The *29th International Conference on Information and Software Technologies (ICIST 2023)* is taking place in Kaunas, Lithuania.

WELCOME

The scientific conference programme includes three invited talks, a workshop and research paper presentations in parallel sessions. The conference papers present recent results as well as discuss research challenges, propose methodologies and describe new applications in four major areas that are covered during the conference, namely,

- Intelligent Methods for Data Analysis and Computer Aided Software Engineering,
- Intelligent Systems and Software Engineering Advances,
- Language Technologies and Smart e-Learning Applications,
- AI-Based IT Solutions.

Conference Proceedings are published by Springer as a part of Communications in Computer and Information Science (CCIS) series and will be referred in Clarivate Analytics. The conference was made possible due to the support of the Faculty of Informatics, Kaunas University of Technology, and Research Council of Lithuania, whose contribution is gratefully acknowledged.

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KEY NOTES & SPEAKERS

M. WOZNIAK is currently a Full Professor at the Faculty of Applied Mathematics, Silesian University of Technology. He is a Scientific Supervisor in editions of "The Diamond Grant" and "The Best of the Best" programs for highly talented students from the Polish Ministry of Science and Higher Education. He participated in various scientific projects (as Lead Investigator, Scientific Investigator, Manager, Participant and Advisor) at Polish, Italian and Lithuanian universities and projects with applied results at IT industry both funded from the National Centre for Research and Development and abroad. He was a Visiting Researcher with universities in Italy, Sweden, and Germany. He has authored/coauthored over 200 research papers in international conferences and journals. His current re-search interests include neural networks with their applications together with various aspects of applied computational intelligence accelerated by evolutionary computation and federated learning models.

Recent Advances in AI Models for IoT Applications
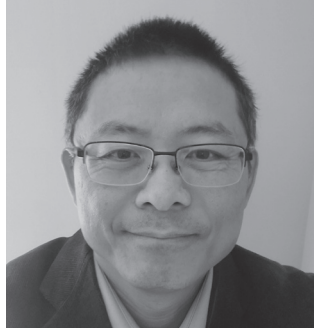
Thursday, October 12th, 10.00 – 11.00

The advances in the Internet of Things (IoT) provide several opportunities to develop a variety of innovations supporting smart homes, industries, healthcare, energy management, and more. Ubiquitous support from intelligent appliances, which continuously gather information, can help us solve everyday issues. Recent years have brought forth various examples of AI working with IoT. In this meeting, we will discuss recent advances in smart environment development. Our study will aim to present the main trends in this field. We will identify the propositions that constitute the main research streams. As a result, we will define an outlook on the wide spectrum of proposed solutions. We will analyze the main market trends to present which branches of innovative science lead to the fusion of science and technology.

Using Generative AI to Create Adaptive Feedback in Engineering Design

Friday, October 13th, 10.00 – 11.00

Design is a creative process with massive open-endedness leading to numerous alternative solutions. The lack of standard solutions, the quantitative nature of design, and personal preferences may all contribute to the uncertainty and inconsistency of human assessment of designs. AI provides a promising solution to this problem, but how can it help a student know if her design is "good" or "bad" and find ways to improve it? To address this, we developed comparative performance metrics based on computing the "distance" between designs, when an improved version of the student's design based on the same objectives is presented to her and compared with her original version, the difference in the scores can be used as metrics to gauge the original design. We use metaheuristic AI such as genetic algorithms to search for possible improvements in the student's zone of proximal development as a way to formatively assess her design and generate adaptive feedback to guide her in real time.

Chief Scientist at the Institute for Future Intelligence in the United States Dr. **CHARLES XIE** has published more than 60 papers in peer-reviewed academic journals and created many scientific and engineering software widely used by students, teachers, and scientists around the world. As the Principal Investigator, he has directed more than 15 research grants from the National Science Foundation and the National Institutes of Health. He is currently working on artificially intelligent algorithms that can be used to create design tutors and assistants embedded in computer-aided design and analysis software in the fields of renewable energy, materials design, and drug discovery.

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THURSDAY, OCTOBER 12th

09.00 – 09.30 **REGISTRATION**
KTU Campus Library

09.30 – 10.00 **OPENING CEREMONY**
Assoc. Prof. Dr. *Rita Butkienė*,
Kaunas University of Technology, Faculty of Informatics
Prof. *Leonas Balaševičius*, Kaunas University of Technology
Prof. Dr. *Audrius Lopata*, Kaunas University of Technology,
Faculty of Informatics

10.00 – 11.00 **KEY NOTE**
Prof. *Marcin Woźniak*
Recent Advances in AI Models for IoT Applications

11.00 – 11.30

11.30 – 13.00 **SESSION 1** | *KTU Campus Library*

*Special Session on **Intelligent Systems and Software Engineering Advances***
Chaired by Prof. *Zbigniew Marszałek*

1. A Deep Learning Algorithm for the Development of Meaningful Learning in the Harmonization of a Musical Melody
Michele Della Ventura

2. Investigation of the Statistical Properties of the CTR Mode of the Block Cipher Based on MPF
Matas Levinskas, Aleksejus Mihalkovich,
Lina Dindiene, Eligijus Sakalauskas

3. Online PID Tuning of a 3-DoF Robotic Arm using a Metaheuristic Optimisation Algorithm: A Comparative Analysis
Muhammad Hamza Zafar, Hassaan Bin Younus,
Syed Kumayl Raza Moosavi, Majad Mansoor,
Filippo Sanfilippo

4. Multivariate Bitcoin Price Prediction based on Tuned Bidirectional Long Short-Term Memory Network and Enhanced Reptile Search Algorithm

Ivana Strumberger, Miodrag Zivkovic, Venkat Ram Raj Thumiki, Aleksandar Djordjevic, Jelena Gajic, Nebojsa Bacanin

5. Android Malware Detection using Artificial Intelligence

Rebecca Kipanga Masele, Fadoua Khennou

13.00 – 14.00

14.00 – 15.15   **SESSION 2** | *KTU Campus Library*

*Special Session on **Intelligent Methods for Data Analysis and Computer Aided Software Engineering (Part 1)***
Chaired by Prof. Dr. *Audrius Lopata*

1. Autoencoder as feature extraction technique for Financial distress classification

Dovilė Kuizinienė, Paulius Savickas, Tomas Krilavičius

2. Scope Assessment Methodology for Agile Projects using Automated Requirements Gathering from Models

Lina Bisikirskiene, Egle Grigonyte

3. User Interaction and Response-based Knowledge Discovery Framework

Martins Jansevskis, Kaspars Osis

4. Privacy Risks in German Patient Forums: A NER-based Approach to Enrich Digital Twins

Sergej Schultenkämper, Frederik Simon Bäumer

5. Application of Machine Learning in Energy Storage: A Scientometric Research of a Decade

Samuel Ajibade, Anthonia Oluwatosin Adediran

15.15 – 15.45

15:45-17:00   **SESSION 3** | *KTU Campus Library*

*Special Session on **Intelligent Methods for Data Analysis and Computer Aided Software Engineering (Part 2)***
Chaired by Prof. *Audrius Lopata*

1. Access Control Approach for Controller Management Platforms
Tomas Adomkus, Klaidas Klimakas, Rasa Brūzgienė, Lina Narbutaitė

2. Enhancing Corporate Website Search: Leveraging Semantic Search and LLMs for Domain-Adaptive Information Retrieval
Falk Maoro, Benjamin Stecker, Michaela Geierhos

3. Synergizing Reinforcement Learning for Cognitive Medical Decision-Making in Sepsis Detection
Lakshita Singh, Lakshay Kamra, Anjana Gupta, H.C. Taneja

4. Towards Data Integration for Hybrid Energy System Decision-Making Processes: Challenges and Architecture
Olha Boiko, Vira Shendryk, Reza Malekian, Anton Komin, Paul Davidsson

5. Modelling Normative Financial Processes with Process Mining
Ilona Veitaitė, Audrius Lopata, Saulius Gudas

ICIST 2023

FRIDAY, OCTOBER 13th

09.30 – 10.00   **REGISTRATION**
KTU Campus Library

10.00 – 11.00   **KEY NOTE**
Chief Scientist at the Institute for Future Intelligence
Dr. *Charles Xie*
Using Generative AI to Create Adaptive
Feedback in Engineering Design

11.00 – 11.30

11.30 – 12.45   **SESSION 4** | *KTU Campus Library*

Special Session on **Language Technologies and Smart**
e-Learning Applications
Chaired by Prof. *Jurgita Kapočiūtė-Dzikienė*

1. Sentiment Analysis of Lithuanian Youth Subcultures
Zines Using Automatic Machine Translation
Vytautas Rudžionis, Egidija Ramanauskaitė,
Aušra Kairaitytė-Užupė

2. Chatbots Scenarios for Education
Sirje Virkus, Henrique Sao Mamede, Vitor Jorge Ramos Rocio,
Jochen Dickel, Olga Zubikova, Evaldas Vaiciukynas,
Lina Ceponiene, Daina Gudoniene

3. Understanding User Perspectives on an Educational
Game for Civic and Social Inclusion
Edgaras Dambrauskas, Daina Gudonienė,
Alicia García-Holgado, Francisco José García-Peñalvo,
Elisavet Kiourti, Peter Fruhmann, Maria Kyriakidou

4. Using Quantum Natural Language Processing for
Sentiment Classification and Next-Word Prediction in
Sentences Without Fixed Syntactic Structure
David Peral-García, Juan Cruz-Benito,
Francisco José García-Peñalvo

5. ViLLE Learning Analytics, a New Way to Teach Computational Thinking
Marika Parviainen

12.45 – 14.00

14.00 – 15.00   **SESSION 5** | *KTU Campus Library*

INFORMATION TECHNOLOGY APPLICATIONS
Special Session on **AI-Based IT Solutions (Part 1)**
Chaired by Dr. **Martyna Kobielnik**

1. Analyzing the Impact of Principal Component Analysis on k-Nearest Neighbors and Naive Bayes Classification Algorithms
Rafał Macióńczyk, Michał Moryc, Patryk Buchtyar

2. Comparison of kNN Classifier and Simple Neural Network in Handwritten Digit Recognition Using MNIST Database
Kuba Małecki, Wiktoria Koman

3. Comparison of Support Vector Machine, Naive Bayes and K-Nearest Neighbors algorithms for classifying heart disease
Konrad Kisiała, Bartosz Lewandowicz

4. Iterative method of adjusting parameters in knn via Minkowski metric
Emilia Pawela, Wojciech Olech

15.00 – 15.30

15.30 – 16.30   **SESSION 6** | *KTU Campus Library*

INFORMATION TECHNOLOGY APPLICATIONS
Special Session on **AI-Based IT Solutions (Part 2)**
Chaired by Dr. **Martyna Kobielnik**

1. Predicting diabetes risk in correlation with cigarette smoking
Julia Jędrzejczyk, Bartołomiej Maliniecki, Anna Woźnicka

2. Soft inference as a voting mechanism in k-nearest neighbors clustering algorithm
Aleksandra Kacprzak, Tomasz Bury, Piotr Żerdziński

3. The BLDC Motor Efficiency Improvement by Electronical Correction of the Power States Indications
Andrzej Sikora, Martyna Kobielnik, Adam Zielonka

4. The impact of entropy weighting technique on MCDM-based rankings on patients using ambiguous medical data
Antoni Jaszcz

16.30 – 16.45   **BEST PAPER AWARDS AND CLOSING THE CONFERENCE** | *KTU Campus Library*
Awarded by Prof. Dr. *Audrius Lopata*

16.45 – 18.00   *Fourchette*

SATURDAY, OCTOBER 14th

09.00 – 09.30   **REGISTRATION**
KTU Campus Library

09.30 – 16.30   **CLOSED SESSION**

*Special Session on **AI Technologies in Education***
Chaired by Assoc. Prof. ***Daina Gudonienė***
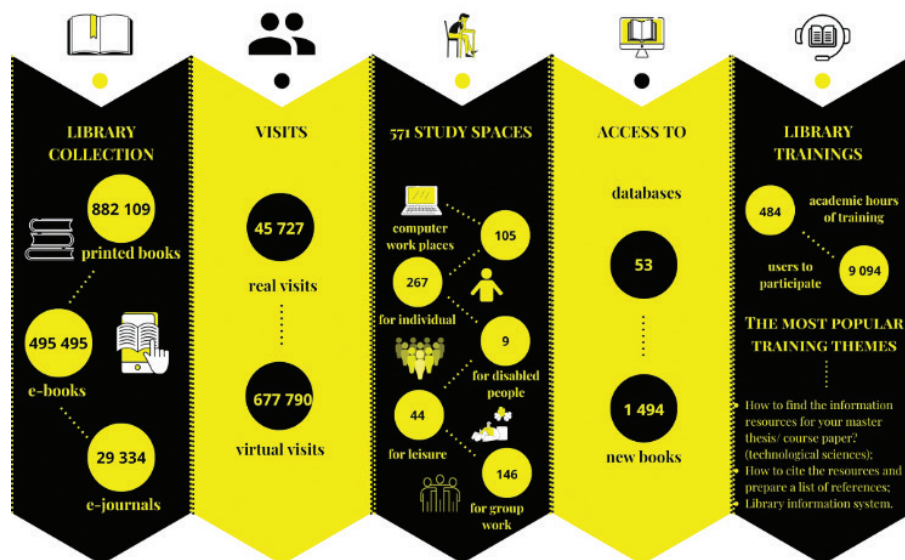
CONFERENCE VENUE

The Library of Kaunas University of Technology is one of the largest libraries in Lithuania; it stores and constantly replenishes one of the richest collections of printed books and periodicals on engineering, technology and sciences in Lithuanian and other languages. The Library also provides access to vast e-resources.

The Library's mission is to provide efficient services meeting the needs of current and future subjects of learning and research by ensuring access to the resources stored at the Library and the global information resources available online.

The Library's vision: a state-of-the-art science and study information resource hub that integrates physical and virtual spaces, creating the favourable environment for study and research, providing services and access to the necessary information resources.

LIBRARY COLLECTION

882 109
printed books

495 495
e-books

29 334
e-journals

VISITS

45 727
real visits

677 790
virtual visits

571 STUDY SPACES

computer work places
105

267
for individual

9
for disabled people

44
for leisure

146
for group work

ACCESS TO

databases

53

1 494
new books

LIBRARY TRAININGS

484
academic hours of training

9 094
users to participate

THE MOST POPULAR TRAINING THEMES

How to find the information resources for your master thesis/ course paper? (technological sciences);
How to cite the resources and prepare a list of references;
Library information system.

ABOUT KAUNAS

Kaunas, second-largest Lithuania's city, which keeps the authentic spirit of the country's national character alive. The city is located at the confluence of the two largest Lithuanian rivers, surrounded by the hills and situated at the crossroads of the most important roads in Lithuania. Due to its geographical position, today, Kaunas is Lithuania's most important center of communication.

It is a home of a variety of festivals & events, from operettas to modern dance, from classical music to Jazz. Kaunas was chosen as the European Capital of Culture 2022. And as a Capital of Culture 2022, Kaunas is changing: from the TEMPORARY CAPITAL to CONTEMPORARY. The city is famous for its Interwar architecture which was awarded the European Heritage Label and is on its way to UNESCO. Kaunas is the only city in the world where so much of the style of the buildings has survived to the present day. Kaunas is a colorful city, famous for its street art, with probably the only square in the world that you can't get into - George Maciunas square, inspired by FLUXUS movement.

Discover Kaunas as a great place for meetings, experience the city's unique ambience and get introduced to a number of modern conference facilities and quality services, along with exciting leisure activities. The unique atmosphere of Kaunas can be explored, which is distinguished by the
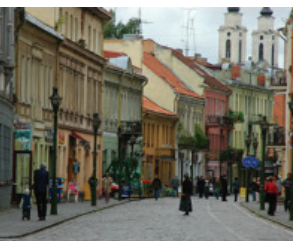
heritage of the painter and composer M. K. Čiurlionis. Kaunas is not only a city of old traditions but also a large centre of business and industry. It can also lay claim to being a city of young people with over 35,000 students (the largest number in Lithuania) studying at one of the seven universities here. For business and investors, our city offers a friendly, open, and creative space for partnerships and cooperation.

Green streets, tree-lined avenues and wide–open squares create surroundings to match everybody's moods. Kaunas is proud of its great number of museums, theatres, universities, colleges, fine hotels, restaurants, cafes and bars. Guests can try a range of cuisine from many European and Asian countries as well as an abundance of traditional Lithuanian food, drink and hospitality.

For more information about Kaunas please visit
https://visit.kaunas.lt/en/

ABOUT KAUNAS UNIVERSITY OF TECHNOLOGY

Kaunas University of Technology, with its eight faculties, a branch in Panevėžys, high school (gymnasium), progymnasium and nine research centres, is the second-largest university in Lithuania. About 80% of Lithuania's industrial engineers have graduated from KTU. In 1990, KPI was restructured and brought into line with most Western universities.

Under Parliamentary decision, it was then granted its present university status and name. Now, Kaunas University of Technology is the largest technical university in Lithuania. More information about Kaunas University of Technology can be found at *http://ktu.edu*
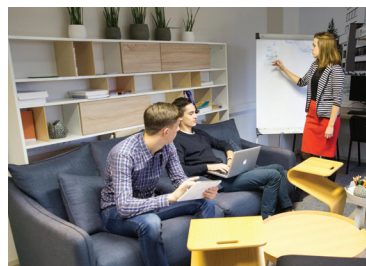
FACULTY OF INFORMATICS

The Faculty of Informatics of Kaunas University of Technology was established in 1977. The faculty currently consists of five departments:

Department of Multimedia Engineering,
Department of Information Systems,
Department of Computer Science,
Department of Software Engineering,
Department of Applied Informatics,

and two research centres:

Centre of Real Time Computer Systems,
*Centre of Information Systems Design Technology.*

The faculty offers the choice of Informatics, Informatics Engineering, Multimedia Technologies, Information Systems, and Software Systems Bachelor degree programmes. Those pursuing a Master's degree can choose accordingly from five study programmes:

> *Informatics,*
> *Information and Information Technology Security,*
> *Information Systems Engineering,*
> *Information Technologies of Distance Education,*
> *Software Engineering.*

Graduates of master's degree studies can pursue the academic career by choosing Informatics or Informatics Engineering doctoral studies.
Each year the Faculty of Informatics accepts around 500 new students seeking Bachelor's or Master's degree, respectively.
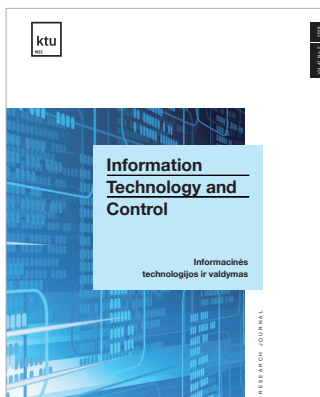
The Faculty also publishes a scientific journal,

INFORMATION TECHNOLOGY AND CONTROL

(indexed by Clarivate Analytics)
www.itc.ktu.lt
itc@ktu.lt

USEFUL INFORMATION

Lithuanian Time
Lithuania is located in the Eastern
European Time Zone, GMT+2.

Currency Euro (€).

Useful Phone Numbers
Emergency call: 112
Information: 118

Kaunas Airport
Information: (+370 6) 12 44442

Kaunas Bus Station
Information: (+370 37) 40 90 60

Kaunas Railway Station
Information: (+370 5) 269 3636

Taxi in Kaunas