

**Lucian Blaga University of Sibiu, Romania**

**Faculty of Sciences**

**Research Center in Informatics and Information Technology**

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# **ICDD 2023**

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**7<sup>th</sup> International Conference on Applied Informatics  
Imagination, Creativity, Design, Development**

**Volume of Abstracts and Program**

**May 11-13, 2023**

**Sibiu, Romania**

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**Seventh International Conference on Applied Informatics**  
**Imagination, Creativity, Design, Development**  
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**Volume of Abstracts and Program**

**7<sup>th</sup> International Conference on Applied Informatics**

**Imagination, Creativity, Design, Development**

**ISSN 2734 – 8687**

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**Editor: Assist. Univ. Cristina Răulea**

## **Motto:**

*“There are no limits, only your imagination”*

## **TOPICS**

- Algorithms and data structures
- Graph theory and applications
- Formal languages and compilers
- Cryptography
- Modeling and simulation
- Computer programming
- Computer vision
- Computer graphics
- Game design
- Data mining
- Distributed computing
- Artificial Intelligence
- Service oriented applications
- Networking
- Grid computing
- Mobile operating systems
- Scientific computing

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- Software engineering
- Bioinformatics
- Robotics
- Computer Architecture
- Evolutionary Computing
- Multimedia Systems
- Internet Communication and Technologies
- Web Applications

## **OBJECTIVES**

The conference is mainly addressed to young researchers from all over the world. The conference gives the participants the opportunity to discuss and present their research on informatics and related fields (like computational algebra, numerical calculus, bioinformatics etc.). The conference welcomes submissions of original papers on all aspects of informatics and related fields ranging from new concepts and theoretical developments to advanced technologies and innovative applications. Paper acceptance and publication will be judged on the basis of their relevance to the conference topics, clarity of presentation, originality and accuracy of the results and proposed solutions. The presentation has to include also a practical application. The conference will include regular presentations and short IT Companies presentations.

## **CONFERENCE COMMITTEES**

### **Scientific Committee**

- Kiril Alexiev - Bulgarian Academy of Sciences, Bulgaria
- Vsevolod Arnaut - Moldova State University, Republic of Moldova
- Galina Atanasova - Angel Kanchev University of Rousse, Bulgaria
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- Arndt Balzer - Technical University of Applied Sciences,  
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- Peter Braun - Technical University of Applied Sciences, Würzburg-Schweinfurt,  
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- Dmytro Dosyn - Institute of Computer Science and Information Technologies,  
Lviv Polytechnic National University
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College Thessaloniki, Greece

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- Michael Emmerich - Leiden Institute of Advanced Computer Science, Leiden University, Netherlands
- Calin Enachescu - University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania
- Ralf Fabian - Lucian Blaga University of Sibiu, Romania
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- Lixin Liang - Tsinghua University, Beijing, China
- Suzana Loskovska - "Ss. Cyril and Methodius" University in Skopje, Republic of Macedonia
- Rossitza S. Marinova - Concordia University of Edmonton, Canada
- Gabriela Moise - Petroleum-Gas University of Ploiesti, Romania

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- G. Jose Moses - Raghu Engineering College Visakhapatnam, Andhra Pradesh, India
- Mircea Muşan - Lucian Blaga University of Sibiu, Romania
- Mircea Iosif Neamţu - Lucian Blaga University of Sibiu, Romania
- Elena Simona Nicoară - Petroleum-Gas University of Ploiesti, Romania
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- Alina Pitic - Lucian Blaga University of Sibiu, Romania
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- Anca Ralescu - University of Cincinnati, United States of America
- Mohammad Rezai - Sheffield Hallam University, United Kingdom
- Cosmin Sabo - Technical University of Cluj-Napoca - North University Center Baia Mare, Romania
- José Saias - University of Evora, Portugal
- Abdel-Badeeh M. Salem - Ain Shams University, Cairo, Egypt
- Livia Sangeorzan - Transilvania University of Brasov, Romania
- Soraya Sedkaoui - Khemis Miliana University, Algeria
- Andreas Siebert - University of Applied Sciences Landshut, Germany
- Ioan Silea - Politehnica University of Timișoara, Romania
- Dana Simian - Lucian Blaga University of Sibiu, Romania
- Petrica C. Pop Sitar - Technical University Cluj-Napoca, Romania
- Lior Solomovich - Kaye Academic College of Education, Israel
- Ansgar Steland - RWTH Aachen University, Germany

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- Florin Stoica - Lucian Blaga University of Sibiu, Romania
- Laura Florentina Stoica - Lucian Blaga University of Sibiu, Romania
- Detlef Streitferdt - Ilmenau University of Technology, Software Architectures and Product Lines Group, Germany
- Grażyna Suchacka - University of Opole, Poland
- Jolanta Tańcula - University of Opole, Poland
- Milan Tuba - Singidunum University of Belgrade, Serbia
- Eva Tuba - Singidunum University of Belgrade
- Oana Țicleanu - Lucian Blaga University of Sibiu, Romania
- Anca Vasilescu - Transilvania University of Brasov, Romania
- Dana Vasiloaica - Institute of Technology Sligo, Ireland
- Sofia Visa - The College of Wooster, United States

### **Chair of the conference**

- Prof. PhD. Dana Simian  
Director of the Research Center in Informatics and Information Technology  
Faculty of Sciences  
"Lucian Blaga" University of Sibiu, Romania  
E-mail: [dana.simian@ulbsibiu.ro](mailto:dana.simian@ulbsibiu.ro), [d\\_simian@yahoo.com](mailto:d_simian@yahoo.com)

### **Steering committee**

- Prof. Dr. Dana Simian - Lucian Blaga University of Sibiu, Romania
- Prof. Dr. Milan Tuba - Singidunum University, Belgrade and State University of Novi Pazar, Serbia



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- Prof. Dr. Peter Braun - Technical University of Applied Sciences Würzburg-Schweinfurt, Germany
- Prof. Dr. Katalina Grigorova - University of Ruse, Bulgaria
- Assoc. Prof. Dr. Laura Florentina Stoica - Lucian Blaga University of Sibiu, Romania

**Organized by:**

Research Center in Informatics and Information Technology

Department of Mathematics and Informatics

Faculty of Sciences

Lucian Blaga University of Sibiu



**Organized with support of Romanian Ministry of National Education**



**Organizing Committee**

- Prof. Dr. Dana Simian - Lucian Blaga University of Sibiu, Romania
- Assoc. Prof. Dr. Nicolae Constantinescu - Lucian Blaga University of Sibiu, Romania
- Assoc. Prof. Dr. Laura Stoica - Lucian Blaga University of Sibiu, Romania
- Assoc. Prof. Dr. Florin Stoica - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Cristina Cismaș - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Ralf Fabian - Lucian Blaga University of Sibiu, Romania

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- Lecturer Dr. Daniel Hunyadi - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Mircea Muşan - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Mircea Iosif Neamţu - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Alina Pitic - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Antoniu Pitic - Lucian Blaga University of Sibiu, Romania
- Lecturer Dr. Oana Țicleanu - Lucian Blaga University of Sibiu, Romania
- Assist. Cristina Raulea - Lucian Blaga University of Sibiu, Romania
- MSc. Felix Husac - Lucian Blaga University of Sibiu, Romania
- Stud. Nicolae Andrei Bălănoiu - Lucian Blaga University of Sibiu, Romania
- Stud. Casiana Blana - Lucian Blaga University of Sibiu, Romania
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- Stud. Emanuel Marian Muntean - Lucian Blaga University of Sibiu, Romania
- Stud. Cosmin Lucian Pătrînjan - Lucian Blaga University of Sibiu, Romania
- Stud. Teodora Popa - Lucian Blaga University of Sibiu, Romania
- Stud. Elisei Prală - Lucian Blaga University of Sibiu, Romania
- Stud. Nicoleta Radu - Lucian Blaga University of Sibiu, Romania
- Stud. Eusebiu Șerban - Lucian Blaga University of Sibiu, Romania

## **OFFICIAL LANGUAGE**

The official language of the conference is English.

## SPONSORS

In alphabetical order:



**Sibiu IT Association**



**AUSY Technologies Romania**



**BIT Association**



**CodexWorks technologies**



**ASTRA National Museum Complex,  
Sibiu**



**Fundația Academia Ardeleană**



**GESS Engineering**



**Global Solutions for Development**



**NXP**



**NTT Data**



**PAN FOOD**



**Omeron Technologies, Romania**



**ProIT**



**ROPARDO**



**Top Tech**



**WENGLOR**

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**PROGRAM**

**THURSDAY, May 11, 2023**

**Faculty of Sciences,  
 Sibiu, Dr. I. Rațiu st., No. 5-7  
 2nd Floor, Room A27**

*International Conference on Applied Informatics – ICDD 2023*

**organized by**

**Faculty of Sciences, *Research Center in Informatics and Information Technology*  
 Lucian Blaga University of Sibiu, Romania**

<b>8<sup>30</sup> – 9<sup>00</sup></b>	<b>Registration</b>
<b>9<sup>00</sup> – 9<sup>20</sup></b>	<b>Opening ceremony</b>
<b>9<sup>20</sup> – 9<sup>30</sup></b>	<b>ProIT presentation</b> <ul style="list-style-type: none"> <li>• <i>Automotive Advanced Driving Systems, Codruța Olaru, Marian Mircea</i></li> </ul>
<b>9<sup>30</sup> – 10<sup>45</sup></b>	<b>Papers presentation - Chair Prof. Dr. Dana Simian</b>
9 <sup>30</sup> – 9 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>StudBase, Viorel Augustin Bărbos, Andrei Eduard Dumitraș, Rareș Andrei Crainic, TUCN - North University Center of Baia Mare, Romania</i></li> </ul>
9 <sup>45</sup> – 10 <sup>00</sup>	<ul style="list-style-type: none"> <li>• <i>Question-Answering System for Coffee Machines, Marius Benkert, Jochen Schmidt, Lennard Rose, Technical University of Applied Sciences Würzburg-Schweinfurt, Germany</i></li> </ul>
10 <sup>00</sup> – 10 <sup>15</sup>	<ul style="list-style-type: none"> <li>• <i>Advanced sentiment analysis at textual conversation level using modern NLP techniques, Rareș-Gabriel Mușea, Lucian Blaga University of Sibiu, Romania</i></li> </ul>
10 <sup>15</sup> – 10 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>Domina - a puzzle game meant to improve mental health, Petar Mishev, Galina Atanasova, "Angel Kanchev" University of Ruse, Bulgaria</i></li> </ul>
10 <sup>30</sup> – 10 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>Control and Simulation for an Electrically Controlled Pneumatic Suspension, Maria-Denisa Kiss, Lucian Blaga University of Sibiu, Romania</i></li> </ul>
<b>10<sup>45</sup> – 11<sup>15</sup></b>	<b>Coffee break</b>
<b>11<sup>15</sup> – 13<sup>00</sup></b>	<b>Papers presentation - Chair Prof. Dr. Peter Braun</b>
11 <sup>15</sup> – 11 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>MemStego. Stenography and Memes combined, Vladislav Nikolov, Galina Atanasova, "Angel Kanchev" University of Ruse, Bulgaria</i></li> </ul>
11 <sup>30</sup> – 11 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>BreathApp, Marian Ionuț Căndea, Norbert Alexandru Kovacs, Gheorghe-Cătălin Iuga, Rareș Ciprian Chiuzbăian, Eduard</i></li> </ul>

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11 <sup>45</sup> – 12 <sup>00</sup>	<p><b>Florin Podolac, Edmond Roland Volosciuc</b>, TUCN - North University Center of Baia Mare, Romania</p> <ul style="list-style-type: none"> <li>• <i>A User-Friendly Solution for streamlining Hotel and Restaurant Management with QR Code Integration</i>, <b>Corina Iordache, Felix Husac</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
12 <sup>00</sup> – 12 <sup>15</sup>	<ul style="list-style-type: none"> <li>• <i>Advanced Vision-Guided Autonomous Navigation Robot</i>, <b>Stephanie Fișcă, Cristian Nicolae Cîndea</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
12 <sup>15</sup> – 12 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>Android app for vehicles owners</i>, <b>Elisei Daniel Prală</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
12 <sup>30</sup> – 12 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>Prism: Democratizing Artificial Intelligence through a Low-code Approach</i>, <b>Matei-Ioan Marin</b>, Gheorghe Lazăr National College Sibiu, Romania</li> </ul>
12 <sup>45</sup> – 13 <sup>00</sup>	<ul style="list-style-type: none"> <li>• <i>The game theory behind a 2D action role-playing game</i>, <b>David-Stelian Hoka</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
<b>13<sup>00</sup> – 15<sup>30</sup></b>	<b>Lunch – Hotel Imparatul Romanilor Sibiu</b>
<b>15<sup>30</sup> – 17<sup>15</sup></b>	<b>Papers presentation - Chair Assoc. Prof. Dr. Florin Stoica</b>
15 <sup>30</sup> – 15 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>Biometric authentication solution based on high-resolution iris data</i>, <b>Teodora Popa</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
15 <sup>45</sup> – 16 <sup>00</sup>	<ul style="list-style-type: none"> <li>• <i>Learning to unpermute</i>, <b>Muhammad Zakriya Shah Sarwar, Nehmiya Shikur</b>, Technical University of Applied Sciences Würzburg-Schweinfurt, Germany</li> </ul>
16 <sup>00</sup> – 16 <sup>15</sup>	<ul style="list-style-type: none"> <li>• <i>Multi Source Music Player</i>, <b>Kameliya Shoylekova, Bozhidar Atanasov</b>, Angel Kanchev University of Ruse, Bulgaria</li> </ul>
16 <sup>15</sup> – 16 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>GEditor</i>, <b>Matei Steavu</b>, Radu Negru National College, Făgăraș, Romania</li> </ul>
16 <sup>30</sup> – 16 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>FindYourGym</i>, <b>Alexandru-Ioan Manu</b>, TUCN - North University Center of Baia Mare, Romania</li> </ul>
16 <sup>45</sup> – 17 <sup>00</sup>	<ul style="list-style-type: none"> <li>• <i>The Epidemics Toolset: An interactive web app for genome comparison and mathematical modelling in epidemiology</i>, <b>Augusta Ionaș</b>, Samuel von Brukenthal National College, Sibiu, Romania</li> </ul>
17 <sup>00</sup> – 17 <sup>15</sup>	<ul style="list-style-type: none"> <li>• <i>The Bezt Shaorma: A Fun and Engaging Approach to Learning About Physical Forces</i>, <b>Ștefanel-Alexandru Banu, Sorin-Ionuț Conea</b>, Vasile Alecsandri University of Bacău, Romania</li> </ul>
18 <sup>15</sup> – 20 <sup>45</sup>	<b>Official Dinner – Restaurant Sonne, Sibiu</b>
20 <sup>45</sup> – 21 <sup>45</sup>	<b>Sibiu by night (walking in the Sibiu downtown)</b>

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**FRIDAY, May 12, 2023**

**Faculty of Sciences,  
Sibiu, Dr. I. Rațiu st., No. 5-7  
2nd Floor, Room A27**

*International Conference on Applied Informatics – ICDD 2023*

**organized by**

**Faculty of Sciences, *Research Center in Informatics and Information Technology*  
Lucian Blaga University of Sibiu, Romania**

<b>9<sup>00</sup> – 10<sup>00</sup></b>	<b>Papers presentation - Chair Lecturer. Dr. Daniel Hunyadi</b>
9 <sup>00</sup> – 9 <sup>15</sup>	• <i>An analysis of the impact of Russia's invasion of Ukraine on the volatility of fuel prices in Romania</i> , <b>Ioana-Andreea Gîfu, Maria Ioana Popa</b> , University of Craiova, Romania
9 <sup>15</sup> – 9 <sup>30</sup>	• <i>Smart-R</i> , <b>Bogdan Ștefan Lupănescu, Vasile Șofron</b> , TUCN - North University Center of Baia Mare, Romania
9 <sup>30</sup> – 9 <sup>45</sup>	• <i>Facial Recognition System in MATLAB</i> , <b>Victor Ötveș</b> , Lucian Blaga University of Sibiu, Romania
9 <sup>45</sup> – 10 <sup>00</sup>	• <i>Navigating the Future: an approach of autonomous indoor vehicles</i> , <b>Julian Tilly, Christopher Neeb, Chandu Bhairapu, Fatima Mohamed, Indrasena Reddy Kachana, Mahesh Saravanan, Phuoc Nguyen Pham</b> , Technical University of Applied Sciences Würzburg-Schweinfurt, Germany
<b>10<sup>00</sup> – 10<sup>30</sup></b>	<b>Coffee break</b>
<b>10<sup>30</sup> – 11<sup>30</sup></b>	<b>Papers presentation - Chair Prof. Dr. Frank Michael Schleif</b>
10 <sup>30</sup> – 10 <sup>45</sup>	• <i>Detecting Tobacco Crop Using Convolutional Neural Network (CNN) and Ensemble Method</i> , <b>Zeynep Dilan Daşkın</b> , Transilvania University of Brasov (Erasmus Student in Braşov, Student from Atilim University), Romania
10 <sup>45</sup> – 11 <sup>00</sup>	• <i>Integrated Modules to Develop an AI-based Technology for the Transcription of Old Romanian Documents</i> , <b>Eduard Coman, Andreea Dascalu, Claudiu Marinescu</b> , Transilvania University of Braşov, Romania
11 <sup>00</sup> – 11 <sup>15</sup>	• <i>Contextual based supervised text correction with index-based tokenization</i> , <b>Marin-Eusebiu Șerban</b> , Lucian Blaga University of Sibiu, Romania

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11 <sup>15</sup> – 11 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>Autonomous driving simulation utilizing DNNs in Unreal Engine 5</i>, <b>Cristian Nicolae Cîndea, Stephanie Fîșcă</b>, Lucian Blaga University of Sibiu, Romania</li> </ul>
12 <sup>00</sup> – 13 <sup>30</sup>	<b>Lunch – University Canteen, Sibiu</b>
13 <sup>30</sup> – 14 <sup>45</sup>	<b>Papers presentation - Chair Prof. Dr. Dana Simian</b>
13 <sup>30</sup> – 13 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>Using Deep Learning Methods For Modeling And Forecasting Brent Crude Oil Prices</i>, <b>Maria Ioana Popa, Ioana-Andreea Gîfu</b>, University of Craiova, Romania</li> </ul>
13 <sup>45</sup> – 14 <sup>00</sup>	<ul style="list-style-type: none"> <li>• <i>Using Nudging to Influence Sustainable Product Selection in an Online Supermarket under the Factor of Time Pressure</i>, <b>Leonie Zech</b>, Technical University of Applied Sciences Würzburg Schweinfurt, Germany</li> </ul>
14 <sup>00</sup> – 14 <sup>15</sup>	<ul style="list-style-type: none"> <li>• <i>From Turing Complete game to my own PC</i>, <b>Dennis - Vlăduț Teglas</b>, Transilvania University of Brașov, Romania</li> </ul>
14 <sup>15</sup> – 14 <sup>30</sup>	<ul style="list-style-type: none"> <li>• <i>Breezy Air - An IoT application to monitor the quality of breathed air</i>, <b>Gabriel Claudiu Radu, George Bogdan Trîmbițaș</b>, Titu Maiorescu National College Aiud, Romania</li> </ul>
14 <sup>30</sup> – 14 <sup>45</sup>	<ul style="list-style-type: none"> <li>• <i>On Enforcing Database Constraints Using MS VBA Event-Driven Procedures and SQL Server</i>, <b>Diana Christina Mancaș</b>, Ovidius University, Constanta, Romania</li> </ul>
16 <sup>30</sup> – 17 <sup>45</sup>	<b>Closing ceremony - Room A27</b>

**SATURDAY, May 13, 2023**

*International Conference on Applied Informatics – ICDD 2023*

**organized by**

**Faculty of Sciences, Research Center in Informatics and Information Technology  
 Lucian Blaga University of Sibiu, Romania**

8 <sup>30</sup> – 20 <sup>00</sup>	<b>Trip on the route</b> Sibiu - Alba Iulia (The Citadel Alba-Carolina, Reunification Cathedral, downtown) - Hunedoara (Corvins' Castel) - Open Air Astra Museum Sibiu (Night of Museums)
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## ABSTRACTS

### **The Bezt Shaorma: A Fun and Engaging Approach to Learning About Physical Forces**

*Ștefănel-Alexandru BANU, Sorin-Ionuț CONEA*

“The Bezt Shaorma” is a novel mobile game developed using Unity and programmed with C#, designed to improve players' reaction times, and promote a deeper understanding of physical forces. This study presents the development, implementation, and assessment of “The Bezt Shaorma”, which was published on the Google Play Store. The game's core objective involves players gathering raw food ingredients to create a virtual shawarma. To achieve this, players must navigate through an interactive environment that challenges their reaction time and problem-solving skills, while concurrently exposing them to the principles of classical mechanics. The game incorporates various tasks that require players to manipulate different physical forces, including gravity, friction, and tension, to achieve the desired outcomes. “The Bezt Shaorma” aims to provide an engaging and educational experience for players, fostering a deeper comprehension of physics concepts, improving their competitive thinking and enhancing their cognitive abilities. To evaluate the efficacy of the game in achieving these goals, a pre- and post-test experimental design was conducted, wherein participants’ reaction times and understanding of physical forces were measured. The results indicate that “The Bezt Shaorma” effectively

promotes improvements in reaction time and understanding of physical forces among players, demonstrating its potential as an innovative educational tool especially to develop children's motorical function.

## **StudBase**

*Viorel Augustin BĂRBOS, Andrei Eduard DUMITRAȘ,  
Rareș Andrei CRAINIC*

Studbase is a web application that is an integrated solution for the needs of students, teachers, secretary, canteen and student league. It offers a wide range of functionalities such as adding products, creating cafeteria menus, viewing grades by students, adding grades by teachers, managing departments, specializations and curricula, as well as the management of students and teachers.

The technologies used to build the application are Next.js which is a React Framework, Express.js which is a Node.js framework for building the server side of web applications and MongoDB which is a document-oriented NoSQL database.

One of Studbase's goals is to streamline and improve administrative and academic procedures within a higher education institution. Students can view their grades in real time, which helps them track their academic progress and make informed decisions. Teachers can quickly and easily add notes, which will cut down on the time needed to process them. The secretary can easily manage departments, specializations and curriculums in addition to keeping an eye on student and faculty activity.

Additionally, Studbase offers an integrated solution for canteen management. The canteen manager can create new products, compose weekly menus and users can buy food directly through the web application. This provides a convenient and fast user experience without the need to use other apps or payment methods. Our platform also includes a social component where users can interact with each other through a system that allows users to view others profile, to send them friend request and initiating conversations.

The originality of Studbase lies in the integration of many important functionalities for students, teachers, secretary, canteen and students league in a single application. This approach reduces the complexity and time required to manage daily activities, providing an intuitive and simple user experience. Overall, Studbase is an innovative and useful solution for any academic environment.

## **Reasoning about a concurrent-based functional programming approach for studying the Software Transactional Memory method**

*Marius BENKERT, Jochen SCHMIDT, Lennard ROSE*

Our study presents a comprehensive Question Answering (QA) system for coffee machine related questions. The system covers a wide range of topics such as maintenance, usage, and troubleshooting of coffee machines, offering quick and accurate answers to the users through its intuitive interface and natural language processing capabilities. The system provides

a seamless experience for coffee machine owners and users to access the information they need, ensuring smooth operation of their machines and allowing them to enjoy their favorite beverages with ease. To evaluate the performance of these models, we fine-tuned a range of BERT-based Transformers on a manually created dataset of 653 question-answer pairs. In conclusion, our findings demonstrate the feasibility of using NLP Question Answering models to deliver technical answers about coffee machines, and highlight the importance of fine-tuning these models on task-specific data.

## **BreathApp**

*Marian Ionuț CÂNDEA, Norbert Alexandru KOVACS,  
Gheorghe-Cătălin IUGA, Rareș Ciprian CHIUZBĂIAN,  
Eduard Florin PODOLAC, Edmond Roland VOLOSCIUC*

Breath is an air quality monitoring app that uses advanced machine learning algorithms to accurately predict air quality in multiple locations in Romania. With an intuitive and easy-to-use visual interface, Breath provides users with accurate measurements about the air quality in key locations across Romania.

The main purpose of the app is to provide users with precise air quality forecasts, that can be visualized in an interactive map that includes locations from all over the country. The predictions are based on data collected by the Copernicus Sentinel5P satellite to ensure the best possible accuracy.

In addition to monitoring air quality, this project aims to raise awareness and encourage action for cleaner air. By providing up-to-date information on air quality, Breath empowers individuals to make informed decisions about their health and well-being.

The app uses several cutting-edge technologies, including NextJS combined with Material-UI for the front end, a Golang Gin API connecting to a MongoDB database, and Python for data processing and machine learning algorithms.

Overall, Breath is a must-have tool for anyone who wants to stay informed about air quality in Romania. With its accurate forecasts and easy-to-use interface, the app makes it easy to be informed about the air quality in Romania.

## **Autonomous driving simulation utilizing DNNs in Unreal Engine 5**

*Cristian Nicolae CÎNDEA, Stephanie FIȘCĂ*

The rapid advancement of deep learning techniques and the growing importance of virtual environments in research and development have enquired the integration of deep neural networks (DNNs) into various platforms. This paper presents an approach for the integration, manipulation, and utilization of DNNs in Unreal Engine 5, focusing on the integration of autonomous lane-keeping control for vehicles. We create and train a DNN outside of the engine, employing a combination of convolutional and fully connected layers to process and interpret visual

driving lane information. The proposed network is then integrated into Unreal Engine 5, utilizing a custom plugin with support from ONNX runtime and an OpenCV dedicated communication channel to bridge the gap between the two environments. The resulting system demonstrates the effectiveness of the DNN-based lane-keeping controller, showcasing robust performance. Our work contributes to the phenomenon of integrating deep learning techniques in game engines, offering valuable insights for future developments in the fields of autonomous vehicles, robotics, and virtual prototyping.

## **Integrated Modules to Develop an AI-based Technology for the Transcription of Old Romanian Documents**

*Eduard COMAN, Andreea DASCALU, Claudiu MARINESCU*

This paper presents components of an architecture intended to decipher old Romanian documents written in the Cyrillic script, in order to ease the access to the Romanian written cultural heritage of a wide diversity of researchers of the past, of students and of publishing houses. Our approach applies to printings and to hand-copied books that mimic the printings (uncials) and cover 4 centuries (from the XVI<sup>th</sup> to the half of the XIX<sup>th</sup>). The peculiarities of these documents make a classical OCR approach inappropriate, as they display a huge variety of Cyrillic fonts, the copyists often made errors and placed their corrections interlinear, and the writing was not standardized, therefore the language varies immensely from the contemporary Romanian. The proposed modules deal mainly with the

recognition of characters, by using deep learning methods, linearization of the writing and recuperation of old Romanian words from the string of converted Latin letters.

## **Detecting Tobacco Crop Using Convolutional Neural Network (CNN) and Ensemble Method**

*Zeynep Dilan DAŞKIN*

In recent years, Agricultural Farming has focused more on producing high-quality crops to reduce the waste of overall production. Applying various automation techniques, such as artificial intelligence methods, has been getting more interest and work each day due to the massive increase in population and demand for food. In this study, the authors focused on two frameworks for identifying tobacco crops from weeds under real-life conditions. To achieve this goal, an existing Convolutional Neural Network (CNN) model was first applied to a dataset, and later on, the same network was ensembled and tested with the same data. This research aims to evaluate the performance of the already existing Convolutional Neural Network (CNN) model called AlexNet by using the Ensembling Method. At the end of the study, the evaluation of the models was discussed and compared according to their prediction accuracy.

## **Advanced Vision-Guided Autonomous Navigation Robot**

*Stephanie FÎȘCĂ, Cristian Nicolae CÎNDEA*

This article presents an advanced autonomous navigation robot designed as a four-wheeled vehicle, powered by a Raspberry Pi, primarily focused on enabling smooth and intelligent navigation through a test environment. The proposed cyber-physical system uses a camera for environmental perception and employs computer vision techniques for lane detection and traffic sign recognition.

To generate a comprehensive understanding of the environment, the system utilizes computer-vision based techniques. Moreover, it incorporates a deep learning generated model trained on a diverse dataset of traffic signs, enabling the robot to accurately classify and interpret detected signs in real-time. By recognizing and reacting to these, the robot can effectively follow traffic rules, and adjust its behavior accordingly. This will ensure safe and reliable navigation in various situations.

Our research contributes to the development of cost-effective, autonomous navigation and sign recognition capabilities, paving the way for potential applications in urban transportation, last-mile delivery, and intelligent mobility systems.



## **An analysis of the impact of Russia's invasion of Ukraine on the volatility of fuel prices in Romania**

*Ioana-Andreea GÎFU, Maria Ioana POPA*

In this paper we analyzed the impact of Russia's invasion of Ukraine on the evolution of fuel prices in Romania in an unstable period from both an economical and an geopolitical viewpoint. This period is of interest because it gave rise to severe challenges that affected the global energy market and induced an erratic evolution of fuel prices. It results in a time-varying volatility (heteroskedasticity in returns), which is often very difficult to model and forecast. We first put the energy market evolution in a global context, which includes the ban on seaborne imports of Russian oil, the reshuffling of fuel flows and the finding of new suppliers for European countries. Next, we conducted a univariate and bivariate analysis of gasoline and diesel prices in Romania and presented the results using several visual tools, useful for capturing variational and distributional characteristics. Finally, we used the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) method for modeling and forecasting the volatility of fuel price.

## **The game theory behind a 2D action role-playing game**

*David-Stelian HOKA*

In this article it presents the game theory that approaches the problem of behavior in a 2 Dimensional Action Role-Playing Game (ARPG). The paper assists us to understand game theory by creating a 2D action role-playing game which demonstrates the successful application of game theory principles in the development of an ARPG game, providing an innovative and enjoyable gaming experience for players.

## **The Epidemics Toolset: An interactive web app for genome comparison and mathematical modelling in epidemiology**

*Augusta IONAȘ*

The Covid-19 pandemic has shown us that access to quick, reliable results about viruses and possible outbreaks is essential. As such, my project "The Epidemics Toolset" aims to aid researchers and laypersons in discovering information about an unknown virus. The goal is to provide an interactive tool to both analyse an unknown virus genome and predict the evolution of an infectious disease. The user can upload a .fasta file with two virus genomes, a known one and an unknown one, for which the web app computes relevant elements such as the similarity percentage and the GC content. Moreover, it calculates and graphs the possible spread of the infectious disease through mathematical models such as the SIR and SEIR.

The web app was designed in Anvil using Python and integrating Google Colaboratory code.

## **A User-Friendly Solution for streamlining Hotel and Restaurant Management with QR Code Integration**

*Corina IORDACHE, Felix HUSAC*

The management of hotels and restaurants can be a complex and challenging task, especially when it comes to keeping track of guest bookings, room availability, and food service. In this paper, we present a hotel and restaurant management application that utilizes Svelte.js and MongoDB to streamline these processes. The application allows hotel staff to easily manage bookings, track room availability, and monitor guest activities in the hotel and restaurant. The use of QR codes provides a seamless experience for the guests, allowing them to easily access areas of the hotel and check relevant information. In addition, the application can log the use of the canteen and the items served, allowing for accurate billing at the end of the stay. This approach eliminates the need for traditional canteen ordering and billing procedures, making the process faster, more efficient, and more secure. Guests are billed for their restaurant or canteen expenses when they check out. Our application provides a robust and scalable platform for hotel management, with potential for expansion into inventory management and other areas. Future improvements to the application could include additional features such as analytics and data visualization, further enhancing the value of the application for hotel owners and managers. It also has the potential

for expansion into inventory management and other areas. Overall, this application offers a user-friendly and comprehensive solution for hotel and restaurant management, and can greatly improve the guest experience while streamlining operations for hotel staff.

## **Control and Simulation for an Electrically Controlled Pneumatic Suspension**

*Maria-Denisa KISS*

In this article, I will present the process of electronically controlling an air suspension system. The developed system allows the user to choose between different operating modes, such as Sport, Off-Road, or Normal, through buttons.

Additionally, it includes a simulation function of a road with bumps, so the reaction of the pneumatic suspension can be visualized in such driving conditions. All of these actions can be viewed on an LCD where the graphical part of the suspension is implemented.

## **Smart-R**

*Bogdan Ștefan LUPĂNESCU, Vasile ȘOFRON*

The aim of this paper is to describe the development of a web application that evaluates students' knowledge and grants them a life to use in a range of games if they pass the exam. The platform comprises games such as puzzles and word scrambles, which students can access by utilizing their

earned lives. During the development process, various technologies were used, including HTML, CSS with Bootstrap, PHP, Laravel, and JavaScript, while MySQL served as the backend.

The primary objective behind creating this application was to offer students an interactive platform for testing their knowledge and motivating them to succeed by providing rewards. By integrating gamification and educational content, the platform has become a fun and effective learning tool for students.

This paper analyzes the diverse technologies employed in the development process and highlights their benefits and challenges. Additionally, it provides a comprehensive overview of the application's design and architecture, along with the testing and deployment procedures.

Overall, this paper presents a detailed account of the creation of a web application that blends gamification with educational content to provide students with an engaging and productive learning experience.

## **On Enforcing Database Constraints Using MS VBA Event-Driven Procedures and SQL Server**

*Diana Christina MANCAȘ*

The goal of this paper is to provide a rigorous methodology for enforcing database constraints using MS VBA event-driven procedures for software applications built on top of MS SQL Server databases, in the framework of the software engineering Database Constraint-Driven Design and Development. The original contribution is a pseudo-code algorithm for

assisting developers in this process. We exemplify the results of using it with some VBA code examples taken from a genealogy database software application designed and developed using this methodology. Consequently, it enforces all the database constraints -be they relational or not- which govern this sub-universe of discourse, thus guaranteeing the highest possible quality of its managed data. We also show that the proposed algorithm works fine not only for other relational database management systems, but even with NoSQL platform backends, and that the modifications needed to adapt it to other similar SQL embedding frontend platforms are minimal.

## **FindYourGym**

*Alexandru-Ioan MANU*

Unhealthy eating habits and sedentary lifestyle are two major problems facing contemporary society. Obesity is a global public health problem, and its consequences are multiple and can include cardiovascular disease, type 2 diabetes, high blood pressure and other serious conditions.

To counter this problem, it is necessary to adopt a healthy lifestyle that includes a balanced diet and regular physical activity. Sport is a key factor in promoting health and fighting obesity, but not everyone enjoys these activities or has access to them.

In this sense, the gym is an affordable and effective solution for people who want to exercise and maintain a healthy weight. In the fitness room, you can

practice exercises with dumbbells or with your body weight, without needing the collaboration of other people, as in the case of team sports.

Although there are many gyms, it can be difficult to choose the right one for you based on your goals and specific needs. A specialized mediating web application in this domain would make the user's decision easier. I decided to start this project on my own to create an app which will allow gym owners to create a web page without any knowledge of coding and for the users a specialized application where you can find the information you need about the gyms. The application should be simpler and easy to use and understand.

## **Prism: Democratizing Artificial Intelligence through a Low-code Approach**

*Matei-Ioan MARIN*

Prism is an innovative low-code web tool that enables users to create and publish custom artificial intelligence web applications without requiring extensive technical expertise. Despite AI being a powerful technology, its day-to-day accessibility remains limited for many individuals. This tool seeks to address this issue by providing a dual-interface system, combining a user-friendly drag-and-drop design interface for constructing the visual part of the app and a modular graph visualization interface for defining the app's functionality. Users can integrate features like computer vision, language models, and their custom AI models into their web applications using pre-built modules. Thus, Prism democratizes access to AI technologies, empowering a broader audience to create and deploy AI-

driven web applications. The paper will discuss the design principles, architecture, and implementation of the proposed tool, highlighting its potential impact on the AI development landscape.

## **Domina - a puzzle game meant to improve mental health**

*Petar MISHEV, Galina ATANASOVA*

This article presents the benefits of playing puzzle games and especially their function as a mental health improvement tool. Computer games are seen as tools for improving the brains health, by challenging it with simple to learn, but hard to master challenges. The presented game by the author is an example of how such games work and help improve one's skills in special awareness tasks. Additionally, the author's game is also a way to test the capabilities of the Godot engine, a free and open source game engine.

## **Advanced sentiment analysis at textual conversation level using modern NLP techniques**

*Rareş-Gabriel MUŞEA*

In an era of digitalization, of perpetual technological advance, of remote communication achieved as efficiently as possible thanks to social media, Artificial Intelligence (AI) plays a crucial role in the development and implementation of systems capable of simulating intelligent human behaviour, so that users can have an immersive and close to reality



experience as possible. Natural language processing (NLP) is one of the most notable attempts in the history of Artificial Intelligence to obtain smart human-like behaviour through computer system and specialized algorithms. The idea also led to the advent of sentiment analysis as a way to investigate the frequency of good, negative or neutral feelings within publicly expressed attitudes or even views and opinions. This paper aims to compare two modern sentiment analysis models, which are based on advanced NLP techniques. They are able to estimate, by means of a prediction, the polarity of a textual message within a conversation. For the experimental demonstration of these two methods of sentiment analysis, different datasets will be used, one from a social media application and the other from an existing training file. The prevalence of positive or negative texts, as well as their classification will prove to be beneficial, especially within social networks, where an intelligent system based on such conversation analysis could detect a malicious chat, or a possible fraud/harassment. In the past years, numerous users have been victims of such malicious activities, which could be prevented by warning users about the dangers to which they are exposed.

### **MemStego. Stenography and Memes combined**

*Vladislav NIKOLOV, Galina ATANASOVA*

The paper examines the potential use of stenography in daily communication by a particular target group, as well as others. It proposes the use of funny images and memes that are frequently shared in daily

communication. The paper introduces a new solution called MemStego, which is an amalgamation of steganography, cryptography, and memes. While there are already existing solutions, MemStego was created as a side project motivated by the authors' interest in cybersecurity and communication. Unlike other software products that use images provided by the user, MemStego uses memes as well that are obtained from the Memegen API.

## **Facial Recognition System in MATLAB**

*Victor ŐTVEŞ*

In this paper I present a safer and more efficient alternative that solves the problem of allowing a person's authorized access to a room. The main aspects of the work refer to the presentation of how the models are trained and the accuracy obtained.

## **Using Deep Learning Methods For Modeling And Forecasting Brent Crude Oil Prices**

*Maria Ioana POPA, Ioana-Andreea GÎFU*

Two major crude oil futures contracts are Brent traded on ICE (InterContinental Exchange) in London and WTI (West Texas Intermediate) traded on NYMEX (New York Mercantile Exchange). Brent ICE appear to be more interesting to work with as it has much more global scope and

represents better the European area. Our specific purpose in this paper is to model and forecast Brent crude oil prices using deep learning techniques. However, reaching the goal is not easy since financial time series analysis in general (and market indices in particular) is a very challenging task, due to their intrinsic nonlinearity, nonstationarity and uncertainty. We acquired the data via Yahoo Finance API. The dataset spans a period of time from January 2008 to February 2023 and consists of several time series, including the historical Brent oil prices as an endogenous variable and other Forex Market exchange rates and Stock Market indices to potentially play the role of exogenous variables.

## **Biometric authentication solution based on high-resolution iris data**

*Teodora POPA*

Restrictions regarding a system access can be applied in order to protect the data within it. These restrictions are implemented by creating a solution that consists in authenticating those who wish to access the system. Biometric data is an option for an authentication-based solution for protecting a system. Biometric data can be provided by one, two or more sources of the same individual. The authentication-based solution proposed in this article uses iris data. It is formed from four modules: high-quality iris data acquisition, data processing, signature creation and signature verification.

## **Android app for vehicles owners**

*Elisei Daniel PRALĂ*

The purpose of this article is to present the design and implementation of an Android application aimed at vehicle owners.

The present application combines basic and advanced functions.

As basic features we have included vehicle maintenance, management of various taxes, periodic inspections and insurances, access to offers for sale and purchase of vehicles.

As an advanced feature, we have considered the possibility of setting personalized notifications related to administrative and maintenance issues. This is an ongoing project. At the moment we have not implemented all the features, but the originality lies in the range of functionalities offered in a single app and the ease of use of this app.

## **Breezy Air - An IoT application to monitor the quality of breathed air**

*Gabriel Claudiu RADU, George Bogdan TRÎMBIȚAȘ*

This work shows as a practical solution to implement automatic data communications connected to the internet, the users having the possibility to have access to in real time to extracted data from the environment on the quality of the breathed air and provided by the sensors (temperature,

humidity, atmospheric pressure, dust and Volatile Organic Compounds concentration).

We have made Breezy-Air as a coded project in Arduino IDE, based on sensors and having a visual, sonorous and lighting functions for critical situations when recorded values exceed the maximum allowed and constitute a potential danger.

The data provided by the sensors is displayed on a LCD screen, in the mobile app, and on the ThingSpeak web page: recording temperature variations, atmospheric pressure, relative humidity, dust, VOC concentration and generating useful statistics are done through via the open data platform ThingSpeak.

We chose an IoT solution because the Internet of Things allows remote monitoring of devices and the possibility to intervene/control when needed, as well as the possibility to have real-time access to the data extracted from the environment, provided by the sensors used.

## **Learning to unpermute**

*Muhammad Zakriya SHAH SARWAR, Nehmiya SHIKUR*

Unpermuting an image is the process of reversing the effect of image permutation, which is the process of shuffling the pixels of an image in a random order. Deep learning techniques are particularly useful for this task as they are able to learn complex patterns and features from a given data. This project aims to develop models that can unpermute an image using supervised and unsupervised learning techniques. The project is divided into

two phases, the first one focuses on developing a supervised learning model, where a neural network is trained using a dataset of paired original and permuted images. The second phase focuses on developing an unsupervised deep learning model, where the network is trained using unpaired permuted and original images.

## **Multi Source Music Player**

*Kameliya SHOYLEKOVA, Bozhidar ATANASOV*

The paper discusses the creation of a system that creates playlists of music from multiple different sources eliminating the inconvenience of not having a certain song in the playlist and allowing for the easy sharing of the playlist.

## **GEditor**

*Matei-Cristian STEAVU*

GEditor is an app made with the purpose to improve the efficiency of a 3D printer. The app does this by modifying the GCode of an object generated by a slicer such as Ultimaker Cura or Prusaslicer with encoded functions such as speeding up certain layers of filament. The programming language is C# and the UI is made by using Windows Forms in Visual Studio.

## **Contextual based supervised text correction with index-based tokenization**

*Marin-Eusebiu ȘERBAN*

The aim of this article is to propose a supervised learning algorithm, that can recognise unsuitable words (e.g., incomplete, mistyped) in a given text input and correct them based on contextual information.

The algorithm takes the input text and builds the training set for the supervised learning process. We propose an indexing-based tokenisation approach, used first for the training dataset and then for the text we want to process. The predictive capabilities of our algorithm depend on the contextual relationship between the training dataset and the input text.

We have also developed a general method for generating a learning dataset starting from raw text. We implemented the proposed algorithm using Python and TensorFlow and validated it. The reported results are promising.

## **From Turing Complete game to my own computer**

*Dennis-Vlăduț TEGLAS*

In this paper, we discuss an application called Turing Complete, which helped me discover a passion for computer systems architecture. At its core, this application is a game that teaches you how to build a computing machine starting from a single logic gate (NAND) and then program it to solve various computational problems. Furthermore, it has a tutorial in which you learn what the basic architecture of a processor looks like, as well

as the different components it consists of. Once the tutorial is completed, you are free to improve the created computing machine in any way you like, even simulating an entire computer.

I plan to present the computer I built using this application, starting with an overview of the architecture that connects the components, followed by an explanation of what each component does, and finally, a demonstration of a program written in machine code that the computer can understand.

I will also try to show a part of the tutorial I went through, along with a few examples of challenges it presents, to highlight the educational aspect that it can offer to a student who wants to understand what is behind any device they use and perhaps discover a passion in this field.

As a comparison with other applications where you can create and simulate a circuit, this one has a much friendlier and more colourful interface, as it is intended for those who have no idea how a computer works, as well as those who have some ideas but don't know how to put them together. Furthermore, the application has a rather large community, and anyone can publish any work they have done that might be useful to someone else.

## **Navigating the Future: an approach of autonomous indoor vehicles**

*Julian TILLY, Christopher NEEB, Chandu BHAIAPU,  
Fatima MOHAMED, Indrasena Reddy KACHANA,  
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In this project, we explored the ability of Reinforcement learning (RL) in driving an indoor car autonomously. RL has proven its good performance



in solving challenging decision-making problems. Therefore, RL can be a promising solution for autonomous car to deal with complex driving scenarios. As hardware a model car equipped with sensors and powerful computational unit has been used. We also utilized SLAM for environment mapping and a combination of lidar data and Wi-Fi technology for localization. The experiment showed that the model can perform very well in simulation. Although the model lacks the ability to drive the car as smoothly along a route, the car is still able to avoid obstacles and walls in an unknown real-world environment.

## **Using Nudging to Influence Sustainable Product Selection in an Online Supermarket under the Factor of Time Pressure**

*Leonie ZECH*

The advancing climate change confronts society with new problems. For this reason, new solutions must be created to reduce climate change. Past studies have revealed that nudging can influence people in making healthier or more sustainable food choices in different environments.

This study examines the effect of nudges on sustainable food choices under the factor time pressure, a system-1-condition. This was realized with the help of a realistic online supermarket. The more sustainable alternatives were highlighted with a nudge. A simplification nudge and a social norms nudge were used for this purpose. Participants had to add four products of different product categories to the shopping cart. Each of the four products was available in four different versions in the online store, of which two

product options were marked with a nudge and two of the product options were presented without a nudge. The first group of participants had to do the shopping without any time constraints. The comparison group had to do the shopping under time pressure. It was found that the nudging effect was not influenced by time pressure, what indicates that the effect of nudging is not increased under a system-1-condition.

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**Seventh International Conference on Applied Informatics**  
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