湖北工業大學 HUBEI UNIVERSITY OF TECHNOLOGY

IEEE

IC-IDC 2026

2026 INTERNATIONAL CONFERENCE ON
INTELLIGENT DESIGN AND COMPUTING

2026年智能设计与计算国际学术会议

会议手册

CONFERENCE PROGRAM

武汉 May 15-17, 2026 Wuhan, China

Sponsored by: Hubei University of Technology

Organized by: School of Arts & Design, Hubei University of Technology
School of Digital Art Industry Institute, Hubei University of Technology
School of Computer Science and Artificial Intelligence, Hubei University of Technology
School of Big Data and Artificial Intelligence Industry, Hubei University of Technology
Hubei Design and Research Center of Cultural and Crestive Industry

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尊敬的各位专家学者：

您好！热忱欢迎您莅临美丽的武汉，参加2026年智能设计与计算国际学术会议（IC-IDC 2026）。为确保您在会议期间顺利开展学术交流，敬请仔细阅读本会议手册。

会场地点：湖北工业大学图书馆报告厅

Dear Distinguished Guests,

Warmly welcome to the beautiful city of Wuhan for the 2026 International Conference on Intelligent Design and Computing (IC-IDC 2026). To ensure a smooth academic exchange during the conference, please read the conference program carefully.

Venue: Hubei University of Technology, Library Lecture Hall

会议简介 About IC-IDC 2026

2026 International Conference on Intelligent Design and Computing (IC-IDC 2026) will be held in Wuhan, China, from May 15 to 17, 2026. The conference brings together experts, scholars, engineers, and researchers from around the world in the fields of intelligent design and computing, and aims to provide a high-level international platform for academic exchange and collaboration.

Focusing on the latest research progress, emerging trends, and industrial applications in intelligent design and computing, IC-IDC 2026 is dedicated to promoting the exchange of research findings, strengthening academic communication, and fostering the integration of industry, academia, and research. Through keynote speeches, thematic sessions, and other academic activities, the conference will address key technologies and innovative directions in related fields, broaden research horizons, and support the transformation of academic achievements into practical applications.

We warmly welcome colleagues from universities, research institutions, and industry worldwide to join us in this event and contribute to the innovative development of intelligent design and computing.

组织单位 Organizations

◆ **Sponsored by:**

Hubei University of Technology

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School of Arts & Design, Hubei University of Technology

School of Digital Art Industry Institute, Hubei University of Technology

School of Computer Science and Artificial Intelligence, Hubei University of Technology

School of Big Data and Artificial Intelligence Industry, Hubei University of Technology

Hubei Design and Research Center of Cultural and Crestive Industry

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School of Media and Art Design, Wuhan Donghu University

The Hubei Province Yangtze River Culture Institute

Hubei Cultural and Creative Industry Association

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Asia Design Week

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会议议程 Conference Agenda

2026年5月16日	May 16, 2026	
08:00-09:00	签到	Registration	签到地点：湖北工业大学图书馆报告厅 Venue: Hubei University of Technology, Library Lecture Hall
会场地点：湖北工业大学图书馆报告厅 Venue: Hubei University of Technology, Library Lecture Hall Online Zoom ID: 864 8310 5537 Password: 20260516		
Hosts: Jian Rao (Welcome Speech), Zhiwei Ye		
09:00-09:10	开幕式&欢迎致辞	Opening Ceremony & Welcome Speech	
09:10-09:20	会议合照	Photography	
**大会报告	Keynote Speeches**		
09:20-09:45	覃京燕 教授，北京科技大学（人工智能学院 副院长） Prof. Jingyan Qin, Beijing University of Science and Technology	
09:45-10:10	谭浩 教授，湖南大学（文化与媒体计算研究学院 院长） Prof. Hao Tan, Hunan University	
10:10-10:35	鲁艺 教授，北京工业大学（艺术设计学院 副院长） Prof. Yi Lu, Beijing University of Technology	
10:35-10:45	茶歇	Coffee Break	
10:45-11:10	阿克斯·赫特 教授，佩奇大学 Prof. Akos Hutter, University of Pécs	
11:10-11:35	唐智川 教授，浙江工业大学（设计与建筑学院 副院长) Prof. Zhichuan Tang, Zhejiang University of Technology	
11:35-12:00	孙凌云 教授，浙江大学（国际设计研究院 院长） Prof. Lingyun Sun, Zhejiang University	
12:00-14:00	午餐	Lunch（楚风苑）	

会议议程 Conference Agenda

2026年5月16日	May 16, 2026 口头报告	Oral Presentation Session: Artificial Intelligence and Generative Design	
会场地点：湖北工业大学图书馆报告厅 Venue: Hubei University of Technology, Library Lecture Hall Online Zoom ID: 864 8310 5537 Password: 20260516			
Hosts: Ziqi Liu, Xinyi Wang			
14:00-14:10	1. 孟宇婷，沈阳航空航天大学 Yuting Meng, Shenyang Aerospace University		
14:10-14:20	2. 熊诗祺，湖北工业大学 Shiqi Xiong, Hubei University of Technology		
14:20-14:30	3. 任佳煊，浙江师范大学 Jiaxuan Ren, Zhejiang Normal University		
14:30-14:40	4. 刘珂茹，沈阳航空航天大学 Keru Liu, Shenyang Aerospace University		
14:40-14:50	5. 王宇晨，北京理工大学 Yuchen Wang, Beijing Institute of Technology		
14:50-15:00	6. 高颖，沈阳航空航天大学 Ying Gao, Shenyang Aerospace University		
15:00-15:10	7. 周梦娇，湖北工业大学 Mengjiao Zhou, Hubei University of Technology		
15:10-15:20	8. 韩瑞鹏，西安工程大学 Ruipeng Han, Xi'an Polytechnic University		
15:20-15:30	9. 杨春燕，嘉兴大学 Chunyan Yang, Jiaxing University		
15:30-15:40	10.徐三姗，新美术学院 Sanshan Xu, Nuova Accademia di Belle Arti		
15:40-16:00	优秀汇报颁奖和会议闭幕	Award & Closing Ceremony	

大会报告 Keynote Speaker

覃京燕 教授

北京科技大学

Prof. Jingyan Qin

Beijing University of Science and Technology

Speech Title:

Narrative Design of Interactive Generative Artificial Intelligence

Brief Introduction:

Jingyan Qin: Professor at the second level of Beijing University of Science and Technology, doctoral supervisor, Vice Dean of the School of Artificial Intelligence, Vice Dean of the Artificial Intelligence Research Institute, Director of the Center for Science and Technology Aesthetic Education, Deputy Director of the Key Laboratory of the Ministry of Education (Intelligent Bionic Unmanned System), Head of the Digital Humanities Micro-major, Distinguished Professor of the Ministry of Education's Changjiang Scholars Program, and the first Beijing Young Teaching Master. Member of the National Higher Education Aesthetic Education Teaching Guidance Committee, Member of the Digital Art Committee of the China Artists Association, Member of the Industrial Design Teaching Guidance Committee of the Ministry of Education from 2018 to 2025, Expert Committee Member of the China-Europe Humanities and Arts Education Alliance of the Ministry of Education, Executive Committee Member of the Human-Computer Interaction Specialty Committee of the China Computer Federation (CCF), Senior Member of the Association for Computing Machinery (ACM), and Member of the CRUCIBLE Fellow International Interdisciplinary Education Alliance at the University of Cambridge. Responsible for three national first-class undergraduate courses including "Artificial Intelligence and Innovative Design", has won more than 70 awards at home and abroad such as the Humanities and Social Sciences Achievement Award of the Ministry of Education, the German Red Dot Award, and the China Red Star Design Award, with over 200 papers, including several ESI Highly Cited Papers. Ranked in the top 1% of Highly Cited Researchers in China in 2024 and 2025, with 12 publications. Deputy Chief Editor of "Encyclopedia of China" for Information Art Design, and member of the inaugural editorial board of "China Design Yearbook".

大会报告 Keynote Speaker

谭浩 教授

湖南大学

Prof. Hao Tan

Hunan University

Speech Title:

Machine Behavior Design — Human Factors and Interaction Design of Intelligent Machines Oriented to Safety and Experience

Brief Introduction:

Hao Tan has been recognized under the Ministry of Education's National High-Level Talent Program as a Distinguished Professor (2025) and Young Scholar (2021). He also serves as the Director of the Intelligent Design and Interactive Experience Lab (iDi Lab) at Hunan University and the Director of the Hunan University-Xiaomi Joint Research Center for Intelligent Terminal Human Factors Engineering. He has long been engaged in industry-academia collaborative education and teaching, leading the establishment of joint research and education centers between Hunan University and key industry partners including Baidu (2018), Huawei (2021), and Xiaomi (2025). His work has been recognized as an exemplary project by the Ministry of Education's Industry-Academia Collaborative Education Program. He received the First Prize of the National Teaching Achievement Award in 2018 and the Second Prize in 2022. His primary research interest lies in human-computer interaction design. He has proposed the theory of "Machine Behavior Design," taking artificial intelligence as both the object and the tool. He has published extensively in SCI/SSCI/CSSCI-indexed journals, including The Lancet, Computers in Human Behavior, and Zhuangshi. Two of his papers have been recognized as ESI Highly Cited Papers. He has been listed as a Top 1% Highly Cited Author on CNKI (2024, 2025).

大会报告 Keynote Speaker

鲁艺 教授

北京工业大学

Prof. Yi Lu

Beijing University of Technology

Speech Title:

Virtual-Real Symbiosis: Innovation Design Driven by Digital Intelligence

Brief Introduction:

Yi Lu is a professor and PhD supervisor, and a recipient of the National Cultural Talent Program (Youth Category). She currently serves as Vice Dean of the School of Art and Design at Beijing University of Technology. She also serves concurrently as Deputy Director of the Art and Design Committee of the Beijing Artists Association, Deputy Director of the Design Innovation Committee of the Beijing Interdisciplinary Science Society, Council Member of the Beijing Association for Science and Technology Originality Committee, Member of the Professional Committee of the Beijing-Tianjin-Hebei Design Discipline Alliance, and Executive Committee Member of the Technical Committee on Human-Computer Interaction of the China Computer Federation (CCF). She has led and participated in 15 national-level projects, including those funded by the National Social Science Foundation of China (Post-Funding Program and Special Program on Ideological and Political Education in Higher Education), the National Arts Fund, and the Innovation Group Program of the Beijing Municipal Science and Technology Commission. She has published more than 30 academic papers in leading journals indexed by CSSCI, SCI, and SSCI, and has authored five academic monographs published by major Chinese publishers. Her works have won international awards, including the German iF Design Award and the American Muse Gold Award. She has also been honored as a Capital Education Pioneer, Chief Expert of the Ministry of Education's Outstanding Professional Degree Case Studies, a Youth Talent in the "Four Batches" Program for Publicity, Ideology, and Culture of Beijing, a High-Level Talent under the "Phoenix Program" of Beijing's Chaoyang District, and an Outstanding Young Faculty Talent of Beijing Higher Education Institutions during the 14th Five-Year Plan period.

大会报告 Keynote Speaker

阿克斯•赫特 教授

佩奇大学

Prof. Akos Hutter

University of Pécs

Speech Title:

Research-Led Architectural Design in Rural Heritage Contexts: Integrating Protected Built Heritage and High-Quality Natural Environments

Brief Introduction:

Recipient of the design award for the Hungarian National Pavilion at the 2014 Milan Expo. Awarded the Hungarian "Sustainable Architecture" Media Architecture Prize. Member of the Architects' Council of Europe (ACE) and the Regional Architecture Committee of the Hungarian Academy of Sciences. Serves as Chair Advisory Board Member of the Built Environment and Infrastructure Committee at the University of Denver, USA, and Visiting Professor at Metropolitan State University of Denver, USA.

大会报告 Keynote Speaker

唐智川 教授

浙江工业大学

Prof. Zhichuan Tang

Zhejiang University of Technology

Speech Title:

Research on Design Innovation of Age-Friendly Rehabilitation Products in the Era of Artificial Intelligence

Brief Introduction:

Professor, Jianxing Distinguished Professor, and PhD Supervisor at Zhejiang University of Technology, and Head of the Design Discipline. Selected as a National "Ten Thousand Talents Program" Young Top-Notch Talent, Zhejiang Zhijiang Youth Scholar, and Zhejiang Provincial Leading Talent in Higher Education. Holds committee roles in the Chinese Mechanical Engineering Society and several academic organizations. Research focuses on intelligent rehabilitation product design, human-computer interaction, and industrial design. Led 12 projects funded by NSFC, NSSF, and key provincial R&D programs. Published over 80 papers in journals including JAR, IEEE TNSRE, and the Journal of Mechanical Engineering (Google Scholar citations: 1,700+); authored 2 monographs; holds 17 invention patents. Received First and Second Prizes of Zhejiang Philosophy and Social Sciences Outstanding Achievements, a Special Prize from China General Chamber of Commerce, and a Red Dot Best of the Best Award.

大会报告 Keynote Speaker

孙凌云 教授

浙江大学

Prof. Lingyun Sun

Zhejiang University

Speech Title:

Opening the Second Golden Age of Design

Brief Introduction:

Professor Lingyun Sun is a Changjiang Scholar Distinguished Professor appointed by the Ministry of Education. He currently serves as Vice Dean of the College of Artificial Intelligence and Dean of the International Design Institute at Zhejiang University. His research interests include generative artificial intelligence, intelligent design, and human-computer interaction. He serves as Executive Editor-in-Chief of Design and Artificial Intelligence. He has published textbooks including Intelligent Product Design and Fundamentals of Artificial Intelligence for General Education (Large Model Edition).

口头报告 Oral Presentation

■ Yuting Meng, Shenyang Aerospace University

- **Title:** Research on Immersive Exhibition Space Design Based on Visitor Emotional Response and Computer Vision-Driven Spatial Reconfiguration

- **Abstract:** Addressing the issues of traditional exhibition spaces being static and one-way, which prevents dynamic adaptation to visitors' emotional changes, this paper proposes an immersive exhibition space design method based on visitor emotional response and computer vision-driven spatial reconstruction. The innovations include: (1) constructing a multimodal computer vision emotion recognition model that integrates facial expressions (ResNet50 + attention mechanism) and body posture (ST-GCN), trained and evaluated on public datasets (FER2013, NTU-RGB+D, EMOTIC), achieving high accuracy and robust performance; (2) designing adaptive linear and nonlinear hybrid mapping rules from emotion categories and intensities to spatial elements (lighting color temperature, projection contrast, sound volume, spatial layout), forming an MQTT-based sense-decide-act closed-loop control mechanism; (3) using the Power Station of Art in Shanghai as a hypothetical scenario and validating the proposed system in a Unity3D-simulated exhibition environment, where the average closed-loop latency is 46.8 ms, and the user study shows a 35.8% improvement in self-reported immersion compared to static exhibition mode. The proposed system effectively enhances visitors' immersion and emotional resonance, providing a computer-driven technical path and practical reference for the design of intelligent exhibition spaces.

口头报告 Oral Presentation

■ Shiqi Xiong, Hubei University of Technology

- **Title:** A Study on the Application Effectiveness of an Intelligent Design Platform Based on Importance-Performance Analysis in Interior Design

- **Abstract:** With continuous technological advancement, intelligent design platforms have gradually become essential tools in the interior design industry. As an effective method for evaluating user satisfaction, Importance-Performance Analysis provides robust support for optimizing these platforms. This paper analyzes the practical performance of intelligent design platforms in interior design from an application perspective, explores the advantages and limitations of intelligent design platforms in interior design applications, examining how metrics like design efficiency, usability, quality and functionality impact user experience. Through quantitative and systematic evaluation of user feedback data, it identifies areas for platform improvement, offering insights for further development in this field.

口头报告 Oral Presentation

■ Jiaxuan Ren, Zhejiang Normal University

- **Title:** ISSG: An Interpretable Cross-Modal Generative Framework for Culturally Constrained Pattern Design — A Case Study on Hakka Motifs

- **Abstract:** Text-to-image systems can produce plausible cultural ornaments, but they rarely expose how open natural-language intent becomes a culturally valid symbol plan. We define this problem as the cultural intent gap and propose Intent-Semantics-Symbol-Generation (ISSG), a four-layer framework that inserts inspectable semantic and symbolic mediation between user wishes and image generation. We instantiate ISSG as WishMotif, a web system combining DeepSeek-based semantic parsing, user-confirmed meaning-group calibration, an institutionally sourced 174-record Gannan Hakka costume motif catalogue, and reference-conditioned image synthesis with Gemini 2.5 Flash Image. The catalogue is used as a bounded case study rather than a complete ethnographic archive. A think-aloud study (N=20) and matched-prompt ablation show a deliberate trade-off: prompt-only generation often produces richer auspicious imagery from broad model priors, while ISSG anchors core symbolic content in curator-auditable motif records, improving traceability, user agency, and cultural grounding.

口头报告 Oral Presentation

■ Keru Liu, Shenyang Aerospace University

- **Title:** Research on Narrative Design of Interior Space Based on Intelligent Perception

- **Abstract:** This paper proposes a five-layer "Perception-Privacy-Fusion-Decision-Actuation" architecture for intelligent interior narrative design, transforming static spaces into dynamically responsive environments. To overcome the limitations of traditional linear storytelling and the privacy risks of continuous behavioral tracking, the framework integrates multimodal data fusion with differential privacy at the edge. A dynamic attention mechanism adjusts sensory weights in real-time, effectively mitigating environmental noise and accurately capturing user engagement states. To evaluate the proposed architecture, a comprehensive simulation was conducted based on the Mandhilaras Museum exhibition scenario. Empirical results from 500 simulated visitor trajectories demonstrate that the intelligent intervention significantly enhances holding power. Specifically, the dynamic triggering of deep exploration nodes increased the average spatial dwell time from 16.5 seconds to 45.2 seconds ($p < 0.001$) compared to static baselines. Furthermore, rhythm acceleration strategies successfully reduced the fatigue-driven early exit rate from 48.4% to 12.8%. By translating macro-conceptual spatial theories into transparent, mathematically grounded transition rules, this research provides a robust, ethically compliant methodological framework for the next generation of human-centric, interactive interior space design.

口头报告 Oral Presentation

■ Yuchen Wang, Beijing Institute of Technology

- **Title:** A Multi-model Affect Measurement-Driven Framework for Color Hue Translation

- **Abstract:** Contemporary digital media often remain limited to visual attraction and superficial participation, making it difficult to evoke affective resonance and embodied presence. This study takes the sublime in Chinese traditional culture as the entry point and treats affect as a mediating dimension between color design and aesthetic experience. A browser-based experimental system integrating Check-All-That-Apply (CATA) and facial expression recognition (FER) was developed to collect subjective and objective affective data. The sublime was measured through five dimensions: vastness, small self, liminality, order, and atmosphere, while hue conditions were generated through controlled rotation in the CIELab color space. The results show the sublime is a multidimensional affective structure centered on surprise, and that rotate 60° and 120° hue conditions exhibit the closest correspondence to the high-sublime profile. This study provides an affect-driven framework for cultural experience translation and a computable pathway for culturally informed color design.

口头报告 Oral Presentation

■ Ying Gao, Shenyang Aerospace University

- **Title:** An Intelligent Virtual Reality-Based Human-Computer Interaction System with Closed-Loop Adaptive Design for Stress Assessment

- **Abstract:** This paper presents an intelligent Human-Computer Interaction (HCI) system for adaptive stress management via a unified objective-subjective feedback framework in Virtual Reality (VR). Unlike open-loop tools, our system features three innovations: (1) a custom 3D-printed Galvanic Skin Response (GSR) sensor with high signal-to-noise ratio and sub-millisecond temporal calibration; (2) a Unity-based VR environment dynamically modulating Structural (Edge Density) and Non-Structural Complexity (Shannon Entropy); and (3) an active closed-loop architecture implementing objective-subjective data fusion. By integrating real-time physiological feature extraction (e.g., SCR peak detection) with subjective verbal appraisals, the system actively adjusts visual complexity. Empirical validation confirms the system's construct validity, proving that fusing physiological arousal with cognitive appraisal provides a robust foundation for dynamic stress management in digital media interactions.

口头报告 Oral Presentation

■ Mengjiao Zhou, Hubei University of Technology

- **Title:** Random Forest and Gradient Boosting for Tea Beverage Brand Regional Cultural Perception Analysis

- **Abstract:** Regional culture has become an important resource for differentiating new-style tea beverage brands, yet its evaluation still relies heavily on expert judgment. Based on 366 consumer questionnaires, this study applies Logistic Regression, Random Forest, and Gradient Boosting Decision Tree to predict consumers' attention to regional cultural attributes and compares machine-learning-derived feature importance with AHP expert weights. The scale shows acceptable reliability, with a Cronbach's α of 0.795. Random Forest achieves the highest test-set accuracy of 59.78%, macro-AUC of 0.6803, and five-fold cross-validation accuracy of 0.619 ± 0.043, although its macro-F1 score indicates limited performance on minority classes. The Spearman correlation between machine-learning weights and AHP weights is 0.322, with $p = 0.307$, suggesting a weak and statistically non-significant association. The results show partial consistency in brand logo evaluation, but also reveal differences in typography, public art, sound communication, and olfactory communication. This study offers a data-driven framework for evaluating brand cultural attributes and highlights the complementary value of expert judgment and consumer perception data.

口头报告 Oral Presentation

■ Ruipeng Han, Xi'an Polytechnic University

- **Title:** Three-Dimensional Display of Garment Based on Deep Learning

- **Abstract:** To address the high cost, long production cycle, and low efficiency of traditional physical garment display, this paper proposes a deep learning-based method for three-dimensional garment visualization. First, a multi-view diffusion model is integrated with a neural surface reconstruction framework to enable efficient garment model generation. Then, a point-cloud segmentation network is constructed by fusing density-based point cloud features with image features extracted by a convolutional neural network. Based on the segmentation labels, texture mapping is performed on different semantic regions of the garment model to achieve the final garment visualization. Compared with baseline methods, the proposed reconstruction method improves the F-score by 13.2 percent and 11.8 percent on the DeepFashion3D and Multi-Garment Net datasets, respectively. The segmentation model achieves an accuracy of 93.4 percent and a mean intersection over union of 91.0 percent, representing improvements of 6.64 percent and 5.85 percent, respectively. The proposed method can provide technical support for virtual try-on, garment display, and other applications in the apparel industry, demonstrating promising application potential.

口头报告 Oral Presentation

■ Chunyan Yang, Jiaxing University

- **Title:** A Study on the Translation of Traditional Cultural Genes in Chinese Computer Animation Driven by Intelligent Design

- **Abstract:** With the rapid development of intelligent design and computing technology, Chinese computer animation has gradually explored a path of integrating traditional cultural genes into modern visual expression. Taking the "Nezha" series of animated films as the core research object, this paper explores the translation mechanism of traditional cultural genes in Chinese computer animation from four dimensions: intelligent media characteristics, visual translation threshold, cultural acceptance environment, and narrative theme expression. Based on the similarity algorithm detection via intelligent agents, this study quantitatively analyzes the retention rate of core traditional cultural genes in animation visual symbols, and reveals the application strategy of intelligent computing technology in the translation of traditional cultural genes. The research shows that driven by intelligent design technology, the "symbolic shell-spiritual core" hierarchical transformation model has become a general strategy for the modern translation of traditional culture in Chinese computer animation. This model not only inherits the core connotation of traditional culture but also meets the aesthetic needs of modern audiences. This study provides theoretical reference and practical path for the high-quality development of Chinese computer animation under the background of intelligent computing, and enriches the research system of cross-media translation of traditional culture.

口头报告 Oral Presentation

■ Sanshan Xu, Nuova Accademia di Belle Arti

- **Title:** Design Research of a Smart Dining Table for Home Use Integrating the LDA-GAI-TOPSIS Methodology

- **Abstract:** With the rapid development of the smart furniture industry, the smart dining table, as a key product in this sector, is transitioning from functional design to a more comprehensive user experience approach. This study proposes a design process for smart dining tables integrating the LDA-GAI-TOPSIS method, aiming to accurately identify user needs and optimize design solutions through online review data. Using a Python-based web crawler, 124,188 valid user reviews were collected from JD.com and Taobao. These reviews encompassed user feedback on multiple aspects of smart dining tables, including functionality, experience, and appearance. Through the LDA topic model, the study identified 4 primary design requirement themes: intelligent control and system integration, interactive experience and operational convenience, material quality and structural safety, and emotional interaction and aesthetic design. Subsequently, based on requirement analysis and keyword extraction, the research further refined design keywords associated with each theme using DeepSeek technology, ensuring design solutions precisely align with user needs. These keywords provide designers with clear direction, enhancing the relevance and innovation of designs. The Midjourney platform played a pivotal role in generating design proposals. Designers rapidly produced multiple conceptual sketches for smart dining tables by inputting design prompts generated by DeepSeek. They then refined details using optimization techniques such as variant prompts, partial redraw commands, and upscaling operations. Through this iterative generation process, 4 distinct smart dining table design proposals were ultimately developed. Finally, the TOPSIS method was employed to conduct a multi-criteria evaluation of multiple design proposals, selecting the optimal design solution. Evaluation results indicated that Design Proposal 2 achieved the highest relative proximity score, establishing it as the optimal solution. The proposal underwent refinement and optimization to enhance design feasibility and market competitiveness. This study integrates online review data mining with GAI fusion to establish a data-driven design pathway for user-demand-oriented smart dining tables. It enhances demand identification efficiency and design decision-making rigor in the industrial design sector while expanding the interdisciplinary research scope between design studies and computer science. Future applications of this methodology can extend to other smart products and consumer categories, further accelerating the rapid development of the industrial design industry.

海报展示 Poster Presentation

■ Fei Tang, Shanghai Aerospace Electronic Communication Equipment Research Institute

- **Title:** Improved Constant False Alarm Rate Detection Algorithm Based on CNN

- **Abstract:** To address the problem of adaptive constant false alarm rate (CFAR) detection in complex environments, an improved CFAR detection algorithm based on CNN, termed CNN-CFAR, is proposed. In this algorithm, a lightweight one-dimensional convolutional neural network (1D-CNN) is first employed for background recognition. Using the 1D-CNN solely for background recognition not only ensures the lightweight nature of the recognition model but also endows the algorithm with interpretability. Subsequently, based on the four identified background types, four corresponding CFAR detection algorithms are used for threshold calculation. Effective background differentiation and the use of the corresponding algorithms address the degradation in detection performance caused by the target masking effect in traditional CFAR algorithms. Simulation results demonstrate that the CNN-CFAR algorithm can perform background recognition nearly in real time with an accuracy exceeding 90%. Moreover, under the double-sided target interference background, its detection performance is significantly superior to that of VI-CFAR.

海报展示 Poster Presentation

■ Zekun Peng, Shanghai Jiao Tong University

- **Title:** Kinematic Modeling and Performance Analysis of a Dual-Arm Embodied Home Care Robot

- **Abstract:** With the growing demand for home-based assistive robotics, dual-arm systems provide enhanced dexterity but introduce challenges such as workspace overlap and potential collisions. This paper investigates the kinematic modeling and performance of a dual-arm embodied home care robot. A Denavit-Hartenberg(D-H)--based kinematic framework is established, and forward and inverse kinematics are derived and validated. The workspace is evaluated using a Monte Carlo method, with overlapping regions characterized. In addition, manipulability based on the Jacobian condition number is analyzed. Results show that the system achieves a wide reachable workspace with a significant overlapping region, enabling coordinated manipulation while introducing collision risks. Higher angular manipulability is observed across most of the workspace, indicating strong orientation capability. The study provides insights for motion planning of dual-arm assistive robots.

海报展示 Poster Presentation

■ Jing Shen, Wuhan University of Communication

- **Title:** Research on the Digital Heritage and Artistic Value of Clark Porcelain Based on AIGC Technology

- **Abstract:** This paper aims to explore the potential applications of AIGC technology in the digital preservation and inheritance of Clark porcelain, analyzing its historical background and cultural value, and examining the significance of its digital transformation. By leveraging AIGC, the digitization of Clark porcelain can provide interactive and immersive experiences that cater to the preferences of younger generations in the modern era. Furthermore, it offers new possibilities for the presentation and engagement of traditional culture, enabling more dynamic, accessible, and innovative ways to experience, learn about, and appreciate this unique cultural heritage.

海报展示 Poster Presentation

■ Han Zhang, China University of Mining and Technology (Beijing)

- **Title:** PGT: A Patching-Gated iTransformer Model for Lithium-Ion Battery Thermal Runaway Prediction

- **Abstract:** The widespread application of lithium batteries in new energy vehicles and energy storage power stations has made fires caused by thermal runaway a core bottleneck restricting industrial safety. Accurate early prediction is crucial for risk prevention and emergency response, but existing multi-sensor time series models have limitations: insufficient generalization ability of simulated data, poor capture of local abrupt features, ineffective sensor noise filtering, and inability to predict the maximum risk of thermal runaway. To address these issues, this paper combines situational awareness with multivariate time series prediction and proposes a PGT model based on iTransformer inversion paradigm. We independently built a thermal runaway data collection platform to collect multi-sensor data from the entire process under overcharging, and used data augmentation to solve the problem of insufficient samples. PGT combines time dimension patches to capture local mutation features, as well as variable level gating self attention to evaluate sensor reliability and suppress noise, and is combined with situational awareness of dynamic evolutionary perception. Experiments on enhanced real datasets show that PGT performs better than baseline, with an RMSE improvement of 9.72%, and uniquely achieves accurate prediction of maximum thermal runaway risk. It provides an effective warning method and promising paradigm for multi-sensor prediction in energy security, and offers new solutions for similar time series prediction problems with multivariate redundancy.

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