



## Editorial

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This issue consists of eleven articles. The topics discussed are process diagnosis, quantum-dot cellular automata (QCA) test, mixed-signal testing, hardware and data security, verification and validation, radiation hardening, software testing, analog and RF circuit testing, and microfluidic device testing.

We begin with an article on wafer map diagnosis. Authors are Hou, Qin, Lu, Yi and Chen from Guilin University of Electronic Technology, Guilin, China.

The second article is on quantum-dot cellular automata (QCA), contributed by Dhar from Siksha ‘O’ Anusandhan Deemed to be University, Bhubaneswar, India, Mukherjee from University of Engineering and Management, Kolkata, West Bengal, India, Banerjee, Manna and Maji from National Institute of Technology, Durgapur, West Bengal, India, and Panda from Dr Sudhir Chandra Sur Institute of Technology and Sports Complex, Kolkata, West Bengal, India.

Third article takes us into mixed-signal testing as discussed by Yuan, Y. Zhang, L. Zhang, Hou and Han from Chongqing University of Posts and Telecommunication, Chongqing, China.

Fourth article addresses hardware and data security as explained by Mouleeswaran from Dayanandasagar University, Bengaluru, India, Ramesh from Sri Venkateswara College of Engineering and Technology, Thirupachur, India, Manikandan from Vellore Institute of Technology (VIT), Vellore, India, and Anbalagan from Red Hat India Private Limited, Bengaluru, India.

The fifth article continues with another topic in hardware security – the physical unclonable function (PUF). Presenters of this work are Panchore from National Institute of Technology Patna, Bihar, India, Rajan from Shri Ramdeobaba College of Engineering and Management,

Nagpur, Maharashtra, India, and Singh from Indian Institute of Technology Patna, Bihar, India.

With the sixth and seventh articles, we enter the areas of verification and validation. The sixth paper conducts these functions with a modified scan element. Contributors of this work are Iwata, Yamasaki, and Yamaguchi from National Institute of Technology (KOSEN), Nara College, Nara, Japan.

In the seventh paper, Khairullah from University of Mosul, Mosul, Iraq, discusses formal verification of cyber-physical systems (CPS) designed to perform safety-critical functions.

Next, the eighth article presents a method for radiation hardening of static random-access memory (SRAM). This work is reported by Ahilan from PSN College of Engineering and Technology, Tirunelveli, Tamil Nadu, India, Anushagorantla from Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India, Kiruba from Bangalore College of Engineering and Technology, Chandapura, Bengaluru, India, Hamad and Hassan from Taif University, Taif, Saudi Arabia, Venkatram from K. L. University, Vijayawada, Vaddeswaram, Andhra Pradesh, India, and Sindhu from IES College of Engineering, Thrissur, Kerala, India.

Ninth article shows how to generate software tests for hard-to-detect faults by using a combination of two search algorithms, namely, Olympiad optimization algorithm (OOA) and genetic algorithm (GA). Authors are Zheng from Rizhao Polytechnic, Rizhao City, Shandong Province, China, Arasteh from Istinye University, Istanbul, Türkiye and Khazar University, Baku, Azerbaijan, Mehrabani from University of Tabriz, Tabriz, Iran, and Abania from Islamic Azad University, Tabriz, Iran.

The tenth article presents a method for diagnosis of analog circuits using recent developments in artificial intelligence (AI). Presenters are G. Li, W. Li, Wen, Sun, and Tang from Naval Aviation University, Yantai, China.

Eleventh article focuses on fault detection in digital microfluidic biochips (DMFB) that have healthcare applications. The described technique uses a graph theory algorithm referred to as pebble transversal. Contributors of this

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work are Saha from Sister Nivedita University, Kolkata, West Bengal, India, Das from Haldia Institute of Technology, Haldia, West Bengal, India, Shukla from MathWorks India Private Limited, Bengaluru, Karnataka, India, and Majumder from University of North Bengal, Darjeeling, West Bengal, India.

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