



SysInt 2022

System-Integrated Intelligence

7-9
September
Genova Italy

6th International Conference on System-Integrated Intelligence
Intelligent, flexible and connected systems in products and production

Wednesday 7

Artificial Intelligence Pervasive Sensor Smart Factory
Structural Human SS1 SS2 SS3 SS4 SS5



9.00-9.30	Opening		
9.30-10.30	Keynote: Stefan Edelkamp		
10.30-11.00	Break		
11.00-13.00	Artificial Intelligence	Structural Health Monitoring	
13.00-14.00	Lunch		
14.00-15.00	Keynote: Fu-Kuo Chang		
15.00-16.30	SS3: TinyML: The Quest for Next-Generation Computing, Part 1	Smart Factory and Logistic Systems, Part 1	
16.30-17.00	Break		
17.00-18.00	SS3: TinyML: The Quest for Next-Generation Computing, Part 2	Smart Factory and Logistic Systems, Part 2	

Thursday 8

8.30-9.30	Keynote: Fabrizio Bracco		
9.30-11.00	Sensors and Sensing Systems	SS4: Advancement in manufacturing and sustainability, Part 1	
11.00-11.30	Break		
11.30-13.00	Human Machine Interaction	SS4: Advancement in manufacturing and sustainability, Part 2	
13.00-14.00	Lunch		
14.00-15.30	Pervasive and Ubiquitous Intelligence, Part 1	SS1: Applications and Challenges in the use of 5G in Production and Logistics	
15.30-16.00	Break		
16.00-18.00	SS2: Human-in-the-loop control of haptic devices: now and the future	SS5: Sensor of Things	
19.30-23.00	Gala Dinner		

Friday 9

9.00-10.00	Keynote: Gregory Zacharewicz		
10.00-10.30	Break		
10.30-12.00	Pervasive and Ubiquitous Intelligence, Part 2	Smart Factory and Logistic Systems, Part 2	
12.00-13.00	Closing and Best paper Awards		
13.00-14.00	Lunch		

08.00	Registration
09.00	Opening Ceremony
09.30	Keynote Speech: MULTI-GOAL ROBOT MOTION PLANNING <i>Prof. Stefan Edelkamp, Czech Technical University, Prague - CZ</i> <i>Session Chairs: Prof. Christian Gianoglio, Prof. Edoardo Ragusa</i>
10.30	Break
11.00-13.00	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  Benvenuto Room </div> <div> <p>Artificial Intelligence <i>Session Chairs: Prof. Stefan Bosse, Prof. Christian Gianoglio, Prof. Edoardo Ragusa</i></p> <p>Towards Challenges and Proposals for Integrating and Using Machine Learning Methods in Production Environments <i>Thimo Florian Schindler; Dennis Bode; Klaus-Dieter Thoben</i></p> <p>Autonomous Driving based on Imitation and Active Inference <i>Sheida Nozari; Ali Krayani; Pablo Marin; Lucio Marcenaro; David Martin; Carlo Regazzoni</i></p> <p>Machine Learning based Reconstruction of Process Forces <i>Berend Denkena; Heinrich Klemme; Dennis Stoppel</i></p> <p>A Novel Rule-based Modeling and Control Approach for the Optimization of Complex Water Distribution Networks <i>Enrico Ferrari; Damiano Verda; Nicolò Pinna; Marco Muselli</i></p> <p>Graph-based Segmentation & Markov Random Field for Covid-19 Infection in Lung CT Volumes <i>Giulia Iaconi; Federica Ferraro; Marco Balletto; David Solarna; Marco Trombini; Gabriele Moser; Silvana Dellepiane</i></p> <p>Image based Classification of Methods-Time Measurement Operations in Assembly using Recurrent Neuronal Networks <i>Patrick Rückert; Katrin Birgy; Kirsten Tracht</i></p> </div> </div>
11.00-13.00	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  4H Room </div> <div> <p>Structural Health Monitoring <i>Session Chairs: Prof. Lorenzo Capineri, Dr. Dirk Lehmhus</i></p> <p>A sensing system for defects detection in reinforced aluminium panels by ultrasonic guided waves sensors <i>Lorenzo Capineri; Andrea Bulletti; Cosimo Damiani; Luca Bergamaschi</i></p> <p>A Tiny Machine Learning Approach to the Edge Localization of Acoustic Sources via Convolutional Neural Networks <i>Federica Zonzini; Giacomo Donati; Luca De Marchi</i></p> <p>Integrating Electronic Components, Sensors and Actuators in Cast Metal Components: An Overview of the State of the Art <i>Dirk Lehmhus; Thomas Rahn; Christoph Pille; Matthias Busse</i></p> </div> </div>

Fast Temperature-compensated Method for Damage Detection and Structural Health Monitoring with Guided Ultrasonic Waves and Embedded Systems

Christoph Polle; Stefan Bosse; Michael Koerd; Björn Maack; Axel Herrmann

A Study on a Novel Impact Test for SHM of CFRP Based on Screwdriver bit launch and Electret Microphone

Paulo Roberto Aguiar; Cristiano Soares Junior; Pedro O. Junior; Reinaldo Gotz; Paulo Monteiro Monson; Alessandro Roger Rodrigues

Optimization of Non-destructive Damage Detection of Hidden Damages in Fiber Metal Laminates using X-ray Tomography and Machine Learning Algorithms

Stefan Bosse; Chirag Shah; Axel V. Hehl; Carolin Zinn

13.00 Lunch

14.00 **Keynote Speech:**
DESIGN OF ADVANCED MULTIFUNCTIONAL COMPOSITES FOR FLY-BY-FEEL AUTONOMOUS ELECTRIC VEHICLES

Prof. Fu-Kuo Chang, Stanford University, CA - USA

Session Chairs: *Dr. Dirk Lehmus*

15.00-16.30



Benvenuto Room

SS3: TinyML: The Quest for Next-Generation Computing, Part 1

Session Chairs: *Dr. Hamoud Younes, Prof. Ali Ibrahim*

INVITED:

ENERGY-EFFICIENCY FOR TINYML AND EDGEAI: A CROSS-LAYER FRAMEWORK WITH HARDWARE AND SOFTWARE TECHNIQUES

Prof. Muhammad Shafique, New York University Abu Dhabi (NYU-AD)

Inter-Operability of Compression Techniques for Efficient Deployment of CNNs on Microcontrollers

Hamoud Younes; Hugo Le Blevet; Mathieu Léonardon; Vincent Gripon

Energy Consumption Analysis of pruned Semantic Segmentation Networks on an Embedded GPU

Hugo Tessier; Vincent Gripon; Mathieu Léonardon; Matthieu Arzel; Thomas Hannagan; David Bertrand

15.00-16.30



4H Room

Smart Factory and Logistic Systems, Part 1

Session Chairs: *Prof. Flavio Tonelli*

INVITED:

RISKS AND CHALLENGES OF DEEP LEARNING METHODS IN THE INDUSTRIAL MANUFACTURING PROCESS

Prof. Ilias Papadimitriou, GF Casting Solutions - CH

ANSALDO ENERGIA PROGETTO LHP (OR6.3) Proper Management of PPE (Personal Protective Equipment) financed by the Italian Ministry of Economic Development

Roberto Mosca; Marco Mosca; Roberto Revetria; Saverio Pagano; Federico Briatore

An Application of Engineering 4.0 to Hospitalized Patients

Roberto Mosca; Marco Mosca; Roberto Revetria; Fabio Currò; Federico Briatore

16.30

Break

17.00-18.00



Benvenuto
Room

SS3: TinyML: The Quest for Next-Generation Computing, Part 2

Session Chairs: *Dr. Hamoud Younes, Prof. Ali Ibrahim*

A Tiny CNN for Embedded Electronic Skin Systems

Fouad Sakr; Hamoud Younes; Joseph Doyle; Francesco Bellotti; Alessandro De Gloria; Riccardo Berta

Detecting Ice on Wind Turbine Rotor Blades: Towards Deep Transfer Learning for Image Data

Maria Teresa Alvela Nieto; Holger Gelbhardt; Jan-Hendrik Ohlendorf; Klaus-Dieter Thoben

Towards Real-time Human Detection in Maritime Environment using Embedded Deep Learning

Mostafa Rizk; Fatima Slim; Amer Baghdadi; Jean-Philippe Diguët

17.00-18.00



4H
Room

Smart Factory and Logistic Systems, Part 2

Session Chairs: *Prof. Flavio Tonelli*

DT-based System for Predicting Process Behavior

Bowen Qi; Hong-Seok Park

Optimal Robot Workpiece Placement for Maximized Repeatability

Jan Baumgärtner; Philipp Gönzheimer; Jürgen Fleischer

Enhancing Vendor Managed Inventory with the Application of Blockchain Technology

Santhosh Ganesan; Hendro Wicaksono; Omid Fatahi Valilai

Thursday 8

08:30

Keynote Speech:

TRANSFACTORY: TOWARDS A NEW TECHNOLOGY-HUMAN MANUFACTURING CO-EVOLUTION FRAMEWORK

Prof. Fabrizio Bracco, University of Genoa - IT

Session Chairs: *Prof. Alessandro Bruzzone*

9.30-11.00



Benvenuto
Room

Sensors and Sensing Systems

Session Chairs: *Prof. Klaus-Dieter Thoben, Prof. Lorenzo Capineri*

A Non-Hilbertian Inversion Technique for the Diagnosis of Faulty Elements in Antenna Arrays

Valentina Schenone; Alessandro Fedeli; Claudio Estatico; Matteo Pastorino; Andrea Randazzo

A Passive, Wireless Sensor Node for Material-integrated Strain and Temperature Measurements in Glass Fiber Reinforced Composites

Lukas Bertram; Michael Brink; Klaus-Dieter Thoben; Walter Lang

Multi-camera Metrology System for Shape and Position Correction of Large Fuselage Components in Aircraft Assembly

Daniel Alonso Valencia Zubiaga; Jörg Wollnack; Sanjay Kamath; Leander Brieskorn

Management of Research Field Data within the Concept of Digital Twin

Hauke Dierend; Osman Altun; Iryna Mozgova; Roland Lachmayer

Feed-Forward SNN for Touch Modality Prediction

Ali Dabbous; Ali Ibrahim; Maurizio Valle

9.30-11.00



4H
Room

SS4: Advancement in manufacturing and sustainability, Part 1

Session Chairs: *Prof. Alessandro Bruzzone, Prof. Doriana D'Addona*

INVITED:

THE BIOLOGICAL TRANSFORMATION IN MANUFACTURING – CURRENT STATE AND FUTURE TRENDS

Prof. Roberto Teti, University of Naples Federico II - IT

Data Driven Decision Making When Transitioning Towards a Modular Setup

Morten Skogstad Nielsen; Thomas Ditlev Brunoe; Kjeld Nielsen; Ann-Louise Andersen

A novel method for component positioning in thermoformed electronics

Behnam Madadnia; Frederick Bossuyt; Jan Vanfleteren

Towards circular production systems: Outlining the concept, challenges and future research directions

Filip Skärin; Carin Rösiö; Ann-Louise Andersen

11.00

Break

11.30-13.00



Benvenuto
Room

SS4: Advancement in manufacturing and sustainability, Part 2

Session Chairs: *Prof. Alessandro Bruzzone, Prof. Doriana D'Addona*

Mapping changeability capabilities guides production development: cases from Danish industry

Stefan Kjeldgaard; Rasmus Andersen; Alessia Napoleone; Thomas Ditlev Brunoe; Ann-Louise Andersen

Sustainability comparison of a new Reconfigurable Machine Tool and a conventional milling machine

Alessandro Arturo Bruzzone; Alessandra Ferrari; Alessia Napoleone

Comparison of Machine Learning models for Predictive Maintenance Applications

Alessia Lazzaro; Doriana M. D'Addona; Massimo Merenda

Exploring Manufacturing System Development and the Use of Platforms to Reduce Time-to-Market

Morten Skogstad Nielsen; Ann-Louise Andersen; Thomas D. Brunoe; Khaled Medini; Kjeld Nielsen

11.30-13.00



4H
Room

Human Machine Interaction

Session Chairs: *Prof. Giovanni Berselli*

Time Reduction in Online Programming – An Approach to hand guided Teaching for Small Batch Robot Machining

Marten Stepputat; Florian Beuss; Jan Sender; Wilko Fluegge

Ontology-based Documentation of Quality Assurance Measures Using the Example of a Visual Inspection

Tatyana Sheveleva; Kevin Herrmann; Max Leo Wawer; Christoph Kahra; Florian Nürnberger; Oliver Koepler; Iryna Mozgova; Roland Lachmayer; Sören Auer

Controlling Decisions by Head Electrical Signals

Enrico Zero; Alessandro Bozzi; Simone Graffione; Roberto Sacile

Tactile-based Human-robot Collaboration: a Performance Analysis

Francesco Grella; Roberto Canale; Francesco Giovinazzo; Alessandro Albini; Giorgio Cannata

13.00

Lunch

14.00-15.30



Benvenuto
Room

Pervasive and Ubiquitous Intelligence, Part 1

Session Chairs: *Prof. Christian Gianoglio, Prof. Edoardo Ragusa*

FPGA-based Road Crack Detection using Deep Learning

Lorenzo Canese; Gian Carlo Cardarilli; Luca Di Nunzio; Rocco Fazzolari; Marco Re; Sergio Spanò

Simple Non Regressive Informed Machine Learning Model for Prescriptive Maintenance of Track Circuits in a Subway Environment

Andrea Garrone; Simone Minisi; Luca Oneto; Carlo Dambra; Marco Borinato; Paolo Sanetti; Giulia Vignola; Federico Papa; Nadia Mazzino; Davide Anguita

Embedded Implementation of an Algorithm for Online Inertia Estimation in Power Grids

Alessandro Ravera; Valentina Baruzzi; Matteo Lodi; Oliveri, Alberto; Storace, Marco

Random Weights Neural Network for Low-cost Readout of Colorimetric Reactions: Accurate Detection of Antioxidant Levels

Edoardo Ragusa; Valentina Mastronardi; Deborah Pedone; Mauro Moglianetti; , Pier Paolo Pompa; Rodolfo Zunino; Paolo Gastaldo

Resource-Constrained Implementation of Deep Learning Algorithms for Dynamic Touch Modality Classification

Haydar Al Haj Ali; Christian Gianoglio; Ali Ibrahim; Maurizio Valle

14.00-15.30



4H
Room

SS1: Applications and Challenges in the use of 5G in Production and Logistics

Session Chairs: *Prof. Alice Kirchheim*

Augmented real-time control with 5G

Dieter Lutzmayr; Manfred Pauritsch

Concept of a 5G Hybrid Wireless Campus Network as Testbed for Industrial Applications

Christoph Cammin; Thomas Doebbert; Bettina Solzbacher; Gerd Scholl

Reference Network and Localization Architecture for Smart Manufacturing based on 5G

Stephan Ludwig; Doris Aschenbrenner; Marvin Scharle; Henrik Klessig; Michael Karrenbauer; Huanzhuo Wu; Maroua Taghouti; Pedro Lozano; Hans D. Schotten; Frank H. P. Fitzek

Survey on Usage of 5G Campus Networks in Intralogistics

Lara Nehrke; Simone Neumann; Alexandra Cieslak; Alice Kirchheim

Concept for a Revolution of Public Transport

Wolfgang Echelmeyer; Tuan Nguyen; Mert Mete

15.30

Break

16.00-18.00



Benvenuto
Room

SS2: Human-in-the-loop control of haptic devices: now and the future

Session Chairs: *Prof. Lucia Seminara; Prof. Giovanni Berselli, Prof. Salvatore Pirozzi*

An Intelligent System for Human Intent and Environment Detection Through Tactile Data

Gianluca Laudante; Salvatore Pirozzi

Design of a Wearable Haptic Device to Mediate Affective Touch with a Matrix of Linear Actuators

Nikolas Ferguson; Mehmet Ege Cansev; Anany Dwivedi; Philipp Beckerle

The effect of cognitive load on electrotactile communication via a multi-pad electrode

Fabricio Ariel Jure; Erika Geraldina Spaich; Laura Petrini; Strahinja Dosen

Motor-Unit Ordering of Blindly-Separated Surface-EMG Signals for Gesture Recognition

Mattia Orlandi; Marcello Zanghieri; Davide Schiavone; Elisa Donati; Francesco Conti; Simone Benatti

INVITED:

Self-organizing Middleware for Haptically Enabled Robots

Prof. Gerald E. Loeb, University of Southern California, CA - USA

16.00-18.00



4H
Room

SS5: Sensor of Things

Session Chairs: *Prof. Zeinab Hijazi, Prof. Ali Ibrahim*

Automated Tonic-Clonic Seizure Detection using Random Forests and Spectral Analysis on Electroencephalography Data

Craig Stewart; Wai Keung Fung; Nazila Fough; Radhakrishna Prabhu

An Investigation into Routing Protocols for Real-Time Sensing of Subsurface Oil Wells

Craig Stewart; Nazila Fough; Radhakrishna Prabhu

Surface-functionalized Multichannel Nanosensors and Machine Learning Analysis for Improved Sensitivity and Selectivity in Gas Sensing Applications

Luis Antonio Panes Ruiz; Shirong Huang; Leif Riemenschneider; Alexander Croy; Bergoi Ibarlucea; Gianarelio Cuniberti

Design and Simulation of a Novel Low-Voltage RF MEMS Switch for Reconfigurable Antennas

Alaa Elshazly; Mario Mounir; Muhammad K. Khalaf; Faycal Saffih; Yasmine Elogail; Hassan Mostafa

2T1M Neuromorphic Synapse with Pt-Hf-Ti Memristor Model

Heba Allah Gamal; Ayman Haggag; Hassan Mostafa

Embedded Implementation of Signal Pre-processing for Tactile Sensing System

Moustafa Saleh; Yahya Abbass; Maurizio Valle

19.30

Gala Dinner

Friday 9

9.00

Keynote Speech:

MODEL DRIVEN APPROACH FOR DIGITAL TWIN

Prof. Gregory Zacharewicz, Ecole des Mines d'Ales - FR

Session Chairs: *Prof. Marco Mosca*

10.00

Break

10.30-12.00



Benvenuto
Room

Pervasive and Ubiquitous Intelligence, Part 2

Session Chairs: *Prof. Christian Gianoglio, Prof. Edoardo Ragusa*

Human Recognition for Resource-constrained Mobile Robot Applied to Covid-19 Disinfection

Andrea Mattia Garavagno; Daniele Leonardi; Antonio Frisoli

Data-Driven Methods for Aviation Safety: from Data to Knowledge

Irene Buselli; Luca Oneto; Carlo Dambra; Christian Verdonk Gallego; Miguel Garcia Martinez

Design and Deployment of an Efficient Landing Pad Detector

Andrea Albanese; Tommaso Taccioli; Tommaso Apicella; Davide Brunelli; Edoardo Ragusa

Towards a Trade-off Between Accuracy and Computational Cost for Embedded Systems: a Tactile Sensing System for Object Classification

Youssef Amin; Christian Gianoglio; Maurizio Valle

An Optimized Heart Rate Detection System Based on Low-Power Microcontroller Platforms for Biosignal Processing

Benedetta Mazzoni; Giuseppe Tagliavini; Luca Benini; Simone Benatti

10.30-12.00



4H
Room

Smart Factory and Logistic Systems, Part 2

Session Chairs: *Prof. Marco Mosca*

Design and Development of a Tomato Picking Soft Robotic Gripper with a Separator and Mechanical Iris based Pedicel Cutting Mechanism

Shahid Ansari; Bishakh Bhattacharya

The Impact of Intelligent Objects in Quality 4.0

Sergio Salimbeni; Andrés Redchuk

Mutual Resiliency and Lean Analysis for Supply Chain Management in a COVID-19 Ventilator Production Case Study

Alan Caraveo; Saikiran Krishnamoorthy; Jonah Marie Lawas; Parthasarathy Periaswamy; Majid Sodachi; Omid Fatahi Valilai

Fighting Hospital Infections with Engineering 4.0

Roberto Mosca; Marco Mosca; Roberto Revetria; Fabio Currò; Federico Briatore

Cyber-Physical Equipment as a Service

Gustavo Sanchez; Giancarlo Bo; Fabrizio Cardinali; Flavio Tonelli

12.00

Best Paper Award and Closing Ceremony

13.00

Lunch

General Information

Venue

Polytechnical School of the University of Genova,
at Architecture and Design Department (DAD).

Stradone di Sant'Agostino, 37, 16123 Genova

Metro stop: "Sarzano/Sant'Agostino"

Secretariat Opening Hours

Wednesday, September 7, 2022 8.00 am – 6.00 pm

Thursday, September 8, 2022 8.00 am – 6.00 pm

Friday, September 9, 2022 8.30 am – 1.00 pm

Badges

Participants are obliged to wear the official
conference badge on all occasions

Language

The official language is English

Conference Registration includes

Full access to the technical program;

Conference material;

Conference lunches and coffee breaks;

Gala dinner on September 8

(Full Conference Registrations).

Extra tickets for social events can be purchased

Proceedings

Conference papers will be published on Springer.

Best Student Paper Award

Awards will be conferred to authors
during the Closing Ceremony on Friday noon.

Gala Dinner

Thursday 8 - 7.30 pm

Villa Chiossone

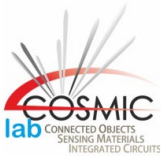
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