

Chapter 4

A Soft Computing Approach for Data Routing in Hospital Area Networks (HAN)

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ABSTRACT

This paper proposes an alternative model to deliver vital signs of patients in a hospital indoor environment where a large number of patients exist and the traffic generated rapidly changes over time using Body Area Network (BAN). The methodology for finding an optimal path includes a meta-heuristic that combines ANT Colony Optimization (ACO). The authors propose an ACO based framework for monitoring data originating from a BAN to improve network life, energy and load balancing of the overall network. Since the traffic generated by BANs on the network changes with time, finding a shortest path is important for Hospital Area Network. In this paper, the authors implemented an ACO based method and have carried out simulations using OMNeT++ to prove that the proposed method can find a better solution than conventional methods.

INTRODUCTION

Ant colony optimization (ACO) is a meta-heuristic search algorithm for problem solving that takes inspiration from the behavior of real ants. The basic idea of ACO lies on the fact that communication among individuals in ant colony happens based on the pheromone trails that are used for communication to other ants. It has been a combinatorial optimization problem by (Dorigo et al., 1996), for many applications. Many studies on ACO have been performed using traveling salesman problem and prove to be superior when compared with other meta-heuristic approaches.

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In this paper, the authors deal with Hospital Area Network where continuous data is being transferred from indoor hospital environment to the destination where a number of nodes exist in the network and the traffic on the network rapidly changes with time because of the critical nature of the data transfer. This scenario reflects where a particular instance typical traffic congestion happens during a network without affecting the network life time and energy consumption.

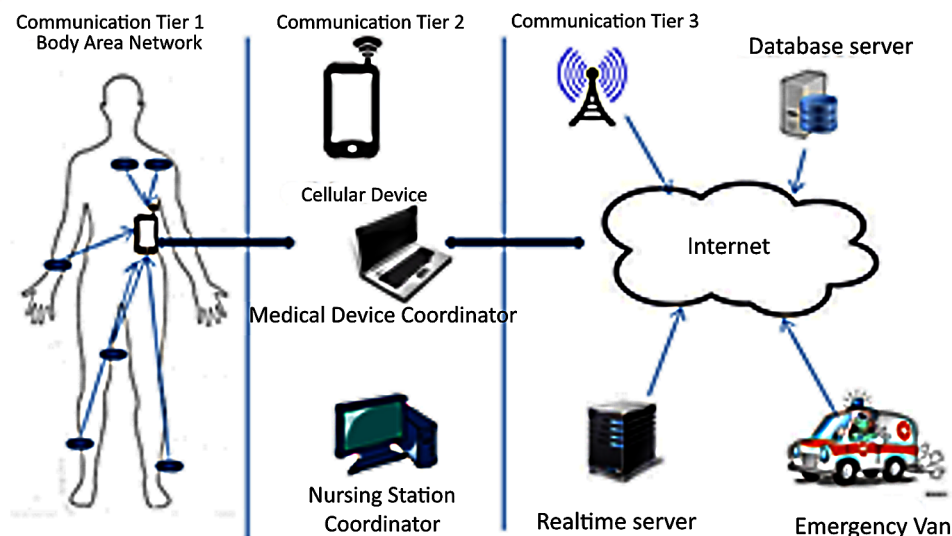
This paper deals with the finding shortest path without time delay and deliver the crucial data within time. Conventional problem solving methods are difficult because when the traffic changes rapidly, the information obtained from an old search may not be helpful because it carries a critical data of the patients. Hence, finding a shortest path solution helps in handling these issues.

In this paper, the researchers propose an evolution strategy method to solve the above issues using ACO. The proposed protocol makes an optimal use of the network energy and increases the network lifetime across the network.

RELATED WORK

Wireless Body Area Networks (WBAN) (Figure 1) together with HAN have created a high impact on the health care because of ageing population due to its sedentary lifestyle and poor diet resulting in an increase in number of people with chronic disease which requires continuous monitoring of the patient. Wireless sensor network technology offers a large scale and cost-effective solutions to this problem. It has become necessity for providing the quality health care timely by using Wireless Body Area Network technology. Authors in (ZK.et.al 2013), for an indoor hospital scenario, it uses centralized and distributed mode of communicating the BAN data packets which are sensitive and critical packets. Communication of the data packets plays a vital role in WBAN, since it consumes energy of the sensor node and that can be optimized by finding the best route to address all important issues concerned with latency, throughput.

Figure 1. General WBAN architecture



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