The 2021 International Workshop on Intelligentized Welding Manufacturing

IWIWM 2021

The 2021 International Workshop on Intelligentized Welding Manufacturing (IWIWM2021)

Shang Hai, China

Dec. 28-30, 2021

Conference Program

The 2021 International Workshop on Intelligentized Welding Manufacturing IWIWM 2021

Conference Program

Dec. 28-30, 2021

Host

Shanghai Jiao Tong University

Nanyang Technological University

Sponsors

Robotics & Automation Committee of CWS（R&A，CWS）

Melted Welding & Equipment Committee of CWS

Editorial Board of Transactions on Intelligent Welding Manufacturing (TIWM)

Co-sponsors

Chinese Welding Society (CWS)

State Key Laboratory of Advanced Welding and Joining (Harbin Institute of Technology)

Shanghai Key Laboratory of Materials Laser Processing and Modification

Jiangsu Provincial Key Laboratory of Advanced Welding Technology

Fronius Intelligent Equipment China Co., Ltd.

Beijing Bo Tsing Tech Co., Ltd.

Welcome Remarks

In recent years, Intelligent Manufacturing, characterized by the extensive application of artificial intelligence(AI), has become a trend of development in the field of advanced manufacturing. The intelligentized welding technology has deservedly become one of the highly active directions of intelligent manufacturing. The intelligentized welding manufacturing (IWM) deals with complex information, networking and intelligent technology during the whole process of welding product manufacturing, including a wide range of welding materials, structures, technics, processes, equipment and systems, products and market. Therefore, it is imperative to research and develop intelligentized manufacturing welding technology.

It is under such a background, the Robotics & Automation Committee of Chinese Welding Society (CWS), co-sponsored by other academic institutions of the CWS, successfully launched and held the “2017 International Workshop on Intelligentized Welding Manufacturing (IWIWM '2017)" in Shanghai, on June 23-25, 2017. AS a series of IWIWM conferences every two years, the second IWIWM Conference, IWIWM2019-SH was held on Nov.6-8 in Shanghai, China and the IWIWM2019-LEX on Nov.8-10 in Lexington, Kentucky, USA, separately. This year,the“2021 International Workshop on Intelligentized Welding Manufacturing-IWIWM '2021” will be organized by Shanghai Jiao Tong University (SJTU),China and Nanyang Technological University(NTU), Singapore.

The IWIWM '2021 will provide an interactive forum for experts, scholars and professionals in the fields of intelligent welding manufacturing, robot welding technology and related applications. There will be world renowned experts and scholars to make keynote speech and round-table seminars. The IWIWM '2021 will bring together colleagues in the welding industry to discuss the hot spots and cutting-edge scientific issues and key technologies in the development of intelligent welding manufacturing. It is more targeted to guide and promote the robust development of welding intelligent manufacturing technology.

Another important topic of the IWICWM’2021 is the discussion of the strategy for the "TRANSACTIONS ON OF INTELLIGENT WELDING MANUFACTURING (TIWM)"，which was launched by Springer in 2017， operation mechanism based on the IWIWM series, making it to be a flagship journal in the field of intelligentized welding manufacturing.

Wish you all promote friendships and gain something during IWIWM2021!

Honorary Chair
Prof. Jiluan PAN

General Chair
Prof. Shanben CHEN

Co-chair
Prof. Yuming Zhang

Co-chair
Wei Zhou

Content

Conference Venue

Shanghai Jiao Tong University

South China University of Technology

Jiangsu University of Science and Technology

Lanzhou University of Technology

Beijing Institute of Petrochemical Technology

✧ Conference Onsite Registration

Date	Dec. 28th, 2021
Time	8:00–20:00
Venue	Shanghai Jiao Tong University

✧ Opening Ceremony

Date	Dec. 29th, 2021
Time	9:00– 9:30
Venue	Shanghai Jiao Tong University

✧ Conference Report

Date	Dec. 29th, 2021
Time	9:30–17:30
Venue	Shanghai Jiao Tong University & Branches

✧ Technical Tour

Date	Dec. 30th, 2021
Time	9:30– 11:30
Venue	Related technology companies

Introduction of Guests and Conference Experts

Introduction of Special Guests

Special Guests	
Reporter	**Professor Pan Jiluan**
Academician of Chinese Academy of Sciences Professor, Department of Mechanical Engineering, Tsinghua University Honorary President of Nanchang University	

Introduction of Professor Pan Jiluan

- **1986-1995 Director of the Academic Committee of Tsinghua University**
- **1982-1985 Vice President of International Welding Society**
- **1981-1986 Chairman of the China Welding Society**
- **1987-1991 Qinshan Nuclear Power Plant Construction Engineering Consultant**
- **1992-2002 President of Nanchang University**
- **2007-2009 Beijing-Tianjin high-speed railway construction project consultant**
- **Honorary Chairman of IWIWM2021**

Special Guests	
Reporter	**Professor Lin Shangyang**
member of China Engineering Academy Director of Technical Committee of Harbin Welding Research Institute Chief Technical Expert of China Academy of Mechanical Sciences	

Introduction of Professor Lin Shangyang

- **1951-1955 Chinese People's Liberation Army faculty group leader**
- **1956-1961 Harbin Institute of Technology, Bachelor of Science in Welding Technology and Equipment**
- **1961-1962 Institute of New Technology Physics, Heilongjiang Branch, Chinese Academy of Sciences**
- **1982-1992 Deputy Chief Engineer, Harbin Welding Research Institute**
- **1987-1995 Director of Research Office, Harbin Welding Research Institute**

- **IWIWM2021 Scientific Advisor**

Special Guests	
Reporter	**Researcher Song Tianhu**
Chairman of the Supervisory Committee of the Chinese Mechanical Engineering Society	

Introduction of Professor Song Tianhu

- **Served as engineer, chief engineer and director of Harbin Welding Research Institute; Dean of the Institute of Mechanical Sciences; Director of the Department of Science and Technology and Quality of the Ministry of Machinery Industry; Vice Chairman and Secretary-General of the Chinese Mechanical Engineering Society; Executive Vice Chairman of the Chinese Mechanical Engineering Society. He is currently the Chairman of the Supervisory Committee of the Chinese Mechanical Engineering Society, as well as the editor-in-chief of Chinese Journal of Mechanical Engineering and the director of the 2nd Mechanical Engineering Nomenclature Examination Committee of the National Scientific and Technical Terms Examination Committee.**
- **He has won the first prize of Science and Technology Progress Award of the Ministry of Machinery, the second prize of National Science and Technology Progress Award, and won the China Welding Lifetime Achievement Award in 2007 and the Science and Technology Achievement Award of China Mechanical Engineering Society in 2011. Enjoyed the special government allowance of the State Council, and was rated as a young and middle-aged expert with outstanding contributions to the country.**
- **IWIWM2021 Scientific Advisor**

Special Guests	
Reporter	**Professor Wu Lin**
Professor of Harbin Institute of Technology	

Introduction of Professor Wu Lin

- **Professor of Harbin Institute of Technology (HIT), China**
- **Former Chairman of China Welding Society (CWS)**

- **Former Vice President of the International Welding Society (IIW)**
- **IWIWM2021 Scientific Advisor**

Special Guests	
Reporter	**Researcher He Shi**
Harbin Welding Institute	

Introduction of Researcher He Shi

- **Vice Chairman and Secretary-General of China Welding Society**
- **Vice Chairman of China Welding Association**
- **Director of China National Standardization Committee**
- **Former Director of Harbin Welding Research Institute**

Special Guests	
Reporter	**Professor Yuming Zhang**
University of Kentucky	

Introduction of Professor Zhang Yuming

YuMing Zhang is a professor of electrical engineering at the University of Kentucky and has been engaged in welding research since 1991. He completed his bachelor's and master's degree in control and a doctorate degree in welding at Harbin Institute of Technology. A total of more than 200 journal papers and 11 US patents have been published. These patents are used for advanced induction and control of innovative welding processes, as well as intelligent robot systems and intelligent learning/modeling of human welders. YuMing Zhang serves as a member including AWS, ASME and SME. A total of 25 doctoral students graduated with the guidance and 5 of them won the Henry Granjon Award from IIW.

Special Guests	
Reporter	Professor Feng Zhili
Oak Ridge National Laboratory (ORNL) Director of Material Processing and Connection Laboratory	

Introduction of researcher Feng Zhili

- **ORNL Outstanding R&D Researcher**
- **One of the founding editors of TIWM**
- **Chairman of IWIWM2021 Academic Committee**

Special Guests	
Reporter	Professor Zhou Wei
Nanyang Technological University	

Introduction of Professor Zhou Wei

Professor Wei Zhou is studying at the School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore. He holds a bachelor's degree in mechanical engineering from Tsinghua University and a doctorate in materials science from Cambridge University. From 1991 to 1992, he was a visiting scientist at the Fraunhofer Institute for Material Mechanics, a visiting scholar in applied physics at Harvard University in 2002, and a visiting scholar at Churchill College, Cambridge University in 2014. In the past thirty years, he has conducted extensive research. Various manufacturing processes including welding, casting, 3D printing and nanofabrication. His recent research interests focus on laser-assisted additive manufacturing and automatic precision welding. He has published 200 journal articles indexed by SCI, with an H index of 34, and has been cited 6000 times in total.

Introduction to the keynote speaker of the conference and summary of the report

Plenary Invited Keynote Speech		
Reporter	**Professor Chen Heping, Professor Zhang Yuming**	
Texas State University, USA University of Kentucky, USA		
Title	**Machine Learning in Intelligent Welding Manufacturing**	

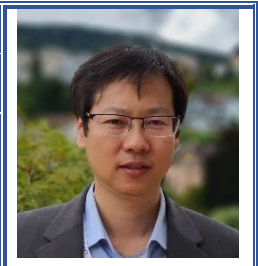
abstract

As the welding processes become more and more demanding, intelligent welding manufacturing becomes more and more attractive. In intelligent welding manufacturing, there are three main stages: pre-design, parameter design and online sensing/control. In this talk, we will focus on the two problems: parameter design and online sensing/control. Using Gaussian Process Regression, a progressive parameter learning method will be discuss which can explore an optimal set of welding parameters. During the welding processes, online sensing/control is needed to deal with the penetration problem and disturbances. A novel method is proposed to predict the penetration by combining 3D surface with oscillation methods. A deep learning method is developed to analyze the captured signals. For online control, a Human-Robot Collaborative Welding method is proposed. The experimental results will also be discussed to demonstrate the effectiveness of the proposed methods.

Introduction of Professor Chen Heping

Dr. Heping Chen received Ph.D. in Electrical and Computer Engineering from Michigan State University, Michigan in 2004. Currently, Dr. Chen is an associate professor at the Ingram School of Engineering, Texas State University, Texas, USA. He worked as a research scientist and project manager at the ABB Corporate Research Center, ABB Inc. about 6 years. He has over 12 year industrial experience. He published more than 160 journal/conference papers. He received more than 10 Awards including the Best Paper Award from the IEEE Transactions on Automation Science and Engineering. He has more than 40 patents/patent applications. He received the Most Outstanding Graduate Student Award from Michigan State University. He is an IEEE Senior member and served in many international conferences as a General Chair, Program Chair and session chair. His research interests include intelligent industrial robotics, machine learning,

welding process, semiconductor manufacturing, machine vision, nanomanufacturing and nanorobotics.

Plenary Invited Keynote Speech		
Reporter	**Professor Bi Guijun**	
Singapore Institute of Manufacturing Technology, Singapore Guangdong Academy of Sciences, China		
Title	**Digitization, sensorization and machine learning for intelligent laser additive manufacturing**	

abstract

As one of the key technologies of Industry 4.0, laser additive manufacturing (LAM) has been gaining rapid momentum in R&D and industry applications. However, achieving high consistency of quality and accuracy remains a challenge. Hence, it is necessary to make the LAM process intelligent to address the issues. In this talk, development of advanced LAM technology through digitization, sensorization and machine learning will be introduced. Firstly, a unique 3D FE thermal history analyses model integrated machine learning approach was developed to continuously predict the temperature field during the deposition and cooling stage in LAM process. In conjunction with a digitized toolpath planning strategy, localised heat accumulation can be minimised, and the homogeneity of the temperature distribution be improved during the entire deposition process. Furthermore, a sensor-based adaptive dimension correction strategy using 3D point clouds as the feedback data was explored. A laser displacement sensor was integrated into a LAM system to perform on-machine laser scanning measurement and in-process surface defects correction of the intermediate layers. Finally, image- based process monitoring and control was investigated. The melt pool size was measured and fed back to a closed-loop controller that adjusts the laser power. The controller was developed with a novel multi-tasking architecture that incorporated an auto-tuning unit that optimises controller parameters automatically, which made the controller adaptable to different part shapes, materials, toolpaths, and process parameters. With this monitoring and control system implemented, the process stability and geometric accuracy of the deposition can be improved.

Introduction of Professor Bi Guijun

Guijun Bi graduated from Fraunhofer Institute of laser technology in Germany in 2004 and received his PhD from RWTH-Aachen University. From 2015 to 2021, Dr. Bi served as Senior Scientist and Group Manager of Joining & Machining Group of Singapore Institute of Manufacturing Technology, and Principal Investigator of “Large Format Hybrid Laser Aided Additive Manufacturing” program, under Agency for Science, Technology and Research (A*STAR), Singapore. His research areas include numerical simulation, process monitoring and control, machine

learning, process and equipment development of laser processing and additive manufacturing. He has published more than 100 papers in international academic journals. He was the principal investigator for more than 10 major R & D projects of A*Star, out of which 3 achievements have won the A*Star Aerosapce program awards. Dr Bi has applied more than 20 patents and 6 have been granted. He is now a Principal Scientist of the Advanced Laser Additive Manufacturing of Guangdong Academy of Sciences, the Secretary General of the International Intelligent Manufacturing Society, and an Adjunct Professor of the National University of Singapore

Plenary Invited Keynote Speech		
Reporter	**Professor Pan Zengxi**	
University of Wollongong, Australia		
Title	**Defect Detection and Process Monitoring for Wire Arc Additive Manufacturing using Machine Learning**	

Abstract

In recent years, major research interests have been attracted on various aspects of the Wire Arc Additive Manufacturing (WAAM) process. Towards the development of commercial WAAM system, efforts on the WAAM process monitoring and quality control for defect free fabrication have increased. Machine learning algorithms provide inbuilt advantages in processing and analysing the data and images, especially for the large data sets generated during the long deposition cycle time. In this presentation, two WAAM process monitoring and defect detection systems using machine learning algorithms are presented. One system makes use of an incremental support vector machine (SVM) to identify disturbances to the welding signal which indicate the presence of potential defects, achieved a success rate greater than 90% F1-score. The incremental learning approach provides an efficient means of detecting welding-based defects, as it does not require large quantities of data to be trained to an operational level, addressed a major drawback of other machine learning methods. Another defect detection system is built upon the YOLOv3 architecture and through moderate changes on anchor settings, achieves 53% precision on surface anomaly detection and 100% accuracy in identifying the fabricated components' location. This system identifies the presence of defects relating to lack-of-fusion and voids immediately after the deposition of a given layer, highlights the feasibility of developing such intelligent computer vision systems for monitoring the WAAM process for defects.

Introduction of Professor Pan Zengxi

Zengxi Pan obtained a Bachelor's Degree in Machine Design Before Completing Master's study in Mechatronics at Tsinghua University, Beijing, China. He completed PHD degree at Stevens Institute of Technology, NJ, USA in 2005.

From 2003 to 2006 he worked as a robotic researcher in ABB Cooperate Research Centre (CRC) at Winsor, CT, USA. He is a key team member for the development of IRC5 force

controller in robotic machining applications.

In 2006, Zengxi joined School of Electrical, Computer and Telecommunication Engineering as a lecturer, followed by becoming a senior research fellow and a member of Welding and Automation Research Group in 2008. Since then, he has been the project leader for both Defence Material Technology Centre (DMTC) and Rail Manufacturing Cooperative Research Centre (RMCRC), leading 6 research projects with each of them worth around AU$0.5million cash funding and last 3 years.

His main responsibility is to develop new technology towards solution of practical industrial problems and coordinate between other researchers and industry. His main research interest lies in automated robot programming for welding applications and wire arc additive manufacturing. He received multiple national award due to his excellent research outcomes, including national innovation award in 2015, DSTO Eureka Prize in 2013, WTIA Chris Smallbone International Award in 2012.

Zengxi has more than one hundred publications in refereed journals and international conferences.

He is the chair of IIW technical commission XII-A: Sensor and Control for Arc Welding processes and production systems since 2013. He is also the pre-screener for IIW Welding in the World Journal, and Associate editor for IEEE Robotics and Automation Letters (RA-L)

Plenary Invited Keynote Speech		
Reporter	**Professor Baicun Wang**	
Zhejiang University		
Title	**Toward Human-centric Intelligent Manufacturing (HIM)**	

abstract

In this talk, the evolutionary footprint of intelligent manufacturing is reviewed from the perspective of HCPS, and the implications, characteristics, technical frame, and key technologies of HCPS for intelligent manufacturing (IM) are then discussed in depth. Finally, applications and outlook of the major challenges of HCPS-based IM is proposed.

Introduction of Professor Wang Baicun

Dr. Baicun Wang is currently a Research Professor at School of Mechanical Engineering, Zhejiang University (ZJU), China. Before joining ZJU, he has been a Postdoctoral Research Fellow at Tsinghua University, Chinese Academy of Engineering, and University of Michigan-Ann Arbor, from 2016 to 2020. Dr. Wang's research interests focus on research, innovation, and applications of human-centered new-generation intelligent manufacturing based on human-cyber-physical systems (HCPS) theory, which include: (1) HCPS & Intelligent Manufacturing, (2) Energy Conversion & Management, and (3) Technology Management & Strategy. Baicun serves as a reviewer for over 10 international scientific journals, including Robotics and Computer-Integrated Manufacturing, Journal of Manufacturing Systems, Nano Energy, and Applied Energy.

IWIWM2021 Conference Organization

Honorary Chairman:	
Pan Jiluan	Academician of Chinese Academy of Sciences, Tsinghua University
Scientific advisory expert	Lin Shangyang, Harbin Welding Research Institute, Academician of Chinese Academy of Engineering Pan Jiluan, Academician of Chinese Academy of Sciences, Tsinghua University Song Tianhu Chairman of the Supervisory Society of China Mechanical Engineering Society (CMES) Wu Lin, Senior Professor, Harbin Institute of Technology
Conference Chairperson	**Co-chairperson**
Chen Shanben, Shanghai Jiao Tong University	Zhang Yuming, University of Kentucky (UK) Zhou Wei, Nanyang Technological University (NTU)

Academic Steering Committee		
Chair		**Co-Chair**
Zhili Feng	Oak Ridge National Laboratory (ORNL)	Feng Jicai, China Welding Society, Harbin Institute of Technology Chen Xiaoqi, Swinburne University of Technology (SUT), Australia He Shi, China Welding Society, Harbin Welding Research Institute
Committee members		
Wen-jian CAI	Oscar CASTILLO	Jian CHEN
Hee-Seok CHANG	Heping CHEN	I-Ming CHEN
Kai CHENG	Anna-Karin Christiansson	Dong DU
Gu FANG	Zhili FENG	Ingo FRISCHKORN
Don HONG	S. Jack HU	Wayne HU
Ran JIN	Elijah Kannatey-Asibu	JR.
Ngai M. KWOK	Sergey Konovalov	Jyrki LATOKARTANO
Huijun LI	Zhuguo LI	Sanjay Mohan Sharma

Pedro Neto.	Zengxi PAN	George Panoutsos
A.B. Rad	Francisco SANDOVAL	Bairan WANG
Wei ZHOU	Yu-Ming ZHANG	Quanmin ZHU
China Welding Society: Du Dong, Feng Jicai, He Shi, Li Xianzheng, Tian Zhiling, Wang Linshu, Wang Min		
Shanghai Jiao Tong University: Li Zhuguo		

Organizing Committee		**Program Committee**	
Chairman		Chairman	
Jiao Xiangdong	Beijing Institute of Petrochemical Technology	Fan Ding	Lanzhou University of Technology
Co-chair		**co-chair**	
Lin Tao	jiangsu Beiren robot system co., LTD.	Zhang Guangjun	Harbin Institute of Technology
Wang Su	Beijing Architecture University	Hua Xueming	Shanghai Jiao Tong University
Xue Jiaxiang	South China University of Technology	Zhang Hua	Shanghai University of Engineering and Technology
Lusheng	Jiangsu University of Science and Technology	Shi Yonghua	South China University of Technology
Luo Zhen	Tianjin University	Li Wenhang	Jiangsu University of Science and Technology
Liu Erbin	South China University of Technology	Xue Long	Beijing Institute of Petrochemical Technology
Chen Xizhang	Wenzhou University		
Committee member		**Committee member**	
Chen Wenjie, Chen Yuxi, Fan Jihua, Kong Meng, Li Laiping, Ma Hongbo, Shen Hongyuan, Tang Guobao, Wang Jifeng, Wang Jianjun, Yan Lihong, Yang Xinhua, Yang Chengdong, Zhang Huajun, Zhang Tao, Zhou Lu, Zhu Pinchao, Zhu Zhenyou, Zeng Konggeng, Li Ruifeng		Cao Jian, Chang Baohua, Chen Bo, Chen Xizhang, Feng Zhiqiang, Gao Hongming,Han Yu, Huang Yiming, Li Wenhang, Li Wen, Lu Hao, Ma Guohong,Shi Yao, Wang Xuewu, Xiao Jun, Xu De, Yang Xinhua, Zhang Lixia, Zhang Wenzeng, Zhang Zhifen, Zhao anzheng	

Secretariat			
Deputy Secretary-General		Deputy Secretary-General	
Chen Huabin	Shanghai Jiao Tong University	Xu Yanling	Shanghai Jiao Tong University
		Lu Na	Shanghai Jiao Tong University

General Conference Schedule

IWIWM2021 General Conference Schedule		
Date: Dec. 28th, 2021		
Time	Agenda	Place
9:00-20:00	Registration	Shanghai Jiao Tong University
19:00-20:30	Online welcome meeting for conference institutions	Online meeting link: https://meeting.tencent.com/dm/phJWKZkZJC5r Tencent Meeting: 689-259-119 Password: 123456
Date: Dec. 29th, 2021		
9:00-12:00	Opening Ceremony & Keynote Speech	Shanghai Jiao Tong University
13:30–15:30	Invited Speech	
15:50-17:30	IWIWM2021 session: Selected Papers	Shanghai Jiao Tong University South China University of Technology Jiangsu University of Science and Technology Lanzhou University of Technology Beijing Institute of Petrochemical Technology
Date : Dec. 30th, 2021		
9:30– 11:30	Relevant technology company visit	

Academic conference report schedule

<table>
<tr><td colspan="6">Date:
Dec. 29th, 2021</td></tr>
<tr><td colspan="6">Opening Ceremony & Invited Keynote Speech
Online meeting link: https://meeting.tencent.com/dm/o7vJ7XrGQn2H
Tencent Meeting: 813-346-280 password: 123456</td></tr>
<tr><td>Time</td><td>Classification</td><td>Speaker</td><td>Topic</td><td>Chairs</td><td>Place</td></tr>
<tr><td>9:00-9:30</td><td>Opening Ceremony</td><td>Introduction Guests Theme Address</td><td>Online meeting between Invited guests and addressing Pan Jiluan, Lin Shangyang, Wu Lin, Song Tianhu, He Shi, Li Zhuguo and other guests met online and delivered speeches</td><td>ShanBen Chen</td><td rowspan="10">Shanghai Jiao Tong University</td></tr>
<tr><td>9:30-10:00</td><td rowspan="9">Invited Keynote Speech</td><td>Heping CHEN, Yu-Ming ZHANG
Texas State University, University of Kentucky</td><td>Machine Learning in Intelligent Welding Manufacturing</td><td>Zhili FENG

Yuming ZHANG</td></tr>
<tr><td>10:00-10:30</td><td>Zengxi Pan
University of Wollongong</td><td>Defect detection of WAAM process using machine learning</td></tr>
<tr><td>10:30-10:40</td><td colspan="2">Coffee break</td></tr>
<tr><td>10:40-11:10</td><td>Dr BI Guijun, Wei ZHOU
Singapore Institute of Manufacturing Technology, Nanyang Technological University</td><td>Digitization, sensorization and machine learning for intelligent laser additive manufacturing</td><td rowspan="3">Wei ZHOU

Xiaoqi CHEN</td></tr>
<tr><td>11:10-11:40</td><td>bocun Wang
Zhejiang University</td><td>Toward Human-centric Intelli-gent Manufacturing (HIM)</td></tr>
<tr><td>11:40-12:00</td><td>Invited Speech</td><td>Ding FAN
Lanzhou University of Technology</td><td>Novel fabricate methods and process analysis in the arc additive manufacturing</td></tr>
<tr><td>12:00-13:30</td><td colspan="4">Lunch</td></tr>
</table>

Section 1: invited speech

Shanghai Jiao Tong University Venue 1-1

Online meeting link: https://meeting.tencent.com/dm/gt6SjyQpZebk

Tencent Meeting: 870-760-591 password: 123456

13:30-13:45	Invited Speech	Yin HU Springer	Development of the Transactions on Intelligent Welding Manufacturing	Xiangdong JIAO Ding FAN Tao LIN	Shanghai Jiao Tong University Venue 1-1
13:45-14:00		Yonghua SHI South China University of Technology	Study on the relationship between arc length and voltage, and arc pressure in keyhole tungsten inert gas (K-TIG) Welding		
14:00-14:15		Wu Yanming China Shipbuilding Industry Corp 725th Institute	Study on energy distribution and its adjustment in narrow gap laser welding of thick-sectioned HSLA steel assisted with laser beam oscillation		
14:15-14:30		Li Ruifeng Jiangsu University of Science and Technology	Fabrication of amorphous composite coatings using ultrahigh laser cladding technologies		
14:30-14:45		Gao Yanfeng Shanghai University Of Engineering Science	Development and application of mobile robot system for welding of complex cabins		
14:45-15:00		Liu Tianyuan The Hong Kong Polytechnic University	3DSMDA-Net: An improved 3DCNN with separable structure and multi-dimensional attention for welding status recognition		
15:00-15:15		Cai Xiaoyu Harbin Institute of Technology	Swing arc narrow gap GMA welding of thick marine steel plate		
15:15-15:30	Coffee break				

Section 1: invited speech

Shanghai Jiao Tong University Venue 1-2

Online meeting link: https://meeting.tencent.com/dm/uyl6NXgbA4oC

Tencent Meeting: 158-396-296 password: 123456

13:30-13:45	Invited Speech	Luo Zhen Tianjin University	Global welding research progress based on big data (2016-2020)	Su WANG Guangjun ZHANG Jiangxiang XUE	Shanghai Jiao Tong University Venue 1-2
13:45-14:00		Tang Guobao Guangzhou Risong Technology Co., Ltd.	Integrated software technology for robotics intelligent manufacturing design and simulation		
14:00-14:15		Fred Chen Fronius Intelligent Equipment China Co., Ltd.	Report on the Fruits and Development of Fronius Intelligent Welding Technology		
14:15-14:30		Andy Shi Beijing Bo Tsing Technology Co., Ltd	Enabling Intelligent Welding of Large Structural Parts - Trackless Unguided All-Position Crawling Welding Robot		
14:30-14:45		Yu LUO, Xiandong JIAO Beijing Institute of Petrochemical Technology	Study on surfacing repair system for Ω seal weld of nuclear power control rod drive mechanism		
14:45-15:00		Li Fang Shanghai Jiaotong University	Key technology and application of robot intelligent manufacturing based on product digital model		
15:00-15:15		Xing Chen Jiangsu Beiren Smart Manufacturing Technology Co.,Ltd.	Development and application of advanced welding technology on battery tray		
15:15-15:30	Coffee break				

Section 2: Selected Paper Report 2-1

Shanghai Jiao Tong University

Online meeting link: https://meeting.tencent.com/dm/zr9rxfkMKGkW

Tencent Meeting: 338-467-829 password: 123456

Time	Speaker	Topic	Chairs	Place
15:30 - 15:40	Lin Ziluo, Shi Yonghua South China University of Technology	Development of a Narrow Gap Passive Vision Seam Tracking Algorithm Based on CNN and dynamic ROI Operation.	Jiankang HUANG Yanling XU	Shanghai Jiao Tong University
15:40 - 15:50	Xie Bin 1, Zheng Zehong 2, Xue Jiaxiang 2 1.Jiangxi Agricultural University, 2.South China University of Technology	Double Wire Arc Additive Manufacturing Technology Study of Stainless Steel by CMT+P Process		
15:50 - 16:00	Shao Minghao Beijing Institute of Petrochemical Technology	Research on Corrosion Behavior of 2219 Aluminum Alloy Double-shaft Shoulder Friction Stir Welding Joint		
16:00 - 16:10	Yu Xiaoyan, Xue Jiaxiang South China University of Technology	Characterization of 316L-Inconel625 functionally graded material fabricated by dual-wire plasma arc additive manufacturing		
16:10 - 16:20	Tao Yujie, Wang Jiankun, Luo Jin Le, Zhou Chao Wenzhou University	Application exploration and analysis of non-metal element Si in the field of high-entropy alloy additive manufacturing		
16:20 - 16:30	Chen Xiyin, Shi Yonghua, Wang Zishun, Wang Jinyi South China University of Technology	Surface Depression Prediction in Advance During K-TIG Welding Based on Sequence Features of Seam	Ruifeng LI Na LV	
16:30 - 16:40	Zhu Kanghong, Chen Weiguang, Chen Huabin Shanghai Jiao Tong University	Online monitoring and evaluation of robotic GMAW quality under complex welding scene		
16:40 - 16:50	Zhou Jinnan, Lu Sheng Jiangsu University of Science and Technology	Thermal cycle curve and performance of Friction Stir Welding assisted by bottom heating		
16:50 - 17:00	Lang Zhiyong Shanghai University Of Engineering Science	Research on Laser-MIG Composite Mobile Welding Robot for U-shaped Board of Ship		
17:00	Chengcheng Zhang, Kai Feng*	Anisotropic micorstructure and		

- 17:10	Shanghai Jiao Tong University	mechanical properties of selective laser melted CoCrFeMnNi high entropy alloy		
17:10 - 17:20	Xuebin Zhuo, Ke Chen*, Haining Yao, Min Wang, Xueming Hua Shanghai Jiao Tong University	Friction stir lap welding of dissimilar AZ31/TC4 and the interfacial microstructure		

Section 2: Selected Paper Report 2-2

South China University of Technology

Online meeting link: https://meeting.tencent.com/dm/c03k6Z24hTBT

Tencent Meeting: 267-174-967 password: 123456

Time	Speaker	Topic	Chairs	Place
15:30 - 15:40	Yu Rui, Li Wenhang Jiangsu University of Science and Technology	Underwater flux cored arc cutting procedure and mechanism of stainless steel	Long XUE Xizhang CHEN	South China University of Technology
15:40 - 15:50	Li Huicong Beijing Institute of Petrochemical Technology	Corrosion performance of magnesium alloy friction stir welding weld with silicon carbide particles as strengthening phase		
15:50 - 16:00	Deng Chengmin Beijing Institute of Petrochemical Technology	Study on the corrosion behavior of laser welding brazed joints of aluminum/copper dissimilar materials		
16:00 - 16:10	Wenlu Zhou, Xueming Hua*, Chen Shen*, Lin Wang Shanghai Jiao Tong University	Microtructure and mechanical properties of Ti-48Al-2Cr-2Nb alloy fabricated by twin-wire plasma arc additive manufacturing		
16:10 - 16:20	Xu Jingfeng, Li Taotao, Li Ruifeng Jiangsu University of Science and Technology	Study on the microstructure evolution of Mg/steel joint by laser induced arc butt fusion welding		
16:20 - 16:30	Zhen Wang, Jiankang Huang, Ding Fan Lanzhou University of Technology	Automatic control and microstructure property of arc additive manufacturing for fine grain steel	Bo CHEN Yonghua SHI	
16:30 - 16:40	Yao Xukai, Shi Bang, Yao Xiucong, Xu Congcong Wenzhou University	Research on Microstructure and Properties of Al-Co-Cr-Fe-Ni High-Entropy Alloy by dual wire Arc Additive Manufacturing		
16:40 -	Xin Heyang, Ni Jinhao, Zhao Senlin	Enhanced tensile properties of AlCoxCrFeNi high entropy alloys		

16:50	Wenzhou University	with high Co content fabricated by laser melting deposition		
16:50 - 17:00	Liu Chenhua Beijing Institute of Petrochemical Technology	An online RGB-D image three-dimensional reconstruction of welding test piece routing strategy		
17:00 - 17:10	Su Xiaoyang, Xu Guoxiang Jiangsu University of Science and Technology	Numerical analysis of hybrid plasma behavoir in rotation laser+arc hybrid fillet welding		
17:10 - 17:20	Qin Rui, Zhang Zhifen Xi'an Jiaotong University	Monitoring of Surface Hardness in Laser Shock Peening based on Modal Acoustic Emission and Cepstrum		

Section 2: Selected Paper Report 2-3

Lanzhou University of Technology

Online meeting link: https://meeting.tencent.com/dm/wOOYgC28ceGJ

Tencent Meeting: 273-204-859 password: 123456

Time	Speaker	Topic	Chairs	Place
15:30 - 15:40	Zhang Hanwen Dalian Jiaotong University	Research on Feature Inspection of Narrow Gap V-shaped Aluminum Alloy Weld	Wenhang LI Huabin CHEN	Lanzhou University of Technology
15:40 - 15:50	Hao Dong, Yan Cai*, Zihan Li, Xueming Hua Shanghai Jiao Tong University	Multiscale Feature Extraction and Its Application in The Weld Seam Quality Prediction for Plasma Arc Welding		
15:50 - 16:00	Xin Zou, Ke Chen*, Haining Yao, Min Wang, Xueming Hua, Aidang Shan Shanghai Jiao Tong University	In-depth Understanding of Chemical Interaction and Bonding Mechanism at the interface of Laminated Metal-Polymer Strip		
16:00 - 16:10	Shen Qingkai, Xue Jiaxiang South China University of Technology	Wire arc additively manufactured high-entropy alloy: microstructure and mechanical properties		
16:10 - 16:20	Ji Jinhong, Xu Guoxiang Jiangsu University of Science and Technology	Study on fluid flow in high speed roation laser+MIG hybrid welding		
16:20 - 16:30	Bi Xiaolin, Li Ruifeng Jiangsu University of Science and Technology	Microstructure and properties of 2205 duplex stainless steel fabricated by cold metal transfer (CMT) based wire and arc additive manufacture (WAAM) process		
16:30	Shuyu Huang, Fenggui Lu*,	Finite element simulation of residual		

- 16:40	Chendong Shao, Haichao Cui Shanghai Jiao Tong University	stresses in multi-pass laser cladding on low-pressure rotor		
16:40 - 16:50	Ruijie Liu, Dongshi Zhang* Shanghai Jiao Tong University	Femtosecond laser induced hierarchical LIPSS nanostructuring for tunable antireflectance and iridescence applications	Zhifen ZHANG Di WU	
16:50 - 17:00	Lin Wang, Chen Shen*, Xueming Hua*, Wenlu Zhou Shanghai Jiao Tong University	Investigation on TiAl alloy fabricated using twin-wire plasma arc additive manufacturing process: microstructure and mechanical properties		
17:00 - 17:10	Li Congwei Beijing Institute of Petrochemical Technology	Research on Process and Performance of Local Dry Underwater Laser Welding of Duplex Stainless Steel		

Section 2: Selected Paper Report 2-4

Jiangsu University of Science and Technology

Online meeting link: https://meeting.tencent.com/dm/wOOYgC28ceGJ

Tencent Meeting: 273-204-859 password: 123456

Time	Speaker	Topic	Chairs	Place
15:30 - 15:40	Li Nan, Lu Sheng Jiangsu University of Science and Technology	Study on high temperature resistance of Zirconium alloy plasma sprayed Cr/FeCrAl coatings for nuclear Application		
15:40 - 15:50	Xinglong Yao, Ding Fan, Jiankang Huang, Dequan Li Lanzhou University of Technology	Numerical simulation and experiment study of arc behavior with different content of copper vapor in GTAW	Guohong MA Fang LI	Jiangsu University of Science and Technology
15:50 - 16:00	Huangfu Lesen, Zhao Yong Jiangsu University of Science and Technology	Study on laser-MIG hybrid welding process of aluminum alloy for high-speed train under alternating magnetic field		
16:00 - 16:10	Liu Shujian Shanghai University Of Engineering Science	Research on welding seam position detection method based on arc sound energy characteristics under magnetic field excitation		
16:10 - 16:20	Li Xu, Yu Jin, Chen Huabin Shanghai Jiao Tong University	Dynamic behavior analysis of molten pool during L-DED process		
16:20 -	Wang Yifei, Wu Kaiyuan South China University of	Study on LLC Digital MIG Power Supply System Based on Bridgeless	Jialei ZHU	

16:30	Technology	PFC	Huajun ZHANG	
16:30 - 16:40	Yan Yufei Dalian Jiaotong University	Research on Recognition of Weld Feature Points Based on Connected Domain		
16:40 - 16:50	Zeng Min, Hu Xing, Yuan Song, Wang Zhuoran South China University of Technology 曾敏，胡子鑫，袁松，王卓然 华南理工大学	Research on Welding parameters of Variable polarity GMAW on Thin Plate		
16:50 - 17:00	Lei Shen, Jiankang Huang, Zhongli Huang, Ding Fan Lanzhou University of Technology	Effect of pulse frequency on microstructure and properties of 2319 aluminum alloy additive manufacturing		
17:00 - 17:10	Xu Leixin Beijing Institute of Petrochemical Technology	Research on Friction Stir Welding and Corrosion Behavior of Aluminum and Copper Dissimilar Alloys		

Section 2: Selected Paper Report 2-5

Beijing Institute of Petrochemical Technology

Online meeting link: https://meeting.tencent.com/dm/OwUW5YTuPaVj

Tencent Meeting: 539-356-378 password: 123456

Time	Speaker	Topic	Chairs	Place
15:30 - 15:40	Wang Caimei Beijing Institute of Petrochemical Technology	Research on Macro-Segregation Mechanism and Corrosion Behavior of High-Entropy Alloy Cladding	Shanlin WANG Chen SHEN	Beijing Institute of Petrochemical Technology
15:40 - 15:50	Zhang Zhengyi, Lu Sheng Jiangsu University of Science and Technology	Optimization of duty cycle and frequency parameters of ZK60 magnesium alloy under two steps voltage-increasing mode		
15:50 - 16:00	Bolun Han, Kai Feng* Shanghai Jiao Tong University	Additively Manufactured High Strength and Ductility CrCoNi Medium Entropy Alloy with Hierarchical Microstructure		
16:00 - 16:10	Cong Chen, Ke Zhang* Shanghai Jiao Tong University	Mechanism of porosity suppression in the oscillating pulse laser -TIG hybrid welding of UHSS		
16:10 - 16:20	Guo Liwei Beijing Institute of Petrochemical Technology	The Influence of Environmental Pressure on the Conductivity of GMAW Arc		

16:20 - 16:30	Qi Li, Jiankang Huang, Jianxiao Zhang, Ding Fan Lanzhou University of Technology	Study on microstructure and properties of S30408/12Cr2Mo1R dissimilar steels welded joint	Yinshui HE Yu LUO	
16:30 - 16:40	Duan Yuhang, Zhao Yong Jiangsu University of Science and Technology	Research on welding technology of super narrow gap laser wire filling welding of medium thick steel plate for bogie		
16:40 - 16:50	Dequan Li, Yi Feng, Jiankang Huang, Ding Fan Lanzhou University of Technology	Study on the diving arc behavior in the high current magnetic control GMAW process		
16:50 - 17:00	Xia Jiayi, Lu Haojie, Zhang Haoquan, Li Qiang Wenzhou University	Additive manufacturing bulk high-entropy alloys: effects of thermo-mechanical processing		
17:00 - 17:10	Tao Taoyuan, Wu Kaiyuan South China University of Technology	Study on high and low-frequency phase double-wire pulsed MIG welding for aluminum alloy		

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