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ES-WCA: Energy efficient and safe weighted clustering algorithm for mobile wireless sensor networks

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The main concern of clustering approaches for mobile Wireless Sensor Networks (WSNs) is to prolong the battery life of the individual sensors and the network lifetime. For a successful clustering approach the need of a powerful mechanism to safely elect a cluster head remains a challenging task in many research works that take into account the mobility of the network. The approach based on the computing of the weight of each node in the network is one of the proposed techniques to deal with this problem. In this paper, we propose an Energy Efficient and Safe Weighted Clustering Algorithm (ES-WCA) for mobile WSNs using a combination of five metrics. Among these metrics lies the behavioral level metric which promotes a safe choice of a cluster head in the sense where this last one will never be a malicious node. Moreover, the highlight of our work is summarized in a comprehensive strategy for monitoring the network, in order to detect and remove the malicious nodes. We use simulation study to demonstrate the performance of the proposed algorithm.

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Wearable smart wireless (WSW) H2S gas sensor based on 3D printing technology

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The proposed wearable smart wireless (WSW) H2S sensor combines nanofabrication and 3-dimensional printing technology (3DPT) to provide sensitive and easy monitoring of H_2S gas. The novel technologies of WSW H_2S sensor dramatically reduce the required mass, power and volume of current state-of-the-art conventional systems allowing for flexible implementation of the instrument at high safety, and reliability. Minimal crew time is required with a hand-held configuration, and the crew involvement is eliminated with autonomous continuous analysis enabled by wireless function offered by an integrated WSW H_2S sensor array. We are developing hybrid structure of graphene (GP) and tin-oxide (SnO_2) porous material based wireless sensor nodes based on 3DPT. 3D printed rubber-like matrix is an ideal substrate for flexible gas-sensors because of its large surface area, flexibility, and facilitated mass transfer of analytes to the reaction sites. We also make the 3D rubber-mesh conductive by plating the surface with copper and deposit nano-porous gas reactive metal film, SnO_2, using electrodeposition method. The flexible sensor film will be packaged into an integrated system with power supply and communication modules.

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