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Editorial

Sensors and Systems for Environmental Monitoring and Control

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The detection and monitoring of odorants and/or chemical pollutants in the environment have become a major challenge to scientific community of modern developed and developing countries of the world. Billions of tons of organic and inorganic chemical pollutants are released into the air, water, and soil, annually resulting in widespread potential health hazards to plants, animals, and humans worldwide. Monitoring of environmental pollution is necessary and considered a crucial element in the assessment of air quality in cities and rural areas.

The field of environmental monitoring and control encompasses a broad range of activities, including the detection of a variety of gases—CO, NO_x, NH_3, and the particularly challenging case of CO_2. Sensing systems have been developed for all of these applications, but this Special Issue is focused on the employment of gas and liquid sensors, electronic noses/tongues, wireless sensor networks, and other systems to monitor and control airborne volatile compounds that are released when waste products are dumped in water, soil, or air.

The published papers deal with the development of sensors and wireless sensor networks for environmental applications. The first paper of this Special Issue addresses the water pollution source localization using wireless sensor networks. In this paper, a study on water pollution source localization is presented. Firstly, the source detection is discussed. Then the coarse localization methods and the localization methods based on diffusion models are introduced and analyzed, respectively, and both methods are compared.

The second paper is on the development of comprehensive water-quality monitoring system that employs a smart network management, nanoenriched sensing framework, and intelligent and efficient data analysis and forwarding protocols for smart and system-aware decision making.

The third paper presents an air pollution monitoring system for subway stations of Seoul (Korea) based on environmental sensors in order to preserve the health of commuters in the subway system. In this study, the accuracy of an instrument for particulate matter (PM) measurement using the light scattering method was improved with the help of a linear regression analysis technique to continuously measure the PM10 concentrations in subway stations. In addition, an air quality monitoring system based on environmental sensors was implemented to display and record the data of PM10, CO_2, temperature, and humidity.

The fourth paper presents an algorithm that is proposed to improve the localization of the unknown position nodes in wireless sensor networks by using fixed and mobile guide nodes (nodes with known position). To evaluate the proficiency, the proposed algorithm has been successfully studied and verified through simulation. Low cost, high accuracy, low power consumption of nodes and complete coverage are the

benefits of this approach, and long term in localization is the disadvantage of this method.

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