An Enhanced I-spin to improve the Energy Efficiency for Wireless Sensor Networks

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Abstract- A wireless sensor network (WSN) is made up of spatially distributed autonomous sensors to monitor various conditions such as physical or environmental conditions. And cooperatively pass their data through the network to a main location. The challenge remains in designing a good routing protocol which provides the solution for various issues such as energy awareness, adaptability and computational speed. But in WSN the main area of concentration is that of using a minimal energy resources and routing a data in an efficient manner.

But in a network, energy loss is due to the routing of data. Protocols like classical flooding, ideal case, gossiping, spin and i-spin can reduce the consumption drastically due to the redundancy and resource blindness. To overcome this disadvantage, we present a novel protocol called enhanced i-spin which has a meta data descriptor and the data is sent on the shortest path. On performing simulation of enhanced i-spin, we compared the above mentioned protocols, and the graph results prove that i-spin has higher percentage in disseminating data at a fixed energy level

Keywords- *Meta data descriptor, resource blindness, data redundancy, routing, dissemination*

I. INTRODUCTION

A wireless sensor network (WSN) consists of spatially distributed autonomous sensor to monitor physical or environmental conditions such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the networks to the main location. It contains large number of sensor nodes in which it either phenomena or very close to it. The protocols used in a WSN to be self-organizing and should be the energy of sensor networks. It is used to processed data instead of sending the raw data to the nodes.

II. SENSOR NETWORK CHALLENGES AND KEY ISSUES

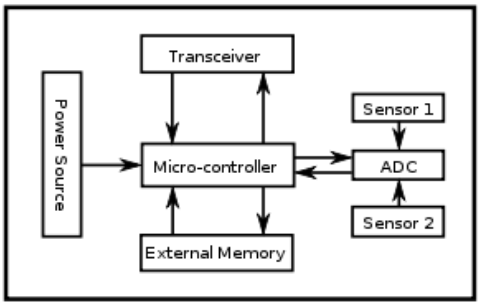
It contains the enormous application of WSN's and it to be constrained in a bandwidth and energy supply. It poses the unique constraints and hardware I it.

A. Some of the Major Challenges

Nature of deployment, self-configuration, Reliability, quality of service, mobility, security.

B. System Architecture and Design Issues of Sensor Networks

It is used to build of "nodes"-from a several thousands of nodes is connected to one sensors. Each network is typically several parts.



A sensor node consists of radio transceiver, and it contains both transmitter and receiver in a single unit. Simply we can imagine that the sensor nodes can be done in small computers, and it is basic in terms of interfaces and components and it usually contains computational power and limited memory, sensors or MEMS.

C. *Design Issues*

The performance of a routing protocol is mainly used to depend upon the architectural model and the design of the sensor networks.

D. Security Implementation

It is mainly used for providing the secure connections in sensor networks and it may deployed in several areas such as battlefield so any conflict between these protocol to create challenge in network security.

E. Energy Considerations

It is the very most important factor for the creation of the infrastructure and it helps for the process to select the routines for transmission. So the multi hop routing introduces topology management and MAC. The direct routing is used to perform only if all the nodes are close to the sink.

F. Node Deployment

Analyze the work of a node it should be dedicated to specific functions such as sensing, aggregation and engaged the many functionalities at the same time and it is used to drain the energy of a node.

G. Data Delivery Models

Based on the various applications of a sensor networks the delivery model to the sink can be hybrid, query-driven and event-driven. Some networks apply hybrid model by the combination of driven data delivery and query –driven**.**

III. WIRELESS SENSOR NETWORKS VS TRADITIONAL WIRELESS SENSOR NETWORKS

There are many protocols from traditional wireless networks such as cellular network, wireless lan and Bluetooth and it is still used in a wireless sensor network, but some differences are:

1. Nodes can be mainly used for a broad cast communication paradigm, it is point-to-point communication.
2. Nodes are cheaper than nodes in ad-hoc networks.

A. Sensor Networks Applications

Some of the modern networks are bi-directional and it enabling the control of sensor activity and such networks are used in industries and consumer applications, such as industrial process monitoring and the control, health monitoring. Some of the sensor networks are divided in to three such as physical, industrial, structural.

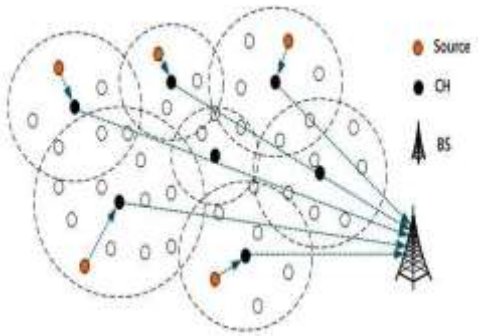
B. Characteristics of Good Routing Protocol

The energy consumption is mainly due to the routing of data and it can be reduce the energy consumption. It can be classified based on the number of hierarchical vs non-hierarchical routing. Mostly the proactive routing ,the data path can setup in advance and I t is suitable for the routing table**.** It shows either the source or destination to the routing protocol.

Some of the characteristics of routing protocols are: Simplicity, Energy awareness, Adaptability, Scalability.

C. Wireless Sensor Network Frame Work Architecture

Wireless sensor networks need an efficient the energy aware routing protocol for the purpose of maximize the life time of the network. In the system analysis the existing protocols working and its disadvantages are discussed.



Functions of different nodes

D. Functions of Sink

1. Decrypted the data packet and check the integrity of the packet
2. It generate new session key.
3. When the session is expired it send the new session key to the gateway.

E. Functions of Sensor Node (Sn)

1. Encrypted the data packet
2. Send the data packets to the gateway nodes.
3. Receive the control packets from gateway nodes
4. Update the session key based on control packets.

IV. EXISTING ROUTING PROTOCOL FOR WIRELESS SENSOR NETWORK

A. Classical Flooding

Every sensor used to receive the data and it forward it to all neighboring nodes without inspecting whether it is transmitted a copy or not.

The main drawback is resource blindness and overlap and resource binding.

B. Implosion

By sending multiple packets of the same data item, the network wastes resources. The main reason for lacking mechanism is to differently identify a data item.

C. *Over-Lap*

At the time of more than one sensor monitor events occurs, the network of sensors may form a geographically overlapping regions leading to a situation when a command node receives multiple copies of data.

D, Resource Blindness

With change in energy level, nodes do not adopt their behavior as it is unaware of resource.

E. Gossiping

Transmit received data to the random neighbor-alternative to flooding mechanism-nodes receives messages, and also it forwards the data back to the neighbor or another randomly selected node-implosion problem solving.

F. Ideal Case

In this technique of routing the data is transmitted to all the nodes in the shortest path from the source and it ensures that each node on network gets the data. This leads to increase it's efficiency of the sensor network by sending the data in the shortest on receiving it from the source.

G. Spin (Sensor Protocol Information Via Negotiation

For the purpose of negotiations SPIN uses three types of messages. When a node receives a new data to disseminate, then it makes advertisement of the received data by creating in ADV packet with meta-data attached by transmitting to all neighbors. Only the meta-data descriptor of the data present in the ADV packet. On receiving the ADV packet, node checks its cache. If the meta-data descriptor is already present in the cache means then the node will not reply to ADV packet. Otherwise it sends a REQ message containing of the meta-data descriptor, it received in ADV message of the data item it wants. Source node after receiving the REQ message dispatches a DATA message which has the data as the payload and a Meta data descriptor as header which is used while constructing the ADV packets. And it also has a resource manager which can poll all the resources of the nodes. If the sufficient energy is not present in the node to complete its process then resource manager stops the node from active participation. If there is no sufficient energy left means then the node will not reply to ADV. By this process the SPIN finds all the possible ways to send the ADV message so efficiency decreases.

V. PROPOSED PROTOCOL ENHANCED I-SPIN (IDEAL-SENSOR PROTOCOL FOR INFORMATION VIA NEGOTIATION)

In our proposed enhanced i-SPIN, we are going to use a Meta data descriptor which is sent as an ADV message to the nodes on the shortest path. On receiving the ADV message the neighbor checks its cache, it won't reply to the ADV message if it is already present; as a pay load it sends REQ message for getting the data. The data is sent on the shortest path, once the REQ has been received.

A. Functional Description

In our project, we implement a protocol enhanced I-SPIN, the maximum data dissemination for a fixed energy is provided by a ideal case approach. But it will undergo a constraint of resource blindness and sending of redundant data to the nodes. In enhanced I-SPIN, by applying "ideal case" in SPIN technique there will be unique data descriptor called Meta data which has the information about the resource of node which is polled by the resource manager. As an advertisement message, the Meta data is sent to nodes which are in the shortest path of the resource node. By sending the ADV messages only to the neighbors on the shortest path the energy is saved, instead the neighboring sensor nodes discover the shortest path and send the message that they have the Meta data descriptor and based on the message the main sensor node selects the neighboring sensor node and transmits the ADV packet thus the redundant and the resource blindness is reduced compared to enhanced I-SPIN.

CONCLUSION

In this project, we introduced enhanced I-SPIN (Ideal Sensor Protocols for Information via Negotiation) for wireless sensor networks applying the Ideal case technique in SPIN approach, than other routing protocols nodes disseminate data efficiency and also overcome the drawbacks of data redundancy and resource blindness. Future enhancements are Enhanced I-SPIN is a protocol which can be introduced in sensor networks to overcome the drawbacks by rectifying resource blindness and data

redundancy which could not be rectified by IDEAL CASE and SPIN protocols. Similarly enhanced I-SPIN can be used to enhance the throughput efficiency of the other hierarchical based routing protocols of the sensor networks. In addition it can be concentrated to increase the other qualities of services in transferring of data process in sensor networks.

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