Human Health Monitoring System Using Raspberry Pi3 And Labview

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Abstract-In this paper Continuous monitoring of critical patients and their biological parameters are transmitted to doctor's console, and doctor's domain address in person using Internet of Things technology (IoT). The design involves measurement of all critical parameters of patients using sensors. Vital parameters measured are temperature, respiration, and pulse rate, humidity and oxygen saturation level using dht11 sensor, MQ sensor, pulse sensor and pulse oximeter sensor. The input sensors are interfaced with an Arduino board and then the signals are transferred to the Raspberry Pi controller and the vital parameters are transmitted to the centralized monitor, where the front end is designed using Lab VIEW software. Using IoT, physicians are notified about the sudden change in patient's condition and the critical readings of the patient are sent to the doctor's domain address through IoT. Thus, critical patients can be monitored by the doctors from wherever they are, enabling more care and attention towards the patient's health by the doctor

Key words: PMS (Patient Monitoring System), ICU (Intensive Care unit), ECG (electrocardiograph)

I. INTRODUCTION

To overcome the existing problem which requires doctor's attention over the patient continuously,this can be overcome by interfacing all the biological parameters of the patient through LabVIEW.It uses the remote monitoring using modernized communication. The measured signals are interfaced with Arduino boards, which are being placed near each and every patient. These signals from the Arduino boards are all transferred to a single Raspberry Pi controller, which acts as a server. From the controller, the data are transmitted to the LabVIEW software for the simulation process as a front-end output. Abasi et al., [2017] have implemented the web publishing tool in lab VIEW. The data are also sent to the doctors with the help of IoT to their personal domains. The biological-parameters such as respiration, pulse, temperature, humidity and pulse oximetry are being monitored. Hence by the help of our project critical patients can be monitored continuously and can be given adequate treatment.The current existing system monitors only the ECG signals and remaining parameters are not available. The major problem faced by the patients in the Intensive Care Unit is that they can't be monitored continuously using IoT.Hence this project aims at the continuous monitoring of very critical patients and their biological parameters are transmitted to the doctor's console. Any major changes in the patients' health can be intimated to the doctor's concerned by the application.

II. PATIENT MONITORING SYSTEM IMPLEMENTATION

A. The patient monitoring system (PMS) is most fairly used in Intensive Care Units and Critical Care Units for the monitoring of patient's vital parameters. Yoon et al., [2013] reviewed the recent trends and challenges in patient monitoring system. It is a single integrated system that measures various parameters such as blood pressure, temperature, heart rate, respiratory rate, and ECG. In exceptional cases, more advanced and sophisticated body measurements such as brain activity muscle activity, etc. are also monitored.

B. The basic function of the PMS is to monitor and activate various alarms whenever a parameter goes critical. PMS is available as both stand alone and centralized configurations.PMS is mainly classified into Analog and Digital types and as Monitors/Defibrillators. In analog type oscilloscopes, only dedicated channel is used for electrocardiographic monitoring (ECG).So, medical monitors tended to be highly focused. One monitor would track a patient's blood pressure, while another would measure pulse oximetry,and ECG. Baig et al., [2013] have a depth analysis to achieve the smart health monitoring system.

C. Nowadays the trend is developed towards multiparameter displays that can track and display many different parameters at once. The measured parameters consist of pulse oximetry (amount of saturated oxygen percentage in blood referred to as SpO2 measured by an infrared cuff), ECG (electrocardiograph of the PQRS waves of the heart with external pacemaker or without an external heart pacemaker), blood pressure (either noninvasively with an inflatable blood pressure cluff or invasively with an inserted blood pressure transducer), and temperature measurement through a thermoelectric transducer.

D. In critical situation, other important parameters can be measured and monitored such as output of cardiac (through an Swan-Ganz catheter), respiration (through airway respiratory rate or through a thoracic transducer belt, an ECG channel), capnography (CO_2 parameter referred to an End-Tidal Carbon Dioxide concentration),etc.

III. PROPOSED SYSTEM DESIGN

The main aim of the planned system is to design a patient monitoring system, which overcomes the existing problem which Requires doctor's attention over the patient continuously by interfacing all the biological parameters through Lab VIEW. The doctors now can continuously monitor the patient's vital parameters using IoT, the various objectives of the system are to simulate bio-signals like Respirator signals, Pulse signal, Temperature signal and Oxygen Saturation, the measured signals are interfaced with Lab view and are transmitted to the centralized monitor through IoT, thus transmission of vital signal to Doctor console using IoT and creating an alert in case of emergency.

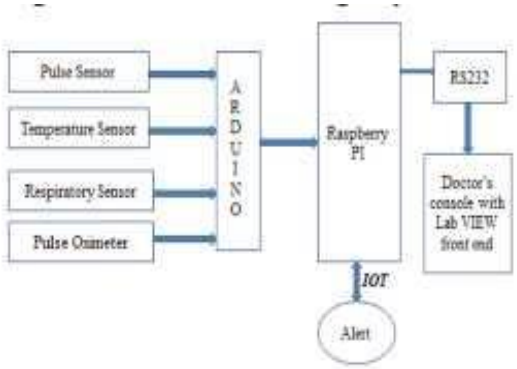

Fig 1: Block diagram of Planned System

The Bio-signals from the sensors such as Pulse, Temperature, Respiratory and Pulse Oximeter are interfaced with Arduino. The Arduino board is connected with Raspberry Pi controller. It acts as a server for IOT in transmission of Bio-signals.
The Bio-signals of the patients are transmitted to the doctor in case of alert using IOT technology.The Lab VIEW is interfaced with Raspberry Pi Controller using RS-23 communication. The Lab VIEW software is used as the front-end panel, the doctor console for the display of detected Biosignals. The Hardware design includes various hardware such as the Temperature sensor (DHT11), Respiratory sensor (MQ sensor), Pulse sensor, Pulse Oximeter, Arduino, Raspberry Pi 3, RS232, Ethernet shield.

Initially all the four sensors are connected to a bread board, from which they are connected to the ground and the supply. From the
bread board, all the sensors are connected to the Arduino board, which acts as a node between the sensors and the controller Raspberry Pi, the controller acts as a mini computer. It also acts as the server from which the Ethernet shield is connected and the output from the sensor is processed and the output is given. From the Arduino board, the RS232 communication port is connected which acts as the bridge for the communication of sensors to the graphical display of the Lab VIEW results. From the Raspberry Pi controller, the keyboard, mouse and the monitor are connected.This controller has the python operating system which has the internet website domain where the data of the patient are transferred.

ZigBee: It is an open global standard wireless technology developed to address the unique needs nd saved.
of low-power, low-cost wireless Mobile to Mobile networks. The Authors [Myung et al., 2011] uses the Bluetooth based blood pressure monitors. Physical radio specification Standards operates on IEEE 802.15.4 and operates in unlicensed bands including 900MHz, 2.4GHz, 868MHz and 900 MHz.

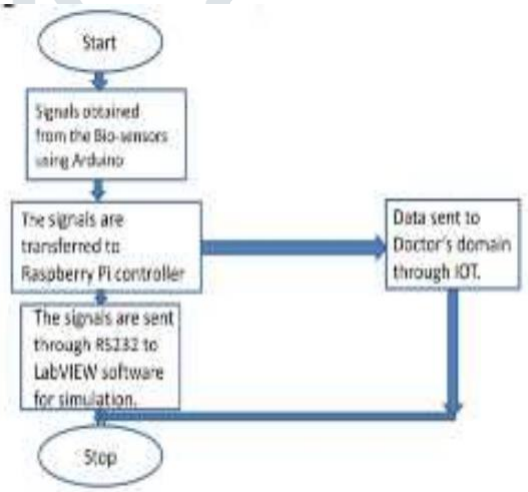

Fig 2: Flow chart of Proposed System

IV. RESULT AND CONCLUSION

The graphical representation of the bio-signals from the sensors is displayed in the Lab VIEW front end panel which is placed in the doctor's console. The result from this project was obtained temperature of the patient, heart rate, CO2, Oxygen saturation Whenever there is an increase of patient body temperature and heartbeat rate the authorized care givers get message so that they can take some immediate measures. The results obtained can be visualized on GUI created on LabVIEW and far distance physicians can see also with help of internet but they should have link to access it. The LabVIEW GUI was designed on LabVIEW 2014.

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