



## Special Issue on Systems monitoring and maintenance: new models, trends and applications

Mangey Ram<sup>1</sup> · Sylwia Werbinska-Wojciechowska<sup>2</sup>

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Technology innovation has recently led to a number of significant advances in the field of system design and performance. Whether they are industrial machinery, infrastructure, or complex software systems, system monitoring and maintenance are essential to sustaining their reliability and longevity. Advances in reliability structures, engineering design, fuzzy logic, optimization algorithms, digitization, smart systems, hybrid system performance, Machine Learning, and the Internet of Things (IoT) have transformed the field of maintenance and monitoring. These innovations are making technology more proactive, data-driven, and cost-effective.

Today, advances in engineering design emphasize designing systems with reliability in mind. Many models and methods, such as Reliability-Centered Maintenance (RCM) and Risk-Based Maintenance (RBM), have become integral parts of designing and maintaining systems to optimize reliability. Fuzzy logic has allowed for more flexible and adaptive maintenance decision-making, accommodating variables that are not easily quantifiable and adjusting maintenance schedules accordingly. Mathematical optimization algorithms have been increasingly used in maintenance planning, such as genetic algorithms, simulated annealing, and particle swarm optimization.

Maintenance procedures have changed drastically as a result of Industry 4.0 and digitalization. Systems are now

equipped with sensors and IoT devices to continually check their functioning. In the realm of software systems, machine learning techniques play a critical role in maintenance today. Real-time system health monitoring has become essential for industrial systems. This includes monitoring the condition of machinery, detecting wear and tear, and identifying potential failures. IoT has enabled remote monitoring and control of systems, even in distant and hazardous environments. IoT sensors have provided continuous data streams that feed into maintenance models, facilitating predictive and condition-based maintenance strategies.

This Special Issue contains 15 articles which are selected after the peer review process as per the theme of the proposed special issue. Some articles were also selected from the 5th International Conference on Mathematical Techniques in Engineering Applications (ICMTEA2021: <https://www.icmtea.in>), held in Dehradun, India on December 3–4, 2021, but open to other authors with high-quality articles. The topics covered in this special issue are fully covered in the aim and scope of the International Journal of System Assurance Engineering and Management (<https://www.springer.com/journal/13198>).

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✉ Mangey Ram  
mangeyram@geu.ac.in; mangeyram@gmail.com  
<https://drmrswami.in/>

Sylwia Werbinska-Wojciechowska  
sylwia.werbinska@pwr.edu.pl  
<https://wm.pwr.edu.pl/pracownicy/sylwia-werbinska-wojciechowska>

<sup>1</sup> Graphic Era (Deemed to be University), Dehradun, India

<sup>2</sup> Wrocław University of Technology, Wrocław, Poland

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