DESIGN APPROACH OF SOLAR ENERGY BACK UP BASED WIRELESS COMMUNICATION & SENSOR NETWORK

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Abstract- Wireless Sensor Network Found a Variety of Scope in Wireless Communication, Lifetime Maximization is the first Difficulty Which Occurs in Front of Designers Though there has been Lots of Work is done in this field in various aspects For Enhancing life of Wireless Sensor Network. In this Paper Unique Idea of Lifetime Maximization Wireless Sensor Network is Discussed which uses Conventional Energy Source as Power Supply for Nodes, How one can use a Solar Energy as a Energy back up for Wireless Sensor Network Node is also discussed in this Paper.

Keywords - Solar Energy as Power Back up, Lifetime Maximization, Conventional Energy Source, WSN Node, Flow Chart.

I. INTRODUCTION

Wireless Sensor Network (WSN) are the new class of networking technology that is increasingly becoming popular today. Rapid development has taken in sensing technology. Microcontrollers with low power consumption and communication radio have spurred the mass production of relatively inexpensive sensor nodes. Such a large scale sensor networks replace use of conventional networks in situation where Geographical conditions and other environmental constraints obstructs the deployment and setting up of regular networks. Because of the huge scale at which such a node can be deployed , they are strongly robust in terms of individual node failure which make them all the more favourable in such harsh situations. There has been an explosion in the use of sensor networks for environmental measurement and study. A range of applications have been built using sensor networks from environmental monitoring to radiation detection to lots of tracking applications.

A wireless sensor network consisting of spatially distributed autonomous sensor equipped with low power transreceivers can be an effective tool for gathering data in variety of environments.

These nodes perform certain measurements and need to transmit all the collected information to base station over a wireless channel. The data are then processed in the base station to draw the some conclusions about the current activity in the area.

One fundamental solution to this problem is clustering.sience the cost of transmitting a bit is higher than a computation of several kilobytes data ,it is advantageous to organize nodes into groups, in this clustered environment the data gathered by the nodes are transmitted to the base station through the hierarchy of cluster heads. Another solution to the problem of life time wireless sensor network is to provide battery that lasts long but such batteries are not available. If one node dies then whole network dies and because of geographical conditions it is not easier to change nodes frequently so there should be permanent source of energy with each node so whole network should survive for long time.

II. WIRELESS SENSOR NETWORK ARCHITECTURE

A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and cooperatively pass their data through the network to a main location.

The WSN is built of “nodes” from a few to several hundreds or even thousands, where each node is connected to one sensor. Depending on routing algorithms data is routed from one node to another node. Several algorithms have been developed for data to be routed in wireless sensor network. In wireless sensor network cluster of nodes are often used for routing data from source to destination, in clusters there is one node which is head node and others are tail nodes. In this all tail nodes transmit there data or send there data to the head node, head node then send this received data along with its sensed data.

For life time maximization of wireless sensor network, in some approaches dynamic selection of head nodes and tail nodes is get done. In this approach selection of head node among all tail nodes is carried out by calculating available energy with all nodes used in wireless sensor network nodes. Now the node with highest energy will become head node after comparing its energy with all nodes in network. Every time whenever data is to be transmitted from tail nodes to the base station or from base station to tail nodes that time data has to be routed through head node i.e head node will receive data from all tail
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III. WIRELESS SENSOR NETWORK NODE

Wireless sensor network uses node which consist following components.

A. Power management circuit.
This consists of power source for node. Power sources like batteries are used in this

B. Sensing unit
This consists of sensors and analog to digital converters which converts sensed data which is in either current or voltage form i.e in analog form to digital form in order to process it further use. This also consists digital to analog converter.

C. Processor
Mostly microcontrollers are used as processors to process the sensed data and then transmit or receive the data through transceiver.

IV. DESIGN DETAILS

A. Developing a node.
For approach as per title indicates there are few changes in traditional wireless sensor network node, which clearly can be shown from following figure.

![Diagram of Proposed WSN node](image)

In this proposed node solar panels are connected with power supply unit, one LCD display is used to show the energy levels of each node and also it will show the routing of data. Except this all construction of node is similar to the traditional wireless sensor network node.

We know the power consumption is the big deal in communication specially in wireless communication, in case of wireless sensor network nodes has to be very small in size because these nodes to be placed in remote locations.

In this design approach because of providing solar energy as a power source thus long lasting power source is can achieved because unlike other sources of energy it will not die early. Solar panels will receive solar energy and get stored to the chargeable batteries which is primary source of energy. As soon as this primary source will lose its energy below reference level which is predetermined it will starts charging through solar panels. During night time when solar energy is not available that time solar energy which is stored with primary power source is only the power which is is available for communication, but during night time communication rate i.e frequency of data transfer is less.

D. PC interface devices
One of the node resides with base station and this node is to be connected with PC, this base station will store all transmitted and received data with itself so it has large storing capacity. Following connection diagram will help you to understand how data is get communicate between base station node and PC. The data which to be transmitted or received is finally to be stored with base station so PC has to be used for storing this data. Received data is transferred to the computer for storing purpose so serial interface which provides the serial data transmission for the sensed data because transreceiver can not communicate directly with PC, then this data is transferred to PC through serial to USB converter. When data has to be transferred from PC to node reverse action of data transferring is get done.

![Connection diagram between Transreceiver and PC](image)

E. Flow chart

![Flow chart for selecting head node and tail node](image)
Fig. 3 shows the flow chart of the selection procedure of head node and tail node. In this procedure all nodes will show their energy and also will send this information to the decision and control unit, then this unit will choose one of the node with the highest energy and will command it to be a head node in this selection way selection of head node is done. Each node has to send its energy value to the decision and control unit, remaining all nodes who’s having less energy than head node will become tail node. For this every time when available energy is compared the higher value of comparison is has to be stored with decision and control unit.

After comparison if decision and control unit found higher value than previous one then this value is get stored with unit, thus after comparison of all nodes one of the node is get selected as a head node and remaining all nodes become tail nodes.

This procedure adds delay in data transmission and reception because after each transmission and reception this procedure is get executed.

E. Developing a network

![Fig 4. Architecture of proposed work](image)

As shown in fig 4 architecture of proposed work contains only three wireless sensor network nodes one cluster head one base station i.e total five nodes are used in this architecture, with same idea one can go for number of nodes.

Cost will get increased if number of nodes gets increased because solar cell going to use are little bit costlier having the voltage rating of 6v and current rating is 500 m amp.

**CONCLUSION**

Hence in this way we can provide a better solution for life time maximization of wireless sensor network by supplying conventional source of energy as a power source so as long as solar cells will be in working conditions. One can further reduce the power consumption by using the efficient data routing algorithm. This approach can use any data routing algorithm authors decided to use LEACH algorithm.

**REFERENCES**


