Design of Central Nursing Station and SMS Intimation to the Doctor Using Labview

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ABSTRACT *Patient Monitoring System is used to monitor the patient's vital parameters like HR, SpO_2, NIBP, IBP, $EtCO_2$, $FiCO_2$ etc. Vital signs are useful in detecting or monitoring medical problems and functions. These vitals need to be monitored continuously as these are the first and most prominent signs that occur during emergency as critical conditions or abnormalities. Whenever the body begins to deviate from its normal functioning and the vital go beyond their normal values it becomes necessary that the concerned doctor and nurse are indicated at the earliest and the necessary course of action is taken. The proposed idea stands as a solution for such a situation. Whenever a patient's vitals deviate from the normal values indicating emergency, it is intimated to the nurse station by an alarm indicator and also to the doctor via an SMS.*

***Key words*:** *SMS Intimation.*

I. INTRODUCTION

Vital signs are the measurement of the body's most basic parameter which are useful in detecting or monitoring medical problems and functions. Vital signs are measures of various physiological statistics, often taken by health professionals in order to assess the most basic body functions. Vital signs are an essential part of a case presentation. These important parameters are measured and monitored by a device called patient monitoring System (PMS). A patient monitor may not only alert caregivers to potentially life-treating events; many provide physiologic input data used to control directly connected life-support devices.

Categories of patients who need physiologic monitoring:

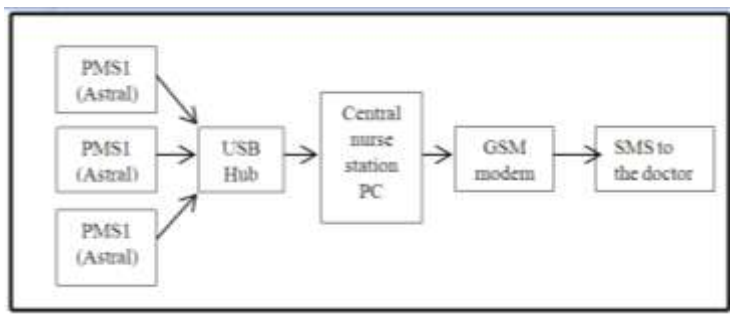
1. Patients with unstable physiologic regulatory system; Example: a patient whose respiratory system is suppressed by a drug overdose or anesthesia
2. Patients with a suspected life-threatening condition; Example: a patient who has finding indicating an acute myocardial infarction.
3. Patients at high risk of developing a life-threatening condition; Example: patients immediately post open-heart surgery, or a premature infant whose heart and lungs are not fully developed.
4. Patients in a critical physiological state; Example: patients with multiple trauma or septic shock.

II. OBJECTIVE

To design and implement a communication interface between multiple Patient Monitoring Systems and in PC in the Central Nurse Station where

the vital condition of the patient or patients at any point of time is displayed in the PC at the Central Nurse Station where the alarm is turned on in situation of emergence when the vital vary from the normal value range. The serial communication for the data transmission from multiple Patient Monitoring System (Astral) to the PC is done through a USB Hub using RS 232 DB9 Connector and USB cables. The module designed will also facilitate intimation to the doctor through an SMS indicating emergency which is accomplished with the aid of GSM modem. The SMS will display the current vital status and the patient ID. The entire module is designed using LabVIEW 13.

III BLOCK DIAGRAM



The Block diagram of Design of Central Nursing Station and SMS Intimation to the doctor using LabVIEW is as shown above. Here all the patient monitors are connected to the USB hub via serial communication cables with USB end at PMS and RS232 end at USB hub. The USB hub is interfaced to the PC in the Central Nursing Station (CNS) through USB cables. The PC can thus continuously display the patient's vital information and the waveforms. Whenever the vitals of the patient drops below a certain minimum the alarm in the PC in the CNS turns on and immediately an SMS is transmitted to in charge doctor via GSM. The message display the patient's name, age, sex, identity number and present vital status. The doctor can take an immediate action.

IV. SCOPE OF THE PROJECT

Health care is regarded as an important determinant in promoting the general physical health and well-being of people. This requires a system that enables a patient's health condition to be monitored continuously and intimate to the concerned personnel. Patient Monitoring System available today, provides continuous monitoring of the patient's vital parameters. Since it is not possible for the doctor or the nurse to be near the patient and monitor the health conditions all the time, there is a requirement for the design of a display system at the Central Nursing Station which continuously display the values of the parameters.

This project provides a wide scope in patient's health monitoring by enabling continuously display of patient's vital parameter along with the alarm indication at the CNS and SMS intimation to the doctor during emergency conditions. The feature designed helps in taking swift actions which is very essential in the medical field. The system is cost effective and can be

implemented to the existing Patient Monitoring Systems.

V. MODULE LEVEL DESCRIPTION

The entire project can be divided into two modules

1. Module 1: Data Acquisition

   This module depicts the way in which the raw data containing the information about the patient's vital are extracted from the Patient Monitoring System and the extracted values are displayed using the palettes provided by LabVIEW.

2. Module 2: Alarm indication and SMS alert

   After the information about the patient's vital have been extracted and displayed, the next step is to check whether an emergency has occurred or not. This module provides information about the way in which an emergency is detected and on occurrence of an emergences situation how the alarms are turned on at the CNS and SMS are sent to the concerned person's phone number by addressing the GSM modem using LabVIEW palettes.

VI. RESULT

We have been successful in implementing a protocol using LabVIEW which will interface multiple Patient Monitoring Systems to the PC in the central Nurse Station where the vital condition of the patient or patients like Electro Cardiograph (ECG), Non Invasive Blood Pressure (NIBP), Saturated pulmonary Oxygen (SpO_2) are displayed and when the vital go above or below the normal value the alarm is turned on indicating emergency.

This protocol will also facilitate intimation to the doctor through an SMS indicating emergency which is accomplished with the aid of GSM module. The SMS will display the current vital status and the patient ID

VII.CONCLUSION

Patient Monitoring System performs repeated or continuous observation or measurements of the patients, his or her physiological function and alerts the caregivers to potentially life-threating events. PMS monitors various parameters such as, Respiratory Rate, Heart Rate, Invasive Blood Pressure (IBP), and Non Invasive Blood Pressure (NIBP). The major reason for the development of the said protocol is to improve the current medical services in terms of safety and convenience for the patients as it is not a practical solution for the nurse to be stationed next to the patient observing the parameters in the PMS at all times. This protocol stands as a solution by displaying data from not just one but also multiple patient monitors enable multiple patients to be monitored at a time at the nurse station

The problem of the emergency situation going unnoticed or observed late is also overcome as the protocol features indication of emergency in the central station itself. This feature of ensuring safety of the patient is enhanced by the development of the SMS option where an SMS to the concerned doctor is sent along with Patient Name.ID, Sex, Age, and most important of vital values at emergency by triggering the GSM modem.

The protocol has been implemented using LabVIEW. LabVIEW being a data flow programming language contains

comprehensive set of tools for acquiring, analyzing, displaying, and storing data, as well as tools to help you troubleshoot your code. The graphical approach has allowed us to build programs simply by dragging and dropping vital representation of lab equipment with which we are already familiar Rather than writing text based code. It is has mode possible to create an application, which communicate by Global Service for mobile, and are therefore easier to implement due to the inherently parallel mature offered by LabVIEW. An application of this method in biomedical includes better accuracy, design security, productivity, speed and flexibility and most important safety of the patient.

VIII.FUTURE SCOPE

The project can further enhanced by adding the following features

- It can be made possible to send the patient's vital conditions as a mail to the doctor's mailbox once timed to send it ever hour where it goes and store in a folder from where it can be accessed.
- The acquisition of the data can be made wireless where the vitals numeric value is sent over Ethernet via TCP/IP protocol and displayed in the CNS.
- The doctor can send a request SMS with patient name and ID and this will extract and send the data to that particular patient at the instance of time.

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The future belongs to those who believe in the beauty of their dreams.

~ Eleanor Roosevelt