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An Intelligent Health Care Monitoring System Using Wireless Sensor Network

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Abstract **-** This work presents an application of Wireless Sensor Network (WSN) of random access with one-way transmission to the monitoring of hospital patients. In this project we will study a clustered wireless sensor network where sensors within each cluster forward the message to another cluster via cooperative communication techniques. In WSN, several architectures usually called network topologies are possible: star, cluster-tree 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.

Keywords **-** Wireless Sensor Network (WSN), Smart System, Healthcare, Wireless Body Area Network.

I. INTRODUCTION

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 monitors 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.

Mobility of the equipment is improved by making the equipment more portable. The literature reviews Diagnosing and continuous record of real-time data by the use of portable patient monitoring system during

normal activity would be beneficial for medical practitioners to do proper and better treatment; also it would be useful for health care providers to improve diseases management (Otto,1999). This challenge attracts many researchers to invent a new design and deploy comprehensive patient monitoring solutions for hospital health care system (Connor et al., 2001). Advances in wireless networking have opened up new opportunities in a variety of application [2].

II. EXISTING HEALTHCARE

Nowadays, healthcare system is highly complex. List of elderly people and people in need for continuous care increases every day. Medical staff faces with more and more challenges each year. This opens serious questions in the domain of interest, which must be answered in the best way possible. Wireless sensor networks can offer this kind of solution.

III. SENSORS USED FOR THE SYSTEM

The three different sensors are used in the system. For measuring the body temperature of the patient, temperature sensor is used in the system. For measuring the humidity of the room where the patient is admitted is measured so as to keep the atmosphere clean, which will be beneficial for the health of the patient, the humidity sensor is used. The heart beats is the main parameter of the WSN. For measuring the heartbeats of a patient, a heartbeat sensor is used. The heartbeat sensor is attached to the patient's fingertip using a clip.

IV. EXPERIMENTAL RESULTS

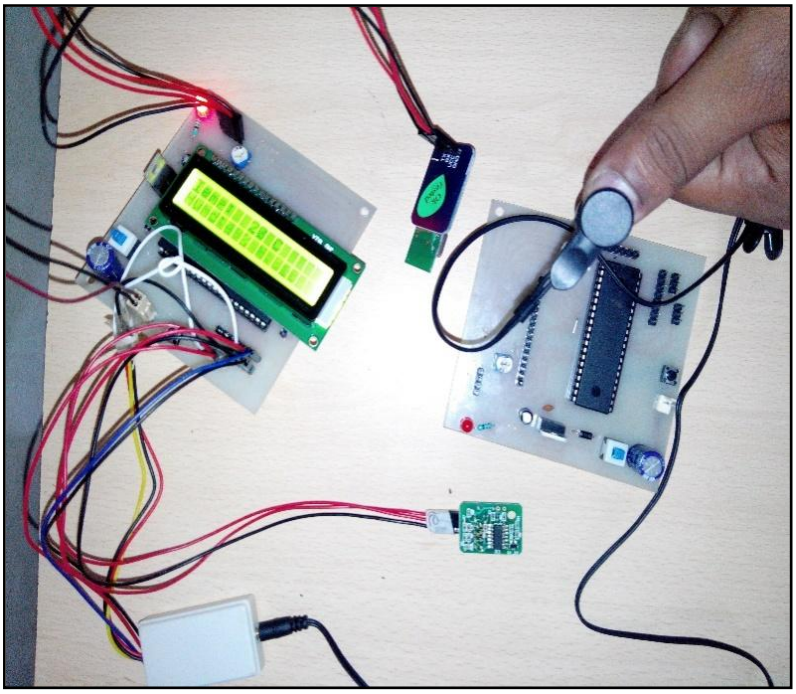

Figure 1: Circuit diagram of working node.

Figure 1 shows the circuit diagram for the working node. The system consists of two working nodes. The three parameters are to be measured. These parameters are body temperature, humidity, and heart beats. For measuring these parameters, the sensors are used.

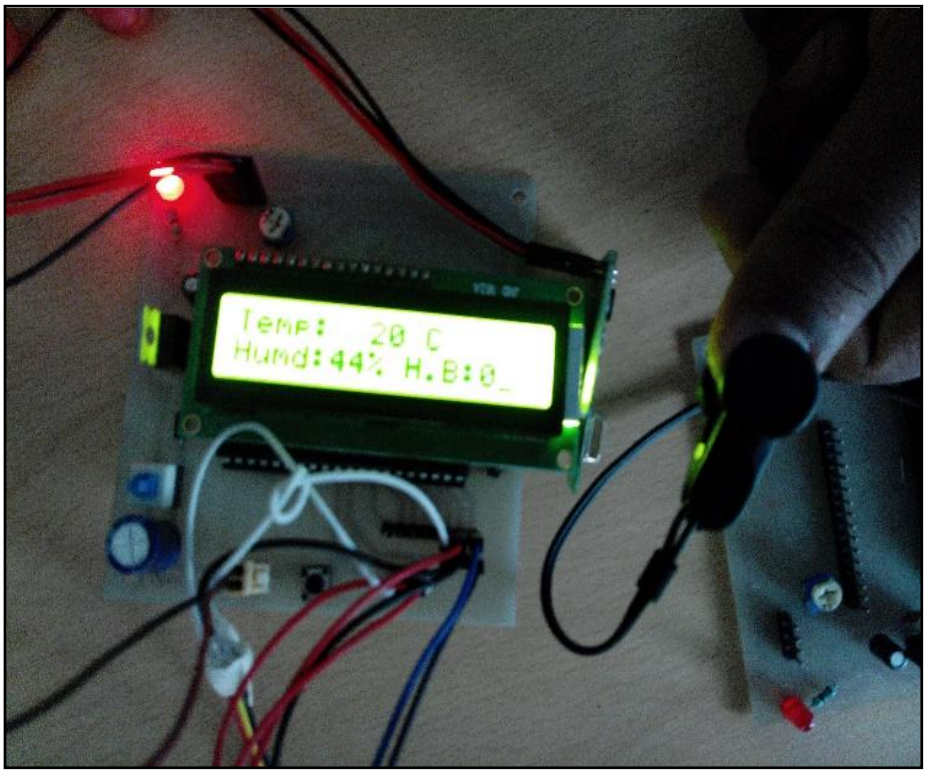

Figure 2: Diagram for node reading.

Figure 2 shows the circuit diagram for the node reading of the proposed system. The parameters for node reading are the heart beats, body temperature, and the humidity. The above image shows the LCD display which displays all the parameters that are being measured of a patient. Herein this image there are three parameters displayed with their readings. The body temperature of any patient (node) is measured using a temperature sensor viz. thermometer. The system shows the body temperature 20^0C. As soon as the temperature is measured it is then transferred to the main node i.e. the controller. The controller later displays this reading on LCD. Here the LCD is connected to the GUI which also displays the same. This parameter is somewhat different than the others. Here the humidity of the room where the patient is admitted is measured so as to keep the atmosphere clean, which will be beneficial for the health of the patient. The heart beats is the main parameter of the WSN. The system shows the humidity as 44^0C. Here the heartbeats of a patient are calculated via a heartbeat sensor. A heartbeat sensor is shown in the above image. The heartbeat sensor is attached to the patient's fingertip using a clip. It later measures the heartbeats through the pulse rate of the patient.

V. CONCLUSION

The proposed system is used for the medical applications. The various parameters are checked by the proposed system. The parameters are body temperature of the patient, heart beats, humidity etc. The system implements the real time scenario for increasing the length of communication among wireless sensor nodes. The proposed system makes the system more energy efficient. The baseline of the system is implemented. A one week experiment showed a robust system with some straightforward communications from front to backend of the system. We believe this system design will greatly enhance quality of life, health, and security for those in assisted-living communities. The system is monitoring and collecting patient data that is subject to privacy policies. For example, the patient may decide not to reveal the monitored data of certain sensors until it is vital to determine a diagnosis and therefore authorized by the patient at the time of a visit to a doctor. Security and privacy mechanisms must be throughout the system.

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