Higher Education
8630	Prisilla Jayanthi and Muralikrishna Iyyanki. Machine Learning Models For Predicting Indian COVID-19 Cases

1234	Sanjiban Sekhar Roy, Tapan Kumar Das and Valentina Emila Balas. Neural network inspired fuzzy approach for predicting cancerous tumours
7510	Asha Kurian and Shikha Tripathi. AutNet: A Deep Learning Approach for Personalised Facial Emotion Recognition in Autistic Children
2741	Daniela López De Luise and Pedro Juan Labonia. Intelligent Management of Humidity Information in Real Time
1000	Cecilia Salina, Daniela López De Luise, Sergio Leiva, Sofía Ramirez and Gilda Romero. A Life-cycle to Improve STEAM Virtual Museum Activities Exposition

**17:10 – 21:00 Departure for the Wine Tasting and Dinner** in Minis-Maderat vineyard, an old vineyard that dates back to 1023, now Balla Geza Winery, Minis, Arad.

<https://www.crameromania.ro/en/wineries/wine-princess-winery-204.html> , <http://ballageza.com/ro/wine-tourism>

**Wednesday, November 23<sup>rd</sup>**

**09:00 – 12:00 Keynote presentations XVIII, XIX, XX, XXI, XXII, XXIII, XXIV & XXV**

*Chair: Valentina E. Balas*

**9:00 – 9:30 Guojun Wang** (China)

*A Two-Level Active Defense Approach to Detecting Unknown Vulnerabilities in Smart Contracts*

**9:30 – 10:00 Sergio Duarte Correia** (Portugal)

*Embedding Artificial Intelligence on Low Complexity and Low Power Processors*

**10:00 – 10:30 Rajeeb Dey** (India)

*Stability of Interpersonal relationship among dyads with delayed emotion: System Theory Approach*

**10:30 – 11:00 Baleanu Dumitru** (Turkey and Romania)

*About modified fractional operators: theory and applications*

**11:00 – 11:30 Mihaela Luca** (Romania)

*Frontiers of Artificial Intelligence and Deep Learning in Endoscopy*

**11:30 – 12:00 Vijender Solanki** (India)

*Impact of Artificial Intelligence and Digital marketing towards developing business foundation online*

**12:00 – 12:30 Neha Sharma** (India)

*Towards Net-Zero Targets -Usage of Data Science for Long-Term Sustainability Pathways*

**12:30 – 13:00 Soumya Banerjee** (France and Ireland)

*Lattice-based crypto and side-channel attacks: A Journey through IoT Paradigm*

**13:00 – 14:00 Lunch break**

Mondo Restaurant – ground floor, Hotel Continental Forum Arad.

## 14:00 – 16:00 Parallel Sessions

### Session 1 – 23 November 2022

#### Session Chairs: Sudarshan T S B

An Cong Tran, Thien Khai Tran, Bao Thai Le and Hai Thanh Nguyen.

6092 *Efficiency Evaluation of Filter sizes on Graph Convolutional Neural Networks for Information Extraction from Receipts*

Divyaprabha K N and Sudarshan T S B. *Energy-Makespan Aware*

162 *Workload Scheduling for Applications with Deadline Prerequisite in Heterogeneous Cloud Computing Platform*

Balla Rakesh, Konda Harsha Reddy, Mohamed Sirajudeen Yoosuf, K.

6031 Saravanan and Raghvendra Kumar, Barna Cornel, *Identification of Transliterated Language from Non-Latin Script using Natural Language Processing*

Ayushi Prakash, Vishal Verma, Vanshika Garg, Antriksh Kumar Shasti

5622 and Sandhya Avasthi. *Handwritten Digit Classification by Applying Deep Learning With Mnist Dataset*

5552 Ravi Shankar Jha. *Resource Optimization for Cloud Services using Harmony Search Algorithm And ANN*

5113 Ravi Shankar Jha. *Parameter Estimation of Linear & Non-Linear Multiple Regression Model using Differential Evolution*

Muncut Elena Stela, Geröcs Attila, Culda Lavinia and Komjaty Andrei.

2825 *Inertial System for Transforming Rotational Motion into Unidirectional Linear Motion Using a Volume of Mercury (Hg)*

Culda Lavinia Ioana, Muncut Elena Stela, Geröcs Attila and Komjaty

5655 Andrei. *Modeling with Petri Nets of a robotic system for feeding the hearth oven used in bakery.*

Shrikant Bhardwaj, Sobhit Saxena, Vikram Kumar Kamboj and Suman

9624 Lata Tripathi. *Impact Of COVID-19 On Current Electricity Market And Renewable Energy: An Extensive Review*

6904 Dragoi Vlad, Sorin-Horatiu Hoara and Valeriu Beiu. *3D Hammocks for Communications*

5647 Roxana-Mariana Beiu, Sorin-Horatiu Hoara and Valeriu Beiu. *Quantum Is Making Hammocks Ubiquitous*



- 4448 Mihai Tache, Dragoi Vlad and Valeriu Beiu. *On Low Power Redundant Schemes*
- 4527 Ritesh Pawar, Deepika Ghai and Amandeep Singh. *Pre-Processing Techniques for Sign Language Recognition System: A Review*
- 9219 Popescu-Bodorin Nicolaie, Grigore Lucian and Balas Valentina Emilia. *A Top Cross-Sensor Fuzzy Iris Recognition Result*
- 1433 Ankit Mundra. *Automation to Analyze the Market Stocks and Prediction using Machine Learning algorithms*
- 9976 Ankit Mundra. *An Empirical Study of Online Auction Fraud Detection*
- 6029 Muhammad Usman Asad, Jason Gu, Umar Farooq and Valentina Emilia Balas. *Review of Teleoperation Research at Robotics Lab for Biomedical, Rehabilitation and Assistive Technologies (ROL-BRAT)*
- 9085 Xu Zhang, Jason Gu, Umar Farooq, Muhammad Usman Asad and Valentina E. Balas. *Beetle Bee with Incremental PID Control Algorithm Applied to Trajectory Tracking Control of OMNI Manipulator*
- 7109 Ahmad Ali, Arslan Amjad, Umar Farooq, Jason Gu, Muhammad Usman Asad, Ghulam Abbas and Valentina Emilia Balas. *Fuzzy Logic Based Control of Higher Order Dual Output Buck Converter*
- 1424 Hareem Siddiqui, Areesha Rahim, Umar Farooq, Muhammad Usman Asad and Jason Gu. *Addressing Power Quality Issues Through Deep Learning*
- 9800 Ankit Mundra. *Modified Size Matrix for Component-Based Software Engineering Development*
- 1035 Ankit Mundra. *A Deep Learning Approach for Basic Understanding of Convolution Neural Network and its Optimization*
- 818 Shikha Mundra. *Hindi English code mixed offensive language classification: A few shot learning approach*
- 2158 Nicolaie Popescu-Bodorin, Valentina Emilia Balas and Madeleine Togher. *Fast, Soft, Sub-optimal, Low-Complexity, Fuzzy Linear Regression with Python And Scikit-Learn*
- 3892 Valentina Emilia Balas and Nicolaie Popescu-Bodorin. *Deep Learning Fuzzy Iris Recognition in Python, Keras, OpenCV and Tensorflow*
- 3318 Valentina Emilia Balas and Nicolaie Popescu-Bodorin. *Fuzzy Data Science with Python and SciKit-Learn*
- 1985 Violeta Tulceanu and Bart Preneel. *Brainwave authentication: from*

- motor to cognitive and emotional tasks*
- 3647 Violeta Tulceanu, Haider Syed Zeshan and Bart Preneel. *Modern investigative tools: the use and possible abuse of BCI*
- 5376 Violeta Tulceanu, Haider Syed Zeshan and Bart Preneel. *Mindprints: world propaganda and EEG*
- 479 Mihaela Popa and Valentina Emilia Balas. *The Three-tank Watergy Configuration*
- 9553 Srikanth Bondalapati and Rajeeb Dey. *Real-Time implementation of a MRAC based PID Control of PV-fed DC-DC Dual Boost Converter under uncertain irradiance and load conditions*
- 3034 Daniel Alexuță. *Aquaponics and seed germination cultures*
- 8296 Bogdana-Tania Gavrilă. *The Research Study and Modeling in The Medical Field-Artificial Pancreas*

**14:00 – 16:00 – Guided tur of the city of Arad**

**16:00 – 18:30 Hiren Kumar Deva Sarma**

*Tutorial: Energy Efficient Computing and Security Issues in Internet of Things*

**18:30 – 19:00 Closing Ceremony, Award Session, and Conclusions**

**19:00 – 20:30 Dinner**

Mondo Restaurant – ground floor, Hotel Continental Forum Arad.

**CONFERENCE SECRETARIAT**

Aurel Vlaicu University of Arad