Program of

The 25th Conference of Open Innovations Association FRUCT

Helsinki, Finland
5-8 November 2019

UNIVERSITY OF HELSINKI IEEE IEEE ComSoc — IEEE Communications Society IEEE Finland

HIIT | HELSINKI INSTITUTE FOR INFORMATION TECHNOLOGY OAMK — OULU UNIVERSITY OF APPLIED SCIENCES future internet — an Open Access Journal by MDPI sensors — an Open Access Journal by MDPI

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,
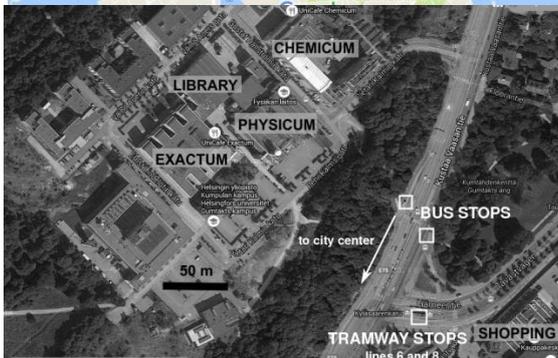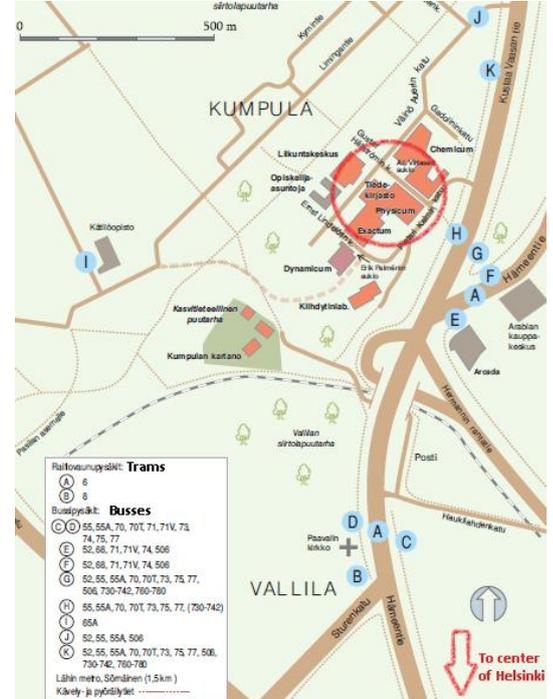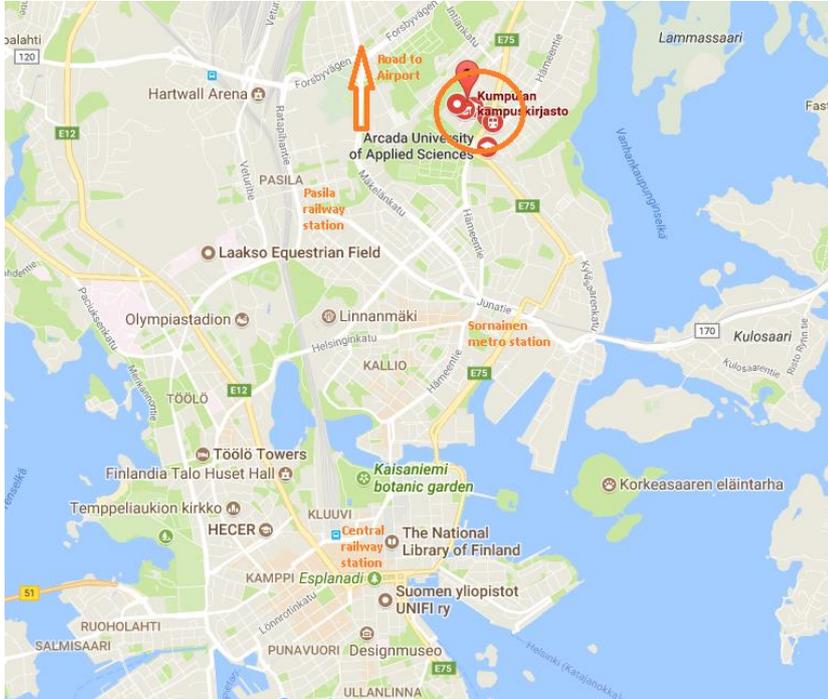VIVANT MEMBRA QUAELIBET!
SEMPER SINT IN FLORE!

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

The 25th FRUCT conference will be held in the downtown of Helsinki - at Kumpula campus of University of Helsinki, address: Ernst Lindelöfin katu 1, 00560 Helsinki. There is a lot of public transport connecting to the city center, e.g., busses, trams, and Sörnäinen metro station is only 1.5 km away. Please refer to map and campus plan below.
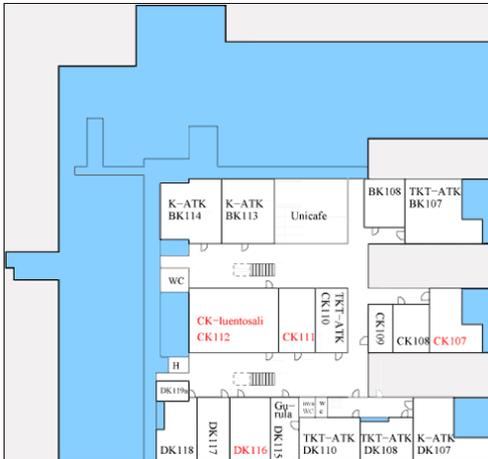

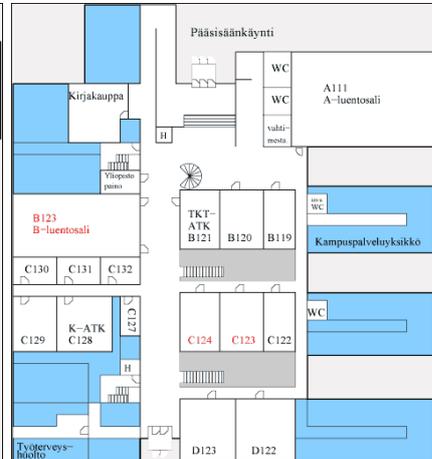The proceedings of 25th FRUCT conference are available online:

Full Papers at https://fruct.org/publications/fruct25/

Works in Progress at https://fruct.org/publications/abstract25/

Exactum basement

Exactum 1st floor

Exactum 2nd floor

General Facts and Statistics for the 25th FRUCT Conference:

Total submissions: **122**	Accepted Full Papers: **50**	Acceptance rate: below **41%**
Total authors: **327**	representing **28** countries	Registered participants: **147**

Organization Committee of the 25th FRUCT

Local Chair: Valtteri Niemi   **Conference Secretary:** Sara Ramezanian
FRUCT President: Sergey Balandin   **Publishing team leader:** Tatiana Tyutina

Program Committee

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Andrey Vasilyev (Yaroslavl State University, Russia)
Fabio Viola (National Institute of Nuclear Physics, Italy)
Valery Vyatkin (Aalto University, Finland)
Katarzyna Wac (University of Geneva, Switzerland)
Maxim Yatskovskiy (FRUCT MD Ltd, Russia)
Weider Yu (San Jose State University, USA)
Mark Zaslavskiy (ITMO University, Russia)
Arkady Zaslavsky (SCIRO, Australia)

Program of the 25th FRUCT conference
November 5-8, 2019, Helsinki, Finland

University of Helsinki, Kumpula Campus, Ernst Lindelöfin katu 1, 00560 Helsinki

DATE	TIME	PROGRAM		
5.11.19	10:00-16:00	**Internal meetings of FRUCT WGs,** Chemicum bld, A120 (***by invitation only***)		
6.11.19	10:00-11:00	**Conference Registration and Coffee**, Lobby of Exactum building		
	11:00-13:30	**Opening of the 25th FRUCT conference**, Exactum bld, CK112 **Keynote talk:** Advances in 5G Security and Privacy, by Valtteri Niemi, University of Helsinki, Finland **Keynote talk:** Run-time / memory protection on future mobile processors, by Jan Erik Ekberg, Huawei, Finland		
	13:30-14:30	**Lunch**		
	14:30-16:00	ISMW & Natural Language Processing I, Exactum bld, CK107	Knowledge and Data Management, Exactum bld, B222	
	16:00-16:30	**Coffee break**		
	16:30-17:30	Computer Vision, Image and Video Processing, Exactum bld, CK107	Internet of Things and Enabling Technologies, Exactum bld, B222	Software Design and Innovative Applications, Exactum bld, C129
7.11.19	09:30-10:00	**Conference Registration**, Lobby of Chemicum building		
	10:00-12:00	Artificial Intelligence, Robotics and Automation Systems, Chemicum bld, A128		
	12:00-13:00	**Lunch**		
	13:00-14:00	**Keynote talk:** IoT as enabler of future factories, by Valeriy Vyatkin, Aalto University, Finland, Physicum bld, E204		
	14:00-14:15	**Short break**		
	14:15-15:30	Intelligence, Social Media and Web (ISMW) & Natural Language Processing II, Physicum bld, E207	Next Generation Networks and Emerging Wireless Technologies, Physicum bld, D114	
	15:30-16:00	**Coffee break**		
	16:00-17:30	Workshop on Advances in Innovative Drone Enhanced Applications (IDEA19), Physicum bld, E207	Advances in Methods of Information and Communication Technology (AMICT), Physicum bld, D114	
	17:30-18:00	Preparation to Demos/Posters session and Pecha Kucha pitches, Exactum building open space		
	18:00-21:00	**Demo/Posters Session and Social Event**, Exactum building open space		
8.11.19	09:00-09:30	**Conference Registration and Coffee**, Lobby of Exactum building		
	09:30-11:30	Innovative Drone Enhanced Applications (IDEA19 Industry), Exactum bld, CK112 **Keynote talk:** Drone based operation support system for ice navigation, by Rune Storvold, NORCE, Norway		
	11:30-12:30	**Lunch**		
	12:30-13:30	ISMW & Natural Language Processing III, Exactum, B119	e-Health and Wellbeing I, Exactum bld, B120	IDEA19 (brainstorm), Exactum bld, BK114
	13:30-14:00	**Coffee break**		
	14:00-16:00	Big Data and Data Mining, Exactum bld, B119	e-Health and Wellbeing II, Exactum bld, B120	IDEA19 session, Exactum bld, CK112
	16:00-16:15	**Official closing of the 25th FRUCT conference**, Exactum bld, CK112		

KEYNOTE SPEAKERS

Prof. Valtteri Niemi is a Professor of Computer Science in **University of Helsinki** and leads the Secure Systems research group. Earlier he has been a Professor of Mathematics in University of Vaasa during 1993-97 and University of Turku during 2012-2015. Between these two academic positions Niemi served for 15 years in various roles at Nokia Research Center and was nominated as a Nokia Fellow in 2009. At Nokia, Dr. Niemi worked for wireless security, including cryptological aspects and privacy-enhancing technologies. He participated 3GPP SA3 (security) standardization group from its beginning and during 2003-2009 he was the chairman of the group. He has published more than 80 scientific articles and he is a co-author of four books and more than 30 patent families.

His keynote talk on *Advances in 5G Security and Privacy* is scheduled for **Nov. 6 at 11.30-12.30**.

Dr. Jan Erik Ekberg is **CTO**, Mobile Security at **Huawei, Finland**. His background is partly in the telecom industry, where he worked for 18 years at Nokia Research Center, and partly in developing secure mobile device platforms (7 years in Trustonic Inc and DarkMatter Llc). His primary interests are related to platform security architectures, TEEs, TPM, mandatory access control mechanisms and protecting mobile software against run-time attacks. He also has a background in (securing) network protocols and telecom systems, as well as with standardizing short-range communication technologies like NFC, BT-LE and WLAN. Now his main focus is in securing the Huawei mobile device platform at the hardware and system software levels. Jan-Erik received PhD in Computer Science from Aalto University, and is currently serving there as an Adjunct Professor in the System Security Group.

His keynote talk entitled *Run-time / Memory Protection on Future Mobile Processors* is scheduled for **Nov. 6 at 12.30-13.30**.

Prof. Valeriy Vyatkin (M'03–SM'04) is a Chaired Professor (Ämnesföreträdare) at **Luleå University of Technology, Sweden**, Professor at Aalto University, Finland, and co-director of CT international laboratory at ITMO University, Russia. Previously he has been with Cambridge University, U.K., as a visiting scholar, and on permanent positions at the University of Auckland, New Zealand, Martin Luther University of Halle-Wittenberg, Germany, Taganrog State University of Radio Engineering, postdoc at Nagoya Institute of Technology, Japan. Research interests include dependable distributed automation and industrial informatics, software engineering for industrial automation systems, distributed architectures, specifically IEC 61499 and multi-agent systems, including Smart Grid, material handling, building management systems, and reconfigurable manufacturing. Dr. Vyatkin was awarded the Andrew P. Sage Award for the best IEEE Transactions paper in 2012.

His keynote talk on *IoT as Enabler of Future Factories* is scheduled for **Nov 7 at 13.00-14.00**.

Dr. Rune Storvold is the **Research Director** at Drones and Autonomous Systems Research Group in **NORCE Technology Department**, Adjunct Professor at Norwegian University of Science and Technology, and Director in Arctic Center for Unmanned Aircraft. He has background in optics and atmospheric physics from the University of Bergen (MS, 1993) and University of Alaska Fairbanks (PhD, 2001). He started working at Norut in 2003 using synthetic aperture radar data for measurements of cryospheric properties and modeling microwave scattering and propagation in snow and ice. In 2005 established Unmanned Aircraft Group at Norut, merged with NORCE in 2019. The Drones and Autonomous Systems group involves 14 fulltime scientists, pilots and engineers in R&D on unmanned aircraft and sensor systems. He has been at the board of directors of UAS Norway since its founding in 2008.

His keynote talk on *Drone Based Operation Support System for Ice Navigation* is scheduled for **Nov 8 at 9.30-10.10**.

Program of the 25th FRUCT conference
November 5-8, 2019, Helsinki, Finland

November 6 (Wednesday)

University of Helsinki, Kumpula Campus, Exactum building, Pietari Kalmin katu 5, 00560 Helsinki

10:00	1h	**25th FRUCT Conference Registration, Lobby of Exactum building**

Session: Official opening of the 25th FRUCT conference
Room: Exactum building, CK112   Chairman: Sergey Balandin

11:00	15m	Official opening of the 25th FRUCT conference
11:15	15m	Welcome words
11:30	1h	**Keynote talk:** Advances in 5G Security and Privacy, by Valtteri Niemi, University of Helsinki, Finland
12:30	1h	**Keynote talk:** Run-time / Memory Protection on Future Mobile Processors, by Jan Erik Ekberg, Huawei, Finland
13:30	1h	**Lunch**

		Session: ISMW & Natural Language Processing I Room: Exactum, CK107 Chairman: Anna Maltseva	Session: Knowledge and Data Management Room: Exactum, B222 Chairman: Dmitry Korzun
14:30	15m	Conversation Frames: Yet Another Contextual Dimension for IPAs, by Omar Almousa, Jordan University of Science and Technology, Jordan and Hazem Migdady, Oman College for Management and Technology, Oman	New Generation Design System of Technological Processes, by Artem Vostropyatov and Dmitry Kulikov, ITMO University, Russia
14:45	15m	Keyphrase Generation: A Multi-Aspect Survey, by Erion Çano and Ondřej Bojar, Charles University, Czech Republic	Master Index Access as a Data Tuple and Block Locator, by Michal Kvet, Veronika Šalgová, Marek Kvet and Karol Matiasko, University of Žilina, Slovakia
15:00	15m	Pragmatic Markers of Russian Everyday Speech: the Revised Typology and Corpus-Based Study, by Natalia Bogdanova-Beglarian, Olga Blinova, Tatiana Sherstinova, Ekaterina Troshchenkova, Kristina Zaides and Daria Gorbunova, Saint Petersburg State University, Russia	A Taxonomy of Situations within the Context of Risk Analysis, by Adam Szekeres and Einar Snekkenes, Norwegian University of Science and Technology, Norway
15:15	15m	Unsupervised Word Sense Disambiguation using Word Embeddings, by Behzad Moradi, Institute for Advanced Studies in Basic Sciences, Iran, Ebrahim Ansari and Zdenek Zabokrtsky, Charles University, Czech Republic	Data-Driven Approach for Dynamic Pricing for Decision Making Systems in Marketing and Finance, by Petr Gladilin and Irek Saitov, ITMO University, Russia
15:30	15m	Research Technology Based on Open-ended Questions: The Key Modules, Contribution of Software Discant and VEGA, by Galina Saganenko, Alexey Geger, Sociological Institute of RAS, Kirill Boyarsky, ITMO University, Victoria Dudina, Saint Petersburg State University, and Elena Stepanova, Baltic State Technical University VOENMEH, Russia	Competence-Based Language Expert Network for Translation Business Process Management, by Alexander Smirnov, Alexey Kashevnik, Mikhail Petrov and Nikolay Shilov, SPIIRAS, Russia, Tilman Schäfer, Thomas Jung, Daniela Barsch-Harjau and Gerhard Peter, Festo AG & Co. KG, Germany
15:45	15m	Semantic Coherence in Schizophrenia in Russian Written Texts, by Polina Panicheva, NRU Higher School of Economics, and Tatiana Litvinova, Voronezh State Pedagogical University, Russia	Human-Machine Collective Intelligence Environment for Adaptive Decision Support, by Alexander Smirnov and Andrew Ponomarev, SPIIRAS, Russia
16:00	30m	**Coffee break**	

		Session: Computer Vision, Image and Video Processing **Room:** Exactum, CK107 **Chairman:** Alexey Kashevnik	**Session:** Internet of Things and Enabling Technologies **Room:** Exactum, B222 **Chairman:** Alexander Smirnov	**Session:** Software Design and Innovative Applications **Room:** Exactum, C129 **Chairman:** Sp Shiva Prakash
16:30	15m	Grayscale and Color Basis Images, by Elena Yakovleva and Anton Makarov, Saint Petersburg State University, Valery Gorbachev and Elena Kaynarova, St.Petersburg State University of Industrial Technology and Design, Russia	Time-Slotted ALOHA-based LoRaWAN Scheduling with Aggregated Acknowledgement Approach, by Gokcer Yapar and Tuna Tugcu, Bogazici University, Turkey, and Orhan Ermis, EURECOM, France	Ukko opaštau lapšie äijän - Serious Games as Tools for Teaching Viena Karelian to Finns?, by Juha-Pekka Koski and Leena Arhippainen, University of Oulu, Finland
16:45	15m	Determining Inhomogeneity Areas in Agricultural Fields Based on the Earth Remote Sensing Images, by Petr Skobelev and Vladimir Galuzin, Samara State Technical University, Vitaly Travin and Anastasiya Galitskaya, SEC «Smart Solutions» Ltd, Elena Simonova, Samara National Research University, Russia	A Novel Genetic Algorithm Selection Method and Implementation in IoT Domain, by Kerem Aytaç, Koç Digital/ Marmara University, Berkin Ağlarcı, Yeditepe University, and Ömer Korçak, Marmara University, Turkey	Urban Public Transport Digital Planning based on an Intelligent Transportation System, by Oleg Golovnin and Anastasia Stolbova, Samara National Research University, Oleg Surnin, Open Code, Pavel Sitnikov and Anton Suprun, ITMO University, Anton Ivaschenko, Samara State Technical University, Russia
17:00	15m	Development of a Mathematical Model to Determine the Accuracy of the Algorithm of Shape from Polarization, by Viacheslav Gulvanskii, SPbETU "LETI", Elena Smirnova and Evgenii Vikulov, «PolarMetr» Ltd, Michael Smirnov and Maria Mamaeva, Saint Petersburg University, Russia	Delivering Reliability of Data Sources in IoT Healthcare Ecosystems, by Argyro Mavrogiorgou, Athanasios Kiourtis and Dimosthenis Kyriazis, University of Piraeus, Greece	Ridesharing for Carsharing Service Provider: Driver and Pedestrian Route Matching, by Alexey Kashevnik, Nikolay Teslya, Sergei Mikhailov and Mikhail Petrov, SPIIRAS, Anton Shabaev, PetrSU, and Andrey Krasov, Bonch-Bruevich Saint Petersburg State University of Telecommunications, Russia
17:15	15m	Transform-Aware Content Adaptive Stegosystem for Social Networks, by Klim Kireev, Edgar Kaziakhmedov and Grigorii Melnikov, Skolkovo Institute of Science and Technology, Russia	The Modeling of Contact Center Dealing with Smart Objects of Internet of Things, by Mikhail Stepanov and Hanna Zhurko, MTUCI University, Russia	Building Individual Educational Routes for Learning SQL Queries, by Anton Govorov, Marina Govorova, Helen Slizen and Sergei Ivanov, ITMO University, Russia
17:30	15m	Perceptual Image Hashing: Tolerant to Brightness and Contrast Corrections Method Based on Cumulative Histogram Slicing, by Aleksei Zhuvikin and Valery Korzhik, Bonch-Bruevich Saint-Petersburg State University of Telecommunication, Russia		
17:45		**Closing of Day**		

November 7 (Thursday)
University of Helsinki, Kumpula Campus, A.I. Virtasen aukio 1, 00560 Helsinki

09:30	30m	**Conference registration, Chemicum building lobby**
		Session: Artificial Intelligence, Robotics and Automation Systems
		Room: Chemicum building, A128 — Chairman: Alexey Kashevnik
10:00	15m	Automated Robotic System with Five Degrees of Freedom, by Sergei Ivanov, Tatiana Zudilova, Irina Osetrova, Igor Anantchenko and Andrei Mikalauskas, ITMO University, Russia
10:15	15m	Classification of Omani's Dates Varieties using Artificial Intelligence Techniques, by Salima Al-Abri, Lazhar Khriji, Ahmed Ammari and Medhat Awadalla, Sultan Qaboos University, Oman
10:30	15m	Monitoring Vegetation Height using Data Acquisition from Ubiquitous Multi-Sensor's Platform, by Sofeem Nasim, Mourad Oussalah, Bjorn Klove and Ali Torabi Haghighi, University of Oulu, Finland
10:45	15m	Simulation of a Six-Degree Manipulator, by Sergei Ivanov, Tatiana Zudilova, Andrei Mikalauskas, Irina Osetrova and Lubov Ivanova, ITMO University, Russia
11:00	15m	6D Pose Estimation of Transparent Object from Single RGB Image, by Munkhtulga Byambaa and Gou Koutaki, Kumamoto University, Japan and Lodoiravsal Choimaa, National University of Mongolia, Mongolia
11:15	15m	Snow Depth Classification using MultiSensory Ubiquitous Platform and Machine Learning, by Sofeem Nasim, Mourad Oussalah, Bjorn Klove and Ali Torabi Haghighi, University of Oulu, Finland
11:30	15m	Interpolation Algorithm for High-speed Processing of Complex Curvilinear Trajectories, by Maxim Afanasev, Kseniia Zimenko, Anastasiya Krylova, Sergey Shorokhov, Yuri Fedosov and Mikhail Kolesnikov, ITMO University, Russia
11:45	15m	An Intelligent Method for Comparing Shapes of Three-Dimensional Objects, by Vladimir Muliukha, Alexey Lukashin and Alexander Ilyashenko, Peter the Great St.Petersburg Polytechnic University, Russia
12:00	1h	**Lunch**
13:00	1h	**Keynote talk:** IoT as Enabler of Future Factories, by Valeriy Vyatkin, Aalto University, Finland, Physicum building, room E204
14:00	15m	**Short break**

		Session: Intelligence, Social Media and Web (ISMW) & Natural Language Processing II **Room:** Physicum, E207 — Chairman: Lidia Pivovarova	**Session:** Next Generation Networks and Emerging Wireless Technologies **Room:** Physicum, D114 — Chairman: Nikolay Teslya
14:15	15m	A Survey on Stylometric Text Features, by Ksenia Lagutina, Nadezhda Lagutina and Ilya Paramonov, Yaroslavl State University, Elena Boychuk, Inna Vorontsova, Elena Shliakhtina and Olga Belyaeva, Yaroslavl State Pedagogical University, Russia	Hybrid Software-Defined Networking Traffic Scheduling: Energy-Aware Load Balancing Perspective, by Etengu R., Tan S.C., Abbou F.M, Lee C.K., Yusoff Z., Shahbe M., MMU, Malaysia
14:30	15m	Sentence To Sentence Similarity: a Review, by Yazid Bounab, Jaakko Seppnen, Markus Savusalo, Riku Mkynen and Mourad Oussalah, University of Oulu, Finland	Privacy Preserving Cyberbullying Prevention with AI Methods in 5G Networks, by Sara Ramezanian and Valtteri Niemi, University of Helsinki, Finland
14:45	15m	Causality-based Social Media Analysis for Normal Users Credibility Assessment in a Political Crisis, by Ahmed Abouzeid, Ole.Christoffer Granmo, Christian Webersik and Morten Goodwin, University of Agder, Norway	AKMA Support in Multi SIM User Equipment, by Gizem Akman and Valtteri Niemi, University of Helsinki, and Helsinki Institute for Information Technology (HIIT), and Philip Ginzboorg, Huawei Technologies, and Aalto University, Finland
15:00	15m	A German Corpus on Topic Classification and Success of Social Media Posts from Facebook, by Max-Emanuel Keller, Johannes Forster and Peter Mandl, Munich University of Applied Sciences, Frederic Aich and Jacqueline Althaller, ALTHALLER communication GbR, Germany	Energy Aware Handover in LBS Interference for 5G Dense Heterogeneous Network, by V. Varsha and S.P. Shiva Prakash, JSS Science and Technology University, India, and Kirill Krinkin, Saint-Petersburg Electrotechnical University "LETI", Russia

15:15	15m	Theory of Semantic Field for Sentiment-Analysis of the Language of Specific Users' Group in Social Media (Case of Freelancer Groups), by Anna Maltseva, Natalia Shilkina and Igor Temnyi, Saint Petersburg State University and Olesya Makhnytkina and Inna Lizunova, ITMO University, Russia	Analysis of the Requirements to Information Exchange Protocol for an All-optical Onboard Network, by Valentin Olenev and Yuriy Sheynin, SUAI University, Vladislav Kosyanchuk, Valeriy Novikov and Georgiy Platoshin, FSUE State Scientific Research Institute of Aviation Systems (GosNIIAS), Russia
15:30	30m	**Coffee break**	

Session: Workshop on Advances in Innovative Drone Enhanced Applications (IDEA19 Research track)
Room: Physicum, E207   Chairman: Vadim Kramar

Session: Advances in Methods of Information and Communication Technology (AMICT)
Room: Physicum, D114   Chairman: Dmitry Korzun

16:00	15m	ROS-based Integration of Smart Space and a Mobile Robot as the Internet of Robotic Things, by Arslan Siddique and Ilya Afanasyev, Innopolis University, David Uchechukwu, Kazan Power Engineering University, Russia, and Aizhan Maksatbek, Yildiz Technical University, Turkey	Ensemble Modeling Method to Predict Life Expectancy of Population in High-income Countries: Japan and Finland, by Nittaya Kerdprasop and Kittisak Kerdprasop, Suranaree University of Technology, and Paradee Chuaybamroong, Thammasat University, Thailand
16:15	15m	An Algorithm for Incident Detection Using Artificial Neural Networks, by Yong-Kul Ki, Woo-Teak Jeong, Hee-Je Kwon and Mi-Ra Kim, Road Traffic Authority, South Korea	Guidelines for Facilitating User-Centric Product and Service Development in an Open Innovation Environment, by Lotta Haukipuro and Leena Arhippainen, University of Oulu, Finland
16:30	15m	Application Layer ARQ and Network Coding for QoS Improving in UAV-assisted networks, by Danil Vasiliev, Andrew Chunaev, Albert Abilov, Irina Kaysina and Daniil Meitis, Izhevsk State Technical University, Russia	Adaptive Chirikov Map for Pseudo-random Number Generation in Chaos-based Stream Encryption, by Aleksandra Tutueva, Dmitriy Pesterev, Artur Karimov, Denis Butusov and Valerii Ostrovskii, Saint Petersburg Electrotechnical University "LETI", Russia
16:45	15m	Digital Passport for Unmanned Vehicles, by Vadim Manaenko, Ivan Berman and Alexander Kapitonov, ITMO University, Russia	Event-Driven Video Services for Monitoring in Edge-Centric Internet of Things Environments, by Nikita Bazhenov and Dmitry Korzun, Petrozavodsk State University (PetrSU), Russia
17:00	15m	Driver Behavior Monitoring Based on Smartphone Sensor Data and Machine Learning Methods, by Friedrich Lindow, University of Rostock, Germany, and Alexey Kashevnik, SPIIRAS, Russia	Temporal Evaluation of Adaptive Neuro-Fuzzy Inference System for Rainfall Time Series Modeling, by Nittaya Kerdprasop and Kittisak Kerdprasop, Suranaree University of Technology, and Paradee Chuaybamroong, Thammasat University, Thailand
17:15	15m	UAS (drone) Arctic Challenges - Next Steps, by Vadim Kramar, Oulu University of Applied Sciences, Finland	Memristor Based Chaotic Circuits for Inductive Sensing, by Timur Karimov, Olga Druzhina, Valerii Ostrovskii, Denis Butusov and Aleksandra Tutueva, Saint Petersburg Electrotechnical University "LETI", Russia

Session: Preparation to Demos/Posters session and Pecha Kucha pitches
Room: Exactum building open space   Chairman: Ksenia Lagutina

17:30	30m	Pitch presentations of posters and demos (2min/pitch)

Session: Conference social event combined with Demo and Poster session
Room: Exactum building open space   Chairman: Ilya Paramonov

18:00	3h	**Demo & Poster Session combined with Social Event** **Exactum building open space**
21:00		**Closing of Day**

November 8 (Friday)
University of Helsinki, Kumpula Campus, Exactum building, Pietari Kalmin katu 5, 00560 Helsinki

09:00	30m	**Conference Registration and Coffee, Lobby of Exactum building**		
		Session: Innovative Drone Enhanced Applications (IDEA19 Industry track) **Room:** Exactum, CK112 Chairman: Vadim Kramar		
09:30	40m	**Keynote talk:** Drone Based Operation Support System for Ice Navigation, by Rune Storvold, NORCE, Norway		
10:10	35m	**Workshop Keynote:** Drone Consortium Development and Commercialisation Examples from Denmark & Iceland, by Patrick Halford, Gaoithe, Finland		
10:45	15m	How to boost your drone-based business with research?, by Hannu Karvonen, Lead of Research Alliance for Autonomous Systems, VTT, Finland		
11:00	15m	Horizon 2020 and Horizon Europe opportunities, by Pekka Rantala, Senior Advisor and Horizon 2020 National Contact Point (ICT, Health & Cybersecurity), Business Finland, Finland		
11:15	15m	Is Urban Air Mobility ready for business?, by Tero Vuorenmaa, CEO at Robots Expert, Finland		
11:30	1h	**Lunch**		

		Session: ISMW & Natural Language Processing III **Room:** Exactum, B119 Chairman: Svetlana Popova	**Session:** e-Health and Wellbeing I **Room:** Exactum, B120 Chairman: Alexey Rabin	
12:30	15m	Sentiment Analysis of Posts and Comments in the Accounts of Russian Politicians on the Social Network, by Konstantin Platonov and Kirill Svetlov, Saint Petersburg State University, Russia	Development of Program for Synchronous Processing of Surface ECG and Intracardiac Electrograms, by Aleksei Anisimov and Alyona Skorobogatova, Saint-Petersburg Electrotechnical University "LETI", Timofey Sergeev, Institute of Experimental Medicine FSBSI "IEM", Russia	IDEA19 Industry track brain-storming **Room:** Exactum, BK114 *(see pages 18-19)*
12:45	15m	Full-scale Personality Prediction on VKontakte Social Network and its Applications, by Sergey Titov, Pavel Novikov and Larisa Mararitsa, Humanteq, Russia	An Ensemble of Triplet Neural Networks for Differential Diagnostics of Lung Cancer, by Lev Utkin, Anna Meldo, Maxim Kovalev and Ernest Kasimov, Peter the Great St.Petersburg Polytechnic University, Russia	
13:00	15m	Digitalization Effects and Indicators Estimation, by Alexander Geyda, SPIIRAS, Russia	A Comparative Analysis of Machine Learning Algorithms For Healthcare Device Data of Social IoT, by Bhavya D, Ds Vinod and Sp Shiva Prakash, JSS Science and Technology University, India	
13:15	15m	Towards Storytelling Automatic Textual Summarizer, by Yazid Bounab, Joshua Muyiwa Adeegbe and Mourad Oussalah, University of Oulu, Finland	Intelligent Support for Clinical Processes Based on Automata Approach, by Aleksandra Vatian, Natalia Dobrenko, Natalia Gusarova, Anatoly Shalyto, Mark Tkachenko, Vitaly Boytsov and Nikolay Egorov, ITMO University, Anna Tatarinova, Elena Ryngach, Tatiana Treshkur, Almazov National Medical Research Centre, Russia	
13:30	30m	**Coffee break**		

		Session: Big Data and Data Mining **Room:** Exactum, B119 Chairman: Nikolay Teslya	**Session:** e-Health and Wellbeing II **Room:** Exactum, B120 Chairman: Sp Shiva Prakash	
14:00	15m	Improvement of Retail Recommender System by Integration of Heterogeneous Sources of Data and Classification of Customers' Parameters, by Mikhail Melnik and Tatiana Kutuzova ITMO University, Russia	Comparative Study of Data Augmentation Strategies for White Blood Cells Classification, by George Kolokolnikov and Andrey Samorodov, Bauman Moscow State Technical University, Russia	IDEA19 Industry track Session II **Room:** Exactum, CK112

14:15	15m	Modern Implementations of Feature Selection Algorithms and their Perspectives, by Nikita Pilnenskiy and Ivan Smetannikov ITMO University, Russia	Development of Neural Network-based Approach for QRS Segmentation, by George Kolokolnikov and Anna Borde, Medicom LLC, and Victor Skuratov, All-Russian Research Institute of Radio Engineering, Russia	
14:30	15m	Remote Collaborative Knowledge Discovery for Better Understanding of Self-tracking Data, by Lauri Tuovinen and Alan Smeaton, Dublin City University, Ireland	Identifying the Relationship between Non-Stem Cancer Cell and Cancer Stem Cell Genes for Breast Cancer: An In-Silico based Approach, by Monalisa Mandal, Xavier University and Sanjeeb Sahoo, Institute of Life Sciences, India	
14:45	15m	Real-time bidding with Soft Actor-Critic Reinforcement Learning in Display Advertising, by Daria Yakovleva, Artem Popov and Andrey Filchenkov, ITMO University, Russia	Development of Portable Cardiograph Using Novel Front-End Solutions, by Aleksei Anisimov, Boris Alekseev and Dmitrii Egorov, Saint-Petersburg Electrotechnical University "LETI", Russia	IDEA19 Industry track Session II **Room:** Exactum, CK112 *(see pages 18-19)*
15:00	15m	Regularized Multimodal Hierarchical Topic Model for Document-by-Document Exploratory Search, by Anastasia Ianina and Konstantin Vorontsov, Moscow Institute of Physics and Technology, Russia	Database Acquisition for the Lung Cancer Computer Aided Diagnostic Systems, by Anna Meldo and Vladimir Zaborovsky, Clinical Research Center of Specialized Types of Medical Care, Lev Utkin, Aleksey Lukashin and Vladimir Muliukha, Peter the Great Saint Petersburg Polytechnic University, Russia	
15:15	15m	The Application of Interpretive Structure Model in Evaluating Criteria for Online-Hotel-Booking-Website, by Mahak Sharma, National Institute of Industrial Engineering, India, and Rajat Sehrawat, Booking.com, Netherlands	Software Tools for Manual Segmentation of Tomography Images Supporting Radiologist's Personal Context, by Aleksandra Vatian, Natalia Gusarova, Anatoly Shalyto, Artem Lobantsev, Vitaly Boytsov, Nikolay Egorov, Ekaterina Markova and Anton Klochkov, ITMO University, Aleksei Zubanenko, "Teleradiomedicine" LLC, and Roman Soldatov, "Ramsay Diagnostics Rus" LLC, Russia	
15:30	15m	Visual Person Identification device using Raspberry Pi, by Yame Asfia, Sara Tehsin, Areesha Shahzeen and Umar Shahbaz, National University of Sciences and Technology, Pakistan	AIzimov: the Platform for Intellectual Diagnostics of Lung Cancer, by Alexey Lukashin, Alexander Ilyashenko, Lev Utkin and Vladimir Muliukha, Peter the Great St.Petersburg Polytechnic University, and Anna Meldo, Clinical Research Center of Specialized Types of Medical Care, Russia	
15:45	15m	*Moving to auditorium CK112 for official closing of the conference*	Operability of Implantable Integrated Implants' Wireless Charging Device and Biotelemetric System, by Alexey Rabin and Anastasia Petrushevskaya, SUAI University, Russia	
16:00	15m	**Official closing of the 25th FRUCT conference, Exactum, CK112**		

Thank you and looking forward to see you at the 26th FRUCT in Yaroslavl, Russia on April 20-24, 2020!

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:

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.).

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**.
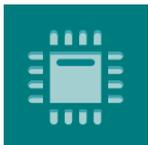
Authors of the best papers of FRUCT conference can get invitation to publish extended version of the paper in the Sensors Journal (impact factor 3.031, Scopus indexing, etc.) with **10% discount**.

Demo Session of the 25th FRUCT Conference

Time: 7 November 2019   Place: University of Helsinki, Kumpula Campus, Exactum bld.
Time: 17:30 – 21:00   Ernst Lindelöfin katu 1, 00560 Helsinki

The Demo section of the 25th FRUCT conference will be combined with the conference social event. The first part is a promotional section to present/introduce demo projects to the public. Presentations will be done following the Pecha Kucha style. Main idea of this section is to make people aware of the demo and become interested to visit the demo stand at the second part of the session. During the second part of demo session teams get a place to install the demo and poster. 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/demo25.

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 October 30, 2019*)

1. ***Demo: Constructing a Digital Person Profile from Open Internet Content, by Artur Harkovchuk and Dmitry Korzun, Petrozavodsk State University***

   The Internet is a rich and ever-growing collection of data on specific people. Large companies are establishing special analytical departments to build digital profiles of people. The paper considers the task of building a digital profile of a person for use by mass consumers. A service is being developed to search for personal data, references in various sources, collateral information and hypotheses based on the information found. The functionality of the service is based on the operability of the developed intelligent decision-making system, which provides the procedure for using the modules for searching and analyzing information connected to it to ensure the best result. To reduce the load, a distributed computing system has been developed that uses user devices to reduce the load on the main server. The resulting prototype shows the possibility of compiling various targeted digital profiles without the use of large computing resources, limited to common Internet hosts and resources of personal mobile devices (e.g., smartphone).

2. ***Demo: Application for measuring the distance from person to object, by Vsevolod Averkov and Kirill Kulakov, Petrozavodsk State University***

   Monitoring the implementation of the restricted access to the nodes of the equipment at the enterprise is an urgent task. One of the ways to solve this problem is to monitor staff and identify moments of contact with equipment nodes. The article presents a software tool for monitoring the work area. The application allows you to measure the distance from the worker to any object and when approaching it to notify. This article is an additional module to the article "Application for the Determination of User Interaction with the Objects Using a Camera".

3. ***Demo: Basic Event Detector for a Data Flow in Production Equipment Monitoring, by Nikita Besedny and Dmitry Korzun, Petrozavodsk State University***

   The presented demo is part of the developed system for multi-parameter monitoring of production equipment. An equipment unit is augmented with multiple sensors for physical parameters (temperature, vibration, tachometer/accelerometer, voltage, sound, etc.). The system transforms the data to the digital form and transfer to the local server. For each sensor the server runs an appropriate data processor (software module) that analyzes the data flow for detecting basic events. In this demo, we consider such events as the parameter exceeds the predefined bounds or the parameter changes drastically. The considered basic events are basic blocks for constructing complex events when a set of basic events form a semantically interlinked structure.

4. ***Poster: GenZ – Strengthening Human Capabilities in the New Digital Era, by Pentti Haddington, Rauli Svento, Sanna Järvelä, Jarkko Saarinen, Netta Iivari and Lotta Haukipuro, University of Oulu***

   Generation Z and beyond: Co-evolution of human capabilities and intelligent technologies in the 21st century (GenZ) is a strategic profiling theme of the University of Oulu, funded by the Academy of Finland. It involves researchers from several fields of sciences. GenZ aims to respond to the challenges rapidly developing new technologies will have on human lives in the 21st century. GenZ aims to strengthen human capabilities, anticipate future challenges and increase human resilience through world-class interdisciplinary research within the identified themes. In the GenZ project, we do not want to take humans for granted. Rather, we ask the following: What if the digital future was not driven by digital technologies but by humans? What do we need to do to strengthen human skills and capabilities and to enable a human-driven digital future? GenZ tackles one aspect of the digitalisation challenge: it recognises that new technologies – Artificial Intelligence (AI), Internet of Things (IoT), Virtual/Augmented Reality/Mixed Reality (VR/AR/XR), robotics and 5G – are rapidly developing and becoming more intelligent, invisible and ubiquitous. At the same time, GenZ claims that contemporary approaches to technological transformation take the human-being for granted and are too narrow. These approaches focus on the development of ICT, new technological solutions and applications, or the possibility to utilise intelligent technologies to develop and increase business. They merely focus on how humans, communities or societies react or adapt to new technologies and how people use a technology after it has been developed and designed; or they predict dystopian futures emerging from the co-existence between humans and technology. GenZ turns this perspective inside out. It claims that the world cannot solely be led by intelligent technologies because they lack capacities that are profoundly human, such as the capability to sense and display emotions, establish shared meanings in interactions with others, and solve complex societal problems in ethical, creative and flexible ways. Intelligent technologies will continue to transform our everyday lives at an increasing pace in the 21st century. They will provide new forms of interaction and learning and relieve humans of routinised or highly complex tasks in all walks of life. Consequently, a concerted response is needed to generate research-based knowledge about the co-evolution of humans and intelligent technologies. The aim of GenZ is to connect the expertise in human sciences with

the world-class research in digital technologies at the University of Oulu and produce new knowledge about the co-evolution of humans and intelligent technologies in a human-driven digital future.

5. **Poster: Big Data analysis for predictive maintenance at INFN Italian data center using Machine Learning approaches, by Leticia Decker de Sousa, Fabio Viola, Simone Rossi Tisbeni, Barbara Martelli, Daniele Bonacorsi and Luca Giommi, National Institute of Nuclear Physics (INFN) – Bologna and INFN CNAF**
Predictive maintenance is a hot topic in research, involving several domains - both scientific and commercial - aimed at increasing the operational efficiency and reducing costs by predicting and preventing faults. The ultimate goal of this project is to build a complete predictive maintenance solution for a data center, based on content extraction from the log files of the services running onsite. Currently, the major Italian Worldwide LHC Computing Grid data center (INFN-CNAF in Bologna) mainly relies on reactive maintenance. The ability to predict future occurrences of problems is a crucial asset in terms of operational efficiency and automation, as well as to reduce overall costs. In order to improve the data center QoS, this work uses the log data as feedstock. Typically, log files are unstructured or semi-structured and heterogeneous data used to extract helpful information for maintaining a computing system. In general, because of its characteristics, this kind of data is hard to work with the standard ML supervised solutions without a deeply time and resource-consuming solution. In addition, this information can be complemented with environment collected data aimed at refining the event predictions or the system diagnostics. In this poster, we present a highly portable plug-and-play approach addressing the main challenges in predictive maintenance for large data centers.

6. **Poster: Adaptive Tuner for Target-Aware Hyperparameter Tuning in Deep Learning, by Tien-Fu Chen and Chien-Chih Chen, National Chiao Tung University**
Contemporary Deep Learning (DL) models are usually very complex with many weight parameters and hyperparameters. The weight parameters are learned by given data in the training framework. Since the neural network training process is time-consuming, trial and error for tuning the suitable value set cost lots of time and computation resource because of the huge hyperparameters combinations. Therefore, many frameworks integrate the existing tuning algorithm to make users easier to search hyperparameters. The challenges for non-professional users exist to choose the suitable tuning algorithm for the better performance. In this poster, we proposed an automated tuner selection system, which automatically selects tuner from a set of tuners for given budget based on previous result. Moreover, we combined with the knowledge pool for accumulate the history data to further improve the performance and efficiency. Experimental results show our work can outperform any tuner in the tuners set for both the performance and efficiency.

7. **Poster: A big data infrastructure for predictive maintenance in large data centres, by Samantha Bandini, Daniele Bonacorsi, Leticia Decker de Sousa, Luca Dell'Agnello, Cristina Duma, Antonio Falabella, Barbara Martelli, Simone Rossi Tisbeni, Davide Salomoni, Daniele Spiga, Fabio Viola and Cristina Vistoli , MyDev, INFN Bologna, INFN CNAF and INFN Perugia**
Predictive maintenance is a new trend in research involving different application domains. Among its advantages (compared to corrective and preventive maintenance), there is a substantial reduction in costs obtained by predicting faults before they occurs. Switching from a reactive to a predictive maintenance approach is a challenging task. We hereby present the first step involving the Italian INFN (National Institute of Nuclear Physics) and its Tier-1 data center: the setup of a modular, scalable infrastructure for predictive maintenance of large data centers. Since 2003 the data centre server hosts not only some of the biggest High Energy Physics experiments, like the Large Hadron Collider ones (ALICE, ATLAS, CMS and LHCb) but also other from the astrophysics and astroparticle fields. In this context, logs from 1197 machines are currently being collected, together with environmental data and infrastructure data. It is then easy to understand how a predictive maintenance approach is appealing for managing an infrastructure of such dimensions.

8. **Poster: Trust, Security and Privacy for HELIOS, by Tommi Meskanen and Valtteri Niemi, University of Helsinki**
HELIOS is a social media platform that is modular, peer-to-peer, open-source and open for developers to build their apps. It is developed under EU Horizon 2020 project by 15 partners around Europe, both industrial and academic.

9. **Poster: Clusterisation of unstructured log entries based on measurements of Levenshtein distance, by Simone Rossi Tisbeni, Daniele Bonacorsi, Barbara Martelli, Fabio Viola, Leticia Decker de Sousa, Tommaso Diotalevi and Luca Giommi, INFN - Bologna, INFN-CNAF and University of Bologna**
With the upcoming start of Run-3, and especially Run-4, the amount of data managed by the Tiers centres of the WLC Grid is expected to massively increase. In this context, the importance of using efficient routines for the analysis of the incoming data is crucial to ensure the effectiveness of the HEP experiments. The actionable data that is available for the analysis includes also the logging data produced by each computing node of the WLCG infrastructure. Many information could be extracted from these sources, regarding the

state of the system, and proper analysis of this data could result in better insight on its working state and eventually predict and prevent faults and errors. While efforts towards the extraction of these insights have enormous potential advantages, it should be ensured that this type of analysis does not require the use of large amount of resources that would preferably be assigned to the experiments. In this context, the INFN-CNAF Tier 1 group, is promoting an effort to introduce a Log ingestion and analytics platform across its services, to explore possible solutions for the development of Predictive Maintenance model to detect and anticipate failures. One of the first results has been the development of a Log clustering algorithm based on measures of text similarity that classifies the lines of unstructured log files into communities according to their content. After testing different text-based similarity measures, an algorithm based on the Levenshtein distance was selected as the one offering the highest number of significant clusters, while keeping the running time and the resources required below an acceptable threshold. The algorithm follows a totally unsupervised procedure and applies to different log files with minimum adjustments. The algorithm was tested on log files from the main components of the Storage Resource Manager (StoRM) and managed to spot discrepancies in the number and type of clusters, enabling a clear visualisation of an anomalous behaviour present in the log file.

10. **Demo: Analysis of the drivers behavior in Drive Safely system, by Alexey Kashevnik and Andrew Ponomarev, SPIIRAS**

Drive Safely system is aimed at driver monitoring using the smartphone and statistics accumulation in the cloud. The developed application allows monitoring drowsiness and distraction dangerous events based on computer vision technologies. Based on accumulated statistics it is possible to analyze the driver behavior using the continuous monitoring data. E.g., based on the driver trips for few months it is possible to determine most popular distraction angles from the road. Based on drowsiness events as well as light sensor it is possible to determine drowsiness events and correlation between the driver eye openness and light level.

11. **Demo: Natural language processing: soft word and phrase search in a free text, by Nikolay Shilov and Alexey Kashevnik, SPIIRAS**

The demo is a result of experimentation software prototype development for extracting certain information from free texts written in natural language. Complex tasks are often difficult for customers to specify since there are a lot of parameters to define and the customer should perfectly know what is really needed and important for the supplier. This means that the negotiation has to take place that take significant time and efforts. A good start for such a negotiation is usually a request describing the customer requirements in a form of free text written in natural language, and it is very important to extract as much information from it as possible. In the demo a pre-defined list of terms (sometimes with synonyms) that are important for order specification is used. The terms are searched for in a soft manner (not an exact search is performed) in the text. The demo is based on an illustrative example from automotive industry. One can enter free text specification of the desired car configuration (misspelled words are welcome) and check which parameters are found by the prototype. The results are highlighted for illustrative purposes. It is also possible to see the list of source parameters and synonyms.

12. **Poster: Towards Conversation Chatbot for Educational Purpose, by Sofeem Nasim, Mourad Oussalah and Murad Ahmed, University of Oulu**

Chatbots are one of category of intelligent, conversation agents stimulated by natural language input and provide conversation output in response. This technology initiated in early 1960's, since then numerous amounts of methodology is used to develop a competent chatbot, which can interact with the user and mimic human conversation. Natural Languages Processing provide ample toolkits for understanding the contextual concept of text. In this study, utilizing the NLP toolkit we developed a rule based chatbot, which responses to user input, after identifying the dialogue act type and grasp the topic discussion of user input.

13. **Demo: Driver face landmarks recognition on NVIDIA Jetson Nano microcomputer, by Nikolay Teslya and Igor Lashkov, SPIIRAS**

The demo shows the launch of a driver's face landmarks recognition system module from Drive Safely application on an NVIDIA Jetson Nano device. This device is a microcomputer based on the ARMv7 microprocessor, a feature of which is the integrated video module based on NVIDIA with 128 NVIDIA CUDA cores. The system performance is sufficient to run pre-trained neural networks and process the video stream from the camera in real time. The face landmarks recognition module from the Drive Safely mobile application has been adapted for operation based on neural networks and launched on the NVIDIA Jetson Nano device. Video stream is processed frame-by-frame in two-stage process. On the first stage, the neural network detects all faces on the frame. On the second stage for each found face the face landmark points are detecting. At the end, all faces are highlighted with rectangles and inside each rectangle all face landmarks are drown. The tests performed showed a performance increase in recognizing landmarks on the face by

8.7% with the same size of the processed image (85 ms on NVIDIA Jetson Nano vs 94 ms on Samsung Galaxy S10e). According to the tests conducted, the best performance is reached while image size is 350x350 pixels.

14. **Demo: Drive Safely application statistics visualization portal, by Nikolay Teslya, Sergei Mikhailov and Igor Lashkov, SPIIRAS**

    Drive Safely is an application for detecting driver dangerous states (distraction and drowsiness) and assisting to avoid accidents by providing recommendation to the driver. The system gathers driving statistics and provide visualization of the key points on a website. Driver uses a special application on smartphone, which detects dangerous states and sends data to the backend part of the Drive Safely system. This data includes information about coordinates, speed, acceleration on three axis, velocity, etc. The Drive Safely application statistics visualization portal consist of two parts: backend, which parse incoming driver data, and frontend part, which represents data. Backend is written on Python language and use asynchronous server framework aiohttp with asyncpg library for asynchronous connections for PostgreSQL database. Using asynchronous mechanisms when building an application allows numerous driver requests scaling. PostgreSQL database is extended with PostGIS module that provide various functions to process geographical geometries such as points, lines, polygons, etc. The frontend part is written on JavaScript language and designed as SPA (single page application), based on Vue.js framework. It operates on the client side based on data received from the backend with using the JSON format. Drive safely application portal provides functions to show driver's track with basic data and information about dangerous events and offer driver to rate travel.

15. **Demo: Employee Monitoring Web-based Video System for Production Purposes, by Nikita Bazhenov, Vyacheslav Dimitrov and Dmitry Korzun, Petrozavodsk State University**

    Video surveillance is an important part of the monitoring process in the enterprise, where it is necessary to monitor the production equipment. In this demo, we want to consider several video services built around employees at a manufacturing enterprise. Video services are built on the basis of events that occur in the enterprise. Such events are important from the point of view of detecting various timely deviations during production, tracking personnel and notifying emergency situations to workers using personal mobile devices and warning systems. Video services are presented in the form of: determining the presence or absence of a worker in the field of production equipment, determining the distance from a person to a camera or machine, monitoring the current state of the area using several video cameras. Video services are presented on the Web using IoT-technologies.

16. **Demo: Mobile app for cycling training with health monitoring, by Maxim Yatskovskiy, FRUCT MD LTd.**

    The demo presents smartphone application for cycling with additional control of health parameters. The application allows you to correlate the route, data from the sensors of the bicycle and some health indicators based on heart rate activity and physical activity. You can analyze the data in the application or on the website, where training data is also presented.

17. **Poster: VIENA Games - Gamification Concepts and Game Prototypes for Learning and Teaching Karelian Language, by Leena Arhippainen, University of Oulu**

    How to increase an awareness of Karelian language in Finland? General public does not often know what Karelian language means, which dialects it includes and how many Karelian speakers there are in Finland and in Russian, in the Republic of Karelia. Karelian is classified as a minority and endangered language. Different actions for revitalizing the Karelian language and culture have been made during the several years in Finland. However, more effort is needed, especially to developed new and easily accessible ways to learn and teach Karelian. We propose that gamification and serious games could be used as tools for revitalizing Karelian language and culture. Especially new services and digital tools should be developed for teachers and Karelian actives for enabling a creation of new database of both old and modern Karelian words. In addition, we need to provide digital ways for learning and teaching Karelian context-independently. This poster presents early gamification concepts and game prototypes for revitalizing Viena Karelian, which is one dialect of Karelian language. These concepts and prototypes can be utilized for all dialects of Karelian language. Because Karelian language is endangered minority language, strong modern digitalized activities are needed in near future to enable collecting language data (e.g. words), store it and use the database for language learning and teaching.

18. **Poster: A Step-Shaped Hierarchical QAM, by Seongjin Ahn, Mingyu Jang and Dongweon Yoon, Hanyang University**

    In this paper, a step-shaped hierarchical quadrature amplitude modulation with two high-priority bits, 4/K-stepped ϑ-QAM, is proposed for $K = 22k$ and $k \geq 3$. We provide a construction method of the signal constellation and present a bit-to-symbol mapping for the proposed 4/K-stepped ϑ-QAM. Through computer simulations, we present bit error rate performance of 4/K-stepped ϑ-QAM in single-input single-output and multi-input multi-output systems by adopting adaptive QR decomposition-M detection and compare with that of the conventional hierarchical constellations.

The Second International Workshop on Advances in Innovative Drone Enhanced Applications (IDEA'19)

Time: 7-8 November 2019   Place: University of Helsinki, Kumpula Campus

Drones are starting to be part of our daily lives, becoming vital for ensuring services in different fields such as precision farming, security, aerial inspection, media and explorations. Opportunities offered by drones, as leverage for jobs and new business, are based on recent technological developments acting as a catalyst for innovative applications with great economic potential.

The IDEA19 workshop is organised by Arctic Drone Labs (Finland), Oulu University of Applied Sciences (Finland), University of Oulu (Finland), University of Helsinki (Finland), University of Bologna (Italy), The Research Alliance for Autonomous Systems (Finland), Robots Expert (Finland) and FRUCT (Finland) with the aim of bringing together people interested to discuss and enlighten the challenges, the opportunities and the long term ambitions of innovative drone applications and technologies. IDEA19 is addressed to researchers, stakeholders and enterprises active in this domain.

The workshop program consists of research and industrial tracks. The research track is organized as a regular session of the FRUCT conference. The Industry Track of IDEA19 aims to discuss business potential, business and research needs, regulations, funding opportunities, and other topics of the community interests.

Workshop keynote speaker

Patrick Halford is CEO of Gaoithe, based in Otaniemi, which helps develop Nordic consortiums between industry, startups, research, academia and institutions. He is on the faculty of Singularity University for mobility & drones, and a Senior Advisor to Gaia Consulting. He is on the board of a number of Nordic drone and space startups and a mentor at startup accelerators in Turku, Copenhagen, Reykjavik and the Basque Region. He has worked on ecosystem developments in Denmark, Iceland and Finland (Kotka/Cursor) and he is part of the Danish Drones4Energy consortium. He is also a conference moderator and speaker, and he teaches business model innovation at Hanken & SSE Executive Education.

His keynote talk on ***Drone Consortium Development and Commercialisation Examples from Denmark & Iceland*** is scheduled for **Nov 8 at 10.10-10.45**.

Workshop program

November 7 (Thursday)
University of Helsinki, Kumpula Campus, A.I. Virtasen aukio 1, 00560 Helsinki

Session: Workshop on Advances in Innovative Drone Enhanced Applications (IDEA19)		
Room: Physicum, E207		Chairman: Vadim Kramar
16:00	15m	ROS-based Integration of Smart Space and a Mobile Robot as the Internet of Robotic Things, by Arslan Siddique and Ilya Afanasyev, Innopolis University, David Uchechukwu, Kazan Power Engineering University, Russia, and Aizhan Maksatbek, Yildiz Technical University, Turkey
16:15	15m	An Algorithm for Incident Detection Using Artificial Neural Networks, by Yong-Kul Ki, Woo-Teak Jeong, Hee-Je Kwon and Mi-Ra Kim, Road Traffic Authority, South Korea
16:30	15m	Application Layer ARQ and Network Coding for QoS Improving in UAV-assisted networks, by Danil Vasiliev, Andrew Chunaev, Albert Abilov, Irina Kaysina and Daniil Meitis, Izhevsk State Technical University, Russia

16:45	15m	Digital Passport for Unmanned Vehicles, by Vadim Manaenko, Ivan Berman and Alexander Kapitonov, ITMO University, Russia
17:00	15m	Driver Behavior Monitoring Based on Smartphone Sensor Data and Machine Learning Methods, by Friedrich Lindow, University of Rostock, Germany, and Alexey Kashevnik, SPIIRAS, Russia
17:15	15m	UAS (drone) Arctic Challenges - Next Steps, by Vadim Kramar, Oulu University of Applied Sciences, Finland
17:30	30m	Preparation to Demos/Posters session and Pecha Kucha pitches
18:00	3h	**Demo & Poster Session combined with Social Event** **Exactum building open space**

November 8 (Friday)
University of Helsinki, Kumpula Campus, Exactum building, Pietari Kalmin katu 5, 00560 Helsinki

09:00	30m	Registration to IDEA19 industry track, networking and morning coffee, **Lobby of Exactum building**
		Session: Innovative Drone Enhanced Applications (IDEA19): Industry track session I **Room:** Exactum, CK112 Chairman: Vadim Kramar
09:30	40m	**Keynote talk:** Drone Based Operation Support System for Ice Navigation, by Rune Storvold, NORCE, Norway
10:10	35m	**Workshop Keynote:** Drone Consortium Development and Commercialisation Examples from Denmark & Iceland, by Patrick Halford, CEO at Gaoithe, Finland
10:45	15m	How to boost your drone-based business with research?, by Hannu Karvonen, Lead of Research Alliance for Autonomous Systems, VTT, Finland
11:00	15m	Horizon 2020 and Horizon Europe opportunities, by Pekka Rantala, Senior Advisor and Horizon 2020 National Contact Point (ICT, Health & Cybersecurity), Business Finland, Finland
11:15	15m	Is Urban Air Mobility ready for business?, by Tero Vuorenmaa, CEO at Robots Expert, Finland
11:30	1h	**Lunch**
		Session: Innovative Drone Enhanced Applications (IDEA19): Brainstorming and planning **Room:** Exactum, BK114 Chairman: Vadim Kramar
12:30	1h	Group work
13:30	30m	**Coffee break**
		Session: Innovative Drone Enhanced Applications (IDEA19): Industry track session II **Room:** Exactum, CK112 Chairman: Vadim Kramar
14:00	15m	Regulations 2020 forward, Henri Hohtari, Senior Inspector, The Transport and Communications Agency Traficom, Finland
14:15	15m	Innovative use of UAV in national weather service, by Anne Hirsikko, Head of Atmospheric and Environmental Research Group, Finnish Meteorological Institute, Finland
14:30	15m	How Wind Lidar Technology can Support Unmanned Aircraft System (UAS) Operations?, by Tapio Haarlaa, Head of Aviation, Strategy and Business Development Vaisala, Weather and Environment Business Area, Finland
14:45	15m	Airborne Emission Monitoring, by Vesa-Pekka Murtovaara, COO at Aeromon, Finland
15:00	15m	Autonomous Drones - Operational Risks and Safety Assessments, by Gokul Krishna Srinivasan, CTO at Third Space Auto, Finland
15:15	15m	Business Finland funding opportunities, by Pekka Rantala, Horizon 2020 National Contact Point (ICT Sector), Business Finland, Finland
15:30	15m	How IoT can Support UAS Applications?, by Pekka Jokitalo, Lead of SuperIoT, Finland-based IoT Alliance and Development Program, Finland
15:45	15m	Arctic Drone Labs and the Arctic Challenges, by Vadim Kramar, Lead of International Activities and Collaboration of Arctic Drone Labs, Finnish drone expertise, Finland
16:00	5m	**Closing of the Industry Track of IDEA19 workshop, by Vadim Kramar**
16:00	10m	**Closing of the 25th IEEE FRUCT conference, by Sergey Balandin**

FOR NOTES

The 25th Conference of Open Innovations Association FRUCT

Program

Helsinki, Finland
5-8 November 2019

A special word of thanks goes to the

Department of Computer Science, University of Helsinki, Helsinki Institute for Information Technology (HIIT), and IEEE Finland Section for sponsoring the conference

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

Sensors Journal for patronship of the organizing team

CALL FOR PARTICIPATION
26th Conference of Open Innovations
Association FRUCT
Yaroslavl, Russia, 20-24 April 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. Traditionally the program consists of FRUCT work groups meetings and intensive (half or full day) technology trainings scheduled for Tu. **The main conference program is for Wed-Fri.** 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. Thanks to sponsors we traditionally have low registration fee and various discounts can be applied. For further details refer to http://www.fruct.org/cfp 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
- ✓ Security and Privacy: Applications and Coding Theory
- ✓ Natural Language Processing, Speech Technologies
- ✓ Software Design, Innovative Applications
- ✓ 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
- ✓ Intelligence, Social Mining and Web
- ✓ IoT based Water Distribution Management
- ✓ IoT and CPS solutions for societal challenges

Call for papers

Depending on the type and maturity level please submit your work into one of the following 3 categories:
- **Full paper** (min 6 full pages, max 12 pages)   **OR**   • **Short paper** (min 2 pages, max 6 pages)

Submission deadline: <u>28 February 2020</u>   Early-bird deadline: <u>7 February 2020</u>

Notification of acceptance: **23 March 2020**   Camera-ready deadline: **30 March 2020**

- **Poster / Demo proposal:** submission deadline: **13 April 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/conference26. If you get some questions that are not covered at the conference web page, feel free to send email to info@fruct.org.