CHAPTER V

CONCLUSIONS AND RECOMMENDATION

5.1.Introduction

This research examines the development of a new method for controlling WSN main parameters such as energy consumption, bandwidth, signal strength and coverage, using single fitness function. A brief history on the attempts of developing solutions for WSN coverage, energy consumption and other related issues is elaborated. The single fitness function proposed was tested with varying parameters. The present solutions in wireless sensor networks for coverage and energy consumption do not address a comprehensive parameter approach. Rather, some selected parameters are optimised while the remaining variables are kept constant. It is believed that adopting all parameters in a single fitness function can provide a more satisfactory model to model WSN coverage and energy consumption.

5.2. Research Contributions

The research examines the possibility of a single fitness function algorithm that provides adequate performance for WSN coverage and energy consumption problem. Ten simulations are carried out to gauge the performance of the single fitness function model. Sensor nodes in WSN network usually have limited onboard processing and wireless communication capabilities, and are equipped with batteries with limited power and thus energy saving techniques needs to be deployed in order to prolong the network lifetime. However, if all the sensor nodes simultaneously operated, redundant sensing data, corresponding wireless communication collision and interference will cause much energy to be wasted. The question arising is that how does all sensing area

get covered with the least active nodes so that no blind-point exists and connectivity kept is significant. Coverage becomes a serious problem in large scale sensor networks where hundreds and thousands of nodes are randomly deployed. Several algorithms aim to find a close-to-optimal solution based on local information. In this work, an algorithm that controls energy-consumption, Radio Bandwidth (BW), and signal strength using single fitness function to overcome Coverage Area Problems has been developed. The specific contributions of the present work are highlighted in the following sections.

A new method for controlling WSN main parameters (such as energy consumption, bandwidth, signal strength and coverage) using single fitness function is proposed, developed and tested. The algorithm is explained thoroughly and verified using simulation tests. If the number of network size start from 15 to 45, then it will almost be a linear increment in the transmitter delay. If the number of network size start from 30 to 45, then it will almost be a linear increment in the sensor cost. If the number of network size start from 35 to 55, then i will almost a linear increment in the transmission cost. The provided energy is on sensor cost, this is a measure on cost of the energy required cost in detecting a vector and generating a packet .Meanwhile, this is the energy cost needed in sending a packet represented by transmit cost. A very high value of transmit cost leads to a rapid depletion of a node's energy during transmission, which invariably leads to wearing out after sending only a few packets. Setting this value very low on the other hand implies that the nodes may be able to send several hundred of packets. However, it should be noted that transmit cost is scaled based on the distance between the nodes. Therefore, energy is often rapidly depleted since more distant nodes can only be reached by a more powerful broadcast. In addition, this is the energy cost in receiving a packet. Once, it takes the value of the

transmit cost, the transmit cost is set in receive cost. There is no need to particularly scale it.

The algorithm has been tested on experimental data and yet to be tested in reality using real WSN. Thus, the next step is to evaluate the performance of the developed algorithm using the simulation toolkit as well as running the test in real WSN. The following can be noted from the current work.

An optimized energy consumption distribution, bandwidth, and signal strength using single fitness function has been analysed, developed and modelled. Simulations of different scenarios of the algorithm that controls energy-consumption, bandwidth, and signal strength using single fitness function is carried out to evaluate the performance of the new model. The tests are carried out in real time based on the developed algorithm to evaluate performance results.

5.3. Recommendations and Future Work

Despite the performance of the present work, an exhaustive investigation may not be realistic within the present time frame and resources. Therefore, future pertinent work includes the following:

Firstly, the present work considered two-dimensional placement of nodes. It may be interesting to evaluate situations where the placements involve three-dimensions to assess if the existing scenarios would not significantly different from that obtained in the present work.

Secondly, a possible extension is the dynamic allocation of energy relative to cluster density or service importance and optimising power & coverage in the rest of the network nodes less dense or less important nodes.

Thirdly, the present work focused specifically on stationary distribution of nodes in WSNs. However, a possibility that may need to be evaluated is the scenarios possible with mobile networks where some of the nodes are not fixed and thereby the distance between nodes varies dynamically.