**IMPLEMENTATION OF MULTIHOP PROTOCOL WITH COST FUNCTION FOR DECREASING ENERGY CONSUMPTION IN NODES**

**ABSTRACT:**

We present a routing protocol for Wireless sensor Networks that is reliable, power efficient, and has a high throughput (WSNs). To reduce energy consumption and increase network longevity, we employ a multi-hop topology. To identify the parent node or forwarder, we offer a cost function. The proposed cost function chooses a parent node with the highest residual energy and the shortest distance to the sink. The residual energy parameter balances energy consumption across sensor nodes, while the distance parameter guarantees packet delivery to the sink is successful.

Our suggested approach decreases the energy consumption of nodes which helps in maximizing the network lifetime.

**Keywords**-- Wireless Sensor Network, Cost Function, energy consumption

**EXISTING SYSTEM:**

An improved energy-efficient clustering protocol (IEECP) is proposed to prolong the lifetime of the WSN-based IoT which consists of three parts:

Firstly, a modified mathematical model is proposed based on the analysis of the energy consumption model for multi-hop communications and overlapping clusters in order to determine the optimal number of clusters. Secondly, a modified fuzzy C-means algorithm (M-FCM) is proposed in order to produce balanced cluster. Thirdly, a new algorithm is proposed known as CH selection and rotation algorithm (CHSRA) that integrates the back-off timer mechanism for CH selection, with a new rotation mechanism for CH rotation among members of the cluster. This major contribution can be achieved through the following tasks:

Selecting the optimal number of clusters based on the modified mathematical model by considering the overlapping case among clusters and multi-hop communications,

Forming balanced clusters that reduce the cost in the intra-distance based on modified fuzzy C-means algorithm (M-FCM) that result from a combination of the FCM algorithm with a centralized mechanism,

Reducing the energy overhead that results from the CH selection process in each round by a new integration of the back-off timer mechanism for CH selection with rotation mechanism in one algorithm known as CH selection and rotation model (CHSRA),

Balancing the communication distance among the CHs in the network based on a new objective function for the back-off mechanism, and

Balancing the life of the selected CHs in the cluster based on a new dynamic threshold.

**DISADVANTAGES:**

1. Complexity.

2. More energy consumption.

**PROPOSED METHOD:**

A new technique to reduce energy use while increasing throughput.

Our contribution consists of the following:

The stability period of our proposed scheme is longer. Nodes are able to stay alive for longer periods of time while using the least amount of energy possible.

High throughput is aided by a long stability period and low node energy consumption.

A.Proposed Protocol:

We deploy numerous nodes in a region under this scheme. The power and compute capability of all sensor nodes are identical.

Two nodes are chosen, and these two nodes will transport data directly to the sink.

a) First phase:

During this phase, the sink sends out a brief data packet containing the sink's location in the area. Each sensor node stores the location of sink after receiving this control message. Each sensor node sends out a data packet that includes the node's ID, position in the area, and energy status. All sensor nodes are updated with the location of their neighbours and sink in this manner.

b) Forwarder Node Selection:

We designed a multi-hop approach for WSN in order to save energy and increase network throughput. The conditions for a node to become a parent node or forwarder are presented in this section. Proposed protocol elects a new forwarder in each round in order to balance energy consumption across sensor nodes and reduce network energy usage.

The ID, distance, and remaining energy status of the nodes are all known to the sink node. Sink calculates all nodes' cost functions and sends them to all nodes.

Every node determines whether or not to become a forwarder node based on this cost function. If n is the number of nodes, the following is the cost function for n nodes:

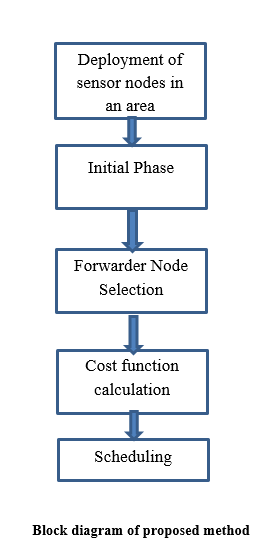
C.F (n)=

The distance between node n and sink is denoted by d (n) and R.E (n) is the residual energy of node n, determined by subtracting the current energy of node from the initial total energy. As a forwarder, it is preferable to use a node with a low cost function. All of the neighboring nodes join forces with the forwarder node and send data to it.

Data is gathered and sent to the sink via the forwarder node.Because the forwarder node has the most residual energy and travels the shortest distance to the sink, it uses the least amount of energy to send data there. Two chosen nodes interact directly with the sink and are not involved in data transmission.

c) Scheduling:

The forwarder node provides time slots to its progeny nodes using Time Division Multiple Access (TDMA) in this phase. Every child node sends its detected data to the forwarder node at a predetermined time. A node enters idle mode when it has no data to send. Only during transmission time do nodes wake up. The energy dissipation of individual sensor nodes is minimized when sensor nodes are scheduled. Performance metric of the proposed method is Energy consumption of nodes, here we use the residual energy parameter to study network energy consumption in order to investigate the energy consumption of nodes every round

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**ADVANTAGES:**

1.Less Complexity

2.Less energy consumption.

**APPLICATIONS:**

1.industrial control

2.environmental monitoring,

3. military surveillance,

4.intelligent transportation systems and medical field.

5.Furthermore, it can function independently in harsh or high-risk places where human presence is not possible

6.Disaster relief operations.

7.Biodiversity mapping

8.monitoring of temperature, pressure, and humidity

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**Software & Hardware Requirements:**

**Software:** Matlab R2018a.

**Hardware:**

**Operating Systems:**

• Windows 10

• Windows 7 Service Pack 1

• Windows Server 2019

• Windows Server 2016

**Processors:**

Minimum: Any Intel or AMD x86-64 processor

Recommended: Any Intel or AMD x86-64 processor with four logical cores and AVX2 instruction set support

**Disk:**

Minimum: 2.9 GB of HDD space for MATLAB only, 5-8 GB for a typical installation

Recommended: An SSD is recommended a full installation of all Math Works products may take up to 29 GB of disk space

**RAM:**

Minimum: 4 GB

Recommended: 8