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PERFORMANCE OPTIMIZATION IN WIRELESS SENSOR NETWORKS USING ADAPTABLE MINIMIZATION OF MULTI-PATH ROUTING FOR IOT ENABLE SELF-DRIVEN DATA AGGREGATION IN PRECISION AGRICULTURE

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Abstract:

A Wireless Sensor Network (WSN) is a large network of sensor nodes that have limited processing and power capabilities. Due to the low connection range and high density of sensor nodes, pocket sharing in sensor networks is commonly used in precision farming. In the recent decade, routing in wireless sensor networks has been a significant research area.Furthermore, extending network life and minimizing power consumption are essential aspects for WSN applications. From this point forward, the focus will be on Adaptable Minimization Multi-Path Routing (AMMR) techniques and related considerations to address in WSN design for AMMR.For determining the greatest number of accessible pathways in a network and the shortest path for routing, the Weighted Graph Shortest Path (WGSR) technique is used. As a result, the system's network life should be extended and network performance should be enhanced.

Keywords: *Wireless Sensor Networks; multipath routing; Adaptable Minimization Multi-Path Routing (AMMR); IOT application; energy efficiency; reliability; precision agriculture.*

I. INTRODUCTION

In recent developments in wireless communication technology and the fabrication of less expensive wireless devices, low-power WSN has been launched. Wireless sensor networks are utilized for a range of applications, including health, target tracking, and environmental monitoring, due to their ease of deployment and extensive capability of the sensor nodes. In addition, temperature, humidity, PH, soil moisture, NPR (Nitrogen, Phosphorus, and Potassium), LDR, and other factors are monitored. Real-time metrics are critical for maintaining the correct proportions for improved agricultural output management and preservation. Sensor nodes are in

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responsible of detecting the target region and transferring the obtained data to the sink node for further processing in each application.

The AMMR system routing patterns by taking into account and assessing the residual batteries of sensors. The following are the work significant contributions:

1. In the proposed system initial identified adaptive next-hop selection techniques based shortest path technique.
2. To collect data from all of the member nodes, created a time slot selection technique based on the connection degree and maximum rank.
3. In the proposed and developed the AMMR, a next-hop selection method for multi-hop routing based on residual node energy, using the time slot selection mechanism.

In this work, the energy restrictions of sensing nodes involved in data routing to destinations in a hierarchy-based network were emphasized. The implemented AMMR uses the residual energy of the intervening nodes to pick the next hop effectively. In order to optimize the first node's lifespan duration, we also took into consideration the energy-specific consumption of nodes.

II. LITERATURE SURVEY

In a wide range of industries, including agricultural, artificial intelligence has improved in wireless sensor networks, particularly in monitoring and control applications. However, research into low-power sensing devices with fully effective Machine Learning (ML) is still distributed and restricted in the field of smart farming [1]. The drone platform provides multispectral data for the production of vegetation indices (VIs) such the Normalized Difference Vegetation Index (NDVI) for crop health analysis, while the IoT sensors in our proposed system give real-time status of environmental conditions affecting the crop[2]. The network is set up as a star, with NB-IoT for the gateway and LoRa for the sensor nodes. [3]-[4].

The novel distributed Connected Dominating Set Construction with Solar Energy Harvesting in Smart Agricultural Applications, (CDSSEHA) algorithm is compared to classic flooding techniques and an energy efficient Connected Dominating Sets (CDS) algorithm [5]- [8]. The primary goal of this work is to increase awareness of Big Data's most recent uses in smart agriculture, as well as the social and economic difficulties that must be addressed. The data generating techniques, technology accessibility, device accessibility, software tool accessibility, data analysis methodologies, and relevant big data applications in precision agriculture [9]-[10].

III. PROPOSED SYSTEM

The following are the main goals of our suggested protocol in terms of development: (i) More consistent data collection times; (ii) Consistent data transmission times; (iii) Efficient energy usage; (iv) Longer network lifetime; (v) Scalability for handling communication costs; (vi) Flexibility for adding/removing nodes By selection the appropriate next hop, in our reduces energy usage during data gathering and transmission..

3.1 Adjustable Minimization Multi Path Analysis (AMMR)

To ensure reachability error tolerance, several pathways between source and target are employed. In sensor networks, an overlay causes routing level problems on the network or provides a backup channel in the case of a failure. As a result, the AMMR strategy, similar to package backup, can be utilized in conjunction with changing the grouping approach if the real root is damaged.

3.2 Network Energy and Weighted Graph Shortest Route Analysis

Algorithm Steps:

To analysis the network lifetime of the sensor network.

T_n= max (M), i = 1, 2, … n

Where, // maximum neighbor node as a max (M), T is time to analysis n number of node

Node responds to a query

Procedure selection ( )

m = message to be scheduled

For each node n in T_n

If max < no.of incoming packets of type m then

Max = no.of incoming packets of type m

Increase the scalability of the sensor network.

If (distance$F_v > E_n$) // first node failed

If (center distance$T_v == E_n$)

Best Node = n_i

Reduce the unbalanced energy consumption problem in the network

End if

End if

Where,

M – Scheduling of message

E_{elec} - Energy dissipation

3.3 Cloud Dataflow management system model

Input: Number of tasks $t_1, t_2, \ldots, t_n$ // task depends upon the users

Output: Analysis of Data flow error

Start

Step1: t_n is the total available tasks in the ready queue.

For i = 1 to t_n

Step2: Assign priority to each task according to its t_{min} // assigning priority to the minimum task

End for

Step3: For i = 1 to n

if (file owner of f = = NULL)

Find the file owner of f

else ($f == read\ the\ file$)

user read the data file

do it for all the Unscheduled tasks

End for

End if

Step4: For each unscheduled tasks t_u

Find the resources

End for

3.4 Cryptographic Virtual Mapping based Secure Data Storage path-based key Communication

Cryptographic Virtual Mapping provisions data manipulation, encrypted data as insert, delete, modify, and append dynamically changing data, such as data. These operations do not require to retrieve the entire data in the cloud. This can be achieved by using a simple linked data structure.

3.4.1 Construction of linked list

Data manipulation specifies this Cryptographic Virtual Mapping method as data insertion, deletion, modification, and dynamically changing data. These operations do not need to retrieve all the data in the cloud. This can be achieved by using a simple linked data structure.

User, this packet will store Key(k) and Key(k-1) to
the register of gateway k, where k>1. When the

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path process is finished, every user (HA or FA) will obtain two keys.
When this packet is transferred to the last user, this packet will store Key(k) and Key(k-1) to
the register of gateway k, where k>1. When the
path process is finished, every user (HA or FA) will obtain two keys.
When this packet is transferred to the last user, this packet will store Key(k) and Key(k-1) to
the register of gateway k, where k>1. When the
the path process is finished, every user (HA or FA)
will obtain two

3.4.2 Secure Storage Path File Verification

Suggestion-The keys symmetric encryption algorithm checks if the storage path files have been modified in the cloud location. First, the user sends a request to get detailed information about the file provided to the cloud storage, and the CSP (Cloud Service Provider) generates a list of all the user's details.

IV.RESULT AND DISCUSSION

The simulation is done using Proteus, a scalable simulation environment for wireless network systems and CBR (Constant Bit Rate) traffic.

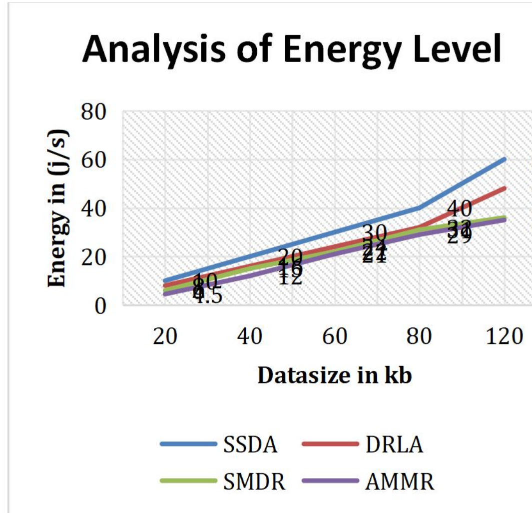

Figure 1 Analysis of Energy Level

In terms of energy use, Figure 2 compares the AMMR technology to existing alternative.

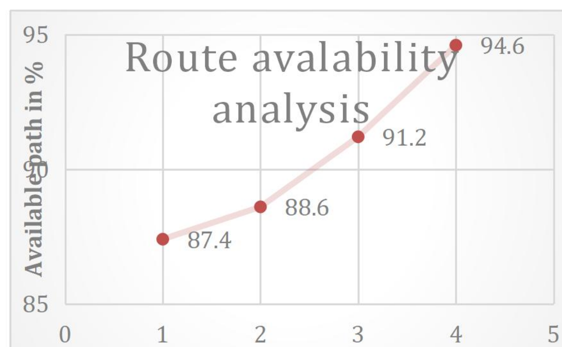

Figure 2. Route Availability Analysis

A comparison of the concept with existing approaches is shown in Figure 2.

V. CONCLUSION

To enhance the probability of data transfer and data reduction when many copies of the same packet must travel to the same destination over several pathways, the proposed AMMR must implement a technique that consumes 4.5 joules/sec of energy. Average accuracy is 94.5 %, PDR performance is measured in 94.6 bits per second (bps), transmission ratio is 95 percent, and network life complexity is 28 seconds.

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