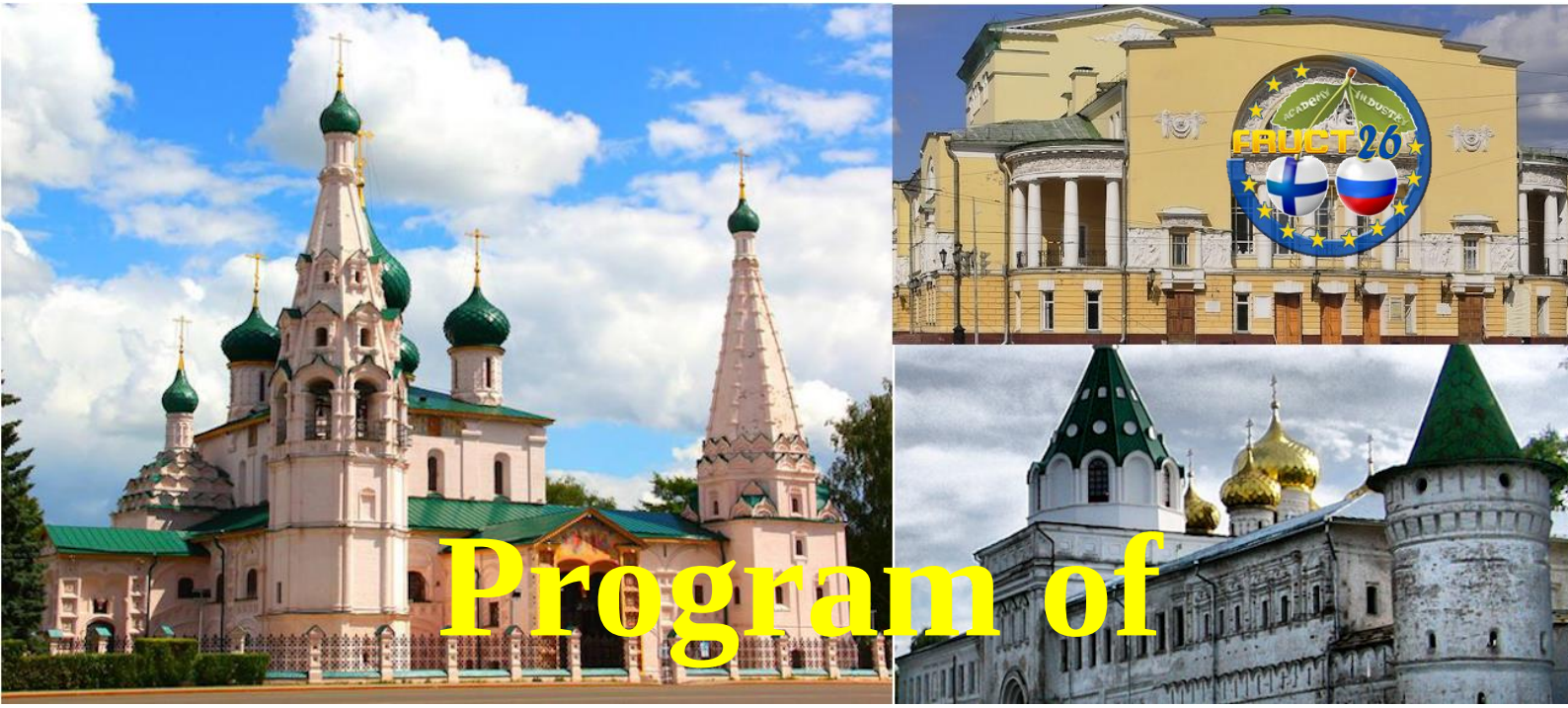

The 26th Conference of Open Innovations Association FRUCT

Yaroslavl, Russia
23-24 April 2020

IEEE

IEEE ComSoc
IEEE Communications Society

HIIT | HELSINKI INSTITUTE FOR INFORMATION TECHNOLOGY

future internet
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GAUDEAMUS IGITUR,
JUVENES DUM SUMUS!
POST JUCUNDAM JUVENTUTEM,
POST MOLESTAM SENECTUTEM
NOS HABEBIT HUMUS.

UBI SUNT, QUI ANTE NOS
IN MUNDO FUERE?
VADITE AD SUPEROS,
TRANSITE AD INFEROS,
UBI JAM FUERE.

VITA NOSTRA BREVIS EST,
BREVI FINIETUR,
VENIT MORS VELOCITER,
RAPIT NOS ATROCITER,
NEMINI PARCETUR.

VIVAT ACADEMIA,
VIVANT PROFESSORES!
VIVAT MEMBRUM QUODLIBET,
VIVANT MEMBRA QUAELIBET!
SEMPER SINT IN FLORE!

VIVANT OMNES VIRGINES
FACILES, FORMOSAE!
VIVANT ET MULIERES,
TENERAE, AMABILES,
BONAE, LABORIOSAE!

VIVAT ET RESPUBLICA,
ET QUI ILLAM REGIT!
VIVAT NOSTRA CIVITAS,
MAECENATUM CARITAS,
QUAE NOS HIC PROTEGIT

PEREAT TRISTITIA,
PEREANT DOLORES,
PEREAT DIABOLUS,
QUIVIS ANTIBURSCHIUS,
ATQUE IRRISORES!

Practical Information

Due to COVID-19 absolute majority of the 26th IEEE FRUCT conference participants selected distant participation option. Correspondingly all conference processes are adapted to best fit for online participation. All conference presentations are pre-recorded by the authors and uploaded to Youtube. The conference program contains links to individual presentations as well as links to plays lists to watch all presentations of a session. All conference sessions are split into 2 parts:

- Self-watching of the session presentations on Youtube. Let's take advantage of distant participation - you can invite colleagues to watch videos and the online session. I also ask you to ***subscribe to FRUCT youtube channel*** – we need to get 1000 subscribers to be allowed make video streaming in the future.
- Online questions and answers session held in Zoom. As some conference participants report issues with Internet connection quality we recommend to held Zoom session in Audio only mode (without video). Please prepare your questions/comments to the authors and use this time to discuss the presented works.

The conference program consists of two parallel tracks. Please note that each track uses its own Zoom call number, for simplicity in the program they are split as left and right tracks. The Q&A sessions of both tracks are scheduled without overlapping, so potentially anyone can take part in all Q&A sessions of the conference. For that you shall watch video presentations beforehand and don't forget to switch Zoom telco numbers when changing the sessions. Please note that all conference presentations (except for keynote talk and demos) will be available online starting on Monday April 20, 2020. In case of any further questions related to the conference organization don't hesitate email to us info@fruct.org.

Authors of the selected FRUCT conference papers will be invited to publish extended version of the paper in the 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:

An official publication of the Information Resources Management Association

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INTERNATIONAL JOURNAL OF **Embedded and Real-Time Communication Systems**

Authors of the best papers of FRUCT conference can get invitation to **FREE of charge** publish extended version of the paper in the International Journal of Embedded and Real-Time Communication Systems (IJERTCS) (ISSN 1947-3176, **Scopus** indexing, SJR quartile: **Q2**, etc.).

future internet

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Authors of the best papers of FRUCT conference can get invitation to publish extended version of the paper in the Future Internet journal (ISSN 1999-5903, Scopus indexing, etc.) with **20% discount**.

electronics

Authors of the best papers of FRUCT conference can get invitation to publish extended version of the paper in the special issue "Ambient Intelligence in IoT Environments" of Electronics (ISSN 2079-9292, **Q1&Q2 in SIR Ranking**). This special issue belongs to the section "Computer Science & Engineering".

The proceedings of 26th FRUCT conference are available online:
The Full Papers Volume: https://fruct.org/publications/fruct26/
ACM section Volume: https://fruct.org/publications/abstract26/

General Facts and Statistics for the 26th FRUCT Conference:

Total submissions: **134**	Accepted Full Papers: **62**	Acceptance rate: **46%**
Total authors: **308**	representing **18** countries	Registered participants: **112**

Organization Committee of the 26th FRUCT

Local Chair: Ilya Paramonov
FRUCT President: Sergey Balandin
Conference Secretary: Andrey Vasiliev
Publishing team leader: Tatiana Tyutina

Program Committee

Chair: Yevgeni Koucheryavy (Tampere University, Finland)

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Program of the 26th FRUCT conference
April 23-24, 2020, Yaroslavl, Russia

The Yaroslavl Demidov State University, Yaroslavl, Russia / Online participation by Youtube + Zoom

PLEASE NOTE: the conference time zone is Moscow time (GMT+3) as onsite conference is held in Yaroslavl, Russia

DATE	TIME	PROGRAM	
23.04.20	09:30-10:40	**Opening of the 26th FRUCT conference** **Keynote talk: Quo Vadis, Edge Computing?** by Jussi Kangasharju, University of Helsinki, Finland	
	10:40-12:00	Advances in Methods of Information and Communication Technology (AMICT) I	e-Health and Wellbeing
	12:00-12:25	Artificial Intelligence, Robotics and Automation Systems I	
	12:25-13:20		Location Based Services: Navigation, Logistics, e-Tourism
	13:20-13:45	**Break**	
	13:45-14:30	**Lunch break**	
	14:30-15:30	**Invited talk: Effect of Preprocessing on Using ANN and ANFIS**, by Mohamed A. Moustafa Hassan, Heliopolis University, Egypt	
	15:30-16:50	Artificial Intelligence, Robotics and Automation Systems II	Software Design and Innovative Applications
	16:50-17:15	Seminar on Intelligence, Social Media and Web (ISMW)	
	17:15-18:00		**Break**
	18:00-19:00	**Demos & Posters Session**	
24.04.20	09:30-10:40	Computer Vision, Image and Video Processing I	Natural Language Processing, Speech Technologies I
	10:40-11:00		Natural Language Processing, Speech Technologies II
	11:00-12:00	Computer Vision, Image and Video Processing II	
	12:00-12:20		Next Generation Networks and Emerging Wireless Technologies I
	12:20-13:20	Artificial Intelligence, Robotics and Automation Systems III	
	13:20-13:40		**Break**
	13:40-14:30	**Lunch break**	
	14:30-15:40	Planning and Controlling of Smart Manufacturing Systems (PCSMS20)	Next Generation Networks and Emerging Wireless Technologies II
	15:40-16:00		Advances in Methods of Information and Communication Technology (AMICT) II
	16:00-17:00	Internet of Things and Enabling Technologies	
	17:00-17:20		Smart Systems and Embedded Networks
	17:20-18:20	Big Data, Knowledge, Data Mining and Data Management	
	18:20-18:40		**Break**
	18:40-19:00	**Official closing of the 26th FRUCT conference**	

Program of the 26th FRUCT conference
April 23-24, 2020, Yaroslavl, Russia

April 23 (Thursday)
The Yaroslavl Demidov State University, Yaroslavl, Russia / Online participation by Youtube + Zoom
PLEASE NOTE: the conference time zone is Moscow time (GMT+3) as onsite conference is held in Yaroslavl, Russia

<table>
<tr><td colspan="4">Session: Plenary session of the 26th FRUCT conference Chairman: Sergey Balandin
Youtube:</td></tr>
<tr><td>09:30</td><td>15m</td><td colspan="2">Official opening of the 26th FRUCT conference, by Sergey Balandin
Please add your questions/comments as comments to the video and we will try to reply them ASAP</td></tr>
<tr><td>09:45</td><td>40m</td><td colspan="2">Video streaming of keynote talk: Quo Vadis, Edge Computing? by Jussi Kangasharju, University of Helsinki, Finland (please note that the link will be active ONLY during this 40 minutes, don’t miss it)</td></tr>
<tr><td>10:25</td><td>15m</td><td colspan="2">Keynote talk Q&A session with Jussi Kangasharju, Zoom 280-192-1973</td></tr>
<tr><td>10:40</td><td colspan="2">Session: Advances in Methods of Information and Communication Technology (AMICT) I
Chairman: Valtteri Niemi
Playlist:https://www.youtube.com/watch?v=4MFSlniULxI&list=PLKlZJpq1JqdNWXZDc2nym3AVhP8Oh4KRR</td><td>Session: e-Health and Wellbeing
Chairman: Johan Beun
Playlist:https://www.youtube.com/watch?v=2jMpQBd8-sc&list=PLKlZJpq1JqdPMAQjsNfuge0ZZpz6YV78s</td></tr>
<tr><td>10:40</td><td>1h</td><td>Asymptotic Analysis of N-Model With Static Priority, by Mariia Maltseva, Evsey Morozov
Regenerative Estimation of a Simultaneous Service Multiserver System With Speed Scaling, by Ruslana Nekrasova, Alexander Rumyantsev
Modeling the Elements of an Enterprise Infocommunication System Using Colored Petri Nets, by Alexey Sukonschikov, Dmitry Kochkin, Anatoly Shvetsov, Igor Andrianov, Arseny Sorokin, Svetlana Rzheutskaya
Stream Data Preprocessing: Outlier Detection Based on the Chebyshev Inequality With Applications, by Georgy Shevlyakov, Margarita Kan
Mathematical Models of Reliability, Performance and Cost of an All-Flash Storage, by Vadim Ponomarev, Evgeny Ivashko, Anton Shabaev, Eugene Pitukhin, Dmitry Kositsyn</td><td rowspan="2">Knowledge-Oriented System in the Development of Functional Nutrition, by Marina Nikitina, Irina Chernukha
Different Approaches for Automatic Nucleus Image Segmentation in Fluorescent in Situ Hybridization (FISH) Analysis for HER2 Status Assesment, by Denis Makhov, Andrey Samorodov, Elena Slavnova
Motivational and Personification Strategies for Human Activities in Everyday Life, by Alexey Kashevnik, Mikhail Kruglov, Nikita Saveliev, Vladimir Parfenov
Statistical Potential to Improve Antibody-Antigen Docking, by Alexander Sadovnikov, Timofei Ermak, Pavel Yakovlev
Feature Extraction Method From Electronic Health Records in Russia, by Alexander Gusev, Igor Korsakov, Roman Novitsky, Larisa Serova, Denis Gavrilov
Multiscale Optical PM2.5 Particles Recognition and Sorting System in Dust Probes, by Andrew Kokoulin, Rostislav Kokoulin
Parkinsons Disease Detection by Using Machine Learning Algorithms and Hand Movement Signal From LeapMotion Sensor, by Anastasia Moshkova, Andrey Samorodov, Natalia Voinova, Alexander Volkov, Ekaterina Ivanova, Ekaterina Fedotova</td></tr>
<tr><td>11:40</td><td>20m</td><td>Q&A in Zoom with authors of Advances in Methods of Information and Communication Technology (AMICT) I session, Zoom 974-238-2704</td></tr>
</table>

12:00	**Session:** Artificial Intelligence, Robotics and Automation Systems I Chairman: Alexey Kashevnik Playlist:https://www.youtube.com/watch?v=QdJHwovf1YQ&list=PLKlZJpq1JqdMPE1ONnGccfPNmECVmzdZy		Q&A in Zoom with authors of **e-Health and Wellbeing** session, Zoom 280-192-1973
12:00	25m	Calculation and Optimization of Industrial Robots Motion, by Lubov Ivanova, Zoia Meleshkova, Sergei Ivanov	
12:25	35m	A Hybrid Method for Constructing Optimal Motion Path for Robot Manipulators While Avoiding Obstacles, by Sergei Ivanov, Andrei Mikalauskas, Lubov Ivanova Detection of Inter Turn Short Circuit Faults in Induction Motor Using Artificial Neural Network, by Menshawy A. Mohamed, Essam Mohamed, Al-Attar A. Mohamed, Mohamed M. Abdel-Nasser, Mohamed A. Moustafa Hassan Diagnosis of Rotating Machines Faults Using Artificial Intelligence Based on Preprocessing for Input Data, by Mostafa Metwally, Mohamed A. Moustafa Hassan, Galal A. Hassaan Vibration Protection of the Robotic Arm From External Effects on the Base, by Zoia Meleshkova, Lubov Ivanova, Sergei Ivanov, Tatiana Zudilova, Tatiana Voitiuk	**Session:** Location Based Services: Navigation, Logistics, e-Tourism Chairman: Nikolay Teslya Playlist:https://www.youtube.com/watch?v=H9C4MS_nKKw&list=PLKlZJpq1JqdNtTJ5YdTpR84uCFXQcHsiJ Models for Tourist Behavior Analysis Based on Neural Network, by Sergei Mikhailov Human-Computer Threats Classification in Intelligent Transportation Systems, by Alexey Kashevnik, Andrew Ponomarev Multi-Layer Data Model for Transportation Logistics Solutions, by Anton Ivaschenko, Sergey Maslennikov, Anastasia Stolbova, Oleg Golovnin Imputation Model of the Link Travel Speed Data for Incident Detection System, by Yong-Kul Ki, Yong-Ho Kim, Yong-Chan Kim Personalized Travel Routes Generation for Mobile Application, by Maksim Khlopotov, Igor Kotciuba, Aleksandr Kudriashov, Valeriia Stromtcova, Mikhail Galperin
13:00	20m	Q&A in Zoom with authors of **Artificial Intelligence, Robotics and Automation Systems I** session, Zoom 974-238-2704	
13:20	25m	**Break**	Q&A in Zoom with authors of **Location Based Services: Navigation, Logistics, e-Tourism** session, Zoom 280-192-1973
13:45	45m	**Lunch break**	
14:30	45m	**Invited talk:** Effect of Preprocessing on Using ANN and ANFIS, by Mohamed A. Moustafa Hassan, Heliopolis University, Egypt	
15:15	15m	Invited talk Q&A session with Mohamed A. Moustafa Hassan, Zoom 280-192-1973	
15:30	**Session:** Artificial Intelligence, Robotics and Automation Systems II Chairman: Dmitry Korzun Playlist:https://www.youtube.com/watch?v=gSCRCFHlLq4&list=PLKlZJpq1JqdNZyD8pFfF7Z_0VsdbnPBk0		**Session:** Software Design and Innovative Applications Chairman: Nikolay Teslya Playlist:https://www.youtube.com/watch?v=MBmHL2aqN1c&list=PLKlZJpq1JqdOMXyc_a9xCNmM2mDAZ0--k
15:30	1h	Development of Theoretical Foundations of the Controlled Synthesis of Multifunctional Coatings by the Micro-Arc Oxidation Method, by Pavel Golubkov, Ekaterina Pecherskaya, Oleg Karpain, Maxim Safronov, Timur Zinchenko, Dmitriy Artamonov Avoiding Unintended Bias in Toxicity Classification With Neural Networks, by Sergey Morzhov	Performance Evaluation of Cloud Services for Russian Companies, by Alexey Bataev Performance Evaluation for the Parabolic Photovoltaic/Thermal Hybrid Solar System, by Heba Mosalam, Mohamed A. Moustafa Hassan Implementation of Networking in the Organization of a Laboratory Practical Work on Numerical Methods in the Basics of

		Raster to Vector Map Conversion by Irregular Grid of Heights, by Serge Popov, Vadim Glazunov, Mikhail Chuvatov, Alexander Purii Seat Belt Fastness Detection Based on Image Analysis From Vehicle In-Cabin Camera, by Alexey Kashevnik, Ammar Ali, Igor Lashkov, Nikolay Shilov Integrating Computer Vision Technologies for Smart Surveillance Purpose, by Igor Ryabchikov, Nikolay Teslya, Nikita Druzhinin	Mathematical Analysis Using a Software Package Based on the Scilab Package, by Vitaly Bogun Fault Tolerant Central Saga Orchestrator in RESTful Architecture, by Konstantin Malyuga, Olga Perl, Alexandr Slapoguzov, Ivan Perl Fast and Scalable Simulation Framework for Large In-Order Chip Multiprocessors, by Yuri Nedbailo
16:30	20m	Q&A in Zoom with authors of **Artificial Intelligence, Robotics and Automation Systems II** session, Zoom 974-238-2704	Android Memory Inspection Techniques and Tools, by Kirill Krinkin, Valeriya Dopira, Olga Kochneva, Sergey Petrov, Maxim Kopylov The Indicators Framework for Developing Display Systems, by Alisa Volk, Vera Ivanova, Alexey Syschikov, Boris Sedov
16:50	**Session:** Seminar on Intelligence, Social Media and Web Chairman: Svetlana Popova Playlist:https://www.youtube.com/watch?v=CDKNja3RQ1M&list=PLKlZJpq1JqdMSHftmQFSxNPrgEW7Ow5Dw		Q&A in Zoom with authors of **Software Design and Innovative Applications** session, Zoom 280-192-1973
16:50	25m	The Methodology of Extraction and Analysis of Event Log Social Graph, by Alexandra Soboleva, Olga Tushkanova	
17:15	25m	A Preliminary Performance Comparison of Machine Learning Algorithms for Web Author Identification of Vietnamese Online Messages, by Alisa Vorobeva, Bui N. Khanh Individual Learning Pathway Validation Based on the Syllabus, by Anton Govorov, Anastasiia Chernysheva, Maksim Khlopotov, Svetlana Derkunskaia, Anna Arzumanian Simple and Efficient Approach to the Aspect Extraction From Customers Product Reviews, by Nadezhda Chechneva	**Break**
17:40	20m	Q&A in Zoom with authors of **Seminar on Intelligence, Social Media and Web (ISMW)**, Zoom 974-238-2704	
18:00	**Session:** Demos & Posters		Chairman: Sergey Balandin
18:00	20m	**Pecha Kucha pitches for posters and demos followed by show of demos and posters;** Playlist: https://www.youtube.com/watch?v=REUPItZhp4s&list=PLKlZJpq1JqdOC6J1F0VaKNtySd5nyzHcA	
18:20	40m	Free discussion in Zoom, Zoom 280-192-1973	

April 24 (Friday)
The Yaroslavl Demidov State University, Yaroslavl, Russia / Online participation by Youtube + Zoom
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09:30	**Session:** Computer Vision, Image and Video Processing I Chairman: Vladimir Khryashchev Playlist:https://www.youtube.com/watch?v=7DtXGXQGCLg&list=PLKlZJpq1JqdM8mrEIKb-i-7HcFG7qizO3		**Session:** Natural Language Processing, Speech Technologies I Chairman: Ilya Paramonov Playlist:https://www.youtube.com/watch?v=ZDoaxofPtFY&list=PLKlZJpq1JqdMtgp86t9PkEWFIuIyhNMv-
09:30	50m	Vehicle License Plate Recognition Based on Edge Detection, by Elena Medvedeva, Igor Trubin, Pavel Kasper Separation of Closely Located Buildings on Aerial Images Using U-Net Neural Network, by Roman Larionov, Vladimir Khryashchev, Vladimir Pavlov Application of Convolutional Neural Networks for Multimodal Identification Task, by Anton Stefanidi, Artem Topnikov, Gennadiy Tupitsin, Andrey Priorov Anomalous Object Tracking in Distributed Camera Network, by Md Shahbaz Khan, Dr Indu Sreedevi HW/SW Co-Design for Dates Classification on Xilinx Zynq SoC, by Ahmed Chiheb Ammari, Lazhar Khriji, Medhat Awadalla Inpainting of Ring Artifacts on Microtomographic Images by 3D CNN, by Anton Kornilov, Ilia Safonov, Ivan Yakimchuk	Named Entity Recognition in Spanish Biomedical Literature: Review and Bert Model, by Liliya Akhtyamova Insight From Nigerian Banking Customers Discussions: A Study of Contextual Semantic Search and Twitter Sentiment Analysis, by Sunday Adewale Olaleye, Joshua Muyiwa Adeegbe, Oluwaseun Alexander Dada, Yazid Bounab Comparative Analysis of Concreteness / Abstractness of Russian Words, by Irina Zhuravkina, Valery Soloviev, Alexander Lobanov, Andrey Danilov Automatic Extraction of Rhythm Figures and Analysis of Their Dynamics in Prose of 19th-21st Centuries, by Ksenia Lagutina, Anatoliy Poletaev, Nadezhda Lagutina, Elena Boychuk, Ilya Paramonov
10:20	20m		Q&A in Zoom with authors of **Natural Language Processing, Speech Technologies I** session, Zoom 280-192-1973
10:40	20m	Q&A in Zoom with authors of **Computer Vision, Image and Video Processing I** session, Zoom 974-238-2704	**Session:** Natural Language Processing, Speech Technologies II Chairman: Ksenia Lagutina Playlist:https://www.youtube.com/watch?v=dIQF23yW4PM&list=PLKlZJpq1JqdMd222AZju1LeHK9PZCSvQk
11:00	**Session:** Computer Vision, Image and Video Processing II Chairman: Vladimir Khryashchev Playlist:https://www.youtube.com/watch?v=LGzldw_Texc&list=PLKlZJpq1JqdNPw-nnna53ZJdOEZ8cW0-S		A Virtual Dialogue Assistant for Conducting Remote Exams, by Anton Matveev, Olesia Makhnytkina, Inna Lizunova, Taisiia Vinogradova, Artem Chirkovskii, Aleksei Svischev, Nikita Mamaev Russian Pragmatic Markers Database: Developing Speech Technologies for Everyday Spoken Discourse, by Natalia Bogdanova-Beglarian, Olga Blinova, Tatiana Sherstinova, Ekaterina Troshchenkova Learning Topic Models With Arbitrary Loss, by Murat Apishev, Konstantin Vorontsov Duplicate and Plagiarism Search in Program Code Using Suffix Trees Over Compiled Code, by Igor Andrianov, Svetlana Rzheutskaya, Alexey Sukonschikov, Dmitry Kochkin, Anatoly
11:00	40m	Methods and Tools for Developing Decision Rules for Classifying Objects in Aerial Images, by Denis Kasimov, Aleksandr Kuchuganov, Valeriy Kuchuganov Fast Recovery of Compressive Sensed Images via Multiple Thresholding Operators, by Evgeny Belyaev Evaluating Distance Approximation for Implicit Curve Fitting, by Marina Goncharova, Alexei	

		Uteshev, Arthur Lazdin Visual Monitoring of Personnel in Manufacturing Equipment Activity, by Vsevolod Averkov, Kirill Kulakov	Shvetsov, Arseny Sorokin Design, Implementation and Usage of Modern Voice Assistants, by Mikhail Belenko, Uliana Muratova, Pavel Balakshin, Nikita Burym
11:40	20m	Recognition of Genetic Diseases Based on Combined Feature Extraction From 2D Face Images, by Vyacheslav Kumov, Andrey Samorodov	Q&A in Zoom with authors of **Natural Language Processing, Speech Technologies II** session, Zoom 280-192-1973
12:00	20m	Q&A in Zoom with authors of **Computer Vision, Image and Video Processing II** session, Zoom 974-238-2704	**Session:** Next Generation Networks and Emerging Wireless Technologies I Chairman: Victor Netes Playlist:https://www.youtube.com/watch?v=1fclwuDlj28&list=PLKlZJpq1JqdNZ0fiqRZ9djoWTcw2VHwqK
12:20	**Session:** Artificial Intelligence, Robotics and Automation Systems III Chairman: Nikolay Shilov Playlist:https://www.youtube.com/watch?v=WdRsZdH0098&list=PLKlZJpq1JqdMcOQjZeEqd6qLSR-VpztAp		Media Control at the Network Edge, by Evelina Pencheva, Ivaylo Atanasov, Denitsa Velkova, Ivaylo Asenov Programmability of Multi-Connectivity in 5G, by Ivaylo Atanasov, Evelina Pencheva, Denitsa Velkova, Ventsislav Trifonov On Proximity Application Server, by Dmitry Namiot, Manfred Sneps-Sneppe Experiment on High Capacity Backhaul Transmission Link Aggregation Solution for 5G Networks, by Mohammad Reza Kouchaki, Mohammad Dabibi
12:20	40m	Emotion Based Music Recommendation System, by Mikhail Rumiantcev, Oleksiy Khriyenko Cohesive Hybrid Intelligent Multi-Agent System Architecture, by Sergey Listopad Models and Methods of Real-Time Action Selection in Virtual Soccer, by Borislav Novikov, Daniil Kivarin, Michail Panteleyev Quadcopter Simulation Model for Monitoring Tasks, by Artemii Zenkin, Ivan Berman, Kanstantsin Pachkouski, Igor Pantiukhin, Vyacheslav Rzhevskiy Satellite Control System Tuned by Particle Swarm Optimization, by Mawj Al-Yasiri, Mohamed S. Saad, Mohamed A. Moustafa Hassan	
13:00	20m		Q&A in Zoom with authors of **Next Generation Networks and Emerging Wireless Technologies I** session, Zoom 280-192-1973
13:20	20m	Q&A in Zoom with authors of **Artificial Intelligence, Robotics and Automation Systems III** session, Zoom 974-238-2704	**Break**
13:40	50m	**Lunch break**	
14:30	**Session:** Planning and Controlling of Smart Manufacturing Systems (PCSMS20) Chairman: Alexander Smirnov Playlist:https://www.youtube.com/watch?v=5NXylDGT66Y&list=PLKlZJpq1JqdNdvSCzygzY7g0qliyEh6Je		**Session:** Next Generation Networks and Emerging Wireless Technologies II Chairman: Dmitry Namiot Playlist:https://www.youtube.com/watch?v=Tm66JXPts2c&list=PLKlZJpq1JqdOIkBQFBlLHhlX87WUE3YbX
14:30	50m	Ontologies in Smart Manufacturing: Approaches and Research Framework, by Nikolay Shilov, Alexander Smirnov, Fazel Ansari Analytical Research on System Capability and Information Technology Use Capability: Problem Statement Examples, by Alexander Geyda	Dependability Measures for Access Networks and Their Evaluation, by Victor Netes Analysis of Channel Estimation Performance in MPC-RAN: Improved MMSE and Compressed Data Techniques, by Emmanuel Mukubwa, Oludare Sokoya

		Algorithm for Experts' Competence Actualization Based on Joint Task Performing Results, by Mikhail Petrov Meta Mining Ontology Framework for Domain Data Processing, by Man Tianxing, Nataly Zhukova, Alexander Vodyaho, Aung Myo Thaw, Nikolay Mustafin	Delay Tolerant Network Potential in a Railway Network, by Eugene Tikhonov, Donat Schneps-Schneppe, Dmitry Namiot Designing WDM-RoF Concept-Based Full-Duplex MMW Fiber Fronthaul Microcell Network, by Mikhail Belkin, Aleksei Alyoshin, Dmitriy Fofanov
15:20	20m	Architecture of a Telecommunications Network Monitoring System Based on a Knowledge Graph, by Kirill Krinkin, Igor Kulikov, Alexander Vodyaho, Nataly Zhukova The Complex Indoor Localization Technique Based on Ontology and SLAM-method, by Maksim Shchekotov, Alexander Smirnov, Michael Pashkin	Q&A in Zoom with authors of **Next Generation Networks and Emerging Wireless Technologies II** session, Zoom 280-192-1973
15:40	20m	Q&A in Zoom with authors of **Planning and Controlling of Smart Manufacturing Systems (PCSMS20)** workshop, Zoom 974-238-2704	**Session:** Advances in Methods of Information and Communication Technology (AMICT) II Chairman: Dmitry Korzun Playlist:https://www.youtube.com/watch?v=PvYhQXaWV5Q&list=PLKlZJpq1JqdMyJB3SCg3ZPu8W-9vpY7_Z
16:00	**Session:** Internet of Things and Enabling Technologies Chairman: Alexander Geyda Playlist:https://www.youtube.com/watch?v=hFcBX0ItIwU&list=PLKlZJpq1JqdMgGs7kYficdJLwNmyyxsWf		Case Study of Using Virtual and Augmented Reality in Industrial Systems Monitoring, by Dmitry Pavlov, Igor Sosnovsky, Vyacheslav Dimitrov, Vasilii Melentyev, Dmitry Korzun Edge Computing Opportunities for Vibration Diagnostics of Rotary Machinery Using Neural Network Approach, by Valentin Perminov, Vladislav Ermakov, Dmitry Korzun Internet of Things Education for MSc Study in Applied Mathematics and Computer Science, by Dmitry Korzun, Olga Bogoiavlenskaia Error Text Codes Recognition From Information Display in Industrial Production Equipment, by Artur Harkovchuk, Dmitry Korzun Smart Video Services Based on Edge Computing with Multiple Cameras, by Nikita Bazhenov, Dmitry Korzun
16:00	40m	Smart Controller for Industrial Internet of Things: Design and Implementation, by Mikhail Kolesnikov, Maxim Afanasev, Yuri Fedosov, Yuri Andreev, Anastasiya Krylova, Sergey Shorokhov, Kseniia Zimenko Axial Movement Sensor Based on Chaotic Oscillator and Planar Coil, by Timur Karimov, Olga Druzhina, Artur Karimov, Denis Butusov Micro-Machined Vibrating Ring Gyroscope Testing, by Vasiliy Kirnos, Alexander Vagachev, Oleg Morozov	
16:40	20m	ROCK-CNN: A Distributed RockPro64-based Convolutional Neural Network Cluster for IoT. Verification and Performance Analysis, by Rezeda Khaydarova, Dmitry Mouromtsev, Vladislav Fishchenko, Maksim Lapaev, Vladislav Shmatkov IoT Data Collection Based on Social Network Models, by Nataly Zhukova, Aung Myo Thaw, Man Tianxing, Nikolay Mustafin	Q&A in Zoom with authors of **Advances in Methods of Information and Communication Technology (AMICT) II** session, Zoom 280-192-1973

17:00	20m	Q&A in Zoom with authors of **Internet of Things and Enabling Technologies** session, Zoom 974-238-2704	**Session:** Smart Systems and Embedded Networks Chairman: Valentin Olenev Playlist:https://www.youtube.com/watch?v=nC1fikR0gIE&list=PLKlZJpq1JqdN_9yilp54KjClEG7yySeUm
17:20	**Session:** Big Data, Knowledge, Data Mining and Data Management Chairman: Alexey Kashevnik Playlist:https://www.youtube.com/watch?v=F-o3bm7sjH4&list=PLKlZJpq1JqdNe-zr4bqkSj_O3ASQ5fi4i		Modified Network of Generalized Neural Elements as an Example of a New Generation Neural Network, by Evgeniy Konovalov Tools for Analysis and Tracking of Deadlock-Free Routes in On-Board SpaceWire Networks, by Valentin Olenev, Alexandr Karandashev, Kristina Alexeeva SystemC-model for GigaSpaceWire Protocol Simulation, by Valentin Olenev, Dmitry Kuznetsov Research of the Effectiveness of High-Level Synthesis Tool for FPGA Based Hardware Implementation of Some Basic Algorithms for the Big Data Analysis and Management Tasks, by Alexander Antonov, Denis Besedin, Alexey Filippov An Approach to Dynamic Reconfigurable Transport Protocol Controller Unit Development, by Elena Suvorova
17:20	40m	Semantic Network Construction on Top of Museum Collection and Other Information Sources, by Oksana Petrina, Dmitry Korzun The Implementation of Metagraph Agents Based on Functional Reactive Programming, by Valeriy Chernenkiy, Yury Gapanyuk, Anatoly Nardid, Nikita Todosiev The Analysis of Customs Mirror Statistics of Foreign Trade of Russia, Represented by Time Series, by Elena Zhiryaeva, Pavel Naumov, Vladimir Naumov On a Novel Machine Learning Based Approach to Recommender Systems, by Oleg Senko An Approach for Complex Event Streams Processing and Forecasting, by Viktor Morozov, Mikhail Petrovskiy	
18:00	20m		Q&A in Zoom with authors of **Smart Systems and Embedded Networks** session, Zoom 280-192-1973
18:20	20m	Q&A in Zoom with authors of **Big Data, Knowledge, Data Mining and Data Management** session, Zoom 974-238-2704	**Break**
18:40	20m	**Official closing of the 26th FRUCT conference,** Zoom 280-192-1973	

Thank you and looking forward to see you at the 27th FRUCT in Trento, Italy on September 7-9, 2020!
(Note that it has been agreed that the 27th IEEE FRUCT conference will allow distant participation)

Demos/Posters Session of the 26th FRUCT Conference

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 Zoom teleconference.

This time the Demo and Posters section is organized in cooperation with Future Internet Journal (ISSN 1999-5903). All conference participants are warmly welcome to take part in voting for the best demo/poster of the 26th IEEE 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/demo26.

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 (*preliminary list based on submissions by April 19, 2020*)

1. ***Demo**: **Competence Actualization System Based on Expert Task Performing Results, by Mikhail Petrov**, **ITMO University***
   Expert network is a community of professionals in a certain domain which are joined together by information system. Expert networks are usually required tools for organization of the joint task performing by professionals. Expert networks contain information about these professionals' competencies and their proficiency levels that is submitted by themself. In such cases task performing can give results which are different from the expected ones. The proposed algorithm analyses task performing results to actualize experts' competencies. It takes into account different parameters of the task and its participants and proposes new values of the experts' proficiency levels. These values depend on task success and experts participation in the task.
2. ***Poster**: **A computer modeling system and testbed for investigation of data transmission in FANET, by Irina Kaisina, Danil Vasiliev, Albert Abilov and Vladislav Titov**, **Kalashnikov Izhevsk State Technical University***
   Nodes in flying ad hoc network (FANET) are flying robots (drones). Drones in FANET could stream video, images, or other data to each other during a mission. Swarms of drones could be used in surveillance missions, rescue operations, remote building inspections, or for pipeline monitoring. Cheap and flexible FANETs could replace expensive point-to-point solutions, but they offer new challenges for researchers.
   One of these challenges is how to improve quality of service (QoS) in FANET. High mobility of flying nodes causes packet loss. Goodput metric also drops drastically with each additional hop between a source and a destination. The need for a new approach that raises these QoS metrics is urgent for data streaming in FANET.
   The most of current articles are based on theoretical part and requires more practical details and further realization. In this time the real investigation this types of networks requires large cash and time costs. We offer system of computing modeling and testbed for investigation of data transmission in FANET.
   In the system of simulation, you can work with each level of the OSI and set different mobility models. A feature of emulation is the ability to work with real operating systems (for example, Ubuntu) and modeling only a communication channel, which gives results that are closest to reality. In simulation and emulation, you can also test new methods and algorithms to improve QoS. However, the closest to reality is a testbed, which consists of several microcomputers and a laptop with a software-configured ad hoc network. Due to the presented tools, it is possible to investigate the process of data transmission in FANET more thorough and predict the effectiveness of the new proposed solutions.
3. ***Demo**: **The driver trip visualization platform for fleet monitoring system, by Sergei Mikhailov**, **SPIIRAS***
   The driver trip visualization platform is suited for monitoring company fleet trips in the city. The developed system is based on the Drive Safely project. The platform is capable to show driver track on the dynamic map with different dangerous states, including drowsiness, distraction, cellphone usage, drinking/eating, and smoking. Each dangerous state on the map has some statistical data such as state duration, car speed and velocity data, and application settings, which driver has on the moment of critical situation. Also, if it possible, the system provides a video of event, which helps analytics to investigate the situation and apply measures to prevent them in the future. The developed platform provides ability to manage the Drive Safely application settings for detecting dangerous states and simultaneously distribute them among drivers in real time. The driver trip visualization platform is able to provide drivers statistics in the form of interactive graphics.
4. ***Demo**: **Usage of Data Mining Technologies for Driver's State Detection Based on the Vehicle Speed Analysis, by Nikolay Shilov, SPIIRAS and Daniil Dorofeev**, **LETI University***
   Currently there is a significant amount of research efforts aimed at vehicle driver's state detection based on various technologies (driver image recognition, in-lane car positioning, analysis of driver's physiological characteristics and others). All these technologies require additional equipment which is not often available for regular drivers.
   This demo presents an ongoing research aimed at driver's state detection based on the vehicle speed analysis that can be done on a mobile phone used, for example, as a navigation system. Though speed itself is not a good feature for the given task (it may significantly differ for city and highway driving), the character of speed changes turns out to be a significant feature that can be used for the driver's state detection with a high level of accuracy.
5. ***Demo: **Exposure adjustment for ELP HD IR camera in DriveSafely system, by Nikolay Teslya**, **SPIIRAS***
   The demo shows the exposure adjustment for ELP HD IR camera for driver assistant system DriveSafely. By the default configuration the camera estimates exposure by frame brightness as an average for the full

frame. This is inappropriate for the system since it finds a driver's face on the frame to detect dangerous state. In case of average brightness evaluation, the driver's face could be lost due to the too light or too dark frame in the face's zone since the average evaluation shows that all is good. The first part of the demo shows manual evaluation of frame brightness taking into account only bounding box of driver's face.
The second part shows adaptation to camera hardware specific. The ELP HD IR camera can be configured only for manual configuration of exposure and uses exposure scale in range [0, 255]. The camera is equipped with aperture and it cannot be configured manually. There are ten possible positions of aperture and the camera switches automatically between them while the exposure is configured. When the aperture position is changing, the frame brightness is also changing, and the camera requires configuration taking into account new conditions. Otherwise, the frames captured from the camera will be too dark or too light. To overcome the virtual scale of exposure had been developed. It provides mapping of camera exposure from scale [0, 255] to virtual scale [0, 100] in way to smooth frame brightness jumps caused by aperture changes. In case of virtual scale reach it bounds the IR LEDs can be used to light up the scene. IR LEDs are turning on in case of the frame has low brightness. In other case the IR LEDs are turning off. After each change of state the frame brightness is estimating again and camera exposure is changing taking into account new frame brightness.

6. ***Demo**: **Error code recognition from a computer numerical control display, by Artur Harkovchuk and Dmitry Korzun**, Petrozavodsk State University*
   Computer numerical control (CNC) display is a widely used element in production machine equipment. CNC information display provides information about the operation of equipment. It is possible to distinguish such important information as current indicators obtained during operation and results obtained during diagnostics. Diagnostic results are error codes notifying the machine operator of deviations from normal operation. Errors and the process of their occurrence describe the operation status of the production machine equipment under monitoring. The implemented demo service shows recognition and tracking of error codes directly from the CNC display. The demo implemented using a camera installed directly to the CNC display.
7. ***Demo**: **Human Presence Detection Service for Production Equipment Workplace using Surveillance Cameras, by Vsevolod Averkov, Nikita Bazhenov, Vyacheslav Dimitrov and Kirill Kulakov**, Petrozavodsk State University*
   The paper presents a demonstration of the work of Service for detecting the presence of the operator at the workplace using surveillance cameras. The service allows using machine vision to detect the presence of an operator at the machine and its location relative to the monitored nodes. The service is part of the OptiRepair equipment monitoring system.

The 1st International Workshop on Planning and Controlling of Smart Manufacturing Systems (PCSMS'20)

Integration and deployment of ICT, IoT and AI technologies into manufacturing systems has led to the appearance of new type of intelligent and data-driven production systems, namely "Smart Manufacturing Systems". Smart manufacturing systems are able to monitor the current situation (environmental conditions, demand, state of the system itself), predict trends and patterns in operational parameters, and respond to changes in real time in a collaborative manner either within one company or across a supply chain. Planning and controlling of such (system of) systems is a complex task that requires development of various methods and models enabling smooth functioning and adaptive behavior. The workshop is aimed at bringing together people interested to discuss challenges, opportunities, methods and models related to smart manufacturing systems.

The topics of interest include (but not limited to) the following subject areas:

- Semantic interoperability support in dynamic systems consisting of multiple independent participants.
- Ontology-based knowledge representation in smart manufacturing systems.
- AI enhanced planning and controlling in dynamic adaptive manufacturing systems.
- Optimization strategies in dynamic adaptive manufacturing systems.
- Job-knowledge management in cyber physical production systems.
- Modeling and predicting KPIs for assessing productivity and economic impact of smart manufacturing systems.

The PCSMS'20 is organized by TU Wien (Vienna, Austria), Fraunhofer Austria (Vienna, Austria), SPIIRAS (Saint-Petersburg, Russia), and FRUCT (Helsinki, Finland) as a regular session of the FRUCT conference. We welcome researchers as well as industry stakeholders to submit papers and take part in the workshop to share their research and findings.

Program

April 24 (Friday)
14:30 – 15:40 Please watch the following workshop presentations at Youtube, the playlist https://www.youtube.com/watch?v=5NXylDGT66Y&list=PLKlZJpq1JqdNdvSCzygzY7g0qliyEh6Je that includes:

Ontologies in Smart Manufacturing: Approaches and Research Framework, by Nikolay Shilov, Alexander Smirnov, Fazel Ansari

Analytical Research on System Capability and Information Technology Use Capability: Problem Statement Examples, by Alexander Geyda

Algorithm for Experts' Competence Actualization Based on Joint Task Performing Results, by Mikhail Petrov

Meta Mining Ontology Framework for Domain Data Processing, by Man Tianxing, Nataly Zhukova, Alexander Vodyaho, Aung Myo Thaw, Nikolay Mustafin

Architecture of a Telecommunications Network Monitoring System Based on a Knowledge Graph, by Kirill Krinkin, Igor Kulikov, Alexander Vodyaho, Nataly Zhukova

The Complex Indoor Localization Technique Based on Ontology and SLAM-method, by Maksim Shchekotov, Alexander Smirnov, Michael Pashkin

15:40 – 16:00 Q&A in Zoom with authors of **Planning and Controlling of Smart Manufacturing Systems (PCSMS20) workshop**, Zoom 974-238-2704

FOR NOTES

The 26th Conference of Open Innovations Association FRUCT

Program

Yaroslavl, Russia
23-24 April 2020

A special word of thanks goes to the

The Faculty of Information and Computer Science, Yaroslavl Demidov State University,
Helsinki Institute for Information Technology (HIIT), and
IEEE Russia, Russia (Siberia), and Russia (Northwest) Joint Sections Information Theory Society Chapter for sponsoring the conference

Future Internet Journal for giving prize for the best Poster/Demo

Printed in National Research University ITMO (Russia)

Approved for publishing on 20.04.2020
Page format 60x84 1/8
Number of copies 300

ITMO university publisher house
197101, Saint Petersburg, Kronverkskiy pr., 49

CALL FOR PARTICIPATION

27th Conference of Open Innovations

Association FRUCT

Trento, Italy, 7-9 September 2020

Overview

FRUCT is a large Pan-European cooperation network that promotes open innovations of academia and industry. FRUCT conference is a high-quality scientific event for meeting academia and business people and setting projects. The average conference is attended by 120+ participants representing over 30 member organizations and guests from other organizations. Participants comes from Russia, Finland, Italy, UK, Denmark, India, Brazil and other countries and industry is primary represented by Dell EMC, Nokia, MariaDB, Intel, Jolla, Open Mobile Platform, etc.
The conference attracts most active and talented students to present their R&D projects, meet people alike, create new teams, and find employers and investors. The conference invites the world-class academic and industrial experts to lecture on the hottest topics. It includes regular sessions as well as thematic workshops.
We welcome everybody to submit papers and take part in the conference, share your research and join the FRUCT Association. We traditionally have low registration fee and various discounts can be applied. For further details refer to http://www.fruct.org/cfp27 and the registration is open at http://www.fruct.org/registration.

List of conference topics

- ✓ Internet of Things and enabling technologies
- ✓ Next Generation Networks, Wireless Technologies, 5G
- ✓ Smart Spaces, Linked Data and Semantic Web
- ✓ Big Data, Data Mining, Data Storage and Management
- ✓ Knowledge and Data Managements Systems
- ✓ Location Based Services: e-Tourism/Logistics/Navigation
- ✓ Open Source Mobile OS: Architectures and Applications
- ✓ UI innovations, UX and Usability, Ergonomics Challenges
- ✓ Security and Privacy: Applications and Coding Theory
- ✓ Natural Language Processing, Speech Technologies
- ✓ Software Design, Innovative Applications
- ✓ Internet of Sounds
- ✓ Bioinformatics, e-Health and Wellbeing
- ✓ Sensor Design, Ad-hoc and Sensor Networking
- ✓ Context Awareness and Proactive Services
- ✓ Artificial Intelligence, Robotics and Automation
- ✓ Computer Vision, Image and Video Processing
- ✓ Smart Systems and Embedded Networks
- ✓ Crowdsourcing and Collective Intelligence
- ✓ Machine Learning for Networked Apps
- ✓ Intelligence, Social Mining and Web
- ✓ IoT based Water Distribution Management
- ✓ IoT and CPS solutions for societal challenges
- ✓ Sound and Music Computing

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: 15 June 2020 **Early-bird deadline: 29 May 2020**

   Notification of acceptance: **6 July 2020** Camera-ready deadline: **13 July 2020**

3. **Poster / Demo proposal:** submission deadline: **31 August 2020**

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). All accepted Full Papers will be included to **IEEE Xplore** and **DOAJ,** and indexed by **Scopus**, **ACM, Web of Science, RSCI/РИНЦ** (as journal publication), **DBLP, etc**. The selected papers get invitations to publish extended papers in the partner journals, e.g., **IJERTCS** (SJR quartile: **Q2**). The Full Papers section of the proceedings is included to **Scimago Journal Rank** http://scimagojr.com/journalsearch.php?q=21100305223&tip=sid. FRUCT has **high rating in national systems**, e.g., **Finnish (JUFO=1**, JufoID: 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/conference27. If you get some questions that are not covered at the conference web page, feel free to send email to info@fruct.org.