UNIVERSITI TEKNOLOGI MARA

MAXIMIZING WIRELESS SENSOR NETWORK LIFETIME USING PARTICLE SWARM OPTIMIZATION

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ABSTRACT

The low energy adaptive clustering hierarchy (LEACH) is a MAC protocol basically based on the TDMA transmission signal integrated with clustering and easy routing protocols in wireless sensor networks. The main purpose of the development of this protocol is to improve the lifespan of wireless sensor networks by taking into account the minimum consumption power that required to select and maintain the Cluster Leader. The way LEACH works basically begins with cluster formation based on signal strengths received. The LEACH Protocol Operation consists of two phases, setup phase and steady state. However, LEACH does not consider residual energy and distance to the base station. Therefore, the system proposes to Maximizing WSN by using the Particle Swarm Optimization (PSO) method which aims to select cluster head and cluster formation and order to reduce residual energy as well as improve the overall network lifetime. This experiment was simulated using a simulation tool called MATLAB 2017a. The result proved that Proposed Method using Particle Optimization (PSO) has increased network lifetime up to 50%, the average energy consumption reduced by 76% and packet delivery ratio consistent by 95% compared to the LEACH protocol.

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TABLE OF CONTENT

CHAPTER ONE
INTRODUCTION

1.1 Research Background

The sensor is a device that serves to convert physical quantities to other physical quantities such as electricity. A collection of wireless sensors, each of which is specially configured and configured, is recognized as Wireless Sensor Network (WSN).

WSN is a wireless network device that uses sensors to monitor physical or environmental conditions around, such as temperature, sound, vibration, electromagnetic waves, pressure, movement, and others. The wireless sensor network consists of arrangement and collection of sensor nodes scattered in a certain region (sensor field) that works to extract analogue data (sensing) and transform into digital data form so that data can be managed and produce an information about the environment.

The development of WSN has actually started from the needs in the military field such as monitoring during the war on the battlefield. With the rapid development of technology and interests, WSN has been expanded in the industry and use for the convenience of civil society, encompassing industrial controls and controls, health surveillance machines, environmental conditions monitoring, healthcare applications, home automation and arrangements in the past cross (Khan et al, 2016).

In addition to one or more sensors, each node in the WSN is usually equipped with a radio transceiver or other wireless communication device, a small micro-controller, and an energy source, usually a battery. Applications and use of WSN are numerous and varied, but generally for monitoring, tracking and controlling. The widespread sensor capabilities of WSN make use of WSN for monitoring widely used. WSN can be used with simple sensors that monitor a phenomenon while for the complex then each WSN will have more than one sensor so that this WSN will be able to do a lot of monitoring a phenomenon.