SURVEY ON MOISTURE MONITORING SYSTEM USING WSN

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ABSTRACT :
A Wireless Dam Sensor Network (WDSN) is introduced in this paper. The WDSN comprises of brilliant hubs what's more, a sink hub. The force sparing techniques at different levels, from the system group engineering, to ZigBee correspondence convention, the sensor hubs design, and the dynamic reaction component are clarified. The exploratory results exhibit the dependability of transmission, and demonstrate the maximal transmission separation. The showed WDSN has the potential application to extensive variety of dam.

KEY WORDS : *Dam Monitoring; Wireless Sensor Networks; ZigBee; Dynamic Response; Energy-mindful*

1. INTRODUTION

Amazing occasions can bring about tremendous harm to the well being of the dams, for example, quakes. Such harms can force a genuine risk to the well being of lives and financial matters. Almost ongoing auxiliary checking of the dams can diminish the loss of human lives or properties by notice of unsafe dams and approaching breakdown, can likewise give data to crisis reaction administrations. Notwithstanding compelling occasions, dam environment experiences steady disintegration over its life range because of consumption, weakness, scour, and so forth. In this way, intermittent checking ought to be utilized to reach. For example, installation time of a moderate size monitoring system can consume over 75% of the total system testing time with installation costs approaching over 25% of the total system cost [1]. To overcome the many disadvantages of the wired systems, uses of wireless technologies have been proposed for structural monitoring [1]-[5]. With the advent of low cost wireless technologies, such as Bluetooth, ZigBee /IEEE 802.15.4, etc., there has been considerable interest in Wireless Sensor Network (WSN) as a viable alternative to the wired systems. Bluetooth is constructed with a point-to-multi-point communication structure [6]. However, only at most eight nodes can be supported by a Bluetooth network. Therefore, Bluetooth can not form large and complex networks. While ZigBee, which is able to form large networks, can be used to solve this problem[7]. Theoretically, ZigBee network structure can connect over 65,000 nodes.

In addition, ZigBee network has a character of low power consumption via multi-hop technology and has the option to self-organize the whole sensor network .In this paper, we propose a ZigBee wireless dam monitoring strategy requiring the appropriate choice of the wireless network topology, the specific wireless technology as well as a suitable protocol to give data with regards to the basic soundness of the dams over their operational lives. When all is said in done, dam observing frameworks are wire based, and the sensors are conveyed at couple of basic focuses in the structure and associated with a focal Data Acquisition (DAQ) module over a link, by and large a co-pivotal link. The wired frameworks hurl a large group of issues, and the essential issues are their establishment and support. Laying out the cabling is costly and tedious, which comes about because of the expansive sizes of structures and the introduced focuses which are by and large difficult to reach. For instance, establishment time of a moderate size checking framework can devour over 75% of the aggregate framework testing time with establishment costs drawing closer more than 25% of the aggregate framework cost [1]. To defeat the numerous burdens of the wired frameworks, employments of remote advances have been proposed for basic observing [1]-[5]. With the appearance of minimal effort remote advancements, for example, Bluetooth, ZigBee/IEEE 802.15.4, and so forth., there has been extensive enthusiasm for Wireless Sensor Network (WSN) as a practical contrasting option to the wired frameworks. Bluetooth is built with a point-to-multi-point correspondence structure [6]. Be that as it may, just at most eight hubs can be upheld by a Bluetooth system. In this way, Bluetooth cannot frame substantial and complex systems. While ZigBee, which can shape vast systems, can be utilized to take care of this issue [7]. Hypothetically, ZigBee system structure can associate more than 65,000 hubs. Moreover, ZigBee system has a character of low power utilization by means of multi-jump innovation and has the alternative to self-sort out the entire sensor system. In this paper, we propose a ZigBee remote dam observing procedure requiring the fitting decision of the remote system topology, the particular remote innovation and also an appropriate convention.

2. DAM MONITORING APPLICATION

When all is said in done, dams are very substantial, and the observing frameworks are broad with a portion of the sensors which are set a long way from the focal checking station, which brings about the procedure of information obtaining troublesome because of the restricted scope of the remote connections. Likewise, the measure of force required to transmit information over such long separations is entirely substantial. In a dam checking framework, the parameters that are being measured are for the most part leakage also, relocation. Natural variables like temperature, water level, and precipitation are moreover measured with a specific end goal to get an exact photo of the dam properties. With respect to any checking framework, support is a costly part of the auxiliary observing framework. For a dam checking framework to bode well, the support cycles ought to be long, for the most part years. In a wired observing framework, wiring must be done at an awesome cost also, power is the slightest of the issues. Though in a remote checking framework, the sensor units will need to rely on upon batteries to give their energy, in this way the sensor units must be exceptionally vitality productive with the goal that they can get by for one complete support cycle utilizing one battery power. From the dialog above, we acquire some imperative conclusions. For the remote observing framework, the sensor hubs are inexhaustible and ought to expend the base measure of force, since they need to make due on battery power for long support cycles. In any case, accomplishing substantial transmission range requires a lot of force, which is obviously in strife with the prerequisite that the force utilization ought to be as little as could be expected under the circumstances.

Determining the contention is one vital test amid the outline of the remote observing framework.

3. SYSTEM OVERVIEW

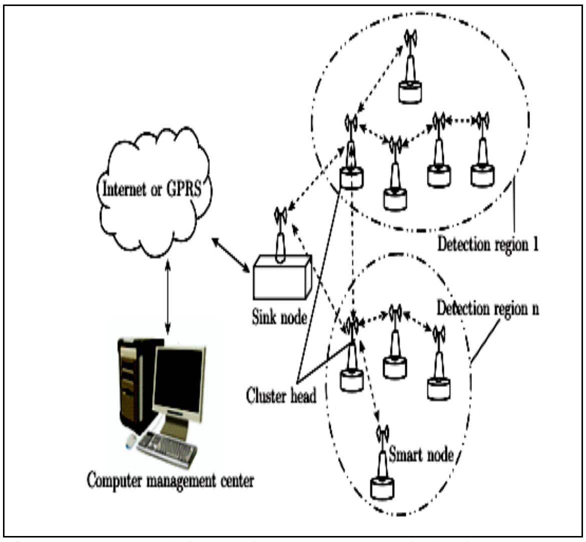

Fig.3.1 *.Diagram of the wireless sensor network for dam monitoring*

In this paper, a Wireless Dam Sensor Network (WDSN) is introduced, as appeared in Fig. 1. The system bunch engineering, which exploits multi-jump and grouping, is embraced to bring down the vitality utilization. The framework comprises of various brilliant hubs (group heads also, the hubs are aggregately called the brilliant hubs), a sink hub, and a PC administration focus. The brilliant hubs screen the parameters, for example, temperature, water level, precipitation, leakage and dislodging in the dam areas. In the interim, every brilliant hub can be a hand-off hub by means of which the remote correspondence between the savvy hubs and the sink hub can be executed. The sink hub is in charge of making and controlling the system, showing the current circumstance, and cautioning the outer and crisis administrations. Alarming the crisis administrations may be actualized through the Internet or GPRS. Correspondence inside the system is actualized utilizing the IEEE 802.15.4 standard, and information are transmitted over the ZigBee convention stack [8].

4. SYSTEM AND COMPONENT ARCHITECTURE

A SINK NODE

The WDSN sink hub is a scaffold between the discovery locales and GPRS or Internet. As appeared in Fig. 4, the sink hub depends on the JN5139 ZigBee module and the MC55 GPRS module.

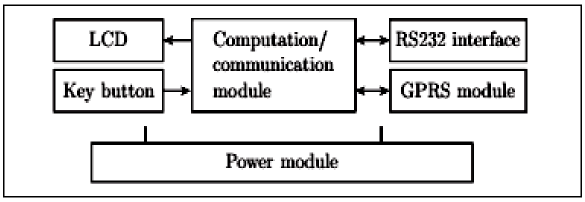

Fig.4 1.*Block Diagram of the sink node*

This arrangement is the base one required by the system organizer usage. Other modules give extra practical abilities, e.g., showing the system current status and recognition information with a MzL05-12864 LCD or selecting the sort of information which can be appeared on the LCD with key catches. Being a 'system organizer' (information accumulation) gadget, the sink hub can be effortlessly adjusted to different undertakings relying upon the required utilitarian abilities. As an extra module that amplifies the utilitarian capacities, a PC has been associated with the sink hub by means of RS232 interface. Since the sink hub devours a generous measure of force what's more, now and again should be versatile for testing, two force supplies, in particular, a steady power supply

B SMART NODE

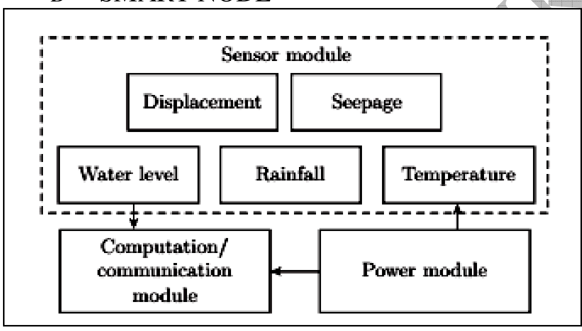

Fig. 4.2.*Block Diagram of the smart node*

The block diagram of the smart node is presented in Fig. 2. The system consists of three modules, namely,sensormodule,computation/communication (C/C) module and power module. The C/C module is the core of this smart device. It is responsible for most of the data processing tasks inside the node and managing the wireless communication links to and from neighboring nodes.The C/C module is based on JN5139 ZigBee module which is a communication module with an embedded microprocessor and has characterization of small size and low energy consumption in operating and stand-by/sleep modes.The sensor module commonly varies from applications.For example, in the dam monitoring system, the most commonly used sensors are temperature, water level, rainfall, seepage and displacement sensors.

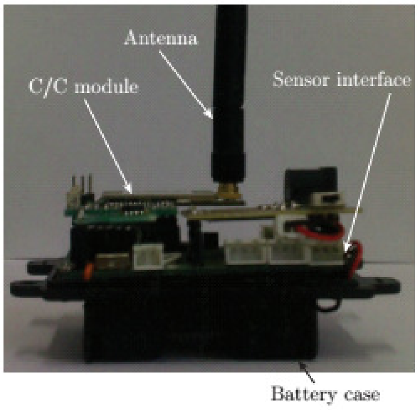

Fig. 4.3.*Physical implementation of the smart node*

The power module plays an important role in the smart node, and high-capacity battery is always a good choice. The physical implementation of the smart node is shown in Fig. 3. The size of the smart node is 75mm*45mm*50mm. This tiny node includes all the modules described above. The sensor module, the C/C module and the power module are connected together via extended interfaces. By means of this kind of structure, it is easy to assemble and disassemble the node. The extended interfaces make it possible to add additional modules to the node when the system is needed to upgrade in future. Four sensor interfaces are convenient for connecting to the optional sensors.

5. NETWORK OPERATION

As the use of the proposed system is to identify the dam wellbeing in partitioned segments, we have picked a bunch topology for the WDSN (Fig. 1) which gives vitality sparing, secure what's more, dependable operation. The information directing in the system is performed by the ZigBee convention. Dynamic reaction concentrates on bringing down the force utilization in this paper, which is for the most part shown on two perspectives as takes after: (1) Frequent dam parameter readings ought to be gathered at the point when the earth is turbulent (say, at regular intervals), however just occasional readings (say, once every day) are required when it is steady. (2) The savvy hubs measure the dam parameters, substituting with the ultra low-control rest mode. In the estimation mode, all parts of the savvy hub are working with the exception of the ZigBee handset. The deliberate estimations of dams are not transmitted to the sink hub until they are over the foreordained risky limits, what's more, can be spared in a memory chip locally available. These predetermined edges can be changed by reinventing. Information transmission is just performed when the preset occasions happen, so the greater part of the time the ZigBee module is in rest mode and its vitality utilization is irrelevant.

6. SIMULATION AND EXPERIMENTAL RESULTS

For our work, we Accept some radio parameters indicated On table 1. Concerning illustration indicated in fig. 5, those sensor hubs need aid deployed haphazardly in the identification region, for the territory for 100m*100m. We mimic that those sink hub is placed a long way starting with the closest sensor node, Furthermore toward (x=50, y=160). Those amount of sensor hubs increments from 10 should 100. We Additionally Accept an vitality misfortune because of transmission separation. Thus, on transmit message between the bunch heads and the hubs utilizing those nothing space proliferation model, the radio expends:

$$E_{fs} = lE_{elce} + l\varepsilon_{fs}d^2, \quad (1)$$

and on transmit message the middle of those sink hub and the group hubs utilizing two-path model, those. Radio expends:

$$E_{mp} = lE_{elce}\frac{N}{k} + lE_{DA}\frac{N}{k} + l\varepsilon_{mp}d^4_{tosink}, \quad (2)$$

where k will be the amount for clusters, d Also n are those separation and the amount of the keen hubs separately. Those common place WSN for multi-hop structure, the grouping structure, Furthermore WDSN for both multi-hop Also grouping building design have been compared on the base of the drain protocol Vitality utilization model recommended Toward w. R. Heizelman [9]. As might a chance to be shown Previously, fig. 6, the energy utilization from claiming WDSN in this paper will be littler over that of the different WSN structures.

Radio parameters	value
Data packet by each WSN node(l)	2000bit
Transmitter and Receiver Electronics(E_{elec})	50nJ/bit
Data Fusion Electronics(E_{DA})	5nJ/bit
Transmit Amplifier of two path model(€$_{mp}$)	0.0013pj/bit/m^4
Transmit amplifier of free space propagation model (€$_{fs}$)	10pj/bit/m^2

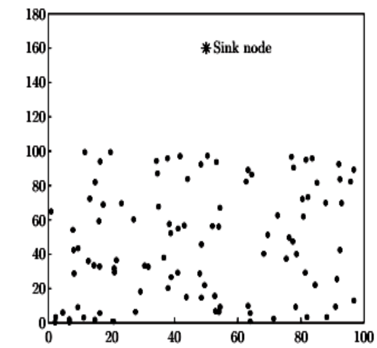

Fig. 6.1.*Simulation Environment*

A trial to describe the execution of the following framework need been led. The ZigBee WSN comprises a sink hub What's more five keen hubs. A RST-A weight transducer will be associated with the advanced mobile hub most distant from the sink node, and the different advanced mobile hubs go about as those transfer hubs. Those separation the middle of each two hubs is movable. We need kept tabs around discovering the unwavering quality What's more precision for transmission by examining the qualities indicated on the sink hub which transform for those weights stacked on the RST-A sensor. Then, the longest transmission separation could make discovered Toward expanding those separation from claiming each two contiguous hubs. A correlation the middle of presentation values and the weights may be indicated over fig. 7. It could a chance to be seen that those qualities indicated on the sink hub attain An higher acceptable match for the estimations. In addition, those longest transmission separation is 300m which will be more drawn out over those separation for two contiguous areas of dam, What's more camwood help prerequisites for information transmission.

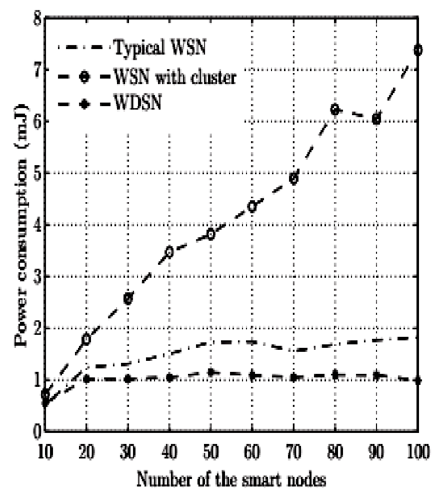

Fig. 6.2 *Power Consumption Analysis*

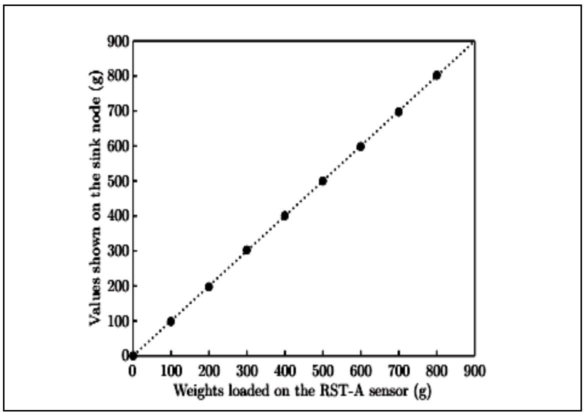

Fig. 6.3.*Comparision Between Display Values And Weights*

7. CONCLUSION

In this work we have built up a Wireless Dam Sensor Network (WDSN) that utilizes keen hubs and a sink hub. Tests made with RST-A weight transducer have demonstrated that the framework can precisely transmit the identifying information. Moreover, we have found that the maximal transmission separation is accomplished when the separation of nearby hubs is expanded to 300m. We have likewise exhibited that the enhancement of information inspecting and information transmission may altogether diminish the force utilization of the sensors. Plus, the ZigBee standard gives extra power sparing to the on board transmitter.Because of its sensible effortlessness, remote network, and low power utilization, the WDSN can be conveyed in a brief span without involving significant support cost. Also, the utilization of Internet or GPRS technologies makes it simple to deal with the system continuously. The exhibited WDSN has the potential application to extensive variety of dam observing.

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