Huawei Future Device Technology Summit Program

November 8-9, 2022
Crowne Plaza Helsinki
FINLAND

HUAWEI

Huawei Future Device Technology Summit

November 8-9, 2022 | Helsinki, Finland

8th of November 2022 | DAY 1 | Room: TÖÖLÖ 2

AGENDA

	7:30-8:10	**Registration Desk Open**
	08:10- 08:15	**Welcome Words** Dr. Guoping Luo
	08:15 - 08:30	**Huawei Opening Speech** Mr. Jia Xu, President of Huawei Finland Research Center
Session 1: Wearable Devices 穿戴技术	08:30– 09:10	**Can Wearable and Mobile Technologies Influence Trends in Non-Communicable Diseases** Prof. Jaakko Tuomilehto, University of Helsinki and THL, Finland
	09:10-09:50	**Minimally Invasive Approaches to Managing Diabetes** Prof. Tony Cass, Imperial College London, UK
	09:50-10:00	**COFFEE BREAK**
	10:00-10:40	**Wearable Devices for Health Monitoring: Present Perspectives and Future Vision** Dr. Peter Charlton, University of Cambridge, UK
	10:40-11:20	**Advanced Monitoring Technologies with Potential for Wearables: Dynamic Laser Speckle and Photoacoustics** Prof. Wiendelt Steenbergen, University of Twente, Netherlands
	11:20-12:00	**Time-Domain Diffuse Optics for Non-Invasive Assessment of Tissue Biomarkers** Prof. Antonio Pifferi, Polytechnic University of Milan, Italy
	12:00-12:40	**Thick SOI Silicon Photonics Platform for Sensing** Dr. Pekka Pursula, VTT, Finland
	12:40-13:40	**LUNCH**
	13:40-14:20	**PANEL DISCUSSION**
Session 2: Sport and Health 运动算法	14:30-15:10	**KIHU, Elite Sport and Technology** Dr. Aki Salo, KIHU, Finland
	15:10-15:50	**EarEEG and Healthcare Applications** Prof. Michel Le Van Quyen, Inserm, France
	15:50-16:00	**COFFEE BREAK**
	16:00 - 16:40	**Time-Resolved Diffuse Optics Transceivers for Wearable Healthcare and Sport Applications** Dr. Jan Nissinen, University of Oulu, Finland
	16:40-17:20	**The INTERLIVE®-network: Progress, Outcome and The Future of The Consortium** Prof. Moritz Schumann, German Sport University, Germany
	17:20-18:00	**PANEL DISCUSSION**
	18:00-18:05	**Day Close** Mr. Siqi Hao

8th of November 2022 | DAY 1 | Room: TÖÖLÖ 1

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	7:30-8:10	**Registration Desk Open**
	08:10- 08:15	**Welcome Words** Mr. Toni Sormunen
	08:15 - 08:30	**Huawei Opening Speech** Mr. Jia Xu, President of Huawei Finland Research Center
Session 1: CG/UI	08:30– 09:10	**The Future of Game Development and Social Play Is Here** Mr. Jarno Kallunki-Mättö, Hypehype, Finland
图形技术	09:10-09:50	**The Success of React Native and How Open Harmony Can Take Advantage of It** Mr. Krzysztof Magiera, Software Mansion, Poland
	09:50-10:00	**COFFEE BREAK**
	10:00-10:40	**Intelligent Cross-Device Interfaces: Towards a New Paradigm** Prof. Antti Oulasvirta, Aalto University, Finland
	10:40-11:20	**Anti-Aliased Tiled Path Filling with Stencil then Cover** Dr. Kevin Rogovin, InVision, US
	11:20-12:00	**The Human-Eye Resolution XR and The Reality Cloud: Use Cases from Varjo** Dr. Ferhat Sen, Varjo Technologies Oy, Finland
	12:00-12:40	**Recent Development in Graphics Benchmarking in UL Solutions 3Dmark Benchmarks and Services** Mr. Pasi Virtanen, UL, Finland
	12:40-13:40	**LUNCH**
	13:40-14:20	**PANEL DISCUSSION**
Session 2: Camera: algorithm	14:30-15:15	**Practical Image Restoration Transformer** Dr. Kai Zhang, ETH Zurich, Switzerland
Camera算法	15:15-16:00	**Vision-Based 3D Human Modeling and Rending** Prof. Janne Heikkilä, Oulu University, Finland
	16:00-16:30	**COFFEE BREAK**
	16:30 - 17:15	**Mobile Hybrid Diffractive Imaging** Prof. Karen Eguiazarian, Tampere University, Finland
	17:15-18:00	**Pushing the Limits of Real-Time Visual-Inertial Odometry** Prof. Juho Kannala, Aalto University, Finland
	18:00-18:05	**Day Close** Mr. Eero Salmelin

Huawei Future Device Technology Summit

8th - 9th November 2022 | Helsinki, Finland

9th of November 2022 | DAY 2 | Room: TÖÖLÖ 2

AGENDA

	7:30-8:10	**Registration Desk Open**
	08:10- 08:15	**Welcome Words** Mr. Eero Salmelin
	08:15 - 08:30	**Huawei Opening Speech** Mr. Yuanwen Liu, President of Huawei Tampere Research Center
Session 1: Camera	08:30– 09:15	**Modern Optical Design at The Age of AI** Prof. Simon Thibault, Laval University / Immervision, Canada
Camera硬件	9:15-10:00	**Spectral Imaging for Mobile Devices** Dr. Jonathan Borremans, Spectricity, Belgium
	10:00-10:30	**COFFEE BREAK**
	10:30-11:15	**Metasurface in Lens Design: How and Why It Is A Fascinating New Technology** Prof. Simon Thibault, Laval University / Immervision, Canada
	11:15-12:00	**Developing Innovative Devices with COMSOL Simulations** Dr. Patrick Grahn, Comsol Oy, Finland
	12:00 – 14:15	**LUNCH**
Session 2: Audio	14:15 - 15:00	**AI-driven Hearing Aid Processing** Prof. Trevor Cox, University Salford, UK
Audio软件	15:00 - 15:45	**Bringing Ultrasonic Sounds Audible and Localizable Using Spatial Super-hearing Techniques** Prof. Ville Pulkki, Aalto University, Finland
	15:45-16:00	**COFFEE BREAK**
	16:00-16:45	**Acoustic Scene Analysis Based Augmented Hearing** Prof. Tuomas Virtanen, Tampere University, Finland
	16:45-17:30	**Sound and Music Technologies of Relevance to Mobile Devices** Prof. Xavier Serra, Music Technology Group, Universitat Pompeu Fabra, Spain
	17:30 - 18:15	**PANEL DISCUSSION**
	18:15-18:20	**Day Close** Mr. Jari Sjoberg

Huawei Future Device Technology Summit

8th - 9th November 2022 | Helsinki, Finland

9th of November 2022 | DAY 2 | Room: TÖÖLÖ 1

AGENDA

	7:30-8:10	**Registration Desk Open**
	08:10- 08:15	**Welcome Words** Dr. Jan Erik Ekberg
	08:15 - 08:30	**Huawei Opening Speech** Mr. Yuanwen Liu, President of Huawei Tampere Research Center
Session 1: Security 系统安全	08:30– 09:00	**Confidential Computing, Attestation & Verification** Mr. Simon Frost, ARM Ltd, UK
	09:00-09:30	**Postquantum Cryptography in Mobile Systems** Prof. Valtteri Niemi, Helsinki University, Finland
	09:30-10:00	**Scalable Collaborative Remote Attestation for Pub/Sub IoT Networks** Prof. Alexandra Dmitrienko, University of Würzburg, Germany
	10:00-10:10	**COFFEE BREAK**
	10:10-10:40	**Blinded Memory** Prof. N. Asokan, University of Waterloo, Canada
	10:40-11:10	**PANEL DISCUSSION**
Session 2: Computer Vision 云视觉搜索	11:20-11:30	**CV Session Introduction** Mr. Kuan Eeik Tan
	11:30-12:10	**From Local Binary Patterns to CNN-based Descriptors, With Applications to Face Analysis** Prof. Matti Pietikäinen, University of Oulu, Finland
	12:10-12:50	**Human Face Recognition: Learning from Biological Deep Networks** Prof. Massimo Tistarelli, University of Sassari, Italy
	12:50 – 14:00	**LUNCH**
	14:00 - 14:40	**Computer Vision for Fashion and Beauty** Prof. Vitomir Štruc, University of Ljubljana, Slovenia
	14:40 - 15:20	**Large Scale Probabilistic Indexing for Efficient Textual Search in Vast Collections of Handwritten Text Images** Prof. Enrique Vidal, Valencia Polytechnic University, Spain
	15:20 - 16:00	**Lightweight Deep Learning for Perception** Prof. Anastasios Tefas, Aristotle University of Thessaloniki, Greece
	16:00-16:10	**COFFEE BREAK**
	16:10 - 16:50	**Transforming Our Future: Signal and Image Processing in Computer Vision** Prof. Mark Nixon, University of Southampton, UK
	16:50 - 17:30	**Deep Learning for Three-Dimensional (3D) Humans** Prof. Mohamed Daoudi, University of Lille, France
	17:30 - 18:30	**PANEL DISCUSSION**
	18:30 - 18:35	**Day Close** Mr. Kuan Eeik Tan

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Prof. Jaakko Tuomilehto

University of Helsinki and THL, Finland

Jaakko Tuomilehto, MD, MA (sociology), PhD is Professor Emeritus of Public Health of University of Helsinki, Finland. His research interests include the epidemiology and prevention of non-communicable diseases such as diabetes, cardiovascular disease, cancer and dementia. He has coordinated numerous scientific research projects and contributed many landmark studies and involved in epidemiological studies. He started his research career with the North Karelia Project in Finland, the first community-based cardiovascular disease prevention program where he was working as a scientist and later as the Principal Investigator. His Finnish Diabetes Prevention Study demonstrated a 58% reduction in incidence type 2 diabetes with lifestyle intervention. This finding was later confirmed by similar trials from many countries He developed a simple, non-laboratory type 2 diabetes risk score FINDRISC (FINnish Diabetes RIsk Score) that has been validated and applied widely globally. He established the DECODE/DECODA (Diabetes Epidemiology-Collaborative analysis of Diagnostic Criteria in Europe/Asia) studies that have assessed the glucose criteria for the diagnosis of diabetes and the importance of postprandial glucose for detection and prognosis of disturbances of glucose regulation. He has contributed to many controlled trials in hypertension, dyslipidaemia, cardiovascular disease.

He has received >35 prestigious scientific awards. He has been acting as a member several American Diabetes Association (ADA), International Diabetes Federation (IDF), European Society of Cardiology (ESC) and WHO committees on diabetes and cardiovascular disease. He is actively involved in several other committees, and advisory boards nationally and internationally and has been chairing multiple scientific organisations. He has served as the Editor-in-Chief of Primary Care Diabetes journal and Editorial Board member in many other scientific journals.

Topic: Can Wearable and Mobile Technologies Influence Trends in Non-Communicable Diseases

Major non-communicable diseases (NCDs), such as cardiovascular diseases (CVD), diabetes, cancer, chronic obstructive pulmonary disease, fatty liver disease and dementia form the majority of disease burden globally. In their etiology lifestyle factors and biological (non-modifiable and modifiable) risk factors are relatively well-known. To reduce the burden by preventing NCDs non-pharmacologic and pharmacologic interventions are necessary.

Lifestyle is based on 3 pillars: diet, physical activity and sleep. In addition, other important modifiable lifestyle risk factors include smoking and excess use of alcohol. In order to understand the magnitude of these problems in individuals and at the population level reliable data are necessary. Although self-reported information is commonly used to obtain data on lifestyle factors, it is well-known that such data are not precise and always biased, and the magnitude of biases cannot be estimated. This may lead to incorrect decisions for the prevention and management of NCDs and their risk factors in individuals. At the population level, the estimation of the burden of NCDs and their risk factors will result in biased findings for their trends

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Prof. Tony Cass

Imperial College London, UK

Tony Cass is Professor of Chemistry in the Department of Chemistry, Imperial College London where his research is focused on point of need and continuous sensing for human, animal, plant and environmental health. Tony graduated in Chemistry from the University of York and has a DPhil from the University of Oxford and he joined Imperial College London after post-doctoral research and a Research Fellowship in Oxford. He is a Fellow of both the Royal Society of Chemistry and the Royal Society of Biology

Tony has held visiting Chairs at the Chinese Academy of Sciences (Wuhan Institute of Virology), Universiti Teknologi, Malaysia and the University of Rome La Sapienza. Tony's research has a strongly translational aspect and he is co-founder of BioNano Consulting Ltd, AquAffirm Ltd and Continuous Diagnostics Ltd. as well as acting as a consultant for a range of technology companies ranging from start-ups to major internationals. His work has been recognized through the award of the Royal Society's Mullard medal, a Royal Society of Chemistry Chemical Landmark award ('Blue Plaque') and the Royal Society of Chemistry's Sir George Stokes Award.

Topic: Minimally Invasive Approaches to Managing Diabetes

Diabetes is a non-communicable disease with a global impact in terms of mortality and morbidity. At its simplest it is defined as the inability to regulate blood (and hence tissue) glucose concentrations and from this derives a host of pathologies including cardiovascular disease, kidney injury, loss of vision, central nerve damage (leading to Alzheimer's Disease), peripheral nerve damage (leading to amputations) and hard to heal ulcers.

Dealing with diabetes consumes 10% of the NHS budget (£14bn pa), a figure that is likely to rise in the coming decades.

Depending on the underlying cause of diabetes it can be managed by diet, exercise and drugs and a combination of these can lead to many years of good health and a productive life. Whilst lifestyle changes and pharmacological interventions are important in the management of diabetes, so too is technological support and in this talk I will illustrate this with a range of examples. These will include: Smart phone apps, wearables and minimally invasive sensors which can be used either separately or in combination. The use of minimally invasive sensors will encompass both the measurement of endogenous biomarkers and therapeutic agents.

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Dr. Peter Charlton

University of Cambridge, UK

Peter Charlton is a British Heart Foundation Research Fellow in the Department of Public Health and Primary Care, at the University of Cambridge. He develops biomedical signal processing techniques to analyze data from wearable devices for clinical decision making.

Peter gained the degree of M.Eng. in Engineering Science in 2010 from the University of Oxford with first class honors. From 2010 to 2020, Peter conducted his research at King's College London, developing techniques to use wearables to monitor cardiovascular and respiratory health. His Ph.D. focused on using signal processing and machine learning techniques to identify acute deteriorations in hospital patients. He developed algorithms to estimate respiratory rate from photoplethysmogram (PPG) and electrocardiogram (ECG) signals, and to assess arterial stiffness and vascular age from the PPG. Peter is currently developing techniques to use identify atrial fibrillation from these signals. He is leading a clinical study to assess the acceptability and performance of wearables in older adults.

Peter works in collaboration with clinicians and industrial partners to translate his work into clinical practice.

Topic: Wearable Devices for Health Monitoring: Present Perspectives and Future Vision

In the future, wearable photoplethysmography devices could be used to monitor the population's health unobtrusively, helping prevent, identify and treat disease. Potential clinical applications for such devices have emerged in only ten years since they entered the consumer market, including detecting atrial fibrillation. Whilst the developments to date are a great achievement, there is potential for wearable photoplethysmography devices to be used for many more clinical applications. In this talk, Peter Charlton will firstly discuss potential future applications such as blood pressure monitoring, sleep apnea detection, and infectious disease surveillance. Second, he will outline key steps required to make these applications a reality: obtaining high quality photoplethysmogram (PPG) signals; reliably extracting physiological information from PPG signals; and using such information wisely to inform clinical decision making. Third, he will discuss challenges in the development of wearable photoplethysmography devices for clinical applications, and potential solutions. It is hoped that this vision will prompt dialogue about how to develop wearable photoplethysmography devices to be of the greatest possible benefit to society.

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Prof. Wiendelt Steenbergen

University of Twente, Netherlands

Wiendelt Steenbergen is professor in Biomedical Photonic Imaging in the Faculty of Science and Technology at the University of Twente, and Vice-dean Research in the same faculty. He obtained an MSc degree in Aerospace Engineering at the Delft University of Technology (1988), a PhD degree in fluid dynamics at the Eindhoven University of Technology (1995) and joined the University of Twente, Enschede (the Netherlands) as postdoc. In 2000 he was appointed assistant professor in biomedical optics and broadened his scope to low-coherence interferometry and photoacoustic and acousto-optic imaging for biomedical purposes. In 2010 he became full professor and group leader of the Biomedical Photonic Imaging group of the University of Twente. His current research interests are speckle based tissue perfusion imaging, combined photoacoustic and ultrasound imaging, tissue perfusion imaging using infrared radiation, and quantification of photoacoustic imaging using acousto-optics. His current medical interest areas are the diabetic foot, transplant surgery and dermatology

Topic: Advanced Monitoring Technologies with Potential for Wearables: Dynamic laser Speckle and Photoacoustics

I will start my talk with a few remarks regarding the challenges posed by the optical behaviour of blood in the microcirculation. Next I will introduce blood flow measurements involving dynamic speckles, how they work, and what may be challenges in wearables. An important issue will be the occurrence of movement artefacts. I will show how these artefacts will depend on the optical configuration of the incoming beam and the light detection arrangement. If time allows I will briefly address photoacoustic imaging.

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Prof Antonio Pifferi

Politechnic University of Milan, Italy

Prof. Antonio Pifferi is Full Professor of Physics at the Polytechnic University of Milan, Italy. He is Director of the "Center for Ultrafast Science and Biomedical Optics" of LaserLab Europe, a network of laser infrastructures in European Union.

Prof. Pifferi has three decades of research experience in developing and applying time-domain diffuse optics technologies for clinical diagnostics. His research has fruited in more than 300 scientific publications, more than 12000 citations and Google Scholar h-index of 61.

Moreover, Prof. Pifferi has co-founded PioNIRS, a startup company in the development and commercialization of time-domain diffuse optics devices for continuous and noninvasive monitoring of tissue oxygenation, stem from latest research at Politecnico di Milano.

To name a few of his other significant activities, we suffice to mention he is a member of IEC (International Electrotechnical Commission) Medical Device Committee as national expert on tissue oximeter standardization and a member of the scientific advisory board of the European Institute for Biomedical Imaging Research.

Topic: Time-Domain Diffuse Optics for Non-Invasive Assessment of Tissue Biomarkers

Speech on 8th of November, Töölö 2, Session 1 Wearable Devices

Dr. Pekka Pursula

VTT, Finland

Dr Pekka Pursula received a doctoral degree in technical physics from Aalto University, in 2009. He has a long career at VTT Technical Research Centre of Finland, on several research and management positions. Since 2018 he is the Research Manager of Microelectronics and Quantum Technology Research Area. This gives Pekka ownership of the research strategy spanning wide topics from the cleanroom to applications, ASICs to MEMS and photonics. Pekka joins us today to present VTT's unique and leading edge thick silicon-on-insulator photonics integration platform highlighting its relevant to the integration of advanced optical sensing systems.

Topic: Thick SOI Silicon Photonics Platform for Sensing

Speech on 8th of November, Töölö 2, Session 2 Sport and Health

Dr. Aki Salo

KIHU, Finland

Aki has over 25 years of academic experience in the UK where he also worked closely with Athletics providing scientific support to especially sprint, hurdles and relay squads. Further, he led projects on enhancing Skeleton sport start for British athletes. Aki has been back in his native Finland since February 2019 as the Director of the Finnish Institute of High Performance Sport KIHU (formerly known as Research Institute for Olympic Sports). Amongst his many duties, he is CEO for the KIHU owned Sports Research and Development Ltd, which is contracted to provide data and validation for various technology companies.

Topic: KIHU, Elite Sport and Technology

Finnish Institute of High Performance Sport KIHU helps Finnish coaches and athletes in their quest to reach the top of their sport. Sport technology has come far in recent years and its progress may be even faster now than in the past. Some sports are naturally more technology dependent than others, and in those events technology can help to achieve big jumps in performance. On the other hand, more devices are being constantly developed to monitor various issues on athletes, but are they reliable? I will show some examples how athletes are being tested and their responses to training monitored, as well as some technology development that we have been working in our Institute.

Speech on 8th of November, Töölö 2, Session 2 Sport and Health

Prof. Michel LE VAN QUYEN

Inserm, France

Topic: EarEEG and Healthcare Applications

The clinical use of brain monitoring based on electroencephalogram (EEG), in natural environments and over long time periods, is hindered by the limited portability of current wearable systems, and the invasiveness of implanted systems. To that end, we have developped the NAOX earplugs based on recent advances in sensor miniaturization which meets key patient needs (discreet, unobstrusive, confortable, robust); thus promising great advantages for healthcare applications. In our research, we have benchmarked the NaoX earplugs against scalp EEG during a combined polysomnography or cognitive protocols. Though brain signals have greater amplitudes in scalp EEG recorded with wet electrodes, as expected, the signal maintains sufficient SNR for in-ear EEG detection. In addition, preliminary results suggest that the in-ear system can monitors seizures in epileptic patients. Based on good performances, I will present here several domains of Medical and Healthcare Applications that we are investigating (epilepsy monitoring, sleep disorders and TDAH). In these different domains, I will stress that the given effective ability to remotely and continuously monitor patients' brain conditions is moving towards new out-of-hospital or home-based caring models.

Speech on 8th of November, Töölö 2, Session 2 Sport and Health

Dr. Jan Nissinen

University of Oulu, Finland

Jan Nissinen received Dr.Tech. degree and Title of Docent in electrical engineering from the University of Oulu, Finland, in 2011 and 2018, respectively. He has been a Postdoctoral Researcher with the Circuits and Systems Research Unit, University of Oulu, since 2011.
His research interests include designing of analog and mixed-signal integrated circuits for pulsed time-of-flight laser rangefinders, pulsed Raman spectroscopy and time-domain diffuse optics. He has designed or co-designed over 16 mixed-signal ASICs in the area of TOF laser range finding,
SPAD arrays for Raman spectroscopy and miniaturized CMOS laser driver.

Topic: Time-Resolved Diffuse Optics Transceivers for Wearable Healthcare and Sport Applications

Time-resolved diffuse optics (TRDO) can be used to investigate the optical properties of the tissue. TRDO is based on the time domain measurement, which allows collecting higher information content of the tissue. In particular, the unique feature of TRDO is selecting different mean depths to be measured by using different arrival times of detected photons. Therefore, it makes possible to select for example a specific muscle for measurements of oxygen level and enables to define the lactate threshold of the muscle. In addition, an accurate heart rate measurement is feasible during sport because TRDO is not sensitive for motion artifacts because of higher sampling rate. CMOS optical transceivers based on single-photon avalanche diodes (SPAD), timing electronics and laser diode drivers for TRDO are presented in this presentation. The CMOS technology enable to integrate both the SPAD arrays, all timing electronics and laser diode drivers into the same die.
Thus, it makes possible to construct a small sized optical transceiver for wearable healthcare and sport devices to measure for example heart rate and muscle oxygen saturation.

Speech on 8th of November, Töölö 2, Session 2 Sport and Health

Prof. Moritz Schumann

German Sport University, Germany

Acting Prof. Dr. Moritz Schumann is head of the Translational Exercise Physiology group at the Department of Molecular and Cellular Sports Medicine at the German Sport University Cologne and holds an Acting Professorship in Training and Movement Science at the University of Potsdam, Germany. Dr. Schumann received his PhD in Biology of Physical Activity from the University of Jyväskylä (Finland) in 2016 and performed his post-doctoral studies at Shanghai Jiao Tong University (China). Since 2019, Dr. Schumann is also an honorary research fellow at the Exercise Translational Medicine Center at Shanghai Jiao Tong University (China). In early 2022, Dr. Schumann completed his habilitation and was conferred the venia legendi in (Clinical) Exercise Physiology at the German Sport University Cologne. Dr. Schumann is founding member and co-chair of the European INTERLIVE®-Network, that aims at developing gold standards for the validation of wearable devices. He is also member of the editorial board of several scientific Journals and has authored and co-authored over 75 peer-reviewed scientific publications, 6 text books and book chapters and over 60 conference abstracts.

Topic: The INTERLIVE®-network: Progress, Outcome and The Future of The Consortium

Towards Intelligent Health and Well-Being: Network of Physical Activity Assessment (INTERLIVE®) is a joint European initiative of six universities and one industrial partner. The consortium was founded in 2019 and strives towards developing best-practice recommendations for evaluating the validity of consumer wearable and smartphones to measure direct and derived metrics. This talk will discuss the necessity of universal standards for validity testing of consumer wearables. In this context, current deliverables of the network will be presented and future perspectives outlined.

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Mr. Jarno Kallunki-Mättö

Hypehype, Finland

Jarno "Killi" Kallunki-Mättö works at HypeHype, the new online game creation platform in early access. Killi and the HypeHype team believe in democratizing game development by empowering everyone with a mobile device to create, play and publish modern games on the go. Killi has over 15 years of experience in the game & tech industry, before HypeHype he worked for 10 years at Microsoft and Xbox.

Topic: The Future of Game Development and Social Play Is Here

We will talk & deliver a real-time demo about HypeHype, our new platform for creating, remixing, and playing user-generated online games with a phone, tablet, or desktop. Currently, in early access, HypeHype offers all the essential features and tools for making modern games and takes game creation from months of complex PC editing to just hours of visual editing on the go.

What is the exact time slot and specs of the event stage etc. so we can prepare? Any other things we should know when planning? We plan to show a live demo of HypeHype by using a phone or tablet that is connected to the screen & audio via USB-C or a similar cable. We also need online access for that demo device in order for the demo to work properly. We also have a PowerPoint deck, but that will be shown only in the beginning and the focus would be on the live demo.

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Mr. Krzysztof Magiera

Software Mansion, Poland

Krzysztof Magiera is a founder of Software Mansion – a software development agency from Krakow, Poland, specializing in cross platform mobile UI framework – React Native. He formerly worked at Facebook on mobile infrastructure, and specifically was on the team that created React Native internally at Facebook and later open sourced it. He brought his knowledge and experience working with the platform to Software Mansion which allowed the company to become a leading software agency when it comes to React Native projects, both in terms of building products for the clients with this technology, but also as a key contributor to the ecosystem. Krzysztof's team at Software Mansion built and maintains one of the most critical packages in the React Native community.

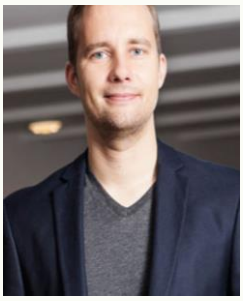
Topic: The Success of React Native and How Open Harmony Can Take Advantage of It

React Native has for many years been one of the top choices when selecting a cross platform mobile UI framework. In this talk I'll discuss on why it's became so popular. What factors are important when building great developer tooling? Why open source approach is so critical? What role the community and external contributors play in this process? We will answer these questions backed by the story of React Native to learn about the key aspects when it comes to building next generation UI framework for mobile and beyond.
Apart from that, we will also discuss the current state of the framework and its future directions. This will let us argue about the point of integrating React Native with Open Harmony, specifically given its new architecture – Fabric

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Prof. Antti Oulasvirta

Aalto University, Finland



Antti Oulasvirta leads the User Interfaces research group at Aalto University and the Interactive AI research program at FCAI (Finnish Center for AI). Prior to joining Aalto, he was a Senior Researcher at the Max Planck Institute for Informatics and the Cluster of Excellence on Multimodal Computing and Interaction at Saarland university. He received his doctorate in Cognitive Science from the University of Helsinki in 2006, after which he was a Fulbright Scholar at the School of Information in University of California-Berkeley in 2007-2008 and a Senior Researcher at Helsinki Institute for Information Technology HIIT in 2008-2011. During his postgraduate studies in 2002-2003, he was an exchange student at UC Berkeley's Neuropsychology Lab. He was awarded the ERC Starting Grant (2015-2020) for research on computational design of user interfaces. Dr. Oulasvirta serves as an associate editor for ACM TOCHI and has previously served International Journal of Human-Computer Studies, as well as served as a column editor for IEEE Computer. He frequently participates in the paper committees of HCI conferences, including the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI). His work has been awarded the Best Paper Award and Best Paper Honorable Mention at CHI fifteen times between 2008 and 2022. He has held keynote speech talks on computational user interface design at NordiCHI'14, CoDIT'14, EICS'16, IHCI'17, ICWE'19, and Chinese CHI '19. He is a member of ELLIS (European Laboratory for Learning and Intelligent Systems). In 2019, he was invited to the Finnish Academy of Science and Letters. He was a SICSA Distinguished Visiting Fellow in 2011 and in 2022.

Topic: Intelligent Cross-Device Interfaces, Towards a New Paradigm

In this talk, I develop a proposal on what "intelligent connectivity" could look like from human-computer interaction perspective. The proposal is a synthesis of discussions with the Huawei UCD Lab in Lund and several results from the area of HCI. I start by discussing the present, hugely popular interaction paradigm called WIMP (Windows, Icons, Menus, Pointing devices), and build an argument for an alternative paradigm called FEST (Faces, Embodied control, Speech, Touch).

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Dr. Kevin Rogovin

InVision, US

Dr. Kevin Rogovin was working as a senior graphics engineer at Intel Finland RC and is currently responsible for 2D renderer at InVision. Over 12 years ago he has been smitten with using the GPU to render large heavy vector graphic scenes with performance. He aims to leverage his mathematics background and knowledge of GPU implementation details to implement such a renderer. He was a guest speaker about his 2D renderer - FastUIDraw at XDC2016.

Topic: Anti-aliased Tiled Path Filling with Stencil then Cover

In this talk we will show a method how to render path fills at high performance with anti-aliasing when the geometry of the path rendered is changing every frame. The GPU feature set required for this technique is suitable for WebGL2.

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Dr. Ferhat Sen

Varjo Technologies Oy, Finland

Ferhat Sen is a designer and engineer with 15+ years of experience. He brings together design and technology to create innovative online/onsite digital experiences. He has produced over 100 projects ranging from virtual environments to web applications with a wide technology background.
Ferhat is currently working at Varjo as Director of XR Technology Solutions, leading a global team of solutions engineers working with customers in defense, aerospace, automotive, healthcare/research domains.

Topic: The Human-eye Resolution XR and the Reality Cloud: Use Cases from Varjo

Varjo is the industry-leading provider of professional-grade VR/XR solutions and has been enabling its customers to use the most advanced VR/XR technology in their operations. The presentation will introduce Varjo's human-eye resolution headsets with various use cases in training&simulation, design&engineering, medical&research. Presentation will also introduce Varjo Reality Cloud, world's first human-eye resolution VR/XR cloud streaming software platform.

Speech on 8th of November, Töölö 1, Session 1 CG/UI

Mr. Pasi Virtanen

UL, Finland

Pasi Virtanen has worked on UL Solutions' 3DMark, PCMark and Procyon benchmark product lines and related services and data analysis since 2006. He is responsible for all of UL Solutions benchmark development partnerships and product management for the 3DMark graphics benchmarks and benchmark data based services for the hardware industry and retailers

Topic: Recent Development in Graphics Benchmarking in UL Solutions 3Dmark Benchmarks and Services

The changing landscape of gaming graphics presents new challenges and opportunities for graphics benchmarks. This keynote speech will cover general 3DMark graphics benchmarking philosophy where we aim to create real-world relevant benchmarks and single-feature targeted feature tests. In recent years, on Windows the gaming performance landscape has changed considerably with the rise of raytracing and multiple competing super sampling solutions that make comparing different GPU architectures and vendors for gaming more complicated than ever before. The keynote speech covers UL Solutions' current strategy to provide reliable and relevant graphics benchmarks for the future and how the changing landscape has affected benchmark design.

Speech on 8th of November, Töölö 1, Session 2 Camera: Algorithm

Dr. Kai Zhang

ETH Zurich, Switzerland

Kai Zhang is currently a postdoctoral researcher at Computer Vision Lab, ETH Zurich, Switzerland, working with Prof. Luc Van Gool and Prof. Radu Timofte. He received his Ph.D. degree from School of Computer Science and Technology, Harbin Institute of Technology, China, in 2019. He was a research assistant from July, 2015 to July, 2017 and from July, 2018 to April, 2019 in the Department of Computing of The Hong Kong Polytechnic University. His research mainly focuses on developing flexible, effective, efficient, and interpretable deep learning techniques for inverse problems in low-level computer vision.

Topic: Practical Image Restoration Transformer

Transformer has recently emerged as a strong competitor against convolutional neural networks (CNNs) for image restoration. In this talk, I will present some typical Transformer architectures for image restoration and show their advantages and disadvantages over CNNs. Apart from network architecture, training data is also a key factor to train an effective deep model for practical image restoration. I will then present simple but effective data synthesis pipelines for practical image super-resolution and denoising. Finally, I will present three promising research directions for network architecture design without using Transformer.

Speech on 8th of November, Töölö 1, Session 2 Camera: Algorithm

Prof. Janne Heikkilä

Oulu University, Finland

Janne Heikkilä has around 30 years of experience in computer vision and machine learning covering both basic and applied research. He has served the research community in various positions of trust including editorial boards of scientific journals, program committees of international conferences, and as a President of the Pattern Recognition Society of Finland. He is an IAPR Fellow and a Senior Member of IEEE. He has been the principal investigator in numerous research projects funded by Academy of Finland, Business Finland/TEKES and enterprises. His current research interests include 3D computer vision, biomedical image analysis, computational photography, digital image and video processing, and deep neural networks. Prof. Heikkilä has published more than 200 peer reviewed scientific articles in international journals and conferences.

Topic: Vision-based 3D Human Modeling and Rending

Image-based human modeling is a long-standing problem in computer vision. During the past decades many approaches have been introduced that rely on various representations and imaging setups. While the early works were mostly based on geometric techniques, use of machine learning in more recent works has considerably changed the playfield and enabled accurate 3D modeling even from a single image. This talk gives a brief overview of those approaches that is followed by discussion on novel view synthesis, which is a related problem where the model is transformed back to an image representing the human from another unseen viewpoint. In that case, pure geometric models and representations are no longer sufficient to provide photorealistic rendering results. To this end, a novel architecture is presented to learn dense features in novel views obtained by sphere-based neural rendering and to create complete rendered images using a global context inpainting model. The performance is further boosted by using a refinement module that enhances the self-occluded regions of the initially estimated novel views. Finally, some qualitative results are presented that are synthesized from monocular RGB-D videos.

Speech on 8th of November, Töölö 1, Session 2 Camera: Algorithm

Prof. Karen Eguiazarian

Tampere University, Finland

Professor Karen O. Eguiazarian has received M.Sc. in mathematics from Yerevan State University, Armenia, in 1981, Ph.D. degree in physics and mathematics from Moscow State University, Russia, in 1986, and Doctor of Technology degree from Tampere University of Technology, Finland, in 1994.

He is a Professor at Computing Sciences Department, Tampere University, Tampere, Finland, leading 'Computational imaging' group and a Docent in the Department of Information Technology, University of Jyväskyla, Finland. Dr. Eguiazarian is a co-founder and CEO of Noiseless Imaging Oy (Ltd).

His main interests are in the field of computational imaging, compressed sensing, efficient signal processing algorithms, image/video restoration and compression. Dr. Eguiazarian has published over 700 refereed journal and conference articles, books and patents in these fields. He was an Editor-in-Chief of Journal of Electronic Imaging (SPIE), Associate Editor of IEEE Transactions of Image Processing, and is a Member of the DSP Technical Committee of the IEEE Circuits and Systems Society.

Topic: Mobile Hybrid Diffractive Imaging

A topic of this presentation is a hybrid diffractive imaging system, where a refractive lens is arranged simultaneously with a multilevel phase mask (MPM) as a diffractive optical element (DOE). Extended-depth-of-field (EDoF) imaging and low chromatic aberrations are the two potential advantages of this hybrid setup. A fully differentiable image formation model that uses neural network techniques to maximize the imaging quality by optimizing MPM, digital image reconstruction algorithm, refractive lens parameters (aperture size, focal length) and distance between the MPM and sensor, will be described. The numerical and experimental comparisons are performed between the designs for the visible wavelength interval [400-700]~nm and the following EDoF ranges for simulations and experiments [0.5-100]~m and [0.5-2.0]~m, respectively. Using SLM as a programmable DOE allows to study the potential of imaging with wavefront phase modulation. It is proved experimentally, first time to the best of our knowledge, that wavefront phase modulation is able to provide imaging of advanced quality as compared with some commercial multi-lens cameras.

Speech on 8th of November, Töölö 1, Session 2 Camera: Algorithm

Prof. Juho Kannala

Aalto University, Finland

Juho Kannala is an Assistant Professor of Computer Vision in the Department of Computer Science at Aalto University and an Adjunct Professor at the University of Oulu. He is also a co-founder of Spectacular AI, which is a university spin-off company providing solutions based on computer vision, spatial AI and sensor fusion. Juho's research is in the field of computer vision.

Topic: Pushing the Limits of Real-time Visual-inertial Odometry

In this talk we present HybVIO, a novel hybrid approach for combining filtering-based visual-inertial odometry (VIO) with optimization-based SLAM. The core of our method is highly robust, independent VIO with improved IMU bias modeling, outlier rejection, stationarity detection, and feature track selection, which is adjustable to run on embedded hardware. Long-term consistency is achieved with a loosely-coupled SLAM module. In academic benchmarks, our solution yields excellent performance in all categories, especially in the real-time use case, where we outperform the current state-of-the-art. We also demonstrate the feasibility of VIO for vehicular tracking on consumer-grade hardware using a custom dataset, and show good performance in comparison to current commercial VISLAM alternatives.

Speech on 9th of November, Töölö 2, Session 1 Camera: Hardware

Prof. Simon Thibault

Laval University, Immervision, Canada

Simon Thibault is professor and director of the physics department at Laval University and Immervision's Principal Optical Designer working on cutting edge wide angle lens, applied research, as well as leading in pure research. SPIE and OSA Fellow, he is also the chair holder of the NSERC Industrial Research Chair in Optical Design supporting a world-class infrastructure for optical training (http://lrio.copl.ulaval.ca/) and sits on several international conference program committees at Optica, SPIE and IEEE. Particularly as Chair the International Optical Design Conference (IODC, 2021, 2023 in Quebec City next June). He has authored over 250 scientific papers and holds more than 25 patents. His is associate editor of Optic Express and Optical Engineering and special section editor with Applied Optics and Optics Express.

Topic: Modern Optical Design at The Age of AI

Data-driven methods to assist lens design have recently begun to emerge; in particular, under the form of lens design extrapolation to find starting points (lenses and freeform reflective system). I proposed a historical trip over the years to better understand why the AI has been applied first to the starting point problems and where we are going in the future. So does deep learning networks (DNN) can be used to help or support optical system design. Design activities highly rely on designer experiences. So does a trained DNN on previous lens design can be used to help lens designer.

Speech on 9th of November, Töölö 2, Session 1 Camera: Hardware

Dr. Jonathan Borremans

Spectricity, Belgium

Jonathan Borremans received the M.Sc. and Ph.D. degree in Electrical Engineering at the University of Brussels, in collaboration with imec, Belgium. He authored more than 100 scientific papers and patents.
Jonathan has been a Principal Scientist at imec's wireless group, and later became a Program Manager and group leader at imec's specialty image sensor group. In 2018 he founded Spectricity, where he serves as CTO and board member.

Topic: Spectral Imaging for Mobile Devices

Spectral imaging will bring a new innovation wave to mobile devices, unlocking advanced consumer applications in photography, cosmetics, health, food and smart gardening. In this presentation, we will introduce Spectricity's truly miniaturised spectral imaging solution, and discuss application use cases such as skin sensing and advanced auto white balancing.

Speech on 9th of November, Töölö 2, Session 1 Camera: Hardware

Prof. Simon Thibault

Laval University, Immervision, Canada

Simon Thibault is professor and director of the physics department at Laval University and Immervision's Principal Optical Designer working on cutting edge wide angle lens, applied research, as well as leading in pure research. SPIE and OSA Fellow, he is also the chair holder of the NSERC Industrial Research Chair in Optical Design supporting a world-class infrastructure for optical training (http://lrio.copl.ulaval.ca/) and sits on several international conference program committees at Optica, SPIE and IEEE. Particularly as Chair the International Optical Design Conference (IODC, 2021, 2023 in Quebec City next June). He has authored over 250 scientific papers and holds more than 25 patents. His is associate editor of Optic Express and Optical Engineering and special section editor with Applied Optics and Optics Express.

Topic: Metasurface in Lens Design: How and Why it is a Fascinating New Technology

Over the year, we have seen many new technologies growing up and metasurface is certainly a special of them. The number of papers published on this subject is unprecedented. This talk will discuss how and why it is so fascinating for the community. I will also describe how we can combine the power of modern optical design software and metasurface model to build unprecedented new tools to support raytracing through metasurfaces. Particularly, we will discuss about using DLL in OpticStudios to implement metasurface models. This approach is possible because we can find analytical models to avoid heavy FDTD analysis. The limits of this approach will be discussed as well as a solution for the future. Finally, we discuss the future of metasurface and how lens design community can take the benefit of it..

Speech on 9th of November, Töölö 2, Session 1 Camera: Hardware

Dr. Patrick Grahn

Comsol Oy, Finland

Patrick Grahn is part of the COMSOL team in Finland, specializing in optics, electromagnetics, and acoustics. He received his doctoral degree in the field of nano-optics from Aalto University. For the past 10+ years, Patrick has been working with mathematical modelling and finite-element based simulations for academic and commercial applications. His research interests include studying the interaction of waves with artificial materials, such as metamaterials.

Topic: Developing Innovative Devices with COMSOL Simulations

Future innovations in optics rely on judiciously controlling the wave nature of light. We desire to understand and optimally control phenomenon such as scattering, interference and diffraction. This can be achieved with the help of finite-element based simulations. Using simulations, we can calculate how properties, such as polarization, wavelength and angle-of-incidence, influence the performance of our optical devices.

In this presentation, we will explore innovative solutions in applications such as optical coating, diffuse surface scattering and light-control with metasurfaces. In particular, we consider a visible-band metalens composed of octagonal pillars in a hexagonal lattice. Using COMSOL simulations, we investigate the electromagnetic properties of the metalens and uncover its strengths and weaknesses.

Speech on 9th of November, Töölö 2, Session 2 Audio: Software

Prof. Trevor Cox

University Salford, UK

Trevor Cox is Professor of Acoustic Engineering at the University of Salford. He is a past president of the UK's Institute of Acoustics and was awarded the IoA Tyndall Medal. His research covers architectural acoustics, psychoacoustics and audio. He has been PI/CI on 10 EPSRC projects on built environment acoustics. Current EPSRC projects include two on machine learning challenges to improve hearing aids (https://claritychallenge.org/ and http://cadenzachallenge.org/). Trevor co-wrote the definitive text on room Acoustic Absorbers and Diffusers (CRC Press). He was an EPSRC Senior Media Fellow. He has presented 26 documentaries for BBC radio including: The Physicist's Guide to the Orchestra. He won an ASA Science Writing Award for his popular science book Sonic Wonderland. The book describes the oil tank where he broke the Guinness World record for the longest echo.

Topic: AI-driven Hearing Aid Processing

Speech on 9th of November, Töölö 2, Session 2 Audio: Software

Prof. Ville Pulkki

Aalto University, Finland

Ville Pulkki is a professor in the Department of Signal Processing and Acoustics at Aalto University, Helsinki, Finland. He has been working in the field of spatial audio for over 20 years. He developed the vector-base amplitude panning (VBAP) method in his Ph.D. (2001) and directional audio coding after the Ph.D. with his research group. He also has contributions in perception of spatial sound, laser-based measurement of room responses, and binaural auditory models. He has received the Samuel L. Warner Memorial Medal Award from the Society of Motion Picture and Television Engineers and the AES Silver Medal Award. He enjoys being with his family, building his summer house, and performing in musical ensembles.

Topic: Bringing Ultrasonic Sounds Audible and Localizable Using Spatial Super-hearing Techniques

Ultrasonic sources are inaudible to humans, and while digital signal processing techniques are available to bring ultrasonic signals into the audible range, there are currently no systems which also simultaneously permit the listener to localise the sources through spatial hearing.

Therefore, we describe a method whereby an in-situ listener with normal binaural hearing can localise ultrasonic sources in real-time; opening-up new applications, such as the monitoring of certain forms of wild life in their habitats and man-made systems. In this work, an array of ultrasonic microphones is mounted to headphones, and the spatial parameters of the ultrasonic sound-field are extracted. A pitch-shifted signal is then rendered to the headphones with spatial properties dictated by the estimated parameters. The processing provides the listener with the spatial cues that would normally occur if the acoustic wave produced by the source were to arrive at the listener having already been pitch-shifted. The results show that the localization accuracy delivered by the proof-of-concept device implemented here is almost as good as with audible sources, as tested both in the laboratory and under conditions in the field.

Speech on 9th of November, Töölö 2, Session 2 Audio: Software

Prof. Tuomas Virtanen

Tampere University, Finland

Tuomas Virtanen is Professor at Tampere University, Finland, where he is leading the Audio Research Group. He received the M.Sc. and Doctor of Science degrees in information technology from Tampere University of Technology in 2001 and 2006, respectively. He has also been working as a research associate at Cambridge University Engineering Department, UK. He is known for his pioneering work on single-channel sound source separation using non-negative matrix factorization based techniques, and their application to noise-robust speech recognition and music content analysis. He has done significant contributions to sound event detection in everyday environments. In addition to the above topics, his research interests include content analysis of audio signals in general and machine learning. He has authored more than 200 scientific publications on the above topics, which have been cited more than 16000 times. He has received the IEEE Signal Processing Society 2012 best paper award for his article "Monaural Sound Source Separation by Nonnegative Matrix Factorization with Temporal Continuity and Sparseness Criteria" as well as seven other best paper awards. He is an IEEE Fellow and recipient of the ERC 2014 Starting Grant, and has been a member of the Audio and Acoustic Signal Processing Technical Committee of IEEE Signal Processing Society.

Topic: Acoustic Scene Analysis Based Augmented Hearing

Conventional audio signal processing methods implemented in customer devices such as hearables enable augmented hearing by suppressing stationary noises or doing spatial filtering. Modern deep learning techniques have the potential for significantly more powerful manipulation of audio signals, especially together with acoustic scene analysis based techniques. Such techniques enable recognizing sound sources present in a scene, their spatial locations, and separating the signals of individual sources from each other. By combining the above techniques with advanced signal processing, it will be possible to manipulate audio in a device so that the user will only hear the content he/she is interested in, such as the voice of a specific speaker among a crowd of people, or sources closest to the listener, or make sources of interest appear closer than they are in reality. The techniques have a huge potential in reducing the listening effort, improving the intelligibility, and increasing the quality of perceived audio.

Speech on 9th of November, Töölö 2, Session 2 Audio: Software

Prof. Xavier Serra

Universitat Pompeu Fabra, Spain

Xavier Serra is a Professor of the Department of Information and Communication Technologies and Director of the Music Technology Group at the Universitat Pompeu Fabra in Barcelona. After a multidisciplinary academic education, he obtained a PhD in Computer Music from Stanford University in 1989 with a dissertation on the spectral processing of musical sounds that is considered a key reference in the field. His research interests cover the computational analysis, description, and synthesis of sound and music signals, with a balance between basic and applied research and approaches from both scientific/technological and humanistic/artistic disciplines. Dr. Serra is very active in the fields of Audio Signal Processing, Sound and Music Computing, Music Information Retrieval and Computational Musicology at the local and international levels, being involved in the editorial board of a number of journals and conferences and giving lectures on current and future challenges of these fields. He was awarded an Advanced Grant from the European Research Council to carry out the project CompMusic aimed at promoting multicultural approaches in music information research.

Topic: Sound and Music Technologies of Relevance to Mobile Devices

At the Music Technology Group of the Universitat Pompeu Fabra in Barcelona, we do research on a wide variety of topics related to sound and music computing, including sound synthesis, audio source separation, audio feature analysis, computational analysis of sound events, music classification, music retrieval, multimodal music processing, computational music creativity, and music performance analysis. Most of this research involves working on advanced signal processing and machine learning methodologies and aims at obtaining efficient and scalable deep learning models of relevance to a wide variety of industrial applications. Mobile devices are a special application area in which efficiency and personalization are especially relevant. In my talk I will give a general presentation of some of our current research, making special emphasis on the use case of mobile devices.

Speech on 9th of November, Töölö 1, Session 1 Security

Mr. Simon Frost

ARM Ltd, UK

Simon Frost is a Senior Principal Architect in the Architecture and Technology Group at Arm. He runs a software prototyping team responsible for building components that assist using technologies based on Arm architectures in various environments. The OSS projects Parsec and Veraison originated within this team. Simon also has responsibility for Attestation within the Arm CCA.

Topic: Confidential Computing, Attestation & Verification

There are an increasing set of scenarios where it is desirable to increase the protection available for data during execution. Confidential Computing is the use of hardware Trusted Execution Environments (TEE) to provide the basis for that protection. This session introduces the Arm Confidential Compute Architecture which provides such a TEE and an Attestation mechanism for a user to establish trust in the environment. It also introduces OSS Project Veraison which creates components that can be used to verify Attestation reports across a range of architectures.

Speech on 9th of November, Töölö 1, Session 1 Security

Prof. Valtteri Niemi

Helsinki University, Finland

Valtteri Niemi is a Professor of Computer Science at University of Helsinki and Professor of Mathematics in University of Turku. His main research areas are wireless security, applied cryptography and privacy. Niemi was the chairman of 3GPP security group during 2003-2009.

Topic: Postquantum Cryptography in Mobile Systems

Speech on 9th of November, Töölö 1, Session 1 Security

Prof. Alexandra Dmitrienko

University of Würzburg, Germany

Alexandra Dmitrienko is an associate professor at the University of Würzburg in Germany, where she is heading the Secure Software Systems research group starting from 2018. Before that, she worked for about 10 years in renowned security institutions in Germany and in Switzerland: Ruhr-University Bochum (2008-2011), Fraunhofer Institute for Information Security in Darmstadt (2011-2015), and ETH Zurich (2016-2017). She holds a PhD degree in Security and Information Technology from TU Darmstadt (2015). Her PhD dissertation was awarded by the European Research Consortium in Informatics and Mathematics (ERCIM STM WG 2016 Award) and recognized as outstanding by Intel – she received an Intel Doctoral Student Honor Award. Over the past years, her research interests focused on various topics on secure software engineering, system security and privacy, and security and privacy of mobile, cyber-physical and distributed systems.

Topic: Scalable Collaborative Remote Attestation for Pub/Sub IoT Networks

Remote Attestation (RA) is an essential security mechanism that enables detection of malicious presence on remote platforms, yet it is does not scale to large networks with many nodes. Collaborative RA (cRA) schemes overcome this limitation by producing RA results collectively or by accepting RA evidences produced by other parties. Yet, existing collaborative RA schemes impose limitations, such us a requirement for time synchronization, synchronous communication, and no support for sleeping or disconnected devices. Furthermore, they rely on centralized trusted parties, which cannot be established in networks of devices owned and managed by mutually untrusted stakeholders (a typical scenario for large-scale IoT networks). These limitations prohibit their application in IoT networks utilizing Pub/Sub communication protocols. In this talk, we present Scalable Collective Remote Attestation for Pub-Sub (SCRAPS), a novel collective RA scheme that overcomes these limitations and enables application of cRA in Pub/Sub IoT networks.

Speech on 9th of November, Töölö 1, Session 1 Security

Prof. N Asokan

University of Waterloo, Canada

N. Asokan is a Professor of Computer Science at the University of Waterloo where he holds a David R. Cheriton chair and serves as the Executive Director of Waterloo Cybersecurity and Privacy Institute (CPI). He is also an Adjunct Professor of Computer Science at Aalto University, where he was the founding director of Helsinki-Aalto Institute for Cybersecurity (HAIC). Asokan's primary research theme is systems security broadly, including topics like the development and use of novel platform security features, applying cryptographic techniques to design secure protocols for distributed systems, applying machine learning techniques to security/privacy problems, and understanding/addressing the security and privacy of machine learning applications themselves. Asokan is a Fellow of both ACM and IEEE and was chosen for an Outstanding Innovation Award and SIGSAC Outstanding Contributions Award by SIGSAC, ACM's special interest group in security and privacy. For more information about Asokan's work, visit his website at https://asokan.org/asokan/ or follow him on Twitter (@nasokan).

Topic: Blinded Memory

Outsourcing computing to a remote processor is popular and compelling. While cryptographic techniques like homomorphic encryption allow a client to outsource computation on sensitive data while ensuring that the data cannot be leaked. However, such techniques incur substantial computation and communication costs. Leveraging hardware assistance to ensure security efficiently is thus an attractive proposition. Trusted Execution Environments (TEEs), which saw widespread deployment in the early 2000s by mobile device manufacturers to run sensitive computations on commodity devices, can help to realize secure outsourced computing. But the security guarantees provided by traditional TEEs have been called into question by various attacks that exploit the inherent complexity in modern hardware and software. In this talk, I will describe Blinded Memory (BliMe): on-going work by my students to come up with minimal processor extensions that can help to efficiently realize secure outsourced computing. BliMe consists of a minimal set of ISA extensions that uses taint-tracking to ensure confidentiality of sensitive (client) data even in the presence of server malware, run-time attacks, or side-channel attacks. To secure outsourced computation, BliMe extensions can be used together with an attestable, fixed-function hardware security module (HSM) and an encryption engine that provides atomic decrypt-and-taint and encrypt-and-untaint operations. I will describe the overall architecture, the current status of the work, and the challenges we face..

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Emeritus professor. Matti Pietikäinen

University of Oulu, Finland

Matti Pietikäinen received his Doctor of Science in Technology degree from the University of Oulu, Finland. He is an emeritus professor at the Center for Machine Vision and Signal Analysis, University of Oulu. From 1980 to 1981 and from 1984 to 1985, he visited the Computer Vision Laboratory at the University of Maryland. He has made fundamental contributions, e.g. to local binary pattern (LBP) methodology, texture-based image and video analysis, and facial image analysis. He has authored over 350 refereed papers in international journals, books and conferences. His papers have over 80,000 citations in Google Scholar (h-index 98) (October 10, 2022). He was Associate Editor of IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Pattern Recognition, IEEE Transactions on Forensics and Security, IEEE Transactions on Biometrics, Behavior and Identity Science, and Image and Vision Computing journals. Currently he serves as a Guest Editor for special issues of IEEE TPAMI and Proceedings of the IEEE. He was President of the Pattern Recognition Society of Finland from 1989 to 1992, and was named its Honorary Member in 2014. From 1989 to 2007 he served as Member of the Governing Board of International Association for Pattern Recognition (IAPR), and became one of the founding fellows of the IAPR in 1994. He is IEEE Fellow for contributions to texture and facial image analysis for machine vision. In 2014, his research on LBP-based face description was awarded the Koenderink Prize for Fundamental Contributions in Computer Vision. He was the recipient of the prestigious IAPR King-Sun Fu Prize 2018 for fundamental contributions to texture analysis and facial image analysis. In 2018, he was named a Highly Cited Researcher by Clarivate Analytics, by producing multiple highly cited papers in 2006-2016 that rank in the top 1% by citation for his field in Web of Science.

Topic: From Local Binary Patterns to CNN-based Descriptors, With Applications to Face Analysis

Effective descriptors are needed for extracting useful information from objects in images and videos. Local binary patterns (LBPs) introduced in early 1990s have been highly popular in various applications of image and video analysis due to their effectiveness and computational simplicity, for example in face analysis. LBPs were originally developed in Machine Vision Group (MVG) at the University of Oulu. Since 2014 convolutional neural networks (CNNs) have gained a dominating role in computer vision, e.g. due to their ability to learn an image description from data at multiple scales.
In this talk we will first give a short introduction to the research at MVG since 1981, creating a foundation for our LBP research since 1990s. Then, basics of image and video description with LBPs are presented. Next, our ongoing research towards compact and energy-efficient CNN-based descriptors is introduced. The goal is to combine the strengths of LBP and CNN descriptors. After this, several applications of our research in face analysis are presented, including many video demonstrations. Finally, current status of AI and some future prospects are briefly outlined.

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Massimo Tistarelli

University of Sassari, Italy

Massimo Tistarelli received the Phd in Computer Science and Robotics in 1991 from the University of Genoa. He is Full Professor in Computer Science (with tenure) and director of the Computer Vision Laboratory at the University of Sassari, Italy. Since 1986 he has been involved as project coordinator and task manager in several projects on computer vision and biometrics funded by the European Community.

Prof. Tistarelli is a founding member of the Biosecure Foundation, which includes all major European research centers working in biometrics. His main research interests cover biological and artificial vision (particularly in the area of recognition, three-dimensional reconstruction and dynamic scene analysis), pattern recognition, biometrics, visual sensors, robotic navigation and visuo-motor coordination. He is one of the world-recognized leading researchers in the area of biometrics, especially in the field of face recognition and multimodal fusion. He is coauthor of more than 150 scientific papers in peer reviewed books, conferences and international journals. He is the principal editor for the Springer books “Handbook of Remote Biometrics” and “Handbook of Biometrics for Forensic Science”

Topic: Human Face Recognition: Learning from Biological Deep Networks

In this talk we analyse an hybrid model network trying to better understand the role of the different layers, including the retino-cortical mapping simulated by a log-polar image resampling. The following issues will be addressed:

• What is the representation space within a deep convolutional network and how this reflects the organization of the human visual cortex.

• How the retino-cortical mapping, implemented in the human visual system, may impact the representation space, hence improving the classification performance.

• The relevance of peripheral vs foveal vision, coupled with visual attention, for face recognition.

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Vitomir Štruc

University of Ljubljana, Slovenia

Vitomir Štruc is an Associate Professor at the University of Ljubljana, Slovenia. He received his doctoral degree from the Faculty of Electrical Engineering in Ljubljana in 2010. Vitomir's research interests include problems related to biometrics, computer vision, image processing, pattern recognition and machine learning. He (co-)authored more than 150 research papers for leading international peer reviewed journals and conferences in these and related areas. He served in different capacities on the organizing committees of several top-tier vision conferences, including IEEE Face and Gesture, ICB, WACV and IJCB. Vitomir is a Senior Area Editor for the IEEE Transactions on Information Forensics and Security, a Subject Editor for Elsevier's Signal Processing and an Associate Editor for Pattern Recognition, and IET Biometrics. He served as an Area Chair for WACV 2018, 2019, 2020, ICPR 2018, Eusipco 2019 and FG 2020, 2021 and as the Program Chair for IJCB 2020 and IWBF 2022. Currently he acts as a Program Co-Chair for IWBF 2023, and a General Co-Chair for IJCB 2023. Dr. Struc is a Senior member of the IEEE, a member of IAPR, EURASIP, Slovenia's national contact point for the European Association for Biometrics (EAB) and the former president and current executive committee member of the Slovenian Pattern Recognition Society, the Slovenian branch of IAPR. Vitomir is also the current VP Technical Activities for the IEEE Biometrics Counci

Topic: Computer Vision for Fashion and Beauty

With the developments in the field of generative modeling and with the appearance of powerful model architectures, such as Generative Adversarial Networks (GAN), a wide range of new techniques and inventive algorithms has emerged recently to solve diverse computer vision problems, including many problems related to virtual try-on applications for the fashion and beauty industry. In this talk, I will first provide a short overview of recent advances in generative modeling and describe some of our research efforts that focus explicitly on generative models. Next, I will present examples of our recent work coming out from the ARRS funded DeepBeauty project and talk about: (i) face image editing with our GAN inversion based MaskFaceGAN technique that allows for photo realistic image manipulation and explicitly addresses the problem of attribute entanglement seen with many latent-space based editing solutions, (ii) virtual try-on with our context-driven C-VTON model and (ii) virtual eyewear personalization with GlassesGAN. Finally, I will elaborate on some of the existing challenges with generative models and highlight future research directions.

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Enrique Vidal

Valencia Polytechnic University, Spain

Enrique Vidal is an emeritus professor of the Universitat Politècnica de València (Spain) and former co-leader of PRHLT research center in this University. He has published hundreds of research papers in the fields of Pattern Recognition, Multimodal Interaction and applications to Language, Speech and Image, and Handwritten Document Processing, and has led many important projects in these fields. Dr. Vidal is a fellow of the International Association for Pattern Recognition (IAPR).

Topic: Large Scale Probabilistic Indexing for Efficient Textual Search in Vast Collections of Handwritten Text Images

Probabilisitic Indexing (PrIx) of images of handwritten documents has been developed in the last decade to explicitly cope with the intrinsic ambiguity and uncertainty exhibited by handwritten text, and more so, by text of historical manuscripts. The presentation will outline the fundamentals of PrIx and its usefulness for searching for textual contents in very large collections of untranscribed manuscripts. This application will be showcased through on-line, publicly available search interfaces for large, iconical historical manuscript collections which have been recently processed with the PrIx technology.

Going beyond basic textual search, the presentation will also outline recent PrIx-based developments which allow Text Analytics, Statistical Information Extraction and Document Classification to be successfully carried out on large collections of images of untranscribed manuscripts.

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Anastasios Tefas

Aristotle University of Thessaloniki, Greece

Anastasios Tefas received the B.Sc. in informatics in 1997 and the Ph.D. degree in informatics in 2002, both from the Aristotle University of Thessaloniki, Greece. Since 2022 he has been a Professor at the Department of Informatics, Aristotle University of Thessaloniki. From 2008 to 2022, he was a Lecturer, Assistant Professor, Associate Professor at the same University. Prof. Tefas participated in 20 research projects financed by national and European funds. He is the Coordinator of the H2020 project OpenDR, “Open Deep Learning Toolkit for Robotics”. He is Area Editor in Signal Processing: Image Communications journal. He has co-authored 145 journal papers, 270 papers in international conferences and contributed 17 chapters to edited books in his area of expertise. He has co-organized more than 15 workshops, tutorials, special sessions and special issues and has given more than 20 invited talks. He has co-edited the book “Deep Learning for Robot Perception and Cognition”, Elsevier, 2022. Over 8800 citations have been recorded to his publications and his H-index is 47 according to Google scholar. His current research interests include computational intelligence, deep learning, pattern recognition, machine learning, digital signal and image analysis and retrieval, computer vision and robotics.

Topic: Lightweight Deep Learning for Perception

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Mark Nixon

University of Southampton, UK

Mark S. Nixon is a Professor in the Vision, Learning and Control research group in the School of Electronics and Computer Science at the University of Southampton. He was previously the President of the IEEE Biometrics Council and Vice Chair IEEE PSPB. He is a Fellow of the IAPR (for services to biometrics and computer vision) and the Distinguished Fellow of the BMVA 2015. His research interests are in image processing and computer vision and his team develops new techniques for static and moving shape extraction applied in medical image and behaviour analysis. He and his team were early workers in automatic face recognition, came to pioneer automatic gait recognition, helped to start ear biometrics and later soft biometrics for human identification. His books include Feature Extraction and Image Processing for Computer Vision (4th Ed. Academic Press 2019), Human ID Based on Gait (Springer 2005) and Doh! Fourier (World Scientific 2022). He has been chair/program co-chair for many conferences, especially biometrics ones (inc. BMVC'98, ICPR'04, IEEE BTAS'10, ICPR'16, IEEE ISBA'16, IAPR/IEEE IJCB'17, and IAPR/IEEE ICB'19).

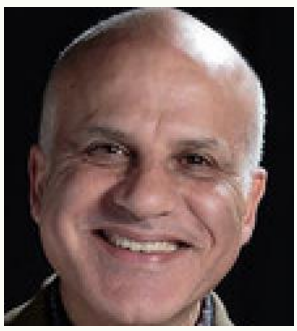
Topic: Transforming Our Future: Signal and Image Processing in Computer Vision

The talk will cover basic technology, its use in modern systems and question where it might go in the future. When I first met the Fourier transform at University, I was impressed and mystified at the same time. What a fantastic insight Fourier had! Phrasing the lecture for those with much or with little knowledge, I shall show how the Fourier transform is used in signal and image analysis, revealing aspects of its formulation that are not generally appreciated. I shall then describe how it is used in image analysis, before moving to the more general state of art in computer vision. As much of this is now deep learning, I shall move to describe uses of transforms in deep learning before discussing with the audience where this technology might go in the future. Much of the material derives from two of my books, *Do'h! Fourier*, and *Feature Extraction and Image Processing for Computer Vision* as well as from my team's research in Vision and Biometrics. I shall look forward to the talk!

Speech on 9th of November, Töölö 1, Session 2 Computer Vision

Prof. Mohamed Daoudi

University of Lille, France



Mohamed Daoudi is a Full Professor of Computer Science at IMT Nord Europe and the Head of Image group at CRIStAL Laboratory (UMR CNRS 9189). His research interests include pattern recognition, computer vision and 3D human shape analysis. He has published over 150 papers in some of the most distinguished scientific journals and international conferences. He is/was Associate Editor of Image and Vision Computing, IEEE Transactions on Multimedia, IEEE Trans. on Affective Computing and Computer Vision, Image Understanding and Computers and Graphics. He has served as Conference Chair of Shape and Modelling International (SMI 2015) and as General Chair of IEEE International Conference on Automatic Face and Gesture Recognition (IEEE FG 2019). He has chaired many International Scientific Conferences and workshops in his field, and has served more recently as area chair at 3DV 2021 and ACM Multimedia (2021, 2022). He is a Fellow of the International Association for Pattern Recognition.

Topic: Deep Learning for Three-dimensional (3D) Humans

Huawei Future Device Technology Summit

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Thank You

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