Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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NOVEL APPROACH FOR FINDING SHORTEST ROUTE USING DIJKSTRA'S ALGORITHM AND FUZZY LOGIC IN A WIRELESS SENSOR NETWORK INTEGRATED IN A FOREST FIRE DETECTION SYSTEM

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Abstract

This paper proposes a Fuzzy Logic Controller/ Dijkstra's Algorithm based software that calculates the most reliable communication link between a WaspmotePlug&Sense Sensor Node and a Meshlium Router in a Wireless Sensor Network (WSN). The algorithm implements the effect of three parameters important for the functioning of the WSN: Waspmote involvement, the received signal strength indicator (RSSI) and the distance of the Waspmotes, for achieving optimal work capability of the system. Due to the inherent weaknesses of the conventionally used Star and Tree topologies which provide a single route with no alternatives on the forwarding of data, the lack of a software or algorithm that would select the optimal route and the fact that signal quality does not necessarily indicate optimal route employment, we propose an application of a Mesh topology along with a Fuzzy Logic Controller/ Dijkstra's Algorithm based software. Mesh topology allows each controller to be individually connected to at least two Meshlium routers, thus providing an alternative transmission solution in case of damage to certain links between the nodes and selection of a more efficient link for transmission of information. The Fuzzy Logic Controller/ Dijkstra's Algorithm setup reduces energy consumption of the WSN fire detection system by calculating and determining which routers should start up, instead of all of them working.

Key words: Dijkstra's algorithm, wnergy consumption, fuzzy logic controller, software defined network, WSN

Received: March, 2019; Revised final: January, 2020; Accepted: February, 2020

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