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AIR SAFE: an Internet of Things System for Air Quality Management Leveraging Artificial Intelligence Algorithms

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Abstract : Nowadays, people spend most of their time in closed environments, in offices, or at home. Therefore, secure and highly livable environmental conditions are needed to reduce the probability of aerial viruses spreading. Also, to lower the human impact on the planet, it is important to reduce energy consumption. Heating, Ventilation, and Air Conditioning (HVAC) systems account for the major part of energy consumption in buildings [1]. Devising systems to control and regulate the airflow is, therefore, essential for energy efficiency. Moreover, an optimal setting for thermal comfort and air quality is essential for people's well-being, at home or in offices, and increases productivity. Thanks to the features of Artificial Intelligence (AI) tools and techniques, it is possible to design innovative systems with: (i) Improved monitoring and prediction accuracy; (ii) Enhanced decision-making and mitigation strategies; (iii) Real-time air quality information; (iv) Increased efficiency in data analysis and processing; (v) Advanced early warning systems for air pollution events; (vi) Automated and cost-effective m onitoring network; and (vii) A better understanding of air quality patterns and trends. We propose AIR SAFE, an IoT-based infrastructure designed to optimize air quality and thermal comfort in indoor environments leveraging AI tools. AIR SAFE employs a network of smart sensors collecting indoor and outdoor data to be analyzed in order to take any corrective measures to ensure the occupants' wellness. The data are analyzed through AI algorithms able to predict the future levels of temperature, relative humidity, and CO_2 concentration [2]. Based on these predictions, AIR SAFE takes actions, such as opening/closing the window or the air conditioner, to guarantee a high level of thermal comfort and air quality in the environment. In this contribution, we present the results from the AI algorithm we have implemented on the first s et o f d ata c ollected i n a real environment. The results were compared with other models from the literature to validate our approach.

Keywords : air quality, internet of things, artificial intelligence, smart home
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