Wsn For Enhancing The Energy Cycle For Agriculture Farms:A Review

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Abstract:

This thesis explored the Architecture and designed an algorithm for improving their network life time and energy consumption for sensor nodes. This required to decide the techniques that suggest the method and also studied the basics of tool.WSNs are utilized in environmental observation, security, medical applications, etc. The device nodes are typically every which way deployed in a very specific region. These device nodes collect their information and send it to the base Station (BS) via some . It is also useful for a WSN user or administrator to obtain sensor readings and network health and performance metrics, and to control actuators or change software behavior remotely. Remote access to the WSN is especially important when nodes are physically inaccessible, mobile, or spread over a large geographical area. We have developed a method for monitoring and controlling WSN nodes from a graphical interface over an agriculture farm. The interface between the WSN and the Internet services contains an abstraction layer, allowing uniform access to nodes built using various technologies and running different software and control techniques. Therefore clustering plays a really vital role in prolonging the soundness amount and the network period of time. The Cluster Heads (CHs) collect the info from all the nodes in their cluster, combination it then finally sends it to the BS. These device nodes must control the energy with proposed technique to send their information efficiently to the BS. The most objective of all routing protocols is to reduce the energy consumption, so the network period of time and notably the soundness period of the network is also enhanced. By network lifetime, we tend to mean the time period from the beginning of the network until the death of the last node, whereas, stability amount suggests that the time period from the beginning of the network until the death of the primary node. In this paper we have made simulations the control system with wsn instruments that show the enhance lifetime of large cluster based sensor networks. We have also investigated the usefulness of enforcing a minimum separation distance between cluster heads in a cluster based sensor network to prolong network lifetime for agriculture.

Keywords:*Control Techniques, Sensor Nodes, Cluster Head, Wireless Sensor Network, Control instuments.*

INTRODUCTION

A wireless sensor network (WSN) can be defined as a network of (possibly low-size and low complex) devices denoted as nodes that can sense the environment and communicate the information gathered from the monitored field (e.g., an area or volume) through wireless links; the data is forwarded, possibly via multiple hops relaying, to a sink (sometimes denoted as controller or monitor) that can use it locally, or is connected to other networks (e.g., the Internet) through a gateway.

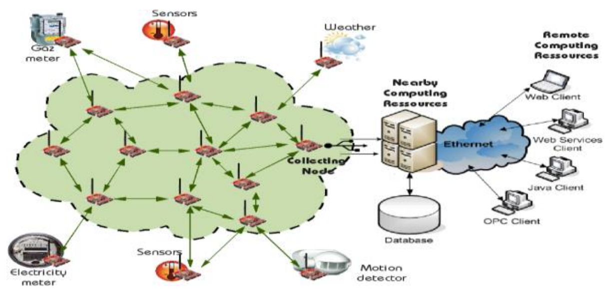


Fig 1: Typical WNS

Classification of sensor network on basis of their mode of functioning and the type of target application are:

1.1 WSN Monitoring Requirements

From the point of view of the software developer, you get less Energy consumption and higher data link Reliability is of great importance. The engineer needs it Be able to monitor system performance when Develop and test software to maintain WSN. Indicators Like the processor, memory charging, alarm frequency, The duration of countries with a high level of energy and the amount of data transmitted Received over radio, a task in development and Enhanced WSN. These parameters must be Known to all network points. Higher level, specific to services Parameters, as well as lower-level parameters such as radio Link quality is also important for programming algorithms In service-oriented networks and self-healing or adaptation Routing algorithms. The raw sensor data must also be Monitor when debugging data processing programs or when Set up your network after installation. Also some simple Applications require periodic sensor readings On a central computer. Network administrators and users Be also interested in WSN contract health monitoring (Such as remaining battery charge) or sensor data Performance measures.

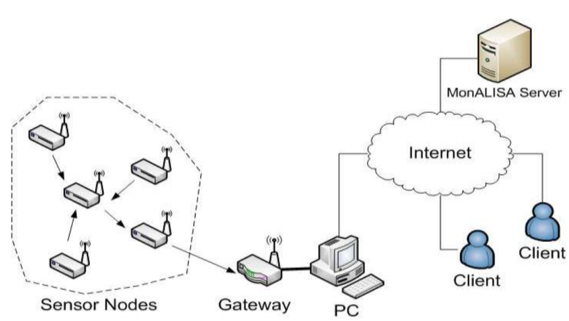


Fig. 2. WSN monitoring and control architecture

WSNs whose nodes are in inaccessible locations or spread over a large area clearly require software provisions to allow remote monitoring, without the need for physical access to the nodes. Even when WSNs occupy a small area and their nodes are easily accessible, connecting a dedicated debugging interface to the nodes can be cumbersome and expensive when the nodes are in large numbers. When using a WSN or when developing software, the user must also be able to control the network. Setting applicationspecific software parameters, controlling actuators directly, enabling and disabling services, upgrading the software running on the nodes are examples where control of the WSN is necessary. WSN nodes are built by multiple vendors and may vary in size, power consumption, microprocessor architecture or sensor interfaces (*Fig. 2*). Many real-time operating systems and network protocol stacks can run on WSN nodes, such as TinyOS (Hill 2000), Contiki (Dunkels 2004), Sensinode NanoStack, etc.

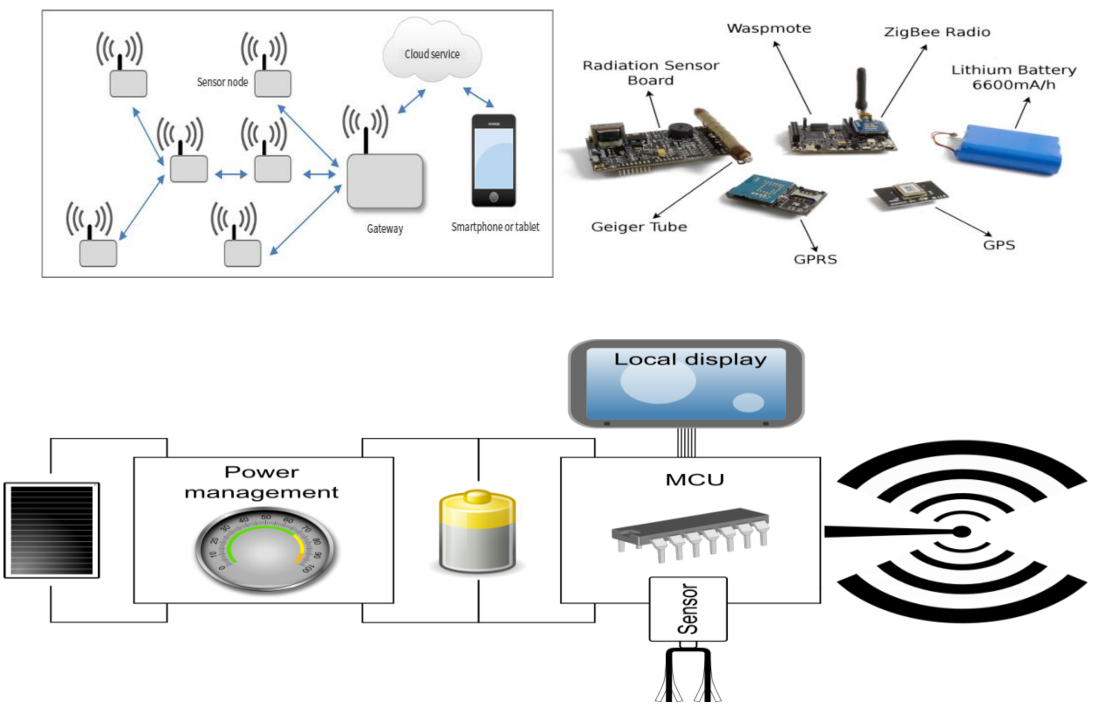


Fig 2: Many real-time operating systems and network protocol stacks can run on WSN nodes, such as TinyOS (Hill 2000), Contiki (Dunkels 2004), Sensinode NanoStack, etc.

1.3. SYSTEM ARCHITECTURE

We developed a method for monitoring and controlling a variety of WSNs remotely over the Internet for farming (Monitoring Agents using a Large Integrated Services Architecture) (Newman 2003, Legrand 2004). Our method uses an abstraction layer to provide remote monitoring and control to essentially any kind of WSN.

BRIEF LITERATURE SURVEY

The adaptation program can choose to be executed periodically by monalisa-wsn and return a data point each time, or to provide data points on the standard output periodically. The first option is used when polling the WSN and the second is used when the WSN itself pushes the data. When polling the WSN, each node from a list is queried for certain data such as sensor readings, performance metrics or debugging information. The nodes are identified by their address, which can have a wide variety of formats, depending on the hardware and software used. A technology-specific detection program, "detect", is used to build that list, which monalisa-wsn then uses transparently. The list can also be built dynamically when nodes announce their presence to the gateway, as is the case with the Raven platform. In this case the corresponding "detect" runs permanently and updates the list when needed. [4]

Where a parameter-based control interface is not sufficient, a command-line interface is provided, which is directly linked to the WSN-specific adaptation software without further processing by the control framework. This can be used to upgrade the software running on the nodes, for instance, by sending a .hex memory image file to the adaptation program. In order to provide increased uptime, a supervisor program can watch that the various components of the framework are running correctly. It can for instance restart programs that have crashed or locked, such as the WSN driver (Sensinode for example uses a stand-alone process as a driver, to which the other programs connect through sockets), the node detection program or the main monalisa-wsn program. [5]

Heinzelman et al. [4] developed the LEACH protocol (Low Energy Adaptive Clustering Hierarchy) which can be classified as a hierarchical algoritm, due to its inherent creation of clusters. The LEACH operation is composed by two phases: a setup phase and a steady-state phase. The setup phase needed in order to create the clusters inside the network and elect the cluster heads in each cluster. During the steady-state phase the nodes inside each cluster sense data and transmit data to their cluster head. The cluster head collects all the data sent by the nodes in clusters, it aggregates all data and sends it to the sink. Aggregation is useful if the data collected in a cluster are correlated. LEACH protocol assumes that all cluster heads can directly communicate with the central base station of the network; therefore it is not applicable in large regions. Periodically, the network goes back to the setup phase, to allow the selection of new cluster heads.

Arti Manjeshwar and Dharma p. Agrawal [2] proposed a formal classification of sensor networks, based on their mode of functioning, as proactive and reactive networks. Reactive networks, as opposed to passive data collecting proactive networks, respond immediately to changes in the relevant parameters of interest. They introduce a new energy efficient protocol, TEEN (Threshold sensitive Energy Efficient sensor Network protocol) for reactive networks. The performance of protocol for a simple temperature sensing application was being evaluated. In terms of energy efficiency, the protocol has been observed to outperform existing conventional sensor network protocols. TEEN is based on a hierarchical grouping where closer nodes form clusters and this process goes on the second level until the BS (sink) is reached. TEEN is a clustering communication protocol that targets a reactive network and enables CHs to impose a constraint on when the sensor should report their sensed data. After clusters are formed, the CH broadcasts two thresholds to the nodes namely Hard threshold (HT), and Soft threshold (ST). Hard threshold is the minimum possible value of an attribute, beyond which a sensor should turn its transmitter ON to report its sensed data to its CH. Thus, the hard threshold allows the nodes to transmit only when the sensed attribute is in the range of interest, thus reducing the number of transmissions significantly. Once a node senses a value at or beyond the hard threshold, it transmits data only when the value that attribute changes by an amount equal to or greater than the soft threshold, which indicates a small change in the value of the sensed attribute and triggers a sensor to turn ON its transmitter and send its sensed data to the CH. As a consequence, soft threshold will further reduce the number transmissions for sensed data if there is little or no change in the value of sensed attribute.

Thus, the sensors will send only sensed data that are of interest to the end user based on the hard threshold value and the change with respect to the previously reported data, thus yielding more energy savings. One can adjust both hard and soft threshold values in order to control the number of packet transmissions. However, both values of hard soft thresholds have an impact on TEEN. These values should set very carefully to keep the sensors responsive by reporting sensed data to the sink.

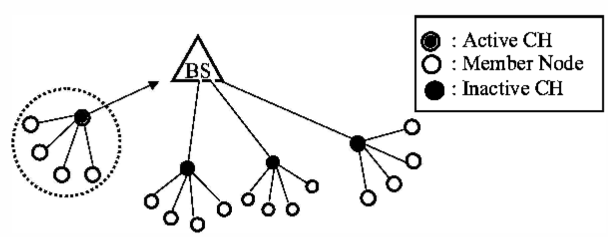


Fig 3: Clustering in TEENS

Arati Manjeshwar and Dharma P. Agrawal [2] proposed APTEEN just as an improvement to TEEN in order to overcome its limitations and shortcomings. It mainly focuses on the capturing periodic data collections (LEACH) as well as reacting to time-critical events (TEEN). Thus, APTEEN is a hybrid clustering-based routing protocol that allows the sensor to send their sensed data periodically and react to any sudden change in the value of the sensed attribute by reporting the corresponding values to their CHs. The architecture of APTEEN is same as in TEEN, which uses the concept hierarchical clustering for energy efficient communication between source sensors and the sink. APTEEN guarantees lower energy dissipation and helps in ensuring a large number of sensors alive. When the base station forms the clusters, the CHs broadcasts the attributes, the hard and soft threshold values, and TDMA transmission schedule to all nodes, and a maximum time interval between two successive reports sent to a sensor, called count time (TC). CHs also perform data aggregation in order to save energy. APTEEN supports three different types of query namely:

- ✓ History query: to analyze past data values,
- ✓ One-time query: to take a snapshot view of the network, and
- ✓ Persistent query: to monitor an event for a period of time.

Tejaswi et. al. [3] developed CAMP-TEEN is the extension of TEEN protocol, most suitable for the application of land slide prediction. Nodes sense the slight movement of soil and change in parameters that occur before land slide. CAMP enhances localization and energy efficiency of multi-hop routing protocol and TEEN is an extended version of LEACH which saves energy by using threshold values. It is useful in landslide prediction applications because each rock have different threshold values. In CAMP-TEEN, one node broadcasts a beacon pulse. Nodes which are nearby to that node receive this beacon and sends an acknowledgement return to beacon node. The acknowledgment has the distance between nodes and beacon node based on RSSI (Received signal strength indication). It constructs the neighborhood table for each node until all nodes have their neighboring table. CAMP uses distributed clustering in which CH is selected on the basis of local information of nodes. In CAMP-TEEN, CH selection criteria depend on a timer which is given as:

$$T(v) = K/E - \alpha$$

Where K, is the proportionality constant which is taken as 1, E is the normalized energy of the node and α is the random number between 0 and 1. Timer starts for every node by using above equation. The node with least timer value will have high energy as they are inversely proportional to each other. The high energy node will be elected as a CH then neighbor nodes of CH will terminate their timers.

NEED AND SIGNIFICANCE

Proactive network design includes sensor network collecting data periodically from its environment or responding to a particular query. They are not suitable for time critical applications. A monitoring service (Farm-purposed WSN) runs on the computer with the WSN gateway, calling WSN-specific programs that report incoming data. These programs call the WSN drivers and perform WSN-specific data formatting, while presenting a unified interface to the monitoring service, effectively forming an abstraction layer.

OBJECTIVES

The main objective my thesis is to develop an energy efficient increased lifetime threshold sensitive clustering algorithm by dynamic selection of cluster heads using multi-hops and multi-path, that leads to load balancing on different-different clusters. This results in the enhancement of cluster heads or normal nodes network lifetime implanted on large are for agriculture.And also to evaluate the performance of our protocol, we have implemented it on the MATLAB simulator with the integrated model of advance clustering protocol.

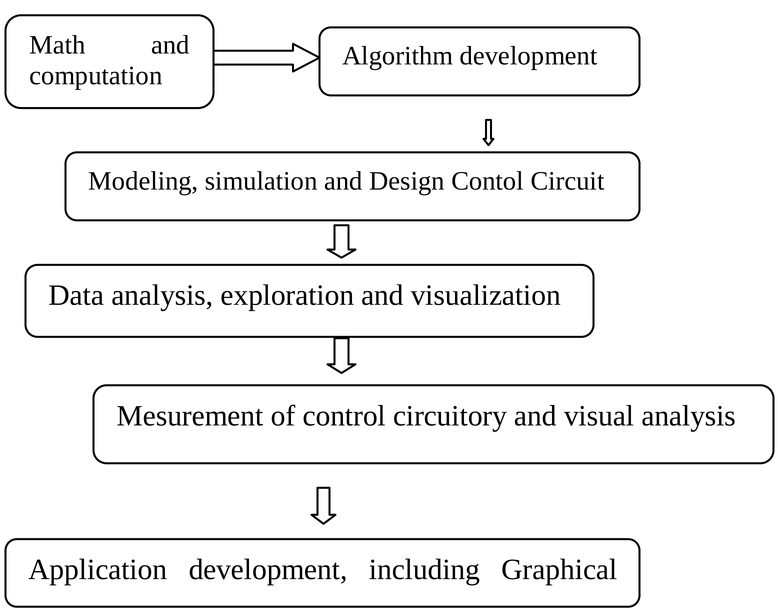
PROPOSED WORK

Developing a self organized node for wsn introduced the idea of multihop and multipath. Due to cluster change continuously it has to necessary for node to have the feature like multimode and multipath. This will use multi-hop and multi-path for increasing the network life and decreasing the consumption of power. The power consumption will be less due to load balancing on cluster heads of every cluster.

System Configuration

- ✓ Measurement Station
- ✓ Sensors :
- ✓ Signal Conditioning Circuits
- ✓ Data Acquisition
- ✓ Measurement Server
- ✓ GSM Modem
- ✓ Control Center
- ✓ Alarm Notification
- ✓ Measurement and Alarm Storage
- ✓ CGI Programs
- ✓ Remote Stations

6.1 : Development Stage



CONCLUSIONS

The capability to monitor and control WSN nodes and WSNs as a whole, without physical access to the nodes, from any remote location, is important when developing WSN software and when administering or using the WSN. We developed a framework for monitoring and controlling WSNs through a uniform interface, independent of their hardware or software technologies. The framework allows monitoring of low and high-level parameters andbperformance indicators for each WSN node. The framework allows parameter-based control of each WSN node, as well as console-based control for complex tasks. The framework also allows managing isolated WSN control as a single entity. The system of WSN independent programs and an control layer composed of WSN-specific adaptation programs. These programs are written in a MATLAB, allowing them to be compiled and run on control systems as well as embedded, resource-limited systems.This facilitation of Setup will be efficiently enhance the energy for heavey duty work like farm monitoring.

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