Wireless Sensors Network For Monitoring

Shubham Sharma

Lovely School of computer science Engineering,Lovely Professional University
Phagwara,Punjab,INDIA
Under the Guidance of: Miss Himanshu Sharma U.ID – 16833
Designation – Assistant Professor
Discipline of CSE/IT
Lovely School of Technology & Sciences
Lovely Professional University, Phagwara

Abstract

The paper is on the various wireless sensor that are being used in our daily life as well as the wireless sensors are those that are used for various disaster detection notification, emergencies detection in the indoor environment,structure monitoring and many other areas where wireless sensors are used.In this paper we concentrate on various factor like on structure monitoring,emergengy response notification for indoor situation and also the use of wireless sensors network in different areas(fields)

 Wireless sensors is the growing latest tecnology that make the whole mechanism to control the things wirelessely. WSNs are being used as a tool for engineers to build the new technology and for monitoring various application.WSNs is the fast growing technology in the market nowdays.The main advantage for it is that they are used wirelessely in the network,and also build up system which make life easier in data manipulation,processing,tracking etc

The paper focus on the wirelss sensors network there working,uses.From the papers that are reviewed earlier.The papers that are reviewed contain very nice explanation with the work done is excellent.The work done in this paper provides a revolutionary step in the area of wireless sensors.

Network is that which is used for communication between person to person that is used for sharing data our ideas our opinion etc.Network are everywhere in environment from telephone line, communiation cable,radio waves or different types of file(data) transfering instrument,mobile is the perfect example that we use in our daily life.From the past few years everyone thinks of that network is like a lots of wires with different port connection.This make the normal person very difficult to understand also provoke the person and disturb the person due to cluster of wires for simple network for this the best way to get rid of these wire is that to use wireless device that is wireless sensor network.It provide you liberty form the conjusted wires,cable.Wireless sensor network is the combination effort and activeness of micro(small)sensors nodes.Sensors are of very small size with low cost,low power,low maintenance but its is capable of sensing and communicating.It helps in communicating from a very long distance.It is like for event detection at the sink side relies on the collective information of sensor source nodes.It sense the detection and send that information to the database where it is linked to within few seconds.

Sensors is a device that convert the signal in one form of energy to another form of energy for example: heat, motion,light, pressure.It consist of various components like Microcontroller,transceiver,external memory,power source and many more sensors.
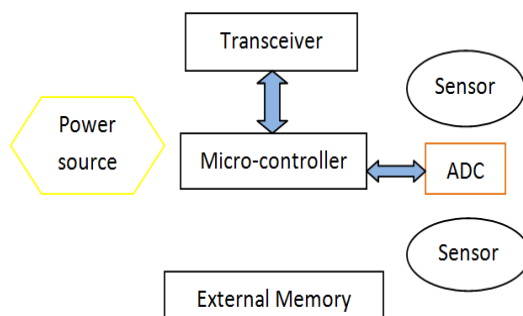

Figure1. Sensor content

Every component is necessary in performing different task in wireless sensors.

Working-It is collection of motes.Motes used to communicate with each other in a way that every child motes collects the sensed data(event detection)and send it to the parent mote that can be anywhere where data is to be stored.
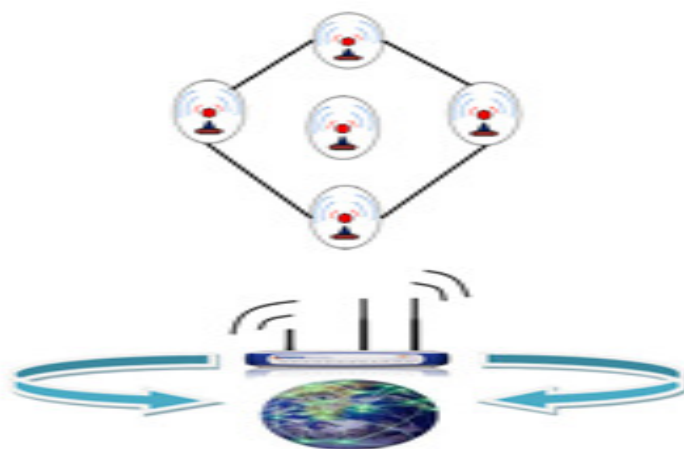
WSN Architecture-

Figure 2. Basic Architecture view of wireless sensor network

Review of paper-In the paper there is a brief description of emergency response notification for indoor situation in this it is given in various form like such as pop-ups on a computer screen,SMS on their cell phone,by giving alert info through telephone,this sensor is basically used in the SIUC (Southern Illinois University carbondate)campus.

Various keywords that are used are –

- IEEE 802.15.4,IEEE 802.11
- ZIGBEE
- Emergency service network
- Sensors

Zigbee device can transmit data over a very long distance by passing data through intermediate device to reach more distant ones.It require low data rate,long battery life and secure networking.It improve the efficiency,safety,security,reliability and convenience of product.It uses the 2.4GHz radio frequency to deliver a variety of reliable and easy-to-use standard anywhere in the world.Zigbee offers a variety of innovative standards smartly designed to help you be green[1]

802.11/802.15.4 –It is a set of media access control(MAC) and physical layer(phy) specification for implementing(WLAN)

In the paper temperature sensing is used in the field of emergency response.Zigbee wireless temperature sensor for temperature sensing.Temperature sensor produces voltage this voltage is then supplied to single ended input to the Analog to Digital converter (ADC) Multiplexer.The ADC initiates a conversion the ADC gives the output code that is converted into a temperature in degree.The increase in temperature due to fire will increase voltage in the temperature sensor.In order to find surrounding temperature the temperature is increased due to self heating must be subtracted from the result.There are equation to calculate temperature in degree.This system has the potential to reduce the response time in a cost-effective way and additional options to the sensors such as image processing and multiple sensors can be used for future scope.

In the second paper work is on the structural monitoring

Structural Monitoring is the collection and analysis of structural response to ambient or forced vibration of building,Bridges and other structures.It shows the structure health or detecting the changes in the structure the effects its performance.It depends upon two major factor that is how quickly the changes occurs and severity(state of being too bad)is thedegree of change.MEMS accelerometer is used in structural monitoring made up of siliconchip.It is very compact in size consumes little energy and is inexpensive

Wisden-Wisden help in reliable data transport

- End to end and hop to hop recovery low overhead data
- Time sampling

Wisden uses vibration card especially for structural application
Wisden focus on its three novel-software component
- Reliable data transport-Technique to construct routing tree recover packet hop by hop or end to end transfer of packet
- Compression-Reduce data requirements and to improve latency
- Data Synchronization-Need to synchronize clock network wide
  Structure Data Acquistion System

It measure the real world physical condition and convert it into a digital numeric that can be easily manipulated by a computer.Convert physical parameter to electric signal
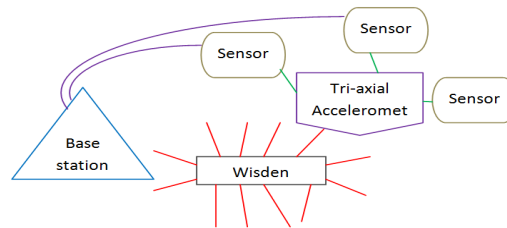
Wisden overview-

Figure 3. Basic Working of wisden

Sample deliverd be reliabilty to the base station and time sync.Sending again and again each sample is worthless so we send where there is large motion caused by natural disaster.It then compress data and send it to the base station.It uses hop to hop and end to end transmission of data.It recover packet loss.Sample of same event but of different nodes can be sync at base station.

The final conclusion of this paper is to describe the design of a wireless structure data acquisition System called wisden.The system mimics(to make copy)wired data acquisition system,compression algorithm,reliable transport,time synchronization

Future scope is to gain significant experience with the system's overall accuracy and performance by arranging it to work on large structure at different scales.

 In Third paper monitoring is done on Development of a Field Wireless Sensors Network Based on ZigBee Technology .

In this, the field wireless sensor network based on Zigbee technology is being used. It consist of various PDA, Zigbee coordinator and several Zigbee notes. PDA manages the coordinator. To collect the information in order that its serial ports that are connected. Coordinator collects data from its nodes and then transmits it to the PDA. Here the working is done to sense, soil   temperature. Soil electrical conductivity, soil moisture, environment humidity and sensor's status. Hardware architecture of each node is being consist of Zigbee module integrated with transceivers, a microcontroller some field sensor and peripheral circuit. Some algorithm for reading and processing the data and communication between PDA   and coordinator. It is used for as agriculture information collection system they are, of relatively very low cost

Introduction-Accurate working on agriculture field requires low cost and high efficient monitoring system. Wireless sensors are useful in this field because of easy installation and less expensive. It takes less power, short range, restricted average. Zigbee is best in this field. It is being build on establishment of IEEE 802.15.4 standard Zigbee provides higher network flexibility than Bluetooth. Allowing many topologies can be used like tree and mesh.

Application of Zigbee-

Zigbee based remote sensing network for Accurate viticulture(agriculture for grape wine). The nodes are recharged by sun,wind and waterflow. Zigbee used in wireless sensor network for monitoring animal presence and pastures time. Used in behaviour of herd of animals. Used telemetric platform for in vivo monitoring of psychological parameters.

Used in monitoring for storage and transport of fruits. Used to monitor soil and environmental status in a crop for good horticulture. Used in green house. Used for soil moisture and temperature monitoring.

Sensor used are analogue devices. Analogue devices is usually a combination of Both analogue machine and analogue media can be used for measuring proper record and continuous information. In this Zigbee is being Setup in both hardware and software

DEVELOPMENT OF THE WIRELESS SENSOR

Whole network-Wireless sensor network on Zigbee is consisting of two parts coordinator and routers. Coordinator used to select frequency channel to be used and allowing other device to join the network. Makes coordination between the nodes. Router used to relaying message from one node to another and connect child nodes to it. PDA manages Zigbee to collect field information. Each node is connected to 4 sensors. Node collects the information and send to coordinator and then it is transmitted to PDA.
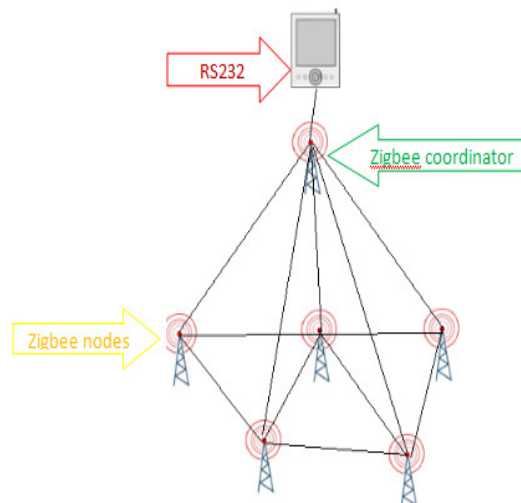

Figure 4. Coordination between Zigbee nodes

Hardware Development- JN5139 is used because of low cost and is IEEE 802.15.4 wireless microcontroller which provides fully integrated solution. It includes a wireless Transceiver 32-bit RISC CPU, on-chip memory and an extensive range of peripheral. Various sensors like soil electrical conductivity sensor, soil moisture sensor are being connected to ADC channel of the microcontroller. Soil temperature sensor and environment humidity sensor is also used. DS18B20 is chosen as the core parts of the soil temperature sensor require only one part Pin for communication. Besides all these like sensor reading sensors status is also important information to collect. It is judged by estimating the power supply voltage for the sensors. The error flag pin on the LDO chip goes low when output voltage go out of the normal value.
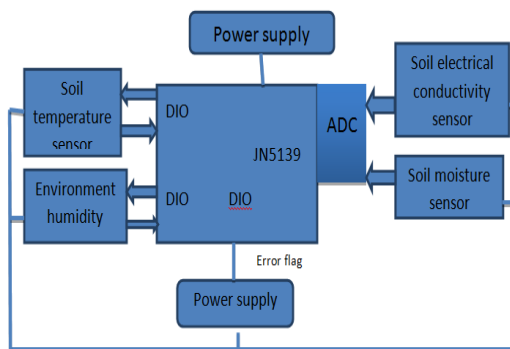
Figure 5. JN5139 wireless Microcontroller

SOFTWARE DEVELOPMENT

Network establishment- In this application code blocks is used. Two types of data service are provided MSG and KVP (more complicated data is being send in this). AFDE (application framework sub-layer data entity) to create KVP or MSG frame. ADD a right simple descriptor for an endpoint on coordinator or router so that they communicate to each other. If power goes of the coordinator it restarted and it save the network context to flash memory. So that they don't have to rejoin again. The 16-Bits short address is allocated when a device joins the network calculated by algorithm know as CSkip

Sensor operation- Soil moisture sensor an soil electrical conductivity sensor are analogue device so there reading can be converted by using formula. However other two sensors that is humidity sensor and soil temperature sensor are digital equipment. These sensors are programmed for reading.

Communication between Zigbee coordinator and PDA

The Command send from PDA to Zigbee is departed in 3 parts.

Firstly sensor reading and status checking is done. Secondly node number is to select. Thirdly node address to check. The command sent form PDA to Zigbee coordinator is formed in 16 hexadecimal form while the data set form Zigbee coordinator to PDA is in ASCII form for example- sender data ' 0201035f ' here 02 represent sensor reading and status reading

01 represents node number how many nodes are needed. 035f represent info form the node where short address is 0x035f.

Receiving data 0x35f@1t30 here 0x35f represent short address @1 means information comes from the node which is fixed to number 1 and t30 means that temperature is 30 degree centigrade.

Conclusion- Field information is used to calculate various Soil electrical conductivity, soil moisture, environment humidity and sensor's status. It uses various Analogue equipment because the digital equipment are expensive. In this it is important to optimize the performance of every component to consume as little power as possible Improvement the software and hardware view.

Final Conclusion- That the technology advancement increase by the time, latest technology like WSNs is growing to achieve great potential in use. It is the power that inspires those people, their attention and interest who make interaction with this technology.

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