Genetic Algorithm based Chain Leader Election in Wireless Sensor Network for Precision Farming

ABSTRACT

Wireless Sensor Network (WSN) is one of the commonly used technologies in Precision Farming (PF). It provides farmers with accurate real-time information on their farms. In practice, WSN consists of numerous wireless sensor nodes, where each node relies on limited energy sources such as battery to maintain its operation. The energy management issue in WSN has gained attention of scholars, leading to new protocols or schemes developed over the years. Conventionally, PEGASIS protocol selects chain leader without considering the distance and residual energy level of each sensor node. As such, it might increase the energy consumption rate to transmit collected data from sensor node to sink. Inadequate energy management leads to rapid energy drain and eventually shorten the lifespan of WSN. Therefore, this study aims to prolong the lifespan of WSN while minimizing the energy consumption. Genetic Algorithm (GA) is proposed to enhance the chain leader selection scheme of the conventional PEGASIS. The proposed GA will select optimum chain leader by considering the energy consumption rate of each node. As such, the proposed algorithm is able to increase node's transmission as well as improve the lifespan of WSN by 50% as compared to the conventional approach.