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RESEARCH ARTICLE

MONITORING OF MEDICAL PARAMETERS USING WIRELESS SENSOR NETWORK

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ABSTRACT

This work presents an application of wireless sensor network (WSN) of the random access with one way transmission to the monitoring of the patients in the hospital. In the paper, we will study a clustered wireless sensor network. The sensors are within each cluster forward the message to another cluster via cooperative communication techniques. In wireless sensor network, several architectures usually called network topologies are possible: star, cluster free and mesh. In different topologies, sensor nodes can act as simple data transmitters and receivers or routers working in a multi hop fashion. Other wireless networks are not as energy constrained as WSNs, because they may be plugged into the mains supply or equipped with batteries that are rechargeable and replaceable. The nodes of the proposed wireless sensor network are created by using a combination of various sensors a CC2500 low power wireless radio.

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INTRODUCTION

In the wireless measurement is a very fast growing area of research. The wireless sensor network (WSN) is a specific. Use of radio communications systems where many stations nodes transmit the information to a base station (sink). It requires a completely different approach to radio communications than traditional systems, or even ad hoc networks. You can list a number of important factors affecting the design of the WSN network. These are: bands and communication frequencies, the demand for power supply (for example: for the purposes of communication and data processing), reducing external (environmental) as well as, hardware limitations, scalability, fault tolerance range [1]. Underline Design philosophy of WSN is create network that consist of large number of small and low end devices called sensor nodes. These sensor nodes are made of computing storage, sensing, and communication and power units [3]. The present patient monitor systems in hospitals allow continuous monitoring of patient vital signs, which require the Sensors to be hardwired to nearby, bedside monitor or PCs, and essentially confine the patient to his hospital bed. Even after connecting these systems to a particular patient, a paramedical assistant need to continuously monitor and note down all the vital parameters of a given patient by keeping track of all of his/her records manually. Adopting such a method is error prone and may lead to disaster in the case of a human error.

In the current proposed system the patient health is continuously monitored by the Mobile multi patient monitoring system and the acquired data is transmitted to a centralized Control room using Wireless Sensor Networks. A CC2500 node is connected to every patient monitor system that consumes very low power and is extremely small in size. These slave nodes are specifically designed for low power consumption, with minimal circuit components. They are intended for small packet, long distance range applications and typically consist of a low power processor with minimal resources and interface capabilities. They also have a conservative transceiver that is capable of transmitting data at a time and has a moderate transmitting range of about 50 m. Therefore, WPANs seem to be a perfect fit for remote patient monitoring. This paper builds an independent system that automatically logs vital parameters of patients for easy access. The data is accessible to doctors through mobile device for convenience. Data of all patients is stored in a common database.

Proposed System

We are developing network architecture for smart healthcare that will open up new opportunities for continuous monitoring of patients. While preserving patient comfort and privacy, the network manages a continuous medical history.

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The advantages of a WSN are numerous for smart healthcare, as it provides the following important properties:

Portability and unobtrusiveness

Small devices collect data and communicate wirelessly, operating with minimal patient input. They are carried on the body.

Ease of deployment and scalability

Devices can be deployed in potentially large quantities with dramatically less complexity and cost compared to wired networks. Existing structures can be easily augmented with a WSN network whereas wired installations would be expensive and impractical. Devices are attached to the patients and turned on, self-organizing and calibrating automatically.

Real-time and always on

Physiological and environmental data can be monitored continuously, allowing real-time response by emergency or healthcare workers. The data collected form a health journal, and are valuable for filling in gaps in the traditional patient history. Even though the network as a whole is always-on, individual sensors still must conserve energy through smart power management and on-demand activation.

Reconfiguration and self-organization

Since there is no fixed installation, adding and removing sensors instantly reconfigures the network. Sensors self-organize to form routing paths, collaborate on data processing, and establish hierarchies.

Architecture of wireless sensor network

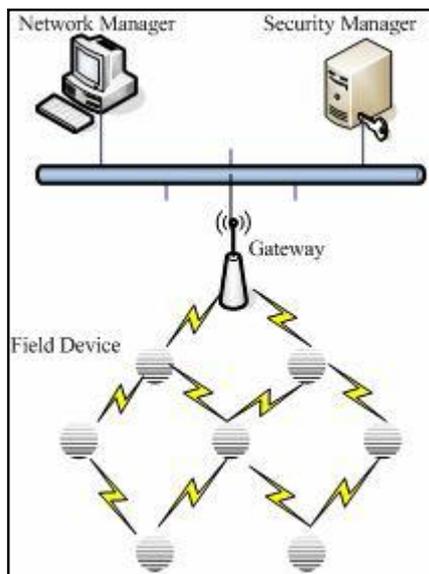


Figure 1 Architecture of Wireless Sensor Network

Figure 1 shows the architecture of Wireless Sensor Network. In a typical WSN, we see following network components: *Sensor nodes (Field devices)*: Each sensor network node has typically several parts: a radio transceiver with an internal antenna or

connection to an external antenna, a microcontroller, an electronic circuit for

1. Interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting.
2. Gateway or Access points - A Gateway enables communication between Host application and field devices.
3. Network manager - A Network Manager is responsible for configuration of the network, scheduling communication between devices (i.e., configuring super frames), management of the routing tables and monitoring and reporting the health of the network.
4. Security manager - The Security Manager is responsible for the generation, storage, and management of keys.

The base stations are one or more distinguished components of the WSN with much more computational, energy and communication resources. They act as a gateway between sensor nodes and the end user as they typically forward data from the WSN on to a server. Other special components in routing based networks are routers, designed to compute, calculate and distribute the routing tables. Many techniques are used to connect to the outside world including mobile phone networks, satellite phones, radio modems, high power Wi-Fi links etc. Figure shows the architecture of WSN.

RESULT



Figure 2 Graphical User Interface of the proposed system

Figure 2 shows the graphical user interface of the proposed system. The graphical user interface is developed by the using software visual studio dot net 2010. In the graphical user interface, the body temperature of the human is sensed by the temperature sensor. The other parameters like humidity, heart beat rate of the patient, respiration are sensed by the sensor and are shown on the LCD display. The graphical user interface shows these parameters.

CONCLUSION

The main aim of the proposed system is to design and implement the real time monitoring of the medical parameters of the patients. The parameters are human body temperature, humidity, respiration, heart beat etc. These medical parameters are monitored by using different sensors. The graphical user interface is to be designed for the end user. The real time

monitoring and evaluation of the medical parameters of the patients greatly helps to save their life in critical situations. The proposed systems have two nodes which are connected to 16*2 LCD display. The LCD display the information sensed by the various sensors which are used.

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