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Android Application for measuring ECG,Temperature, Heart rate and Sending Alerts to Family Doctor

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***Abstract* — This paperwork describes the development and test of circuitry and software to enable the use of Android mobile phones equipped with Bluetooth to receive the incoming temperature, heartbeat, electrocardiogram (ECG) signal from a user and show it in real time on the cell phone screen. The system comprises four distinct subsystems. The first one is dedicated to condition the analog ECG signal, heartbeat and temperature values, preparing it for conversion to the digital form. The second one consists of a microprocessor and a Bluetooth module. This unit samples the signals and values, serializes the samples and values and transmits them via the Bluetooth module to the Android cell phone. The third subsystem is the cell phone itself. An application program installed on cell phone receives the output from microprocessor and suitably charts the values on the screen for analysis. The fourth subsystem is for transferring data from cell phone to desktop. An application program written in vb.net receives data from cell phone device and sends it to doctor's desktop.**

***Keywords*— *ECG, heartbeat circuit, temperature sensor; An-droid; Bluetooth; cardiac patients; wireless medical applications; home healthcare; embedded systems*.**

I. INTRODUCTION

In a clinical environment, heart rate is measured under controlled conditions similar in cases of blood measurement, heart beat measurement, and Electrocardiogram (ECG)[3]. However, there is a great need that patients should be able to measure the heart rate in the home environment as well. ECG monitoring is effective in both, forecasting heart disease and keeping cardiac patients under tight surveillance of their heart conditions [1]. Widespread use of ECG monitoring is however a pretty distant goal, mainly in nations of the developing world and poor nations. The main reasons for that are the high cost of ECG machines, bulky ECG equipment, the need for a specialist to operate the ECG device, and the competing demands from other areas (e.g. educational and infrastructure development) for limited national budgets. Indeed, significant part of population within the nations of industrialized world cannot afford private healthcare. Therefore, reducing costs of medical devices can lead to improvement of the aforementioned scenario.

Heart rate is the number of heartbeats per unit of time, typically expressed as beats per minute. Heart rate can vary as the body's need to inhale oxygen and exhale carbon dioxide changes during exercise or sleep. The measurement of heart rate is used by medical professionals to assist in the diagnosis and tracking of medical conditions. It is also used by individuals, such as athletes, who are interested in monitoring their heart rate to acquire maximum efficiency. Changes in lifestyle and unhealthy eating habits have resulted in a dramatic increase in incidents of heart and vascular diseases [3].

Therefore there is a need to develop a compact device that can measure ECG, heartbeat and temperature providing primary treatment to the person so that undue mishaps can be avoided within the golden hours after a patient is struck with a heart problem.

II. EXISTING SYSTEM

Existing system consists of ECG monitoring system which comprises three distinct subsystems, as depicted in Fig. 1. The first one is dedicated to process the analog ECG signal, preparing it for conversion to the digital form which is necessary as mobile phones do not include the means to directly interface to analog signals from the external world.

The second subsystem consists of a microcontroller and a Bluetooth module which samples the ECG, serializes the samples and transmits them via the Bluetooth module to the Android cell phone. The third subsystem is the cell phone itself which receives the ECG samples and suitably plots the ECG signal on the screen for analysis.[1]

III. PROPOSED SYSTEM

The circuit of the System is shown in figure 3. The hardware of the system has been interfaced with the ARM-7 Microcontroller through Amplifier part. The circuit senses the parameters related to the human body such as Body Temperature, Heartbeat and ECG. The system is designed with the help of different sensors available in the market and suitable signal conditioning circuits are designed with the help of well known circuits. The parameters of temperature sensor and heartbeat is displayed on the LCD display. Considering the parameters of all the techniques we discussed till now we come to conclusion that this techniques are the best for authentication purpose but there is common drawback for all the above stated system that right person may get authentication But it may not be at right situation. That is the unauthorized person may force or harm the authorized person to get access to the system.

IV. SYSTEM DESIGN

Fig 3.Presents the Block diagram of proposed system which consist of following modules.

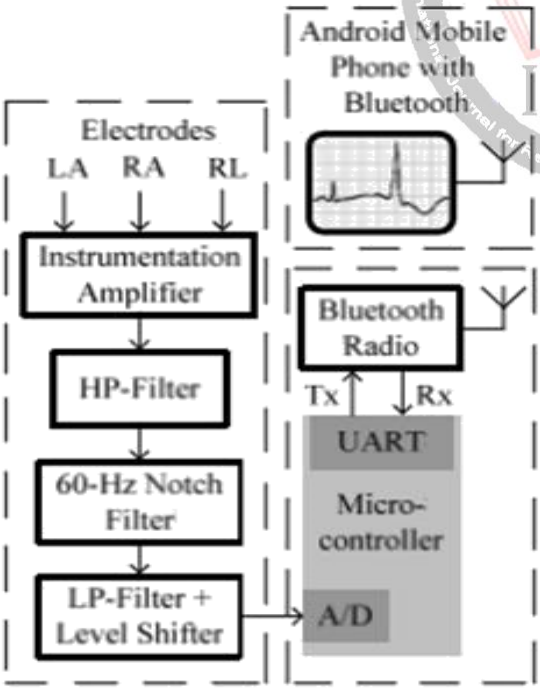

Fig. 1. Android mobile phone-based ECG monitoring system

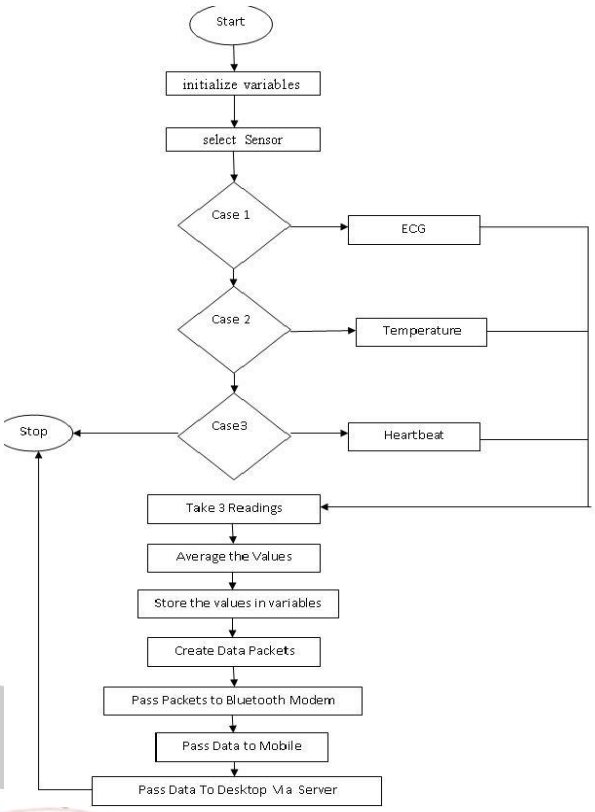

Fig. 2. Flowchart of the Proposed System

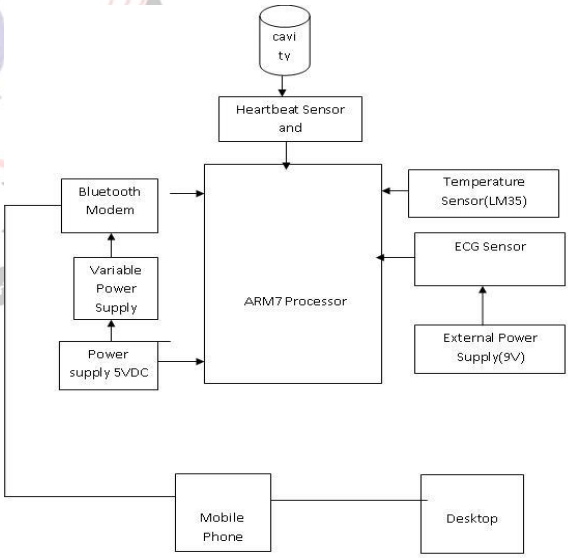

Fig. 3. Block diagram

1) Power supply: The performance of the master box depends on the proper functioning of the power supply unit. 9V battery is used as the power supply of which 3.3V is applied to Bluetooth module, microprocessor, using LM1117 and 5V to temperature sensor and heartbeat sensor.

2) Temperature Sensor: Temperature sensor senses the temperature from body and sends the data to microprocessor. The processor converts the data in digital form and displays it on LCD screen. Temperature sensor LM35 is chosen as it has higher accuracy and wider range from its counterparts.

3) Heartbeat Sensor: Heartbeat sensor measures the heart rate by sensing the change in blood flow in the finger while the heart is pumping the blood. The sensor consists of light detector and 660nm red led. The heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reaches the detector. With each heart beat the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated on top by a LED which blinks on each heart beat. The buzzer beeps each time the circuit receives a pulse signal.[3]

4) ECG: The ECG module contains 3 probes which are connected to patient's body. These probes will act as sensors and will fetch the pulse beat data from the patient's body. The data sensed by the probes will be directly sent to the processor for amplification and further processing. Before sending the data to the processor the data first will be passed through various noise filters to remove unwanted noise. Two 9 volts batteries will be connected to the circuit which will provide symmetrical voltages to the circuit[1].

5) Bluetooth Modem: Bluetooth wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while main-taining high levels of security. The key features of Bluetooth technology are robustness, low power, and low cost. The Bluetooth specification defines a uniform structure for a wide range of devices to connect and communicate with each other. Here Bluetooth modem RN-42 (2.4 GHz class 2)is used. It is connected to user's android device for transmitting the data from microprocessor to the android device within the range of 10 meters

6) LCD : The LCD is used to display the digital parameters on the hardware circuit device.

7) Android Phone : An android application will be in-stalled on user's device which will be used to display the output(Health parameters) received from hardware circuit. An-droid phone works as a medium for sending received data from circuit to doctor's desktop.

V. CONCLUSION

Thus the proposed system is a device using which patient and doctor can communicate with each other. It is an application where the patients can carry with themselves the hardware component and a report of their current health status will be sent to the concerned doctors in case of any suspension of any type of cardiac ailment and the doctors in turn can provide an immediate remedy which could act as a first aid to the patient or could solve some minor issues.

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