

***20th IEEE International Conference on
Industrial Informatics
(INDIN 2022)***

Conference Program



25 - 28 July 2022

Virtually from

Perth, Australia



Welcome Message from IES President

Dear Authors, Invited Guests, and Delegates

As President of the *Industrial Electronics Society* (2022-2023), I welcome you to the 20th IEEE International Conference on Industrial Informatics (INDIN 2022), held virtually from Perth, Australia.

INDIN is one of our society's flagship annual conferences that travels in a rotation scheme around Asia/Australia, America, and Europe. Our conference focuses on contemporary industrial topics ranging from informatics, control, communications, and computational intelligence. I am sure that this virtual meeting is a good platform for excellent scientific discussions and collaboration among the many research centers and universities. I want to express my appreciation to the organizing committee, which made an effort to organize this important and inspiring conference, which collected 117 paper presentations and delegates from 36 countries. It is important to note that 50% of participants are students.



I want to say a few words about the *Industrial Electronics Society*. We have members from more than 100 countries worldwide associated with almost 100 chapters. In addition, the IES is responsible for six leading journals that provide a forum for exchanging scientific ideas for many researchers worldwide. We are also proud of our technical and conference activities, of which the INDIN conference is a remarkable example! Thank you for attending the conference and encouraging participation in the Industrial Electronics Society activity. In IES, everyone will find a place to build their competence in one of the 24 Technical Committees <http://www.ieee-ies.org/technical-committees>. Please take a look at our website: <http://www.ieee-ies.org> and use IE Technology News: <https://iten.ieee-ies.org>.

Once again, welcome to INDIN 2022.

Malinowski Mariusz

IES President

Welcome Message from General Chairs

Dear Authors, Invited Guests, and Delegates

As the General Chairs of the 2022 IEEE International Conference on Industrial Informatics (INDIN 2022), it gives us immense pleasure to welcome all guests and delegates from Universities, Research Organizations, Industry, Government, and NGOs from 36 countries around the world to the Conference.



COVID-19 changed many of our current practices including face-to-face conferences but we are thankful to all conference authors and delegates who supported arranging this conference on-line.



The INDIN conference series, started 20 years ago in Canada, is now coming to Perth, Australia for the second time. This year, INDIN 2022 is hosted by IES Western Australia Chapter and Murdoch University. IES western Australia Chapter has won the Best IES Chapter Award in 2021 and 2022 while Murdoch University is a distinguished education and research institution positioned on the forefront of the industrial informatics in Australia.



INDIN 2022 received 164 submissions from 36 countries with 528 co-authors across six continents. Authors from China, Germany, Brazil, Portugal, Sweden, United Kingdom, India, Australia, France, Hong Kong, Korea and Qatar had respectively submitted the highest number of papers to the Conference. Each submission was peer-reviewed by at least two experts in the respective fields and the acceptance decisions were based on at least two consistent recommendations, ensuring high quality and standard of the Conference and its Proceedings. In total, 117 papers were finally accepted and are included in the Conference Proceedings and Program. The accepted and scheduled papers will be presented in 12 oral sessions over a 4-day period. 22 of the accepted papers were submitted to 4 special sessions of the Conference.



We are also privileged to have 3 distinguished keynote speakers, one industry forum, one joint students, Young Professionals and Women in Engineering Forum, and 4 tutorial sessions.

We would like to take this opportunity and thank all distinguished keynote speakers, technical track chairs, Special session organizers, forum panelists, session chairs, numerous reviewers and authors, and all members of the technical and organization committees. We sincerely thank the Conference's financial sponsor and technical co-sponsors. Without their great support, this conference could not have been successful.

We wish all of you a very pleasant and fruitful online time at the Conference, and we hope that you could have an opportunity to travel to Perth in a future conference, hosted by us, when the COVID-19 pandemic is settled down.

Best regards,

Farhad Shahnia, Yousef Ibrahim, Valeriy Vyatkin, and Kim Fung Man

INDIN 2022 General Chairs

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Technical Tracks and Special Sessions

TT 01 - Industrial cyber-physical systems and industrial agents

Track Chairs: William Dai (Shanghai Jiaotong University, China), Luis Ribeiro (Linköping University, Sweden)

TT 02 - Artificial intelligence in industrial applications

Track Chairs: Daswin De Silva (La Trobe University, Australia), Khan Muhammad (Sungkyunkwan University, Korea), Yudong Zhang (University of Leicester, UK)

TT 03 - Safety and security in industrial applications

Track Chairs: Dimitrios Serphanos (University of Patras, Greece), Remigiusz Wisniewski (University of Zielona Gora, Poland)

TT 04 - System and software engineering, runtime intelligence

Track Chairs: David Hästbacka (Tampere University, Finland), Roopak Sinha (Auckland University of Technology, New Zealand)

TT 05 - Robotics and mechatronics in industrial applications

Track Chairs: Yasutaka Fujimoto (Yokohama National University, Japan), Kang-Hyun Jo (Ulsan University, Korea)

TT 06 - Distributed and networked control and automation systems

Track Chairs: Niels Lohse (Loughborough University, UK), Chen-Wei Yang (Lulea Tekniska Universitet, Sweden), Alois Zoitl (Linz University, Austria)

TT 07 - Industrial digitalization, digital twins in industrial applications

Track Chairs: Sten Gruener (ABB, Germany), Jürgen Jasperneite (University of Lemgo, Germany), Seppo Sierla (Aalto University, Finland)

TT 08 - Human, computer and machine interaction

Track Chairs: Daisuke Chugo (Kwansei Gakuin University, Japan)

TT 09 - Real-time and networked embedded computing, industrial IoT technologies and applications

Track Chairs: Gaetano Patti (University of Catania, Italy)

TT 10 - Factory automation and communication systems

Track Chairs: Wolfgang Kastner (TU Wien, Austria), Martin Wollschlager (TU Dresden, Germany)

TT 11 - Technologies, infrastructures and applications for smart grids, buildings, and cities

Track Chairs: Federico Baronti (Università di Pisa, Italy), Kim Fung Tsang (City University of Hong Kong, Hong Kong)

TT 12 - Education in engineering and industrial informatics

Track Chairs: João Martins (Universidade Nova de Lisboa, Portugal), Andrea Matta (Politecnico di Milano, Italy)

TT 13 - Industrial informatics tools

Track Chairs: Andrei Lobov (Norwegian University of Science and Technology, Norway), Lei Shu (Nanjing Agricultural University, China)

TT 14 - Intelligent finance

Track Chairs: Heping Pan (Chengdu University, China), Simon Lin (Tsinghua University, China), Jerome Yen (University of Macau, China), George Yuan (Soochow University, China)

SS 01 - Real-time Monitoring, Diagnosis, Prognosis and Tolerant Control for Industrial Systems

Special Session Organizers: Zhiwei Gao (University of Northumbria, Newcastle, UK), Lina Yao (Zhengzhou University, China)

SS 02 - Future Industrial Sensing: The Role of Vision and Touch

Special Session Organizers: Dermot Kerr, and Sonya Coleman (Ulster University, Northern Ireland, UK)

SS 03 - Industry 4.0 in Agriculture

Special Session Organizers: Lei Shu (Nanjing Agricultural University / University of Lincoln, China / UK), Adnan M. Abu-Mahfouz (Council for Scientific and Industrial Research (CSIR), South Africa), Gerhard P Hancke (City University of Hong Kong, Hong Kong), Umair M. Qureshi (SPEED/The Hong Kong Polytechnic University, Hong Kong)

SS 04 - Deterministic Communication and Computing for Advanced Industrial Systems

Special Session Organizers: Cailian Chen and Qimin Xu (Shanghai Jiao Tong University, China), Zhengtao Ding (University of Manchester, UK), Paul Pop (Technical University of Denmark, Denmark)

Program at a glance

	Monday July 25th	Tuesday July 26th	Wednesday July 27th	Thursday July 28th
14:00 – 15:00	Tutorial – 1	Opening Ceremony	Keynote Talk – 2	Industry Forum
15:00 – 16:00	Tutorial – 2	Keynote Talk – 1	Students, Young Professionals and Women in Engineering Forum	
16:00 – 16:30				
16:30 – 17:30	Tutorial – 3	Oral Sessions	Oral Sessions	Oral Sessions
17:30 – 18:30	Tutorial – 4	Tue-1, Tue-2, Tue-3	Wed-1, Wed-2, Wed-3	Thu-1, Thu-2, Thu-3
18:30 – 19:00				Poster Forum
19:00 – 20:00		Oral Sessions	Keynote Talk – 3	
20:00 – 20:30		Tue-4, Tue-5, Tue-6		Closing Ceremony

All times are Australian Western Standard Time (AWST). GMT+8

Monday, July 25th

14:00 – 15:00	Tutorial – 1 (Plenary Room)	<i>An Active Disturbance Rejection Method: The Equivalent Input Disturbance Approach and Its Applications</i> <i>by</i> Jinhua She (Tokyo University of Technology, Japan), Lan Zhou (Hunan University of Science and Technology, Xiangtan, China), and Youwu Du (Jiangsu University of Technology, Changzhou, China)
15:00 – 16:00	Tutorial – 2 (Plenary Room)	<i>Multiple Active Bridge Converters for flexible DC grids</i> <i>by</i> Giampaolo Buticchi and Jiajun Yangn (University of Nottingham, Ningbo, China)
16:00 – 16:30		
16:30 – 17:30	Tutorial – 3 (Plenary Room)	<i>Smart Management and Standardization for Industrial Internet of Things (IIoT)</i> <i>by</i> Hao Ran Chi (Insituto de Telecomunicacoes and Universidade de Aveiro, Portugal), Chung Kit Wu, Yang Wei, and Kim Fung Tsang (City University of Hong Kong, Hong Kong), Hongxu Zhu (National University of Singapore, Singapore)
17:30 – 18:30	Tutorial – 4 (Plenary Room)	<i>Analysis and Design of Near-Field Couplers for Wireless Power Transfer</i> <i>by</i> Minfan Fu (ShanghaiTech University, China), Ming Liu (Shanghai Jiao Tong University, China), Chengbin Ma (Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute, China)

Important Notes for Tutorial Sessions:

- All registered delegates of the conference can attend any tutorial sessions.
- The recorded video files of all Tutorials are available on the library section of Qiqochat.
- All interested in attending a tutorial session, first need to watch the recorded tutorial on the Qiqochat profile and then attend the session at the given time.
- The tutorial presenters will first conduct a short summary of the topics covered in the tutorial and will then run the sessions in an interactive Q&A format.

Tutorial – 1

Time: Monday, July 25th, 14:00-15:00 AWST

Room: Plenary Room

An Active Disturbance Rejection Method: The Equivalent Input Disturbance Approach and Its Applications

by Jinhua She (Tokyo University of Technology, Japan), Lan Zhou (Hunan University of Science and Technology, Xiangtan, China), and Youwu Du (Jiangsu University of Technology, Changzhou, China)

Abstract: Industrial systems usually contain disturbances that degrade control performance. Thus, disturbance rejection is one of the most important objectives in control-system design. Several elegant methods, which have two degrees of freedom, have been devised and used in control engineering practice. Since one degree of freedom is directly used for disturbance rejecting, this kind of method has the potential to achieve high disturbance-rejection performance. The EID approach is one of the methods. It uses a state observer and an EID estimator to actively estimate and compensate for the effect of disturbances on system output. It does not require the inverse dynamics of a plant, a system state, a model of exogenous disturbances, or the differentiation of measured outputs. Thus, it is simple to implement and is effective in rejecting various kinds of disturbances.

In this tutorial, three speakers are going to explain the method from the basic idea to the recently developed theoretical results and advanced applications. First, the background and the way of thinking about active disturbance rejection, and the definition of an EID are explained. Next, the configuration of an EID-based control system is described. Techniques of system design are discussed in detail. Then, the analysis of system stability and control performance is discussed. Finally, Application examples of the EID approach in different industrial fields are demonstrated.

Jinhua She received his Ph.D. degree from Tokyo Institute of Technology, Tokyo, Japan, in 1993 in control engineering. In 1993, he joined the School of Engineering, Tokyo University of Technology, where he is currently a professor at the Department of Mechanical Engineering. His research interests include the application of control theory, repetitive control, process control, Internet-based engineering education, and assistive robotics. Dr. She's research interests include the applications of control theory, repetitive control, active disturbance rejection, process control, mobile-based engineering education, and assistive robotics. He has published more than 300 journal papers. His work has been cited 10831 times, and his h-index is 41 and i10-index is 144 (Google Scholar, January 8, 2021). He received the IFAC (International Federation of Automatic Control) Control Engineering Practice Paper Prize in 1999 (jointly with M. Wu and M. Nakano), and had been included in the list of Thomson Reuters' Highly Cited Researchers in 2012-2015. Dr. She served as the Delegate of Cluster 4 of Technical Committees (containing 6 TCs) in IES and the Chair of IEEE IES Technical Committee on Human Factors, and is an AdCom member from 2022 to 2024. He is an Associate Editor of IEEE Transactions on Industrial Electronics, IEEE/ASME Transactions on Mechatronics, IEEE Journal of Emerging and Selected Topics in Industrial Electronics, etc.

Lan Zhou received the B.S. degree from Hunan Normal University, Changsha, China, in 1998, and the M.S. degree and the Ph.D. degree from Central South University, Changsha, China, in 2006 and 2011, respectively. From 2008 to 2010, she was a Joint Cultivation Doctoral Candidate of Japan and China. She is currently a Professor of Control Theory and Control Engineering at the School of Information and Electrical Engineering,

Hunan University of Science and Technology, Xiangtan, China. Her current research interests include robust control, repetitive control, nonlinear control, and application for mechatronic systems.

Youwu Du received the B.S. and the M.S. degrees in engineering from Central South University, Changsha, China, in 2007 and 2010, respectively, and the ph.D. degree in engineering from China University of Geosciences, Wuhan, China, in 2020. In 2012, he joined the School of Physics and Electronic Information, Anhui Normal University, Wuhu, China. He was a Visiting Scholar with the Graduate School of Industrial Technology, Advanced Institute of Industrial Technology, Tokyo, Japan, from 2018 to 2019. In 2021, he moved to the School of Electrical & Information Engineering, Jiangsu University of Technology, Changzhou, China. His research interests include disturbance estimation and rejection, application of control theory, time-delay system, and robust control. Dr. Du is a member of IEEE and a member of the Automation Association of China.

Tutorial – 2

Time: Monday, July 25th, 15:00-16:00 AWST

Room: Plenary Room

Multiple Active Bridge Converters for flexible DC grids

by Giampaolo Buticchi and Jiajun Yangn (University of Nottingham, Ningbo, China)

Abstract: The aim of the tutorial is to introduce the model and the control of the multiple active bridge converters. As learning outcome, the attendees will be learn how to derive the mathematical model of the converter and how to implement the control. The tutorial will include:

- Operations of the Multiple Active Bridge converter with phase shift modulation
- Control of the Multiple Active Bridge Converters
- Stability analysis by means of impedance modeling
- Overview of the applications of the multiple active bridge converters in smart distribution and
- Green transportation
- Simulation Exercise

Giampaolo Buticchi received the Master degree in Electronic Engineering in 2009 and the Ph.D degree in Information Technologies in 2013 from the University of Parma, Italy. He was appointed Associate Professor in 2017 at The University of Nottingham Ningbo China and the Head of Power Electronics of the Nottingham Electrification Center. He was promoted Professor in 2020. His research focuses on power electronics for renewable energy systems, smart transformer fed micro-grids and dc grids for the More Electric Aircraft. He is author/co-author of more than 260 scientific papers and an Associate Editor of the IEEE Transactions on Industrial Electronics, the IEEE Transactions on Transportation Electrification and the IEEE Open Journal of the Industrial Electronics Society. Dr. Buticchi is involved in the major international organizations (IEEE, IET, RAeS, HEA) and he has been organizing tutorials and special session in the relevant conferences and journals related to Power Electronics. He is currently the Chair of the IEEE Industrial Electronics Society Technical Committee on Renewable Energy Systems and Cluster Delegate.

Jiajun Yang received the PhD degree and B.Eng. degree (Hons.) in electrical and electronic engineering in 2017 and 2022, from the University of Nottingham Ningbo China, Ningbo, China. From 2017 to 2018, he was a hardware engineer in power electronics with the Nottingham Electrification Centre. Now he works as a research fellow in power electronics for intelligent manufacturing with the China Beacons Institute. His current research interests include stabilization, optimization and protection of power electronics based microgrids.

Tutorial – 3

Time: Monday, July 25th, 16:30-17:30 AWST

Room: Plenary Room

Smart Management and Standardization for Industrial Internet of Things (IIoT)

by Hao Ran Chi (Instituto de Telecomunicações and Universidade de Aveiro, Portugal), Chung Kit Wu, Yang Wei, and Kim Fung Tsang (City University of Hong Kong, Hong Kong), Hongxu Zhu (National University of Singapore, Singapore)

Abstract: Industrial Internet-of-Things (IIoT) has witnessed the prosperity of network softwarization/virtualization, artificial intelligence (AI), etc. Emerging communication technologies have targeted towards the promised Massive Machine Type Communications (mMTC), eMBB (enhanced Mobile Broadband), and URLLC (Ultra Reliable Low Latency Communications) in 5G, e.g., contributed by network automation, Low power wide area network (LPWAN), and mmWave, respectively. Diversified technologies and new requirements also lead to urgent demands towards standardizing the IIoT based emerging applications. This tutorial will discuss the cutting-edge technologies for automated management of IIoT based smart applications, e.g., network automation in network level, LPWAN deployment in physical layer, and corresponding multi-layer coordination. Besides, the emerging IEEE standards (e.g., IEEE2668, IEEE1451.5.5, etc.) will also be discussed, with their corresponding impact towards standardizing the aforementioned IIoT based technologies and applications. Therefore, this tutorial will provide standardization guidance to industrial and academic researchers, towards smart management of IIoT based applications.

Hao Ran Chi is currently a Researcher with the Instituto de Telecomunicações and Universidade de Aveiro, Portugal since 2019. Before that, he is a research scholar in North Carolina State University. His research interests include 5G (and beyond), IoT infrastructure development, wireless communication, eHealth, evolutionary optimization, and machine learning.

Chung Kit Wu received his B.Eng. degree in electronic and communication engineering, with first-class honors, from City University of Hong Kong in 2014, and obtained his Ph.D. degree from the same university in 2020. His research interest includes Internet-of-things (IoT), standardization, digital signal processing, machine learning, healthcare applications, optimization, and complex network.

Hongxu Zhu is currently a Research Fellow of the HLT lab in the Department of Electrical and Computer Engineering, National University of Singapore. His research interests include IoT, smart application development, machine learning.

Yang Wei received the B.Eng. degree in Measurement Control Technology and Instruments (at top 5%) from China Ji Liang University in 2016. She received the MSc degree in Electronics from the University of Edinburgh in 2017. Currently, she is working toward the Ph.D. degree at the Department of Electrical Engineering, City University of Hong Kong. Her research interests include artificial intelligence, complex network, wireless communication, machine learning, and Internet of Things (IoT) technology.

Kim-Fung Tsang received the Ph.D. degree in Electrical Engineering from the University of Wales College of Cardiff (formerly known as the University of Wales Institute of Science and Technology), Cardiff, U.K., in 1995. He is currently an Associate Professor with the Department of Electrical Engineering, City University of Hong Kong, specializing in IoT. KF authored or coauthored about 300 technical papers and four books/chapters and a

few patents. Dr. Tsang is a Fellow of the The Hong Kong Institution of Engineers, a Chartered Engineer and a Member of IET, an Associate Editor and a Guest Editor of the IEEE Transactions On Industrial Informatics, an Associate Editor of IEEE Transactions On Industrial Electronics, and an Associate Editor of the IEEE Industrial Electronics Magazine.

Tutorial – 4

Time: Monday, July 25th, 17:30-18:30 AWST

Room: Plenary Room

Analysis and Design of Near-Field Couplers for Wireless Power Transfer

by Minfan Fu (ShanghaiTech University, China), Ming Liu (Shanghai Jiao Tong University, China),
Chengbin Ma (Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute, China)

Abstract: In this tutorial, we aim to comprehensively summarize and explain our pioneer work on the near-field couplers for wireless power transfer, including both inductive power transfer (IPT) and capacitive power transfer (CPT). This tutorial begins with an overview of the major challenges and limitations of the present couplers. The inductive couplers based on multiple coils are firstly discussed. The associated challenges like complicated cross coupling and power decoupling are mentioned and addressed. A voltage equalizer using the multiple-receiver coupler are used to illustrate the benefits of inductive coupling. In order to improve user experience, several emerging inductive couplers are also introduced in this tutorial, including six-degree of freedom transmitter and modular inductive coupler. Besides, the near-field electric coupling approaches are mentioned and discussed. A uniform comparison standard is built to compare the coupling performance of several capacitive couplers, like horizontal coupler, vertical coupler, and interleaved coupler. A circular coupler with stable coupling is shown to well address the misalignment issue. Finally, this tutorial continues to build a uniform modeling and compensation theory to explain the duality between IPT and CPT.

Minfan Fu received the B.S., M.S., and Ph.D. degrees in electrical and computer engineering from University of Michigan-Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, Shanghai, China in 2010, 2013, and 2016. He is currently an Assistant Professor at School of Information Science and Technology (SIST), ShanghaiTech University, Shanghai, China. Between 2016 and 2018, he held a postdoctoral position with the Center for Power Electronics Systems (CPES), Virginia Polytechnic Institute and State University, Blacksburg, VA, USA. His research interests include megahertz wireless power transfer, high-frequency power conversion, high-frequency magnetic design, and applications of wide-band-gap devices. He has ten years of experience in Multi-MHz wireless power transfer (WPT) research. His first three IEEE journal papers on MHz WPT, which were published in 2014 and 2015, have been world widely cited 148, 134, and 115 times. At CEPS, he worked with Dr. Fred C. Lee, a National Academy of Engineering member and IEEE Fellow, and extended his expertise to the field of high-frequency power electronics. He developed the next-generation GaN-based DC-DC module. Compared to the state-of-the-art products, the peak efficiency and power density have increased from 91% to 96% and from 88 W/inch³ to 130 W/inch³. He holds one US patent and has published 46 papers in prestigious IEEE journals and conferences, such as IEEE Trans. Industrial Electronics and IEEE Trans. Power Electronics. Currently, his total google scholar citations exceeds 770, and one of his first papers was listed by Essential Science Indicators (ESI) as top 1% highly cited papers in engineering and publication years.

Ming Liu received the B.S. degree in mechatronics engineering from Sichuan University, Sichuan, China, in 2007, and the Ph.D. degree in electrical and computer engineering from the University of Michigan-Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, Shanghai, China, in 2017. From 2017 to 2020, he was a Postdoctoral Research Fellow with the Department of Electrical Engineering, Princeton University, USA. He joined the School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai, China, in 2020, where he is currently an Associate Professor of Electrical Engineering. His research interests include megahertz wireless power transfer, battery management systems, high frequency high performance power electronics for emerging applications. He has conducted extensive research on the MHz WPT and has

authored or co-authored over 50 IEEE journal and conference papers. Dr. Liu was the recipient of Top Ten Academic Star Award and Excellent PhD Thesis Award Nomination from Shanghai Jiao Tong University in 2016 and 2018, Research Excellence Award from AirFuel Alliance, USA, in 2019, and Best Paper Award of IEEE ECCE-Asia in 2020. He serves as Guest Editor of IEEE Transactions on Industrial Informatics and Chair of the Wireless Power Transfer for Energy Storage Charging Subcommittee of Energy Storage Technical Committee, IEEE Industrial Electronics Society.

Chengbin Ma received the B.S. degree in industrial automation from East China University of Science and Technology, Shanghai, China, in 1997, and the M.S. and Ph.D. degrees in electrical engineering from The University of Tokyo, Tokyo, Japan, in 2001 and 2004, respectively. From 2004 to 2006, he was an R&D Researcher with the Servo Motor Laboratory, FANUC Limited, Japan. Between 2006 and 2008, he was a Postdoctoral Researcher with the Department of Mechanical and Aeronautical Engineering, University of California, Davis, USA. He joined the University of Michigan–Shanghai Jiao Tong University Joint Institute (UM-SJTU Joint Institute), Shanghai Jiao Tong University, Shanghai, China, in 2008, and currently an Associate Professor of electrical and computer engineering. His research interests include energy management, wireless power transfer, dynamics and motion control, and wide applications in electronic devices, electric vehicles, microgrids, smart grids, etc. He is an IEEE senior member. He serves as Delegate of Energy Cluster, Chair of Energy Storage Technical Committee and Chair of Shanghai Chapter, IEEE Industrial Electronics Society. He is an Associated Editor for the IEEE Transactions on Industrial Informatics. He and his supervised students won many teaching and research awards at Shanghai Jiao Tong University, such as Koguan Top Ten Best Teacher Award in 2017 and Koguan Top Ten Research Group Award in 2014. He also received Research Excellence Award from AirFuel Alliance, USA, in 2019.

Tuesday, July 26th

<p>14:00 – 15:00</p>	<p>Opening Ceremony (Plenary Room)</p>	<p>Welcome messages and opening remarks by:</p> <ul style="list-style-type: none"> • Farhad Shahnian (INDIN 2022 General Chair) • Mariusz Malinowski (IES President) • Milos Manic (IES President-elect) • Luis Gomez (INDIN 2022 Technical Committee Chair) • Chengbin Ma (INDIN 2022 Tutorials Chair) • Yang Shi (IES vice-President – Conferences) • Yousef Ibrahim (IES vice-President – Membership) • Valeriy Vyatkin (IES vice-President – Technical Activities) • Thilo Sauter (IES vice-President – Publications) • Muhammad Adnan Hayat (IES Western Australia Chapter Chair)
<p>15:00 – 16:00</p>	<p>Keynote Talk – 1 (Plenary Room)</p>	<p><i>Dealing with Spatial and Temporal Complexity: Simple solutions for complex problems</i> by Professor Xinghuo Yu (RMIT University, Australia)</p>
<p>16:00 – 16:30</p>		
<p>16:30 – 18:30</p>	<p>Oral Sessions (Room-1,2,3)</p>	<p>Tue-1: Industrial cyber-physical systems and industrial agents (Room-1) Tue-2: Artificial intelligence in industrial applications - 1 (Room-2) Tue-3: Safety and security in industrial applications (Room-3)</p>
<p>18:30 – 19:00</p>		
<p>19:00 – 20:30</p>	<p>Oral Sessions (Room-1,2,3)</p>	<p>Tue-4: Real-time and networked embedded computing, industrial IoT technologies and applications (Room-1) Tue-5: Technologies, infrastructures and applications for smart grids, buildings, and cities (Room-2) Tue-6: Industry 4.0 in Agriculture (Room-3)</p>

Keynote Talk – 1

Time: Tuesday, July 26th, 15:00-16:00 AWST

Room: Plenary Room

Dealing with Spatial and Temporal Complexity: Simple solutions for complex problems

by Professor Xinghuo Yu (RMIT University, Australia)

Abstract: The fast advances in information and communication technologies have made it possible to enable ambient data intelligence and situational awareness in Cyber-Physical Systems for optimal management and operation. However, it has also led to explosive growth of spatial and temporal information and computational complexity. An innovative way of thinking is required to tackle these large-scale complex problems efficiently and effectively. In this talk, we advocate a novel problem-solving approach, the simplicity approach, which is underpinned by a ‘simple solutions for complex problems’ philosophy. Several nature-inspired methodologies such as AI, swarm intelligence, complex network dynamics, as well as the human perspectives will be examined. Several real-world problems, such as money laundering network detection and autonomous microgrid network for power supply arising from our own research projects, will be used as case studies.

Xinghuo is an Associate Deputy Vice-Chancellor, a Vice-Chancellor’s Professorial Fellow, and a Distinguished Professor at RMIT University (Royal Melbourne Institute of Technology), Melbourne, Australia. He is the Senior Past President of IEEE Industrial Electronics Society. He received BEng and MEng degrees from the University of Science and Technology of China, Hefei, China, in 1982 and 1984, and PhD degree from Southeast University, Nanjing, China in 1988, respectively. His main research areas include control systems engineering, intelligent and complex systems, and smart power and energy



systems. He received many awards and honours for his contributions, including the 2018 MA Sargent Medal from Engineers Australia, the 2018 Australasian AI Distinguished Research Contribution Award from Australian Computer Society, and the 2013 Dr.-Ing. Eugene Mittelman Achievement Award from IEEE Industrial Electronics Society. He is a Fellow of the IEEE, Engineers Australia, Australian Computer Society, and Australian Institute of Company Directors.

Tue-1: Industrial cyber-physical systems and industrial agents

Time: Tuesday, July 26th, 16:30-18:30 AWST

Room: 1

Session Chairs: Georgios Konstantinou, Hai Wang

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Midhun Xavier, Victor Dubinin, Sandeep Patil, Valeriy Vyatkin

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118 Human-centric Application in Cyber-Physical System: An Inertial-based Motion Capture and Recognition System

Huiying Zhou, Longqiang Wang, Baicun Wang, Geng Yang

147 Technology-Independent Demonstrator for Testing Industry 4.0 Solutions

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Tue-2: Artificial intelligence in industrial applications – 1

Time: Tuesday, July 26th, 16:30-18:30 AWST

Room: 2

Session Chairs: Daswin de Silva, Amirmehdi Yazdani

2 Towards Developing a Liver Segmentation Method for Hepatocellular Carcinoma Treatment Planning

Snigdha Mohanty, Julien Abinahed, Abdulla Alansari, Subhashree Mishra, Sudhansu Sekhar Singh, Sarada Prasad Dakua

4 Facial Landmarks and Generative Priors Guided Blind Face Restoration

Huan Wang, Zi Teng, Chengdong Wu, Coleman Sonya

16 Efficient SST prediction in the Red Sea using hybrid deep learning-based approach

Mazen Hittawe, Sabique Langodan, Ibrahim Hoteit, Ouadi Beya, Omar Knio

40 Context-Enriching Feature Selection Method for Industrial Machine Learning

Hadil Abukwaik, Lefter Sula, Pablo Rodriguez

76 Identity Verification based on the RGB and NIR Images of the Palm

Jaekwon LEE, Jooyoung Kim, Kar-Ann Toh

81 Computer Vision Techniques to Support Biosensors Based on Burrowing Clams

Je Nam Jun Junior, Bruna de Vargas Guterres, Adriano Rayol da Silva, Rafael Gerhardt, Samantha Eslava Martins, Juliana Zomer Sandrini, Silvia Silva da Costa Botelho

82 Unsupervised Object Re-identification via Instances Correlation Loss

Qing Tang, Kanghyun Jo

83 A Lazy Engine for High-utilization and Energy-efficient ReRAM-based Neural Network Accelerator

Yang Wei-Yi, Chen Ya Shu, Xiao Jin-Wen

Tue-3: Safety and security in industrial applications

Time: Tuesday, July 26th, 16:30-18:30 AWST

Room: 3

Session Chairs: Yousef Ibrahim, Moayed Moghbel

- 19 Distributed ledger-based authentication and authorization for Industrie 4.0 components**
Alaettin Dogan, Aron Schnakenbeck, Alexander Fay

- 22 Cyberattack Impact Reduction using Software-Defined Networking for Cyber-Physical Production Systems**
Felix Specht, Jens Eickmeyer, Jens Otto

- 52 Network-Based Machine Learning Detection of Covert Channel Attacks on Cyber-Physical Systems**
Hongwei Li, Danai Chasaki

- 63 A PUF-based Secure Bootstrap Protocol for Cyber-Physical System Networks**
José Luis Conradi Hoffmann, Leonardo Passig Horstmann, Antônio Augusto Fröhlich

- 113 Identifying Security Requirements for Smart Grid Components: A Smart Grid Security Metric**
Marie Clausen, Johann Schütz

- 125 DDoS Attacks on Smart Manufacturing Systems: A Cross-Domain Taxonomy and Attack Vectors**
Farzana Zahid, Gustavo Funchal, Victoria Melo, Matthew Kuo, Paulo Leitao, Roopak Sinha

- 158 A Comparative Analysis of the Impact of Cryptography in IoT LoRa Applications**
Inês Lino, Jose Cecilio

- 179 Digital Twin-Enhanced Methodology for Training Edge-Based Models for Cyber Security Applications**
David Allison, Kieran McLaughlin, Paul Smith

Tue-4: Real-time and networked embedded computing, industrial IoT technologies and applications

Time: Tuesday, July 26th, 19:00-20:30 AWST

Room: 1

Session Chairs: Aris Lalos, Muhammad Adnan Hayat

- 3 Exact schedulability analysis of systems based on multi-rate periodic cyclic executives**
Reinder J. Bril
- 14 Dynamic Task Offloading Approach for Task Delay Reduction in the IoT-enabled Fog Computing Systems**
Hoa Tran-Dang, Dong-Seong Kim
- 87 Configuration of Parallel Real-Time Applications on Multi-Core Processors**
Mohammad Samadi Gharajeh, Tiago Carvalho, Luis Miguel Pinho
- 153 A Specification for a Decentralised Internet of Things**
Ryan Kurte, Zoran Salcic, Kevin Wang
- 156 Rollback Sequences for Dynamic Reconfiguration of IEC 61499**
Laurin Prenzel, Simon Hofmann, Sebastian Steinhorst
- 173 Missing Data Imputation for Multivariate Time series in Industrial IoT: A Federated Learning Approach**
Alexandros Gkillas, Aris Lalos

Tue-5: Technologies, infrastructures and applications for smart grids, buildings, and cities

Time: Tuesday, July 26th, 19:00-20:30 AWST

Room: 2

Session Chairs: Martina Calais, Moayed Moghbel

- 10 Multi-Bus-Based Distributed Secondary Voltage Control for Microgrids**
Congyue Zhang, Xiaobo Dou, Yongqing Lv, Xingfeng Xie
- 25 Feasibility of using Gyroscope to Derive Keys for Mobile Phone and Smart Wearable**
Yuanzhen Liu, Dutliff Boshoff, Gerhard Hancke
- 55 Control of Battery Storage Systems in Residential Grids: Model-based vs. Data-Driven Approaches**
Ali Moradiamani, Samaneh Sadat Sajjadi, Najmeh Bazmohammadi, Mahdi Jalili, Josep M. Guerrero, Xinghuo Yu
- 65 Multi-Agent Deep Reinforcement Learning For Real-World Traffic Signal Controls - A Case Study**
Jürgen Jasperneite, Jie Wang, Maxim Friesen, Tian Tan
- 70 Validation of Distributed Real-Time Simulations for Decoupled Power System Models**
Zhiwei Shen, Felipe Arrano-Vargas, Georgios Konstantinou
- 123 A Win-Win Local Energy Market for Participants, Retailers, and the Network Operator : A Peer-to-Peer Trading-driven Case Study**
Liaqat Ali, M. Imran Azim, Jan Peters, Vivek Bhandari, Anand Menon, Vinod Tiwari, Jemma Green

Tue-6: Industry 4.0 in Agriculture

Time: Tuesday, July 26th, 19:00-20:30 AWST

Room: 3

Session Chairs: Zuneera Umair, Amirmehdi Yazdani

60 Lightweight Object Detection Model with Data Augmentation for Tiny Pest Detection

Zhipeng Yuan, Shunbao Li, Po Yang, Yang Li

105 Mushroom-YOLO: A deep learning algorithm for mushroom growth recognition based on improved YOLOv5 in agriculture 4.0

Yifan Wang, Lin Yang, Hong Chen, Aamir Hussain, Congcong Ma

115 A Head Motion Recognition Approach for Driver Alertness Detection

Kam Wing Huang, Bruno Silva, Gerhard Hancke

152 Optimal Deployment of IoT-based Solar Insecticide Lamps under Coverage and Maintenance Cost Considerations

Fan Yang, Lei Shu, Qin Su, Guangjie Han

155 An IoT-based Optimized Watering System for Plants

Kai-yu Tsang, Zuneera Umair, Umair Mujtaba Qureshi, Inez Maria Zwetsloot

161 Orthoimage Super-Resolution via Deep Convolutional Neural Networks

Vladimir Berezovsky

Wednesday, July 27th

<p>14:00 – 15:00</p>	<p>Keynote Talk – 2 (Plenary Room)</p>	<p><i>AI Enhanced Multi-Model Knowledge Image Caption for Robotics and Intelligent Manufacturing Systems</i> by Professor Ren C. Luo (National Taiwan University, Taiwan)</p>
<p>15:00 – 16:00</p>	<p>Forum (Plenary Room)</p>	<p>Joint Students, Young Professionals, and Women in Engineering Forum by Yousef Ibrahim (Australia), Jasiński Marek (Poland), Lucia Lo Bello (Italy)</p>
<p>16:00 – 16:30</p>		
<p>16:30 – 18:30</p>	<p>Oral Sessions (Room-1,2,3)</p>	<p>Wed-1: System and software engineering, runtime intelligence (Room-1) Wed-2: Artificial intelligence in industrial applications – 2 (Room-2) Wed-3: Robotics and mechatronics in industrial applications (Room-3)</p>
<p>18:30 – 19:00</p>		
<p>19:00 – 20:00</p>	<p>Keynote Talk – 3 (Plenary Room)</p>	<p><i>Intelligent Energy Supply to Meet the Ever-Growing Secure Energy Demand with Industrial Power Electronics Converters Having Flexible Intelligent Control and Communication Systems</i> by Professor Kamal Al-Haddad, (École de Technologie Supérieure, Canada)</p>

Keynote Talk – 2

Time: Wednesday, July 27th, 14:00-15:00 AWST

Room: Plenary Room

AI Enhanced Multi-Model Knowledge Image Caption for Robotics and Intelligent Manufacturing Systems

by Professor Ren C. Luo (National Taiwan University, Taiwan)

Abstract: Artificial Intelligence becomes an important core technology of soft power in terms of global technological development, which has a wide spectrum of applications including robot integrated manufacturing automation as well as industrial cyber-physical systems (iCPS) under increased efficiency and flexibility at reduced cost. Image Caption can recognize contains of picture and can speak out. It is high-level that generates the context scenario descriptions from an image, which purpose is to generate a description of the image automatically. We need to concern a variety of elements and their spatial information to form semantically and syntactically sentences. The aforementioned issues, challenges and opportunities will be the focus of this presentation including some exemplary best practices and research results with video demo from our NTU iCeIRA Lab.

Ren, IEEE and IET Fellow, received Dipl.-Ing. and Dr.-Ing in EE from the Technische Universitaet Berlin. He is an Irving T. Ho Chair Professor at National Taiwan University. He served two-terms as President and Dean of Engineering of National Chung Cheng University, and Founding President of Robotics Society of Taiwan. He was President of IEEE Industrial Electronics Society. Ren was Toshiba Chair Professor in the University of Tokyo. He was an assistant, tenured associate and Full Professor of Department of Electrical and Computer Engineering at North Carolina State University. He served as CTO of FFG Inc. the world 3rd largest machine tool manufacturer and was CTO of ASUS Inc. the world 2nd largest PC manufacturer and Chief Technology Officer of FFG Inc. the world 3rd largest machine tool manufacturer. Ren's professional expertise includes AI enhanced robotic control systems, multi-sensor fusion, computer vision, intelligent manufacturing automation technologies. He has authored more than 530 papers and holds over 25 international patents. He is current Editor-in-Chief of IEEE Transactions on Industrial Informatics (IF 10.215), also was 5 years Editor-in-Chief of IEEE/ASME Transactions on Mechatronics. Ren received IEEE Eugene Mittelmann Outstanding Research Achievement Award, IEEE IROS Harashima Innovative Technologies Award; ALCOA Company Outstanding Engineering Research Award, USA; He also served as referee and final review panel member for the evaluation and assessment of national competitive major research grants program for numerous international organizations and countries, such as USA, Japan, Canada, Australia, European Union, Austria, Singapore etc.



Forum

Time: Wednesday, July 27th, 15:00-16:00 AWST

Room: Plenary Room

Joint Students, Young Professionals, and Women in Engineering Forum

by Yousef Ibrahim (Australia), Jasiński Marek (Poland), Lucia Lo Bello (Italy)

This networking event aims at talking about the students, young professionals and women in engineering groups at IES and the possible avenues for career development, professional development, networking, friendship/relationship building and knowledge-sharing. All students, fresh graduates, young engineers and female engineers are encouraged to attend this forum.

Wed-1: System and software engineering, runtime intelligence

Time: Wednesday, July 27th, 16:30-18:30 AWST

Room: 1

Session Chairs: Georgios Konstantinou, Hai Wang

- 23 Semi-Automatic Testing of Data-Focused Software Development Kits for Industrie 4.0**
Torben Miny, Sebastian Heppner, Igor Garmaev, Tobias Kleinert, Marko Ristin, Hans Wernher van de Venn, Björn Otto, Karsten Meinecke, Christian Diedrich, Nico Braunisch, Martin Wollschlaeger
- 72 Emotional Experience Design of B2C Web site Based on Emotion Recognition**
Lanxin Li, Wenzhe Tang, Chengqi Xue
- 93 A Container-Based Framework for Developing ROS Applications**
Pedro Melo, Rafael Arrais, Sérgio Teixeira, Germano Veiga
- 95 Using Modules to Manage the Content of IEC 61499 Type Libraries**
Michael Oberlehner, Virendra Ashiwal, Alois Zoitl, James Christensen
- 121 Towards Building Ontology-Based Applications for Integrating Heterogeneous Aircraft Maintenance Records**
Abdallah Abdallah Abdulsalam, Ip-Shing Fan
- 122 Survey on methods for early prototyping and validation of technical product ideas**
Laban Asmar
- 132 From Requirement Specification to OPC UA Information Model Design: A Product Assembly Line Monitoring Case Study**
Quang-Duy Nguyen, Saadia Dhouib, Kunal Suri, Fadwa Rekik
- 176 Cube Bot --- A Smart Factory Showcase for the Real-Time Container Architecture**
Joseph Hirsch, Marius Lichtblau, Marian Lingsch Rosenfeld, Kilian Telschig, Alexander Knapp

Wed-2: Artificial intelligence in industrial applications - 2

Time: Wednesday, July 27th, 16:30-18:30 AWST

Room: 2

Session Chairs: Amirmehdi Yazdani, Md Shoeb

- 97 Multi-level Feature Reweighting and Fusion for Instance Segmentation**
Xuan-Thuy Vo, Tien-Dat Tran, Duy-Linh Nguyen, Kanghyun Jo
- 101 Study on Clustering Method of Driving Behavior Data Based on Variational Auto Encoder and Coupled-GP-HSMM**
Kohjiro Hashimoto, Daichi Yanagihara, Hiroshi Kuniyuki, Kae Doki, Yuki Funabora, Shinji Doki
- 106 Deep Learning based Visual Quality Inspection for Industrial Assembly Line Production using Normalizing Flows**
Robert Maack, Hasan Tercan, Tobias Meisen
- 130 The Impact of Communication and Memory in State-Based Potential Game-based Distributed Optimization**
Steve Yuwono, Dorothea Schwung, Andreas Schwung
- 139 Partial Domain Intelligent Diagnosis Method for Rotor-Bearing System Based on Deep Learning**
Xiaoyue Liu, Cong Peng
- 140 An Intelligent Area Localization Framework for Rotating Machine Vision Vibration Measurement**
ZhaoZhou Cai, Cong Peng, Bingyun Yang, Xiaoyue Liu
- 144 Masked Self-Supervision for Remaining Useful Lifetime Prediction in Machine Tools**
Haoren Guo, Haiyue Zhu, Jiahui Wang, Vadakkepat Prahlad, Weng Khuen Ho, Tong Heng Lee
- 145 CAM/CAD Point Cloud Part Segmentation via Few-Shot Learning**
Jiahui Wang, Haiyue Zhu, Haoren Guo, Abdullah Al Mamun, Vadakkepat Prahlad, Tong Heng Lee

Wed-3: Robotics and mechatronics in industrial applications

Time: Wednesday, July 27th, 16:30-18:30 AWST

Room: 3

Session Chairs: Nikolaos Kouvakas, Muhammad Adnan Hayat

- 28 Low-Code Development in Worker Assistance Systems: Improving Flexibility and Adaptability**
Marc Brüninghaus, Carsten Röcker
- 31 Mixed Environment of Real and Virtual Objects for Task Training using Binocular Video See-through Display and Haptic Device**
Kazuho Iwamoto
- 37 Entropy-based coordination for maintenance tasks of an autonomous mobile robot system**
Tapio Heikkilä, Eric Halbach, Jukka Koskinen, Janne Saukkoriipi
- 69 Observer-Based Robust Adaptive Tracking for Uncertain Robot Manipulators with External Force Disturbance Rejection**
Abdul Rehan Khan Mohammed, JIAYI ZHANG, Bilal Ahmad
- 135 Design and Implementation of a Vision Based In-Situ Defect Detection System of Automated Fiber Placement Process**
Muhammed Zemzemoglu, Mustafa Unel
- 162 Supporting robotic welding of aluminium with a laser line scanner-based trigger definition method**
Jaime Marco-Rider, Tuan Anh Tran, Eirik B. Njaastad, Olav Egeland, Andrei Lobov
- 184 Robust Continuous Sliding Mode Controller for Uncertain Canonical Brunovsky Systems Using Reduced Order Extended State Observer**
Kamal Rsetam, Mohammad Al-Rawi, Zhenwei Cao
- 187 Model Following through a Metaheuristic PD Controller for a Magnetic Levitation System**
Nikolaos Kouvakas, Fotis N. Koumboulis, Katerina Xydi

Keynote Talk – 3

Time: Wednesday, July 27th, 19:00-20:00 AWST

Room: Plenary Room

Intelligent Energy Supply to Meet the Ever-Growing Secure Energy Demand with Industrial Power Electronics Converters Having Flexible Intelligent Control and Communication Systems

by Professor Kamal Al-Haddad, (École de Technologie Supérieure, Canada)

Abstract: Intelligent energy supply has become the goal as to satisfy the normal advancement of humanity and to fulfill the society needs in terms of more sustainable and clean energy consumption. For the last several years, efforts were spent on developing remedial industrial electronics devices and control strategies to reduce the negative impact and mitigate the Electric power quality of the awaited massive penetration of power devices on the electric network. Intelligent control techniques, advanced network distribution systems, digital network, and new topologies of multilevel type of power electronics converters appeared. Moreover, reducing the use of massive natural resources such as copper and iron usage along with capacitors is a contribution of Carbon-free environment. Many research efforts in this direction have been taking place around the world as to reduce the use of passive components, and increase the converter bandwidth while counting on advanced fast controllers. The presentation will follow on the latest development of new power electronic energy sources in Canada and around the world while highlighting the challenges facing the growth of interconnecting electric vehicles, drives and renewable sources through intelligent control of power electronics converters distributed along the grid. Late development on modeling and intelligent control of distributed converters and power quality enhancement as well as prohibition of harmonics circulation to ensure pollution-free environment of electrical equipment connected to the networks will be discussed.

Kamal received the B.Sc.A. and M.Sc.A. degrees from the University of Québec à Trois-Rivières, Canada, respectively, and the Ph.D. degree from the Institute National Polytechnique, Toulouse, France, in 1988. Since June 1990, he has been a professor with the Electrical Engineering Department, École de Technologie Supérieure (ETS), Montreal, QC, where he has been the holder of the senior Canada Research Chair in Electric Energy Conversion and Power Electronics since 2002. He has supervised more than 180 Ph.D. and M.Sc. students working in the field of power electronics. He is a consultant and has established very solid link with many Canadian industries working in the field of power electronics, electric transportation, aeronautics, and telecommunications. Prof Al-Haddad successfully transferred



25 technologies to the industry. His fields of interest are in highly efficient static power converters, harmonics and reactive power control using hybrid filters, and multilevel converters including the modeling, intelligent control, and development of prototypes for various industrial applications in electric traction, renewable energy, power supplies for drives, electrification and transportation, etc. Prof. Al-Haddad is a fellow member of the Canadian Academy of Engineering. He is IEEE IES President 2016-2017, IEEE Division VI director elect, associate editor of the Transactions on Industrial Informatics, IES Distinguished Lecturer, and recipient of the IEEE Dr.-Ing. Eugene Mittelmann Achievement Award. Prof. Al-Haddad is a member of the Academy of Sciences and Fellow of the Royal Society of Canada.

Thursday, July 28th

14:00 – 16:00	Industry Forum (Plenary Room)	
16:00 – 16:30		
16:30 – 18:30	Oral Sessions (Room-1,2,3)	<p>Thu-1: Factory automation and communication systems (Room-1)</p> <p>Thu-2: Intelligent finance (Room-2)</p> <p>Thu-3: Real-time Monitoring, Diagnosis, Prognosis and Tolerant Control for Industrial Systems (Room-3)</p>
18:30 – 20:00	Poster Forum (Poster Room)	
20:00 – 20:30	Closing Ceremony (Plenary Room)	

Thu-1: Factory automation and communication systems

Time: Thursday, July 28th, 16:30-18:30 AWST

Room: 1

Session Chairs: Martin Wollschlaeger, Hai Wang

- 26 Comprehensive Management Function Model: Generality and Workflow**
Santiago Soler Perez Olaya, Martin Wollschlaeger
- 68 Adaptive Industrial IoT gateway using kafka streaming platform**
Nico Braunisch, Sven Schlesinger, Robert Lehmann
- 79 A Contextual Bandit Learning Based Quality Test System in 5G-Enabled IIoT**
Sige Liu, Peng Cheng, Zhuo Chen, Wei Xiang, Branka Vucetic, Yonghui Li
- 136 A Scheduled Cluster-Tree Topology to Enable Wide-Scale LoRaWAN Networks**
Vitor Vasconcelos, Erico Leão, Natanael Ribeiro, Francisco Vasques, Carlos Montez
- 150 Maturity Levels for Automation Software Engineering in automated Production Systems**
Birgit Vogel-Heuser, Eva-Maria Neumann, Juliane Fischer
- 159 Quantitative analysis of communication handling for centralized multi-agent robot systems using ROS2**
Lukas Dust, Emil Persson, Mikael Ekström, Saad Mubeen, Emmanuel Dean
- 164 Resource Allocation and Retransmission Scheme for URLLC in Industrial Wireless Networks with Mixed Traffic**
Jingfang Ding, Meng Zheng
- 181 Impact Analysis of Data Clustering Techniques for Data-Based Topological Formation in WSNs**
Miguel Lino, Carlos Montez, Erico Leão, Ricardo Lira

Thu-2: Intelligent finance

Time: Thursday, July 28th, 16:30-18:30 AWST

Room: 2

Session Chairs: Heping Pan, Moayed Moghbel

- 5 Image Processing Based Implied Volatility Surface Analysis for Asset movement Forecasting**
Yuanyuan Qi, Guoxiang Guo, Yang Wang, Jerome Yen
- 12 Genetic Algorithm Based Quantitative Factors Construction**
Zhaofan Su, Jianwu Lin, Chengshan Zhang
- 18 A General Intelligent Portfolio Theory with Strength Investing and Sector Rotation in Stock Markets**
Heping Pan
- 33 Asset Movement Forecasting with the Implied Volatility Surface Analysis Based on SABR Model**
Shaowei Xu, Hongxin Huan, Yuanyuan Qi, Guoxiang Guo
- 36 Graph Attention Network for Financial Aspect-based Sentiment Classification with Contrastive Learning**
Zhenhuan Huang, Guansheng Wu, Xiang Qian, Baochang Zhang
- 38 Fundamental Multi-factor Deep-learning Strategy For Cryptocurrency Trading**
Yinghe Qing, Jifeng Sun, Ying Kong, Jianwu Lin
- 44 Less is More: Bitcoin Volatility Forecast Using Feature Selection and Deep Learning Models**
Haiping Wang, Xin Zhou
- 77 Study on the Relationship between Mixed Tail Risk and Expected Stock Returns**
Wen Rui Zhao, Chengyi Pu

Thu-3: Real-time Monitoring, Diagnosis, Prognosis and Tolerant Control for Industrial Systems

Time: Thursday, July 28th, 16:30-18:30 AWST

Room: 3

Session Chairs: Vitor Pires, Muhammad Adnan Hayat

- 80 Identification of Industrial Alarm Floods Using Time Series Classification and Novelty Detection**
Gianluca Manca, Alexander Fay
- 109 Non-rechargeable battery remaining useful life prediction with interactive attention sequence to sequence network**
Zhiwei Gao
- 116 Reinforcement Learning based Optimal Tracking Control for Hypersonic Flight Vehicle: A Model Free Approach**
Xiaoxiang Hu, Kejun Dong, Teng Yang, Bing Xiao
- 117 Fault diagnosis and fault-tolerant control for bilinear stochastic distribution systems with actuator fault**
Bo Cao, Lina Yao
- 131 Fuzzy PID Control for Multi-joint Robotic Arm**
Jialin Lin, Xiaoxu Liu, Zhongxing Ren
- 143 Real-time OEE visualisation for downtime detection**
YuanHao Li, Luiz Inoue, Roopak Sinha
- 148 Product Quality Control in Assembly Machine under Data Restricted Settings**
Fatemeh Kakavandi, Roger De Reus, Cláudio Gomes, Negar Heidari, Alexandros Iosifidis, Peter Gorm Larsen
- 151 A GAN-based fault detection for dynamic process with deconvolutional networks**
Dapeng Zhang

Poster Forum

Time: Thursday, July 28th, 18:30-20:00 AWST

Room: Poster

Session Chairs: Qimin Xu, Kim Fung Tsang

- 8 Enhancing Reliability by Combining Manufacturing Processes and Private 5G Networks**
Marcel Müller, Jan-Martin Knorr, Daniel Behnke, Christian Arendt, Stefan Böcker, Caner Bektas, Christian Wietfeld
- 15 Migrating legacy production lines into an Industry 4.0 ecosystem**
João Palmeira, Gustavo Coelho, Adriano Carvalho, Paulo Carvalhal, Paulo Cardoso
- 21 A multi-attribute auctioning system for the circular economy with Ricardian contracts**
Eric Naim Chiquito Garcia, Ulf Bodin, Kåre Synnes
- 48 Robustifying cooperative awareness in autonomous vehicles through local information diffusion**
Nikos Piperigkos, Aris S. Lalos, Kostas Berberidis
- 49 Hand-object Interaction Definition and Recognition for Analyzing Manual Assembly Behaviors**
Kazuaki Kondo, Tianyue Wang, Yuichi Nakamura, Yuichi Sasaki, Miho Kawamura
- 61 Life prediction model of lithium-ion batteries in the early-cycle stage based on convolutional long short-term memory with attention mechanism**
Chen Zhang, Lifeng Wu
- 71 Network Calculus-based Routing and Scheduling in Software-defined Industrial Internet of Things**
Luyue Ji, Wenjie Wu, Chaojie Gu, Jichao Bi, Shibo He, Zhiguo Shi
- 88 Inertial Measurement Unit based Human Action Recognition Dataset for Cyclic Overhead Car Assembly and Disassembly**
Jan Kuschan, Hristo Filaretov, Jörg Krüger

- 92 **Criteria to consider in a decision model for collaborative robot (cobot) adoption: A literature review**
Andreia Silva, Renata Blanc, Ana Correia Simões
- 94 **Documentation-driven GUI development for integration of image processing libraries**
Ana Lopes, Daniel Silva, Sérgio Lopes, José Correia, Carlos Lima, Carlos Silva
- 98 **Offset Estimation Based on ARIMA-LSTM for Time Synchronization in Single Twisted Pair Ethernet**
Guanwen Cui, Zhezhuang Xu, Xuchao Gao, Songbing Lin, Yi Guo
- 99 **Financial Topic Modeling Based on the BERT-LDA Embedding**
Mei Zhou, Jianwu Lin, Ying Kong
- 104 **SELF-FTS: A self-supervised learning method for financial time series representation in stock intraday trading**
Jifeng Sun, Yinghe Qing, Chang Liu, Jianwu Lin
- 108 **FPGA based Implied Volatility Calculation with Multi-section Method**
Su Wang, Hongxin Huan, Seng Fat Wong, Joseph Yen
- 110 **AASPMP: Design and Implementation of Production Management Platform Based on AAS**
Qihang Zhou, Yihao Wu, Chaojie Gu, Wenchao Meng, Shibo He, Zhiguo Shi
- 111 **Fundamental Quantitative Investment Theory and Technical System Based On Multi-Factor Models**
Li Zhao, haichuan Liu, Heping Pan
- 124 **War Economy Analysis after Mortgage Crisis on Stock and Gold with Semi-Covariance**
Shanyue Zhou, Zhili Chen, Jun Huang, Heping Pan
- 141 **Sentiment Analysis of Board Secretaries' Q&R Data**
Jia Miao, Jianwu Lin, Shenglei Hu, Guangling Liu
- 146 **Curriculum Learning in Peristaltic Sortation Machine**
Mohammed Sharafath Abdul Hameed
- 160 **Integration of Machine Learning Task Definition in Model-Based Systems Engineering using SysML**

Simon Rädler, Eugen Rigger, Jürgen Mangler, Stefanie Rinderle-Ma

168 Using Counterfactuals to Proactively Solve Service Level Agreement Violations in 5G Networks

Ahmad Terra, Rafia Inam, Pedro Batista, Elena Fersman

172 Learning Cybersecurity in IoT-based Applications through a Capture the Flag Competition

Alexandre de Oliveira Júnior, Gustavo Funchal, Jonas Queiroz, Jorge Loureiro, Tiago Pedrosa, Javier Parra, Paulo Leitao

174 Learning-based Automatic Report Generation for Scheduling Performance in Time-Sensitive Networking

Lingzhi Li, Qimin Xu, Yanzhou Zhang, Lei Xu, Yingxiu Chen, Cailian Chen

178 Deep Learning for Semiconductor Defect Classification

Terence Sweeney, Sonya Coleman, Dermot Kerr

182 Tweet and News Sentiment Indicators and the Behavior of the Brazilian Stock Market

Lucas Faria, Kethlyn Silva, Deborah Silva Alves Fernandes, Marcio Giovane Fernandes, Fabrizzio Soares

185 Control over networks: A case study of Wastewater Treatment Plants

Mercedes Chacón Vásquez

190 Formal model of IEC 61499 execution trace in FBME IDE

Tatiana Liakh, Valeriy Vyatkin, Sandeep Patil, Radimir Sorokin, Daniil Akifev

Local Organizers



Western Australia Chapter

