第二届智能装备与特种机器人国际会议(ICIESR 2023)

The 2nd International Conference on Intelligent Equipment and Special Robots (ICIESR 2023)

会议手册

主办单位：

山东科技大学

Shandong University of Science and Technology

国际智能制造学会

International Society for Intelligent Manufacturing

承办单位：

山东科技大学机械电子工程学院

College of Mechanical and Electronic Engineering, Shandong University of Science and Technology

山东省高校重型装备可靠性与运维管理国际合作联合实验室

Shandong Provincial University Joint Laboratory for International Cooperation on Reliability and Operation & Maintenance Management of Heavy Equipment

山东省矿山机械工程重点实验室

Shandong Province Key Laboratory of Mining Machinery Engineering

山东省高校重型装备可靠性与运维管理重点实验室

Shandong Provincial University Key Laboratory on Reliability and Operation & Maintenance Management of Heavy Equipment

中国·青岛

2023年10月20日-22日

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Welcome to ICIESR 2023

About ICIESR 2023

The 2nd International Conference on Intelligent Equipment and Special Robots (ICIESR 2023) will be held from October 20 to 22, 2023 in Qingdao, China.

The conference will mainly focus on intelligent equipment, robotics, intelligent detection, intelligent manufacturing and related fields. The purpose of the conference is to provide a platform for experts, scholars, engineering technicians, and technical R&D personnel engaged in the research of intelligent equipment and robotics to share scientific research results and cutting-edge technologies, understand academic development trends, broaden research ideas, strengthen academic research and discussion, and promote cooperation in the industrialization of academic achievements. Experts from the Singapore, UK, Australia, and other countries as well as fellows of the Chinese Academy of Sciences and Singapore Academy of Engineering, the National Science Fund for Distinguished Young Scholars, experts from the Education Commission, experts from the intelligent equipment industry and robotics are to be invited to make academic reports. We sincerely invite experts and scholars from domestic and foreign universities, research institutions, businesses and other related personnel to attend the conference.

Organiser:

Shandong University of Science and Technology, International Society for Intelligent Manufacturing

Conference Dates:

October 20-22, 2023

Conference Venue:

DOUBLE TREE by Hilton, No. 788, Road Xinghaiwan, Huangdao District, Qingdao, China.
（青岛东方影都希尔顿逸林酒店，青岛市黄岛区星海湾路 788 号）

Organising Committees

Chair

Professor Qiang Zhang

Shandong University of Science and Technology

Co-Chair

Professor Wei Zhou

International Society for Intelligent Manufacturing

Organising Members

Prof. Xin Zhang, Shandong University of Science and Technology

Prof. Jinpeng Su, Shandong University of Science and Technology

Prof. Xianfei Yan, Shandong University of Science and Technology

Prof. Chenming Li, Shandong University of Science and Technology

A. Prof. Fuyan Lyu, Shandong University of Science and Technology

A. Prof. Yuting Lv, Shandong University of Science and Technology

A. Prof. Rongrong Yu, Shandong University of Science and Technology

A. Prof. Long Feng, Shandong University of Science and Technology

A. Prof. Shoubo Jiang, Shandong University of Science and Technology

A. Prof. Weimin Huang, Shandong University of Science and Technology

A. Prof. Hengxuan Luan, Shandong University of Science and Technology

A. Prof. Di Jiang, Shandong University of Science and Technology

Dr. Chunyong Fan, Shandong University of Science and Technology

Dr. Ning Chen, Shandong University of Science and Technology

Dr. Jieying Gu, Shandong University of Science and Technology

Dr. Xiangwei Dong, Shandong University of Science and Technology

Zhikuan Yang, Shandong University of Science and Technology

Weijian Ren, Shandong University of Science and Technology

Session Organizers

Session 1: A. Prof. Rongrong Yu, Shandong University of Science and Technology

Session 2: Dr. Chunyong Fan, Shandong University of Science and Technology

Session 3: Prof. Chenming Li, Shandong University of Science and Technology

Session 4: Dr. Ning Chen, Shandong University of Science and Technology

Session 5: Dr. Jieying Gu, Shandong University of Science and Technology

Session 6: Dr. Xiangwei Dong, Shandong University of Science and Technology

Session 7: A. Prof. Long Feng, Shandong University of Science and Technology

Session 8: A. Prof. Shoubo Jiang, Shandong University of Science and Technology

Session 9: Prof. Jinpeng Su, Shandong University of Science and Technology

Session 10: Prof. Xianfei Yan, Shandong University of Science and Technology

Session 11: A. Prof. Weimin Huang, Shandong University of Science and Technology

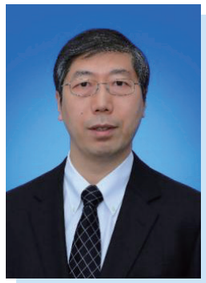
Session 12: A. Prof. Hengxuan Luan, Shandong University of Science and Technology

Session 13: A. Prof. Fuyan Lyu, Shandong University of Science and Technology

Session 14: A. Prof. Di Jiang, Shandong University of Science and Technology

Scientific Advisory Committee

Professor Guirui Yu
Academician of CAS
Institute of Geographic Sciences and Natural Resources Research



Professor Jinsong Leng
Academician of CAS
Harbin Institute of Technology

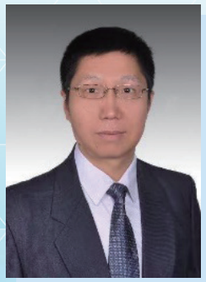
Professor I-Ming Chen
Fellow of SAE
Nanyang Technological University, Singapore

Professor Guofa Wang
Academician of CAE
China Coal Technology Engineering Group

Professor Zhengchang Shen
Academician of CAE
BGRIMM Technology Group

Professor Zhong You
University of Oxford

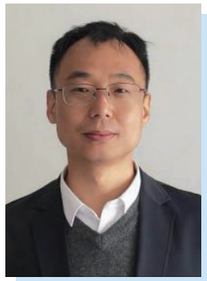
Professor Guoxing Lu
Swinburne University of Technology



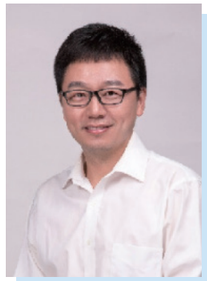
Professor Xilun Ding
Beihang University (BUAA)

Professor Xiaoli Xi
Beijing University of Technology

Professor Yanju Liu
Harbin Institute of Technology



Professor Xiaobo Wang
Lanzhou Institute of Chemical Physics, CAS



Professor Guifu Zou
Soochow University

Professor Wei Li
Northeast Petroleum University

Professor Juchuan Dai
Hunan University of Science and Technology

Professor Hongwei Li
Qingdao Aerospace Power Structure Safety Institute

Professor Laigui Wang
Liaoning Technical University

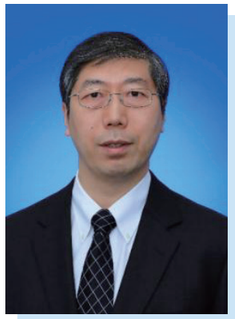
Plenary Keynote Speeches (Saturday, 21 October, Room: 1+2)

Plenary Keynote Speech 1: Programmable Shape Morphing Structures: from Fundamentals to Applications

Speech Time: 08:50-09:25

Speaker: Professor Jinsong Leng, Harbin Institute of Technology

Chair: Professor Wei Zhou, Nanyang Technological University, Singapore



Jinsong Leng is a professor at Harbin Institute of Technology, China. He is a Member of Chinese Academy of Sciences, the Foreign Member of Academia Europaean, Member of the European Academy of Sciences and Arts. He is the dean of School of Future Technology, Director of the Center for Smart Materials and Structures (CSMS), and Director of International Center for Applied Mechanics at Harbin Institute of Technology (HIT), China. His research fields include smart materials and structures, 4D printing and space deployable structures, etc. He currently serves as Vice President of the International Committee on Composite Materials (ICCM), Vice President of the Chinese Society for Composite Materials (CSCM), Vice President of Chinese Society of Aeronautics and Astronautics (CSAA), and Editor-in-Chief of the International Journal of Smart and Nano Materials (IJSNM). He was elected as Fellow of American Association for the Advancement of Science (AAAS), Fellow of the Society of Photo-Optical Instrumentation Engineers (SPIE), Fellow of Institute of Physics (IOP), Fellow of Royal Aeronautical Society (RAeS), Fellow of Institute of Materials, Minerals, and Mining (IMMM) and Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA).

Speech Abstract: Smart materials and structures are a kind of new materials and structures that can make active responses under external stimulations and have the functions of self-sensing, self-driving, and self-repair. Typical smart materials include shape memory polymers and their composites, dielectric elastomer electroactive polymers, shape memory alloys, piezoelectric composites, and electric/magnetorheological materials. At present, shape memory polymers such as epoxy, cyanate

ester, styrene, polyimide, polylactic acid, and polyurethane with adjustable glass transition temperatures have been developed. Furthermore, we have developed a series of bio-inspired soft robots, including soft crawlers, soft rollers, soft climbers, soft swallowers, and dexterous soft manipulators, etc. This report will focus on the typical smart materials such as shape memory polymers and their composites, and introduce new ideas and new achievements of smart material structures in various fields including soft robotics, aerospace, biomedical, 4D printing, and other fields. Potential applications for shape memory polymers and their composites will also continue to expand elsewhere.

Plenary Keynote Speech 2: Perception and Learning in Intelligent Manufacturing and Warehouse Automation Systems

Speech Time: 09:25-10:00

Speaker: Professor I-Ming Chen, Nanyang Technological University, Singapore

Chair: Professor Wei Zhou, Nanyang Technological University, Singapore

Professor I-Ming Chen received B.S. degree from National Taiwan University in 1986, and M.S. and Ph.D. degrees from California Institute of Technology, Pasadena, CA in 1989 and 1994 respectively. He is currently Full Professor in the School of Mechanical and Aerospace Engineering, and Co-Director of CARTIN (Center for Advanced Robotics Technology and Innovation) in Nanyang Technological University (NTU), and Technical Advisor to National Robotics Program Office in Singapore. He is Editor-in-chief of IEEE/ASME Transactions on Mechatronics (2020-2022) and is a member of the Robotics Task Force 2014 under the National Research Foundation which is responsible for Singapore's strategic R&D plan in robotics. His research interests are in logistics and construction robots, wearable devices, human-robot interaction and industrial automation. Professor Chen is Fellow of Singapore Academy of Engineering, Fellow of IEEE and Fellow of ASME, General Chairman of 2017 IEEE International Conference on Robotics and Automation (ICRA 2017) in Singapore.

Speech Abstract: Industry robot manipulators have been invented for nearly 50 years. In the past, such robot manipulators are used in mass manufacturing lines and programmed manually by engineers. However, as modern manufacturing moves into low volume high mix products in a very tight schedule, it becomes very challenging to program the robots to handle large variety of products and parts and also to make changes to the manufacturing lines in a very short time. With advancement in 3D machine vision, machine learning methods and fast computing power, there is an emerging trend to put 3D perception device, machine learning technique into industry robots to make them "smart" enough to handle a variety of products in a changing environment. In this speech, we will discuss how 3D perception systems and machine learning techniques are used in manufacturing scenarios like intelligent masking/taping for component maintenance, intelligent spray painting. We will use our past experiences in Amazon Robotics Challenge and DHL Robotics Challenge as examples to look at the integration of 3D perception, machine learning and robot motion planning in current warehouse automation to handle the item-picking process.

Plenary Keynote Speech 3: Development of Carbon Peaking & Neutrality, Green Manufacturing and Low-Carbon Transformation in China

Speech Time: 10:00-10:35

Speaker: Professor Guirui Yu, Institute of Geographic Sciences and Natural Resources Research, CAS

Chair: Professor Wei Zhou, Nanyang Technological University, Singapore

Professor Guirui Yu is a researcher at the Chinese Academy of Sciences (CAS). He is a Member (Academician) of the CAS, a Professor at the University of the CAS, the Director of the Ecosystem Ecology Teaching and Research Office, and the Head of the Ecology Department of the School of Resources and Environment. He primarily engages in interdisciplinary research on ecology and geography and has conducted systematic research on the mechanisms of carbon, nitrogen, and water cycling and coupling processes in terrestrial ecosystems, vegetation functional traits, and biogeography. He also serves as the Director of the Comprehensive Research Center of the National Ecosystem Observation Research Network (CNERN), Vice Director of the CERN Science Committee of the CAS, Chairman of the China Land Ecosystem Flux Observation Research Network Alliance (ChinaFLUX), Chairman of the Asia Flux Network (AsiaFlux), Chief Representative of China for the China-US Green Partnership Program, Vice Chairman of the Sixth Council of the China Qinghai-Tibet Plateau Research Association, Advisory Expert of the Life Sciences Division of the National Natural Science Foundation of China, Member of the Academic Committee of the Chinese Academy of Agricultural Sciences, and Member of the Expert Group of the National Key Research and Development Plan.

Speech Abstract: Currently the global carbon governance has entered a new phase of “carbon neutrality”. “Carbon-peak and carbon-neutrality” initiative has become a significant long-term strategic goal for China. The Chinese government aims to achieve two macro objectives: “forcing reductions in energy and industrial emissions, promoting technological advancement and development transformation; and driving comprehensive ecological environmental management while cultivating a new type of ecological economy”. A meaningful reference for China’s carbon neutrality approach is: through efforts in energy transformation and industrial emission reductions to directly reduce approximately 7.4 billion tons of anthropogenic CO2 emissions annually. This would be offset by carbon sinks from ecosystems (2-2.5 billion tons of CO2 per year) and carbon capture, utilization, and storage (CCUS) technologies (0.5-1 billion tons of CO2 per year), neutralizing the remaining approximate 3 billion tons of CO2 human-made emissions annually. This approach signifies reserving a certain space for anthropogenic carbon emissions to sustain economic development and national security.

Accordingly, we must: (1) Adjust the energy structure, refine decarbonization technologies, promote societal transformations, and cultivate a new ecological economy; (2) Develop green manufacturing industries, innovate in emissions reduction, deepen environmental management, and advance green development; and (3) Strengthen ecological carbon conservation and enhance green carbon sequestration, nurture a modern ecological economy, and work towards building a beautiful China. These are the three major tasks under the “carbon-peak and carbon-neutrality” (so-called “dual carbon”) initiative.

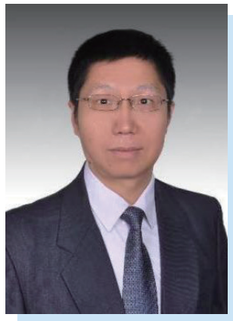
From the perspective of coordinated development of nature, society, and economy, it is crucial to: (1) Steadily advance the optimization of the “carbon-peak and carbon-neutrality” action strategy path and conduct research and development on cutting-edge emissions reduction technologies; (2) Implement the key technological iterations of the “carbon-peak and carbon-neutrality” initiative and its widespread application; (3) Establish a system for the national monitoring of carbon sources and sinks, comprehensive evaluation, and quantitative certification methods, as well as its application systems; and (4) Develop new industrial policies and regulatory mechanisms for decarbonization, emissions reduction, and carbon sequestration, along with the carbon sink market trading system. These represent the four major technological tasks.

Plenary Keynote Speech 4: Development and Applications of Carbon Fiber Composite Manufacturing Equipment

Speech Time: 11:00-11:35

Speaker: Professor Xilun Ding, Beihang University

Chair: Professor Qiang Zhang, Shandong University of Science and Technology



Professor Xilun Ding is the Dean of School of Mechanical Engineering and Automation, Beihang University. He received the National Science Fund for Distinguished Young Scholars from NSFC in 2011 and became the Cheung Kong Scholar Chair Professor of MoE in 2014. He has been the PI of the National Science Fund for Creative Research Groups of NSFC since 2021. He has long been engaged in the study and development of space mechanism, bionic robot and manufacturing equipment for carbon fiber reinforced polymers. Striving to fulfil the significant needs on aeronautics & astronautics and public safety of the country, he has achieved innovative achievements in the theory and application of variable topology robots and mechanisms. He is the independent author of 3 books and the author of more than 300 important journal and conference papers in China and internationally. He has been authorized more than 120 national invention patents. As the first person to complete, he was rewarded Second Prize of National Award for Technological Invention, Second Prize of National Teaching Achievement Award (MoE) and several scientific prizes of province or ministry level.

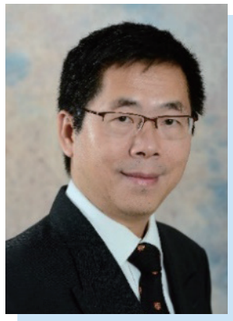
Speech Abstract: Carbon fiber-reinforced composites, known for their excellent properties such as lightweight, high strength, strong design flexibility, and fatigue resistance, have extensive applications in aerospace and other industries. Specifically, these materials are used in diverse structural configurations, necessitating strict quality consistency. However, current manufacturing processes often face challenges like surface defects, fiber breakage, and abrasion, which require precise control and minimal damage during production. This poses a significant challenge. This presentation, therefore, focuses on the urgent need for carbon fiber composite material structure manufacturing in the aerospace field. It places special emphasis on key technologies such as winding, automated fiber placement, and 3D additive manufacturing processes, as well as the precise control of process parameters. Additionally, it highlights the development of high-performance equipment for the manufacturing of carbon fiber composite material structures.

Plenary Keynote Speech 5: Condition Monitoring of Integrated Robots Based on Fiber Optic Sensing and Deep Learning

Speech Time: 11:35-12:10

Speaker: Professor Wei Zhou, Nanyang Technological University, Singapore

Chair: Professor Qiang Zhang, Shandong University of Science and Technology



Professor Wei Zhou is with School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore. He graduated with a BEng degree in Welding from Tsinghua University, China (1985) and obtained PhD in materials science and metallurgy from University of Cambridge, UK (1991). He was a Guest Scientist, Fraunhofer Institute for Mechanics of Materials, Germany (1991); Visiting Scholar in applied physics, Harvard University (2002); Senior Scientist (on joint appointment), Singapore Institute of Manufacturing Technology (2008-2010); and Visiting Fellow, Churchill College, Cambridge University (2014). He has carried out extensive research on a wide range of advanced manufacturing processes and worked closely in collaboration with many industrial partners such as Rolls-Royce, UK and Schaeffler Group, Germany. He is a Fellow of Singapore Welding Society, International Association of Applied Mechanics, and Indian Structural Integrity Society. He has served on the governing bodies of a number of government and academic institutions. He served as Chairman, National Mirror Committee (Singapore) to ISO/TC 44 “Welding and Allied Processes” and Liaison Officer to ISO/TC 261 “Additive Manufacturing”. Currently he is President, International Society for Intelligent Manufacturing.

Speech Abstract: Intelligent robots are being increasingly used in modern manufacturing. Condition monitoring is one of the crucial technologies for their safe operations. At the current stage, due to the drawbacks of electrical sensors such as poor embeddability and poor electromagnetic resistance, condition monitoring systems applied to integrated industrial robots are relatively limited. In response to this demand, we are developing a condition monitoring system based on fiber optic sensing and deep learning for the integrated industrial robot. Since fiber optic sensors have the characteristics of anti-electromagnetic interference, small size, lightweight, excellent flexibility, great embeddability, and will not produce electrical signals that interfere with or damage the electrical circuits of industrial robots, they can be ideally embedded into integrated industrial robots to monitor their operation status more effectively and directly. This report will focus on how to integrate fiber optic sensors into an integrated industrial robot and introduce new approaches based on deep learn-

ing for anomaly detection and collision identification of the integrated industrial robot. We believe that the proposed condition monitoring system holds significant potential for application in intelligent industrial robots and provides robust support for the ongoing advancement of Industry 4.0.

Plenary Keynote Speech 6: Recycling and Processing Technology of Rare Metal Materials

Speech Time: 14:00-14:35

Speaker: Professor Xiaoli Xi, Beijing University of Technology

Chair: Professor Guifu Zou, Soochow University

Xiaoli Xi, Professor, Doctoral Supervisor, Director of the Materials and Manufacturing Department at Beijing University of Technology. Winner of the National Science Fund for Distinguished Young Scholars and the National Natural Science Fund for Distinguished Young Scholars. Serves as the Deputy Director of the Rare Metals Metallurgy Academic Committee of the China Nonferrous Metals Society, the Deputy Director of the Solid Waste Resource Utilization Professional Committee of the China Nonferrous Metals Society, and the Deputy Director of the Molten Salt Chemistry Committee Branch of the China Metals Society.

Professor Xi has been engaged in scientific research on efficient recycling and reconstruction of scarce metal materials, simulation of metallurgical processes, and preparation and performance control of tungsten-based materials for a long time. Received two-second prizes in the National Science and Technology Progress Award and one gold medal at the Geneva International Invention Exhibition.

Speech Abstract: The sustained supply of key strategic resources, green recycling of scarce metals, and high-performance reconstruction are crucial for national security and economic development. Conducting basic research on the application of rare strategic metal resources such as tungsten, cobalt, and nickel for recycling high-performance materials, committed to solving the traditional theoretical limitations and technical improvement challenges faced by metallurgical separation engineering in complex systems of multi-component metal secondary resources. Constructing a “coordination precipitation” model and a high-temperature coordination electrolysis multi-field model, revealing the distribution/separation laws of solid-liquid phases and metal dissolution/precipitation laws of multiple metals, elucidating the mechanism of solute segregation and special powder formation, inventing key new technologies for green cycling of scarce metals, and collaborating with industry, academia, and research in industrial production, achieving efficient recycling and high-end application of rare metal materials such as tungsten, cobalt, and nickel.

Plenary Keynote Speech 7: Research and Application of Key Technologies for High-Reliability Operation of Intelligent Fully Mechanized Mining Equipment in Coal Mines

Speech Time: 14:35-15:10

Speaker: Professor Qiang Zhang, Shandong University of Science and Technology

Chair: Professor Guifu Zou, Soochow University

Qiang Zhang, Professor, Doctoral Supervisor, The dean of the College of Mechanical and Electronic Engineering, Shandong University of Science and Technology, is one of Taishan Scholar Youth Expert in Shandong Province and "Top 1000 Talents-Hundred Talent Level" in Liaoning Province. Professor Zhang is the main academic leader of various national and provincial research platforms (teams), including the Ministry of Education's innovation team, the National-Local Joint Engineering Research Center for Mine Safety Detection Technology and Automation Equipment, and the National Key Laboratory Cultivation Base for Mine Disaster Prevention and Control. Professor Zhang has undertaken 8 national-level projects, including national key R&D projects, key projects of the National Natural Science Foundation, and general projects. He has published 2 monographs. and more than 60 academic papers indexed by SCI/EI ,been granted 45 China patents and 9 international patents, formulated 5 national energy industry standards and 1 group standard. He have received 2 first prizes for scientific and technological progress in Shandong Province, 1 second prize for scientific and technological progress in Liaoning Province, 1 second prize for scientific and technological progress in higher education institutions in Shandong Province, as well as 7 first prizes and 12 second prizes at the provincial and ministerial level in other provinces.

Speech Abstract: The reliability of fully mechanized mining equipment is foundational to the intelligent development of mining operations. Operational and maintenance management stands as a crucial assurance for the dependable functionality of this equipment. The establishment of an intelligent operational platform for fully mechanized mining equipment holds significant importance in reducing the operational costs of intelligent mining systems and ensuring the secure and reliable operation of such equipment. This report aims to delve into the key factors influencing the reliability of fully mechanized mining equipment. Through an in-depth study of the fault mechanisms and models of these devices, the report introduces the latest academic advancements in three aspects: information perception and transmission, construction of diagnostic and assessment models, and the development of intelligent operational platforms. Additionally, it showcases the practical application of these advancements.

Plenary Keynote Speech 8: Geomechanical Evaluation and Development of Rotary Steering Tools Based on Drilling Data

Speech Time: 15:10-15:45

Speaker: Professor Wei Li, Northeast Petroleum University

Chair: Professor Guifu Zou, Soochow University

Li Wei, professor of Northeast Petroleum University, doctoral supervisor, distinguished professor of "Longjiang Scholars", winner of the special support program, the first "Longjiang Scientific and Technological Talents", winner of Sun Yueqi Youth Science and Technology Award, person in charge of Efficient Drilling Rock Breaking Technology Laboratory of National Engineering Research Center of Oil & Gas Drilling and Completion Technology, director of the Key Laboratory of Reconstruction and Evaluation of Oil and Gas Reservoir Fracturing in Heilongjiang Province, leader of the scientific and technological innovation team of efficient rock breaking technology of oil and gas drilling of Heilongjiang Provincial colleges and universities. He has been engaged in the research directions including deep formation rock breaking mechanism, drilling speed increase technology, reconstruction of hydraulic fracturing, and has successfully developed several sets of downhole speed increase tools, including torsional impactor, long-life composite impactor, and injector-suction type impactor. In addition, he has presided over 20 provincial and ministerial level projects such as National Natural Science Foundation projects and in the meantime has published 80 Chinese academic papers and 50 English academic papers, including 40 SCI papers, 22 EI papers and 10 industry Top journal papers. He has obtained 32 authorized invention patents and has won 10 provincial and ministerial awards, including 2 provincial and ministerial first prizes and 4 provincial and ministerial second prizes.

Speech Abstract: Real-time identification, prediction and monitoring of formation lithology, physical properties, geomechanical characteristics and drilling geological environment factors are of great significance for timely discovery of effective reservoirs, the track of geological target zones with drilling, targeted dynamic adjustment and optimization of drilling, guidance of well completion and reservoir reconstruction programs. The report investigates the application of geological engineering parameters with drilling and their derived parameters on geomechanical characteristics and reservoir physical characteristics, establishes the mechanical comparative energy model, completes correction

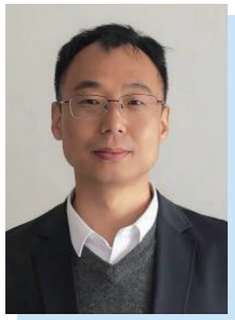
of the mechanical specific energy model parameters from the wellhead to well-bottom, and finally proposes the standardized mechanical comparative energy model, so as to conduct the prediction of geomechanical parameters based on mechanical comparative energy, dynamic evaluation and optimization of drill bit and drilling parameters while drilling, and early warning of complex downhole conditions. On this basis, the research and development of rotary steering tools are carried out, and the laboratory principle experiment and full-size research and development are made.

Plenary Keynote Speech 9: Development of High-Performance Grease for Advanced Mechanical Equipment

Speech Time: 16:10-16:45

Speaker: Professor Xiaobo Wang, Lanzhou Institute of Chemical Physics, CAS

Chair: Professor Hongwei Li, Qingdao Aerospace Power Structure Safety Institute



Professor Xiaobo Wang was born in 1976, and he received his bachelor's degree in chemistry at Henan University in China in 1990. He joined Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences after 1990, and obtained his PhD here in physical chemistry on a study of the preparation and tribochemistry of nano-materials in 2004. Since 2004, he started to work at State Key Laboratory of Solid Lubrication (LSL), Lanzhou Institute of Chemical Physics. In 2008, he was promoted to a professor. His current research interests are the designs, preparations, triboloigcal behavior and mechanisms of novel materials, and the development of high-performance lubricating oils and greases. Up to now, he has published more than 120 papers and obtained 20 Chinese Patents. His research interests are in the design, preparation and engineering application research of key friction pair lubricants for high-end equipment. His team has developed lubricants and special lubricating grease products with excellent performance, which have been applied in batches for the first time in many important industries such as rail transit, large wind turbines, weapons and ships, and have contributed to the development of the advanced equipment in my country's important industries. The lubricating grease research team he leads has become one of the most influential teams in this field at home and abroad.

Speech Abstract: This report outlines the current development status and technical needs of advanced equipment, the domestic and foreign technical status and trends of high-performance lubricating grease materials for high-end equipment, and introduces the relevant teams of the National Key Laboratory of Lubricating Materials and Technology, Lanzhou Institute of Chemical Physics, CAS, on advanced equipment research progress in the field of lubrication technology.

Plenary Keynote Speech 10: Data-Driven Modeling and State Assessment of Large-Scale Wind Turbine Systems

Speech Time: 16:45-17:20

Speaker: Professor Juchuan Dai, Hunan University of Science and Technology

Chair: Professor Hongwei Li, Qingdao Aerospace Power Structure Safety Institute

Professor Juchuan Dai is a professor at Hunan University of Science and Technology. He is a Distinguished Professor of "Furong Scholar Award Program" in Hunan Province, Hunan Province Leading Talent in Science and Technology Innovation, vice president of Hunan mechanical engineering society, a member of the Mechanical Dynamics Committee of the Chinese Society of Vibration Engineering, and a member of the China Alliance for Excellence in Engineer Education in the Mechanical Industry. In recent years, he has led the Central Military Commission Equipment Development Department '13th Five-Year' Pre-Research Shared Technology Project, the National Defense Science and Technology Industry Bureau's '13th Five-Year' and '14th Five-Year' National Defense Basic Research Projects, the National Natural Science Foundation of China (NSFC), and the major demonstration projects for civil-military integration in Hunan Province. He has published more than 60 papers in major academic journals such as Renewable & Sustainable Energy Reviews, Energy, Renewable Energy, Chinese Science E Series, Journal of Mechanical Engineering. He has received one first prize and two second prizes for scientific and technological progress in Hunan Province, two teaching achievement awards in Hunan Province, one first prize in the China Machinery Industry Science and Technology Award, and is a recipient of the second Xiangtan Mayor's Quality Award.

Speech Abstract: Wind power is an important direction for clean energy development under the strategic goal of "carbon peak and carbon neutral". Due to the uniqueness of large-scale wind turbine systems, neither theoretical analysis, numerical simulations, nor small-scale indoor experiments can fully and accurately represent their performance characteristics, resulting in certain discrepancies between actual performance and design specifications. Mining SCADA data to comprehensively analyze the performance characteristics of wind turbine systems become an inevitable demand as the industry has reached a certain level of maturity. However, SCADA data suffers from insufficient data types and contains a large amount of random information that is inconvenient to process. The team led by the presenter has mined and analyzed SCADA data of wind farms with continuous support from the National Natural Science Foundation of China. They have formed a systematic analysis system from data processing, and data-driven model construction to performance evaluation and optimization. This presentation primarily focuses on SCADA data preprocessing, data-driven modeling, and state assessment.

Program for Plenary Keynote Speech

Saturday, 21 October, Room: 1+2	
Opening Ceremony **Host: Professor Lianjun Chen, Shandong University of Science and Technology**	
8:30-8:35	Welcome Speech President of Shandong University of Science and Technology
8:35-8:40	Opening Speech Professor Wei Zhou, Nanyang Technological University, Singapore
8:40-8:50	Group Photo
Plenary Keynote Speech **Chair: Professor Wei Zhou, Nanyang Technological University, Singapore**	
8:50-9:25	Speaker: Professor Jinsong Leng, Harbin Institute of Technology Title: Programmable Shape Morphing Structures: from Fundamentals to Applications
9:25-10:00	Speaker: Professor I-Ming Chen, Nanyang Technological University, Singapore Title: Perception and Learning in Intelligent Manufacturing and Warehouse Automation Systems
10:00-10:35	Speaker: Professor Guirui Yu, Institute of Geographic Sciences and Natural Resources Research, CAS Title: Development of Carbon Peaking & Neutrality, Green Manufacturing and Low-Carbon Transformation in China
10:35-11:00	Coffee Break, Hallway outside of Room 1+2
Plenary Keynote Speech **Chair: Professor Qiang Zhang, Shandong University of Science and Technology**	
11:00-11:35	Speaker: Professor Xilun Ding, Beihang University Title: Development and Applications of Carbon Fiber Composite Manufacturing Equipment
11:35-12:10	Speaker: Professor Wei Zhou, Nanyang Technological University, Singapore Title: Condition Monitoring of Integrated Robots Based on Fiber Optic Sensing and Deep Learning
12:10-14:00	Lunch, Dipingxian Canteen 1st Floor (一楼地平线餐厅)
Plenary Speech **Chair: Professor Guifu Zou, Soochow University**	
14:00-14:35	Speaker: Professor Xiaoli Xi, Beijing University of Technology Title: Recycling and Processing Technology of Rare Metal Materials
14:35-15:10	Speaker: Professor Qiang Zhang, Shandong University of Science and Technology Title: Research and Application of Key Technologies for High-Reliability Operation of Intelligent Fully Mechanized Mining Equipment in Coal Mines
15:10-15:45	Speaker: Professor Wei Li, Northeast Petroleum University Title: Geomechanical Evaluation and Development of Rotary Steering Tools Based on Drilling Data
15:45-16:10	Coffee Break, Hallway outside of Room 1+2
Plenary Keynote Speech **Chair: Professor Hongwei Li, Qingdao Aerospace Power Structure Safety Institute**	
16:10-16:45	Speaker: Professor Xiaobo Wang, Lanzhou Institute of Chemical Physics, CAS Title: Development of High-Performance Grease for Advanced Mechanical Equipment
16:45-17:20	Speaker: Professor Juchuan Dai, Hunan University of Science and Technology Title: Data-Driven Modeling and State Assessment of Large-Scale Wind Turbine Systems

Program for Session Speech

Meeting Room:1+2 Session 1 Topic: Kinematics Modeling and Optimization Design of Special Robots			
Time	**Title**	**Authors**	**Chairs**
8:30-8:40	Foot design and research of pedal walking rehabilitation robot considering front and rear feet	Maoying Ding, Kan Shi*,Weixin Kong,Qing Gao	Rongrong Yu (Shandong University of Science and Technology)
8:40-8:50	Kinematics modeling and analysis of three-joint bionic robot fish tail	Xiangshuai Li, Kan Shi*, Weixin Kong, Qin Gao, Jianglong Tang, Junjie Wang, Huanzhi Yuan	
8:50-9:00	Human Activity Recognition Based on Improved Convolutional Neural Network	Shihao Yang, Chao Zhang, Peisi Zhong*, Jing Meng, Mei Liu*, Xiangwen Wang	
9:00-9:10	Trajectory Prediction Method for Lower Limb Exoskeleton Robots Based on ARIMA Model	Tianping Li, Peisi Zhong, Chao Zhang, Xiaowen Wang, Mei Liu	
9:10-9:20	Robot adaptive impedance control algorithm for industrial robots	Xiangwen Wang, Chao Zhang, Peisi Zhong, Zhenyu Zhang, Mei Liu	
9:20-9:30	A Path Planning Method Based On Bio-inspired Neural Network for Cleaning Robots	Chunhao He, Baoren Wang, Jie Wang, Weilong Liu, Hu Cui	
9:30-9:40	A gait learning method for lower limb exoskeleton robots based on improved CPSO-DMP	Yunlong Liu, Peisi Zhong, Mei Liu	
9:40-9:50	Design and analysis of an intelligent line inspection robot control system	Wen Han Bi, Dong Li, Peng Cheng Xue	

Meeting Room:1+2 Session 2 Topic: Fluid Simulation & Underwater Structure			
9:50-10:00	Numerical simulation analysis of the flow field inside the fan nozzle of a deep cleaning vehicle	Qingguang Chen*, Jin Xu,Xiaojie Shi	Chunyong Fan (Shandong University of Science and Technology)
10:00-10:10	Research on Underwater Mineral Feature Matching based on Binocular Stereovision and Improved SURF	Tingyi Ding, Zhongxu Hou, Jiazhen Cao, Xinxin Li, Chunjian Su*	
10:10-10:20	Kinematic Analysis of Leg Mechanism in Water-inspired Frog Robot	Guifu Liu* , Minghui Zhang	
10:20-10:30	Numerical simulation of gas-solid two-phase flow in complex pipelines	Chunqi Zhao, Hongen Ge, Xin Zhang, Zhu Liu	
10:30-10:40	Study on the Separation Performance of a Hydrocyclone with Inflatable Adjustable Underflow Orifice	Shubing Tian, Fajian Li, Baoling Zhang, Yongkang Hao, Peikun Liu, Xiaoyu Li	
10:40-10:50	Analysis of positive pressure characteristics in transition section of the pipe belt conveyor	Nini Hao, Xiaoting Yia, Yuan Zhang, Xingyu Wang, Xinming Sun, Changzheng Sun,Mengchao	
10:50-11:00	The Influence of a Novel Air Column Regulating Device on the Separation Performance of Hydrocyclone	Baoling Zhang, Shubing Tian, Yongkang Hao, Peikun Liu , Xiaoyu Li	
11:00-11:10	The strength analysis of the fracking pump body based on the combined simulation of Simerics-MP and ANSYS	LIU Shengwei, WANG Weizhang, WANG ledong, LIU zaihao, LIU chengju	
11:10-11:20	Numerical study on the spray performance of the nozzle used for sludge drying	Yongkang Hao, Shubing Tian, Baoling Zhang, Fuyao Wang, Peikun Liu,Xiaoyu Li	

11:20-11:30	Analysis of the effect of volumetric efficiency of emulsion pumps	Yuang Yin, Xiaowen Wang	
11:30-11:40	The influence of guide vane blade distribution on the performance of mine axial flow fan	CHEN Qingguang, WANG Qinchang, LIN Xianlai, LIU Haixiu, LIU Songshou	
12:00-13:30	Lunch, Dipingxian Canteen 1st Floor (一楼地平线餐厅)		
Meeting Room:1+2 Session 3 Topic: Nonlinear Systems and Control for Intelligent Robots			
13:30-13:40	Dynamic characteristics analysis of multi-motor driven scraper conveyor	Qiang Zhang*, Zhongjun Ma*, Ying Tian, Junming Liu	Chenming Li (Shandong University of Science and Technology)
13:40-13:50	Research on Multi-Motor Synchronization Control Strategy Based on Sliding Mode Control	Qiang Zhang*, GuangHao Zhao*, Ying Tian	
13:50-14:00	A particle swarm optimization algorithm with fast convergence for robotic arms	Zongsheng Wang*, Kaixuan Xu, Yulin yanga , Fangzhen Zhanga ,Jiaqi Zhenga	
14:00-14:10	The Motion and Analysis of Six-Wheeled Robot Mobile Platform for Post-Disaster Rescue	Junjie Wang *,Kan Shi*,Weixin Kong , Jianglong Tang,Guifu Liu, Xiangshuai Li	
14:10-14:20	Trajectory planning for active walking in lower limb rehabilitation exoskeletons based on GRNN-DMPs	Xiaowen Wang, Chao Zhang, Peisi Zhong*, Yanxin Lang, Mei Liu*	
14:20-14:30	F-RCLSTM: Faster Region-Based Convolutional Long Short-Term Memory-Based Object Detection for Advanced UAV Patrolling	Obad Abdullah Yousef Rabea ,XIA Lufei,Al-Qubati Mohammed Ahmed,Berk B.A. Ba gerid ,WANG Liange	
14:30-14:40	Improved nonlinear flux observer for position sensorless control of permanent magnet synchronous motors	LI JINHONG, TANG XIKAI, LUAN SHILIN, DING HOGNCHANG	

14:40-14:50	Application Research on Adaptive Control Method of Variable Frequency Tensioning System for Large Belt Conveyor	Shi Hao, Shi Chunfa, Li Zhengli	
14:50-15:00	A novel Control Design of the Artificial Swarm System	Si Lu, Chenming Li, Weiyong Zhu, Rongrong Yu	
15:00-15:10	Control Design for Equality and Inequality Constraints based on a novel Udwadia-Kalaba Approach	Dongyue Zhang, Yanbo Yue, Yuan Zhang, Chenming	
15:10-15:20	Multi motor deviation coupling control based on Neural Network PID	Guangqing Chen, LiYuan Liu, Aiqin Sun	
15:20-15:30	Dynamics Analysis of a Three-Motor-Driven Scraper Convey	Zhengkun Pei, Qiang Zhang, Jingru Bai	
15:30-15:40	Cooperative control design for fuzzy belt conveyor systems with multi PMSMs	Qiying Li, Yuan Zhang, Rongrong Yu, Chenming Li*	
15:40-15:50	Research on Synchronous Control System of Multi-motor Driven Scraper Conveyor	Jingru Bai, Qiang Zhang, Zhengkun Pei	

Meeting Room:3 Session 4 Topic: Intelligent Equipment Optimization Design			
Time	**Title**	**Authors**	**Chairs**
8:30-8:40	Fast Inverse Kinematics Algorithm for Manipulator with Decoupling Configuration	Qing Gao, Kan Shi	Ning Chen (Shandong University of Science and Technology)
8:40-8:50	Research on human joint motion attitude capture system based on inertial sensor	Yanxin Lang, Chao Zhang, Peisi Zhong*, Tianping Li, Mei Liu*	
8:50-9:00	Accurate identification and localization of automotive pistons based on 2D vision position correction	Yifei Huang, Zhenyu Liu, Hongfei Xu, Tong Yang, Jiayin Fang	
9:00-9:10	Active control of dynamic characteristics of composite bar with piezoelectric layer	Jinfeng Zhang * , Zengrui Liu , Chao Feng , Yongwei Shi , Peisi Zhong	
9:10-9:20	Lightweight Design of Stamped Part Truss Autoloader Robot	Zhongyuan Zhou, Dalei Jiao, Hengchao Chen, Xiuhua Sui	
9:20-9:30	Design and parameter optimization of a constant wheel-base independent suspension system	Guang Qing Chen, Jun Yi Song, Ai Qin Sun	
9:30-9:40	Acquisition of load spectrum and life analysis of excavator boom	Lirong Wan, Wei Qin, Wenting Liu, Guoliang Liu, Hao Niu	
9:40-9:50	Study on the Bending Characteristics of Soft Fingers with Four Grooving Methods	Jinchuan Zhang, Ping Zhang, Ying Tian	
9:50-10:00	Vehicle dynamics modeling based on Matlab/Simulink	YanZong Ma, Qiang Zhang, Hezhe Zang, Yang Liu, Gangchai Wang	
10:00-10:10	Structural design and analysis of a certain type of composite wing	Yanmiao Yin,Ying tian,Wei liu	

Meeting Room:3 Session 5 Topic: Fault Diagnosis of Intelligent Robot System			
10:10-10:20	Research on improvement of point cloud segmentation method used for flexible packaging bag recognition	Hu Cui, Jie Wang, Baoren Wang1*, Hongfeng Bian , Xiaolong Su, Ziao Su, Chunhao He	Jieying Gu (Shandong University of Science and Technology)
10:20-10:30	Rolling bearing life prediction based on firefly algorithm optimization neural network	Haikun Yang, Songshou Liu, Shengru Zhang, Yongchao Zhang*, Yin Liu	
10:30-10:40	Gait Prediction Analysis Based on Particle Swarm Optimization Algorithm Support Vector Machine	Xiuhua Sui ,Sen Yang, Chenglin Zhang, Jian Song, Chuanjiang Wang	
10:40-10:50	Fault diagnosis method of rolling bearing based on improved PSO optimization MCKD	Hongchang Ding*, Dewen Pu, Kai Wang, Xinjie Cheng, Guangwei Liu	
10:50-11:00	A fault diagnosis method of interturn short circuit of three-phase permanent magnet synchronous motor based on transfer learning	Hongchang Ding, Xinjie Cheng, Kai Wang, Dewen Pu	
11:00-11:10	Low-complexity High-Performance Smoke/Fire Detection System in Smart City Environments Using Cross-Attention, Capsule based Optimized Siamese Convolutional Stacked Recurrent Neural Network	Liang Wang, Berk A.B. Ba Geri, Obad Abdullah Yousef Rabea	
11:10-11:20	Research on signal noise reduction of rolling bearing based on DAE-EEMD	Mao Wei, Zhong Peisi,Liu Mei,Fu Lin, Song Hui	
11:20-11:30	Influence of radar antenna frequency and detection height on identification accuracy of coal-rock interface	Shuo Chen, Zihao Wang, Qiang Zhang, Ying Tian	

11:30-11:40	Gearbox State Identification Method Based on Vibration Signal Variational Modal Decomposition and Random Forest	Xinye Liu, Qiang Zhang, Zeyu Ding	
11:40-11:50	Belt Rotation In The Pipe Conveyor:Research On A Detection Method Based On Image Processing	Yuan Chao, Yuan Zhang, Mengchao Zhang, Zhuang Wang,Dongyue Zhang	
11:50-12:00	Studying the use of sliding mode control to track the course of an autonomous vehicle	Yan Xiaoxiao	
12:00-13:30	Lunch, Dipingxian Canteen 1st Floor (一楼地平线餐厅)		
Meeting Room:3 Session 6 Topic: Dynamic Modeling and Failure Analysis of Intelligent Equipment			
13:30-13:40	Influence of axial position and depth of circumferential groove on stability margin of contra-rotating fan	Qingguang Chen*, Xiaojie Shi, Jin Xu, Yunlong Dai	Xiangwei Dong (Shandong University of Science and Technology)
13:40-13:50	Effect of cone-plate angle on the separation performance of cone-plate cyclone clarifiers	Yulong Zhang, Hongxu Bai, Weiping Du, Zhengwei Yang, Kuoyue Zhang	
13:50-14:00	Study on foam cyclone defoaming of flotation coal concentrate	Xiaoguo Wang*, Peikun Liu, Yuekan Zhang, Lanyue Jiang, Xinghua Yang	
14:00-14:10	Study on the separation characteristics of cyclone in spill-cone overflow tube	Lin Feng, Peikun Liu, Zhiyuan Han, Yuekan Zhang*	
14:10-14:20	Numerical study of residual strength of CFRP bi-adhesive single lap joint under low speed impact	Shanling Han , Tao Wang, Jie Yin, Yong Li	
14:20-14:30	Venturi mixer gas-liquid mixing characteristics study	HU Xiaodong, ZHANG Xue, WANG Hu, XING Kun, YANG Yang	

14:30-14:40	Failure Analysis of Cooling Coil in Palladium Carbon Catalytic Hydrogenation Reactor	HU Xiaodong, WANG Hu,ZHANG Xue, XU Zhisheng, XU Heming,YANG Yang	
14:40-14:50	Numerical simulation of the separation performance of a new type of column-cone column-cone hydrocyclone based on CF	Xiangxi Xu, Peikun Liu, Yuekan Zhang, Wei Hu, Qingyun Zhang	
14:50-15:00	Environmentally friendly gas-insulated switchgear system design and heat dissipation analysis	Zhengmao Feng, Hui Pan, Peizhong Li, Kai Lv, Zhongyuan Zhou, Xiuhua Sui	
15:00-15:10	A new type of battery thermal management system for Unmanned Mine Truck	Wen Xiang,Kou Guiyue,Sui Pengxiao, Li Chenming, Mu Mingfei	
15:10-15:20	Design of infrared automatic running water alarm device	Yong Zhang, Panlong Yao Jiamin Yu	
15:20-15:30	Predictive modeling and rationality analysis of cutting forces in cortical bone layer with different bone densities	Heqiang TIAN, Jinchang AN, Hongqiang MA	

Meeting Room: 4 Session 7 Topic: Fluid Dynamics of Special Hydraulic Machinery and System			
Time	**Title**	**Authors**	**Chairs**
8:30-8:40	Effect of water injection flow rate on the separation performance of two-stage hydrocyclone	Zhang Yuekan, Hu Wei, Xu Mingyuan, Zhang Qingyun, Xu Xiangxie	Long Feng (Shandong University of Science and Technology)
8:40-8:50	Study on the adaptability of air volume adjustment of local ventilation system to the dust concentration in the heading face	Hengxuan Luan, Hailong Cui, Pengju Xu, Xinchen Fan, Xidong Zhang, Hailong Jiang*	
8:50-9:00	Study on the performance of gas-solid two-phase jet of superfine dry powder fire-extinguishing nozzle	Yuqi Liu, Hongen Ge, Xin Zhang,Longfei Jiao	
9:00-9:10	Influence of the structure of three-phase jet fire monitor nozzle on its internal flow field	Longfei Jiao, Hongen Ge, Xin Zhang,Yuqi Liu	
9:10-9:20	Analysis of atomization characteristics of gas-liquid two-phase flow nozzle based on Fluent	Wang Liang, Chen Tianming, Wu Mingchao, WangQia, Sun Yuyang	
9:20-9:30	Experimental Study on Industrial Application of a gradually expanding underflow hydrocyclone	Yu Shizheng*, Liu Peikun, Hou Duanxu, Zhang Yuekan, Yang Xinghua, Jiang Lanyue	
9:30-9:40	Numerical analysis of jet characteristics of mixed jet fire monitors	Zhu Liu, Hongen Ge, Xin Zhang, and Chunqi Zhao	
9:40-9:50	Research on the influence of cutting surface characteristics on the cutting load of the conical pick	LIU Jinxia, ZENG Fanchang, ZHANG Chao	
9:50-10:00	Effect of cylindrical height of a hydrocyclone for the flow field and separation performance	Zhang Yuekan, Zhang Qingyun, Xu Mingyuan, Hu Wei, and Xu Xiangxi	
10:00-10:10	Research on influence of coal-rock identification accuracy based on radar air-coal wall interface reflection wave	Zihao Wang, Shuo Chen, Qiang Zhang, Ying Tian	
10:10-10:20	Research on the modeling method of multi-sensor based fault diagnosis models	Zeyu Ding, Qiang zhang, Xinye Liu, Long Feng	
Meeting Room: 4 Session 8 Topic: Intelligent Mining Equipment and Robots			
10:20-10:30	Study on the influence of chain speed on the dynamic characteristics of scraper conveyor chain drive system under impact condition	Jinwang Lv, Yuqi Zhang, Wei Qu, Hongwei Zhang, Shoubo Jiang*, Jiexu Cui	Shoubo Jiang (Shandong University of Science and Technology)
10:30-10:40	VIO-based Inspection Robot for Coal Mine Pump Rooms	Mingjian Zong*, Shihao Wang, Xu Cao	
10:40-10:50	Coal-Rock Interface Radar Recognition Method Based on Air-Coal Wall Interface Reflected Waves	TIAN Ying, LI Chun-zhi, CHEN Shuo, WANG Zi-hao, ZHANG Qiang*	
10:50-11:00	Mining vibrating screen modal analysis	Lijun Zhu, Guangliang Wu	
11:00-11:10	Study on the impact damage characteristics of the middle slot of the scraper conveyor	Qiang Zhang, Yang Liu, Cong Wang, Gangcai Wang, Yanzong Ma	
11:10-11:20	Dynamic Analysis of Two Point Drive Scraper Conveyor	Ying Tian, Shouxiang Ma, Wenlong Yang	
11:20-11:30	Research and design of cross-section scanning device for mining wire ropes	Dong Dong,Xintao Yu,Jiajie Li,XuLi Zhu	
11:30-11:40	Study on automatic locking system of explosion-proof cover of fan in coal mine	Ying Tian, Gangcai Wang, Hezhe Zhang, Yang Liu, Yanzong Ma	
11:40-11:50	Leak localization method for coal mine water supply pipelines based on CEEMD and wavelet denois	Yu Xia, Ying Tian,Yang Wang,Jieying Gu	

11:50-12:00	Plasma-assisted TBM cutting mechanism for rock breaking	Hongxin Wei , Kuidong Gao , Acan Jiang , Hong Chen	
12:00-13:30	Lunch, Dipingxian Canteen 1st Floor (一楼地平线餐厅)		
Meeting Room: 4 Session 9 Topic: Robot Dynamics in Special Working Cases			
13:30-13:40	Analysis of energy absorption characteristics of hexagonal thin-wall buffer structure of anti-impact support	Ying Tian*, Fangying Liu*, Qiang Zhang,-Jinpeng Su,Runxin Zhang	Jinpeng Su (Shandong University of Science and Technology)
13:40-13:50	Research on Dynamic Characteristics Analysis Method of Rotary Drilling Rig Mast	Yongquan Wang, Hongen Wu*, Xiaoqing Yu , Haiyong Guo	
13:50-14:00	Mechanical response analysis of simple harmonic dynamic load of sliding advance hydraulic support	Zhongxu Hou, Tingyi Ding,Rui Shen,Lili Gao*	
14:00-14:10	Research on vibration inherent characteristics of dense paste transportation pipeline	Lyu Fuyan, Zhang Yong,Cao Can, Zhao Leilei,Tang Qiming,Ma Yuanhao, Li Chunzhi, Zhao Xinying	
14:10-14:20	Chatter suppression in composite boring bar considering internal damping	Jinfeng Zhang * Zhong Wang, Chao Feng, Xiaohui Yang, Peisi Zhong	
14:20-14:30	Research on vibrating screen bearing fault diagnosis method based on VMD-ISSA-KELM	Zhengwei Yang,Hongxu Bai,Kuoyue Zhang	
14:30-14:40	Structural parametric study of composite acoustic absorbers for noise barriers	QI Mei, YAO Xin, WANG Dengbin, CHEN Qingguang, CHU Liang	
14:40-14:50	Research on shearer coal loading performance considering drum vibration	DONG Yachong, GAO Feng, ZHONG Weiyan, QIN Lei	

14:50-15:00	Stability analysis of functionally graded CNT-reinforced composite boring bar	Jinfeng Zhang, Xiaohui Yang, Chao Feng, Zhong Wang, Peisi Zhong	
15:00-15:10	Buffering characteristics analysis of multi-head spiral hydraulic buffer	Chenglong Wang, Zhipeng You, Lujie Wu,Yanxi Liu	
15:10-15:20	Piezoelectric vibration with oscillation float buoy to harvest ocean wave energy for wireless sensors	Pengkai Li, Xiaozhen Du, Xiaotong Liu, Wenxiu Wang	
Meeting Room: 4 Session 10 Topic: Vibration Modeling and Analysis for Structures of Intelligent Robots			
15:20-15:30	Analysis of vibration characteristics of cutter section of roadheader under vertical cutting condition	QIN Lei,GAO Feng*,GUO Mingyi	Xianfei Yan (Shandong University of Science and Technology)
15:30-15:40	The normal mode analysis of coal-slurry-filled straight pipes	Lyu Fuyan, Cao Can, Zhang Yong, Ma Yuanhao, Li Chunzhi*, Zhao Xinying	
15:40-15:50	A Study on the Dynamic Response of a Parallel Mechanism with Revolute Wear Clearance	Chengsi Ning, Yucai Zhang, Ziguo Wang, Yingjie Yang, Shuo Ju	
15:50-16:00	Dynamic analysis of multi-link mechanism with lubrication clearances considering interval parameters	Yucai Zhang, Chengsi Ning, Ziyang Dong, Aiguo Wang	
16:00-16:10	Chatter mode of spinning composite bar considering internal and external damping	Jinfeng Zhang , Yongwei Shi, Chao Feng, Zengrui Liu, Peisi Zhong	
16:10-16:20	Dynamic characteristics and experimental study of rail belt conveyor operation process	Shi Hao, Li ZhengLi*, Liu Jinshan	
16:20-16:30	Sound transmission analysis of laminated plate under arbitary boundary conditions	Fangxu Qiu, Qiang Zhang, Jinpeng Su, Zhengmin Hu	

16:30-16:40	Study on Vibro-acoustic Characteristics and Suppression of Plate-Cavity System	Jinpeng Su, Yiqiang Jiang, Qiang Zhang*, Zhengmin Hu	
16:40-16:50	Free vibration analysis of functionally graded foamed cylindrical shell using modified variational method	Shanlu Lv, Jinpeng Su*, Qiang Zhang, Ying Tian	
16:50-17:00	Vibration analysis of functionally graded porous annular shell under arbitrary boundary conditions using an energy method	Jianxing Jiang, Jinpeng Su*, Qiang Zhang, Ying Tian	

Meeting Room: 5 Session 11 Topic: Interface Mechanical Behaviors and Control for Intelligent Equipment and Special Robots			
Time	**Title**	**Authors**	**Chairs**
8:30-8:40	Locomotion analysis of antiparallelogram ring four array mechanism	Jiang Long Tang, Jia Chao Liu, Qing Gao, Zhi Yuan Xun, Liang Yuan	Weimin Huang(Shandong University of Science and Technology)
8:40-8:50	Design of a seven-bar gait training robot with simulated ankle trajectory	Kan Shi, Huanzhi Yuan*, Ju Wang, Yanan Yao	
8:50-9:00	Research on the Correction Method of Plaid Matching Cutting Piece	HongenWu,Yanzhuang Wang,Yongding Xie,Xiaoqing Yu	
9:00-9:10	Lubrication Characteristics Analysis of Eight-Groove Water-Lubricated Rubber Bearings	Bao yunlong,Chen ming, Zou rui	
9:10-9:20	Study on the Tribological Characteristics of Machining Microstructures with VibrationAssisted Turning	Liu yingao, Zou rui	
9:20-9:30	Lubrication performance analysis of tilting pad journal bearing with dynamic and static pressure	Zou rui, Chen ming, Xu sen, Wang xiuli	
9:30-9:40	Development of Test Platform for Measures Performance of Magnetorheological Transmission Devices	Kefeng Zong,Xintao Yu, Qingchao Chen, Xuli Zhu	
9:40-9:50	Research on the Detection and Reading Recognition Algorithm of Pointer Instrument Based on YOLOv7	BaorenWang,Pengju Wang, Yangzhuang Wang,Xiaoqing Yu	
9:50-10:00	CLAW POLE PARTS CONVEYING AND ATTITUDE ADJUSTMENT DEVICE	PanLong Yao, JiaMin Yu	

10:00-10:10	Simulation and Result Analysis of Various Motor Starting Processes	Nini HAO,Zeqing ZHONG, Yuan ZHANG, Xingyu WANG	
Meeting Room: 5 Session 12 Topic: Advanced Monitoring Techniques for Intelligent Robots and Systems			
10:10-10:20	CNN-SVM Bearing Fault Diagnosis Model Based on North Goshawk Optimization(NGO)	Dalei Jiao, Zhongyuan Zhou, Hengchao Chen, Xiuhua Sui*	Hengxuan Luan (Shandong University of Science and Technology)
10:20-10:30	Tomato grading algorithm based on Multi-feature Fusion	Yanzhi Bi, Chao Zhang, Peisi Zhong,Yang Xue, Mei Liu	
10:30-10:40	Research on SLAM-based map fusion algorithm for multi-mobile robot	Quanhu Cao, Peisi Zhong*, Zhongyuan Liang, Guangxiu Jiao, Mei Liu	
10:40-10:50	Research on Coal Gangue Recognition Technology Based on Deep Learning	Pengju Wang ,Yanzhuang Wang, Hailiang Wei , Yaqian Huo	
10:50-11:00	Surface Defect Detection of Vehicle Brake Discs Based on YOLO-NF	Lin FU,Xiao WANG,Peisi ZHONG, Wei MAO, Mei LIU	
11:00-11:10	Study of static sealing performance of underwater robots	Li Dong, Xue Pengcheng, Bi Wenhan	
11:10-11:20	A Deep Learning Algorithm for Coal Gangue Identification Based on Machine Vision	Weilong Liu, Baoren Wang, Baojuan Jia, Chunhao He, Chengcheng Song	
11:20-11:30	Design of digital twin based vibrating screen modeling and remote monitoring system	Kuoyue Zhang,Hongxu Bai,Weiping Du,Chengzhe Liu	
11:30-11:40	A Machine Vision-Based Edge Detection Method for Conveyor Belt Lap of Pipe Belt Conveyor	Nini HAO, Xingyu WANG,Yuan ZHANG,Mengchao ZHANG,Changzheng SUN,Chengquan HU	

11:40-11:50	Overview of Digital Twins in Mining Equipment	Ying Tian, Jiamin Yu, Jieying Gu	
11:50-12:00	Research on Coal-Rock Recognition Based on the EMD-EM-BP Model	Shengyu Tian,Ying Tian,Yang Wang,Jieying Gu	
12:00-13:30	Lunch, Dipingxian Canteen 1st Floor (一楼地平线餐厅)		
Meeting Room: 5 Session 13 Topic: Structural and Performance Optimization Algorithms for Special Robots			
13:30-13:40	Design and research of a robot based on Hilbert curve	Jiachao Liu, Jianglong Tang, Kan Shi*	Fuyan Lyu (Shandong University of Science and Technology)
13:40-13:50	Sub-pixel detection of screw tooth profile based on improved Zernike moments	Yang Xu, Xiao Wang, Peisi Zhong, Yanzhi Bi, Mei Liu, Weiwei Ge	
13:50-14:00	Creative Design of Rover Suspension Mechanism Based on Regenerative Kinematic Chain Method	Weixin Kong*, Kan Shi*, Maoying Ding , Xiangshuai Li , Huanzhi Yuan , Junjie Wang, Zongjia Wang	
14:00-14:10	Volume Calculation and Error Analysis of the Working Space of the Manipulator Based on the Principle of Calculus	Chuanjiang Wang , Jian Song, Shuai Zhang, Sen Yang, Xiujuan Sun	
14:10-14:20	Exoskeleton gait planning based on Gaussian process regression and dynamic motion primitives	Dawei Zhang, Mei Liu, Wei Xiong, Chao Zhang, Xiao Wang	
14:20-14:30	Improved Global path planning A* algorithm based on inflection optimization	Guang Qing Chen, Chun Xiao Lv, Ai Qin Sun	
14:30-14:40	Motion Control of a Hexapod Robot Based on CPG and RBF Neural Network	Liu Yu, Li Xiang, Tao Guosheng, Zhang Haowei	

14:40-14:50	Substation inspection robot path planning based on improved Dijkstra algorithm	GuangQing Chen, JingFeng Xu, AiQin Sun	
14:50-15:00	Research on predicting leakage aperture of water pipelines based on IGWO-BP model	Tianyan Tan, Qiang Zhang, Yang Wang, Jieying Gu*	
15:00-15:10	Design and Implementation of Post-Disaster Search and Rescue Robot Based on BeiDou Navigation and Positioning System	Jigeng Bing, Qiang Zhang,Xinye Liu	
15:10-15:20	Optimization of gas assisted molding process parameters based on orthogonal experimental design	Lyu Fuyan, Ma Yuanhao, Sun Li, Zhang Yong, Cao Can, Chen Qingguang, Chen Xiangyang	
Meeting Room: 5 Session 14 Topic: Advanced Material for Intelligent Equipment and Special Robots			
15:20-15:30	Research on the improved YOLOv5s tube sheet weld defect detection method	Xiaoqing Yu, Hongen Wu*, Yongquan Wang, Jiangbing Qin	Di Jiang (Shandong University of Science and Technology)
15:30-15:40	Evaluation of friction reduction performance of micro-pit textured surfaces under lubrication conditions with different sliding speeds	*Xiangyuan Zhou, Jian Wang, ke Li	
15:40-15:50	Residual stresses on high-speed milling surfaces of die steel and fatigue life numerical simulation	Hongbin Xia, Tongle Zhang, Ke Li, Yanping Yue	
15:50-16:00	Effect of Fin Distribution on Melting Process of PCM	Liu Xianping, Yi Qiujie	
16:00-16:10	Numerical simulation of 18Ni300 martensitic steel during laser additive manufacturing process	Junru Yang, Tongle Zhang, Ran Zhu, Chuijiang Kong	

16:10-16:20	The directional effect of cutting temperature by high-speed ball-end milling process of die steel Cr12MoV	Junru Yang, Ke li, Weimin Huang*, Hongbin Xia, Tongle Zhang	
16:20-16:30	Simulations of fluid flow in steel cord-rubber composites material based on X-ray tomography and lattice Boltzmann method	Fangkai Guo, Shanling Han, Yanan Miao, Yong Li*	
16:30-16:40	Effect of Induction Heat Treatment and Conventional Heat Treatment on Corrosion Resistance of 316L Stainless St	Chuanwei Qiu, Chengcheng Song	
16:40-16:50	Research on bottom bulge of copper- aluminum composite plate in incremental forming	Chengcheng Song, Chuanwei Qiu, Weilong Liu	
16:50-17:00	The electrochemical behavior of the titanium substrate before and after alkaline hydrothermal reaction.	LIU Zaihao, WANG Hong, LIU Shengwei	

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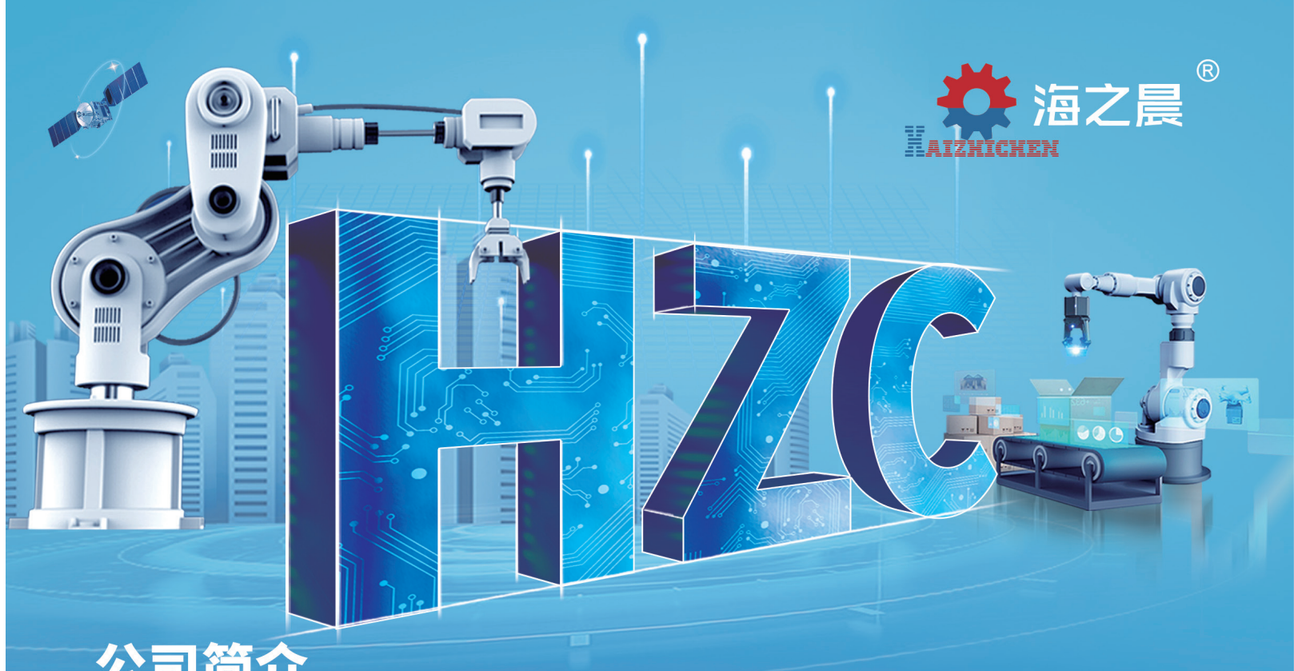

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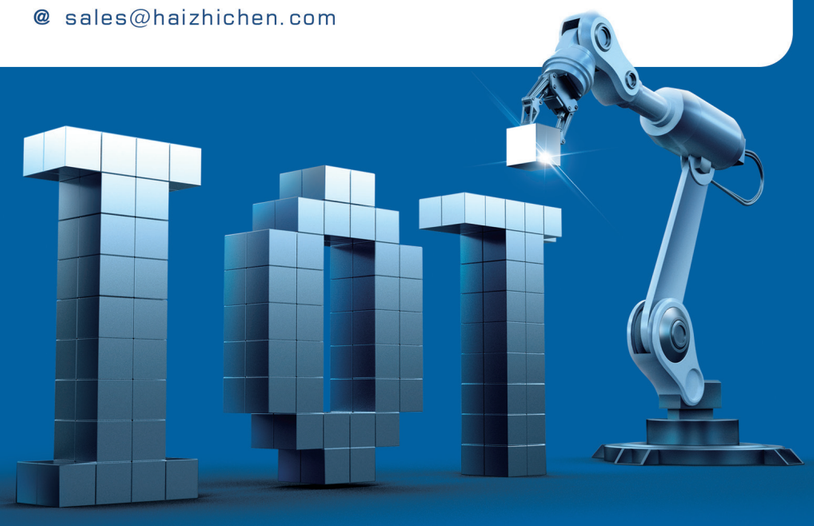

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