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PERFORMANCE ANALYSIS OF ENERGY CONSUMPTION IN WSN IN DIFFERENT NODES

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ABSTRACT

The WSN is built of "nodes" from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and communications bandwidth. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network.

In this project are using fuzzy clustering, k-mean and self-organizing map (SOM) based clustering method. It is observed that overhead in cluster based protocol is not much dependent upon update time. Simulation a result indicates that a cluster based protocol has low communication overheads compared with the velocity based protocol. In the simulation result we consider main approaches Clustering technique (SOM, Fuzzy, K-Means), differentdifferent numbers of node (50,100 and 150) with 5 cluster. The simulation performance analysis on the based comparison of average energy consumption. The result shown between communications overhead versus velocity and percentage decay rate of energy for WSN versus Velocity.

Key-Word: WSN, SOM, Fuzzy, K-Means, Sensors, Nodes.

INTRODUCTION

Wireless Sensor networks (WSNs) have become one of the most interesting areas of research in the past few years. A WSN is composed of a number of wireless sensor nodes which form a sensor field and a sink. These large numbers of nodes, having the abilities to sense their surroundings, perform limited computation and communicate wirelessly form the WSNs. Recent advances in wireless and electronic technologies have enabled a wide range of applications of WSNs in military, traffic surveillance, target tracking, environment monitoring, healthcare monitoring, and so on. There are many new challenges that have surfaced for the designers of WSNs, in order to meet the requirements of various applications like sensed quantities, size of nodes, and nodes‟ autonomy. Therefore, improvements in the current technologies and better solutions to these challenges are required. The future developments in sensor nodes must produce very powerful and cost- effective devices, so that they may be used in applications like underwater acoustic sensor systems, sensing based cyber physical systems, time critical applications, cognitive sensing and spectrum management, and security and privacy management.

REQUIREMENTS FOR A WIRELESS SENSOR NETWORK

Initial research into wireless network sensors was mainly motivated by military applications, with the Defiance Advanced Research Projects Agency (DARPA), continuing to fund a number of prominent research projects (e.g., Smart Dust, Network of Embedded systems (NEST)).The type of applications considered by these projects led to a de facto definition of a wireless sensor network as a large-scale (thousands of nodes, covering large geographical areas), wireless, ad-hoc, multi-hop, un-partitioned network of homogenous, tiny (hardly noticeable), mostly immobile (once deployed), sensor nodes that would be randomly deployed in the area of interest, (Kay Romer et al. 2004). Further applications and projects do not always fit these requirements, but these are the basic constraints assumed by most developers. To summarize the aims that a node and a network of this nature have to achieve, these are ideally the main characteristics: Low power consumption, Low cost nodes that use cheap and commonly available batteries, Small physical size to facilitate deployment, Compliance to standards and regulations, Single design for international markets, Ability to maintain time synchronization with other nodes and hopping messages to destination, Operate over wide temperature ranges especially for military applications or high temperature scenarios (i.e. a desert zones) and Fault tolerant.

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ENERGY CONSUMPTION

Energy consumption is easily one of the most fundamental but crucial factor determining the success of the deployment of sensors and wireless sensor networks (WSNs) due to many severe constraints such as the size of sensors, the unavailability of a power source, and inaccessibility of the location and hence no further handling of sensor devices once they are deployed. Efforts have been made to minimize the energy consumption of wireless sensor networks and lengthen their useful lifetime at different levels and approaches. Some approaches aim to minimize the energy consumption of sensor itself at its operating level, some aim at minimizing the energy spent in the input/output operations at data transmission levels and others target the formulation of sensor networks in terms of their topology and related routing mechanisms. The generic goal here is to reduce the amount of energy consumption of some components of the application as much as possible by reducing the tasks that have to be performed by the sensors and the associated networks yet still fulfill the goal of the intended application. We consider 5 access points with different clustering techniques K-means, Fuzzy and SOM for 50, 100 and 150 Nodes as shown in figure 1, 2, and 3 respectively.

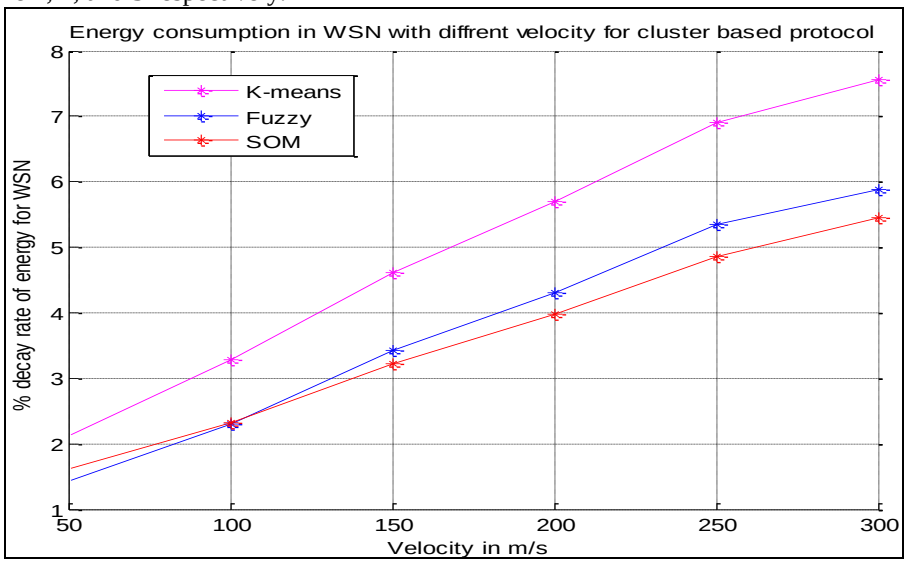

Fig: 1Performance of Energy consumption in WSN for 50 Nodes

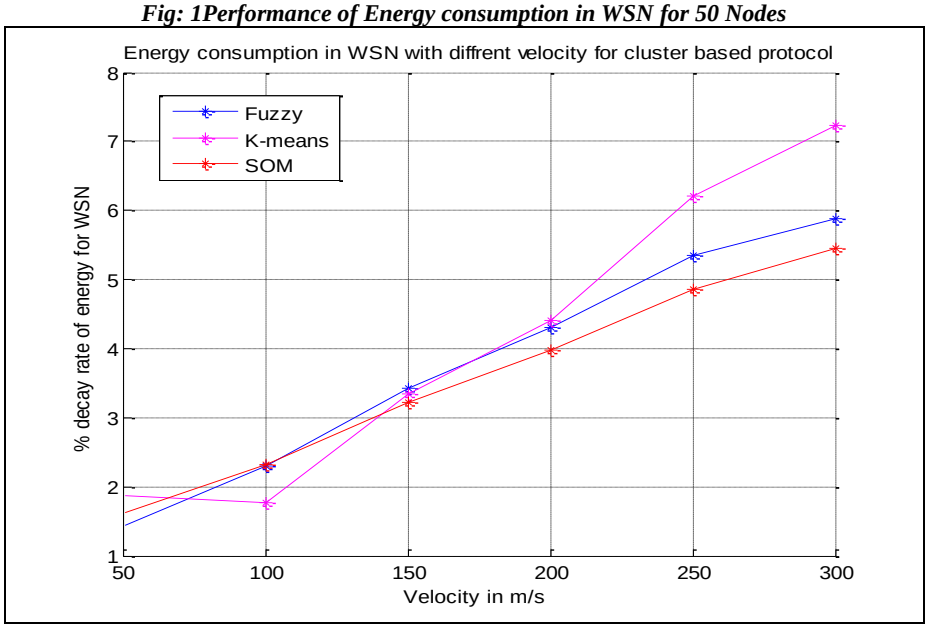

Fig: 2 Performance of Energy consumption in WSN for 100 Nodes

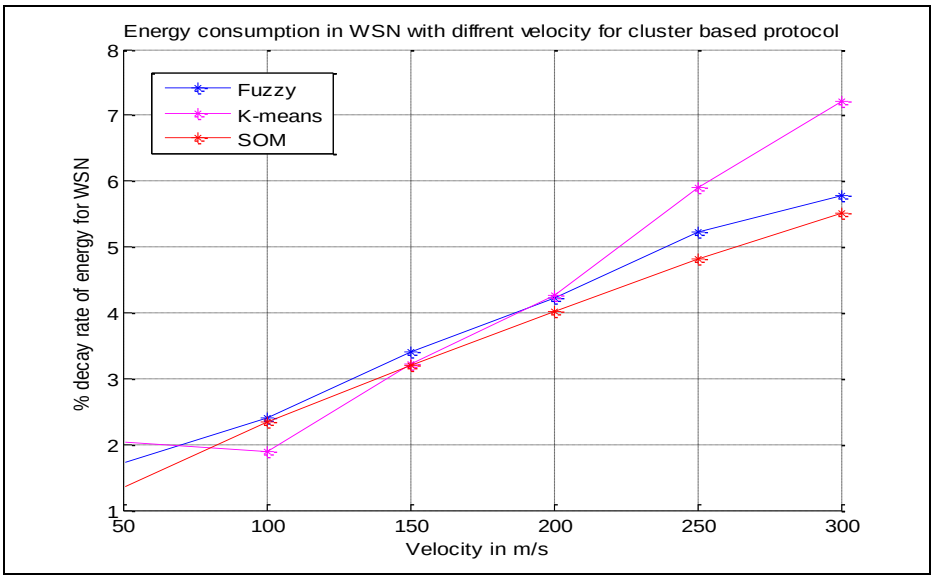

Fig: 3 Performance of Energy consumption in WSN for 150 Nodes

CONCLUSION

Advances in wireless communication technology are enabling the deployment of networks of small sensors. These sensor networks have applications in military monitoring, health, industrial control, weather monitoring, commodity tracking, home control etc, as promising as this technology seems, many design issues must yet be resolved before Wireless Sensor Networks become fully functional. The sink velocity from 50 m/s to 300 m/s has been taken into the account for finding the energy consumption and a comparative analysis is presented in the result section of the thesis. The performance of wireless sensor networks system for Self organizing map has performed better than other two methods. It is also observed that overhead pattern in cluster based protocol is not much dependent upon update time.

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