

2025 IEEE International Conference on Blockchain Technology and Information Security (ICBCTIS 2025)

**Haikou, China
5-7 December 2025**

IEEE Catalog Number: CFP25BW5-POD
ISBN: 979-8-3315-3807-1



Copyright © 2025, IEEE

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:	CFP25BW5-POD
ISBN (Print-On-Demand):	979-8-3315-3807-1
ISBN (Online):	979-8-3315-3806-4

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

TABLE OF CONTENTS

Hierarchical Defense Model based on Post-quantum Cryptography	1
<i>Jianfei Shen, XiaoBin Qi</i>	
Utilizing Dependency Chains for Concurrent Transaction Processing in DAGbased Blockchain	7
<i>Xueming Si, Shuosen Ma, Zhongyuan Yao</i>	
Dual-Branch Cross-Attention Network for Detecting QIM-based VoIP Steganography	13
<i>Hong Zhao, Yi Zhou, Hui Wu</i>	
Dynamic Backdoor Attack Based on Multiscale Local Binary Pattern	19
<i>Zhenyan Luo, Jiao Peng, Yirong Jiang, Fuxiu Li, Yifan Shu, Qiaoshi Lu</i>	
Performance of Open-Source Large Language Models in Smart Contract Vulnerability Detection	27
<i>Yan Liu, Diandong Liu, Yongyi Han, Qianying Yang, Bowen Wu, Lianshan Sun</i>	
Authenticated Attribute-Based Searchable Encryption with Full Policy Hiding over Cloud Encrypted Data	34
<i>Fei Li, Xingfu Yan, Fucai Luo, Wing W. Y. Ng</i>	
A Highly Robust Sharding Blockchain Consensus Protocol for Large-Scale Node Networks	44
<i>Liangxin Liu, Ying Gao, Kexin Hu, Yuan Lu, Qianhong Wu</i>	
MariAuth: Ultra Lightweight Mutual Authentication in NTN-assisted 6G Maritime Networks	49
<i>Aatif Suleman, Shabeer Ahmad, Umar Ajaib Khan, Ahmad Mustafa, Muhammad Asghar Khan Arshad Saleem, Farhan Ullah, Sagheer Abbas, Zahid Ali Khan</i>	
Research on Intelligent Expert Extraction Methods Based on SBERT and Blockchain	55
<i>GuangJun Zai, HaoDong Zhou, ChenHong Qi, Zhan Shi</i>	
Consortium Blockchain and Its Application of Attribute-based Encryption	60
<i>Lei Shang, Qingfang Meng, Yuhong Sun, Tao Li, Xu Chen</i>	
LLM-TAD: Interpretable Ethereum Fraud Detection Based on Large Language Models	68
<i>Sijie Cheng, Yanbo Yang, Jiawei Zhang, Pengfei Li</i>	
Virtual Real Fusion in ICS: A Seven-Tuple Representation and Shadow to Real Promotion	73
<i>Chengcai Diao, Guangrun Zhou, Lijuan Xu, Dawei Zhao</i>	
Reputation-Enhanced Leader Election for Blockchain Consensus	80
<i>Junda Wu, Chengxiang Xia, Qi Chen, Hongyang Yan</i>	
End-to-End Secure Code Repair with Context-Aware Anonymization and Isolated Agent Execution	86
<i>Chao Wang, Zan Zhou, Chaopeng Wang, Yi Sun, Shujie Yang, Yujiao Yuan, Lin Jia, Xu Xiang, Zhiyuan Han</i>	
Privacy-preserving Data Possession Auditing and Rights Confirmation Scheme for AI Generated Content	94
<i>Peng Li, Jiawei Zhang, Yanbo Yang, Mingyao Liu, Huaiyuan Qi</i>	
Adaptive Compression for Trusted Data Circulation of Federated Learning in Internet of Vehicles	100
<i>Zhi Lin, Jie Zhang, Steven Guan, Ka Lok Man</i>	

VulCrosser: Smart Contract Vulnerability Detection Based on Complex Network Analysis in Interactive Scenarios	105
<i>Junchao Zhang, Yaohui Zhong, Huanchun Wei, Jiahui Huang, Teng Huang, Chenxi Wan, Yukun Chen Guohe Wu</i>	
A Weighted Asynchronous Federated Learning Scheme to Combat Model Poisoning Attacks	113
<i>Juhao Wang, Yongwei Tang, Hongyuan Cheng, Jingcheng Song</i>	
SAID-IoD: A Secure and Robust Mutual Authentication Protocol for the Internet of Drones Environment	118
<i>Sidra Ishaq, Waseem Abbas i, Shabeer Ahmad, Aatif Suleman, Muhammad Noman Sohail Muhammad Asghar Khan, Sagheer Abbas, Farhan Ullah</i>	
Asymmetric Password Authentication Transport Layer Security Protocol	124
<i>Yuhao Han, Libin Wang</i>	
A Fine-Grained Attribute-Based Access Control Model for Blockchain	132
<i>Yinzen Wei, Yuxin Feng, Hongyu Chen, Chengfang Hu</i>	
A Multi-Task Learning ESMM-based Commodity Recommendation Scheme with Local Differential Privacy	140
<i>Zerui Yu, Siwei Chen, Lingfeng Hu, Jian Zhong</i>	
Research on Privacy-Preserving Multi-Party Data Collaborative Operation and Maintenance Technology for High-Speed Trains	146
<i>Chaoyuan Sun, Weijiao Zhang, Peng Sun, Hui Wang</i>	
A Blockchain-Based Multi-Source Data Fusion and Verification Mechanism for Whole-Process Supervision of Bulk Agricultural Products	153
<i>Weihong Tian, Fang Fang, Ting He, Zhongliang Xiao, Jiacheng Liao</i>	
BC-TMICP: A Blockchain-based Transitional Medical Image Copyright Protection Scheme From Centralization to Decentralization	163
<i>Xiaohong Cai, Yi Sun, Chao Wang, Tianwei Cai, Yusong Chen, Guangyu Xu</i>	
An Efficient Indexed Network Threat Gene Library Construction Scheme in Smart Grid	172
<i>Muxian Liu, Liyu Lu, Yuan Tang, Guihua Liu, Zhibo Dong</i>	
BAI2EPF: Blockchain and AI Bidirectionally Empowered Intelligent Equipment for Pet Feeding	179
<i>Wenxue Yang, Guofeng Zhang, Yajie Pang, Xuguang Li, Shouzheng Wang, Ying Gao, Shuhan Bie</i>	
Blockchain-Based Fast and Reliable Post-Disturbance Response for Resilient Power Grids	185
<i>Yi Wu, Mengyuan Zhang, Yajun Zhang, Zhijie Ma, Zhuopu Han, Dong Wang, Chang Liu, Jie Song</i>	
Data Early Warning Method Based on Prototypical Networks	190
<i>Qi Ma, Na Xi, BaoYing Xue, BeiBei Zhang</i>	
A Blockchain-based Trusted Interaction Framework for Intelligent Aquaculture Supply Chain via Smart Contracts	195
<i>Kai Zhang, YangSong, Ming Yang, Yue Wang</i>	
Research on Traceability and Trust Mechanisms of Power Grid Equipment Supply Chains Based on Blockchain Technology	200
<i>Ke Ma, Zhenqi Yang, Bo Tian</i>	

RLHF-Driven Intrusion Detection and Reward Analysis in Industrial IoT	205
<i>Hanlin Chen, Entie Qi, Mengjie Zuo, Xiaofeng Shi</i>	
Research on Key Technologies of CAD Drawing Recognition and Data Traceability Driven by Blockchain Smart Contracts	213
<i>Xiaogang Wang, Xiang Chen, Fanjun Meng, Haoran Li</i>	
A Blockchain-Based Trusted Research Information Management System	218
<i>Xiaoni Chang, Feiang Ran, Guopeng Wang</i>	
Deep Learning-Based Smart Contract Vulnerability Detection Model	225
<i>Rui Wu, Guangfu Wu, Kangjun Li, Lei Liu, Lulu Liu, Weiqiang Wu</i>	
SIoT-Based Classification of Trustworthy Nodes by Using Machine Learning Techniques	230
<i>Muhammad Tahir, Manoj Kumar, Zubair Sajid, Xiao Zheng</i>	
Multimodal Spam Detection Based on Multi-View Complementary Hybrid Feature Fusion	241
<i>Ge Zhai, Bo Yang, Runyuan Sun, Zhifeng Liang, Kaiyang Fang, Zhenyu Li</i>	
A Compartmented Multi-Secret Sharing Scheme Based on Feedback with Carry Shift Register Sequences	249
<i>Haichuan Chen, Zhiqiang Lin, Qi Chen</i>	
Enhancing HMI Security with Physiological Trustworthiness: A Study on EEG-HRV Synergy for Behavioral and Cognitive State Discrimination	254
<i>Bin Zhao, Jianwu Dang, Gaoyan Zhang, Zhongjie Li, Wanping Xu, Aijun Li</i>	
Research on the Method of Factual Hallucination Relief Based on blockchain Large Language Model	261
<i>Pengfei Li, Yanbo Yang, Jiawei Zhang, Sijie Cheng</i>	
DMECNet: Dynamic Multi-Expert Convolutional Network for Malware Open-Set Recognition	266
<i>Xin Li, Jiarui Hu, Shumian Yang, Lei Zhao, Lizhuang Tan, Lijuan Xu, Dawei Zhao</i>	
Generating Privacy-Preserving Trajectories That Use Diffusion Models	273
<i>Zhouyong He, Yining Liu, Nan Zhang</i>	
Model-Auditors: An Auditing Scheme for Enhancing the Credibility of the Model	278
<i>Yapeng Miao, Jiangtao Hu, Xinyi Zhang, Qing Ai</i>	
Applications and Challenges of Blockchain Based Internet of Vehicles	283
<i>Zhongwei Zhao, Yuwen Chen, Han Yang, Ting Han, Hongdi Zhang, Yue Yin</i>	
LogFree: A Low-Resource-Oriented Model for Log Anomaly Detection	289
<i>Yinghao Li, Yongpeng Wei, Tianxing Gu, Mengke Yu, Yusong Lin</i>	
Privacy-Preserving and Poisoning-Resilient Enhanced Cross-Silo Federated Learning	294
<i>Xiaofan Zheng, Xingfu Yan, Fan Yang, Wing W. Y. Ng, Yuanyuan Li, Shuangyan Wu</i>	
Progressive Recovery Method for JPEG Images Based on Hybrid Threshold Secret Sharing	305
<i>Yulong Guan, Zhen Wu</i>	
Empowering Symbolic Execution: Enhancing Smart Contract Verification through AI-based Formal Translation	310
<i>Liangjun Deng, Hongyuan Cheng, Yuchen Zhang, Hang Lei, Yanchao Lou, Xiaolei Shang</i>	

BML-WAF: A Framework Based on Blockchain and Machine Learning for Web Application Firewall Log Integrity and Analysis	318
<i>Ningyang Tang, Yuxing Duan, Qingsong Li, Hang Cui</i>	
BIPSec: An End-to-End Formal Verification Framework for AH/ESP in Industrial-Grade IPsec Protocol Stacks	324
<i>Chuan Li, Yang Zhang, Rui Yao, Xia Yang, Wensheng Guo, Haiyong Sun</i>	
Blockchain Privacy Protection Scheme Based on BFV and Threshold Regulation	332
<i>Pengli Zheng, Zongqu Zhao, Yue Zhang, Yanmiao Li, Caihua Cui</i>	
Research On Collaborative Traffic Sign Detection And Occlusion Robustness Based On Blockchain Trusted Data Source	338
<i>An Zhang, Jing Liu, Yuhongyue Li, Xuequan Li, Jingying Li, Minghe Zhang</i>	
A Data-Free Fine-tuning Framework for Multimodal Backdoor Defense	345
<i>Jiazhi Li</i>	
Efficient Detection Scheme for Unknown Network Traffic Targeting Smart Grid Devices	352
<i>Muxian Liu, Liyu Lu, Wendi Chen, Fanyu Wu</i>	
A HEVC Steganography Scheme Based on Intra-Frame QDST Coefficient	359
<i>Si Liu, Yunxia Liu, Hongguo Zhao, Cong Feng</i>	
Performance Analysis and Selective Retransmission Optimization For Fragmented Post-Quantum IKEv2	364
<i>Xuejie He, Lei Han, Ziming Jiang</i>	
A Survey of Deep Image Steganography with Invertible Networks	373
<i>Jifan Yang, Lina Tan, Xiang Xiao, Xiangyu Xie, Yirong Jiang, Rizhen Yu</i>	
Physically Secure PUF-Based Reputation Management Protocol for VANETs	378
<i>Xiaosong Guan, Juhao Wang, Yuchen Zhang, Changxin Gao, Yongwei Tang, Jiuru Wang</i>	
Temporal Context-Enhanced Wireless Intrusion Detection: Boosting Recall for Hard-to-Detect Attacks	383
<i>Haocheng Jiang, Yubo Yan, Xiangyang Li</i>	
Federated Matching Learning for Privacy-Preserving and Robust Task Allocation in Industrial Control System Crowdsourced Testing	388
<i>Xin Liu, Lei Li, Donglan Liu, Rui Wang, Bing Su, Shanjie Xu</i>	
Towards Trusted Textual Data Valuation: Information Entropy as the Key	395
<i>Wenze Xiong, Yetong Wang, Wanxin Li, Hao Guo, Jie Zhang</i>	
Privacy-Preserving Traffic Flow Prediction Based on a Spatiotemporal Hybrid Attention Network	400
<i>Zhenyan Luo, Qiaoshi Lu, Zhaolin Li, Yifan Shu, Jiao Peng, Weijin Jiang</i>	
Decentralized Identity: A Comprehensive Review of Current Trends and Future Directions	409
<i>Vatsal Gupta, Anant Wairagade</i>	
LLM-Driven Automated Generation of Formal Specifications for C Programs	417
<i>Lanxin He, Yang Zhang, Wensheng Guo, Rui Yao, Xia Yang, Haiyong Sun</i>	

A Privacy-Preserving and Amount-Flexible Multi-Hop Payment Protocol for Autonomous IoT Resource Scheduling	428
<i>Wenqi Li, Zuobin Ying, Yibo Bao</i>	
Lattice-based Unique Ring Signature Scheme against Quantum Attack in Blockchain	435
<i>Hai Wang, Xianfeng He, Feng Zhang, Yuzhe Zheng, Xuanye Chen, Xu Chen</i>	
Trusted and Privacy-preserving Self-Sovereign Data Access Control for Distributed IIoT Systems	440
<i>Yifan Zhao, Jiawei Zhang, Yanbo Yang, Fangfang Zhang, Xu Wang, Qiuyu Mou</i>	
NGS-based threshold homomorphic encryption scheme without CRS	446
<i>Xu Zhao, Zheng Yuan</i>	
Federated Learning for Enhancing Internet-of-Drones Security: Formulation, Simulation, and Future Directions	452
<i>Muhammad Asghar Khan, Adil Humayun Khan, Sagheer Abbas, Farhan Ullah, Kamran Ali Memon Zahid Ali Khan</i>	
A Federated GNN-based Intent-aware Fair Recommendation Method	458
<i>Yong Ding, Jia Zhu, Shuo Wang, Zhen Liu, Ruwen Zhao, Fanyi Yang</i>	
Proactive Network Defense with Multi-Objective Hierarchical Reward-Driven Reinforcement Learning	465
<i>Senhao Zhu, Xiaofeng Lu, Pietro Lio</i>	
PASO: Prediction-Anchored Sequence Optimization for Latency-Constrained AMM Batch Execution on Blockchains	470
<i>Xueming Si, Jingfeng Wei, Zhongyuan Yao</i>	
Multimodal Network Intrusion Detection Model based on Deep Learning	478
<i>Yang Wang, Yirong Jiang, Weijin Jiang, Rizhen Yu</i>	
Revisiting Transformer for QIM-Based VoIP Steganalysis	484
<i>Xuesong Wang, Cheng Zhang, Linqiang Liu</i>	
A Certificateless Authentication Scheme Based on Zero-Divisor Graph for IoT	490
<i>Wei Chen, Zhongkai Dang, Yanzhao Tian</i>	
Subsystem Integration and Stability Evaluation Methods for Industrial Control Software Crowdsourcing Testing Platforms	498
<i>Fenghua Tong, Fuqiang Yu, Lijuan Xu, Dawei Zhao</i>	
SECBC-APSS: A Secure Edge-Cloud-BlockChain Integrated Agricultural Product Safety Supervision System Driven by Blockchain and Cryptography	505
<i>Guofeng Zhang, Yue Wang, Yajie Pang, Peng Wang</i>	