Embeded Besed Monitoring and Controlling Energy Efficient Wireless Sensor Network System Using Distance Vector Protocol

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***Abstract*—** Gathering the information of the atmosphere and soil is the fundamental information of Embedded based monitoring and controlling energy efficient WSN system using distance vector protocol. WSN consist of a large no of small and low cost sensor node powered by small batteries. Since each sensor node has limited energy. Disease management generally frequent use of fungicides applied several times during the growing season. High cost and more use of pesticide have motivated to develop such monitoring and controlling system to predict all terms and provide solution automatically. In this paper we propose the novel approach Embedded based monitoring and controlling energy efficient WSN system using distance vector protocol with solar powered sensor node and Data management server. In first part background of the application was analyzed and defined. In second part it was composed solar powered WSN gateway with distance based and link state routing protocol and data manage server. Theoretical foundation of the design was introduced to improve the monitor and control the pesticide use. Power control and solar use is a widely used technique in improving the throughput and the quality of service in wireless communication.

Keywords- *Wireless sensor network node, Sensors, Microcontroller, Solar system, Distance vector and link state protocol.*

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I. INTRODUCTION

Disease occurs when a susceptible plant under environmental conditions that favor the infection and growth of the plant. Weather plays a key role in plant disease development. Temperature, Humidity, Soil moisture, leaf wetness and rain fall is major factor that trigger fungal disease in a plant. Disease management generally requires the use of fungicide applied several times during the growing season of crop. Most grapes farm growing in India liberally does the grape farms with every pesticide. Since these are toxic, the soil ecology suffer and also grapes carry the risk of toxic content and all this is very expensive.

The major goal is to reduce risk, cost, no of sprays and apply when crop has smallest to highest risk because of the prediction system for disease.

In this paper proposed system consist of a farmer cloud system of different sensing devices which will keep track of the required parameters for the system. The system will work for large geographical area where farms are located. Major task done by the system is to calculate and report the geographical conditions of particular region with appropriate solution where the system is to be implemented. GSM, WLAN and Zigbee, are currently used popularly, but they all have high loss of power. All them can't full fill the needs of collecting field information for its short lift time. If equipment's were sourced by a solar or wind energy harvesting device, they would be very large and exert negative effective on the field-work of agriculture machine. The on-going technological developments in the miniaturization of electronic devices and wireless communication technology have lead to emergence of wireless sensor networks (WSN) which make it is possible to acquire the field information more timely, accurately and conveniently. Many systems were designed to serve precision agriculture, but high power consumption and not enough life time restrain the rate of adoption of them.

To address this issue, we present our system, an energy efficient wireless sensor network system. In our system, a number of sensor motes are programmed, enclosed and deployed in the field. With every node equipped with soil moisture sensors, soil temperature sensors and other sensors, the system supports various information collections of

precision agriculture. In this paper, we propose disease prediction system for particular season. We propose a sensor network design that enables the acquisition of Air Temperature Air Humidity, Soil, Moisture, Disease information and the entire sensor nodes are powered by solar system. We propose a technique to compress the data and short transporting packet and reduce the message transmit power. We propose a technique to send data fast with multi hope and save the node energy.

II. SYSTEM FRAMEWORK

In order to better understand the various issues deploying a wireless sensor network in farm and collecting of farm information, we developed a prototype system. It is composed of battery-powered, solar powered sensor nodes. WSN consist with arduino circuit, WSN Node and data management server. Sensor node apperceives the all sensor information and converts the analogy voltage outputted by sensor into digital value. Then the digital value is processed by a compression algorithm and sent out after packed. The packet is routed in the network composed of all nodes in the field and received by WSN gateway ultimately. WSN gateway builds a bridge between the wireless sensor network and the General Packet Radio Service (GPRS) network, by which the data from the wireless sensor network can be transported to data management center, which is running on WSN data management software. The server receives, stores, analyzes, predict remedies and make solution from the WSN.

III. LITERATURE SURVEY

A. "A Survey on Sensor Networks "

For different application areas there are different technical issues that are to be solved in wireless sensor networks. Energy efficient root can be found based on available power in the node or the energy required for transmission in the links along the roots. The flexibility, fault tolerance, high sensing fidelity, low cast and rapid development characteristics of sensor networks create many new and exciting application areas for remote sensing.

B. " Power-Aware Routing in Mobile Ad Hoc Networks "

Different power aware metrics can be used to increase energy efficiency such as Minimize energy consumed/packet, Maximize time to networks partition, Minimize variance in node power level, Minimize cost/packet, Minimize maximum node cost. Thus rather than using traditional metrics such as hop count or delay for finding roots it is important to use above mentioned metrics.

C *"Gossip-based Sleep Protocol (GSP) for Energy Efficient Routing in wireless Ad Hoc Networks"*

In this approaches the core idea is shown that within certain value of gossip sleep probabilistic „P" and under certain topology density, the networks remains connected and thus works well.

D *"Energy-efficient communication protocol for wireless micro sensor networks"*

Route the queries to the nodes that have observed a particular event rather than flooding the entire network to retrieve information about the occurring events. When a node detects an event, it adds such event to its local table called events table and generates an agent. Agent travel the information .Hence there is no need to food the whole networks, which reduces the communication cost

E *"Routing Techniques in wireless sensor networks: A SURVEY"*

a. Flat structure based routing – All nodes are typically assigned equal roles or functionality.

b. Hierarchical structure based routing – node plays different role in network depending on their positions in the hierarchy.

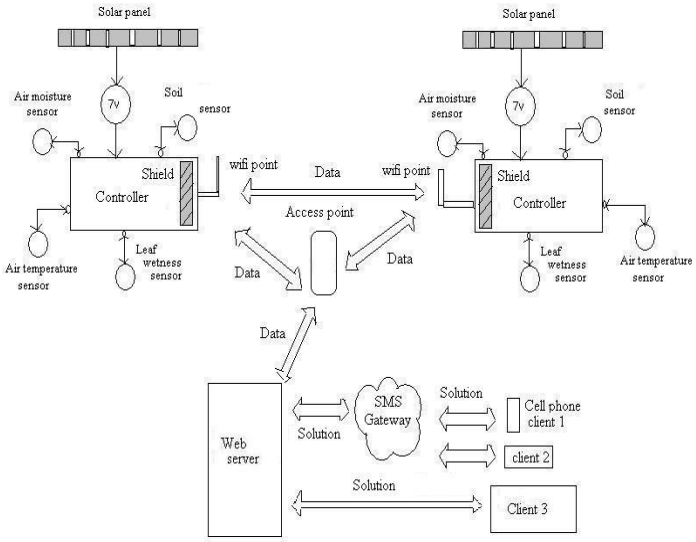
c. Location Based routing – sensor nodes positions are exploited to route data in the network.

IV. METHODOLOGY

In Proposed system there will be number of sensing station to calculate different geographical conditions like temperature, humidity, Air pressure heat sensor, soil moisture. Each station will calculate different parameters and pass it to an Access point placed at a distance from them. This access point collect data from mesh type network of those sensor stations and send information to a group of servers where the actual manipulation is done with that information .this course is done

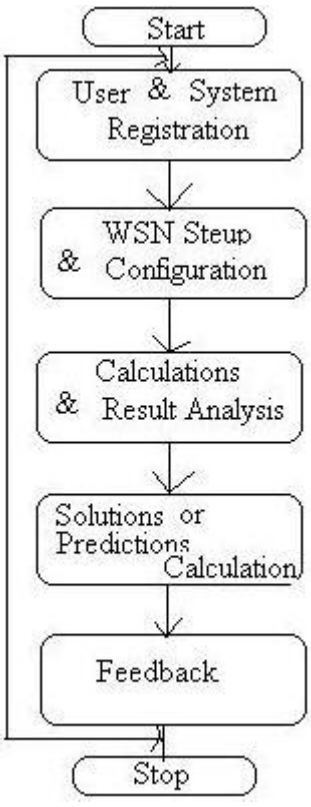
by an application on server which will calculate the data in different manner provided by the sensors, an algorithm will be used for manipulation of data. The result will be compared with threshold value.

V. WSN ARCHITECTURE



"Fig. 1", Block diagram of WSN system.

VI. SYSTEM WORK



"Fig 2", Flow of System operation

VII. DATA COMPRESSION AND ROUTING ALGORITHM

The transmission range of message is limited in a certain area, which can reduce the average hops and power consumption of radio. It can also reduce the packet loss rate. On the other hand, the data is compressed effectively, which can short the transported data packet and reduce radio power cost. The monitored area, as the root area of RQT, is divided into four equal sub-areas and each sub-area is divided into four equal square sub-areas secondly. The size of the smallest area depends on your requirement for the field fineness and every smallest sub-area must have one sensor. If it is more than one sensor in one sub area, they elect a cluster head to communicate with sensors belonging to other sub-area. All sensors in adjacent smallest sub-area have the ability to communicate with each other, including point to point mode or multi-hop mode, so that they are capable of playing as cluster head. Sensor nodes are divided into many virtual clusters. Every cluster composes of all nodes in the same sub-area. Every cluster has a cluster head and the sink node is the cluster head of the whole network.

The cluster head receives messages from his child nodes and compresses them, send to his cluster head. The process is repeated until the message packet is send to the sink node. The cluster head is elected by a simple algorithm: distance of node belonging to the same subarea is compared and the one who nearest to the sink node will be chosen as the cluster head of the cluster. By using geography coordinates represented by Morton coded, election is operated locally and don't need communicate with other nodes. From the up description, it is known that all the cluster heads form a logical quad-tree. The cluster head accepts the messages from his four child-nodes and sorts them on the Morton code from small to big.

In routing algorithm each sensor node build with two methods for calculating the shortest path as shown in Fig. 2 i.e. distance vector to calculate nearest node and Link state to calculate minimum time for nearest node. Every sensor node sends data from node to another sensor node to cluster head (sink node). Cluster head collects the signals with RF24.h header file which contain distance and link state algorithm

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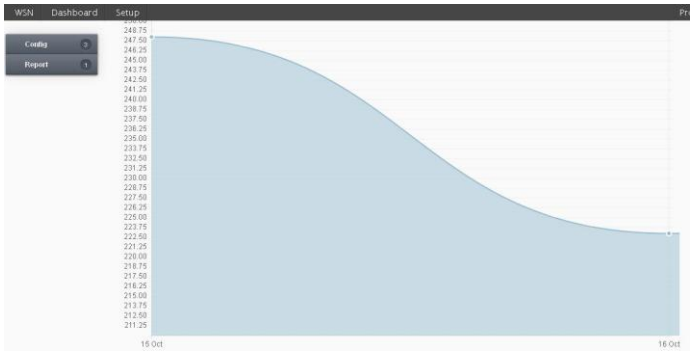
logic. These readings are stored in database for calculating the infection index and send remedies to user.

VIII. PERFORMANCE ANALIST TABLE

	idlog	date	server	service	option	description
	575	2013-11-20 11:54:44	2	2	1	212
	576	2013-11-20 11:54:44	2	3	1	253
	577	2013-11-20 11:54:44	2	4	1	218
	578	2013-11-20 11:54:45	3	5	1	221
	579	2013-11-20 11:54:45	3	2	1	160
	580	2013-11-20 11:54:45	3	3	1	203
	581	2013-11-20 11:54:45	3	4	1	211
	582	2013-11-21 13:00:50	1	5	1	153
	583	2013-11-21 13:00:51	1	2	1	206
	584	2013-11-21 13:00:51	1	3	1	226
	585	2013-11-21 13:00:52	1	4	1	245
	586	2013-11-21 13:00:52	2	5	1	111
	587	2013-11-21 13:00:52	2	2	1	238
	588	2013-11-21 13:00:52	2	3	1	241
	589	2013-11-21 13:00:52	2	4	1	247
	590	2013-11-21 13:00:53	3	5	1	237
	591	2013-11-21 13:00:53	3	2	1	154
	592	2013-11-21 13:00:53	3	3	1	216
	593	2013-11-21 13:00:53	3	4	1	214

"Fig. 3", server reading table

IX. ANALYSIS GRAPH



"Fig. 4", Sensor reading chart.

X. CONCLUSION

We present Embedded based monitoring and controlling energy efficient WSN system using distance vector protocol in the field, and its application for land. The current design of the system is calculate the actual condition of the field .System will decide the option and solution .System also provide the solution to repair present geographical condition of the filed. System will also take care of availability of the required solution. System will also keep history .We will address these issues and seek more efficient methods in future work.

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