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New Optimization Algorithm for Fast Node Selection in Wireless sensor Networks

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Abstract:

Wireless Sensor Networks (WSNs) play a major role in revolutionizing the world by its sensingtechnology. WSNs has emerged as that powerful technology which has multiple applications such as such as military operations, surveillance system, Intelligent Transport Systems (ITS) etc. WSNs comprises of various sensor nodes, which captures the data from the surrounding alongside monitoring the external environment. Much of the research work is focused on making the sensor network operating with minimum consumption of energy, so that it can survive for longer duration. The primary concern in the direction of saving energy has been due to the discharging of those batteries on which sensor nodes are operated. In addition to that, WSNs are also exploited for its security aspects so that it can be used in some confidentialsectors like military battlefield. In this paper to find out the solution when the processor heat data transmission very low such a problem using optimization algorithms would give the solution.

Keywords: WSN, Internet Data, Optimization Algorithm, Routing Algorithm

Introduction

Indeed, the Wireless Sensor Network (WSN), the realization of distributed architecture, is an innovative field to ensure Site Specific Data Management (SSDM). Industrial sector reveals the spacio- temporal variance in case of various physical as well as chemical parameters. In case of industry the parameters such as, the process parameters and environmental parameters are of great interests. The physical parameters such as temperature, relative humidity, concentration of typical gases in the air etc. and chemical parameters such as pH of the solution, salinity of the water etc. must be monitored and controlled to the desired level to increase the productivity without compromise in the quality. In case of typical industry both indoor as well as outdoor environment must be monitored and controlled. For collection of the data of industrial parameters of Site-Specific variability, the Wireless sensor network is most suitable.

Advancement in wireless communication has made possible the development of wireless sensor networks comprising of devices called sensor nodes. Sensor nodes are low power, small size & cheap devices, capable of sensing, wireless communication and computation. As soon as the sensors are deployed in the network, they configure themselves and connect with each

other for data collection and thereby forwarding the data to the Base Station. WSN can also be defined as a network comprising of possibly low-size and low complexity devices termed as nodes which are capable of sensing the environment and communicating gathered information from the monitored area; the gathered data can be transmitted directly or through multi –hops to sink, which can then use it locally or is connected to other networks (e.g. internet) through gateway nodes. The main components of sensor node consist of a sensing unit, a processing unit, a transceiver and a power unit. Sensing unit senses the physical quantity which is then transformed into digital one through ADC i.e. Analog to Digital converter. Thereafter processor is used for further computations and transceiver is used to transmit and receive data from the other nodes or from the Base Station. Power unit is the most prominent unit in any sensor node. Once the battery is exhausted, it can't be replaced for unattended applications. Other units are application dependent unit like Mobilizer, Power Generator and Location Finding System.

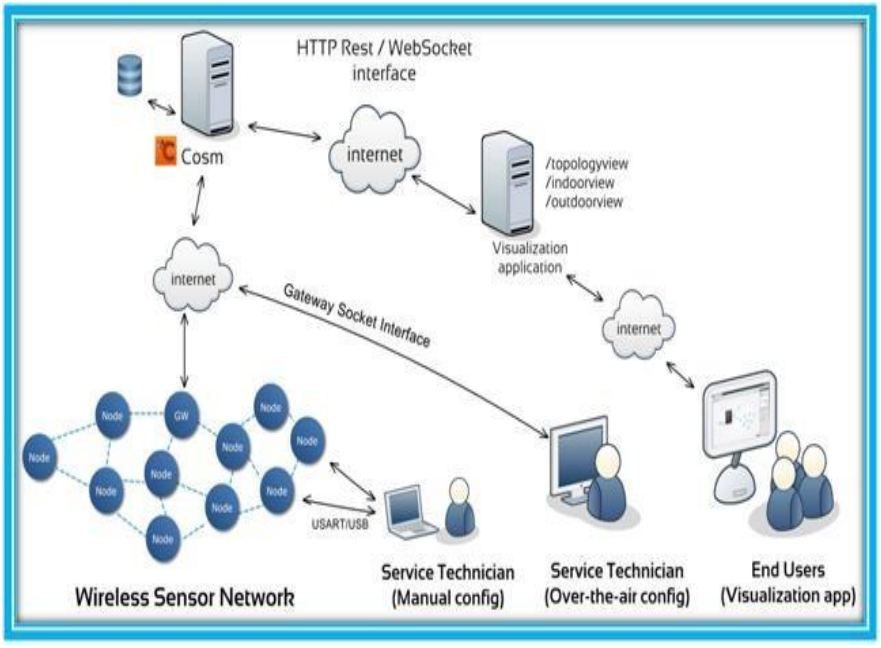


Fig 1: WSN Architecture

Literature Review

The Wireless Sensor Network (WSN) is an emerging field of electronics, ensuring research of applied nature. The salient features of wireless sensor network motivate to undertake the research work in this field. According to the architecture, the wireless sensor network (WSN) consists of a thousand of self-organizing, lightweight sensor nodes, which are used to monitor physical or environmental conditions. Normally, the parameters considered for monitoring include temperature, sound, humidity, vibration, pressure, gases, motion etc.

Each sensor node in a **WSN is equipped with a RF module, an array of sensors, a battery**

unit and a Central Processing Unit (CPU). Although, research in the field of WSN was initially motivated by military applications. Now days, it is deserving a key position in many industrialand public service areas including traffic monitoring, weather conditions monitoring, video surveillance, industrial automation and healthcare applications. The node communicates wirelessly and self-organize after being deployed in an ad hoc network. The WSN realizes the deployment of IEEE 802.15.4 standard for wireless communication.

The Wireless Sensor Node (SN)

To establish wireless sensor network, the features of wireless sensor nodes (SNs) play commendable role on the enhancement of accuracy and reliability of WSN. Therefore, the sensor node must be highly accurate and reliable. To enhance characteristics of sensor node the embedded technology is most suitable. Wireless Sensor Node is smart device and operatingas the End Devices (ED) to interact with the physical world, as the Router to collect the data from the sensor nodes and disseminate towards the Co-ordinator node. The wireless sensor nodes are mostly distributed in wide geographical area. Each sensor node has the capabilities to collect the data and disseminates to the coordinator. The data is routed to the coordinator by multichip infrastructure.

Proposed work

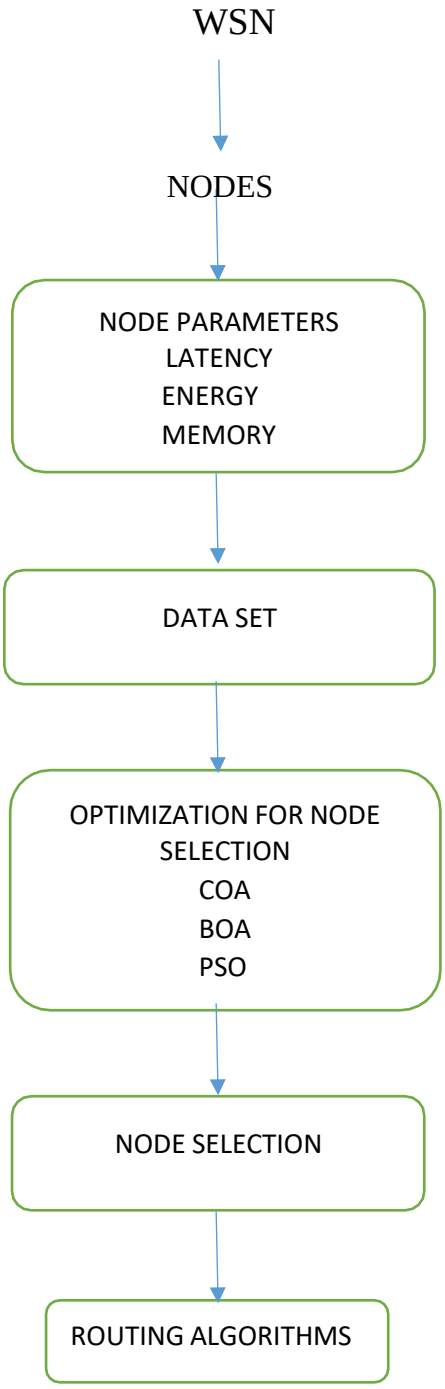


Fig 2: Proposed work for node selection and improve data transmission

A WSN is consisted of a number of wireless nodes that collects information from environment by means of different sensors. A gateway server computer acts as a bridge between the WSN and the outside world. The gateway server can essentially have the capability

to control any specific node. The sensor network connects to the internet or computer networks to transfer data for analysis and use. Sensor network nodes cooperatively sense and control the environment. They enable interaction between persons or computers and the surrounding environment. A wireless sensor network contains a large number of tiny sensor nodes that are densely deployed either inside the phenomenon to be sensed or very close to it. Sensor nodes consist of sensing, data processing, and communicating components. The position of sensor nodes need not be engineered or predetermined.

In this proposed methodology once we have selected the nodes from networks. It can affect Sensor nodes monitor physical parameters such as temperature, pressure, motion and vibration. The sensor node performs three primary functions which are sensing, communication and data processing. Sensor node consists of microcontroller, small energy and limited battery capacity. When the processor getting heat the data transmission to system to system very slow. So, we need to an improve the data transmission using routing algorithms.

Routing algorithms

- ✓ Ad hoc On-Demand Distance Vector routing (AODV)
- ✓ Destination Sequenced Distance Vector (DSDV)
- ✓ Dynamic Source Routing (DSR)

Ad hoc On-Demand Distance Vector routing (AODV)

AODV is a reactive (or on-demand) MANET routing protocol, it only keeps routes that have a demand in the network. For reaching destinations, AODV holds a routing table with the next hop. If no packets are sent on a path, they will time out after a while. It only consists of information about its neighbour nodes so re-transferring the data frames might take more time.

Types of routing in AODV

RREQ: Route Request

A node, Initiates to send/transmit a packet but doesn't know how to get there, it sends an RREQ multicast message to start the route discovery process. Neighbouring nodes keep trackof where the message originated and move it on to their neighbors before it reaches the destination node.

RREP: Route Reply

The destination node responds with an RREP, which returns to the source through the path taken by the RREQ. As the RREP returns to the source, forward routes are formed in the intermediate nodes. If an intermediate node knows the path to the destination, it may send an RREP in response to a received RREQ, allowing nodes to enter an established route. Communication between the source and the destination will begin once the RREP arrives at

the source and the route is established.

REER: Route Error

AODV typically has less overhead as a reactive protocol (less route maintenance messages) than proactive. In the event of the connection interruption that the path no longer functions, i.e. messages cannot be sent, a RERR message is sent through a node detecting the link interruption. The message is re-cast by other nodes. The RERR message shows the unattainable destination. Message receiving nodes inactivates the route.

Destination Sequenced Distance Vector (DSDV)

DSDV was one of the first proactive routing protocols available for Ad Hoc networks. It was developed by C. Perkins in 1994, 5 years before the informational RFC of the MANET group. It has not been standardized by any regulation authorities but is still a reference.

Algorithm

DSDV is based on the Bellman-Ford algorithm.

With DSDV, each routing table will contain all available destinations, with the associated next hop, the associated metric (numbers of hops), and a sequence number originated by the destination node.

Tables are updated in the topology per exchange between nodes.

Each node will broadcast to its neighbours' entries in its table. This exchange of entries can be made by dumping the whole routing table, or by performing an incremental update, that means exchanging just recently updated routes. Nodes who receive this data can then update their tables if they received a better route, or a new one. Updates are performed on a regular basis, and are instantly scheduled if a new event is detected in the topology. If there are frequent changes in topology, full table exchange will be preferred whereas in a stable topology, incremental updates will cause less traffic. The route selection is performed on the metric and sequence number criteria. The sequence number is a time indication sent by the destination

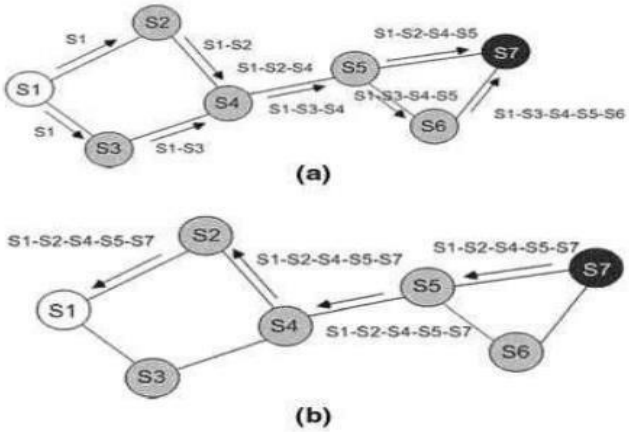
node. It allows the table update process, as if two identical routes are known, the one with the best sequence number is kept and used, while the other is destroyed (considered as a stale entry).

Dynamic Source Routing (DSR)

The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobilenodes. DSR allows the network to be completely self-organizing and self-configuring, withoutthe need for any existing network infrastructure or administration. It is a reactive protocol andall aspects of the protocol operate entirely on-demand basis. It works on the concept of sourcerouting. Source routing is a routing technique in which the sender of a packet determines the complete sequence of nodes through which, the packets are forwarded. The advantage of source routing is: intermediate nodes do not need to maintain up to date routing information inorder to route the packets they forward. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance". DSR requires each node to maintain a route – cache of all known self – to – destination $_{pairs}$. If a node has a packet to send, it attempts to use this cache to deliver the packet.

Example

In the following example, the route discovery procedure is shown where S1 is the source node and S7 is the destination node.



(a) Route Discovery **(b)** Using route record to send the route reply

Conclusion:

WSNs have been profoundly used in various sectors of human life. The sensing technology has made it possible for any sensor node to communicate and respond to the different attributes. This paper has briefed about various aspects in WSN. With the brief introduction to the WSN, Applications have been highlighted along with the security aspects in WSN. Thereafter the tabular comparison of different simulation software's has been given. It can be concluded from the study done in this paper, that WSN has revolutionized almost every sector of modern era. In this paper we have discussed the transmission of data from one system to another system using routing algorithms (DSR, DSDV, AODV)to improve the speed of data transmission.

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