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Weed Detection Using Dual Cluster Head and Faf Technique Through Wireless Sensor Networks

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ABSTRACT - The main challenge of Wireless Sensor Networks is to transfer the data with less cost and energy. Another requirement of efficient WSN is to have a maximum lifetime of sensor nodes. To overcome this barrier, many techniques such as, LEACH, PEGASIS etc., are invented over the decades. This project proposes the concept of dual cluster head which follows sleep and awake modes to share the work load. AODV routing protocol is used to enhance the next hop to be selected based on forward aware factor (FAF). This system improves the energy efficiency and reduces the delay and hence this technique can be used for weed detection among cereal crops. Low-Energy-Adaptive Clustering Head is the most popular wireless sensor technique. It is the clustering based routing algorithm. Improved version of LEACH is PEGASIS (Power Efficient Gathering in Sensor Information Systems). It is a near optimal chain based protocol. LEACH protocol is a simple solution where the clusters are formed to fuse data before transmitting to the base station. When a node dies, it is very difficult to transmit data to the base station directly hence LEACH protocol is used to transfer data efficiently to the base station. Later a protocol named PEGASIS was proposed which is an improvement over LEACH protocol

Keywords— LEACH, PEGASIS, Forward Award factor, Tiny aggregation,Hybrid Energy Efficent Distributed.

1. INTRODUCTION

A wireless sensor network (WSN) (sometimes called a wireless sensor and actuator network(WSAN) are spatially distributed through the network to a main location. The more modern networks are bi-directional, also enabling *control* of sensor activity.development of wireless sensor networks was motivated by military applications such as battlefield

surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

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. The propagation technique between the hops of the network can be routing or flooding.

2 SCOPE OF THE PROJECT

One of the applications of this system is weed detection in agricultural field. This sensor detects the weed based on biomass. The biomass of the infected area will be more than the unaffected area. This information can be transmitted efficiently using this technique. This technique can also be used for other applications.

Low-Energy-Adaptive Clustering Head is the most popular wireless sensor technique. It is the clustering based routing algorithm. Improved version of LEACH is PEGASIS (Power Efficient Gathering in Sensor Information Systems). It is a near optimal chain based protocol.

3 SYSTEM ANALYSIS

EXISTING SYSTEM

- Existing system uses single cluster head to transfer the data from nodes to base station.
- Sensor nodes are usually small, lightweight and have limited battery power. So, sensor nodes can easily lose their energy and may die quickly.

Limitations

- Always Maintaining Upstate Link

PROPOSED SYSTEM

- Thus we have proposed the concept of dual cluster head
- In this One cluster will be in AWAKE mode and another one will be in SLEEP mode. WSN becomes more efficient, when there is low latency, less energy and high lifetime of sensor nodes.
- This proposed Technique can be used for Weed Detection in Agriculture Field

ADVANTAGES

- Since we use dual cluster analysis there will be a backup unit which overcomes the node failure.
- It increases the lifetime of sensor nodes

NS2 SIMULATION STEPS

- Simulation using NS2 consists of three main steps
- 1. First, the simulation design is probably the most important step. Here, we need to clearly specify the objectives and assumptions of the simulation.
- 2. Secondly, configuring and running simulation implements the concept designed in the first step. This step also includes configuring the simulation scenario and running simulation.
- 3. The final step is post simulation processing. The main tasks in this steps include verifying the integrity of the program and evaluating the performance of the simulated network. While the first task is referred to as debugging, the second one is achieved by properly collecting and compiling simulation results.

COMPONENTS OF NS2

- NS2: the simulator, version: ns-2.28

- NAM: Visualized trace tool
- Pre-processing: Traffic and topology generators
- Post-processing: Simple trace analysis, often in AWK, Perl (mostly), or Tcl

4 IMPLEMENTATION

MODULE DESCRIPTION

The modules involved in the system are decribed below

NETWORK MODEL

- The nodes collects the data and may forward it to the sink or cluster head or to the base station.
- Formation of Nodes
- Collection of Data
- Environmental Setup

CLUSTER FORMATION

- All the nodes in the network share the broadcast message through AODV protocol.
- Then the Cluster Head selects the forwarding node by calculating the neighbor node. Based on FAF (Forward Aware Factor) the node forms the cluster.

DATA AGGREGATION & DATA MODELLING

- Aggregation is a process of combining and compressing the data from all the sensor nodes in cluster.
- The data should be forwarded to the destination. Here we are using the concept of FAF (Forward Aware Factor) for efficiently transferring.

ANALYSIS MODULE

Packet Delivery Ratio

- Packet Delivery Ratio is the ratio of the number of delivered data packets to the destination.

- we inferred that maximum number of packets are compressed and transmitted to the destination node. when the energy of awake cluster head goes beyond threshold level, it transfers all the data to sleeping cluster head. So the probability of data loss is minimum.

Energy Consumption

- Every node in the network requires energy to transfer the data. The greatest challenge of WSN is to consume less energy. By contrast to LEACH.

5 ALGORITHM

Network Simulator (Version 2), widely known as NS2, is simply an event driven simulation tool that has proved useful in studying the dynamic nature of communication networks. Simulation of wired as well as wireless network functions and protocols (e.g., routing algorithms, TCP, UDP) can be done using NS2.

1) In general, NS2 provides users with a way of specifying such network protocols and simulating their corresponding behaviors. Due to its flexibility and modular nature, NS2 has gained constant popularity in the networking research community since its birth in 1989.

2) NS2 consists of two key languages:

C++ defines the internal mechanism (ie. ,a backend) whereas the OTCL sets up simulation by assembling and configuring the objects as well as scheduling discrete events (i.e., a frontend).

NETWORK TOPOLOGY CREATION

To be able to run a simulation scenario, a network topology must first be created. In ns2, the topology consists of a collection of nodes and links. Before the topology can be set up, a new simulator object must be created at the beginning of the script. The simulator object has member functions that enable creating the nodes and the links, connecting

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agents etc. All these basic functions can be found from the class Simulator. When using functions belonging to this class, the command begins with "$ns", since ns was defined to be a handle to the Simulator object.

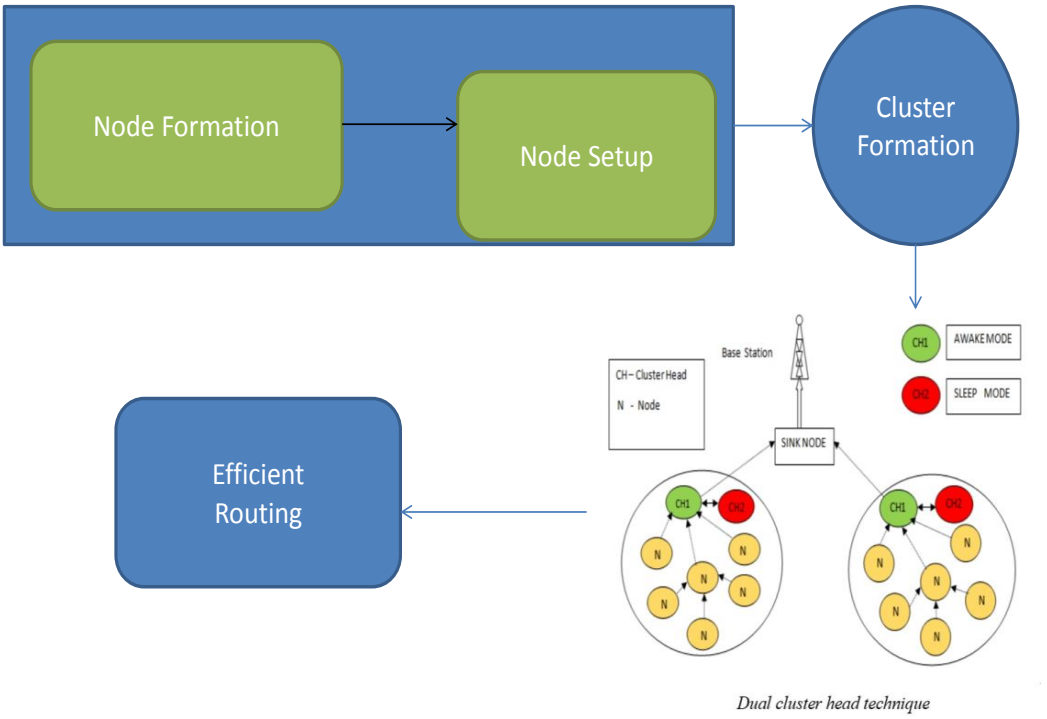

Fig 1 System Architecture

6 CONCULSION AND FUTUREWORK

CONCLUSION

In this Technique we have used dual cluster heads where one is in sleep mode and the other is in awake mode. When the active cluster head's energy drains beyond the threshold level, it activates the sleeping cluster node. The data is efficiently transmitted using FAF by considering two important factors such as forward energy density and link weight. After locating the nearest neighbor node, the source node forwards the data to the destination. AODV protocol is used in this experiment. This technique reduces the cost of

weed detection in agriculture field. Simulation results proved that the experiment is very efficient when compared to LEACH.

FUTURE WORK

In the future we use multicluster head to transfer information from source node to the base station.We can do real time example of this project in the agriculture field of detecting an weed plants of unwanted growth using sensor.The sensor it detects the unwanted growth plants and it gives alerts to the human.

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