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Misty Blowers
Russell D. Hall
Venkateswara R. Dasari
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Contents

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

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3 Advanced Hardware Architectures
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4 Artificial Neural Networks and Deep Learning
Gustave W. Anderson, Lockheed Martin Corporation (United States)

5 Blockchain Inspired Architectures
James Sidoran, Air Force Research Laboratory (United States)

Introduction

The Chairs of the Disruptive Technologies in Information Sciences conference would like to thank the SPIE organizers, the speakers, expert panelists, and students who made this conference such a great success. This year, the conference broadened its scope to include exciting and cutting edge disruptive technologies like new blockchain architectures, distributed ledger technologies, and quantum science-based security protocols. New machine learning and artificial intelligence-based systems explored the integration of AI in both embedded hardware and software applications. The conference featured three keynote speakers; Dr. Richard Linderman from the United States Department of Defense delivered an exciting keynote describing how deep learning and intelligent autonomous systems are revolutionizing the Department of Defense's global posture in C5ISR, advanced architectures, and distributed network defense. Dr. Raju Namburu, the Chief Scientist of the United States Army Research Laboratory, explored the frontiers of research on such topics as high-performance computing, big data analytics, quantum information sciences, and advanced visualization for command and control. Dr. Misty Blowers, Conference Chair, delivered the third and final keynote that discussed cyber autonomy and the convergence of artificial intelligence with blockchain technologies, distributed ledger systems, and smart contracts for improved security, transparency, and governance.

The conference featured several interactive panel discussions that resulted in a spirited exchange of ideas between the panelists and the audience. The conference featured six sessions covering disruptive technologies in the following areas:

1. IoT, Big Data Analytics and Storage
2. Advanced Networking
3. Advanced Hardware Architectures
4. AI Neural Networks and Deep Learning
5. Blockchain Inspired Architectures
6. Computational Intelligence for Mission Assurance and Resilience

In each of the sessions, prominent subject matter experts from a global community presented their research and engaged the audience in interactive discussions. Under each session, emphasis on technological disruption highlighted the game changing developments in those areas. In the first session on Internet of Things (IoT), big data analytics, and remote data storage, there were discussions focused on communication abstractions, power management, and distributed data analytics related to IoT architectures. The second session on advanced networking covered disruptive areas such as autonomous networking, quantum security protocols, programmable networks, UAV communications, and the dark web. The third

session on advanced hardware focused on novel computing architectures, memristors, and the softwarization of hardware intelligence and hardware enabled cyber security. The fourth session on artificial intelligence focused on various algorithms and optimization strategies as applied to command, control, data fusion, analytics, intelligence, surveillance, and reconnaissance. The fifth session on blockchain-inspired architectures attracted some interesting papers dealing with emerging blockchain technologies relevant to private industry and defense. The sixth and the final session focused on computational intelligence for mission assurance and resilience and addressed the impact and relevance of these technologies to the mission effectiveness.

Misty Blowers
Russell D. Hall
Venkateswara R. Dasari