第三届物联网感知与仪器国际研讨会

The 3rd International Symposium on Sensing and Instrumentation in IoT Era

2022 年 11 月 16-18 日，中国上海

(会议网站：https://issi2022.casconf.cn/)

一、会议简介

第三届物联网感知与仪器国际研讨会（ISSI 2022）将于 2022 年 11 月 16-18 日在中国上海举办。物联网感知与仪器国际研讨会由美国 IEEE、IEEE 仪器与测量协会和上海市突出贡献专家协会等主办，交通运输行业重点科研平台主任联合会议秘书处、葡萄牙里斯本大学学院和上海海事大学等承办。研讨会旨在为物联网感知与仪器领域的国内外专家学者和技术人员提供一个学术交流与技术研讨的国际交流合作平台，将根据物联网技术的最新发展，以智慧城市、智慧交通、智慧物流、智慧港口、智慧医疗等基础（物联网）的基础（感知与仪器）作为本次大会的主题，为我国自主掌握物联网自主核心技术提供强有力的支撑。来自包括中国科学院院士、新加坡工程院院士、美国 IEEE 会士（IEEE Fellow）等在内的多名国际知名专家、国家知名学者等，为大家分享物联网技术理论与应用领域的最新成果和发展动态。会议采用大会报告、专题研讨会、分组报告等形式进行交流。本次会议所有接收的论文将全部进入 IEEE Xplore 数据库，并提交 EI 检索。

第一届物联网感知与仪器研讨会（ISSI 2018）于 2018 年在中国上海召开，第二届研讨会（ISSI 2019）于 2019 年在葡萄牙里斯本召开，两届会议所有接收的会议论文已全部被 EI 收录。

二、自动化码头前沿技术国际论坛

为推动中国自动化码头技术的发展，加强国内外高校、科研机构和企业在该领域的技术研讨与交流，2022 年 11 月 16 日下午，会议组委会与交通运输部联合举办“自动化码头前沿技术国际论坛”。由新加坡国立大学、美国 Moffatt & Nichol、荷兰 TBA、德国西门子、瑞士 ABB，以及中国上海港、中国北部湾港、中国华东电子等全球港口技术专家来分享智慧港口、自动化码头数字孪生、自动化码头仿真、设备自动化与运维、自动化码头 TOS、U 型自动化码头等领域有关的前沿理论与技术。

演讲嘉宾与报告题目及摘要如下。

Modelling of digital twin for mega container port with hybrid DES formalism

Abstract: This presentation briefly introduces the hybrid simulation modeling formalism via O²DES Framework (object-oriented discrete event simulation), which is a scientific approach and innovative development of C4NGP towards practical application in the modeling of mega container ports. The hybrid formalism has an “event-based” kernel for accurately describing the rules of discrete-event systems; it adopts a “state-based” modularization for the segmented hierarchical structure of a complex industrial system, to simplify the process of modeling, as well as the maintenance and reusability of the model library; and, through the “activity-based” perspective, it provides an overview on the dynamics of all flowing entities in the system. This approach effectively the simulation and modeling capability of C4NGP, and prepared the research team to address practical operational problems in mega container terminals with higher complexity.

Biography: Dr. Li Haobin is a Senior Lecturer in the Department of Industrial Systems Engineering & Management (ISEM), College of Design and Engineering (CDE), National University of Singapore (NUS). He is currently the Assistant Head (Outreach & External Relations) of the ISEM Department, Academic Director of Master of Science (MSc) Program in Maritime Technology and Management (MTM), and Co-Director of Centre of Excellence in Modelling and Simulation for Next Generation Ports (C4NGP). Dr. Li received his B.Eng. degree (1st Class Honours) in 2009 from ISEM Department in NUS, with a minor in Computer Science; and Ph.D. degree from the same department in 2014. He

has research interests in operations research, system engineering, simulation modelling, and simulation-based optimization with applications for the logistics and maritime industries. He is the inventor of the MO-COMPASS and GO-POLARS algorithms; and the main developer of O²DES Framework, which is used extensively for providing industry-related simulation modelling, and integrated optimization solutions.

使用离散事件仿真混合建模形式构建巨型集装箱港口数字孪生

报告摘要：报告大致介绍了基于 O² DES 框架 （面向对象离散事件仿真）的混合仿真模型范式，该范式是 C4NGP（下一代港口建模与仿真卓越中心）在大型集装箱港口建模中的科学方法与创新发展。这种混合建模范式，通过“基于事件”的内核来准确描述离散事件系统的规则，实现一个复杂工业体系中的分层分段结构；采取了“基于状态”的模块化方式，来简化建模过程以及模型数据库的可维护和可重复性；同时通过“基于活动”的观点，对一个系统中全部流动实体的动态进行了概述。该方法有效地增强了 C4NGP 仿真与建模的能力，并且为研究团队解决更加复杂的大型集装箱码头的实际操作问题做好准备。

个人简介：李浩斌博士是新加坡国立大学(NUS)设计与工程学院、工业系统工程与管理(ISEM)系的高级讲师，现任 ISEM 系外联与对外关系的助理主管，海事科技与管理 (MTM)理科硕士项目的学术主管，以及下一代港口建模与仿真卓越中心的副主任。李博士于 2009 年获得 NUS ISEM 的本科一等荣誉学士学位，辅修计算机科学；并于 2014 年获得同院系的博士学位。他的主要研究兴趣是运筹学、系统工程、仿真模型和基于仿真的优化以及在物流和海事行业中的应用。他是 MO-COMPASS 和 GO-POLARS 算法的发明者，O² DES 框架的主要开发者，该框架广泛应用于工程行业相关的仿真建模与集成优化方案。

A Practical and Proven Approach to Design and Implement High Performing Automated Terminals

Abstract: Automated terminals require more investment into fixed infrastructures than conventional terminals. However, they are developed in times of uncertainty about cargo flows, customer demands, policies and regulations and emerging technology. How to ensure that a terminal is up to the demands of the future for at least 30 to 40 years? TBA has been assisting terminal operators around the globe in designing automated terminals which are ready for the future, in terms of performance, sustainability but also robustness for change. Through the use of high-definition simulation, scenario analysis, and robust design, the world’s largest and best performing automated terminals have resulted. From LBCT in Long Beach, APMT’s and DPWorld’s terminals in Rotterdam, to Tuas terminals in Singapore, and the terminals in Qing Dao and Yang Shan.

What to take into account in designing a terminal such as the ones mentioned? How to ensure they can handle the volume, deliver the performance, and make minimal use of resources, such as land, energy, whilst providing a safe working environment? During the speech, I’ll illustrate the key do’s and don’t by examples from the recent past.

Finally, I’ll provide an outlook into the future. What new developments can we expect? What is the role of artificial intelligence in this? How to ensure a minimal carbon footprint? What’s the role of the human in these automated sites?

Biography: Dr. Yvo A. Saanen is Managing Director and Founder (1996)

of TBA, a leading terminal design and simulation company in The Netherlands. He is in charge of all port & terminal related projects all over the world in their planning and optimization process of container terminals by means of simulation and emulation. TBA is the software and consulting business unit of Konecranes, and in this capacity Yvo Saanen is responsible for all commercial aspects of the business unit. In this role, he has participated in various projects, ranging from long term development, process improvement, terminal extensions and redesign of handling systems to design of greenfield terminals. Examples are the DP World's facility in Antwerp, and HPH's Euromax facility in Rotterdam, and OOCL's facility in Long Beach, but also recent automated terminals in Rotterdam by APMT and DP World.

Dr. Saanen holds an MSc in Systems Engineering and a PhD on the design and simulation of robotized container terminals, both from Delft University of Technology. He is a lecturer at the institute of Maritime Economics and Logistics (Erasmus University Rotterdam), teaching simulation and logistics and, in various bodies, lectures about terminal design by means of simulation, and publishes regularly about his work in scientific magazines as well as business magazines.

设计和运营高性能自动化码头的实用验证方法

报告摘要：与传统码头相比，自动化码头需要对固定的基础设施进行更多投资。然而，它们是在货物流量、客户需求、政策和法规以及新兴技术不确定的情况下开发的？如何确保一个码头至少在 30 至 40 年内都能满足未来的需求？TBA 一直在协助全球的码头运营商设计自动化码头，这些码头在性能、可持续性以及应对变化的稳健性方面为未来做好准备，通过使用高精度仿真、情景分析和稳健设计，产生了世界上最大和性能最好的自动化集装箱码头，包括了长滩的 LBCT 码头，鹿特丹的 APMT 和 DPWorld 码头，新加坡的 Tuas 码头，以及中国青岛和上海洋山四期码头。

在设计诸如上述的码头时要考虑到什么？如何确保它们能够处理一定的集装箱量，提供高效率操作，并尽量减少资源的使用，如土地、能源，同时提供一个安全的工作环境？在报告中，我将通过最近的例子来说明关键的“做”和“不做”。

最后，我将分享对未来自动化码头的展望。我们可以期待哪些新的发展？人工智能在其中的作用是什么？如何确保最小的碳排放？人在这些自动化码头中的角色是什么？

个人简介：Yvo A.Saanen 博士是荷兰领先的自动化码头设计和模拟仿真公司 TBA 的董事总经理和创始人（TBA 公司创立于 1996 年）。他负责全球港口和码头相关的项目，通过模拟和仿真的方式对集装箱码头进行规划和优化。现在 TBA 是 Konecranes 的软件和咨询业务公司，Yvo Saanen 负责该公司的所有业务。他参与了多个自动化码头项目，从长期开发、工艺改进、码头扩建和装卸系统的重新设计，还包括绿色码头的设计。例如，DP World 在安特卫普的项目，HPH 在鹿特丹的 Euromax 项目，东方海外在长滩港的项目，以及 APMT 和 DP World 在鹿特丹的自动化码头项目。

Yvo A.Saanen 博士拥有荷兰代尔夫特理工大学，系统工程硕士学位和自动化集装箱码头设计与仿真博士学位。他是海事经济和物流研究所（鹿特丹伊拉斯谟大学）的讲师，教授模拟和物流，并在多个机构中通过模拟讲授自动化码头设计，并定期在科学杂志和商业杂志上发表他的学术论文。

Unlock the Automation Terminal Potential with AI Technology

Abstract: Automation terminal with the large number of connected systems which make maintenance work is getting more complex. Endusers increasingly request system support for predictive maintenance such that the number of failure interventions was kept to a minimum. Save the inventory of spare parts as well. Using Artificial Intelligence algorithms support data analysis and developed Predictive Maintenance Systems for automated cranes to support the first project achieved a fault prediction rate of up to 80%.

Biography: Gerhard L. Fischer graduated in 1987 with a Dipl.-Ing. (FH) degree in Electrical Engineering from the University of Applied Science, Munich, Germany. He visited Arizona State University, USA on a Fulbright exchange grant and in 1990 joined Siemens AG in Erlangen, Germany to develop high frequency and large-power converters. In 1995 he changed to sales/marketing of variable speed drives followed in 1996 by a posting in Siemens Centre of Competence in Singapore to support the build-up of an regional sales network. 1998 he moved to Taipei to coordinate Siemens East Asian crane business. In 2002 he went back to Germany working with Siemens AG in Erlangen for sales and marketing of crane control systems. 2004 thru 2008 he worked with Siemens crane systems head office in The Hague, Netherlands in a business development function for harbor cranes. Since 2008 he is with Siemens AG, Digital Industries, Motion Control, Cranes business segment in Erlangen/Germany as head of sales. He is member of IEEE Industry Applications Society, the VDI working group B1 for cranes, the VDE DKE working group for hoisting systems and vice-chairman of the PEMA committee for equipment design and infrastructure.

如何运用人工智能技术释放自动化码头的潜力

报告摘要：当前自动化码头大量的集成系统使得设备维护工作变得越来越复杂。用户越来越多地要求系统支持预测性维护，以便将设备系统故障干扰的数值保持在最低水平，并节省备品备件的库存。使用人工智能算法支持数据分析，并为支持第一个项目的自动化起重机开发了预测维护系统，实现了高达 80%的故障预测率。

个人简介：Gerhard L.Fischer 1987 年毕业于慕尼黑应用科学大学，获得电气工程专业学士。在富布赖特基金的资助下，费舍尔先生在美国坦佩的亚利桑那州立大学进行了学术访问，于 1990 年加入了位于德国埃尔兰根的西门子股份公司，从事大功率变频器的研发工作。1995 年，他从研发岗位转换为销售职能，负责西门子变频传动系统销售管理，1996 年被派往西门子新加坡能力中心任职，支持建立西门子亚太区域的销售网络，1998 年被派往中国台北，协调管理西门子在东亚区域的起重机业务。2002 年，调回西门子德国埃尔兰根总部，负责西门子全球起重机业务的销售管理。2004 年至 2008 年，他被派往荷兰西门子，在位于海牙的西门子起重机系统部，负责港口起重机的业务开发工作。自 2008 年起，调回德国西门子埃尔兰根总部，担任西门子起重机业务部门销售主管。费舍尔先生作为 IEEE 工业应用协会的成员，他发表了多篇关于功率半导体应用、转换器技术和变速驱动系统在各个行业中的应用技术论文。他还是 VDI 起重机工作组 B1、VDE 起重系统工作组的成员，并担任 PEMA 设备设计和基础设施委员会副主席。

Exploration and Practice of U-shaped Automated Container Terminal——Beibu Gulf Port

Abstract: Firstly, the reporter brings about the sharing of technical practice and application achievements of Qinzhou automated container terminal of Beibu Gulf Port, including Beibu Gulf Port overview, project overview, the world's first U-shaped process scheme, the vision of sea-rail intermodal

transport, automated equipment design, system architecture design, big data application, smart security design, and other typical elements. In addition, exploration for port automation

shares views on topics such as self-driving technology, TOS system technology, and automated terminal future vision by Beibu Gulf Port.

Biography: Furong Went, senior engineer, is currently Beibu Gulf Port Co., Ltd. Chief engineer, Guangxi Qinzhou Bonded Port Shenggang Terminal Co., Ltd. Executive Director & General Manager. He served as technician and deputy director of the Technology Department of Fangcheng Port Group, deputy director and director of Engineering Technology Department of Beibu Gulf Port Co., Ltd., general manager of Technology Department and general manager of Automated Container Terminal Construction Project Department of Beibu Gulf Port Co., Ltd, chief engineer, and general manager of Technology Department and general manager of Automated Container Terminal Construction Project Department of Beibu Gulf Port Co., Ltd, chief engineer.

He has organized the preparation of several top-level design plans such as the Research on the "Four First class" Construction Strategic Planning and Evaluation System of Beibu Gulf Port. As an expert, he has participated in the preparation of Guidelines for the Construction of Automated Container Terminals [JTS/T 199-2021]. He presided over the construction of the fully automated container terminal of Beibu Gulf Port, innovatively designed and implemented the world's first U-shaped automated container terminal handling system, and fully carry out the automation transformation of container yards, and Presided over the establishment of Beibu Gulf Port's unified external service platform "Bbw Port Network" and so on. He has published and obtained many papers and technical patents, and won more than ten honorary titles and various awards.

U 型自动化集装箱码头探索与实践—北部湾港

报告摘要：报告首先对北部湾港钦州自动化集装箱码头技术实践及应用成果的分享，内容包括北部湾港概况、项目概况、全球首创 U 型工艺方案、海铁联运设想、自动化设备设计、系统架构设计、大数据应用及智慧安防设计等典型元素。另外，针对港口自动化的探索，分享北部湾港针对无人驾驶技术、TOS 系统技术、自动化未来设想等主题观点。

个人简介：温富荣，高级工程师，现任北部湾港股份有限公司总工程师，广西钦州保税港区盛港码头有限公司执行董事、总经理。历任防城港务集团技术员、技术部副主任，北部湾港股份有限公司工程技术部副部长、部长，北部湾港股份有限公司技术部总经理兼自动化集装箱码头建设项目部总经理，北部湾港股份有限公司总工程师。

他组织编制了《北部湾港“四个一流”建设战略规划及评价体系研究》等多项顶层设计规划，参与交通运输部水运行业标准《自动化集装箱码头建设指南》编制。他主持建成北部湾港全自动化集装箱码头，创新设计全球首创的 U 型布局自动化集装箱码头装卸系统并落地实施，主持建成北部湾港对外统一服务平台“北港网”等多项信息化系统。发表取得多篇论文和技术专利，并获得个人荣誉称号及各类奖项十余项。

R&D and Practice of CiTOS7

Abstract: Container terminals around the world are developing towards unmanned, automated, and

intelligent trends nowadays. In this context, this report introduces the development status of automated container terminals in China, especially the terminal layout modes and the utilization status of automated quayside crane, automated yard crane, and horizontal transport equipment. Taking the project of Guangzhou Nansha Port Phase-IV Automated Container Terminal for instance, the R&D and practice of Container Intelligent Terminal Operating System (CiTOS7) developed by Yantai Huadong Elec-Tech Co., Ltd. is introduced, including the innovative points in ship loading, yard crane dispatching, and horizontal transport. Meanwhile, the technological and development trends of automated terminals in the future are also discussed in this report.

Biography: Mr. Li Dalin Graduated from Hefei University of Technology in 1990, majoring in computer science; Senior engineer, engaged in R&D and implementation of port and shipping software for 30+ years, has rich experience in port informatization construction practice, participated in automated, unmanned, and intelligent container terminal construction of multiple ports; presided over the development of container terminal TOS, bulk cargo terminal TOS, oil terminal TOS, and other port operating systems; and participated in information-based construction of 40+ container terminals, including Guangzhou Nansha Port Phase-I Container Terminal TOS System Project, Guangzhou Nansha Port Phase-III Container Terminal TOS System Project, Tianjin Port Eurasia International Container Terminal TOS System Project, Xiamen Ocean Gate Container Terminal TOS System Project, Guangzhou Nansha Port Phase-IV Container Terminal TOS System Project, etc. He is now the General Manager of Yantai Elec-Tech Co., Ltd.

自动化集装箱码头 CiTOS7 的研发与实践

报告摘要：基于目前国内外集装箱码头无人化、自动化和智慧化的发展趋向，介绍了国内自动化集装箱码头发展状况，特别是码头的布局模式和自动化岸桥、自动化场桥及无人水平运输等设备在自动化码头使用的情况。以广州南沙四期集装箱自动化码头为案例，介绍烟台华东电子集装箱码头操作系统（Citos7.0）在自动化集装箱码头的研究和实践，包括装船、场桥调度和水平运输等方面的创新点。展望了未来自动化化码头的技术及发展趋势。

个人简介：李大林 1990 年毕业于合肥工业大学计算机专业，高级工程师，从事港口航运软件开发和实施 30 多年，有丰富的港口信息化领域实践经验，参入多个港口集装箱码头自动化、无人化和智能化的建设。主持开发集装箱码头操作系统、散货专业码头操作系统、油品码头操作系统等港口软件，参入了广州南沙一期集装箱码头系统、广州南沙三期集装箱码头系统、天津欧亚集装箱码头操作系统、厦门远海集装箱码头操作系统、广州南沙四期集装箱码头等 40 个集装箱码头信息化建设。目前就职于烟台华东电子科技公司总经理。

What Smart Port Means and What its Benefits are

Abstract: Many ports are executing ambitious Smart Port plans to allow them to expand their efficient cargo handling capabilities. Smart Port is a tool that will make it possible re-engineering of core port processes and optimizing their operational platforms such as Port Community Systems (PCS) by leveraging technology trends such as cloud computing, IOT, 5G, digital twin, data analytics, and artificial intelligence (AI). If it is done right, its use cases are broad and some of its immediate benefits include: vessel estimated time of arrival (ETA) predictability, seamless vessel service coordination,

optimal quay utilization, effective resources allocation, optimal dwell time management etc.

Biography: Ashebir Jacob has successfully led multidisciplinary design teams to deliver planning, design, and construction of green and brown field projects of different sizes and complexities. With more than 35 years of professional experience, Ashebir's planning work has included the preparation of feasibility studies, operational analysis, and the development of general cargo terminals, conventional and automated container terminals, and rail intermodal facilities. As a Port Practice Leadership team member, he plays a key role in developing companywide port practice strategy, developing business expansion plans, aligning expertise with the future market needs as well as, plans, organizes, and supervises a staff of, planners, engineers, technicians, and simulation/emulation software engineers dedicated to providing services for the development of the state-of-the-art port facilities.

Ashebir, as an VP of Moffatt & Nichol, is leading the company's automated container terminal development team and the simulation and emulation team. His automated terminal experience includes defining the terminal business case, performing feasibility analyses, developing terminal layout options, and establishing simulation and static analysis criteria. Ashebir also has extensive experience in the development of criteria for TOS development, automated container handling equipment, system integration, testing, acceptance, training, and continuous improvement.

智慧港口的含义及其优势

报告摘要：很多港口正在雄心勃勃的推进港口智能化，以便于能够更加高效的增加港口货物处理能力。我们认为智慧港口意味着一种工具，它利用云计算、物联网、5G、数字孪生、数据分析和人工智能（AI）等最新技术，使港口核心流程的重新设计，港口社区系统（PCS）等运营平台的优化成为可能。如果成功，智慧港口将会变得更广泛，直接好处包括：船舶预计到达时间（ETA）的可预测性、无缝的船舶服务协调、最佳码头利用率、有效的资源分配、最佳停留时间管理等。

个人简介：Ashebir Jacob 成功地领导了多学科的设计团队，完成了不同规模和复杂程度的绿色港口项目的规划、设计和施工。他拥有超过 35 年的专业经验，Ashebir 的规划工作包括编写可行性研究报告、运营分析，以及开发普通货物码头、传统和自动化集装箱码头和海铁联运设施。作为港口业务领导团队的成员，他在制定整个公司的港口业务战略、制定业务扩展计划、将专业知识与未来的市场需求相结合，以及计划、组织和监督由规划师、工程师、技术人员和模拟/仿真软件工程师组成的工作人员方面发挥着关键作用，致力于为最先进的港口设施的发展提供服务。

Ashebir 作为 Moffatt & Nichol 公司的副总裁，负责该公司的自动化集装箱码头开发团队以及模拟和仿真团队。他的自动化码头经验包括定义码头的商业模式，进行可行性分析，制定码头布局方案，以及建立仿真和静态分析标准。Ashebir 在制定 TOS 开发标准、自动化集装箱处理设备、系统集成、测试、验收、培训和持续改进方面也有丰富经验。

Perception in yard automation

Abstract: Requirements on yard automation are increasing. Terminal operators expect solutions with high performance, accuracy and with a minimum of manual interventions for corrective actions. In addition, the systems shall be easy to deploy, repair and maintain with highest level of performance with limited downtime and personnel requirements. The combination of increased performance requirements and robustness requires innovative solutions where recent advances in robotics, autonomous driving and perception can provide pathways to solutions.This talk will discuss the transition from traditional automation systems to perception based solutions with a use case in transaction towards road chassis in the transfer zone.

Biography: Pontus Klang is manager at ABB Ports and responsible for the core R&D team developing innovative terminal automation solutions. He has more than 20 years of experience working with industrial software systems and recently focused more on perception problems and application of robotics within terminal automation. Pontus has a MSc in Computing Science and Engineering.

码头堆场自动化中的感知

报告摘要：集装箱码头对于堆场自动化的需求越来越高。码头运营商期望解决方案具备高性能及高精度，并且能够将人工干预最少化。此外，系统本身应易于安装部署、维修和维护，在实现最高性能水平的同时，减少停机时间和对人员的依赖。 更高性能需求结合更高稳定性，则需要创新的解决方案。机器人、自动驾驶和感知方面的最新成果可以为解决方案提供实现途径。本次演讲将通过一个交换区内对外集卡作业的实际案例，来讨论从传统自动化系统到基于感知的解决方案的转型。

个人简介：Pontus Klang 是 ABB 港口业务核心研发团队经理，他的团队负责开发创新性的码头自动化解决方案。他具备超过 20 年的工业软件系统工作经验，最近致力于感知问题研究和机器人在码头自动化中的应用。Pontus 拥有计算机科学与工程硕士学位。

三、征稿主题

- **物联网在自动化码头中的应用**
- 5G 通讯技术应用场景下的传感器网络；
- 物联网相关的智能传感器与无线传感器网络；
- 物联网测试方法与自动化仪器；
- 智能传感器网络定位技术与算法；
- 智能物联网系统软件平台与中间件；

- 基于物联网的可穿戴系统解决方案；
- 物联网系统设计方法；
- 物联网系统中的大数据处理技术；
- 无线传感器网络与物联网的能源获取与节能技术；
- 智能仪器设备及远程设备监控；
- 物联网及物联网安全标准；
- 智慧港口与物流中的传感器与物联网技术；
- 5G 通讯技术在智慧港口、智慧物流、工业物联网、港航的应用；
- 面向结构健康监测的传感与物联网技术；
- 物联网在智慧城市、智慧家居、智慧农业、智慧医疗等领域中的应用；
- 以及其他与 IoT、IoE 相关的领域。

四、投稿要求

1. 论文必须是英文稿件，且论文应具有学术或实用价值，未在国内外学术期刊或会议发表；
2. 论文需按照会议网站提供的模板排版，请将页数控制在 4-6 页；
3. 凡投稿论文被录用未作特殊申明者，视为已同意授权出版；
4. 会议采用 EDAS 系统进行投稿。

五、组织机构

- **主办单位：**IEEE

  IEEE 仪器与测量协会

  上海市突出贡献专家协会

- **承办单位：**交通运输行业重点科研平台主任联合会议秘书处

  葡萄牙里斯本大学学院

  上海海事大学

  上海浦东新区研发机构联合会

- **协办单位：**葡萄牙电信研究院

  自动化码头技术交通运输行业研发中心（中远海运港口）

  智能港口物流交通运输行业协同创新平台

  航运技术与控制工程交通运输行业重点实验室

  交通安全特种材料与智能化控制交通行业重点实验室

  上海水岳实业有限公司

- **支持单位：**上海市浦东新区科学技术协会

  Sensor

  美国世哲出版公司

六、重要信息

- 会议时间：2022 年 11 月 16 日 - 18 日
- 会议地点：上海国信紫金山大酒店
- 会议语言：英文（同声翻译）
- 会议模式：线上线下结合

七、日程安排

日期		行程安排
第一天	全天	注册
11.16	13:00-17:30	自动化码头前沿技术国际论坛 Workshop

	18:00-20:00	欢迎晚宴	
第二天 11.17	08:30-09:00	ISSI2022 开幕式	
	09:00-09:20	集体合影	
	09:20-10:00	Internet of Things Information Acquisition and Cognition **By Junhao Chu**	
	10:00-10:40	Full Duplex Communications for the Next Generation Wireless Networks **By Octavia A. Dobre**	
	10:40-11:00	茶歇	
	11:00-11:40	Industrial Internet of Things, 5G/B5G/6G and Edge Computing **By Xingwei Wang**	
	11:40-12:20	IoT Smart Sensing Systems and AI in the food chain: From Precision Agriculture to Automatic Port Terminal **By Octavian Postolache**	
	12:00-13:30	午餐	
	14:00-15:30	分会场报告 1	分会场报告 2
	15:30-15:50	茶歇	

	15:50-17:20	分会场报告 3	分会场报告 4
	18:00-20:00	晚宴	
第三天 11.18	08:30-09:10	What Smart Port Means and What Benefits Area **By Ashebir Jacob**	
	09:10-09:50	IoT Enabled Smart Sensors for Home, City and Environmental Monitoring **By Subhas Mukhopadhyay**	
	09:50-10:30	茶歇	
	10:30-10:50	Smart Sensing and Localization **By Lihua Xie**	
	10:50-11:30	Empowering the digital transformation of discrete manufacturing by advanced Industrial IoT **By Lei Zhong**	
	11:30-12:10	Keynote IX **By Xiuwen Fu**	
	12:10-13:30	午餐	
	13:30-15:00	分会场报告 5	
	15:00-15:20	ISSI2022 颁奖仪式 & 闭幕式	

主旨报告题目及摘要与专家如下。

Internet of Things Information Acquisition and Cognition

Abstract: The keynote mainly discusses the following three issues: the first one is the Internet of Things in the context of the intelligence era. The second one is the real-time acquisition and intelligent analysis of physical big data. The third is the Internet of Things technology promotes the development of the instrument industry.

Biography: He is currently an academician at the Shanghai Institute of Technical Physics, Chinese Academy of Sciences, dean of the Institute of Optoelectronics, Fudan University, professor of East China Normal University, editor-in-chief of Journal of Infrared and Millimeter Waves, editor-in-chief of Materials Today Electronics, academician of Asia Pacific Academy of Materials, a fellow of SPIE. He was a member of the Presidium of the 8th Chinese Academy of Sciences, a representative of the 10th and 11th National People's Congress, a counselor of the Shanghai Municipal Government, and a vice-chairman of the Shanghai Association for Science and Technology.

He has long been engaged in infrared optoelectronic physics and semiconductor research, as well as new optoelectronic devices and interdisciplinary research. He has won the National Natural Science Award 3 times, the Natural Science Award at the ministerial level, and the Science and Technology Progress Award 12 times. He has published more than 800 papers, 100 patents, 6 monographs in Chinese and English, and edited more than 10 books. In 2014, he was rated as one of the top ten outstanding national scientific and technological workers. In 2017, he won the first National Innovation Medal. In 2017, he was rated as "Pride and Strength" Touching Shanghai Person of the Year. In 2020, he received the United Nations Industrial Development Organization Shanghai Global Science and Technology Innovation Center Outstanding Contribution Award, and in 2022, he was honored as the Outstanding Person in Popular Science Communication in Shanghai.

物联网信息获取与认知

摘要：报告主要讨论以下三个问题：1, 智能时代背景下的物联网；2, 物理大数据的实时获取与智慧分析；3, 物联网技术推动仪器产业发展。

个人简介：褚君浩，博士，中国科学院院士。现任中国科学院上海技术物理研究所研究员，复旦大学光电研究院院长，华东师范大学教授，《红外与毫米波学报》主编，《Materials Today Electronics》 主编，亚太材料科学院院士，SPIE 会士。曾任第八届中科院学部主席团成员，第十、十一届全国人大代表，上海市政府参事，上海市科协副主席等。长期从事红外光电子物理和半导体研究以及新型光电子器件和学科交叉研究。获得国家自然科学奖三次、部委级自然科学奖或科技进步奖 12 次。发表学术论文 800 余篇，专利 100 项，中英文专著 6 部，编著 10 余部。2014 年评为十佳全国优秀科技工作者，2017 年获首届全国創新争先奖章；2017 年评为“光荣与力量”感动上海年度人物”。2020 年获得联合国工业发展组织上海全球科技创新中心突出贡献奖。2022 年评为上海市大众科学传播杰出人物。

IoT Enabled Smart Sensors for Home, City and Environmental Monitoring

Abstract: The advancement of sensing technologies, embedded systems, wireless communication technologies, nano-materials, and miniaturization makes it possible to develop IoT enabled smart sensing systems. IoT enabled sensors empowers the vision of a Smart City to become a reality. IoT enabled sensors provides real time environmental data which will provide full awareness of weather/climate and can be used to take any strategic/corrective actions to address issues. This seminar will discuss fabrication and developmental works on IoT enabled sensors at Macquarie University based on MEMS as well as flexible materials for home, health and environmental monitoring. The success of the Commonwealth funded (Govt. of Australia) Smart city project and New South Wales Government Funded Water project will be shared.

Abstract: Subhas holds a B.E.E. (gold medalist), M.E.E., Ph.D. (India) and Doctor of Engineering (Japan). He has over 31 years of teaching, industrial and research experience.

Currently he is working as a Professor of Mechanical/Electronics Engineering, Macquarie University, Australia and is the Discipline Leader of the Mechatronics Engineering Degree Programme. His fields of interest include Smart Sensors and sensing technology, instrumentation techniques, wireless sensors and network (WSN), Internet of Things (IoT), Mechatronics etc. He has supervised over 55 postgraduate students and over 150 Honours students. He has examined over 75 postgraduate theses.

He has published over 450 papers in different international journals and conference proceedings, written ten books and sixty two book chapters and edited eighteen conference proceedings. He has also edited thirty five books with Springer-Verlag and thirty two journal special issues. He has organized over 20 international conferences as either General Chairs/co-chairs or Technical Programme Chair. He has delivered 410 presentations including keynote, invited, tutorial and special lectures.

He is a Fellow of IEEE (USA), a Fellow of IET (UK), a Fellow of IETE (India). He is a Topical Editor of IEEE Sensors journal. He is also an associate editor of IEEE Transactions on Instrumentation and Measurements and IEEE Reviews in Biomedical Engineering (RBME). He is a Distinguished Lecturer of the IEEE Sensors Council from 2017 to 2022. He chairs the IEEE Sensors Council NSW chapter.

Full Duplex Communications for the Next Generation Wireless Networks

Abstract: With the 3GPP Release 17 out, Advanced 5G is on its way. An unprecedented proliferation of new Internet-of-everything services is ongoing, such as extended reality, aerial vehicles, automation of industry, and connected autonomous systems, leading to the digital transformation of the vertical industries and society. In the last few years, the research community has started to look toward the next generation (6G) of wireless network, which aims to bring us closer to the fully connected, intelligent digital world of the future. This talk will briefly discuss the vision of 6G wireless networks, and then focus on the full duplex technology which theoretically doubles the sum rate and enables reduced latency. In particular, different machine learning-based methods will be introduced, which tackle the critical self-interference problem in full duplex transceivers. Results from measurements will be presented. The talk will conclude with directions for future investigation in the next generation wireless

networks.

Biography: Octavia A. Dobre is a Professor and Research Chair at Memorial University, Canada. Previously, she was with the New Jersey Institute of Technology, USA and Polytechnic Institute of Bucharest, Romania. She was a Visiting Professor with Massachusetts Institute of Technology, USA and Université de Bretagne Occidentale, France. Her research interests include technologies for B5G wireless, blind signal identification and parameter estimation techniques, resource allocation, as well as optical and underwater communications.

Dr. Dobre is the Director of Journals of the IEEE Communications Society, and served as the inaugural Editor-in-Chief (EiC) of the IEEE Open Journal of Communications Society and the EiC of the IEEE Communications Letters. She was the General Chair, Tutorial Co-Chair, and Technical Co-Chair at various conferences.

Dr. Dobre was a Royal Society Scholar and a Fulbright Scholar. She is an elected member of the European Academy of Sciences and Arts, a Fellow of the Engineering Institute of Canada, a Fellow of the Canadian Academy of Engineering, and a Fellow of the IEEE.

Smart Sensing and Localization

Abstract: Sensing and localization are essential for IoT and intelligent unmanned systems. GPS has been widely used for positioning and navigation. However, in indoor and many outdoor environments such as urban canon, forest, tunnel, GPS may not be available or unreliable. Hence, there has been a lot of interest in developing technologies and algorithms for localization in such environments. In this talk, we shall discuss several sensing and localization systems and algorithms we have developed over the past few years including WiFi based indoor positioning and human activity recognition, UWB based localization, multi-modality sensor fusion, etc., and their applications in smart buildings, healthy/elderly care, and unmanned systems. Challenges and future research directions will be highlighted.

Biography: Lihua Xie is a professor with School of Electrical and Electronic Engineering, Nanyang Technological University and Director, Center for Advanced Robotics Technology Innovation (CARTIN). He has served as Head of Control and Instrumentation Division and Director of Delta-NTU Corporate Laboratory for Cyber-Physical Systems. His research areas include control engineering, indoor positioning, and unmanned systems. He has authored and co-authored 9 books, over 500 journal and 380 conference articles, and 25 patents/technical disclosures, and was listed as a highly cited researcher. He has secured over $90M research funding as programme and project PI. He is currently an Editor-in-Chief of Unmanned Systems and has served as an Editor of IET Book Series on Control and Associate Editor of IEEE Transactions on Automatic Control, Automatica, IEEE Transactions on Control Systems Technology, IEEE Transactions on Control of Network Systems, etc. He was an IEEE Distinguished Lecturer (2011-2014) and an elected member of Board of Governors of IEEE Control System Society (2016-2018). Professor Xie is Fellow of Academy of Engineering Singapore, Fellow

of IEEE, Fellow of IFAC, and Fellow of CAA.

智能传感与定位

报告摘要：传感和定位对于物联网和智能无人系统来说是至关重要的。GPS 是已被广泛用于定位和导航的技术。然而，在室内和许多室外环境中，如城市、森林、隧道，GPS 可能依然会出现无法使用或不可靠的情况。因此，我们对基于这种复杂环境下的定位技术和算法产生了大量的兴趣点。本次报告我们将分享在过去几年中开发的几种传感和定位系统和算法，包括基于 WiFi 的室内定位和人类活动识别、基于 UWB 的定位、多模式传感器融合等，以及它们在智能建筑、健康/老年人护理和无人系统中的应用。届时也将对未来的挑战及研究方向进行分享。

个人简介：谢立华，新加坡南洋理工大学电气与电子工程学院教授，先进机器人技术中心主任，新加坡工程院院士，IEEE、IFAC 和 CAA 会士。曾任南洋理工大学控制与仪表系主任和台达电子-南洋理工大学信息物理系统实验室主任。研究领域包括鲁棒控制、网络控制、定位与无人系统。曾出版了 9 本书，500 多篇期刊文章，25 项专利和技术披露，被列入 Thomson Reuters 和 Clarivate Analytics 高被引作者。他目前是《无人系统》杂志的主编和中国科学-信息科学杂志的副主编，曾是 IET 控制系列丛书主编，IEEE Transactions on Automatic Control, Automatica, IEEE Transactions on Control System Technology, IEEE Transactions on Control of Network Systems 等杂志的副主编。同时也是 IEEE 杰出讲师（2011-2014）, IEEE 控制系统学会理事（2016-2018）和 CDC2023 大会总主席。

Industrial Internet of Things, 5G/B5G/6G and Edge Computing

Abstract: The industrial Internet of Things (IIoT) is a foundational technology for Industry 4.0. IIoT perceives, collects, processes, and communicates real-time events in industrial systems through automated intelligent objects to promote digital transformation. Particularly, the modern communication network technology represented by 5G/B5G/6G and the accompanying mobile edge computing technology can work together to develop IIoT and play a crucial role in the connection of industrial devices, closely integrating production factors and exerting the value of joint operations.

From the rise and development of the Industrial Internet, we expound on the origin of the Industrial Internet of Things, emphatically analyze the relationship and combination of the Industrial Internet of Things with 5G/B5G/6G and edge computing, intensely discuss the huge challenges and countermeasures faced by its development, and predicts its development trend.

Biography: Xingwei Wang is a professor and Ph.D. supervisor at Northeastern University, China. Professor Wang is currently Vice President of Northeastern University. He is a winner of the National Science Fund for Distinguished Young Scholars, a winner of the State Council Special Allowance, a winner of New Century Outstanding Talents of the Ministry of Education, an outstanding scientific and technological researcher of Liaoning Province, a distinguished professor of the XingLiao Plan, an outstanding teacher in Liaoning Province, and a winner of the May Day Labor Medal in Shenyang. His research interests include the Internet, cloud computing, and cyberspace security. He has won two Second Prizes of the National Scientific and Technological Progress, two First Prizes of Scientific and Technological Progress of the Ministry of Education, and the First Prize of Science and Technology of China

Communication Society. He has published more than100 papers in famous academic journals and 9 books in the CS domain. He has obtained 27 authorized invention patents. In addition, he has won over 20 national, provincial and ministerial talent training awards.

工业物联网、5GB5G6G 与边缘计算

报告摘要：从工业互联网的兴起与发展，阐述了工业物联网的由来，重点剖析了工业物联网与5GB5G6G、边缘计算的相互关系与结合，深入讨论了其发展面临的巨大挑战和对策，预测了其发展趋势。

个人简介：王兴伟，男，1968 年生，博士，东北大学教授，博士生导师。国家杰出青年科学基金获得者，国务院政府特殊津贴获得者，教育部新世纪优秀人才，辽宁杰出科技工作者，兴辽计划特聘教授，辽宁省优秀教师，沈阳五一劳动奖章获得者；全国工程专业学位研究生教育指导委员会委员；中国计算机学会网络与数据通信专委会副主任委员，中国计算机学会互联网专委会副主任委员；中国通信学会会士，会士遴选委员会委员；中国教育和科研计算机网 CERNET 专家委员会委员；辽宁省互联网协会副理事长；《计算机学报》编委，《软件学报》编委，《计算机研究与发展》编委，《电子学报》编委。爱思唯尔中国高被引学者。辽宁省智能互联网理论与应用重点实验室主任，辽宁省创新团队负责人。主要研究方向为互联网、云计算和网络空间安全等。获国家科技进步二等奖 2 项、教育部科技进步一等奖 2 项、中国通信学会科学技术一等奖 1 项、教育部技术发明二等奖 1 项、辽宁省技术发明二等奖 1 项、湖南省自然科学二等奖 1 项；在 IEEE Trans 等著名学术期刊和 IEEE ICDCS 等著名学术会议上发表论文 100 余篇，SCI 收录 100 余篇；出版学术著作 9 部；取得国家发明专利授权 27 项；国家级和省部级人才培养奖励 20 项。

IoT Smart Sensing Systems and AI in the food chain: From Precision Agriculture to Automatic Port Terminal

Abstract: In the context of current realities when the global population is growing by more than 80 million a year some of the studies are predicting an increasing pressure on the planet natural resources and transportation. Regarding food resources the situation is going worst when unpredictable meteorologic events are running up in the context of great climate changes that are a truly global effect of anthropogenic greenhouse emissions that also can be related to transportation. In the current scenario new solutions to adapt the agricultural production to the growing of world population providing high quality products and preserving the environment are required and represent a research and development in what we mention as precision agriculture (PA). Additionally the equipment's, nutrients (NPK), pesticide transportation in global word require the development new automatic port terminal solutions that can reduce the loading and unloading times and the improvement of port logistics based on IoT and IIoT technologies.

Precision Agriculture (PA) combines technologies and practices to optimize the agricultural production through specific farm management that assures the effective usage of the resources used to reduce environmental degradation. At the same it focusses on the accuracy of operations considering the place, time to act and method to be applied. Agricultural operations are carried out to reach the production goals using the information provided by the smart sensors and instrumentation. Distributed smart sensing system characterized by fixed and mobile nodes (associated with Unnamed Aerial Vehicle (UAV)) are used to turn the farming operations into data, and to make the future operation in a data driven ones. These new including edge and cloud computing that are capable to run the artificial intelligence algorithms may contribute to slightly replacement of the human decisions based on their

accumulated experience to machine-based decision. This new way to act in agriculture in digital form combining technologies such as smart sensors, cloud and mobile computing, data science is related to the fact that classical decisions cannot be applied nowadays when the cultivated areas are much extended, and the adverse meteorological events are occurring frequently that conduct to miss-management with yield losses. The same technologies can be also applied for transportation where IoT ecosystems are adapted to the new challenge of the intelligent transportation particularly to automatic port terminals that are directly involved in food resource and agricultural equipment transportation.

In this talk we'll see together the meaning of precision agriculture in the context of heavily uncertainty associated with climate change and also solutions of intelligent transportation and optimization of automated port terminal activities. IoT ecosystem for precision agriculture will be discussed including multimodal sensing and artificial intelligence. Referring to the sensing as part of the IoT ecosystem the land distributed sensing and remote sensing are considered. The agriculture UAV imagery and satellite imagery solutions as so as the relation between the data coming from the smart sensors distributed in the field and acquired images using multispectral or hyperspectral image will be part of the presentation. Metrological characteristics of smart sensors as so as the calibration requirements of this kind of systems will be considered taking into account different sensing technology of soil macronutrients and soil moisture such as time delay reflectometry or fiber optic sensors. Regarding automated port terminal special attention will be granted to remote sensing different technologies including vision, radars or RFID being discussed as so as the integration in a IoT ecosystems for port terminals.

Another important aspect of precision agriculture and automated port terminals is the possibility of using AI both to develop models for farming and loading and unloading operations considering data coming from different sources materialized by smart sensing nodes with specific communication capabilities such as NB-IoT, LoRa or 5G. Particular examples of smart irrigation and nutrients delivery will be part of my talk as so as smart port case study where remote sensing can be used for optimization of activities and safety promotion.

Biography: Dr. Octavian Adrian Postolache (IEEE SM, 2006, IEEE DL 2014-2022) graduated in Electrical Engineering at the Gh. Asachi Technical University of Iasi, Romania, in 1992 and he received the PhD degree in 1999 from the same university, and university habilitation in 2016 from Instituto Superior Tecnico, Universidade de Lisboa, Portugal.. In 2000 he became principal researcher of Instituto de Telecomunicações where he is now Senior Researcher. He joined Instituto Universitario de Lisboa/ ISCTE-IUL Lisbon where he is currently A. Professor. His fields of interests are smart sensors for biomedical and environmental applications, pervasive sensing and computing, wireless sensor networks, signal processing for biomedical applications and computational intelligence with application in automated measurement systems. He is principal researcher and active member of national and international research teams involved in Portuguese and EU and International projects in the field of biomedical application, smart ports, smart cities and environmental monitoring. Dr. Postolache is author and co-author of 10 patents, 10 books, 18 book chapters, 75 papers in international journals with peer review, more than 250 papers in proceedings of international conferences. He is IEEE Senior

Member I&M Society, Distinguished Lecturer of IEEE IMS, chair of IEEE I&MSTC-13 Wireless and Telecommunications in Measurements and chair of IEEE IMS Portugal Chapter. He is Associate Editor of IEEE Sensors Journal, Sensors MDPI open journal. He was general chair of IEEE MeMeA 2014, and TPC chair of ICST 2014, Liverpool and ICST 2017 in Sydney. He received IEEE best reviewer and the best associate editor in 2011, 2013 and 2017, and other awards related to his research activity in the field of smart sensing and IoT.

Tolerance of Industrial Internet of Thing systems to Cascading Failures: A Physical-Service Networking Perspective

Abstract: The Industrial Internet of Things (IIoT) has emerged as the fundamental paradigm to connect various manufacturing units and service functions in the cyber-manufacturing context. In practical IIoT systems, the node component is the forwarder of information and the provider of services. This dual role enables the IIoT system to complete production tasks more flexibly and intelligently, while also making the entire production system more vulnerable to cascading failures than general IoT systems from a networking perspective. In this talk, we will introduce a new cascading model for IIoT from a physical-service networking perspective, and share some of our findings about the tolerance of the IIoT systems to cascading failures.

Biography: Xiuwen Fu is the associate professor in the Institute of Logistics Science and Engineering, Shanghai Maritime University. He was ranked in the 2022 world's top 2% scientist list (Information & Communication Technologies area). He has published more than 60 scientific papers, including 6 ESI Hotspot/Highly cited papers. His research has been cited more than 1200 times (Google scholar source). His research interests focus on Internet of things, system reliability, aerial-ground integrated systems, and sensor networks. He serves on the editorial board of 3 international journals, e.g. Frontiers in Sensors, Sustainability.

物理-服务耦合视角下工业物联网的级联失效可靠性

报告摘要：在网络制造环境，工业物联网是串联各种制造单元与服务单元的核心信息基础设施。在工业物联网中，制造单元既是消息的发送者，也是服务的提供者。这种紧密的耦合关系使工业物联网在能够更灵活、更智能地完成生产任务的同时，也会使得整个智能制造系统从网络角度变得更加脆弱。这背后的原因是系统级联失效风险的上升。在本次报告中，我们将从一种全新的视角，即物理-服务耦合视角，提出一种能够真实刻画工业物联网级联失效演化规律的理论网络模型，并分享我们关于工业物联网系统的级联失效行为特征的一些发现。

个人简介：符修文是上海海事大学物流科学与工程研究院的副教授。他进入了 2022 年世界前 2% 科学家名单（信息和通信技术领域），已发表 60 余篇论文，包括 6 篇 ESI 热点/高被引，被引用超过 1200 次（Google Scholar）。他的研究兴趣包括物联网、系统可靠性、空地一体化系统和传感器网络。他在 3 个国际期刊的编委会任职，如 Frontiers in Sensors, Sustainability。

Empowering the digital transformation of discrete manufacturing by advanced Industrial IoT

Abstract: The discrete manufacturing industry is benefiting from the rapid growth of technologies such as artificial intelligence, machine vision, and real-time data analytics. Schneider Electric's factories are

accelerating the rapid deployment of IIoT to factories through the continuous convergence of IT/OT and the definition of standardized hardware and software platforms. During the digital transformation and smart operation evolution of supply chain factories, Edge computing and cloud-side collaboration combine with applications such as AR equipment diagnosis, AGV, and visual assembly guidance. Industrial IoT makes continuous upgrading of product manufacturing processes, improving product quality and stimulating new business opportunities. Meanwhile, Schneider Electric has also carried out meaningful exploration in the combination of private 5G network and IIoT.

Biography: With nearly 15 years of experience in factory automation and manufacturing engineering, Zhong Lei is responsible for the delivery of IT/OT converged machine projects and the promotion and deployment of IIoT hardware and software standard solutions for supply chain factories in China. He is the regional subject matter expert with IIoT domain and is responsible for the operation of Schneider's IIoT Club in China. Zhong Lei now work at Schneider Electric Global Supply Chain machine designer center (Asia).

IIoT 技术赋能离散制造工厂的数字化转型升级

报告摘要：离散制造业正受益于人工智能，机器视觉，实时数据分析等技术的不断提升而得到了迅速的发展。施耐德电气的工厂正通过 IT/OT 的不断融合，定义标准化的软硬件平台来加速 IIoT 在工厂的快速部署。在供应链工厂数字化转型和智慧运营的升级过程中， IIoT 边缘计算以及云边协同这个数字化底座，深度结合了 AR 设备诊断，AGV 以及视觉装配引导等工业应用，实现产品制造过程的不断升级，提升了产品质量的同时也激发了新的商业机会。同时，在私有 5G 网络和 IIoT 结合方面，施耐德电气也已经开展了非常有意义的探索。

个人摘要：钟磊目前就职于施耐德设备制造（亚太）中心，现任施耐德设备制造中心（亚太）项目经理。在工厂自动化和制造工程方面有近 15 年的经验，负责 IT/OT 融合机器项目的交付和施耐德中国区工厂 IIoT 软硬件标准解决方案的推进和部署。他是 IIoT 主题方向中国区专家，并负责施耐德中国区 IIoT 俱乐部的运营工作。