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Pulse Rate Monitoring Device Based On Arduino and Android Platform

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Abstract: Healthcare is the most important concern of many countries in the world. E-Health systems depending on a modern technology play a vital role in eradicating the problems and faster curing of the patient's. A flexible and user friendly device is introduced in the system which can be used in rural area to undergo regular check-up or check the patient's heart rate. This system provides a useful approach to check the patient's heart beats would be continuously monitored and once the heart beats shoot in unfavourable conditions than a buzzer would be initialised to its active state so that the particular action can be taken. If the patient is unable to turn off the buzzer, then registered phone numbers would get text messages about patient's condition. This would decrease the risk of patient undergoing the same consequences again. Advancement in system by providing functionality to contact immediately to the doctor and two of their relatives if the person does not stop the alarm.

Keywords: Wireless sensor network, Mobile Computing, IOT, Hibernate, MySQL.

I. INTRODUCTION

As healthcare is a civil right, nowadays, industries focus more on healthcare applications. The quality provided by these healthcare applications helps to increase their use which can lead to increase in Indian economy. Healthcare systems consists of various models as well as software applications to take care of patients. Existing applications consist of functionalities which includes measuring of heart beats, blood pressure, temperature and so on. These measurements helps to know about various cardiac diseases as well as to monitor patients at every instance. Existing systems contains various android applications which helps to monitor patient's health. Proposed system consists of functionalities not only to measure pulse rate by using pulse rate sensor but also to provide emergency system. Emergency system contains an alarm. If patient failed to close particular alarm then an emergency message is send to registered relatives. This reduces risk of heart attacks and stress bursting. This system also helps to provide preventive measures on time.

II. LITERATURE SURVEY

A. J. Taelman^{1,2}, S. Vandepu², A. Spaepen¹ and S. Van Huffel² - Influence of Mental Stress on Heart Rate and Heart Rate Variability

This paper states that Stress is a huge problem in today's society. Being able to measure stress, therefore, may help to address this problem. Although stress has a psychological origin, it affects several physiological processes in the human body: increased muscle tension in the neck, change in concentration of several hormones and a change in heart rate (HR) and heart rate variability (HRV). The brain innervates the heart by means of stimuli via the Autonomic Nervous System (ANS), which is divided into sympathetic and parasympathetic branches. The sympathetic activity leads to an increase in HR (e.g. during sports exercise), while parasympathetic activity induces a lower HR (e.g. during sleep). The two circuits are constantly interacting and this interaction is reflected in HRV. HRV, therefore, provides a measure to express the activity of the ANS, and may consequently provide a measure for stress. We therefore explored measures of HR and HRV with an imposed stressful situation. We recorded changes in HR and HRV in a group of 28 subjects at rest, and with a mental stressor. The results suggest that HR and HRV change with a mental task. HR and HRV recordings may have the potential, therefore, to measure stress levels and guide preventive measures to reduce stress related illnesses.[1]

B. Yanpin Ren, Nan Lyu - A Pulse Measurement and Data Management System Based on Arduino Platform and Android Device

This paper tells that a prototype of pulse measurement and data management system is built on Arduino platform and Android device. It is provided with functions of pulse measurement, data storage and share in local device and online cloud server. Among the system, first a smart pulse sensing module with a Bluetooth interface is designed to measure pulse rate and peak value. Pulsedata with time stamp is then sent to Android device through Bluetooth. A data management application is developed for Android device, which can receive pulse data from sensing module and further upload to online cloud server.[2]

C. Dipali H. Patil, Garima Kumari, Pooja Daware, Vijayalaxmi Shinde, Akanksha Pran Raina - Stress Detection by Measuring Heart Rate Variability

This paper gives us brief introduction about in today's world one of the major leading factor to health problem is STRESS. The detection and the solution is mainly dependent on the experience of the clinician is in detecting the factors of stress. The disadvantage of this method is that the clinician's detection may be wrong at some stage, due to the unawareness of new problems. The basic parameter on which stress can be identified are Galvanic Skin Response(GSR), Heart Rate(HR), Body Temperature, Blood Pressure(BP) which provides detailed information of the state of mind of a person. These parameters vary from person to person on the basis of certain things such as their body condition, age, gender and experience. In our project, we have focused on one such parameter i.e. heart rate variability(HRV) as major technique for detecting stress. HRV serves as a substitute for "vertical integration". This "Vertical integration" of the brain mechanism guides flexible control over behaviour with peripheral physiology and thus it provides beneficial information to understand the problems related to stress and health. In order to avoid clinician's mistake in detecting stress level, we have introduced a new hardware device which easily calculates the accurate pulse rate of a person and gives appropriate solution to the stress level.[3]

III. PROPOSED SYSTEM

This system replaces the traditional Bluetooth module with Wifi module. This application needs to be installed and all users will register for the same with individual username and password. The individual will be continuously monitored by taking the input through pulse rate sensor and displayed on the android application. The readings will also be accessible to the doctor on web portal so as to monitor the individuals health.

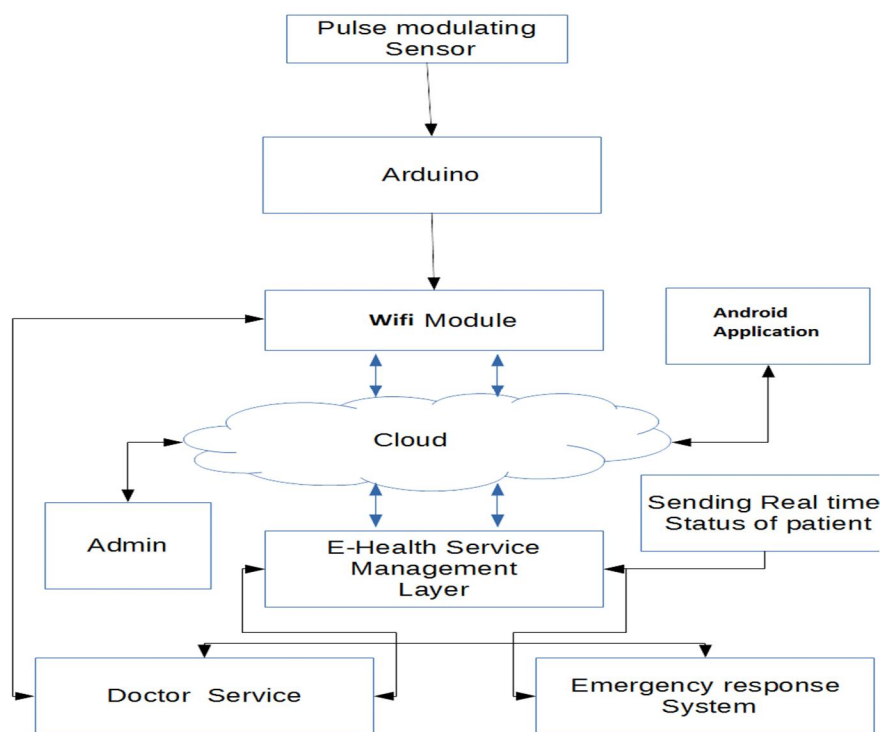


Fig 1. Proposed System Architecture

The product has four modules, the pulse rate sensor is used to get the input from the person in the form of pulse rate. The android module is used for storing the input from the sensor and the wifi module on it is used for wireless connection with the android application. A web portal is developed for admin to access and modify the data stored.

Steps involed in each module:

A. Pulse rate sensor module:

- 1) Continuous monitoring of pulse rate
- 2) Sending the pulse rate to android application through wifi module.

B. Android Module

- 1) An individual has to register through application.
- 2) The pulse rate received from the sensor will be send through application in database.
- 3) An individual can check details of pulse rate through application.
- 4) If the individual is at risk a message will be send to registered contacts.

C. Wifi Module

- 1) Wireless communication is provided between the sensor and android application.

D. Web Portal Module

- 1) The doctor has to register through web portal.
- 2) The admin can access and modify the data stored.

E. Implementation

The proposed system consists of different modules the pulse rate sensor is used to get the input from the person in the form of pulse rate. The android module is used for storing the input from the sensor and the Wi-Fi module on it is used for wireless connection with the android application. A web portal is developed for admin to access and modify the data stored. After a person registers and logs in to the android application, his pulse rate is displayed in analog/digital form. On comparing it with healthy stress level, if the stress level comes to be average preventive measures are displayed on the screen, if it comes to be below average or if at a risk of heart attack an alarm invokes for few seconds if the person does not stop the alarm an immediate notification is given to the doctor and two of his family members through a message.

F. Comparison

Table 1: Comparison between Traditional System and Proposed System[4][5]

Properties	Traditional System	Proposed System
Efficiency	Less	More
Security	Less	More
Mode Of Operation	Bluetooth	WiFi Module
Emergency Alert System	Not Present	Present
Access to Doctor	No	Yes

IV. CONCLUSION

This paper introduces the efficient method for monitoring the heart rate of a particular patient which is simpler than the existing method. This proposed method is secure enough reliable and easily accessible. It also provides emergency alarm system and SMS facility. We are currently developing the system for Arduino and Android Application but the proposed system can be extended further providing more secured, advanced and reliable features.

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