Review of Nature Inspired Technique for Minimize Energy Consumption in Wireless Sensor Networks

Prabjot kaur[1] Er. Dinesh kumar[2]
[1,2]Department of Computer Science and Engineering
[1,2]Gzsccet, bathinda

Abstract— Wireless sensor networks (WSNs) consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions. These are low cost, self-organized networks. These networks are infrastructure-less and self-configured to monitor various conditions such as temperature, sound, vibration, pressure, motion or pollutants. The data collected at sensor consumes more energy, but sensor nodes have only limited energy. In this paper, the clustering concept has been used by dividing the region into cells. This technique uses an ant colony optimization (ACO) and MRPSO to select the paths from source to destination node. The new algorithm can also be designed in such a way that low energy nodes do not take part in forwarding the route request messages to find a route to destination node. The proposed scheme minimize the energy consumption as compared to the existing.

Key words: Wireless Sensor Network (WSN), Ant Colony Optimization(ACO), MRPSO (particle swarm optimization)

I. INTRODUCTION

A. *Wireless Sensor Network Overview:*

Sensor networks are highly distributed networks of small, lightweight wireless nodes, deployed in large numbers to monitor the surroundings or system by the measurement of physical parameters such as temperature, pressure, or relative humidity. Building sensors have been made possible by the recent advances in micro-electromechanical systems (MEMS) technology. The sensor nodes are similar compared to that of a pc with a processing unit, limited computational power, limited memory, sensors, a communication device and a power source in kind of a battery. In a typical application, a WSN is scattered in a region where it is supposed to gather data through its sensor nodes. The applications of sensor networks are endless, limited only by the human imagination. Wireless sensor networks are becoming a growing section of research and development because of the tremendous quantity of applications that can greatly benefit from such systems and has led to the development of tiny, cheap, disposable and self-contained battery powered computers, referred to as sensor nodes or "motes", that may accept input from an attached sensor, process this input data and transmit the outcomes wirelessly to the transit network.

Wireless Sensor Networks (WSNs) could be defined as a self-configured and infrastructure-less wireless networks to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a primary location or sink where the data could be observed and analyzed. A drain or base station acts like a screen between users and the network. It's possible to retrieve required information from the network by injecting queries and gathering results from the sink. Typically an instant sensor network contains hundreds of tens of thousands of sensor nodes. The sensor nodes can communicate among themselves using radio signals. An instant sensor node is designed with sensing and computing devices, radio transceivers and power components. The individual nodes in an instant sensor network (WSN) are inherently resource constrained: they have limited processing speed, storage capacity, and communication bandwidth. Following the sensor nodes are deployed, they are responsible for self-organizing an appropriate network infrastructure often with multi-hop communication with them. Then a onboard sensors start collecting information of interest. Wireless sensor devices also answer queries sent from the "control site" to do specific instructions or provide sensing samples. The working mode of the sensor nodes may be either continuous or event driven. Global Positioning System (GPS) and local positioning algorithms may be used to acquire location and positioning information. Wireless sensor devices could be designed with actuators to "act" upon certain conditions. These networks are now and again more specifically referred as Wireless Sensor and Actuator Networks.

II. CLUSTERING IN WIRELESS SENSOR NETWORKS

Generally in most wireless sensor network (WSN) applications nowadays the whole network will need to have the capacity to operate unattended in harsh environments where pure human access and monitoring can't be easily scheduled or efficiently managed or it's even not feasible at all. Based with this critical expectation, in lots of significant WSN applications the sensor nodes tend to be deployed randomly in the region of interest by relatively uncontrolled means (i.e., dropped with a helicopter) and they form a network in an ad hoc manner. Moreover, considering the whole area that has to be covered, the short duration of the battery energy of the sensors and the likelihood of experiencing damaged nodes during deployment, large populations of sensors are expected; it's a natural possibility that hundreds or even tens of thousands of sensor nodes will undoubtedly be involved. In addition, sensors such environments are energy constrained and their batteries usually can't be recharged. Therefore, it's obvious that specialized energy-aware routing and data gathering protocols offering high scalability must certanly be applied so as that network lifetime is preserved acceptably saturated in such environments.

Naturally, grouping sensor nodes into clusters has been widely adopted by the study community to satisfy the above mentioned scalability objective and generally achieve high energy efficiency and prolong network lifetime in large-scale WSN environments. The corresponding hierarchical routing and data gathering protocols imply cluster-based organization of the sensor nodes so as that data fusion and aggregation are possible, thus leading to significant energy savings. In the hierarchical network structure each cluster features a leader, which can be also referred to as the cluster

head (CH) and usually performs the special tasks referred above (fusion and aggregation), and several common sensor nodes (SN) as members. The cluster formation process eventually results in a two-level hierarchy where in actuality the CH nodes form the bigger level and the cluster-member nodes form the lower level. The sensor nodes periodically transmit their data to the corresponding CH nodes. The CH nodes aggregate the information (thus decreasing the sum total amount of relayed packets) and transmit them to the beds base station (BS) either directly or through the intermediate communication with other CH nodes. However, because the CH nodes send constantly data to higher distances compared to common (member) nodes, they naturally spend energy at higher rates. A standard solution so as balance the vitality consumption among all the network nodes, is always to periodically re-elect new CHs (thus rotating the CH role among all the nodes over time) in each cluster.

III. ANT COLONY OPTIMIZATION (ACO)

Ant colony algorithms are based on the behaviour of ants finding food in a search area. This algorithm is used for determining the optimal paths from source to food [9]. For the first time ant roams randomly, when they found food ants return back to their colony and marked their followed path by pheromones which shows that the path has food. When other ants see these markers of pheromone they tend to go after the same path with some certain probability in order to bring food. If they do so, the path gets populated with their own pheromone and the path would get stronger as many as ants follow the same path. Shortest paths are stronger than longest ones because in shortest path the large amount pheromone is present, whereas in longest one it may get decayed

IV. CONCLUSION

In this paper we proposed an technique ant colony optimization (ACO) and MRPSO to select the paths from source to destination node. The paths having highest pheromone value will be selected. The concept of PSO is used to update the paths. In this concept only the nodes having highest pehromones take part in the broadcasting. Energy consumption in this is less as compared to previous techniques.

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