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Introductory notes for the Acta IMEKO Thematic Issue on Measurement Systems and Instruments based on IoT Technologies for Health

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Dear Readers,

The Internet of Things (IoT) has revolutionized many services people rely on in everyday life. Of course, there is no exception in the healthcare sector, where the impact of IoT grows rapidly. Indeed, the use of IoT technologies helps healthcare, by connecting more easily patients to medical staff for continuous and long-term monitoring, through smart data management and innovative wearables as well.

With these premises, we are delighted to present to you this new Thematic Issue "Measurement Systems and Instruments based on IoT Technologies for Health". The papers accepted in this Issue contemplate, under different points of view, the importance of measurement systems and instruments for IoT applications related to health. Common aspects can be traced in these papers, from low-cost monitoring to wireless interfaces, both fundamental for IoT. An important theme underlined by these papers is air quality monitoring, which should be analyzed in everyday life to avoid serious health risks.

A first example of low-cost monitoring for an IoT application related to health is presented in [1]. Specifically, the low-cost monitoring system is proposed for Skin Conductance signals. The comparison with the signals provided by a reference desk equipment points out the ability of the low-cost system in providing the same relevant information for stimulus detection, despite its simpler design and hardware limitations. In fact, the increase of both baseline and peaks are detected by the proposed low-cost system after stimulation.

A low-cost system for air quality is then described in [2]. The system monitors CO_2 and Volatile Organic Compounds (VOCs) inside protective equipment such as FFP2 masks (commonly adopted during the COVID-19 pandemic), aggregates data over a 15-minute window, and calculates average values for each measured parameter. By comparing average values to reference thresholds, the monitoring system can suggest removing the mask when necessary. An innovative aspect is the personalized monitoring of exhaled breath, as customized and reliable information is provided to doctors, thanks to the integration of removable memories.

Air quality in living environments or outdoor is discussed also in [3], where a portable monitoring station is presented to measure parameters such as CO_2 and VOCs, in the presence of pollutants. The portable station acquires a combination of weather and air quality parameters, with low-cost and reduced power consumption. Data connectivity is ensured by wireless interfaces and the portable station can be part of a network, for possible distributed monitoring and alert delivery, in case of critical weather and air conditions.

Similarly, wireless networks can be exploited in indoor location identification and tracking. In [4], a method for remote rehabilitation that requires only the access to Wi-Fi points (routers) is presented without the hotspot mode for user mobile devices. The Wi-Fi access points with non-standard firmware are proposed as measuring equipment to determine in real time the coordinates of the patient location within a medical institution.

Finally, the paper [5] presents a mechatronic automatism based on near-field communication that allows the identification of user garments by sensor data, to improve the quality of life of fragile people, such as blind or disabled ones. With the help of an integrated interface to manage the requests from the user, a proper algorithm classifies the garments depending on their predominant color.

We hope you will enjoy your reading.

Grazia Iadarola,
Susanna Spinsante and
Francesco Lamonaca,
Guest Editors

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