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Research Paper

LABVIEW BASED REAL TIME ONLINE DATA ACQUISITION SYSTEM FOR WIRELESS SENSOR EXTENDED NETWORKS

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In recent decades, the requirement in the health care field is rising quickly, and therefore we need there is a strong need for efficient monitoring systems in health care units. This paper, presents a Wireless Sensor Network (WSN) for monitoring patient's physiological conditions continuously using Zigbee. Here the physiological conditions of the patient's are monitored by sensors and the output of these sensors are transmitted via Zigbee and the same has to be sent to the remote wireless monitor for acquiring the observed patient's physiological signal. The remote wireless monitor is constructed of Zigbee and Personal Computer (PC). The measured data from the patients are transferred to a central monitoring station via a Zigbee. In this a PC acts as a central monitoring station which runs LabVIEW for monitoring the parameters using Global Addressing Scheme.

Keywords: RTOS, Wireless, Zig-bee, LabView, Body monitoring, Monitoring, Patient monitoring

INTRODUCTION

In present scenario, patient health parameters are adopting rapidly. For implementing automated measurements each patient is given a dedicated system and does not works on centralized mode of operation. If a patient is admitted in ICU a regress monitoring of health parameters is done but consider if a patient is admitted in a normal ward there advance measurement systems doesn't exist. In such cases nurse goes to ward and measures patient's body parameters for every certain interval of time, during this manual measurement there is chance of missing the accuracy during to inefficient nurses, the measurement records which taken by nurses are can be analyzed by doctors as reference of disease diagnosis.

If the measurement goes wrong the diagnosis fails or misleads. This term of conventional not only wastes nurses' massive manpower, but also aggregation, query analysis to measurement result is miscellaneous, as well as cannot feedback in time when patient appears special condition, which can cause delay of treatment time. Through analysis we can see, this kind of style has bigger limitation, especially, to those patients with infectious diseases, monitoring personnel is inconvenience to contact.

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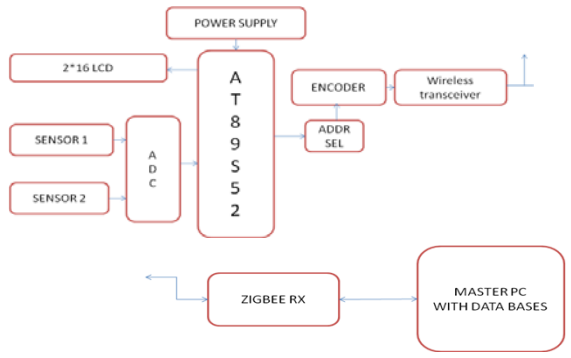
So, aiming to this problem, by sensor technology, single chip microprocessor technology, etc., we design a wireless remote monitoring system. This system uses wireless communication (Zig-bee) technology, which eliminates the manual measurements. Monitoring of each patient sub-system in real time, as well as communicating with central monitoring station, we can increase work efficiency, and data reliability, etc.

HARDWARE AND SOFTWARE DESCRIPTION

Figure 1 shows the functional block diagram of the system hardware. The system has been designed to take several inputs to measure physiological parameters of human such as temperature, heart rate, detection of any fall and the saline level. The inputs from the sensors are integrated and processed. The results are sent through the Zigbee Module to a host computer, which stores the data into an Access Database. The values can then be displayed on the Graphical User Interface (GUI) running on a computer. If it is inferred that the person is medically distressed, an alarm may be generated. The program is a user interface, allowing a report on the current status of the individual.

Figure 1: Block Diagram



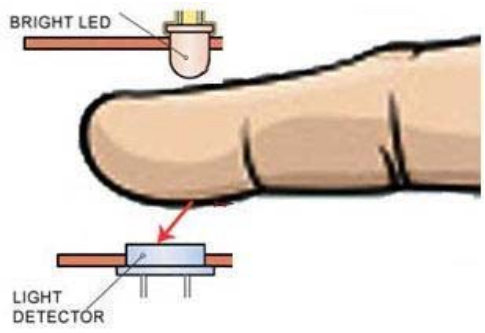
Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Thus the LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 is rated to operate over a "55°C to +150°C temperature range.

Heart Beat Sensor

The system consists of an infrared (IR) LED as transmitter and an IR photo-transistor as a receiver that acts as a fingertip sensor. The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the maximum light must pass spread in finger and detected by detector. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified through an amplifier which outputs analog voltage between 0 to 5 V logic level signal. The illustration of fingertip sensor is shown in Figure 2.

Figure 2: Illustration of Heart beat sensor



GLOBAL ADDRESSING SCHEME

To establish a functional data communication scenario, sensor nodes should have addresses. A sensor node may contain hardware ID with its network interface, but this ID may be too long (e.g., 48 bits for usual Ethernet card) for a network of thousand nodes where 10/12 bits are good enough to address whole network.

Node id	Node data3	Node data2	Node data1	Start bit

Again, due to large network size, manual assignment of address is not feasible. Failure of nodes also makes static address allocation quite critical. So address allocation should be dynamic and self-adjustable.

RESULTS AND DISCUSSION

This technique presents a system to upgrade existing health monitoring systems in the hospitals by providing monitoring capability and a thus a better cure. This system is based upon wireless technology, i.e., Zigbee IEEE 801.15.4 providing low cost effective solution. As it is wireless device, the cost of cables is reduced here. It provides continuous monitoring of the vital signs of the patient over long periods of time until an abnormal condition is captured and hence critical situations can be overcome.

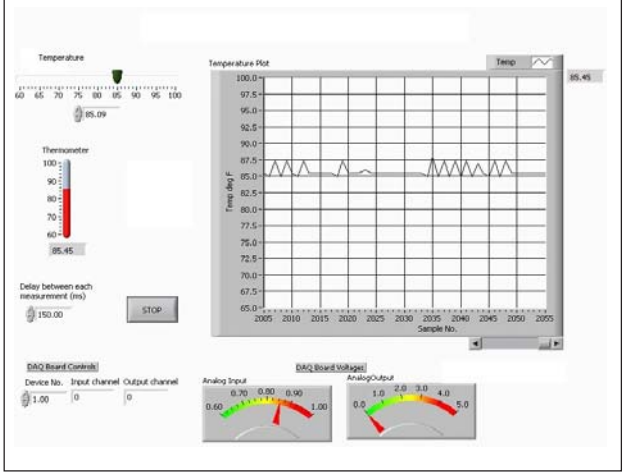
This intelligent monitoring system provides long term monitoring capability useful for the staff in the hospitals and reduces their workload. Future work may include more number of sensors in a single system to provide flexibility. Hence the main goal of this paper is to develop a patient health monitoring system to alert the staff in the hospitals so that immediate care is provided to patients.

The proposed technique has the following advantages

- Easy and Reliable for Doctors: In a hospital, either the nurse or the doctor has to move physically from one person to another for health check, which may not be possible to monitor their conditions continuously. Thus any critical situations cannot be found easily unless the nurse or doctor checks the persons health at that moment. This may be a strain for the doctors who have to take care of a lot number of people in the hospital.
- Increase efficiency: The number of nurses required for keeping a check on patients in ICU can be reduced to a large extent.
- More Accurate: Chances of human error in checking different health parameters is also reduced, also the database can be updated time to time.

PC LABVIEW SNAP

Figure 3: Snapshot of Our Proposed System



CONCLUSION

The patient body monitoring system implemented with RTOS gives promising results than the other conventional methods. It works effectively in term

of automated systems compared to the existing method. However, it has room for improvement in this project. In the future, the system will be intergrated with WWW (World Wide Web). So, that patient data can be accessed over internet from any part of the world. As a result, medical prescriptions and precautions can be made easier. In a nutshell, this project is highly potential for application purposes in ICU monitoring.

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