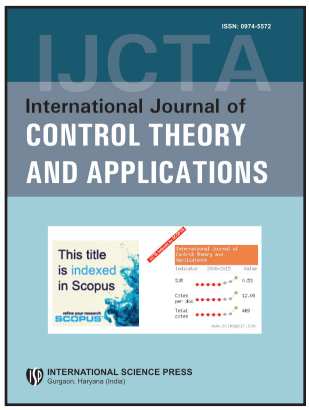

International Journal of Control Theory and Applications

ISSN : 0974-5572

Volume 10 • Number 16 • 2017

Adaptive Algorithm for Optimal Route Configuration in Multi-Hop Wireless Sensor Network

Hikma Shabani[a], Ahmed M.A. Haidar[b], Norhuzaimin Julai[c], Musse M. Ahmed[d], P.R.P. Hoole[e] and Majdi Marai[f]

[a]*Corresponding author, Deparment of Electrical and Electronic Engineering, Universiti Malaysia Sarawak, Sarawak, Malaysia. Email: shikma@unimas.my*
[b-e]*Deparment of Electrical and Electronic Engineering, Universiti Malaysia Sarawak, Sarawak, Malaysia*
[f]*Department of Electronic and Communications Engineering, Hadhramout University of Yemen, Yemen*

Abstract: Wireless Sensor Networks (WSNs) are best solutions for numerous aspects of engineering applications such as monitoring, control and surveillance of electrical plant amongst others. Autonomously, sensors will communicate with each other, collaborate, share and forward information in a multi-hop fashion without any centralized controller. To gather relevant data, the route optimization mechanism is used to solve the long routing problem and provide the shortest path amongst communicating nodes. Thus, this shortest path criterion is not suitable for WSN as it may lead to power drainage of several nodes and may cause high signaling and processing costs due to the network reconstruction. This paper proposes an optimal route configuration technique based on an adaptive genetic algorithm in which the architecture of multi-hop wireless sensor network is considered as a distributed computing infrastructure. The obtained results show that the proposed algorithm provides an optimal route configuration with the best performance in terms of evaluating the covered distance, packet loss and time delay.

***Keywords*:** Adaptive Genetic Algorithm; Optimal Route Configuration; Multi-Hop Wireless Sensor Network; Distributed Computing Infrastructure.

1. INTRODUCTION

Nowadays, the remote monitoring and control of electrical plants has emerged as the best approach to maximize the electricity production and mitigate power station failure rates [1]. Conventional current and voltage monitoring methods are expensive and difficult to implement in complex systems [2]. Being one of the options, fiber-optic require optoelectronic transmitters in remote areas [3]. Thus, wireless sensor networks (WSNs) offer an attractive alternative to wired systems due to their easy access to remote sites, no leasing cost and adaptability to changing network [4]. In fact, to ensure a long lifetime network system, just like any battery operated wireless device, the energy resource management is one of the vital concerns in WSNs. Though, the traditional routing optimization protocols such as ad-hoc on-demand distance vector (AODV), dynamic source routing (DSR) and temporarily