



**4th International Conference
on Advances in Signal Processing
and Artificial Intelligence (ASPai' 2022)**

Conference Programme

**Corfu, Greece
19-21 October 2022**



Organized by:



Message from Chairman

On behalf of Organizing Committee I would like to welcome you to the 4th *International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI '2022)*, 19-21 October 2022, Corfu, Greece.

Technological innovations and advances in signal processing and artificial intelligence (AI) have been always an important parts of the majority of the industries and driving factors of the artificial intelligence (AI) market. The global AI market size was estimated at US \$ 87.04 billion in 2021 and it is expected to hit US \$ 1,597.1 billion by 2030 with a registered CAGR of 38.1% from 2022 to 2030. Based on the technology, the deep learning segment accounted largest market share in 2021.

The ASPAI Conference Series has been launched to provide a forum for open discussion and development of emerging artificial intelligence and appropriate signal processing technologies focused on real-word implementations. The goal of the conference is to provide an interactive environment for establishing collaboration, exchanging ideas, and facilitating discussion between researchers, manufacturers and users. The 1st *International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI '2019)* has taken place in Barcelona, Spain, the second ASPAI '2020 and the third ASPAI '2020 conferences where in the virtual format due to the COVID-19 pandemic. In 2022 we are returning to the in-person format with the traditional plenary and poster session, keynote presentations and social activities during the event.

The ASPAI' 2022 is organized by IFSA with the media partners: IOS Press (journal *Integrated Computer-Aided Engineering* (ISSN: 1069-2509, e-ISSN: 1875-8835)), World Scientific (*International Journal of Neural Systems* (ISSN: 0129-0657, e-ISSN: 1793-6462)), Elsevier (open access journal *Data in Brief* (ISSN: 2352-3409)) and Publishing house 'Science Library' (journal *Soft Measurements and Computing* (ISSN 2618-9976)).

The conference is focusing any significant breakthrough and innovation in the mentioned field with a broadest concept.

We trust that you will find ASPAI' 2022 conference professionally rewarding and stimulating as well as enjoyable. Welcome to ASPAI' 2022 !

Prof., Dr. Sergey Y. Yurish
ASPAI' 2022 Conference Chairman

Conferences Venue

The Conferences will take place on 19-21 October 2022 in Kerkira (Corfu Island), Greece, *Corfu Holiday Palace* hotel, conference rooms *Kerkyra*.

Registration

The Registration Desk is opened in the Corfu Holiday Palace event hotel:

- Tuesday, 18 October, from 20:00-21:30 (in the Welcome Cocktail area)
- Wednesday, 19 October, from 8:45-18:00 (near the room *Kerkyra*)
- Thursday, 20 October, from 8:45-18:00 (near the room *Kerkyra*)
- Friday, 21 October, from 8:45-12:00 (near the room *Kerkyra*)

Language

The official language of the Conferences is English. There will be no simultaneous interpretation.

Insurance and Liability

The conferences organizers do not accept responsibility for any individual, medical, travel or personal insurance policies as necessary.

Conference Identification Tag

The Organizing Committee request that you wear your identification tag (badge) at all times during the conference. Your conference identification tag will serve as your admission to all conference paper presentation sessions.

Welcome Cocktail

18 October 2022, Tuesday (20:00-21:30). The Welcome Cocktail will take place in the *Corfu Holiday Palace* event hotel near the Kefi bar. Do not miss this opportunity to say the first "hello" to attendees and committee members.

Please do not forget to collect your badge (ID tag) at the registration desk before the Welcome Cocktail. The registration desk will be opened in the Welcome cocktail area from 20:00 to 21:30.

Coffee/Tea Refreshment

Coffee/tea will be served at the times indicated in the programme near the Kefi bar.

Gala Dinner

20 October 2022, Thursday (20:00-23:30). The Gala Dinner will take place in the *Corfu Holiday Palace* event hotel, *Nausica Ballroom*.

Local Time

The local time in Corfu is: GMT+3, Athens

Conference web site:

<http://www.aspai-conference.com/>

Post-Conference Publications

Selected papers presented at the conference will be published by IOS Press in *Integrated Computer-Aided Engineering* journal (ISSN: 1069-2509, e-ISSN: 1875-8835, Impact Factor 2022: 6.137), by World Scientific in the *International Journal of Neural Systems* (ISSN: 0129-0657, e-ISSN: 1793-6462, Impact Factor 2022: 6.325), by Elsevier in *Data in Brief* (ISSN: 2352-3409) open access journal, special issue on 'Big Data in AI', and by IFSA Publishing in *Sensors & Transducers* open access journal (ISSN: 2306-8515, e-ISSN 1726-5479) special issue on 'AI & Signal Processing'.

Authors will be also invited to extend their paper or/and articles into the book chapters for the '*Advances in Signal Processing: Reviews*' Vol. 3 or '*Advances in Artificial Intelligence: Reviews*', Vol. 3 Book Series. These open access books will be published in 2023 by IFSA Publishing, S.L. (Barcelona, Spain).

Conference proceedings and books published by IFSA Publishing, S.L. were indexed in the Conference Proceedings Citation Index (CPCI) and Book Citation Index respectively by Clarivate Analytics (former Thomson Reuters).

Organizing Committee

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Prof., Dr. Sergey Y. Yurish (*IFSA, Spain*)

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Keynote Speaker I



Dr. John Hobby

Nokia Bell Labs, Murray Hill, USA

Image Processing for Digital Twin Technology

Abstract

Consider the problem of constructing a digital twin by taking a two dimensional CAD drawing such as a building floor plan, and augmenting it with new three dimensional data. The new three-dimensional data is a point cloud in some unknown coordinate system. It can come from Laser range finding or from comparing common features in multiple images from a video stream, but it might also be useful to match Lidar-based 2D data against a CAD drawing.

An algorithm that has worked well on real world data is first to analyze the point cloud to decide which way is up, then apply polyline-based matching. The "which way is up ?" algorithm involves optimization of a "how well clustered" metric. The polyline-based matching is applied after projecting the point set onto a floor plane, and analyzing vertical histograms to decide which parts of the projected image most resemble walls. The vertical histograms are also used to correct for residual tilt due to inaccuracy in the "which way is up ?" result.

Short Biography:

John Hobby earned his PhD in computer science from Stanford University in 1985 under Donald Knuth. Since then, he has been at Bell Labs in Murray Hill, New Jersey. It was originally known as AT&T Bell Labs and is now Nokia Bell Labs. John's work covers a wide variety of practical algorithms, and he is now in the Artificial Intelligence Research Lab.

Keynote Speaker II



Prof. Dr. Denis Kouamé

Paul Sabatier University of Toulouse, France

Quantum Physics Inspired Image Processing: Image Restoration, from Model-based to Learning Approaches

Abstract

Many signal or image processing tasks rely on linear model or some statistical assumptions on the observed signals/image or on the signal/image to be retrieved. In this talk, we will introduce a different way of image processing, based on quantum physics laws, referred to as quantum image processing (QuIP). We show that relating image samples to quantum features offers a great opportunity to efficiently address many tasks. Going a step further, QuIP is unfolded in a deep neural network via both quantum interactions and other quantum concepts, mainly the Hamiltonian operator. This leads to a versatile way to solve many inverse problems in image processing including denoising, deconvolution, with interesting performances. Some applications are also discussed in the talk.

Short Biography:

Denis Kouamé is a professor in medical imaging and signal processing at Paul Sabatier University of Toulouse, France. He currently leads the Signals and Images department at IRIT. His research interests are the general areas of Inversion in signal and image processing, computational imaging, medical imaging and namely medical ultrasound imaging, with special focus on image reconstruction and restoration. He has served as area chair or associate editor in several international conferences in signal, image processing or medical imaging, namely IEEE ICASSP, ICIP, ISBI. He was/is involved, as principal investigator or as member, in different European or French research projects (ANR, FUI, INSERM). His works resulted in creating different companies including two start-ups. He was an Associate Editor in Chief for IEEE Transactions on Ultrasonics Ferroelectrics and Frequency Control. He is a Senior Associate Editor for the IEEE Transactions on Image Processing and Associate Editor for the IEEE Transactions on Computational Imaging.

Keynote Speaker III



Prof. Dr. Yuchen Jiang
*Harbin Institute of Technology (HIT),
Department of Control Science
and Engineering, China*

AI-enabled Plant-wide Process Monitoring in Industry 4.0

Abstract

This presentation will focus on the recent advancement in industrial safety and security issues and will discuss several SOTA approaches enabled by AI technologies. Data-driven process monitoring has been extensively studied by both academia and industry, yet, there is still very large gap to achieve effective and efficient plant-wide monitoring. In this talk, in addition to novel theoretical ideas and identified challenges through broad investigation, a powerful open-source toolbox will be put forward. It realizes a series of basic and advanced AI algorithms for process monitoring, and is useful for research and teaching. The delivered content is based on recent research results from the speaker's group, which are recognized as 'Featured Article of the Journal' or ESI Highly-Cited Paper.

Short Biography:

Dr. Yuchen Jiang is an Assistant Professor with Harbin Institute of Technology (HIT). He received the B.E. degree in automation and the Ph.D. degree in control science and engineering from HIT in 2016 and 2021, respectively. His research interests include data-driven process monitoring, fault diagnosis and prognosis, industrial cyber-physical systems, and artificial intelligence. Dr. Jiang is an active member of IEEE, CAC, and CAAI. He is a reviewer of 20+ international journals and international conferences.

Keynote Speaker IV



Prof., Dr. Kiyavash Negar
*College of Management of Technology
at EPFL, Switzerland*

Causal Inference in Complex Networks

Abstract

Causal determinism states that every event is necessitated by precedent events together with governing laws, natural or otherwise. Causal determinism is deeply ingrained with our ability to understand the physical sciences and their explanatory ambitions. Besides understanding phenomena, identifying causal networks is important for effective policy design in nearly any avenue of interest, be it epidemiology, financial regulation, management of climate, etc. Yet determining statistical causation among interacting stochastic processes and variables remains quite challenging. This lecture will review recent advances in causal inference: How far have we come, and where do we go from here?

Short Biography:

Prof. Negar Kiyavash is chair of Business Analytics in the College of Management of Technology at EPFL. Prior to joining EPFL, she was on faculty of Georgia Institute of Technology and University of Illinois at Urbana-Champaign. Her research focuses on data analysis with focus on causal inference in complex networks.

Keynote Speaker V



Dr. Valerio Frascolla
*Director Research and Innovation,
Intel Labs, Germany*

AI at the Edge

Abstract

Artificial Intelligence (AI) is becoming more and more a key ingredient to fulfil the new requirements of the forthcoming services and application in the most disparate verticals and domains of the society, from social science to industrial automation, from the creation of new molecules to more precise weather forecasts. At the same time, there's also an increasing trend to move closer to final users ("at the edge") needed data, storage and processing capabilities, to reduce system energy consumption and latency. This talk therefore elaborates on the convergence point of AI and Edge, picking some interesting challenges and providing some solutions, also coming from the work of European collaborative funded research projects.

Short Biography:

Dr Valerio Frascolla (MSc and PhD in Electronic Engineering) is Director of Research and Innovation at Intel and had been working at Ancona University, Comneon, Infineon, as reviewer for the EC and as independent evaluator for the Portuguese and Romanian science foundations. Valerio is in the advisory board of 6 EU projects and has worked in different technical and management roles in other 18. He has expertise in wireless system architecture, requirements management, standardization, program management, business aspects, coaching and mentoring. He is author of 75+ publications, Technical Program Committee member of 85+ conferences, reviewer for 30+ journals. His main research interest is 5G and beyond system design, with focus on spectrum management, AI, and edge technologies. Valerio is very active representing Intel in the European ecosystem, serving in key roles, e.g., being Vice-President of the BDVA/DAIRO association, and work group lead in AIOTI, 6G-IA, and NetworkEurope.

Programme at Glance

Date Time (GMT+3)	19.10.2022 Wednesday	20.10.2022 Thursday	21.10.2022 Friday
8:45-9:00	Registration	Registration	Registration
9:00-9:15	* Opening Session (Sergey Y. Yurish, Chairman)	* Daily Notifications	* Daily Notifications
9:15-10:00	Keynote Speaker I	Keynote Speaker III	Keynote Speaker V
10:00-10:30	<i>Coffee Break</i>	<i>Coffee Break</i>	<i>Coffee Break</i>
10:30-12:30	Regular Session: <i>Signal Processing & Fuzzy Logic</i>	Zoom Session: <i>Intelligent Measurements, Systems & Data</i>	Regular Session: Machine Learning & Applied AI (II)
12:30-13:30	<i>Lunch on your own</i>	<i>Lunch on your own</i>	<i>Lunch on your own</i>
13:30-14:15	Keynote Speaker II	Keynote Speaker IV	Zoom Session: <i>Signal Processing & Deep Learning</i>
14:15-16:15	Regular Session: <i>Signal Processing & Deep Learning</i>	Regular Session: Machine Learning & Applied AI (I)	14:15-15:45 <i>Poster Session & Farewell Cocktail</i>
16:15-16:45	<i>Coffee Break</i>	-	15:45 – 16:00 * Closing Session (Sergey Y. Yurish, Chairman)
16:45-18:45	Regular Session: <i>ANN & Artificial Applied Intelligence</i>	-	-
18:45-20:00	-	-	-
20:00-23:30	-	Gala Dinner <i>Nausica Ballroom</i>	-

* - must attend sessions

The time in the table and in the technical programme below is the local time in Corfu is: GMT+3, Athens.

Technical Conference Programme

Day 1

19 October 2022, Wednesday

Regular Session: Signal Processing & Fuzzy Logic

Chairman: Dr. John Hobby
Nokia Bell Labs, Murray Hill, USA

- 1. Better Exploiting the Redundancy of Serial Manipulators with Fuzzy Logic: A Planar 3-DOF Example**
Luc Baron and Negar Hassantabar (*Canada*)
- 2. Crest Factor Minimization for Wide-Bandwidth Multi-Sine Signals with Non-Flat Amplitude Spectra Using Partial Modulation**
Helena Althoff, Steffen Geinitz and Christian Linder (*Germany*)
- 3. Deep Learning Driven One-Class Detection YOLO Model in RGB Data for Edge-Computing Applications**
Petr Dolezel, Dominik Stursa, Veronika Rozsivalova and Pavel Skrabanek (*Czech Republic*)
- 4. Synchronization in Multi-Channel Burst Mode Demodulator for DVB-RCS Satellite Receiver: A Multi-core DSP Implementation**
Laxmaiah P., Dileep K. G. and Hari Prasad S. V. (*India*)
- 5. Monitoring Real-Time Personal Activity and Recognition Based on Fusion and Complex Feature Extraction of Multimodal Sensors (pre-recorded video)**
Diego Teran and Enrique Dominguez (*Spain*)

Regular Session: Signal Processing & Deep Learning (I)

Chairman: Prof. Dr. Denis Kouamé
Paul Sabatier University of Toulouse, France

- 1. Drone Radio Signal Detection with Multi-timescale Deep Neural Networks**
Claus Horn, Matthias Nyfeler and Christof Schüpbach (*Switzerland*)

- 2. Radio Map Reconstruction with Deep Neural Networks in a Weakly Labeled Learning Context with use of Heterogeneous Side Information**
Aleksandra Malkova, Massih-Reza Amini, Benoît Denis and Christophe Villien (*France*)

- 3. Building Health Monitoring Using Smartphone and Deep Neural Networks**
Francisco Vega and Wen Yu (*Mexico*)

- 4. How to Leverage DNN-based Speech Enhancement for Multi-Channel Speaker Verification ?**
Sandipana Dowerah, Romain Serizel, Denis Jouvét, Driss Matrouf and Mohammad Mohammadamini (*France*)

- 5. Attention-based Stacked LSTM for Displacement Time History Prediction of RC Bridge Piers Using Experimental Real-time Hybrid Simulation (pre-recorded video)**
Omid Yazdanpanah, Minwoo Chang and Ensieh Ali Bakhshi (*Iran, South Korea*)

- 6. Saliency Map from Subitizing Processing: First Approximation (pre-recorded video)**
Carola Figueroa (*Chile*)

Regular Session:
ANN & Artificial Applied Intelligence

Chairman: Dr. Matthias Nyfeler
Zurich University of Applied Sciences (Switzerland)

- 1. Web Application to Support the Credibility of Social Web Content**
Kristina Machova and Laura Pončáková (*Slovakia*)
- 2. Collective Obstacle Avoidance Strategy – an Agent-based Simulation Approach**
Alain-Jérôme Fougères, Juliette Grosset, Moïse Djoko-Kouam and Jean-Marie Bonnin (*France*)
- 3. A Smart Powered Wheelchair for Mobility of Cognitively Impaired Older Adults: Case Studies with Navigation and Obstacle Avoidance Help**
Sahereh Obeidavi and Gangolf Hirtz (*Germany*)
- 4. Convergence of Gradient Descent Algorithm Based Smoothing Double Regularization for Pi-Sigma Neural Networks (pre-recorded video)**
Khidir Mohamed (*Saudi Arabia, Sudan*)
- 5. Encoder-Decoder Network with Guided Transmission Map: Architecture (pre-recorded video)**
Le-Anh Tran and Dong-Chul Park (*South Korea*)
- 6. Embedded Artificial Neural Network for Data Prediction in Energy Efficient Wireless Sensors Networks (pre-recorded video)**
Imourane Abdoulaye, Laurent Rodriguez, Cecile Belleudy and Benoit Miramond (*France*)

Day 2
20 October 2022, Thursday

**Virtual Session in Zoom:
Intelligent Measurements, Systems & Data**

Chairman: Prof., Dr. Sergey Y. Yurish
International Frequency Sensors Association (IFSA), Spain

- 1. Intelligent Measurement in Era of Digitalization**
Prokopchina S. V. (*Russia*)
- 2. Big Data as the Conceptual Basis of BI Systems**
Zaslavskaja V. L., Konovalova V. S. (*Russia*)
- 3. Aspects of Using Weakly Structured and Unstructured Data in Business Intelligence Systems**
Zaslavskaja V. L., Romantsva N. V. (*Russia*)
- 4. Estimability of Effectiveness of Rehabilitation Measures Following Injuries in the Locomotor Apparatus on the Basis of Analysis of Small Samples**
Alekseev V. V., Korolev P. G., Tsareva A. V., Ivanova K. M. (*Russia*)
- 5. Virtual Digital 3D Sensor. Evaluation of the Accuracy of Measuring the Parameters of the Kinematic Portrait of a Person**
V. V. Alekseev , A. V. Tsareva , N. V. Romantsova, Baranova V. A. (*Russia*)

**Regular Session:
Machine Learning & Applied Artificial Intelligence (I)**

Chairman: Prof., Dr. Kiyavash Negar
College of Management of Technology at EPFL, Switzerland

- 1. Variable Projection Support Vector Machines**
Tamás Dózsa and Péter Kovács (*Hungary*)
- 2. Machine Learning-Based Identification of Data-driven Virtual Channels for Automotive Proving Ground Testing**
Mahmoud Elkafay, Enrico Risaliti and Bram Cornelis (*Belgium*)
- 3. Inspection Approach for Automated in-line Defect Detection on Decorated Foil Plates**
Paul Josef Krassnig, Matthias Haselmann and Dieter P. Gruber (*Austria*)
- 4. Autonomous Robotic Sorting of Recyclable**
Vasileios Tzounakos and Michail Maniadakis (*Greece*)
- 5. A Low-cost AI-based Soft Sensor for Food Drying Monitoring**
Evanthia Neofotistou, Nikos Stoupas and Michail Maniadakis (*Greece*)
- 6. Auto-encoder Based Medicare Fraud Detection**
Mansour Zoubeirou A. Mayaki and Michel Riveill (*France*)
- 7. Automatic Identification of Extremely Tiny Brain Hemorrhages in SWI Images using Convolutional Neural Network (pre-recorded video)**
Sahereh Obeidavi and Gangolf Hirtz (*Germany*)

Day 3
21 October 2022, Friday

**Virtual Session in Zoom:
Signal Processing & Deep Learning (II)**

Chairman: Prof., Dr. Sergey Y. Yurish
International Frequency Sensors Association (IFSA), Spain

- 1. Ear Tag type Tympanic Temperature Sensor for Cattle Considering Communication Range and Its Application**
Takahiro Natori, Hisashi Nabenishi and Naoyuki Aikawa (*Japan*)

- 2. A Deep Learning Vision Transformer using Majority Voting Ensemble for Nematode Classification with Test Time Augmentation Technique**
Abdul Qayyum, Abdesslam Benzinou, Kamal Nasreddine, Valentin Foulon, Anthonin Martinel, Catherine Borremans, Randi Hagemann and Daniela Zeppilli (*France, Norway*)

- 3. Deep Feedforward Neural Network Classifier with Polynomial Layer and Shared Weights**
Konstantinos Filippou, George Tsekouras, George Aifantis and Emmanouil Mavrikos (*Greece*)

**Regular Session:
Machine Learning & Applied Artificial Intelligence (II)**

Chairman: Prof. Tamás Dózsa
Eötvös Loránd University, Hungary

- 1. Unsupervised Text Clusterisation to Characterize Adverse Drug Reactions from Hospitalization Reports**
Xuchun Zhang, Michel Riveill and Milou-Daniel Drici (*France*)
- 2. Robust Sensor Spike Detection Method Based on Dynamic Time Warping**
Federico Deuschle, Bram Cornelis and Konstantinos Gryllias (*Belgium*)
- 3. Causal Effect Identification with Minimum Mean Estimation Error**
Jalal Etesami, Negar Kiyavash and Matthias Grossglauser (*Switzerland*)
- 4. Visual Inspection of Patterned Surfaces with Supervised Deep Learning Using Mixed Real and Synthetic Defects**
Matthias Haselmann, Paul Krassnig and Dieter P. Gruber (*Austria*)
- 5. K-nearest Neighbors to Predict Wood Logs Sawed Output: A Comparison of ESF and ICP Dissimilarities**
Sylvain Chabanet, Mathis Dumas, Hind Brill El-Haouzi and Philippe Thomas (*France*)
- 6. Sparse and Irregularly Distributed Geo-Data Categorization for Predictive Regression Model Training and Inference – Strategies and Results**
Jeremie Farret, Rogayah Soleymani and Vanessa Farias (*Canada*)

Poster Session (Conference Room *Kerkyra*):
21 October 2022 (14:15-16:15)

- 1. Multiple Unscented Particle Filtering for Dynamic State Estimation in Power Systems**
Nesrine Amor, Muhammad Tayyab Noman and Michal Petru
(*Czech Republic*)
 - 2. A Deep Learning Architecture for Automatic Raga Identification**
Ioanna Miliarezi and Stella Paschalidou (*Greece*)
 - 3. A New Automatic Tool to Transform Neutral Human Face to Persuasive Virtual Face**
Afef Cherni, Roxane Bertrand and Magalie Ochs (*France*)
 - 4. Unscented Particle Filters for Estimation of Gene Expression Time Series Data**
Muhammad Tayyab Noman, Nesrine Amor and Michal Petru
(*Czech Republic*)
 - 5. A New Video Real-World Dataset for the Comparison of Defogging Algorithms**
Alexandra Duminil, Jean-Philippe Tarel and Roland Brémond (*France*)
 - 6. Convolutional Recurrent Network Design for Real-Time Speech Enhancement**
Amir Rajabi and Mohammed Krini (*Germany*)
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