

# **2023 15th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC 2023)**

**Hangzhou, China  
26-27 August 2023**



**IEEE Catalog Number: CFP2339H-POD  
ISBN: 979-8-3503-2618-5**

**Copyright © 2023 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:	CFP2339H-POD
ISBN (Print-On-Demand):	979-8-3503-2618-5
ISBN (Online):	979-8-3503-2617-8
ISSN:	2157-8974

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2023 15th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC) **IHMSC 2023**

## Table of Contents

Preface .....	xii
Committees .....	xiii
Reviewers .....	xv
Organizers and Sponsor .....	xviii

### 2023 15th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC)

Memetic Beluga Whale Optimization for Feature Selection .....	1
<i>Jinrui Gao (University of Toyama, Japan), Ziqian Wang (University of Toyama, Japan), Baohang Zhang (University of Toyama, Japan), Zhenyu Lei (University of Toyama, Japan), Yuki Todo (Kanazawa University, Japan), and Shangce Gao (University of Toyama, Japan)</i>	
Relationship Between Alarm Signal Urgency, Annoyance and Suitability and Its Implications in Man-Machine Interface Design .....	6
<i>Yeqing Pei (Beijing Institute of Fashion Technology, China)</i>	
Design of Intelligent Water Blocking System for Underground Garage .....	11
<i>Ye Jian (Tongji Zhejiang College, China) and Liao Yan (Tongji Zhejiang College, China)</i>	
Object Tacking with Siamese Convolution Network re-Detection .....	15
<i>Wei Wang (Chongqing University of Technology), Zhengbang Yan (Chongqing University of Technology), and Wenjun Quan (Chongqing University of Technology)</i>	
Index t-SNE Based on Sobol Sequence Initialized Harris Hawk Optimization Algorithm .....	19
<i>Yuanzhao Zhang (Huzhou College, China), Linsong Wei (Huzhou College, China), Wei Nai (Huzhou College, China), Dan Li (Huzhou College, China), and Zan Yang (Huzhou College, China)</i>	
Logistic Regression Based on Faure Sequence Initialized Fruit Fly Optimization Algorithm .....	24
<i>Xinsheng Sun (Huzhou College, China), Yingjie Wang (Huzhou College, China), Zan Yang (Huzhou College, China), Wei Nai (Huzhou College, China), and Dan Li (Huzhou College, China)</i>	

Distributed Spectrum Resource Allocation via Stochastic Learning in Potential Games .....	28
<i>Changhao Sun (China Academy of Space Technology, China), Qingrui Zhou (China Academy of Space Technology, China), and Huaxin Qiu (Beihang University, China)</i>	
Improving Robustness of CNN on Noisy Labels with Hinge Loss Function .....	32
<i>Fengyu Gao (Fujian Polytechnic Normal University, China), Chien-Hua Chen (Kaohsiung Municipal United Hospital, Taiwan), Hong Zhang (Fujian Polytechnic Normal University; Key Laboratory of Nondestructive Testing of Fujian Polytechnic Normal University, China), and Shih-Yen Hsu (I-Shou University, Taiwan)</i>	
Analysis on Computer-Aided Diagnosis of Breast Tumors Based on GA-SVM .....	36
<i>Shufang Zhou (The Second Affiliated Hospital of Zunyi Medical University, China) and Xiaoyong Liu (Zunyi Normal University, China)</i>	
GoogLeDNet: GoogLeNet with Dendritic Learning for Image Classification .....	41
<i>Yaotong Song (University of Toyama, Japan), Houtian He (University of Toyama, Japan), Zhiming Zhang (University of Toyama, Japan), Jiayi Li (University of Toyama, Japan), Zhipeng Liu (University of Toyama, Japan), and Shangce Gao (University of Toyama, Japan)</i>	
Classification of Arrhythmia Based on the Fusion of MobileNet and BiLSTM Models .....	45
<i>Mingxuan Tang (Hohai University, China), Yibo Fan (Hohai University, China), Junzhe Huang (Hohai University, China), Peng Gao (Hohai University, China), and Yan Zhan (Hohai University, China)</i>	
COVID-19 Fake News Detection Using Transformer Based Model .....	49
<i>Mahdieh Ghafourianaghahasnpour (York University, Canada), Youwu Liu (York University, Canada), Zijiang Yang (York University, Canada), and Edward Hongfei Zhang (St. Robert Catholic High School, Canada)</i>	
Digital Twin-Based job Shop Deviation Detection and Real-Time Scheduling .....	53
<i>Hongxia Cai (Shanghai University, China) and Xiaoyu Chen (Shanghai University, China)</i>	
Continuous Human Gait Phase Estimation Considering Individual Diversity .....	59
<i>Xingxuan Zhang (Chinese Academy of Sciences; University of Chinese Academy of Sciences, China), Haojian Zhang (Chinese Academy of Sciences, China), Jianhua Hu (Chinese Academy of Sciences, China), and Yunkuan Wang (Chinese Academy of Sciences, China)</i>	
Modeling and Simulation of User Behavior Under the Influence of Network Information Cocoon....	63
<i>Hao Song (South China University of Technology, China) and Danxiang Ai (Guangdong University of Technology, China)</i>	
HJADE: An Efficient Differential Evolution with Complex Nonlinear Population Size .....	67
<i>Qianyu Zhu (University of Toyama, Japan), Yifei Yang (University of Toyama, Japan), Haotian Li (University of Toyama, Japan), Shibo Dong (University of Toyama, Japan), Yuki Todo (Kanazawa University, Japan), and Shangce Gao (University of Toyama, Japan)</i>	
An Event Early Warning Method Based on Knowledge Base and Semantic Fingerprint .....	72
<i>Xiaojin Wang (China Mobile(Hangzhou) Information Technology Co., Ltd., China) and Ying Zhang (China Mobile(Hangzhou) Information Technology Co., Ltd., China)</i>	

Intelligent Data Management Practice Under Ocean Shipping Based on Data Lifecycle Theory .....	76
<i>He Jing (China Institute Of Marine Technology &amp; Economy, China) and Chen Ming-Jun (China State Shipbuilding Cultural &amp; Mediatech (Beijing) Co., Ltd., China)</i>	
Calligraphy's Reflective Expression: Intelligent Chinese Calligraphy Affective and Style Recognition .....	80
<i>Baixi Xing (Zhejiang University of Technology, China), Yanhong Pan (Zhejiang University of Technology, China), Qimeng Chen (Hangzhou Dianzi University, China), Xinjie Song (Zhejiang University of Technology, China), Kaiqi Wang (Zhejiang University of Technology, China), and Yuehan Shi (Zhejiang University of Technology, China)</i>	
User-Attention Based Product Aesthetics Evaluation with Image and Eye-Tracking Fusion Data Analysis .....	84
<i>Baixi Xing (Zhejiang University of Technology, China), Xinjie Song (Zhejiang University of Technology, China), Qimeng Chen (Hangzhou Dianzi University, China), Lei Shi (Newcastle University, UK), Yanhong Pan (Zhejiang University of Technology, China), Kaiqi Wang (Zhejiang University of Technology, China), and Mengyue Tang (Zhejiang University of Technology, China)</i>	
User Emotion Status Recognition in MOOCs Study Environment Based on Eye Tracking and Video Feature Fusion .....	88
<i>Baixi Xing (Zhejiang University of Technology, China), Kaixi Wang (Zhejiang University of Technology, China), Xinjie Song (Zhejiang University of Technology, China), Yanhong Pan (Zhejiang University of Technology, China), Yuehan Shi (Zhejiang University of Technology, China), and Siyu Pang (Zhejiang University of Technology, China)</i>	
Research On Overload Monitoring Technology for Bridges Based on Fast DIC and Deep Learning...	92
<i>Binghai Li (China Construction Fifth Engineering Bureau Co., Ltd., China), Ziyang Niu (China Construction Fifth Engineering Bureau Co., Ltd., China), Hua Tian (China Construction Fifth Engineering Bureau Co., Ltd., China), Daping Li (China Construction Fifth Engineering Bureau Co., Ltd., China), Hongbo Lang (China Construction Fifth Engineering Bureau Co., Ltd., China), Qingxiang Zhao (China Construction Fifth Engineering Bureau Co., Ltd., China), Banfu Yan (Hunan University, China), and Zimu Xiao (China Construction Fifth Engineering Bureau Co., Ltd., China)</i>	
Adaptive Chatter-Free Non-Singular Fast Terminal Sliding Mode Attitude Control for Rigid Spacecraft .....	97
<i>Jinhe Yang (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences, China), Tongjian Guo (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China), Quanliang Dong (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences, China), and Yi Yu (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China)</i>	
Design of Wireless Data Acquisition System .....	103
<i>Wendian Zhang (Changchun Automobile Industry Institute, China)</i>	

Water Bloom Prediction Method Based on Holt-Winters-LSTM .....	108
<i>Chao Wang (Hohai University, China) and Xiaofeng Zhou (Hohai University, China)</i>	
Dendritic Learning-Based DenseNet for Classification .....	112
<i>Yidong Cao (University of Toyama, Japan), Zhipeng Liu (University of Toyama, Japan), Zhiming Zhang (University of Toyama, Japan), Rong-Long Wang (University of Fukui, Japan), Meng Jia (Xi'an University of Technology, China), and Shangce Gao (University of Toyama, Japan)</i>	
Design of Computer Vision Based Construction Progress Monitoring System .....	116
<i>Daping Li (China Construction Fifth Engineering Bureau Co., Ltd.; Zhejiang University, China), Hua Tian (China Construction Fifth Engineering Bureau Co., Ltd., China), Hongbo Lang (China Construction Fifth Engineering Bureau Co., Ltd., China), Ziyang Niu (China Construction Fifth Engineering Bureau Co., Ltd., China), Qingxiang Zhao (China Construction Fifth Engineering Bureau Co., Ltd., China), and Lijun Wen (China Construction Fifth Engineering Bureau Co., Ltd., China)</i>	
Research on Visualization Element Model for Digital Media Animation Script .....	120
<i>Renming Qiao (Nankai University, China)</i>	
Robot Path Planning Algorithm Based on Improved Q-Learning in Dynamic Environment .....	124
<i>Liu Jiale (Hohai University, China), Wang Bing (Hohai University, China), Chen Yuquan (Hohai University, China), Wu Yong (Hohai University, China), and Ren Chen (State Grid Shanghai Electric Power Company Electric Power Research Institute, China)</i>	
Fractional-Order Particle Swarm Optimization for Sustainable Energy Management .....	128
<i>Ningning Wang (Tokyo Language Education Academy, Japan), Zhenyu Lei (University of Toyama, Japan), Haotian Li (University of Toyama, Japan), Tao Zheng (University of Toyama, Japan), Ting Jin (Nanjing Forestry University, China), and Shangce Gao (University of Toyama, Japan)</i>	
Adaptive Synchronization in Lipschitz-Type Multilayer Heterogeneous Networks Subject a Leader .....	133
<i>Huihui Yang (Huzhou College, China) and Xin Jin (University of Electronic Science and Technology of China, China)</i>	
A Multi-sensor Fusion Localization Algorithm via Dynamic Target Removal .....	138
<i>Yongxing Jia (Army Engineering University of PLA, China), Zikai Ni (Army Engineering University of PLA, China), Xue Ni (Army Engineering University of PLA, China), Xiaojian Qian (Army Engineering University of PLA, China), and Jiaqi Zhao (Army Engineering University of PLA, China)</i>	
An Individualized HRTF Model Based on Random Forest and Anthropometric Parameters .....	143
<i>Teng Yuqi (South China University of Technology, China) and Xiaoli Zhong (South China University of Technology, China)</i>	

Effects of Background Sound Type and Intensity in Confined Space on Auditory Working Memory .....	147
<i>Shang Hu (Zhejiang University of Technology, China), Hongting Li (Zhejiang University of Technology, China), Shaowen Ding (China Astronaut Research and Training Center, China), Litao Wu (China Astronaut Research and Training Center, China), and Changhua Jiang (China Astronaut Research and Training Center, China)</i>	
Effects of Interior Lighting in Confined Space on Cognition and Performance .....	151
<i>Shenshen Xie (Zhejiang University of Technology, China), Zaoyi Sun (Zhejiang University of Technology, China), Shaowen Ding (China Astronaut Research and Training Center, China), Litao Wu (China Astronaut Research and Training Center, China), and Changhua Jiang (China Astronaut Research and Training Center, China)</i>	
Bayesian Game Analysis on the Contradictional Relationship Between Lawyers and Parties .....	155
<i>Fujian Sun (University of International Relations, China) and Jingling Shu (China University of Political Science and Law, China)</i>	
Solar Powered IOT Based Remote Patient Monitoring System to Measure Vital Body Signs .....	159
<i>Mehedi Noor Khan (Independent University, Bangladesh), Fariha Sayeed Oishi (Independent University, Bangladesh), Kazi Mayesha Mehzabin (Independent University, Bangladesh), Mehadi Hassan Khan (Independent University, Bangladesh), Mohammad Rejwan Uddin (Independent University, Bangladesh), and Mahady Hasan (Independent University, Bangladesh)</i>	
Automatic Product Sorting and Packaging System .....	163
<i>Sabrina Haque (Independent University, Bangladesh), Samira Binte Khair (Independent University, Bangladesh), Mahib Sadman (Independent University, Bangladesh), Sanzida Nadia (Independent University, Bangladesh), Mohammad Shidujaman (Independent University, Bangladesh), Mohammad Rejwan Uddin (Independent University, Bangladesh), and Mahady Hasan (Independent University, Bangladesh)</i>	
Solar Powered Water Trash Collector Robot .....	168
<i>Sanjana Raquib Bijoya (Independent University, Bangladesh), Tahseen Ahmed Bhuiyan (Independent University, Bangladesh), Foyzul Hoque (Independent University, Bangladesh), Mehadi Hassan Khan (Independent University, Bangladesh), Mahady Hasan (Independent University, Bangladesh), and Mohammad Rejwan Uddin (Independent University, Bangladesh)</i>	
Design of Intelligent Access Control System Based on Baidu Tiangong Internet of Things Cloud Platform .....	173
<i>Chi Xiao (Wuhan Business University, China), Tao Zhang (Wuhan Business University, China), Yuting Zeng (Wuhan Business University, China), Jun He (Wuhan Business University, China), Jingting Huang (Wuhan Business University, China), and Yan Wang (Wuhan Business University, China)</i>	
Research on Visual Object Feature Extraction .....	177
<i>Wendian Zhang (Changchun Automobile Industry Institute)</i>	

Multi-modal Attention Encoder-Decoder Model for Fine-Grained Air Quality Prediction .....	181
<i>Zixu Sun (Nanjing University of Aeronautics and Astronautics, China)</i>	
<i>and Jie Hao (Nanjing University of Aeronautics and Astronautics, China)</i>	
Design of Intelligent Clothesline Based on the Internet of Things .....	186
<i>Wendian Zhang (Changchun Automobile Industry Institute) and Liang Liang (Beijing Jingwei Hengrun Technology Co, Ltd)</i>	
Vehicle Target Detection in Aerial Images Based on Improved YOLOv5 .....	190
<i>Tiegang Bai (Criminal Investigation Police University of China, China), Fubin Shi (Shenyang Aerospace University, China), Zhipeng Wang (Shenyang Aerospace University, China), and Yang Liu (Shenyang Aerospace University, China)</i>	
Human Activity Recognition Based on a Cascade Network Architecture Composed of DFSMN and ACGAN .....	194
<i>Jinfeng Xie (Beijing University of Chemical Technology, China), Liang Xiao (Beijing University of Chemical Technology, China), and Cangju Xing (Beijing University of Chemical Technology, China)</i>	
Clustering AI Patent Fields and Enterprises Based on Hypergraph Partitioning Method .....	199
<i>Chengjie Tang (Zhejiang University, China), Xiaoyu Zhang (Zhejiang University, China), Jiangjie Huang (Zhejiang University, China), and Yongchuan Tang (Zhejiang University, China)</i>	
Design of Environment Monitoring System Based on Single-Chip Microcomputer .....	206
<i>Fan Wang (Hubei University, China), Guojun Liu (Hubei University, China), Wei Zhang (Hubei University, China), and Wen Wang (Hubei University, China)</i>	
EEG-Based Hardware-Oriented Lightweight 1D-CNN Emotion Classifier .....	210
<i>Shenghao Cao (Southeast University, China), Hao Liu (Southeast University, China), Zonghao Hou (Southeast University, China), Xinhe Li (Southeast University, China), and Zhongxing Wu (Southeast University, China)</i>	
An Adversarial Learning with Sum of Top-K Loss Framework for Credit Card Fraud Detection ....	214
<i>Yifan Yan (Fudan University, China), Quanzhou Xiang (Fudan University, China), Ziyuan Li (The Hongkong and Shanghai Banking Co. Ltd, China), Yong Xia (The Hong Kong and Shanghai Banking Co. Ltd, China), Bing Zhu (The Hongkong and Shanghai Banking Co. Ltd, China), and Rujun Jiang (Fudan University, China)</i>	
Automatic Evaluation of Facial Paralysis with Transfer Learning and Improved ResNet34 Neural Network .....	218
<i>Runshu Fu (Fudan University, China) and Guohui Zhou (Fudan University, China)</i>	



Exploring the Integration of Digital Twin and Generative AI in Agricultur .....	223
<i>Jian Liu (Chinese Academy of Inspection and Quarantine, China), Yongqi Zhou (Hybrid Cloud Solution, SSG/TSD, Lenovo, China), Yu Li (Insitute of Standardization of the XinJiang Uygur Autonomous Region), Yong Li (Institute of Product Quality Supervision and Inspection of the XinJiang Uygur Autonomous Region), Sha Hong (Chinese Academy of Inspection and Quarantine, China), Qiang Li (Institute of Product Quality Supervision and Inspection of the XinJiang Uygur Autonomous Region), Xin Liu (Beijing University of Technology, China), Ming Lu (Hybrid Cloud Solution, SSG/TSD, Lenovo, China), and Xing Wang (Taiyuan University of Science and Technology, China)</i>	
Key Quality Feature Identification and Quality Prediction in Complex Manufacturing Processes .....	229
<i>Hongxia Cai (Shanghai University, China) and Zhiqiang Rong (Shanghai University, China)</i>	
Auto Disturbance Rejection Control Based on a Neural Network Predictive State Observer .....	233
<i>Shengzhi Du (Tshwane University of Technology, South Africa), BJ van Wyk (Tshwane University of Technology, South Africa), NFS Nahri (Tshwane University of Technology, South Africa), and Chunling Tu (Tshwane University of Technology, South Africa)</i>	
An Improved Plant Disease Detection Method Based on YOLOv5 .....	237
<i>Hongxia Cai (Shanghai University, China) and JiaYing Jiang (Shanghai University, China)</i>	
Using Linkography to Quantitatively Analyze the Design Ideation of AI Agents .....	241
<i>Jiangjie Huang (Zhejiang University; Wuzhou University, China), Xiaoyu Zhang (Zhejiang University, China), and Yongchuan Tang (Zhejiang University, China)</i>	
Design of a Virtual Reality-Based Mandala Painting Assisted Therapy System .....	245
<i>Changle Xie (South China University of Technology, China), Wei Xiong (South China University of Technology, China), and Yanhui Guo (Guangzhou Panyu Vocational and Technical College)</i>	
Research on Grouping Method of Medium- and Long-Term Observation Missions Based on Large-Scale Remote Sensing Satellite Constellation .....	250
<i>Jun Zhi (Beijing Institute of Remote Sensing Information, China), Shangru Teng (Beijing Institute of Remote Sensing Information, China), Bin Zuo (Beijing Institute of Remote Sensing Information, China), and Chao Zhao (The 54th Research Institution of CETC, China)</i>	
<b>Author Index .....</b>	<b>255</b>