Program of
The 34th Conference of Open Innovations Association FRUCT

Riga, Latvia
15-17 November 2023

RIGA TECHNICAL UNIVERSITY

IEEE

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Practical Information

The FRUCT34 conference is held in a hybrid mode. The first day (November 15, 2023) is reserved for onsite presentations. The second and the third days (November 16-17, 2023) are reserved for online sessions. Correspondingly the conference processes are adapted to best fit on site and online participation correspondingly. For the onsite day we are going to use the traditional format of presentations at **Radisson Blu Latvija Conference & Spa Hotel, Riga; address: Elizabetes Street 55, Riga, LV-1010, Latvia / Online participation.** In addition the sessions will be broadcasted online.

For the online part of the conference, all presentations are pre-recorded by the authors and uploaded to Youtube. The conference program contains links to individual presentations and playlists of all talks for each session. All conference sessions consist of two modules:

1) **Self-watching of the presentations on Youtube**. You are welcome to use the advantages of online participation and freely manage your time. You can ask questions in the comments of the videos. Please subscribe to the FRUCT youtube channel as it will help us to organize video streaming in the future.

2) **Please join the Questions and Answers (Q&A) in MS Teams**. You can use MS Teams either locally installed or web version. Please use the corresponding Teams links. Please use your real name at the registration and we will immediately approve the request to connect. Please, make sure to mute your microphone. If you have any questions, please click on a button with the hand (Raise hand button), so the chairman can easily manage the session. We recommend joining a Teams session in audio mode (without video). Please prepare your questions/comments to the authors and use this time to discuss the presented works.

The conference time is UTC+2, which corresponding to Latvia time zones. The MS Teams links are published in the conference program. You are welcome to watch video presentations in advance. Please note that all online presentations will be available online starting from Monday, May 22, 2023. If you have any further questions don't hesitate to email us at info@fruct.org.

Authors of the selected conference papers get an invitation to publish an extended version of the paper in our partner journals. If you are interested in this opportunity, please express it clearly to the chair of your session. The list of partner journals is as follows:

Authors of the best papers of FRUCT conference can get invitation to publish extended version of the paper in the International Journal of Embedded and Real-Time Communication Systems (IJERTCS) (ISSN 1947-3176, **Scopus** indexing, etc.)

Authors of the best papers of FRUCT conference can get invitation to publish extended version of the paper in the Inventions Journal (Scopus, WoS, CiteScore 5.2, rank'21: 47/300, Q1) with **30% discount**.

The proceedings of 34th FRUCT conference are available online:
Issue 1: https://fruct.org/publications/fruct34/
Issue 2: https://fruct.org/publications/acm34/

General Facts and Statistics for the 34th FRUCT Conference:

Total submissions: **68**	Accepted Full Papers: **22**	Acceptance rate: **32%**
Total authors: **108**	representing **20** countries	

Organization Committee of the 34th FRUCT conference

Local Chair: Nadezda Kunicina   *Publishing team leader:* Tatiana Shatalova
FRUCT President: Sergey Balandin

Program Committee

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Rajeev Kanth	Michele Pagano	Lenis Wong
Alexey Kashevnik	Ilya Paramonov	Hao Yu
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Alexandr Klimchik	Edison Pignaton de Freitas	John Zhang
Olga Kolesnichenko	Lidia Pivovarova	Yunpeng Zhang

Program of the 34th FRUCT conference
November 15-17, 2023, Riga, Latvia

Radisson Blu Latvija Conference & Spa Hotel
Address: Elizabetes Street 55, Riga, LV-1010, Latvia / Online participation
NOTE: Conference time is Latvia time (UTC+2) as conference is held in Riga, Latvia

DATE	TIME	PROGRAM
15.11.23	10:30-11:00	**Onsite registration to the 34th FRUCT conference & Welcome coffee**
	11:00-12:15	**Opening of the 34th FRUCT conference**
	12:15-13:00	**Keynote talk:** Continuous Integration in a Big Multiproduct Project: How to Survive in the Clouds, Tools and Very Long Tests Mess, by Timofey Turenko, MariaDB, Finland
	13:00-14:00	**Lunch**
	14:00-16:00	Onsite session: Innovative Applications
	16:00-16:30	**Coffee break**
	16:30-17:30	Onsite session: 7th DataWorld workshop I
	17:30-18:00	**Break**
	18:00-20:00	**Dinner**
16.11.23	10:00-11:00	**Keynote talk:** Beyond Exact Matches: The Power of Fuzzy Searching in Structured Data, by Ondřej Rozinek, Czech Technical University
	11:00-12:00	Online session: 7th DataWorld workshop II
	12:00-13:00	**Break**
	13:00-14:00	Online session: AI-enabled Applications
	14:00-14:10	**Break**
	14:10-15:30	Online session: Natural Language Processing
	15:30-16:00	**Break**
	16:00-17:20	Online session: Computer Vision, Image and Video Processing
	17:20-17:30	**Break**
	17:30-18:30	Online session: **Demos & Posters**
17.11.23	10:00-11:00	Online session: Network Applications
	11:00-11:10	**Break**
	11:10-12:30	Online session: Algorithms and Modeling
	12:30-13:30	**Break**
	13:30-14:30	Online session: Healthcare and Wellbeing
	14:30-14:45	**Official closing of the 34th FRUCT conference**

MS Teams links:

November 15, 2023 (Wednesday): https://teams.microsoft.com/l/meetup-join/19%3ameeting_NGRkYzgwMDctM2RjYy00MTA4LWI0YTItNTljMGJlZWViYTll%40thread.v2/0?context=%7b%22Tid%22%3a%228324ff4b-14c8-4bf5-b07e-a0713179f37e%22%2c%22Oid%22%3a%224d479202-a42c-46e9-b2f3-e8b1c1583ae9%22%7d

November 16, 2023 (Thursday): https://teams.microsoft.com/l/meetup-join/19%3ameeting_NzA5ZTBkZjgtMDE3Zi00YTBmLTg0YWEtMjRlZDM1MTdhMzhk%40thread.v2/0?context=%7b%22Tid%22%3a%228324ff4b-14c8-4bf5-b07e-a0713179f37e%22%2c%22Oid%22%3a%224d479202-a42c-46e9-b2f3-e8b1c1583ae9%22%7d

November 17, 2023 (Friday): https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZDBjODcwNWYtZWZlNi00OTcwLWI4OWEtOWViMTBlMGMxYTBk%40thread.v2/0?context=%7b%22Tid%22%3a%228324ff4b-14c8-4bf5-b07e-a0713179f37e%22%2c%22Oid%22%3a%224d479202-a42c-46e9-b2f3-e8b1c1583ae9%22%7d

Program of the 34th FRUCT conference

November 15 (Wednesday), Radisson Blu Latvija Conference & Spa Hotel
Address: Elizabetes Street 55, Riga, LV-1010, Latvia / Online participation
NOTE: Conference time is Latvia time (UTC+2) as conference is held in Riga, Latvia

10:30	30m	**Onsite registration to the 34th FRUCT conference and Welcome coffee**
Onsite Session: Opening and Plenary session of the 34th FRUCT conference		Chairman: Sergey Balandin
11:00	15m	Welcome words of behalf of FRUCT Association and practical information, by Sergey Balandin, Finland
11:15	45m	**Addressing by the IEEE ComSoc Latvia**, by Arturs Aboltins, Latvia
12:00	15m	**Addressing by the local organizing team**, by Nadezda Kunicina, Latvia
12:15	45m	**Keynote talk**: Continuous integration in a big multiproduct project: how to survive in the clouds, tools and very long tests mess, by Timofey Turenko, MariaDB, Finland
13:00	1h	**Lunch**
Onsite Session: Innovative Applications		Chairman: Timofey Turenko
14:00	20m	Image Processing Model to Estimate Nutritional Values in Raw and Cooked Vegetables, by Tan Jo Yen (Nielseniq), Sivakumar Vengusamy (Asia Pacific University of Technology and Innovation), Fabio Caraffini (Swansea University), Stefan Kuhn (Tartu University), Simon Colreavy-Donnelly (University of Limerick)
14:20	20m	Human Operator Gaze Movement Characteristics Analysis for Fatigue Detection, by Alexandr Bulygin (SPC RAS), Alexey Kashevnik (SPIIRAS)
14:40	20m	Enhancing IoT Products Through Integrated AI Capabilities: Enabling Seamless AIoT Implementation, by Kerem Aytaç (Priva, Marmara University), Ömer Korçak (Marmara University)
15:00	20m	Dark Activity Detection in AIS-Based Maritime Networks, by Bekir Nazmi Görkem, Burak Çağlayan, Erkam Karaca, Candar Karabulut, Ömer Korçak (Marmara University)
15:20	20m	A Practical Guide to Green Computing for Manufacturers, Businesses, and Individuals, by Athanasios Kiourtis, Argyro Mavrogiorgou, Georgios Makridis, Chrysostomos Symvoulidis, Konstantinos Mavrogiorgos, Dimosthenis Kyriazis (University of Piraeus)
15:40	20m	A Look at Federated Learning Applications in Healthcare, by Qiuxian Chen, Tao Yizheng (Institute of Computer Application, China Academy of Engineering Physics)
16:00	30m	**Coffee break**
Onsite Session: 7th DataWorld workshop I		Chairman: Michal Kvet
16:30	20m	Analytical Tool for the University Data Management, by Michal Kvet, Ivan Pastierik (Zilinska Univerzita v Ziline)
16:50	20m	Towards Automating Database Designing, by Heli Helskyaho ("Miracle Technologies, Finland")
17:10	20m	Enhanced Data Locking to Serve ACID Transaction Properties in the Oracle Database, by Michal Kvet (Zilinska Univerzita v Ziline)
17:30	20m	Machine Learning - Could it Help in the RIGVIR Case?, by Manfred Sneps-Sneppe (AbavaNet), Dmitry Namiot (Lomonosov Moscow State University)
18:00	1.5h	**Dinner**

November 16 (Thursday), Online participation
NOTE: Conference time is Latvia time (UTC+2) as conference is held in Riga, Latvia

10:00	1h	Keynote talk: Beyond Exact Matches: The Power of Fuzzy Searching in Structured Data (**Q&A session**), by Ondřej Rozinek, Czech Technical University
11:00		**Online Session:** 7th DataWorld workshop II Chairman: Michal Kvet Playlist: https://www.youtube.com/watch?v=h8gHeaYM13s&list=PLKlZJpq1JqdOadZivatRA3fh7NSyZVdwq
11:00	40m	A Novel Approach to Regression: Exploring the Similarity Space with Ordinary Least Squares on Database Records, by Ondřej Rozinek, Monika Borkovcova (University of Pardubice)

		[Design of Data Access Architecture Using ORM Framework](#), by Filip Majerík, Monika Borkovcova (University of Pardubice) [Enhancing Minerals Prospects Mapping with Machine Learning: Addressing Imbalanced Geophysical Datasets and Data Visualization Approaches](#), by Dipak Kumar Nidhi, Iiro Seppä, Fahimeh Farahnakian, Luca Zelioli, Jukka Heikkonen (University of Turku), Rajeev Kanth (Savonia University of Applied Sciences)
11:40	20m	**Q&A for the 7th DataWorld workshop II session**
12:00	1h	**Break**
13:00		**Online Session:** [AI-enabled Applications](#) Chairman: Nikolay Shilov Playlist: [https://www.youtube.com/watch?v=dSfBBvMbDA0&list=PLKlZJpq1JqdPx6d2lF-NIkb2Ivn1g_pAI](#)
13:00	50m	[RevelioNN: Retrospective Extraction of Visual and Logical Insights for Ontology-based Interpretation of Neural Networks](#), by Anton Agafonov, Andrew Ponomarev (SPC RAS) [On Audit and Certification of Machine Learning Systems](#), by Dmitry Namiot (Lomonosov Moscow State University), Manfred Sneps-Sneppe (AbavaNet) [Intelligent Service for Hybrid Analysis of Continuous Mental Processes Based on EEG and Video Data](#), by Alexey Kashevnik (SPIIRAS), Eduard Glekler (SPC RAS), Andrey Stankevich, Marina Stradina (ITMO University)
13:50	30m	**Q&A for AI-enabled applications session**
14:20	10m	**Break**
14:30		**Online Session:** [Natural Language Processing](#) Chairman: Lidia Pivovarova Playlist: [https://www.youtube.com/watch?v=MB39QkwuDwg&list=PLKlZJpq1JqdNhbv0Qkx4FOolaX3jGVg7E](#)
14:30	50m	[Client-Service Communication: Speech Patterns and Scenarios (based on the Materials of the "One Day of Speech" Corpus)](#), by Irina Petrova (Saint-Petersburg State University) [Handwritten Paragraph Recognition using Spatial Information on Russian Notebooks Dataset](#), by Samah-Mohammed (ITMO University), Nikolay Teslya (SPC RAS) [Neutralization of Evaluative Expressions Based on Dictionary Data and Distributional Models](#), by Olga Mitrofanova, Veronica Vybornaya (Saint Petersburg State University) [Lexical and Grammatical Features of Russian-Language Tweets in Comparison with Everyday Spoken Russian](#), by Margarita Kirina, Asia Karysheva (National Research University Higher School of Economics)
15:20	30m	**Q&A for Natural Language Processing session**
15:50	10m	**Break**
16:00		**Online Session:** [Computer Vision, Image and Video Processing](#) Chairman: Nikolay Teslya Playlist: [https://www.youtube.com/watch?v=uBV2NotfHbY&list=PLKlZJpq1JqdNUCaYQL-Z7ZhD_j8ndc2MO](#)
16:00	50m	[Improving Brain MRI Image Segmentation Quality: A Hybrid Technique for Intensity Inhomogeneity Correction](#), by Samah Ahmed Abdel Aziz, Ammar Hawbani, Xing-Fu Wang (University of Science and Technology of China), Abdelrahman Samy (Zagazig University), Talaat Abdelhamid (Menoufia University), Ismail Maolood (Ministry of Higher Education and Scientific Research), Saeed Hamood Alsamhi (University of Galway) [Intelligent Machine Vision Implementation for Production Quality Control](#), by Anton Ivaschenko (Samara State Medical University), Vladimir Avsievich (SEC "Open code"), Pavel Sitnikov (ITMO University) [Concept for Anonymous Re-Identification](#), by Robert Kathrein, Oliver Zeilerbauer, Johannes Larcher, Mario Döller (University of Applied Sciences Kufstein) [Video Surveillance for Dangerous Situations in Public Spaces](#), by Nikita Bazhenov, Egor Rybin, Dmitry Korzun (Petrozavodsk State University)
16:50	30m	**Q&A for Computer Vision, Image and Video Processing session**
17:20	10m	**Break**
17:30	1h	**Online Session: Demo & Poster Session,** Playlist: [https://www.youtube.com/watch?v=XFfPY14r7SU&list=PLKlZJpq1JqdNpHB_K9q8eZ-Ofghi491fl](#)
18:30		**Closing of the Day**

November 17 (Friday), Online participation
NOTE: Conference time is Latvia time (UTC+2) as conference is held in Riga, Latvia

10:00		**Online Session:** Network Applications Chairman: Alexey Kashevnik Playlist: https://www.youtube.com/watch?v=knGoPEwiEFs&list=PLKlZJpq1JqdMjUIN293hfT8wORUc3XsZA
10:00	40m	Reinforcement Learning with UAV Assistance for Optimized Computation Offloading in Mobile Edge Computing, by Aisha Alabsi, Ammar Hawbani, Xing-Fu Wang (University of Science and Technology of China), Saeed Hamood Alsamhi (University of Galway), Liang Zhao (Shenyang Aerospace University), Ahmed Al-Dubai (Edinburgh Napier University) A Study of Throughput for USSD Services over IMS, by Thierr Kondengar, Boudal Niang (ESMT) A Metamodel for Web Application Security Evaluation, by Shao-Fang Wen (Norwegian University of Science and Technology)
10:40	20m	**Q&A for Network Applications session**
11:00	10m	**Break**
11:10		**Online Session:** Algorithms and Modeling Chairman: Dmitry Korzun Playlist: https://www.youtube.com/watch?v=7jmFlELoD9M&list=PLKlZJpq1JqdNZd8UY9LMAbbzsRIuu-5rl
11:10	50m	Innovative Solar Photovoltaic Solutions for Water-Efficient Irrigation: A Comprehensive Algorithmic Approach, by Ahmed Ragab (Benha University) On Analysis of Puzzle-Based Warehouse Systems using Modular Petri Nets, by Kasuni V Weerasinghe, Andrei Lobov, Fabio Sgarbossa, Lars Tingelstad (Norwegian University of Science and Technology) Rethinking the Solow Paradox by the Means of Information Use Formalisms, by Alexander Geyda (SPC RAS) Increasing the Accuracy of Signal Formation by Changing the Sampling Rate, by Oleg Popov, Tatiana Chernysheva, Valentin Abramov, Andrey Borisov; Kirill Orlov (MTUCI)
12:00	30m	**Q&A for Algorithms and Modeling session**
12:30	1h	**Break**
13:30		**Online Session:** Healthcare and Wellbeing Chairman: Kirankumari Patil Playlist: https://www.youtube.com/watch?v=qUsCkiybXUA&list=PLKlZJpq1JqdO7roNX05bAm5_zvpsQO__z
13:30	40m	A Concept Model of mHealth Sensorics for Digital Assistance of Human Cognitive Resilience, by Alexander Meigal, Liudmila Gerasimova-Meigal, Dmitry Korzun (Petrozavodsk State University) Design and Testing of LEDSOL Components for Sustainable Access to Clean Water in Africa, by Elena S. Lohan, Xiaolong Zhang (Tampere University), Tomkouani Kodom (University of Lome), Oana Cramariuc, Irina Mocanu (CITST), Iulian Nastac (University Politehnica of Bucharest), Hafida Lebik (UDES), Rafik Elhadi (CRAPC) Modeling of Production and Elimination of Hydrogen and Methane in the Human Body, by Nikita Fadeev (Bauman Moscow State Technical University), Oleg Medvedev (Moscow State University), Sergey Schookin (Bauman Moscow State Technical University)
14:10	20m	**Q&A for the Healthcare and Wellbeing session**
14:30	15m	**Official closing of the 34th FRUCT conference**

Thank you and looking forward to see you at the 35th FRUCT in Tampere, Finland on April 24-26, 2024!
(Note that the 35th FRUCT conference allows online participation)

PROCSI - Promoting Cyber Security for Critical Infrastructures Network Meeting, funded by Nordplus Higher Education 2022

In co-location with the 34th FRUCT conference we organize a meeting of the newly established network **PROCSI – Promoting Cyber Security for Critical Infrastructures**, funded by Nordplus Higher Education 2022 (project number **NPHE-2022/10105**). The PROCSI network is led by UiT the Arctic University of Norway and it will contribute to the education of a new generation of engineers in the Nordic and Baltic regions with high-level competence in digitalization through sharing expertise in cyber-physical systems, power engineering, and informational technology.

Critical infrastructure is the body of systems and networks that are so essential that their continued operation is required to ensure the security of a given nation, its economy, and the public's health and safety. Critical infrastructures span various sectors, from supply chains and manufacturing systems to power systems. IoT and sensor technologies, Advanced Manufacturing, Big Data, and AI increase automating, interconnecting, and optimizing a wide range of technological processes. This innovation cannot continue accelerating without the development of cybersecurity technology.

The PROCSI network consists of institutions having core competencies in educating professionals in the most rapidly developing areas: intelligent manufacturing and logistics, power engineering, and informational technology. The partners are:

- ArcLog – Technological Competence Center for Arctic Logistics Operations, established at the Department of Industrial Engineering, UiT Narvik,
- Institute of Industrial Electronics and Electrical Engineering, and Department of Modelling and Simulation, Riga Technical University, Latvia,
- Faculty of Information Technology and Communication Sciences, Tampere University, Finland.

The PROCSI network event consists of several meetings and presentations of educational and research priorities of the network members. The main focus of this event is on Riga Technical University. In addition to the presentations, demos and cooperation brainstorms, the event program includes topical seminars. The event program consists of the project meeting to summarize the main finding and achievements of the project, plan future activities in the follow-up projects, and life participation in three days program of the FRUCT conference, technically sponsored by IEEE.

Demos/Posters Session of the 34th FRUCT Conference

Playlist: https://www.youtube.com/watch?v=XFfPY14r7SU&list=PLKlZJpq1JqdNpHB_K9q8eZ-Ofghi491fl
Link to the Online Q&A session: https://teams.microsoft.com/l/meetup-join/19%3ameeting_
NzA5ZTBkZjgtMDE3Zi00YTBmLTg0YWEtMjRlZDM1MTdhMzhk%40thread.v2/0?context=%7b%22Tid%22%3a%22832
4ff4b-14c8-4bf5-b07e-a0713179f37e%22%2c%22Oid%22%3a%224d479202-a42c-46e9-b2f3-e8b1c1583ae9%22%7d

The first part of the Demos/Posters section is a promotional section to present/introduce demo projects to the public. Presentations will be done as 2 minutes videos on Youtube in the Pecha Kucha style. The second part of the session will be held in form of open discussion held by MS Teams teleconference.

All conference participants are warmly welcome to take part in voting for the best demo/poster of the 34th FRUCT conference by giving your "Like" for the demos you like the most. One person can vote for as many demos as he/she liked. If you have some special requirements please contact organizing committee by email info@fruct.org.

Pecha Kucha Presentation Format
Pecha Kucha is a presentation technique where a speaker shows a definite number of slides (usually 20 or 15), each for 20 seconds. The slides are changed automatically. The main intention for Pecha Kucha presentation style is to prevent participants from being too verbose and to make their talks more dynamic and impressive.
Pecha Kucha Night is an event where each speaker uses Pecha Kucha presentation, and speakers change each other in non-stop fashion. Initially invented by architects, this kind of event is often used to present creative projects or work; nowadays it is also used for R&D talks too. Pecha Kucha Night format allows all participants to make announcements about their demos in attractive and time-efficient way. That is why we have chosen this format for demo promotion section at FRUCT conference. More information can be found at http://www.fruct.org/demo34.

How to prepare Pecha Kucha presentation
Here is an instruction on how to prepare your Pecha Kucha style presentation for Demo promotion section. Your presentation must contain exactly 6 slides, and each of them will be displayed for 20 seconds. The slides will be changed automatically. The presentation will take exactly 2 minutes (it should be noted that classical Pecha Kucha has 20 slides, but we have to reduce the number due to a large amount of submitted presentations). Provide the information about yourself and your presentation on the first slide (name, institution, title of your presentation).
The main purpose of your talk would be to interest people, so your presentation should make absolutely clear the main ideas of your project and explain what you plan to show at the demo stand. Make your presentation fascinating to attract attendees and avoid technical details in your talk. Reveal one main idea on each slide. Do not overload your slides with information. Remember, that each slide is displayed only for 20 seconds. Place no more than 2 lines of text per slide, or one big picture. Avoid using slide titles. Do not duplicate the same slides in your presentation — it is cheating! If you see that 20 seconds for a particular slide is not enough for you, try to decouple it into the two or more, or omit the details. Do not place "Thank you" or "Q&A" slides in the presentation. Pecha Kucha session does not imply any questions from the auditory. All the questions will be asked afterwards in a poster room. Prepare your speech thoroughly and beforehand. As you have only 20 seconds per slide, it is quite impossible to improvise during the talk. Rehearse your speech several times to be sure in the absence of pauses when you wait for the slide change, or accelerations when you fails to follow your slides. Try to speak in the same pace during all the presentation. It definitely depends on your text, so try to prepare near the same amount of text in speech for each slide.

Check list
- Use exactly 6 slides.
- Place information about yourself and your presentation (name, institution) on the first slide.
- Reveal one main idea on each slide.
- Place no more than 2 lines of text or 1 large image per slide.
- Do not duplicate the same slides, do not place "Thank you" or "Q&A" slides in the presentation.
- Do not use any slide change animation.
- Prepare your speech thoroughly and do not forget to rehearse it.

List of Demos/Posters

1. *Demo:* [Real-Time Assessing the Operation Quality of a Robotic Manipulator](#), by Grigorij Rego, Nikita Bazhenov, Dmitry Korzun, and Egor Rybin
   Abstract: Robotic manipulators are widely employed in various industries for automating repetitive tasks, including sorting objects from waste materials. Video-based assessment is a potential approach to evaluate the performance of such manipulators. In this study, we propose an algorithm for assessing the performance quality of a robotic manipulator using computer vision algorithms. The algorithm is accompanied by experimental results using a single video camera, which include successful, and unsuccessful object acquisitions, as well as object loss during transmission in real time.

2. *Demo:* [Real-Time Evaluation of Hands Position at Sport Training Machine](#), by Konstantin Smirnov, Vladislav Ermakov, Evgeniy Topchiy, and Dmitry Korzun
   Abstract: The digitalization of sport training machines enables sensor-based applications for recognition of human movement at exercise performing. In this demo, we continue our development of the mobile application that uses evaluation of athlete's hands position in real-time. We show more effective solution (in terms of the position accuracy) than we demonstrated at the previous FRUCT conferences. Our previous solution is based on an accelerometer as a sensor for input data. Our successor solution combines an accelerometer and a gyroscope based on Kalman filter. This combination reduces the influence of acceleration on evaluating the angle of the lever of sport training machine relative to the vertical axis (the ``Bench Press'' exercise is used as a demo use case). The accurate measurement of hands position supports estimation of the total distance passed by hands (with given weight). This metric is important for training as well as for new class of sport competitions.

3. *Demo:* [Digital Evaluation of Human Gait in Diagnostic Physical Exercises based on Virtual Reality](#), by Viktoria Kotok, Dmitry Murzaev, and Dmitry Korzun
   Abstract: Digitalized evaluation of human gait becomes a topical problem for mobile healthcare (mHealth) and well-being. We focus on the evaluation when a person is performing diagnostic physical exercises. Our presented demo is based on construction of a digital model for human movement when performing an exercise. The system observes human gait based on sensed data form Virtual Reality (VR) trackers on human body. The data are collected in a database and processed to construct a digital movement 3D model following our mathematical model of movement. The VR technology is used for visualization both when a person executes the given exercise and when constructing the resultant 3D model to analyze. The system includes an experimental stand that ensures the interconnection of the equipment used to make it possible to perform exercises in virtual space and organize the collection and processing of movement data. The system collects data from VR trackers in real time and stores the result in the database. Based on the collected data, numerical motion parameters are calculated and a digital motion model is formed. Using VR technology, a 3D model of movement is realized, which can be transferred to a doctor to analyze gait disorders.

4. *Demo:* [Sensor System of Mobile Robot for Ground Orientation, Terrain Mapping, and Obstacles Recognition](#), by Danila Kostin, Dmitry Melnikov, Danil Ustinov, Semyon Yaskelyanen, and Vladislav Ermakov
   Abstract: Movement of a mobile robot needs a sensor system to recognize the current state and surroundings of the robot in real-time. In this demo, we consider the case of a small 6-wheeled robot. Its sensor system employs the following sensors:
   1. Data from the inertial sensor (IMU 10dof with accelerometer, magnetometer, gyroscope) are processed to estimate orientation of the robot in space (Euler angles).
   2. Data from the 2D lidar sensor (Hokuyo URG-04-LX-UG01) are processed to estimate localization and to make obstacle mapping in parallel to the ground plane.
   3. Video data from the stereo camera (ZED 2) are processed to recognize obstacles (in addition to the 2D lidar).
   Our early experiment shows the possibilities of the robot to solve in real time the problems of ground orientation, terrain mapping, and obstacles recognition.

5. *Demo:* [Intelligent Service for Hybrid Analysis of Continuous Mental Processes Based on EEG and Video Data](#), by Eduard Glekler
   Abstract: In this work we present our developed service for analyzing the continuous mental processes of the human brain. The service is developed to support a specialist who is involved in electroencephalogram data analysis. The service allows implement a hybrid analysis of continuous processes using electroencephalogram and video recording data.

FOR NOTES

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The 34th Conference of Open Innovations Association FRUCT

Program

Riga, Latvia
15-17 November 2023

A special word of thanks goes to the

CALL FOR PARTICIPATION
The 35th Conference of Open Innovations Association FRUCT
Tampere, Finland, 24-26 April 2024

Overview

FRUCT conference is a high-quality scientific event for meeting academia and business people and setting projects. The average conference is attended by 150+ participants from academia and industry. The average **acceptance rate is below 40%**. Traditionally the conference attracts most active and talented students to present their R&D projects, meet interesting colleagues, create new teams, and find employers and investors. The conference invites the world-class academic and industrial experts to lecture on the hottest topics. We welcome submitting papers and take part in the conference, present your research results. The FRUCT conference **allows both onsite and online participation**.

The conference offers low registration fee. FRUCT doesn't offer deadline extension, but **we offer the Early-bird submission** with the additional review cycle. For further details please refer to http://www.fruct.org/cfp35.

List of conference topics

- ✓ Artificial Intelligence in Text Analysis and Generation
- ✓ Artificial Intelligence, Robotics and Automation
- ✓ Big Data, Knowledge Management, Data Mining Systems
- ✓ Cloud, Fog and Edge Computing and Engineering, HPC
- ✓ Coding Theory, DevOps and DevSecOps Technologies
- ✓ Commercialization of Technologies and Digital Economy
- ✓ Emerging Wireless Technologies, 5G and beyond
- ✓ Gamification, E-learning and Smart Data in Education
- ✓ Internet of Things: Apps and Enabling Technologies
- ✓ Location Based Services: Navigation, Logistics, Tourism
- ✓ Natural Language Processing and Speech Technologies
- ✓ Predictive Analytics, Probability and Statistics
- ✓ Wearable Electronics: Novel Architectures and Solutions
- ✓ Workshop: Investigating and Mitigating Climate Changes

- ✓ Algorithms and Modeling
- ✓ Artificial Intelligence Applications
- ✓ Audio Pattern Recognition, Semantic Audio
- ✓ Blockchain Technology and Applications
- ✓ Computer Vision, Image & Video Processing
- ✓ Crowdsourcing and Collective Intelligence
- ✓ e-Health and Wellbeing
- ✓ Intelligence, Social Mining and Web
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- ✓ Smart Systems and Embedded Networks
- ✓ Software Design, Innovative Applications
- ✓ Workshop: The DataWorld

Call for papers

Depending on the type and maturity level please submit your work into one of the following 3 categories:

1. **Full paper** (min 6 full pages, max 12 pages)   **OR**   2. **Short paper** (min 2 pages, max 6 pages)

Submission deadline: 1 March 2024   **Early-bird deadline: 2 February 2024**

Notification of acceptance: **25 March 2024**   Camera-ready deadline: **1 April 2024**

3. **Poster / Demo proposal:** submission deadline: **12 April 2024**

Publication

All submitted Full Papers will be peer reviewed by the technical committee. Accepted Full papers and extended abstracts are published in the proceeding of FRUCT conference (ISSN 2305-7254). The accepted Full Papers will be included to **IEEE Xplore (application is pending)** and **DOAJ,** indexed by **Scopus**, **ACM, Web of Science, RSCI (VAK list)**, **DBLP**, etc. The conference proceedings are included in **AMiner**, **CORE**, and **Scimago Journal Rank** (SJR) http://scimagojr.com/journalsearch.php?q=21100305223&tip=sid. The selected papers get invitations to publish extended versions of the papers in the partner journals, e.g., **IJERTCS**. FRUCT is **rated by many national systems**, e.g., **Finnish (JUFO=1**, ID: 72707**), Norwegian** (NSD=1), **Danish** (BFI=1, ID: 8782540).

Contacts

Paper templates, conference news and other relevant details are available at http://www.fruct.org/conference35. If you get some questions that are not covered at the conference web page, feel free to send email to info@fruct.org.