

Review of Web Enabled WSN Control and Monitoring through Cluster Head

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Abstract – Many research and development of cell found that establishing the wireless sensor nodes network and allow them to work as a cluster, but the problem with wireless sensor network is monitoring of cluster through cluster head because it has limitation of range. By establishing mobile network one can overcome on the limitation over world wide access and support to roaming everywhere due to non-standardized communication between multiple mobile service providers, By utilizing the advantage, of unlimited long distance accessibility due to this there is control over wireless sensor node cluster or network. Here we propose the system for wireless node cluster control and statistics monitoring using web enabled interface and the internet. Cluster node in the system will be responsible for communication with all nodes and allow to work as a middle ware between individual node and web interface.

Keywords - *Wireless Sensor Network (WSN), AVR Based Development Board, CC2500 Trans Receiver Modules, Sensors Modules (LDR), Controlling Devices (Light).*

1. Introduction

A wireless sensor network (WSN) of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The 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. The WSN is built of various nodes from a few to several hundreds or even thousands, where each node is connected to one or more sensors. Each sensor node consists of several parts: transceiver,

microcontroller, electronic circuit for interfacing with sensors for sensing data and power supply. A node may vary in size from smaller to larger. 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.

- In computer science and telecommunications, wireless sensor networks are an active research area, but the problem occur is in wireless sensor network, the Hardware platform and software framework designed for sensor network application needs to be domain independent, but making the system generic is big challenge.
- In wireless sensor network, the problem related to sensing data from various sensors in network and establishing communication between them is difficult task.

The objective of proposed system is to design a wireless sensor network and establish the communication between all nodes using web technology. In this, WSN network head or cluster head responsible for gathering data from all nodes and also communicate with computer system via web internet. A software application will be used to read and write data to and from WSN head over serial communication. After that, this scenario connected to web interface / application to let the user communicate with the WSN head using internet from anywhere. Every node

is designed for heat level controlling system using heat sensor.

Forest Scenario: Consider the sensor nodes are randomly spaced in forest. For considerable no. of sensor nodes there will be the cluster head responsible for gathering and transferring of data from various sensor nodes to client systems through web interface. Here system will get the heat level variations and once the heat level reach at the predefined value system will automatically control the heat energy.

2. Related Work

As various technologies are used for monitoring, managing, controlling and security .But the problem is solved by using various technologies which show the result on stimulation ” [1] WSN, energy efficiency of gas sensor is a major concern since there is no need to attend for several years on same battery power supply. The author proposed method for aggressive energy management at the sensor level, node level, and network level. In this system node is designed with very low sleep current consumption and it contains a metal oxide semiconductor gas sensor and a pyroelectric infrared (PIR) sensor. It exploits information from auxiliary sensors, about the presence of people and from the neighbor nodes about gas concentration to modify the behavior of the node and the measuring frequency of the gas concentration. The author simulate an application scenario which demonstrates a significant lifetime extension resulting in reduce the nodes’ activity and energy requirements, while simultaneously providing a reliable service. ”

[2] WSN there are various advantages of microelectronics, digital electronics, and highly integrated electronics hence many research team are working to increasing need for more efficient controlled electric systems make the development of monitoring and supervisory control tools the object of study of many researchers. This paper proposes a digital system for energy usage evaluation, condition monitoring, diagnosis, and supervisory control for electric systems applying wireless sensor networks (WSNs) with dynamic power management (DPM). To extend the WSN lifetime, sensor nodes implement a DPM protocol. This system is reliable cost effective. ” [3] research and development cell it has been noted to establishing the wireless sensor nodes network and let them work as a cluster, but the major problem with wireless sensor nodes cluster is monitoring of cluster head through wireless technology has limitation of range. Hence it causes to develop mobile network but

again the causes of wide area access to overcome it new technology has been develop i.e. web interface. So that the system for wireless node clusters control and statistics monitoring using web enabled interface and the internet. Cluster node will communicate with all nodes and also work as a middle ware between individual node and web interface. [4] Author proposes a new kind of network, partitioned synchronous network, to jointly address the coverage and connectivity problem. Authors analyze the coverage and connectivity performances of partitioned synchronous network and compare them with those of existing asynchronous network. Author performs extensive simulations to demonstrate that the proposed Partitioned synchronous network has a better connectivity performance than that of asynchronous network, while coverage performances of two types of networks are close. [5] Propose a new node replica detection approach called Area-Based Clustering Detection (ABCD) method for wireless sensor networks the proposed ABCD method gives superior performance when compared with a distributed method (LSM) and traditional center method.

The simulation results show that the proposed ABCD method can achieve high successful detecting replica rate with small amount of communication overhead when compared with the Line-Selected Multicast (LSM) approach. In addition the proposed ABCD method can efficiently improve the performance of centralize approach. [6] Reduce energy consumption to improve lifetime of wireless sensor network. A Proper way is use to improve lifetime is to divide sensor network into groups called as cluster with very high energy node which work as leader of the cluster called cluster head. Cluster head is responsible for managing intra-cluster and inter cluster communication. Energy level of cluster head at a given point of time determines life of cluster and thereby whole sensor network.

Failure in the cluster head brings cluster communication to halt and may require re-clustering to get sensor network back on track. extended to incorporate dynamic selection of sensor node as cluster head, when energy levels of the existing cluster head within the cluster of cluster heads deplete below the given sensor node in same cluster.[7] it propose the method to provide the security of wireless sensor networks. For successful communication in wireless sensor network, it is important to maintain the security and privacy of the transmitted data as well as the data stored at nodes. To provide security various security protocols and models used in the wired and other wireless networks cannot be used instead of that a light weight dynamic security algorithm for wireless sensor networks has been proposed and implemented and then its

performance due to this it provides excellent security and also increase the sensor node lifetime by a for sufficient amount of time by utilizing node energy efficiently.[8] A real-time multiuser motion capture system has been developed using an efficient network of compact wireless MARG (Magnetic, Angular Rate, and Gravity) sensor nodes worn by the users. The motion capture system is designed to provide a completely tracking of multiuser at a high-speed update rate. In order to complete the system requirements, this paper gives an innovation of wireless sensor network, consisting of time synchronization mechanism, pipeline data aggregation method and local orientation estimation to guarantee the accuracy and timeliness of the multiple MARG sensor nodes data transmission.

3. Research Methodology

The figure shows the overall system architecture used in proposed system where all the nodes are deployed randomly with the given predefined task to every node and a cluster node is the head all node communication with computer system.

Phases / modules involved in proposed system development are listed below,

1. Build hardware to read sensors value and control the devices called as node.
2. Build trans-receiver module for data transfer between multiple nodes.
3. Write embedded software to make one of the node works as cluster head.
4. Build interface hardware between cluster node and computer using USB to TTL module.
5. Develop software to communicate with cluster through cluster head called as Hardware Interfacing Module (HIM).
6. Develop web interface to control and communicate with HIM and work as a middle ware between HIM and user.

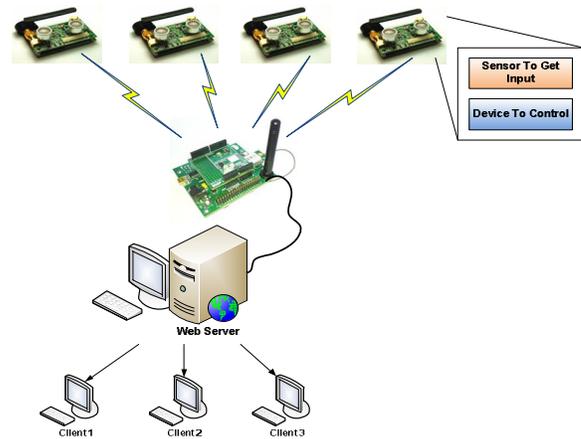


Fig. 1. System Architecture

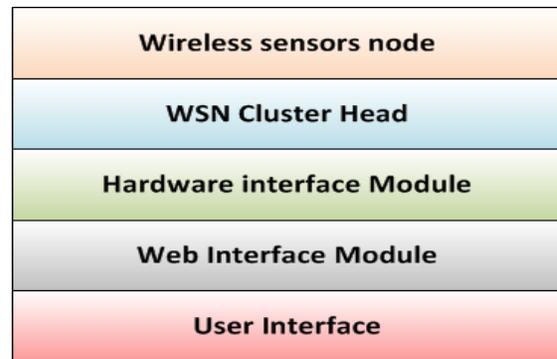


Fig. 2. Interfaces Model

As a hardware implementation system will be less with the hardware based wireless sensor node and software development is again divided in two main sections.

1. **Wireless Sensor Node:** The Node present in network will perform actual activities i.e. it will sense the data from the environment, and transfer to cluster head.
2. **Cluster Head:** The Cluster head is act as sink node, collecting information from sensor node and transfer it to the base station monitoring system.
3. **Hardware Interface Module:** This module will deal with the hardware or cluster head using serial interface with the computer system. All the

transaction with cluster will perform through this module only.

4. **Web Interface Module:** This module mainly developed to work as a middle ware between hardware interface module and user. It will give options to user to control wireless sensor node using internet from anywhere.
5. **User Interface:** User will communicate with WSN through GUI.

4. Conclusions

As proposed system is mainly design to monitor the heat level in order to detect fire at forest it is expected by the system that is should efficiently work autonomously and inform cluster head about its reading so that remote user can have better access over it and also system provide security using encryption technique. Major limitation of wireless sensor node monitoring is it's limitation of range. Wireless has very less distance communication. Using mobile network we can control the WSN but still it has a limitation over multiple states and country. As in web application has a great advantage of anytime anywhere access ability so, by designing the web enabled system we can give this advantage to WSN. The scope of the system is it let its user operate his WSN node network from any platform and from anywhere through just internet connection. By implementing the network head system will having single point of control and communication.

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