Day 1 - November 23, 2020

09:00 - 10:30 CET (Central European Time)

Plenary Room

Opening Ceremony & Welcome Messages

Join the Room

Agenda and Speakers

11:00 - 12:30 CET (Central European Time)

Plenary Room

Plenary Talks

Join the Room

Agenda and Speakers

14:00 - 15:30 CET (Central European Time)

Room 1

Explainable Artificial Intelligence in Industry

Join the Room

Agenda and Speakers

Room 2

Simulation as decision support tool in cross-cutting industrial sectors

Join the Room

Agenda and Speakers

Room 3

Security and Privacy for the Smart Factory

Join the Room

Agenda and Speakers

Room 4

Dynamic logistics optimization in the context of prescriptive analytics

Join the Room

Agenda and Speakers

16:00 - 17:30 CET (Central European Time)

Room 1

Building and Managing Cyber-Physical Production Systems

Join the Room

Agenda and Speakers

Room 2

Smart solutions in the agri-food industry and supply chain

Join the Room

Agenda and Speakers

Room 3

Digital Manufacturing: towards Industry 5.0 - The future is already here

Join the Room

Agenda and Speakers

Room 4

Special Session: Smart Operators 4.0 based on Simulation for Industry and Manufacturing Systems - The SO4SIMS project

Join the Room

Agenda and Speakers

Day 2 - November 24, 2020

09:00 - 10:30 CET (Central European Time)

Plenary Room

Plenary Talks

Join the Room

Agenda and Speakers

11:00 - 12:30 CET (Central European Time)

Room 1

Productivity Management in Industry 4.0: Concepts and Solutions

Join the Room

Agenda and Speakers

Room 2

Additive Manufacturing: technological advances, challenges and impacts

Join the Room

Agenda and Speakers

Room 3

Special Session: Security, Privacy and Protection in Industry 4.0

Join the Room

Agenda and Speakers

Room 4

Automated Factory and Collaborative Robots in Industry and Logistics

Join the Room

Agenda and Speakers

14:00 - 15:30 CET (Central European Time)

Room 1

Virtual/Augmented Reality and Visual Analytics in Industry

Join the Room

Agenda and Speakers

Room 2

Production Planning and Control in Industry 4.0: Challenges and Approaches

Join the Room

Agenda and Speakers

Room 3

Special Session: Applications and Industry 4.0 key enabling technologies - the Know4I and SMILE projects

Join the Room

Agenda and Speakers

Room 4

Security, Privacy and Intellectual Property Rights in Industry

Join the Room

Agenda and Speakers

16:00 - 17:30 CET (Central European Time)

Room 1

Model-based design, parameter estimation and process optimization in Industry 4.0

Join the Room

Agenda and Speakers

Room 2

Maintenance and failure detection: analytics and models

Join the Room

Agenda and Speakers

Room 3

Special Session: Dynamic logistics optimization in the context of prescriptive analytics

Join the Room

Agenda and Speakers

Room 4

Towards the Industrial Operator 4.0

Join the Room

Agenda and Speakers

Day 3 - November 25, 2020

09:00 - 10:30 CET (Central European Time)

Room 1

Integrated logistics planning for efficient smart manufacturing

Join the Room

Agenda and Speakers

Room 2

Impact of Industry 4.0 in the Shipbuilding Industry: Towards the Shipyard 4.0

Join the Room

Agenda and Speakers

Room 3

Digital Twin-Driven Smart Manufacturing

Join the Room

Agenda and Speakers

Room 4

Special Session: Digital image information extraction for material quality control

Join the Room

Agenda and Speakers

11:00 - 12:30 CET (Central European Time)

Room 1

New cross-cutting perspectives for the Industry 4.0

Join the Room

Agenda and Speakers

Room 2

State of the art and Industry 4.0 readiness of real enterprises: insights and considerations

Join the Room

Agenda and Speakers

Room 3

Machine learning in industrial applications

Join the Room

Agenda and Speakers

Room 4

Special Session: Integrated logistics planning for efficient smart manufacturing

Join the Room

Agenda and Speakers

14:00 - 15:30 CET (Central European Time)

Room 1

Industry 4.0 innovations and inter-disciplinary contaminations between management, quality and engineering

Join the Room

Agenda and Speakers

Room 2

Advances in maintenance technologies and approaches: opportunities and challenges

Join the Room

Agenda and Speakers

Room 3

Eco-design and sustainability-oriented processes for Factory 4.0

Join the Room

Agenda and Speakers

Room 4

The digitalization of supply chain: challenges and opportunities from a managerial perspective

Join the Room

Agenda and Speakers

16:00 - 17:30 CET (Central European Time)

Plenary Room

Closing Ceremony with Best Paper Awards

Join the Room

Agenda and Speakers

Abstract Booklet

The ISM 2020 Abstract Booklet is available with information about the keynote and the session talks.

Download the booklet

Full Program

updated November 19, 2020

Opening Ceremony

Day 1 - Nov 23, 2020

09:00 - 12:30 CET

Welcome Messages

MS Teams - Plenary Room

Join at 09:00 CET - Nov 23, 2020

Introduction by the ISM 2020 General Co-Chair: ***Francesco Longo - University of Calabria, Italy***

Welcome messages and greetings:

- **Maria Ulmer** - *Director General of Division I for Digitization and eGovernment, Federal Ministry for Digital and Economic Affairs, Austria*
- **Markus Achleitner** - *Ministry of Economy, Science & Research, Austria*
- **Sandra Savaglio** - *Chair of the Higher Education, Research and Innovation Committee, Calabria Region, Italy*
- **Gerald Reisinger** - *University President/CEO, University of Applied Sciences Upper Austria, Austria*
- **Berthold Kerschbaumer** - *Dean, Faculty for Informatics, Communications and Media, University of Applied Sciences Upper Austria, Austria*
- **Bruno Buchberger** - *Founder of the Softwarepark Hagenberg, Austria*
- **Agostino Bruzzone** - *ISM 2020 Honorary Chair*
- **Michael Affenzeller** - *ISM 2020 General Co-Chair and Scientific Head of Softwarepark Hagenberg, Austria*
- **Antonio Padovano** - *ISM 2020 Program Chair*
- **Emilio Ferrari** - *AIDI President*
- **Luigi Filice** - *AITEM Vice President*

Plenary Talks

MS Teams - Plenary Room

Join at 11:00 CET - Nov 23, 2020

Markus Brummayer

Senior Expert

voestalpine Steel Division

Linz, Austria

Smart Steel Production

voestalpine is a technology leader in the development and production of cutting-edge steel products and is a benchmark company for energy efficiency and environmental compatibility. With its top-quality products and system solutions using steel and other metals, it is a leading partner of the automotive and consumer goods industries as well as of the aerospace and oil & gas industries. voestalpine is also the world market leader in complete railway systems, as well as in the production of tool steel and special sections. Headquartered in Linz, voestalpine is represented by 500 Group companies and locations in more than 50 countries on five continents.

The foundation for voestalpine's technological leadership is research and development and a network of corporate expertise comprised of numerous affiliations with national and international universities, universities of applied technologies, centers of competence as well as a number of development partnerships with key customers. The new powerful technologies and advanced solutions related to Industry 4.0 and Smart Manufacturing are important key enablers for the Steel Industry. This presentation will focus on smart and sustainable steel production processes and workflows along the entire value chain, addressing both the needs and challenges via review and discussion of relevant examples.

Biographical Sketch

Dr. Markus Brummayer, with an academic education in mechatronics, fluid mechanics and innovation management, started his career in the steel industry more than twenty years ago. At voestalpine Steel Division he has been deeply engaged in the development and optimization of production processes and product quality since 2003. His main R&D&I activities are focused on continuous slab casting and hot rolling. Furthermore, he has gained profound experience in cross-process quality optimization along the entire process chain. Within the voestalpine business unit slab (hot metal production, steelmaking and casting) he also coordinates the R&D digitalization

topics. As an inventor, Markus Brummayer has contributed numerous patent applications thereby strengthening voestalpine's technological leadership. Markus Brummayer is a member of the

European Steel Technology Platform (ESTEP) Smart Factory Working Group and the European Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) Digital Working Group. He is Chairman of the Strategic Board of the Center of Excellence for Smart Production FH Upper Austria and a strategic board member of the Pro2Future Research Center. In addition to his employment at voestalpine, Markus Brummayer was CEO of the Austrian Competence Center in Mechatronics (ACCM, now LCM).

Weiming Shen

Professor, FIEEE, FCAE, FEIC

Huazhong University of Science and Technology

Wuhan, China

Agent-Based Collaborative Intelligent Manufacturing in the Era of Industry 4.0

Agent technology represents a new paradigm for developing industrial software applications. During the past 25 years, a significant number of researchers and practitioners have been trying to apply intelligent software agents in the areas of engineering design, collaborative intelligent manufacturing, supply chain management, and smart product services. Recent developments and fast advancements of Cloud/Fog/Edge Computing, Internet of Things, Cyber-Physical Systems, Digital Twins, Big Data, and Blockchains provide new opportunities for applications of intelligent software agents in the manufacturing industry in the era of Industry 4.0, but also bring a lot of new research challenges. This talk presents some first-hand experience in developing agent-based collaborative design and manufacturing technologies and systems, and discusses future trends, R&D

opportunities and challenges.

Biographical Sketch

Dr. Weiming Shen is a Professor at Huazhong University of Science and Technology (HUST), China. Prior to joining HUST, he worked for 20 years at National Research Council Canada as Research Officer, Senior Research Officer, and Principal Research Officer. He is a Fellow of Canadian Academy of Engineering, Fellow of IEEE, Fellow of Engineering Institute of Canada (EIC). He is an internationally-recognized expert on Agent-Based Collaborative Technologies and Applications. He has published several books and over 500 papers in scientific journals and international conferences in the related areas. His work has been cited over 14,000 times with an h-index of 53. His book titled “Multi-Agent Systems for Concurrent Intelligent Design and Manufacturing” and a few related review papers are among the most cited on agent-based intelligent manufacturing. He is the Co-Editor-in-Chief of IET Collaborative Intelligent Manufacturing, an Associate Editor or Editorial Board Member of over ten international journals (including IEEE Transactions on Automation Science and Engineering; IEEE Transaction on SMC: Systems; IEEE SMC Magazine; Advanced Engineering Informatics; Computational Intelligence; Intelligent Buildings International; Service Computing and Applications) and served as guest editor for several other international journals. He is the Co-Chair of the IEEE Technical Committee on Computer Supported Cooperative Work in Design, has been Program Committee Co-Chair of the CSCWD conferences since 2001, and served as General Chair/Co-Chair or Program Committee Chair/Co-Chair for over 30 international conferences.

Parallel Sessions

Day 1 - Nov 23, 2020

14:00 - 15:30 CET

Explainable Artificial Intelligence in Industry

MS Teams - Room 1

Join at 14:00 CET - Nov 23, 2020

Introduction by the Session Chair: ***Florian Sobieczky - Software Competence Center Hagenberg (SCCH), Austria***

EXPLAINING LEARNING MODELS IN MANUFACTURING PROCESSES (#36)

Claudia Goldman, Michael Baltaxe, Debejyo Chakraborty, Jorge Arinez

EXPLAINING A RANDOM FOREST WITH THE DIFFERENCE OF TWO ARIMA MODELS IN AN INDUSTRIAL FAULT DETECTION SCENARIO (#62)

Anna-Christina Glock

IEC 61499 DEVICE MANAGEMENT MODEL THROUGH THE LENSES OF RMAS (#81)

Andrea Bonci, Sauro Longhi, Massimiliano Pirani

EXPLAINABILITY OF AI-PREDICTIONS BASED ON PSYCHOLOGICAL PROFILING (#123)

Simon Neugebauer, Lukas Rippitsch, Florian Sobieczky, Manuela Geiß

Simulation as decision support tool in cross-cutting industrial sectors

MS Teams - Room 2

Join at 14:00 CET - Nov 23, 2020

Introduction by the Session Chair: ***Francesco Longo - University of Calabria, Italy***

SYSTEM SIMULATION AS DECISION SUPPORT TOOL IN SHIP DESIGN (#91)

Marco Gianni, Vittorio Bucci, Alberto Marinò

A SYSTEMS DYNAMICS APPROACH TO SME DIGITALISATION (#98)

Radhakrishnan Viswanathan, Arnesh Telukdarie

OPEN-SOURCE DISCRETE-EVENT SIMULATION SOFTWARE FOR APPLICATIONS IN PRODUCTION AND LOGISTICS: AN ALTERNATIVE TO COMMERCIAL TOOLS? (#119)

Sebastian Lang, Tobias Reggelin, Marcel Müller, Abdulrahman Nahhas

DEVELOPING AN ARTIFICIAL INTELLIGENCE FRAMEWORK TO ASSESS SHIPBUILDING AND REPAIR SUB-TIER SUPPLY CHAINS RISK (#122)

Rafael Diaz, Katherine Smith, Beatriz Acero, Francesco Longo, Antonio Padovano

Security and Privacy for the Smart Factory

MS Teams - Room 3

Join at 14:00 CET - Nov 23, 2020

Introduction by the Session Co-Chairs: ***Rudolf Ramler - Software Competence Center Hagenberg (SCCH), Austria; Atif Mashkoor - Software Competence Center Hagenberg (SCCH), Austria; Thomas Schlechter - University of Applied Sciences Upper Austria, Austria***

MULTI-MODE SYSTEMS FOR RESILIENT SECURITY IN INDUSTRY 4.0 (#40)

Michael Riegler, Johannes Sametinger

PYBNBOWTIE: PYTHON LIBRARY FOR BOW-TIE ANALYSIS BASED ON BAYESIAN

NETWORKS (#46)

Frank Zurheide, Eckehard Hermann, Harald Lampesberger

SMART FACTORY SECURITY: A CASE STUDY ON A MODULAR SMART MANUFACTURING SYSTEM (#82)

Federico Maggi, Marco Balduzzi, Rainer Vosseler, Martin Rösler, Walter Quadrini, Giacomo Tavola, Marcello Pogliani, Davide Quarta, Stefano Zanero

TAXONOMY OF GENERATIVE ADVERSARIAL NETWORKS FOR DIGITAL IMMUNITY OF INDUSTRY 4.0 SYSTEMS (#83)

Vagan Terziyan, Svitlana Gryshko, Mariia Golovianko

BEYOND FEDERATED LEARNING: ON CONFIDENTIALITY-CRITICAL MACHINE LEARNING APPLICATIONS IN INDUSTRY (#89)

Werner Zellinger, Volkmar Wieser, Mohit Kumar, David Brunner, Natalia Shepeleva, Rafa Galvez, Josef Langer, Lukas Fischer, Bernhard Moser

Dynamic logistics optimization in the context of prescriptive analytics

MS Teams - Room 4

Join at 14:00 CET - Nov 23, 2020

Introduction by the Session Co-Chairs: ***Andreas Beham - University of Applied Sciences Upper Austria, Austria; Viktoria Hauder - University of Applied Sciences Upper Austria, Austria***

ROUTE DURATION PREDICTION IN A STOCHASTIC AND DYNAMIC VEHICLE ROUTING PROBLEM WITH SHORT DELIVERY DEADLINES (#49)

Nikolaus Frohner, Matthias Horn, Günther Raidl

DRIVER SHIFT PLANNING FOR AN ONLINE STORE WITH SHORT DELIVERY TIMES (#67)

Matthias Horn, Nikolaus Frohner, Günther R. Raidl

REAL-LIFE SCHEDULING WITH RICH CONSTRAINTS AND DYNAMIC PROPERTIES - AN EXTENDABLE APPROACH (#69)

Michael Bögl, Anna Gattinger, Ionela Knospe, Manuel Schlenkrich, Roman Stainko

DYNAMIC ONLINE OPTIMIZATION IN THE CONTEXT OF SMART MANUFACTURING: AN OVERVIEW (#120)

Viktoria A. Hauder, Andreas Beham, Stefan Wagner, Karl F. Doerner, Michael Affenzeller

Parallel Sessions

Day 1 - Nov 23, 2020

16:00 - 17:30 CET

Building and Managing Cyber-Physical Production Systems

MS Teams - Room 1

Join at 16:00 CET - Nov 23, 2020

Introduction by the Session Chair: ***Christian Zehetner - University of Applied Sciences Upper Austria, Austria***

A GEMMA-GRAFCET METHODOLOGY TO ENABLE THE DIGITAL TWIN BASED ON REAL-TIME COUPLING (#6)

Giacomo Barbieri, David Gutierrez

TOWARDS MASTERING VARIABILITY IN SOFTWARE-INTENSIVE CYBER-PHYSICAL PRODUCTION SYSTEMS (#11)

Rick Rabiser, Alois Zoitl

MTCONNECT-BASED DECISION SUPPORT SYSTEM FOR LOCAL MACHINE TOOL MONITORING (#13)

Carlos Felipe Erazo Navas, Alejandro Echavarria Yepes, Sepideh Abolghasem, Giacomo Barbieri

DEVELOPING AN OPC UA SERVER FOR CNC MACHINES (#71)

André Martins, João Lucas, Hugo Costelha, Carlos Neves

Smart solutions in the agri-food industry and supply chain

MS Teams - Room 2

Join at 16:00 CET - Nov 23, 2020

Introduction by the Session Co-Chairs: ***Giovanni Mirabelli - University or Calabria, Italy; Vittorio Solina - University or Calabria, Italy***

SCALABLE MODEL FOR INDUSTRIAL COFFEE ROASTING CHAMBER (#21)

Federico Di Palma, Francesca Iacono, Chiara Toffanin, Andrea Zaccardi, Lalo Magni

COVID SUPPLY CHAIN RESILIENCE MODELING FOR THE DAIRY INDUSTRY (#74)

Inderasan Munien, Arnesh Telukdarie

PRIORITISING REQUIREMENTS OF INFORMATIONAL SHORT FOOD SUPPLY CHAIN PLATFORMS USING A FUZZY APPROACH (#103)

Patrick R. Burgess, Funlade T. Sunmola

SIMULATION AND TEMPERATURE CONTROL IN CONVECTION DEHYDRATOR FOR LABORATORY (#111)

Honorato Ccalli Pacco

ECONOMIC EVALUATION OF AUTOMATED GUIDED VEHICLES USAGE IN A FOOD COMPANY (#126)

Letizia Tebaldi, Giulio Di Maria, Andrea Volpi, Roberto Montanari, Eleonora Bottani

Digital Manufacturing: towards Industry 5.0 - The future is already here

MS Teams - Room 3

Join at 16:00 CET - Nov 23, 2020

Introduction by the Session Co-Chairs: ***Fabio De Felice - University of Cassino and Southern Lazio, Italy; Antonella Petrillo - University of Napoli "Parthenope", Italy***

AN INDUSTRY 4.0 DEMONSTRATOR FACTORY FOR SMALL SATELLITE SYSTEMS (#24)

Markus Krauss, Florian Leutert, Markus Scholz, Michael Fritscher, Robin Hess, Christian Lilge, Klaus Schilling

INVESTIGATING THE POTENTIAL OF SMART MANUFACTURING TECHNOLOGIES (#66)

Jan Zenisek, Norbert Wild, Josef Wolfartsberger

EVALUATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES TOWARDS INDUSTRY 4.0 (#79)

Horacio René Del Giorgio, Alicia Mon

ARCHITECTURE FOR DATA ACQUISITION IN RESEARCH AND TEACHING LABORATORIES (#100)

Walter Quadrini, Simone Galparoli, Domenico Daniele Nucera, Luca Fumagalli, Elisa Negri

Special Session: Smart Operators 4.0 based on Simulation for Industry and Manufacturing Systems - The SO4SIMS project

MS Teams - Room 4

Join at 16:00 CET - Nov 23, 2020

Introduction by the Session Co-Chair: ***Francesco Longo - University of Calabria, Italy***

The project SO4SIMS (Smart Operators 4.0 based on Simulation for Industry and Manufacturing Systems) aims at moving ahead the state of the art in the area of Smart Operators and their role in manufacturing systems according to the new Industry 4.0 paradigm. The SO4SIMS proposal conceives a holistic methodological and technological

framework able to tackle the Smart Operator problem conceptualization and implementation from multiple interconnected perspectives: (i) a dedicated Digital Twin for collecting and analyzing the data needed to investigate the Smart Operator problem; (ii) a set of new models that will consider in a synergic way: the operators' safety and ergonomic problem, the operators' ageing problem and the interaction of the operators with the shop floor technologies (where collaborative environments are needed); (iii) the need to develop a synthetic, virtual and simulated environment that works as test bed for the practical implementation of the Smart Operator. Dissemination of projects results and expert talks will be carried out in the session.

Plenary Session

Day 2 - Nov 24, 2020

09:00 - 10:30 CET

Plenary Talks

MS Teams - Plenary Room

Join at 09:00 CET - Nov 24, 2020

Giancarlo Fortino

Full Professor of Computer Engineering

University of Calabria

Rende (CS), Italy

Agents meet the IoT: Towards Cognitive and Interoperable Ecosystems of Networked Smart Objects

The future Internet of Things (IoT) will enable a new and wide range of decentralized

systems (e.g. from smart homes to smart cities) where “things”, able to sense/actuate, compute and communicate with other machines and with humans, will play a central role. The growing importance of such novel cyberphysical network and technology demands suitable and effective paradigms able to fulfill the general and specific requirements of IoT systems engineering. In this keynote, we propose the exploitation of the agent-oriented computing paradigm to support IoT systems analysis, design, and implementation. The synergic meeting of Agents with the IoT will make it possible the development of dynamic IoT systems of diverse scales. First, we introduce background and literature about IoT, with a specific focus on IoT systems development along with currently available agent-oriented approaches. Then, we present in detail our agent-oriented approach specifically based on the ACOSO (Agent-based COoperating Smart Objects) Methodology and related middleware, which provides an effective agent programming model and an agent execution heterogeneous platform along with ad-hoc IoT tools for the construction of an IoT system in terms of a Multi-Agent System. Some case studies concerning the development of IoT systems will be briefly described to show the flexibility and effectiveness of the proposed approach. Finally, future challenges will be delineated towards EDGE and Cloud-assisted agent-based approaches for IoT, specifically towards Agent-oriented IoT Data Mining at the EDGE and Industry 4.0.

*ACOSO project site: http://acoso.dimes.unical.it

Biographical Sketch

Giancarlo Fortino (SM’12) is Full Professor of Computer Engineering at the Dept. of Informatics, Modeling, Electronics and Systems (DIMES) of the University of Calabria (Unical), Rende (CS), Italy. He has a Ph. D. degree and Laurea (MSc+BSc) degree in Computer Engineering from Unical. He is High-end Foreign Expert of China (term 2015-2018), Adjunct and Guest Professor at the Wuhan University of Technology (China), High-end Expert of HUST (China), CAS PIFI Visiting Scientist at Shenzhen (2019-2021), and Associated Senior Research Fellow at the Italian National Research Council – ICAR Institute. He has been also Visiting Researcher and Professor at the International Computer Science Institute (Berkeley, USA, 97-99) and at the Queensland University of Technology (Australia, 2009), respectively. He is in the list of Top Italian Scientists (TIS) by VIA-academy and by Guide2Research, with h-index=52 and 10000+ citations according to GS. He is the director of the SPEME (Smart, Pervasive and Mobile Systems Engineering) Lab at DIMES, Unical and co-director of two joint-labs on IoT technologies established with Wuhan University of Technology and Shanghai Maritime University, respectively. His main research interests include Internet of Things computing and technology, agent-based computing, body area networks, human-machine systems, wireless sensor networks, pervasive and cloud computing, multimedia networks, and mobile health systems. He participated to many local, national and international research projects and was the deputy coordinator and scientific & technical project manager of the EU-funded (8Meuro) H2020 INTER-IoT project. He authored about 450 publications in journals, conferences and books. He chaired about 100 Int’l conferences/workshops as co-chair (he is currently the general chair of IEEE International Conference on Human-Machine Systems 2020 in Rome, Apr. 6-8, 2020), organized 60+ special issues in well-known ISI-impacted Int’l Journals, and participated in

the TPC of about 500 conferences. He is the founding editor in chief of the IEEE Book Series on “Human-Machine Systems” and of the Springer Book Series on “Internet of Things: Technology, Communications and Computing”, and currently serves (as associate editor) in the editorial board of IEEE Transactions on Affective Computing, IEEE Transactions on Human-Machine Systems, IEEE IoT Journal, IEEE Sensors Journal, IEEE Access, IEEE SMC Magazine, IEEE OJEMBS, IEEE OJCS, Journal of Networks and Computer Applications, Engineering Applications of Artificial Intelligence, Information Fusion, and others. He is the recipient of the 2014 Andrew P. Sage SMC Transactions Paper award. He is co-founder and CEO of SenSysCal S.r.l., a spin-off of Unical, developing innovative IoT-based systems for e-health and domotics. He is the Chair of the IEEE SMC Italian Chapter, Member-at-large of the IEEE SMCS BoG, Member of the IEEE Press Board of Directors, and founding chair of the IEEE SMC Technical Committee on “Interactive and Wearable Computing and Devices”.

Alois Zoitl

Professor for cyber-physical systems for engineering and production

Johannes Kepler University

Linz, Austria

Hic sunt dracones? Developing software for networked production automation systems

Industry faces major challenges as product life-cycles shorten, product variability increases, and global markets become more volatile. To remain competitive, production facilities and equipment must be adaptable to respond quickly and efficiently to these changes. A key success factor in achieving these goals is the control and automation infrastructure. New distributed architectures are a possible approach to address these requirements. The amount of software in production automation systems is constantly increasing. This is reinforced by the demand for increased networking of these systems. Current technologies are already reaching their limits. This leads to increasing development efforts and costs. It seems as if control software turns into an indomitable beast which is very difficult to control. New interaction and communication patterns as well as new ways of programming automation systems consisting of networked control units are required. In the context of this talk we would like to give an overview of the current and future requirements

for production automation systems. The current approaches to programming production automation systems will be considered. In particular, it will be shown how model-driven or low code software development can help to tame the beast and reduce development efforts. An important aspect here is Open Source Software, which still has great potential especially in the production automation system environment.

Biographical Sketch

Alois Zoitl holds a PhD degree in Electrical Engineering with focus on dynamic reconfiguration of real-time constrained control applications and a Master degree in Electrical Engineering with the focus on distributed industrial automation systems from Vienna University of Technology. Currently he is a Professor for cyber-physical systems for engineering and production with the LIT | CPS Lab at Johannes Kepler University, Linz. Before that he was the scientific research group leader for Industrial Automation at the research institute fortiss in Munich, Germany. Before that he was the head of the research field Distributed Intelligent Automation Systems (Odo Struger Laboratory) at the Automation and Control Institute (ACIN), Vienna University of Technology. He is co-author of more than 150 publications (3 books, 6 book chapters, 19 journal articles) and the co-inventor of 4 patents in the mentioned areas. His research interests are in the area adaptive production systems, distributed control architectures, and dynamic reconfiguration of control applications as well as software development and software quality assurance methods for industrial automation. Alois Zoitl conducted and lead several industry funded R&D projects as well as coordinated and participated in several public funded (national as well as European) R&D projects. He is a founding member of the open source initiatives Eclipse 4diac, providing a complete IEC 61499 solution, and OpENer. Furthermore, he is a member of the IEEE, the PLCopen user organization, and GMA. Since 2009 he is an active member of the IEC SC65B/WG15 for the distributed automation standard IEC 61499. He was named convenor of the group in May 2015.

Parallel Sessions

Day 2 - Nov 24, 2020

11:00 - 12:30 CET

Productivity Management in Industry 4.0: Concepts and Solutions

MS Teams - Room 1

Join at 11:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Tim Jeske - Institute of Applied Industrial Engineering and Ergonomics, Germany***

SENSOR SHIRT AS UNIVERSAL PLATFORM FOR REALTIME MONITORING OF POSTURE AND MOVEMENTS FOR OCCUPATIONAL HEALTH AND ERGONOMICS (#29)

Phillip Petz, Florian Eibensteiner, Josef Langer

A HUMAN-CENTERED ASSEMBLY WORKPLACE FOR INDUSTRY: CHALLENGES AND LESSONS LEARNED (#39)

Roman Froschauer, Werner Kurschl, Josef Wolfartsberger, Sebastian Pimminger, Rene Lindorfer, Jakob Blattner

AN ANALYTICAL FRAMEWORK FOR ASSESSING COGNITIVE CAPACITY AND PROCESSING SPEED OF OPERATORS IN INDUSTRY 4.0 (#42)

Daniela Cavallo, Salvatore Digiesi, Francesco Facchini, Giovanni Mummolo

DEVELOPMENT OF DIGITALIZATION IN PRODUCTION INDUSTRY – IMPACT ON PRODUCTIVITY, MANAGEMENT AND HUMAN WORK (#50)

Tim Jeske, Marlene Würfels, Frank Lennings

Additive Manufacturing: technological advances, challenges and impacts

MS Teams - Room 2

Join at 11:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Luigino Filice - University of Calabria, Italy***

A "LOW-COST" SUBTRACTIVE METHOD FOR FINISHING 3D CONCRETE PRINTED STRUCTURES (#9)

Joseph Canou, Maylis Uhart, Pierre Diaz

GENERATION OF 2.5D DEPOSITION STRATEGIES FOR LMD-BASED ADDITIVE MANUFACTURING (#38)

Diego Montoya-Zapata, Carles Creus, Igor Ortiz, Piera Alvarez, Aitor Moreno, Jorge Posada, Oscar Ruiz-Salguero

FUNCTIONALIZED AM PARTS FOR THE MANUFACTURING OF THE FUTURE (#48)

Giovanna Rotella, Maria Rosaria Saffioti, Michela Sanguedolce, Luigino Filice

THE IMPACT OF ADDITIVE MANUFACTURING ON SUPPLY CHAIN DESIGN: A SIMULATION STUDY (#59)

Marta Rinaldi, Mario Caterino, Pasquale Manco, Marcello Fera, Roberto Macchiaroli

Special Session: Security, Privacy and Protection in Industry 4.0

MS Teams - Room 3

Join at 11:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***Thomas Schlechter - University of Applied Sciences Upper Austria, Austria; Atif Mashkoor - Software Competence Center Hagenberg (SCCH), Austria; Rudolf Ramler - Software Competence Center Hagenberg (SCCH), Austria***

The increasing connectivity of machinery, robots, sensors and mobile embedded devices in industrial production dramatically increases the vulnerability of the involved systems. Yet ensuring security of complex, interconnected Industry 4.0 and IoT systems operating in a highly dynamic, heterogeneous and distributed industry environment is a challenging endeavor. Moreover, besides ensuring reliability, confidentiality, integrity and availability for services and systems, Industry 4.0 also has to cope with issues related to privacy and sensitivity of data and the protection of intellectual property and competitive knowledge exposed during production. The aim of this special session is to bring together researchers and practitioners from different backgrounds and domains to foster mutual understanding of security challenges and risks, and to discuss how they can be effectively addressed along the entire system lifecycle. The invited speakers, including affiliations, are:

- **Shadi Attarha** – *OFFIS*
- **Björn Siemers** – *OFFIS*
- **Stefan Rass** – *AAU Klagenfurt*
- **Mathias Ekstedt** – *KTH Royal Institute of Technology*
- **Simon Kranzer** – *University of Applied Sciences Salzburg*

Automated Factory and Collaborative Robots in Industry and Logistics

MS Teams - Room 4

Join at 11:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Antonio Padovano - University of Calabria, Italy***

ENHANCED AGILITY FOR ASSEMBLY TASKS VIA SELF-SUFFICIENT MOBILE WORKING STATIONS (#12)

Rudolf Pichler, Daniel Strametz, Martin Höffernig

BIASED RANDOM-KEY GENETIC ALGORITHM FOR COBOT ASSIGNMENT IN AN

ASSEMBLY/DISASSEMBLY JOB SHOP SCHEDULING PROBLEM (#43)

Alexander Kinast, Karl F. Doerner, Stefanie Rinderle-Ma

A BIBLIOMETRIC ANALYSIS ON COLLABORATIVE ROBOTS IN LOGISTICS 4.0 ENVIRONMENTS (#84)

Giorgia Atzeni, Letizia Tebaldi, Giuseppe Vignali, Eleonora Bottani

HUMAN ASPECTS IN COLLABORATIVE ORDER PICKING – LETTING ROBOTIC AGENTS LEARN ABOUT HUMAN DISCOMFORT (#106)

Yaxu Niu, Frederik Schulte, Rudy R. Negenborn

Parallel Sessions

Day 2 - Nov 24, 2020

14:00 - 15:30 CET

Virtual/Augmented Reality and Visual Analytics in Industry

MS Teams - Room 1

Join at 14:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Michele Fiorentino - Polytechnic University of Bari, Italy***

USING MIXED REALITY IN INDUSTRIAL SETTINGS - ARE WE READY YET? (#22)

Werner Kurschl, Johannes Schönböck, Sebastian Pimminger, Josef Altmann, Mirjam Augstein

CREATING AN OPEN-SOURCE AUGMENTED REALITY REMOTE SUPPORT TOOL FOR INDUSTRY: CHALLENGES AND LEARNINGS (#37)

Andrea Aschauer, Irene Reisner-Kollmann, Josef Wolfartsberger

AN EMPIRICAL STUDY OF TASK-SPECIFIC LIMITATIONS OF THE OVERVIEW+DETAIL TECHNIQUE FOR INTERACTIVE TIME SERIES ANALYSIS (#78)

Judith Friedl, Björn Zimmer, Lisa Perkhofer, Jan Zenisek, Peter Hofer, Hans-Christian Jetter

FUZZY COGNITIVE MAP-BASED KNOWLEDGE REPRESENTATION OF HAZARDOUS INDUSTRIAL OPERATIONS (#127)

Francesco Longo, Antonio Padovano, Letizia Nicoletti, Caterina Fusto, Mohaiad Elbasheer, Rafael Diaz

FUTURE SCENARIOS FOR THE DESIGN OF LOGISTICS CHAINS FOR RAW MATERIALS (#20)

Sebastian Trojahn, Alexander Teuber

Production Planning and Control in Industry 4.0: Challenges and Approaches

MS Teams - Room 2

Join at 14:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Giuseppina Ambrogio - University of Calabria, Italy***

APPROACHES OF PRODUCTION PLANNING AND CONTROL UNDER INDUSTRY 4.0 (#30)

Jan-Phillip Herrmann, Sven Tackenberg, Elio Padoano, Thilo Gamber

SMART PRODUCTION PLANNING AND CONTROL: TECHNOLOGY READINESS ASSESSMENT (#77)

Sameh Saad, Ramin Bahadori, Muhamad Putra, Hamidreza Jafarnejad

CAPACITY PLANNING OF A MIXED-MODEL ASSEMBLY LINE FOR PREFABRICATED HOUSEBUILDING ELEMENTS (#86)

Maria Anna Huka, Wolfgang Grenzfurtner, Barbara Zauner, Manfred Gronalt

THIRTY YEARS OF FLEXIBLE JOB-SHOP SCHEDULING: A BIBLIOMETRIC STUDY (#95)

Pedro Coelho, Ana Pinto, Samuel Moniz, Cristovão Silva

PARALLEL METAHEURISTICS FOR SHOP SCHEDULING: ENABLING INDUSTRY 4.0 (#94)

Pedro Coelho, Cristovão Silva

Special Session: Applications and Industry 4.0 key enabling technologies - the Know4I and SMILE projects

MS Teams - Room 3

Join at 14:00 CET - Nov 24, 2020

Introduction by the Session Chair: ***Francesco Longo - University of Calabria, Italy***

This session will include a discussion of applications and lessons learned from two ongoing projects in the field of Industry 4.0: the Know4I project and the SMILE project.

Security, Privacy and Intellectual Property Rights in Industry

MS Teams - Room 4

Join at 14:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***Rudolf Ramler - Software Competence Center Hagenberg (SCCH), Austria; Atif Mashkoor - Software Competence Center Hagenberg (SCCH), Austria; Thomas Schlechter - University of Applied Sciences Upper Austria, Austria***

TRACE RECONSTRUCTION IN SYSTEM LOGS FOR PROCESSING WITH PROCESS MINING (#47)

Jasper Jürgensen

EVALUATING THE ALIGNMENT OF SEQUENCE DIAGRAMS WITH SYSTEM BEHAVIOR (#65)

Atif Mashkoor, Alexander Egyed

PROTECTING INTELLECTUAL PROPERTY RIGHTS OF INDUSTRIAL SOFTWARE (#104)

Thomas Ziebermayr

ANONYMIZATION AS HOMEOMORPHIC DATA SPACE TRANSFORMATION FOR PRIVACY-PRESERVING DEEP LEARNING (#105)

Anastasiia Girka, Vagan Terziyan, Mariia Gavriushenko, Andrii Gontarenko

Parallel Sessions

Day 2 - Nov 24, 2020

16:00 - 17:30 CET

Model-based design, parameter estimation and process optimization in Industry 4.0

MS Teams - Room 1

Join at 16:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***Michael Affenzeller - University of Applied Sciences Upper Austria, Austria***

IMPROVEMENT OF MANUFACTURING TECHNOLOGIES THROUGH A MODELLING APPROACH: AN AIR-STEAM STERILIZATION CASE-STUDY (#25)

Francesca Iacono, Jorge Lo Presti, Irene Schimperna, Sara Ferretti, Andrea Mezzadra, Lalo Magni, Chiara Toffanin

EFFICIENCY IMPROVEMENT IN POLYCRYSTALLINE SOLAR PANEL USING THERMAL CONTROL WATER SPRAYING COOLING (#34)

Dominic Ramere, Opeyeolu Timothy Laseinde

SIMULATION OF GROUND BEARING PRESSURE PROFILE UNDER HYDRAULIC CRANE

OUTRIGGER MATS FOR THE VERIFICATION OF 16-POINT COMBINED LOADING (#63)

Ghulam Muhammad Ali, Asif Mansoor, Shuai Liu, Jacek Olearczyk, Ahmed Bouferguene, Mohamed Al-Hussein

PRELIMINARY DESIGN OF AR/SOFC COGENERATION ENERGY SYSTEM USING LIVESTOCK WASTE (#112)

Orlando Corigliano, Giuseppe De Lorenzo, Petronilla Fragiacomo

MICROWAVE PHOTONICS APPROACH AS A NOVEL SMART FABRICATION TECHNIQUE OF A RADIO COMMUNICATION JAMMERS (#114)

Mikhail Belkin, Dmitriy Fofanov

Maintenance and failure detection: analytics and models

MS Teams - Room 2

Join at 16:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***Florian Sobieczky - Software Competence Center Hagenberg (SCCH), Austria***

DYNAMIC FAILURE RATE MODEL OF AN ELECTRIC MOTOR COMPARING THE MILITARY STANDARD AND SKF METHODS (#60)

Diego D'Urso, Ferdinando Chiacchio, Dario Borrometi, Antonio Costa, Lucio Compagno

DECAY-PARAMETER DIAGNOSIS IN INDUSTRIAL DOMAINS BY ROBUSTNESS THROUGH ISOTONIC REGRESSION (#61)

Salma Mahmoud, Florian Sobieczky, Jorge Martinez-Gil, Patrick Praher, Bernhard Freudenthaler

CONTEXT: AN INDUSTRY 4.0 DATASET OF CONTEXTUAL FAULTS IN A SMART FACTORY (#64)

Lukas Kaupp, Heiko Webert, Kawa Nazemi, Bernhard Humm, Stephan Simons

EARLY LIFE RELIABILITY GROWTH TESTING WITH NON-CONSTANT FAILURE INTENSITY (#76)

Nikolaus Haselgruber, Shawn Capser, Giorgio Vignati

DRIFT DETECTION ANALYTICS FOR IOT SENSORS (#109)

Sathyan Munirathinam

Special Session: Dynamic logistics optimization in the context of prescriptive analytics

MS Teams - Room 3

Join at 16:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***Andreas Beham - University of Applied Sciences Upper Austria, Austria; Viktoria Hauder - University of Applied Sciences Upper Austria, Austria***

Dynamic optimization problems in the field of logistics arise from different industry-relevant areas, as for example in the control of portal cranes, transport vehicles, or production lines. When optimizing such logistics processes in real time, a reaction to dynamic events becomes necessary. In order to offer a real-world suitable planning result, new solution approaches have to be developed, which proactively and reactively handle such events. Observing and reacting to changes, continuously learning the prediction of upcoming events and adapting the search strategies for new solutions by analyzing and evaluating its performance over time are only three examples for developing a holistic, real time optimization approach. Integrating such methods enables decision support in real time, i.e. recommendations for operational planning decisions are suggested (prescribed) by continuously optimizing and analyzing the affected logistics planning problems. Such a holistic view on dynamic optimization, considering a prescriptive analytics approach, has not been extensively researched so far. As a result, we cordially invite researchers and practitioners to propose new approaches and/or their experiences made so far in the context of dynamic optimization and prescriptive analytics. With a special focus on industrial practicability, first proposals for new frameworks considering dynamic optimization and prescriptive analytics, project presentations and talks out of a practitioner's point of view are also aimed at in particular. The session will include (i) research project and management project presentations; (ii) real-world management (experience) reports. The invited speakers, including affiliations and titles of their respective talks, are:

- Josef Ressel Center adaptOp: Adaptive Optimization in Dynamic Environments
  Stefan Wagner – *University of Applied Sciences Upper Austria, Austria*
- Steel logistics: digitalization of dynamic problems
  Karl Schneeberger – *Industrie-Logistik-Linz GmbH, Austria*
- Challenges and solutions for optimization in the glass producing industry
  Gerald Fehringer – *LISEC Austria GmbH, Austria*

Towards the Industrial Operator 4.0

MS Teams - Room 4

Join at 16:00 CET - Nov 24, 2020

Introduction by the Session Co-Chairs: ***David Romero Diaz - Tecnológico de Monterrey, Mexico; Antonio Padovano - University of Calabria***

INDUSTRY 4.0 AND HUMAN FACTOR: HOW IS TECHNOLOGY CHANGING THE ROLE OF THE MAINTENANCE OPERATOR? (#52)

Tommaso Gallo, Annalisa Santolamazza

SMART OPERATORS: HOW INDUSTRY 4.0 IS AFFECTING THE WORKER'S PERFORMANCE IN MANUFACTURING CONTEXTS (#116)

Valentina Di Pasquale, Valentina De Simone, Salvatore Miranda, Stefano Riemma

PROCEDURE MODEL FOR THE DEVELOPMENT AND LAUNCH OF INTELLIGENT ASSISTANCE SYSTEMS (#118)

Paul Reichardt, Sebastian Lang, Tobias Reggelin

THE SUSTAINABLE ROLE OF HUMAN FACTOR IN I4.0 SCENARIOS (#124)

Sotirios Panagou, Fabio Fruggiero, Alfredo Lambiase

HUMAN FACTORS, ERGONOMICS AND INDUSTRY 4.0 IN THE OIL&GAS INDUSTRY: A BIBLIOMETRIC ANALYSIS (#128)

Francesco Longo, Antonio Padovano, Lucia Gazzaneo, Jessica Frangella, Rafael Diaz

Parallel Sessions

Day 3 - Nov 25, 2020

09:00 - 10:30 CET

Integrated logistics planning for efficient smart manufacturing

MS Teams - Room 1

Join at 09:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Viktoria Hauder - University of Applied Sciences Upper Austria, Austria; Andreas Beham - University of Applied Sciences Upper Austria, Austria***

THE ASSOCIATION BETWEEN NETWORK CENTRALITY MEASURES AND SUPPLY CHAIN PERFORMANCE: THE CASE OF DISTRIBUTION NETWORKS (#26)

Christian Wallmann, Markus Gerschberger

A CLASSIFICATION-BASED SOLUTION FOR RECOMMENDING PROCESS PARAMETERS OF PRODUCTION PROCESSES WITHOUT QUALITY MEASURES (#75)

Zhengtian Ai, Ingo Heinle, Christian Schelske, Hao Wang, Peter Krause, Thomas Bäck

HEURISTIC APPROACHES FOR SCHEDULING JOBS AND VEHICLES IN A CYCLIC FLEXIBLE MANUFACTURING SYSTEM (#99)

Martin Gutjahr, Hans Kellerer, Sophie N. Parragh

STACKING AND TRANSPORTING STEEL SLABS USING HIGH-CAPACITY VEHICLES (#101)

Biljana Roljic, Sebastian Leitner, Karl F. Doernera

Impact of Industry 4.0 in the Shipbuilding Industry: Towards the Shipyard 4.0

MS Teams - Room 2

Join at 09:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Giuseppe Aiello - University of Palermo, Italy***

NEW APPROACH TO THE FIRE RISK AND FIREFIGHTING SYSTEM IN SMALL SHIPS, AS CONSEQUENCE OF THE USE OF HYBRID PROPULSION (#4)

Valerio Ruggiero

INDUSTRY 4.0: ADVANCED DIGITAL SOLUTIONS IMPLEMENTED ON A CLOSE POWER LOOP TEST BENCH (#17)

Antonio Giallanza, Giuseppe Aiello, Giuseppe Marannano

A COMPARISON OF DIFFERENT LINEARIZED FORMULATIONS FOR PROGRESSIVE FLOODING SIMULATION IN FULL-SCALE (#32)

Luca Braidotti, Germano Degan, Serena Bertagna, Vittorio Bucci, Alberto Marinò

SRTP ASSESSMENT OF PASSENGER SHIPS: A SIMULATION TOOL (#72)

Serena Bertagna, Luca Braidotti, Ubaldo la Monaca, Alberto Marinò, Cristian Trombini, Vittorio Bucci

Digital Twin-Driven Smart Manufacturing

MS Teams - Room 3

Join at 09:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Fei Tao - Beihang University, China; Qinglin Qi - Beihang University, China***

TOWARDS DIGITAL COGNITIVE CLONES FOR THE DECISION-MAKERS: ADVERSARIAL TRAINING EXPERIMENTS (#27)

Mariia Golovianko, Svitlana Gryshko, Vagan Terziyan, Tuure Tuunanen

A MULTI-LAYER ARCHITECTURE FOR NEAR REAL-TIME COLLABORATION DURING DISTRIBUTED MODELING AND SIMULATION OF CYBERPHYSICAL SYSTEMS (#28)

Paul Lonauer, David Holzmann, Christina Leitner, Alexander Probst, Johannes

Schönböck, Hans-Christian Jetter

HIGH-QUALITY SHEET METAL PRODUCTION USING A MODEL-BASED ADAPTIVE APPROACH (#35)

Christian Zehetner, Christian Reisinger, Wolfgang Kunze, Franz Hammelmüller, Rafael Eder, Helmut Holl, Hans Irschik

EQUIPMENT DESIGN OPTIMIZATION BASED ON DIGITAL TWIN UNDER THE FRAMEWORK OF ZERO-DEFECT MANUFACTURING (#68)

Dimitris Mourtzis, John Angelopoulos, Nikos Panopoulos

Special Session: Digital image information extraction for material quality control

MS Teams - Room 4

Join at 09:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Dalibor Štys - Institute of Complex Systems, FFPW, University of South Bohemia (Czech Republic); Jaroslaw Jaczak - University of Appied Sciences Upper Austria, Linz Campus, Austria***

The digital imaging in industrial and security applications typically follows the path: signal capture → signal downgrading (i.e. videocompression, image compression etc.) → data transmission → automated analysis by known procedures. We propose the alternative path: signal capture → signal calibration and correction → extraction of physical parameters from original datasets (i.e. object detection and identification, quasispectral analysis, mechanical parameters extraction etc.) → transmission or storage of much smaller but still undistorted data → analysis based on physical models and/or data mining, up to the extend allowed by the technology in question. There will be shown examples from light microscopy (LM) and X-ray tomography (XCT) usage in the field of material production. XCT brings advanced possibilities in smart manufacturing process covering combination of metrology and product quality assessment. XCT could be applied for in-situ testing of materials and product under various mechanical, chemical and biological conditions. Using TLGI – XCT, it is possible to acquire three complementary image modalities simultaneously. For example, it provides enhanced contrast between various types of carbon containing polymers (carbon composites, bone fragments, wood samples etc.) Often there is no alternative to light microscopy for its non-invasiveness, ability to image structures of thick diffracting samples and spectral resolution. The light microscopy is limited in resolution but we may always distinguish a centroid of the observed signal. In that we are limited only by the magnification and by the size of the element of the camera detector. The Special Session include methods of superesolution/superlocalisation in quality control of nanoprinted structures, nanofibers

and larger biocompatible nanostructured surfaces. This work was partially supported by the ImageHeadstart project ATCZ 215 of the Interreg program. The invited speakers, including affiliations and titles of their respective talks, are:

- ImageHeadstart: Breakthrough Computer Vision Applications in the Micro World: Consortium of Research Organizations for Industry 4.0
  Dalibor Štys – *Institute of Complex Systems, FFPW, University of South Bohemia, Czech Republic*
- Advanced X-ray computed tomography methods for material characterization
  Michal Vopálenský – *Centre Telč of the Institute for Theoretical and Applied Mechanics of the Academy of Science of the Czech Republic, Czech Republic*
- 4D μCT in experimental mechanics and material quality control
  Dan Kytýř – *Centre Telč of the Institute for Theoretical and Applied Mechanics of the Academy of Science of the Czech Republic, Czech Republic*
- Defect extraction in CFRP composites using advanced microcomputed tomography
  Sascha Senck – *University of Applied Sciences Upper Austria, Stelzhamerstraße 23, 4600 Wels, Austria*

Parallel Sessions

Day 3 - Nov 25, 2020
11:00 - 12:30 CET

New cross-cutting perspectives for the Industry 4.0

MS Teams - Room 1

Join at 11:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Cecilia Silvestri - University of "Tuscia", Italy; Antonio Forcina - University of Napoli "Parthenope", Italy; Barbara Aquilani - University of "Tuscia", Italy; Michela Piccarozzi - University of "Tuscia", Italy; Luca Silvestri - University of Nicolò Cusano, Italy***

EXTENDING THE SCOPE OF REFERENCE MODELS FOR SMART FACTORIES (#18)

Nuno Soares

CFD MODELING IN INDUSTRY 4.0: NEW PERSPECTIVES FOR SMART FACTORIES (#51)

Luca Silvestri

THE LEAN PRODUCTION AND INDUSTRY 4.0: STRATEGY/MANAGEMENT OR

TECHNICAL/IMPLEMENTATION? AN SYSTEMATIC LITERATURE REVIEW (#54)

Chiara Cagnetti, Tommaso Gallo, Cecilia Silvestri, Michela Piccarozzi, Alessandro Ruggieri

THE ROLE OF INDUSTRY 4.0 ENABLING TECHNOLOGIES FOR SAFETY MANAGEMENT: A SYSTEMATIC LITERATURE REVIEW (#58)

Antonio Forcina, Domenico Falcone

State of the art and Industry 4.0 readiness of real enterprises: insights and considerations

MS Teams - Room 2

Join at 11:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Stefano Saetta - University of Perugia, Italy; Valentina Caldarelli - University of Perugia, Italy***

FIRST RESULTS OF A SURVEY ON MANUFACTURING OF THE FUTURE (#23)

Christian Fries, Manuel Fechter, Gábor Nick, Ádám Szaller, Thomas Bauernhansl

INDUSTRY 4.0 TOOLS IN INNOVATIVE EUROPEAN FIRMS: EXPLORING THEIR ADOPTION AND COMMUNICATION FEATURES THROUGH CONTENT ANALYSIS (#55)

Michela Piccarozzi, Cecilia Silvestri, Barbara Aquilani, Chiara Cagnetti

MANUFACTURING ENTERPRISE CLUSTERING AND CLASSIFICATION CONCERNING RESHORING INCENTIVES IN THE CONTEXT OF INDUSTRY 4.0 (#85)

Petra Unterberger, Julian M. Müller

A SURVEY STUDY ON INDUSTRY 4.0 READINESS LEVEL OF ITALIAN SMALL AND MEDIUM ENTERPRISES (#90)

Alessia Maria Rosaria Tortora, Maria Alfano, Valentina Di Pasquale, Raffaele Iannone, Cesare Pianese

Machine learning in industrial applications

MS Teams - Room 3

Join at 11:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Florian Sobieczky - Software Competence Center Hagenberg (SCCH), Austria***

MACHINE LEARNING AND STATISTICS: A STUDY FOR ASSESSING INNOVATIVE DEMAND FORECASTING MODELS (#10)

Nikolas Ulrich Moroff, Ersin Kurt, Josef Kamphues

IMPLICATIONS OF EMBEDDED ARTIFICIAL INTELLIGENCE - MACHINE LEARNING ON SAFETY OF MACHINERY (#44)

Sana Anastasi, Marianna Madonna, Luigi Monica

LARGE SCALE PREDICTABILITY ANALYSIS OF PROCESS VARIABLES FROM INJECTION MOULDING MACHINES (#70)

Shailesh Tripathi, Christian Mittermayr, David Muhr, Herbert Jodlbauer

PROTOTYPING MACHINE-LEARNING-SUPPORTED LEAD TIME PREDICTION USING AUTOML (#80)

Janek Bender, Jivka Ovtcharova

AN ADAPTIVE MACHINE LEARNING METHODOLOGY TO DETERMINE MANUFACTURING PROCESS PARAMETERS FOR EACH PART (#92)

David Muhr, Herbert Jodlbauer, Shailesh Tripathi

Special Session: Integrated logistics planning for efficient smart manufacturing

MS Teams - Room 4

Join at 11:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Viktoria Hauder - University of Applied Sciences Upper Austria, Austria; Andreas Beham - University of Applied Sciences Upper Austria, Austria***

From a logistics management perspective, integrated planning is one of the key factors for success. Especially in the current era of smart manufacturing, an increasing digitalization and therefore integration of different sub areas is indispensable to be able to utilize synergy effects. Exchanging information and decisions, i.e. coordinating, integrating, and analyzing different systems and stakeholders within an organization and along the whole supply chain is necessary to manage all logistics processes in a smart and efficient way. Nevertheless, the topic of integrated planning and analytics, especially in the research field of operations research but also in the broader sense of research on logistics management, has not been investigated as extensively as single logistics planning problems, although offering a numerous amount of advantages in contrary to its isolated and sequential counterpart. Therefore, we cordially invite researchers and logistics managers to propose their ideas, solution approaches, and/or managerial experiences concerning integrated logistics planning along the supply chain and thus, supporting efficient smart manufacturing in the widest sense. This session aims at bringing together researchers and practitioners both from a quantitative and qualitative point of view. By mutually giving insights into their innovative work and their perspective on integrated planning and smart manufacturing, lively and prosperous

discussions on the current state of the art and a possible future integration of different logistics planning approaches in the context of smart manufacturing should be encouraged. Especially focusing on industrial implementability, proposals for new frameworks or concepts considering integrated planning, research project presentations and talks out of a practitioner's point of view are also aimed at in particular. The invited speakers, including affiliations and titles of their respective talks, are:

- Shared resources in collaborative vehicle routing
  Margaretha Gansterer – *Professor for Production Management and Logistics, Department of Operations, Energy, and Environmental Management, University of Klagenfurt, Austria*
- Integrated logistics planning: a bi-objective optimization perspective
  Sophie Parragh – *Professor for Production and Logistics Management, Institute of Production and Logistics Management/JKU Business School, Johannes Kepler University Linz, Austria*
- Logistics Optimization in Practice: From Research to Implementation
  Stefanie Kritzinger – *Head of Unit Logistics Informatics, Risc Software GmbH, Hagenberg, Austria*

Parallel Sessions

Day 3 - Nov 25, 2020

14:00 - 15:30 CET

Industry 4.0 innovations and inter-disciplinary contaminations between management, quality and engineering

MS Teams - Room 1

Join at 14:00 CET - Nov 25, 2020

Introduction by the Session Co-Chairs: ***Cecilia Silvestri - University of "Tuscia", Italy; Antonio Forcina - University of Napoli "Parthenope", Italy; Barbara Aquilani - University of "Tuscia", Italy; Michela Piccarozzi - University of "Tuscia", Italy; Luca Silvestri - University of Nicolò Cusano, Italy***

LIFE CYCLE PHASES AND DESIGN MORPHOLOGY FOR THE IMPLEMENTATION OF A COOPERATIVE INVENTORY POOLING-SYSTEM (#8)

Yannic Hafner, Thomas Urban, Johannes Fottner

INDUSTRY 4.0 TOOLS IN LEAN PRODUCTION: A SYSTEMATIC LITERATURE REVIEW

(#53)

Tommaso Gallo, Chiara Cagnetti, Cecilia Silvestri, Alessandro Ruggieri

BUSINESS PROCESS (4IR) CENTRIC OPTIMIZATION MODELLING (#73)

Mageshnee Munsamy, Arnesh Telukdarie

DAQL 2.0: MEASURE DATA QUALITY BASED ON ENTITY MODELS (#93)

Christian Lettner, Reinhard Stumptner, Werner Fragner, Franz Rauchenzauner, Lisa Ehrlingera

STATISTICAL PROCESS CONTROL OF ASSEMBLY LINES IN A MANUFACTURING PLANT: PROCESS CAPABILITY ASSESSMENT (#125)

Eleonora Bottani, Roberto Montanari, Andrea Volpi, Letizia Tebaldi, Giulio Di Maria

Advances in maintenance technologies and approaches: opportunities and challenges

MS Teams - Room 2

Join at 14:00 CET - Nov 25, 2020

Introduction by the Session Chair: ***Antonio Padovano, University of Calabria, Italy***

DYNAMIC MAINTENANCE MANAGEMENT TO IMPROVE MAINTENANCE PRACTICES IN THE AUTOMOTIVE SECTOR (#33)

Dominic Ramere, Timothy Laseinde

IMPLEMENTATION OF INDUSTRY 4.0 TECHNOLOGY: NEW OPPORTUNITIES AND CHALLENGES FOR MAINTENANCE STRATEGY (#56)

Gianpaolo Di Bona, Vittorio Cesarotti, Gabriella Arcese, Tommaso Gallo

ENABLING TECHNOLOGY FOR MAINTENANCE IN A SMART FACTORY: A LITERATURE REVIEW (#57)

Antonio Forcina, Vito Introna, Alessandro Silvestri

RECENT DEVELOPMENTS TOWARDS INDUSTRY 4.0 ORIENTED PREDICTIVE MAINTENANCE IN INDUCTION MOTORS (#113)

Maria Drakaki, Yannis Karnavas, Panagiotis Tzionas, Ioannis Chasiotis

Eco-design and sustainability-oriented processes for Factory 4.0

MS Teams - Room 3

Join at 14:00 CET - Nov 25, 2020

Introduction by the Session Chair: ***Giovanni Berselli, University of Genoa, Italy***

WASTE REDUCTION IN PRINTING PROCESS BY IMPLEMENTING A VIDEO INSPECTION SYSTEM AS A HUMAN MACHINE INTERFACE (#14)

Carlos Alberto Perez Juarez, Sonia Karina Perez Juarez, Francisca Irene Soler Anguiano, Adrielly Nahomee Ramos Alvarez

REACHING SUSTAINABILITY THROUGH A SMART WATER CRISIS-PROOF INDUSTRY (#15)

Adrielly Nahomeé Ramos Alvarez, Gloriveth de Fátima Molina Soler, Ámbar Molina Soler, Idalia Flores de la Mota, Francisca Irene Soler Anguiano

A MODEL FOR THE ECONOMIC ASSESSMENT OF DISASSEMBLY-LINE INTEGRATION IN TRADITIONAL MANUFACTURING PROCESSES (#41)

Marco Sergio, Chiara Franciosi, Raffaele Iannone

OPTIMIZATION OF THE USE OF BIOMASS RESIDUES IN THE POPLAR PLYWOOD SECTOR (#87)

Ivan Ferretti

INTEGRATED PRODUCTION-DISTRIBUTION SCHEDULING WITH ENERGY CONSIDERATIONS FOR EFFICIENT FOOD SUPPLY CHAINS (#96)

Vittorio Solina, Giovanni Mirabelli

The digitalization of supply chain: challenges and opportunities from a managerial perspective

MS Teams - Room 4

Join at 14:00 CET - Nov 25, 2020

Introduction by the Session Chair: ***Eleonora Bottani - University of Parma, Italy; Barbara Bigliardi - University of Parma, Italy***

CONCEPTUAL DESIGN OF AN INTEGRATED SOLUTION FOR URBAN LOGISTICS USING INDUSTRY 4.0 PRINCIPLES (#97)

Bruno Machado, Leonor Teixeira, Ana Luísa Ramos, Carina Pimentel

REVIEW AND ANALYSIS OF BLOCKCHAIN PROJECTS IN SUPPLY CHAIN MANAGEMENT (#88)

Fabian Dietrich, Yiwen Ge, Ali Turgut, Louis Louw, Daniel Palm

CONTEXT-AWARE BLOCKCHAIN-BASED SUSTAINABLE SUPPLY CHAIN VISIBILITY MANAGEMENT (#107)

Funlade T. Sunmola

LISC MODEL: AN INNOVATIVE PARADIGM FOR LIQUID SUPPLY CHAIN (#108)

Mariacarmela Passarelli, Giuseppina Ambrogio, Luigino Filice, Alfio Cariola, Vincenzo Straffalaci

Closing Ceremony

Day 3 - Nov 25, 2020
16:00 - 17:30 CET

ISM 2020 Award Ceremony & ISM 2021 Presentation

MS Teams - Plenary Room

Join at 16:00 CET - Nov 25, 2020

Introduction by the Session Chair: ***Francesco Longo - University of Calabria, Italy***

ISM 2020 Awards Ceremony

- 🏆 Best Paper Award
- 🏆 Industrial Impact Award
- 🏆 Best Service Innovation Paper Award

ISM 2021 Presentation: ***Michael Affenzeller, ISM 2020 General Co-Chair and Scientific Head of Softwarepark Hagenberg, University of Applied Sciences Upper Austria, Austria***

Regular & Invited Sessions

Regular sessions cover the topics of the conference and mainly group the papers that fall within a specific research subject and submitted to the regular program.

Invited Sessions consist of papers collected within the scope of an Open Track proposed by one or more organizers. Papers are mainly based on personal invitation by the Open Track organizer(s) but may also include papers submitted to the regular program.

Regular and Invited Sessions will last about 1 hour and 30 minutes and may include between 4 and 5 papers. Contributions can be either regular papers or short papers (min 3 pages length) and they will appear in the conference proceedings.

Reviewing Process

Each paper submitted to the conference will be individually peer-reviewed taking into

consideration scientific quality, originality and relevance. At the discretion of the IPC and considering the reviewers' comments, individual papers may be accepted for inclusion in the conference proceedings. The revised paper will then undergo a second round of reviews to check whether the authors have carefully addressed the reviewers' comments and the paper is fully acceptable for publication. At the discretion of the program committee, individual papers may be removed from an invited session and placed in the regular program, as well as appropriate contributed papers may be moved to an invited session.

Presentation Formats and Speakers' Instructions

- Each session lasts 1.5 hours, and may includes from 4 to 5 papers. Depending on the number of the papers in the session, you'll have about 12-15 minutes for your presentation, plus some time at the end for the Q&A. The chair/co-chair of your session is responsible for keeping the time, but we recommend you to adhere with the allotted time.
- We recommend you to be in your session's room at least 10 minutes before the scheduled starting time, in order to upload your presentation on the laptop. As a general rule, speakers will not be allowed to use their own laptops, tablets or other devices to give their presentations, unless previously communicated to the conference organization team.
- When you enter the session room, introduce yourself to the chair/co-chair, so they can take note of your presence.
- Provide your presentation in either PowerPoint or PDF format. We suggest you to always bring a PDF copy of your presentation in order to minimize any format issue.

Special Sessions

Special sessions offer a 90-minute venue for the presentation of topics of special academic, social or industrial interest, such as emerging research areas or most recent trends in manufacturing engineering. A Special Session can be also devised to include project presentations, panel discussions or non-technical talks on topics such as research funding, entrepreneurship, or technology transfer, and can receive a wide interest across different themes of the conference. As such, special sessions do not include presentation of scientific papers submitted to the conference and the session

agenda will be defined by the Special Session Chair. All scheduling of special sessions is completed by the conference organisation committee. Requests may be submitted to the committee for a special accommodation but cannot be guaranteed, as the committee decisions are made with the full scope of the conference in mind.

List of ISM 2020 Special Sessions

− Physics and data-based models for process optimization with industrial application

Co-Chairs: [a]Christian Zehetner, [b]Thomas Gross
Affiliation: *University of Applied Sciences Upper Austria / Linz Center of Mechatronics GmbH (Austria)*
Email: [a]christian.zehetner@fh-wels.at, [b]thomas.gross@lcm.at
Track Description: In order to satisfy the high demands on modern products, new strategies for the optimization of industrial manufacturing processes are necessary. In this special session, two research projects and their industrial application are presented. Both examples concern industrial processes optimized with the help of physics and data-based models. The first example is an automatic panel bender. Customer specific production of sheet metal parts with lot size one has been realized by an adaptive manufacturing concept based on physical models. The complete process is controlled by a virtual prototype. The essential physical effects are represented by a model-based approach, e.g. by 2D and 3D Finite Element models or multibody dynamics models. With an advanced and sub-structuring strategy, a real-time adaptive manufacturing process has been realized. This work has been supported by the COMET-K2 center of the Linz Center of Mechatronics. The successful implementation in the commercial product has been realized by the industrial partner. The second example is about energy efficient milling for cement manufacturing. In the framework of the MIDIH project under Horizon 2020, FIWARE based IoT solutions were implemented to monitor the production process in a pilot cement plant. Relying on the recorded process data, physics based and data driven methods were applied to maximize throughput, optimize quality and minimize energy consumption.

+ Security, Privacy and Protection in Industry 4.0

+ Dynamic logistics optimization in the context of prescriptive analytics

+ Integrated logistics planning for efficient smart manufacturing

+ Digital image information extraction for material quality control

Chairs and Speakers

Special session chairs or speakers are not required to submit a paper. The special session chair is the individual who submits the proposal to the conference committee, acts as

the leader and coordinator for the session development, defines the agenda of the

the leader and coordinator for the session development, defines the agenda of the session, is in charge of promoting the session and ensures the successful and timely execution of the session.

Presentation Formats and Speakers' Instructions

- Each session lasts 1.5 hours in total. Please ask the chair/co-chair of your special session for preliminary information about the session agenda and the time at your disposal for the presentation.
- We recommend the speakers to be in the session's room at least 10 minutes before the scheduled starting time, in order to upload the presentation on the conference laptop. As a general rule, speakers will not be allowed to use their own laptops, tablets or other devices to give their presentations, unless previously communicated to the conference organisation team.
- If you are a speaker, when you enter the session room, introduce yourself to the chair/co-chair, so they can take note of your presence.
- Provide your presentation in either PowerPoint or PDF format. We suggest you to always bring a PDF copy of your presentation in order to minimize any format issue.

Submit a Special Session Proposal

Are you willing to organize a special session at ISM focusing on a specific subject? Fill the form and send it to f.longo@unical.it and antonio.padovano@unical.it.

Fill The Form!

Organized by

For further info, please contact

ISM Conference Organization Committee
Francesco Longo, ISM General Co-Chair
Antonio Padovano, ISM Program Chair