# **2021 3rd International Conference** on Artificial Intelligence and **Advanced Manufacture** (AIAM 2021)

Manchester, United Kingdom 23 – 25 October 2021



IEEE Catalog Number: CFP21V44-POD **ISBN:** 

978-1-6654-1733-4

#### **Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved**

*Copyright and Reprint Permissions*: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

#### \*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	CFP21V44-POD
ISBN (Print-On-Demand):	978-1-6654-1733-4
ISBN (Online):	978-1-6654-1732-7

#### Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



### 2021 3rd International Conference on Artificial Intelligence and Advanced Manufacture (AIAM) **AIAM 2021**

### **Table of Contents**

Conference Committee	xix
Reviewers	xxii

## 2021 3rd International Conference on Artificial Intelligence and Advanced Manufacture (AIAM)

SBDNN: Straw Burning Detection Based on Improved Faster RCNN Neural Network
DSPN: Deadlock Detection and Solutions of Reachability Graphs for Petri Nets
Reliability Evaluation of Aerospace Engines Based on Performance Degradation Distribution 11 Lin Zhao (China Aerospace Academy of Systems Science and Engineering, China), Hengshan Zong (China Aerospace Academy of Systems Science and Engineering, China), Xingyu Wang (China Aerospace Academy of Systems Science and Engineering, China), Na Wang (China Aerospace Academy of Systems Science and Engineering, China), and Zeyu Jiao (Institute of Intelligent Manufacturing, GDAS, China)
<ul> <li>Analytical Modeling and Calculation of Hydrodynamic Pressure Field Caused by Rankine</li> <li>Rotating Body Based on Potential flow Theory</li></ul>
Numerical Simulation of Heat Transfer Characteristics of Special-Shaped Heat Pipe

The Single-Factor Analysis and Solution for Axial Movement of Rotating Drive Equipment	5
<ul> <li>Study on the Surface Microstructure Preparation Process Parameters of PET Based on</li> <li>Ultrasonic Embossing Technology</li></ul>	I
Thermal-Mechanical Evolution of arc Additive Manufacturing Process Through Digital Image         Correlation       33         Wenhao Zhang (Tiangong University, China; Tianjin Key Laboratory of         Modern Electromechanical Equipment Technology, Tiangong University,         China) and Haihua Liu (Tiangong University, China; Tianjin Key         Laboratory of Modern Electromechanical Equipment Technology, Tiangong         University, China)	5
Model Construction and Software Simulation Verification of Pneumatic Rear-Axle Modulese	€
<ul> <li>Study on the Influence of Gap Water Body on the Modal Characteristics of Pump Turbine</li> <li>Runner</li> <li>Daiqing Hu (Anhui Jinzhai Pumped Storage Power Co., Ltd., China), Wei</li> <li>Wang (Tsinghua University, China), Shaohua Wang (Anhui Jinzhai Pumped</li> <li>Storage Power Co., Ltd., China), and Zhengwei Wang (Tsinghua</li> <li>University, China)</li> </ul>	3
Research Status of High Entropy Thermal Barrier Coatings: A Review	7
Design of Intelligent Ring Type Internal Fixture	3
Comparative Study on the Calculation Results of Finite Element Modeling of Downlead of Substation Based on Beam Element and rod Element	5

Kinematics Analysis of Gear Transmission System of Artillery Elevating Mechanism
<ul> <li>Experimental Study on Wear Mechanism of Wire with Pre-Stranded Anti-Vibration Hammer 62</li> <li>Wenbin Li (State Grid Hebei Electric Power Research Institute, China),</li> <li>Yanting Feng (State Grid Hebei Electric Power Research Institute,</li> <li>China), Yong Wang (State Grid Hebei Electric Power Research Institute,</li> <li>China), Siming Zeng (State Grid Hebei Electric Power Research</li> <li>Institute, China), Jinkui Li (Shijiazhuang Huaneng Electric Power</li> <li>Fittings Co., Ltd., China), and Hui Zhao (Power and Mechanical</li> <li>Engineering, China)</li> </ul>
Dynamics Analysis of Moving Load and Girder of Crane Based on Vector Form Intrinsic Finite Element
Jiacheng Wang (Shanghai Maritime Univerisity, China) and Long Liu (Shanghai Maritime Univerisity, China)
Current Status and Development of Jet Engine
<ul> <li>Traditional Engines Versus all Kinds of Alternatives: Performance and Emissions</li></ul>
TASEP Model with a Single Defect Coupling on-Ramp83Lin Qi (Linyi University, China), Song Xiao (Linyi University, China),and Xiaoling Cui (Linyi University, China)
The Effect of Constrained Resources on a Synchronous TASEP Model
Dynamic Characteristics Analysis of Side Coal Bunker Structure with Hermiter Column         Transfer Layer       93         Pengfei Yang (State Nuclear Electric Power Planning, Design & Research Institute Co., Ltd, China)
Research on Seismic Performance of Side Bunker with Transfer Story of Herringbone Column96 Pengfei Yang (State Nuclear Electric Power Planning, Design & Research Institute CO., LTD, China)
Direct Generation of Tool Axis Vector for Multi-Axis NC Machining of Mesh Surface
Research on the Relaxation and Creep Characteristics of Tread Rubber Based on Thermal and Mechanical Coupling

<ul> <li>Design of Ultra-Thin and Polarization-Insensitive Perfect Metamaterial Absorber Based on four Opening of Disc</li></ul>
Multi-Dimensional Measure Identification of Rural Shrinkage Mechanism Analysis using         Entropy Method and Intelligent Calculation         Rui Li (Xi'an International Studies University, China) and Xinyi Guo         (Xi'an International Studies University, China)
<ul> <li>Reliability Analysis and Calculation of Large Caliber Naval gun Recoil Process Based on GO</li> <li>Methodology and Multi-State Combination</li></ul>
<ul> <li>Study on Tribological Properties of Hydraulic Cylinders for Intelligent Manufacturing</li></ul>
Research on Numerical Simulation of Vehicle Muffler Structure Based on Computational Fluid Dynamics
Mathematical Statistics and Discussion on the Tribological Properties of Several FrictionReducer by X-Fluorescence Spectra131Yuanyuan Sun (Jiangsu Xuzhou Construction Machinery Research131Institute, China; State Key Laboratory of Intelligent Manufacturing ofAdvanced Construction Machinery, China), Haizhe An (Jiangsu XuzhouConstruction Machinery Research Institute, China; State Key Laboratoryofof Intellige nt Manufacturing of Advanced Construction Machinery,China), Weiwei Zhu (Jiangsu Xuzhou Construction Machinery ResearchInstitute, China; State Key Laboratory of Intelligent Manufacturing ofAdvanced Construction Machinery, China), and Xiaolian Bai (JiangsuXuzhou Construction Machinery Research Institute, China; State KeyLaboratory of Intelligent Manufacturing ofAdvanced Construction Machinery, China), and Xiaolian Bai (JiangsuXuzhou Construction Machinery Research Institute, China; State KeyLaboratory of Intelligent Manufacturing of Advanced ConstructionMachinery, China)

Research and Analysis of Large Size CCGA Used Dispensing Reinforcement	:
Failure Intelligent Data Analysis Research of Last Stage Blades of Feedwater Pump Turbine in a Power Plant	
Jiawei Wang (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), Hua Fan (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), Tianjian Wang (Dongfang Electric Corporation Dongfang Turbine Co., China), Qingsong Li (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), Lei Jiang (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), and Bi Wu (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), and Bi Wu (Dongfang Electric Corporation Dongfang Turbine Co., LTD, China; State Key Laboratory of Long Life High Temperature Materials, China), China; State	
The Structure Design and Pressure-Resisting Performance Prediction About the Power DriveDevice of Autonomous Underwater Vehicles142Jinjun Jia (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), Defeng Gao (China Institute of Marine Technology & Economy, China), Jiajie Yan (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), Dapeng Jiang (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), Yuchen Liao (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), Yuchen Liao (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), and Taiyou Lu (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China)Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China), and Taiyou Lu (Sun Yat-sen University, China; Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China)	
Analysis on Influencing Factors of Mechanical Characteristics of Four-Split Downlead in Substation	
Typical Architecture and System Integration of Digital Factories in Discrete Industries	1
Design of Intelligent Proofreading System Based on Artificial Intelligence	I

A Large Scale Extended Algorithm for 2D Halton Points with Low-Discrepancy Sequences 163 Wenxing Chen (Wuhan University, China), Shuyang Dai (Wuhan University, China), and Baojuan Zheng (Commercial Vehicle Technology Center of SAIC Motor Group Co., Ltd, China)
Real-Time Detection and Early Warning of Driving Fatigue Based on Basic Scale Entropy
A Brief Investigation for Techniques of Deep Learning Model in Smart Grid
Non-Destructive Measurement of Apple Sugar Content Based on Capsule Net
Neural Network-Based Optimization of Rescue Performance of Nitrogen Explosion Type Hydraulic Breaker
Robot Flexible Polishing Methods for Curved Mold and Adaptive Impedance Control
<ul> <li>Design of Online Measurement System for Molten Pool Morphology in Selective Laser Melting (SLM) Process</li></ul>
Trend of Intelligent Robot Application Based on Intelligent Agriculture System
The Realization of Automatic Calibration of Body Scale by a Lever-Type Body Scale       210         Calibration Device       210         Lili Zhang (Shanghai Institute of Measurement and Testing Technology,       210         China), Kun Liu (Shanghai Institute of Measurement and Testing       7         Technology, China), and Juan Zhao (Shanghai Institute of Measurement and Testing       7         and Testing Technology, China)       7
A Simple Method for Estimate Critical Velocity of Cold Spraying Via SP

Research on Floyd Algorithm in Route Optimization of Dangerous Goods Transportation Under Artificial Intelligence	222
<ul> <li>VGG-S: Improved Small Sample Image Recognition Model Based on VGG16</li> <li>Xuesong Jin (Harbin University of Commerce, China), Xin Du (Harbin University of Commerce, China), and Huiyuan Sun (Harbin University of Commerce, China)</li> </ul>	. 229
Design and Implementation of Supermarket Shopping Robot Xiaomin Zhang (Ningbo University of Finance & Economics, China), Qianhao Xu (Ningbo University of Finance & Economics, China), Beng Li (Ningbo University of Finance & Economics, China), and Li Liu (Ningbo University of Finance & Economics, China)	233
Path Planning of Arc Additive Remanufacturing for Defective Castings Chenxu Duan (Sichuan University Jinjiang College, China) and Pan Zhang (Sichuan University Jinjiang College, China)	. 237
Deep Learning-Based Comparative Modeling of Carbon Emissions Projections Dacheng Hou (Zhejiang Ocean University, China), Haoyu Zhang (Zhejiang Ocean University, China), Lili Li (Zhejiang Ocean University, China), Xiaojun Wang (Zhejiang Ocean University, China), Yifan Lin (Zhejiang Ocean University, China), and Huandi Du (Zhejiang Ocean University, China)	. 241
Design of English Writing System Based on Machine Learning Huimin Zhao (Bohai University, China) and Yingshu Yu (Jinzhou Modern Service School, China)	. 252
Flow-Pronged Defense Against Adversarial Examples Shenghong He (Yunnan University Kunming, China), Chao Yi (Yunnan University Kunming, China), Zongheng Zongheng (Yunnan University Kunming, China), and Yunyun Dong (Yunnan University Kunming, China)	256
Infrared Ship Target Segmentation Based on Active Contour Model Ruiying He (Chongqing City Vocational College Chongqing, China)	261
Predictive Analysis and Research Of Python Usage Rate Based on Polynomial Regression Model Yang Gong (Sichuan University, China) and Pan Zhang (Sichuan University, China)	. 266
Interactive Attention Graph Convolution Networks for Aspect-Level Sentiment Classification Hu Han (Lanzhou Jiaotong University Lanzhou, China), Xiaoya Qin (Lanzhou Jiaotong University Lanzhou, China), and Qitao Zhao (Lanzhou Jiaotong University Lanzhou, China)	271
Performance of Reinforcement Learning on Traditional Video Games Yuanxi Sun (New York University Center for Data Science, USA)	276

<ul> <li>Adjustable Load Capacity Forecasting Technology Based on Unsupervised Learning</li></ul>
Elite Parallel Cuckoo Search Algorithm for Regional Coverage Control Problem in High-Density Wireless Sensor Networks
Short-Term Passenger Flow Forecasting Method Based on Multi-Model Combination
<ul> <li>An Artificial Neural Network Optimized by Sparrow Search Algorithm for Predicting the</li> <li>Boiling Point Temperature of Working Fluid</li></ul>
Research and Realization of Air Quality Grade Prediction Based on KNN
Security Assessment of Enterprise Networks Based on Analytic Network Process and Evidence Theory
Transmission Method of the Rendered Image Based on Cube Environment Mapping
Rendering and Transmission Method Based on Model Resolution Expression and User Action Prediction
Application of Artificial Intelligence in Libraries

The Mechanical Performance of 3D Printed Circuit Board330Mengmeng Li (Systems Engineering Research Institute, China StateShipbuilding Corporation Limited, China), Shimin Zhai (SystemsEngineering Research Institute, China State Shipbuilding CorporationLimited, China), Jiming Wang (Systems Engineering Research Institute,China State Shipbuilding Corporation Limited, China), and Ran Wang(Systems Engineering Research Institute, China State ShipbuildingCorporation Limited, China)	)
Intelligently Identified Drug Delivery Car Based on Template Matching	F
<ul> <li>Small Signal Voltage-Frequency Conversion Processing Method for SF6 Sensor</li></ul>	)
Design of A Differential Wheeled Trolley Based on ROS Robot Operating System	3
Hierarchical Recommendation Algorithm Incorporated with Book Descriptions	3
The Design of the Hybrid Intrusion Detection System ABHIDS	F
Identification of Partial Discharge Fault Type and Sensitivity Analysis of Joint Detection Based on Clustering Algorithm	•
Active Learning Approach for Spam Filtering	5
Path Planning for Welding Robot Based on Ant Colony Optimization Algorithm	L
Fish Behavior Detection using Computer Vision: A Review	;
Traceability System for Rare Chinese Herbal Medicines Based on Blockchain Structure	<u>}</u>
A Survey of Research on Image Style Transfer Based on Deep Learning	5

Evolution of Intelligent Feeding System for Aquaculture: A Review
Research Progress in the Field of Image Completion
Optimal Design of Intelligent Logistics Center Storage Location B Based on Apriori
An Improved ICP Point Cloud Registration Algorithm Based on Three-Points Congruent Sets 407 Peng Yu (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Yongqian Yang (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Aizhong Tian (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Changqing Du (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Xiaofan Liu (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Biying Pei (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Kaixin Gu (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Yimu Guo (State Grid Jiangsu Electric Power Engineering Consulting Co., China), and Songyang Che (State Grid Jiangsu Electric Power Engineering Consulting Co., China), Kaixin Go., China), and Songyang Che (State Grid Jiangsu Electric Power Engineering Consulting Co., China)
Design of Intelligent Power Distribution Cabinet Based on Intelligent Distribution Network
Paraphrase Identification Based on Interpretable Mechanism
Diesel Engine Status Prediction Based on Fluid Spectral Analysis
Image Recognition of Human Faces Based on BP Neural Network and Particle Swarm         Optimization       428         Jichao Feng (Hainan University, China) and Ting Gong (Hainan         University, China)
<ul> <li>Weight Estimation Method of Coal and Gangue on Conveyor Belt Based on Instance</li> <li>Segmentation</li></ul>
One-Dimensional Aerodynamic Design of Micro Radial Turbine Based on Genetic Algorithm 436 Chao Li (Inner Mongolia University of Technology, China) and Zhiping

Guo (Inner Mongolia University of Technology, China)

Using Graph Attention Network to Predicte Urban Traffic Flow	
<ul> <li>Evaluation and Decision Methods for Product Configuration Design Process Based on Network</li> <li>Planning Technology with the Demand Preferences of Customers</li></ul>	
Innovative Evaluation Method of Academic Papers in Colleges and Universities Based on Deep         Learning       453         Jinhang Liu (Hubei University of Technology, China)	
<ul> <li>Evaluation of Vehicle Body Styling Based on AHP and EWM Method</li></ul>	
<ul> <li>Finite Element Simulation Analysis of Temperature Field of MEMS Gas Sensor Based on ANSYS</li> <li>Software</li></ul>	
Research on Intrusion Detection Technology of Electric Control System Based on Machine       472         Learning       472         Xiaolong Li (Power Science Research Institute of State Grid Ningxia       472         Electric Power Co., LTD, China), Xinghua Li (Power Science Research       1         Institute of State Grid Ningxia Electric Power Co., LTD, China), Feng       472         Wang (Power Science Research Institute of State Grid Ningxia Electric       472         Power Co., LTD, China), Dongge Zhu (Power Science Research Institute       472         of State Grid Ningxia Electric Power Co., LTD, China), and Yanqing       472         Yang (Beijing University of Posts and Telecommunications, China)       472	
Research on Path Planning Algorithm of Service Robot in Dynamic Environment	
<ul> <li>A Scene Text Detection Algorithm with Multiple Feature Fusion Based on Multiple Kernel</li> <li>Support Vector Machine</li></ul>	

Using Systematic Clustering to Improve Innovation and Enterprise Curriculum Keyword Selection in Search Engine Optimization
Industrial Control Intelligent Operation and Maintenance System Based on Zigbee Wireless Communication Technology
Research on Intelligent Operation Support Technology for 5G Nuclear-Powered Ships
Power Data Quality Optimization and Evaluation Based on BPNN
Efficient Management of Power Grid Technical Transformation Project Under the Environment of Power Internet of Things Based on Kmeans++
Product Information Visualization Systems in the Era of Intelligence
Data Mining and Business Intelligence in SME Customer Relationship Value Analysis
Unmanned Aerial Vehicle Cluster Operations Under the Background of Intelligentization

Research on the Intelligent Monitoring System and the Prediction Model of the Stray Current in Rail Traffic
Research and Application of Instrument Reading Recognition Algorithm Based on Deep Learning
Research on Face Recognition Based on Deep Learning
The Structure Design of an Intelligent Pop Can Recycling Device
<ul> <li>Preparation of Gradient Porous TiAl Intermetallics with Additive Manufacturing Technology 552</li> <li>Yucheng Shang (Wuhan Polytechnic University, China), Wei Hui (Wuhan</li> <li>Polytechnic University, China), Junjie Li (Wuhan Polytechnic</li> <li>University, China), Weilin Chen (Wuhan Polytechnic University, China),</li> <li>Tianen Xie (Wuhan Polytechnic University, China), and Junsheng Yang</li> <li>(Wuhan Polytechnic University, China)</li> </ul>
Simulation Study on Vibration of Wind Turbine with Double-Forked Blade Tip Structure
Research on EEMD-MCKD Method of Bearing Vibration Feature Extraction
Intelligent Parking Space Sharing System
Effect of Different Powder Size on the Pore Properties of Porous Ti-33Al Intermetallics Fabricated by Add Material Manufacture

Design of Financial Data Feature Forecast System Based on Clustering Algorithm
Multi-Robot Cooperative Hunting Based on Virtual Reality Technology
Research on the Design of Household Intelligent Sorting Garbage Bins Based on Raspberry Pi 584 Aiqin Lin (Liaoning Economy Vocational and Technical College, China)
Fault Diagnosis Method and Application of Direction Axis Kernel Partial Least Squares
Realization of Intelligent Cleaning Control System for Photovoltaic Modules
Influence of Blade Tip Structure Change on Aerodynamic Noise of Wind Turbine Under Yaw 597 Yao Hu (Shanghai DianJi University, China), Yuanjun Dai (Shanghai DianJi University, China), and Baohua Li (Shanghai DianJi University, China)
Research on Ultrasonic Phased Array Inspection Parameter Setting Based on 3D Imaging and Multi-Signal Characterizationy
Optimal Configuration of Positioning Device Based on Single-End and Double-End Fusion Positioning

Author Index	
--------------	--