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Introductory notes for the Acta IMEKO second issue in 2026

Francesco Lamonaca[1,2]

[1] *Department of Computer Science, Modeling, Electronics and Systems Engineering (DIMES), University of Calabria, Ponte P. Bucci, 87036, Arcavacata di Rende, Italy*
[2] *CNR-NANOTEC, 87036, Rende, Italy*

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Corresponding author: Francesco Lamonaca, e-mail: editorinchief.actaimeko@imeko.org

Dear Readers,

This issue of *Acta IMEKO* brings together contributions that demonstrate the central role of measurement science in addressing some of today's most pressing technological and societal challenges. From micro-volume measurements and digital traceability to virtual reality, renewable energy, cultural heritage preservation, and intelligent sensing, the papers collected in this issue highlight how metrology provides the scientific foundation for reliable, traceable, and trustworthy information, enabling informed decisions across a wide range of application domains.

The publication of this issue also represents an important milestone for *Acta IMEKO*. The journal has continued its steady growth in scientific quality and international visibility, reaching Q2 according to the latest CiteScore rankings. Furthermore, *Acta IMEKO* has received its first Journal Impact Factor of 0.9 in the Web of Science Journal Citation Reports, a significant achievement that reflects the commitment of our Authors, Reviewers, Editors, and the entire IMEKO Community. These accomplishments reinforce the Journal's mission of disseminating high-quality research in measurement science while maintaining its Diamond Open Access policy, ensuring free access to scientific knowledge for readers worldwide.

Beyond their scientific contributions, the papers presented in this issue also support several of the United Nations Sustainable Development Goals (UN SDGs), demonstrating how advances in measurement science contribute directly to sustainable development.

The paper in [1] focuses on the measurement of small liquid volumes, comparing results obtained using the gravimetric method with different resolutions. The main objective of the study is to characterize the behaviour of microsyringes and micropipettes during the measurement of microvolumes in the range from 0.1 to 1 µL using the gravimetric method, with metrological traceability, and compare the results in the range up to 100 µL. The methodology addresses the challenges associated with measurements below 1 µL by establishing metrological traceability through mass measurement using the gravimetric method. Given that the smallest standard weight is nominally 1 mg, relying solely on the dispensed liquid volume would result in a lack of metrological traceability for volumes under 1 µL. To enhance reliability, eleven independent measurements are taken at each volume point to calculate an average. The results are presented, and simulations were conducted to explore potential improvements by employing a scale with a resolution of 0.001 mg, along with its associated measurement uncertainty. This contribution directly supports UN SDG 3 (Good Health and Well-being) by improving the reliability of analytical and biomedical measurements requiring micro-volume dispensing, and UN SDG 9 (Industry, Innovation and Infrastructure) through advances in high-accuracy measurement methodologies.

The paper in [2] proposes a smart energy efficiency label (smart label) using blockchain technology to ensure secure access, traceability, validation, and certification of all information related to the energy performance of labelled equipment. The methodology involves mapping the process of using the PROCEL label within the Brazilian Labelling Program, demonstrating how blockchain technology can document the complete lifecycle of electrical equipment, from laboratory testing to consumer use. By enabling transparent verification of test results, environmental impact, authenticity, and certification history, the proposed smart label enhances consumer confidence while encouraging manufacturers to improve product performance. This work strongly contributes to UN SDG 7 (Affordable and Clean Energy) through the promotion of energy-efficient technologies, UN SDG 12 (Responsible Consumption and Production) by increasing transparency along the product lifecycle, and UN SDG 9 (Industry, Innovation and Infrastructure) through the adoption of secure digital infrastructures for metrological traceability.

The measurement of the actual shape of a sail during navigation is an important issue both for skippers and sail makers. Besides sophisticated optical approaches based on

artificial vision or fibre optic sensors, the Authors in [3] propose directly measuring the mainsail draft by means of a full-bridge strain gauge mounted on a specially designed printed circuit board attached to a fiberglass batten. The proposed solution achieves sufficient accuracy while remaining inexpensive, making it suitable not only for competitive sailing but also for recreational boats. The wireless transmission capability also enables straightforward integration into distributed onboard sensor networks. This contribution supports UN SDG 9 (Industry, Innovation and Infrastructure) by introducing an innovative and accessible sensing technology, while also contributing to UN SDG 13 (Climate Action) through improved sailing efficiency, potentially reducing reliance on auxiliary engine propulsion.

The integration of physical and virtual reality is becoming increasingly important wherever effective interaction between users and digital environments is required. The study presented in [4] investigates the characterisation of the SenseGlove Nova and Nova 2 haptic gloves, establishing a quantitative framework for evaluating haptic feedback accuracy during object manipulation in virtual environments. By comparing hand kinematics in real and virtual scenarios, the authors provide objective metrics for assessing immersion quality and interaction fidelity. The proposed methodology offers valuable guidance for the design of reliable immersive training systems. This work contributes to UN SDG 4 (Quality Education) by supporting advanced educational and professional training platforms based on virtual reality, while also addressing UN SDG 9 (Industry, Innovation and Infrastructure) through the development of validated human-machine interaction technologies.

The study in [5] investigates the performance of a protective coating composed of a commercial polysiloxane mixed with titanium dioxide nanoparticles applied to terracotta samples. Through colorimetric analysis, static contact angle measurements, and infrared spectroscopy, the authors evaluate the aesthetic impact, wettability, and chemical stability of the coating under accelerated UV aging. Although the coating exhibits good visual durability, the results also reveal important limitations regarding long-term hydrophobic performance, providing valuable insights for the development of more durable and environmentally friendly protective materials. This contribution directly supports UN SDG 11 (Sustainable Cities and Communities) by promoting the preservation of cultural heritage, while also contributing to UN SDG 12 (Responsible Consumption and Production) through the development of sustainable conservation materials and measurement-based assessment methodologies.

Overall, the papers collected in this issue illustrate the breadth of modern measurement science, demonstrating how rigorous metrological principles continue to enable innovation across healthcare, energy, digital technologies, transportation, education, and cultural heritage. As measurement science continues to evolve alongside emerging technologies such as artificial intelligence, digital twins, blockchain, and immersive environments, *Acta IMEKO* remains committed to providing an international forum for the dissemination of scientifically rigorous, application-oriented, and societally relevant research.

I hope you will enjoy reading this issue.

Francesco Lamonaca
Editor-in-Chief

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