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Enhancing The Security Of Wsn In Agriculture

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ABSTRACT:
Sensor is the device which takes or senses the physical or chemical quantities of the particular environment and then gives the information to the particular person or the other sink node which is specially designed for the collecting of the data from where the persons can get the information about that environment and act accordingly so that proper action can be taken. Whenever we use the sensors the network formed is called as the WSN (Wireless Sensor Network) and whenever we discuss about the WSN there is the possibility that at any certain point the security will be compromised since it is not that much secure network which is to be used for the transferring of the important data.In this paper we have proposed a method for the field of agriculture so that whenever the data will be transferred to the co-ordinating node then that data has to reach its destination (co-ordinating node) without any problem like congestion, node failure, hacking etc. And if any problem comes then that will be notified to the user suddenly.

Keywords: WSN, Sensor, Node.

I. INTRODUCTION

Sensors are the sophisticated devices that are frequently used to detect and respond to electrical or optical signals. A sensor converts the physical parameter (like: temperature, blood pressure, humidity, speed etc.) into a signal which can be measured electrically. For e.g. if we take the example of the thermometer then the mercury present in the thermometer constricts or expands depending on the amount of the heat sensed by the thermometer. There are various types of the sensors are present depending upon the need of the various fields elated to our day to day life. List of the various types of the sensors are:

[1] For sound and Vibration
[2] For transportation
[3] For chemicals
[4] For electric currents, electric potential etc.
[5] For environment, weather, moisture, humidity
[6] For flow, fluid velocity
[7] For ionizing radiation, subatomic particles
[8] For navigation instruments
[9] For optical, light, imaging
[10] For pressure
[11] For force, density etc.
[12] For thermal, heat, temperature.
[13] Various sensor technologies etc.

Since it is not possible to study all the types of the sensors we want to contribute my work towards the field of the agriculture since our major part of the economy depends upon the agriculture. With the help of the technology, better resources will be provided to the agriculture field so that the yield of the crops can be obtained. In the last some of the years we have seen that because of the natural calamities the huge number of the crops have been destroyed and as a result of which the results were alarming, various farmers has ended their life. In today's time when we have made so much of the development in the various different fields like industries etc. our agriculture area still remains dependent on the natural resources. Due to which the farmers has to face bad results because the amount of the resources which the part of the field requires also depends upon the various factors but if that particular amount cannot be reached then definitely that crop will be suffered and indirectly that will affect the farmers also.

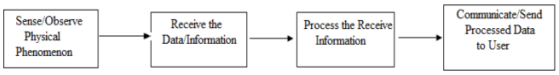

Fig 1: Basic concept of the Sensor Network

Fig 1 shows how the sensor network works in the field where the network is being installed. Firstly the sensors observe the physical phenomenon then it is being received by the sink node and then the data will be processed carefully and finally the data will be communicated to the user which is called as the processed data. For e.g. Suppose in a field we are providing the water for irrigation and some of the water gets stuck to a particular area and on the other hand the other area is not at all getting the sufficient water then in that case, if we are using the sensors in the field a message will be given to the particular coordinating node with the help of which the farmer will easily get to know that which of the area is still in the need of water and if we are not using the sensors in the field then there are chances that the crop will be affected.

Today, the land in our country is also very much limited so if we want to take the maximum yield from the less land then certain technologies certainly has to be used in the agriculture and the use of the WSN in the agriculture is a step with the help of which the better results can be taken in the limited land. So, this type of the agriculture where the precise amount of the resources has to be provide for the increase in the output of the crops is called as the Precision Agriculture which means that the everything will be provided in the precise amount. Humidity[1] or moisture is a universal parameter and its control is considered to be very important in a variety of fields such as industries related to the precision manufacturing, fiber, food etc. Moisture is undesirable whether it appears in the houses, textiles, packaging materials, electronic appliances, chemicals etc. Knowing the moisture content of the soil would enable farmers to tailor their activities to achieve crop yield optimization. Soil moisture detection has been used for monitoring and evaluating construction sites, landscape sites, mining operations, forest areas, flood control areas etc. The rest of the paper is organized as follows: related work is discussed in the Section 2, Section 3 depicts the proposed work which is being by done by me and finally Section 4 concludes the paper.

II. RELATED WORK

The sensor node lifetime depends mostly upon the battery life. In many of the cases, the WSN node has limited power source and replenishment of power may be limited or impossible together. Power consumption requires optimization[2][3][4]. Also whenever we talk of the sensor which is being used to sense of the different types of the soil then a standard test usually includes determination of the available phosphorus, exchangeable potassium, calcium, magnesium etc., their saturation percentages, their pH values[5] etc. Optical sensors appear to have great potential for determining soil organic matter content. They measure soil color that was historically used to assess soil carbon[5]. Persistent or sustained congestion occurs when the long term arrival rate at a link exceeds its capacity. This happens when the source data sending rate increases and the buffer over flows. While transient congestion only introduces a delay in data transmission , persistent congestion results in data loss.
Congestion results in packet drops, increased delays, unreliability, lower throughput, wastage of communication resources, power, and eventually decreases lifetime of the WSN. Congestion control involves methods for monitoring and regulating the total amount of data entering the network to keep traffic levels at an acceptable value. Congestion control in WSN has a rich history of algorithm development and theoretical study. Various schemes for congestion control have been proposed and implemented over the years. Also they can be classified based on whether they follow a traditional layered approach or cross layer approach[9].The various types of the security[6] issues has to be considered whenever we talk of the wireless sensor networks. Since, no wire is being used in the wireless network so there is more possibility that the network will be very much vulnerable to the various attacks. Various number of the attacks have been reported in the WSN. Some of them are:

1. Sink hole attacks
2. Sybil attacks
3. Wormhole attack
4. Hello flood attacks
5. Selective forwarding attacks
6. Routing loops etc…

III. PROPOSED WORK

As we have discussed earlier that in the wireless networks there is high possibility of the security breach. There are a lot of attacks which can attack the network. But the one on which we want to work is the problem of congestion. We will be taking a field of the large area in which various sensors will be installed forming a WSN in the agricultural field. In the whole network one node will be the master (sink) node and the others will be the source node which will be sensing the conditions and sending the messages to the master node.But there is the possibility that at some point of time the various source nodes will be sending a lot of the data and there is the chance that the master node is not able to process the message at that time. So, the congestion will goes on increasing which will affect the performance of the network that is the data which will be coming can be discarded by the master node. So, to avoid the discarding of the data packets a protocol (DSR/AODV) will be implemented on the network and with the help of which if there is any congestion in the network then that will be shown as a message on the display so that the user can get the information about the congestion and rectify it at the right time. That implementation of the routing of the messages will be in the NS2 so that the routing of the packets can be shown on the NAM i.e. Network Animator.

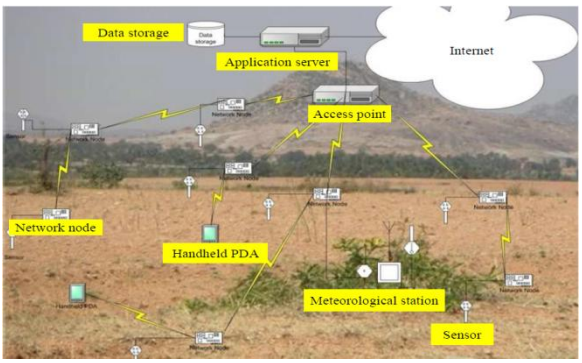

Fig 3. Normal installation of the Sensors in the Field

From **Fig 3** it is clear that how the sensors are being installed in the normal field so that the important information can be transferred to the common node which is called as the sink node. The sensor nodes can be the handheld pc etc. But in the normal models the data is being transferred regularly but the other things are not being considered like the errors, the congestion in the flow of the data etc. So, in our work we have tried to resolve the congestion in the network because of which the data can be transferred without any problem. In our work we will be applying the AODV routing protocol in the network so that if any of the congestion will occur then it will be notified to the user and so the proper action can be taken by the user. Also, we will be tracking the flow of the data on the NS2 and will try to simulate the model so that the data flow and the other things can be easily tracked and simulated. Also in our work an X-Graph will be prepared which will be showing the relation between the no. of packets and the time with the help of which the result will be shown that will try that after transferring how much of the data what will be the loss of packets when we are considering the congestion as the limiting point for any type of the network in the particular field.

Application Layer * Reliability of the data. * Use of cryptographic tech.
Network Layer * Routing of the messages. * Packets dropped completely or selectively. * **Congestion leading to loss of data.**
Data Link Layer * Error detection & correction. * Vulnerable to jamming.
Physical Layer * Transmission Media * Node capture attacks.

Fig 2. Normal Layered Architecture of the WSN in Agriculture

Application Layer * Reliability of the data. * Use of cryptographic tech.
Network Layer * Routing of the messages. * Packets dropped completely or selectively. * **Detecting the congestion and notify to the user for rectification.**
Data Link Layer * Error detection & correction. * Vulnerable to jamming.
Physical Layer * Transmission Media * Node capture attacks.

Fig 3. Proposed Architecture with rectification of congestion

IV. CONCLUSION AND FUTURE SCOPE

Since, the network formed is the WSN so there is more possibility of the attacks. So, with the help of the technique which we want to apply on the field of the agriculture one step in the attacks can be resolved upto an extent. Also, the performance of the network can be increased by eliminating the problem of the congestion. This problem resolution will also be very much beneficial to the farmers to increase the yield of the crop.

If we consider the future scope in this type of the work then the advancement in this type of the work can lead to the very much of the advancement in the agricultural field. In this type of the work the WSN can be directly connected to the internet with the help of which the data can be accessed with the help of the internet so that if the farmer is not there in the field then also the farmer can easily get the information about the field. Also, if the farmers don't know how to operate the internet then for that purpose the coaching the e-choupals have been operated so that the farmers will be able to access the internet.

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