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BLOOD PRESSURE MEASUREMENT SYSTEM USING BLUETOOTH

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ABSTRACT

High blood pressure is a leading chronic disease and has become the main factor for many high-risk diseases such as diabetes, heart attack and cancer. At present there are more than hundred million hyper tension but only 44% of them have been diagnosed, we are going to design a blood pressure measurement system that is completely wireless and uses blood pressure sensors to collect the data of the patient and transfers the information via Bluetooth to a monitor where in the blood pressure of the patient along with the patient details are displayed by this process, blood pressure of the patient can be monitored continuously. The overall procedure can be done within a minute or not more than two minutes. Smart- phones are ubiquitous, so a blood pressure device comprising only the smart-phone can make diagnosis commonly available without the need to procure access to a special blood pressure device. This project reviews recent advances in blood-pressure measurements, specifically with focus on those implemented for smart-phones using Bluetooth.

Keywords: Blood pressure sensors, Oscillometric, Smart-phones and Bluetooth.

1. INTRODUCTION

Blood pressure measurement devices have become increasingly popular during the last decade as prices of these measurement devices have sunk to an appropriate level for ordinary consumers. The incorporation of automatic measurement features and ease of use have also contributed to the growing popularity of blood pressure measurement devices as a lifestyle device. However, such measurements devices are typically cuff based and based on indirect Blood Pressure (BP) measuring method using the detection of sounds. This method had been used for more than 100 years and has two major deficiencies. Firstly, the cuff grossly affects the measured parameter. Secondly, the method determines the blood pressure only at a single point of time. Oscillometric methods, applied in automatic home BP meters, apart from the aforementioned inadequacies, have also a built-in uncertainty, where it empirically calculates the systolic and diastolic values from the measured mean pressure in Tonometry the non-linear effect of the vascular wall decreases in bigger arteries. It is well known that good access to a "big" artery is at the wrist by palpating. Different mechanisms have been developed for the automatic noninvasive palpation on the arterial radials. In order to obtain a stable blood pressure signal, the ton metric sensor must be protected against movement and other mechanical artifacts. The Vascular un loading technique method is to unload the arterial wall in order to linearize this phenomenon with a counter pressure as high as the pressure inside the artery. Blood volume is kept constant by applying this corresponding pressure from the outside. The continuously changing outside pressure that is needed to keep the arterial blood volume constant directly corresponds to the arterial pressure.

This is the basic principle of the so- called "Vascular Unloading Technique". For the realization, a cuff is placed over the finger. Inside the cuff, the blood volume in the finger arteries is measured using a light source and a light detector. The resulting light signal is kept constant by controlling the alterable cut off pressure. During systole, when blood volume increases in the finger, the control system

increases cuff pressure, too, until the excess blood volume is squeezed out. On the other hand, during diastole, the blood volume in the finger is decreased as a result, cuff pressure is lowered and again the overall blood volume remains constant. As blood volume and, thus, the light signal Is held constant over time, intra-arterial pressure is equal to the cut off pressure. This pressure can easily be measured with a manometer. Hydro static pressure refers to any pressure that a liquid exerts on its container. Blood hydrostatic pressure is the pressure that the volume of blood within our circulatory system exerts on the walls of the blood vessels that contain it. However, hydrostatic pressure is not the only pressure that is exerted on a blood vessel, osmotic pressure is also present and the cumulative pressure from inside is countered by the same two types of pressure exerted on the outside of the blood vessels by the tissues that surround them. The hydrostatic pressure exerted by our blood on our blood vessels is what we commonly refer to as our blood pressure and it can cause serious problems when upset. Blood pressure is not the same throughout, for example, the veins and capillaries in our feet have way more pressure inside them than the ones in our head, and gravity is responsible for this particular variation. When we get hypertensive, our blood vessels experience increased hydrostatic pressure on them due to increase of blood flow; it is at this point that arteriosclerosis occurs and as a result, the blood vessels become very hard in order to with stand the high blood pressure in this paper, a blood pressure monitoring device has been presented for real-time non-invasive blood pressure monitoring based on Android smart- phone.

The monitoring device is consisted of three parts: two pieces of independent node modules for acquiring ECG and PPG signals and an Android smart-phone with our application. The acquired ECG and fingertip PPG data, which are measured simultaneously, are sent to user's Android smart-phone by Bluetooth transmission module in real time and display on screen for monitoring. PTT can be computed from the interval between ECG and PPG. Finally, blood pressure can be estimate from the corresponding PTT.

2. LITERATURE SURVEY

BA Zend [1]. et al., Design and development of a Non-invasive wireless blood pressure data acquisition Instrument for remote monitoring based Micro-controller and Bluetooth transmission kit. The real-time blood pressure biomedical signal is measured using an optical measurement circuit based Plethysmography technique (PPG) continuously for a long period of time. The detected measured signal amplified using an operational amplifier circuit and interfaced with the Micro-controller.

K Shimada [2]. et al., White-coat hypertension (HT) and masked HT can be identified by home blood pressure(BP) measurement. The prevalence of these subtypes and the associated risk of cardio vascular disease have not been fully investigated among Japanese hypertensive patients. The risk of cardiovascular events due to HT and its relationship with home BP measurement were examined among Japanese hypertensive patients receiving treatment in the Japan Hypertension Evaluation with Angiotensin II Antagonist Losartan Therapy.

MC Pan [3]. et al., The study aims at realizing a remote online machine condition monitoring system built up in the architecture of both the Borland C++ Builder (BCB) software-developing environment and Internet transmission communication. Various signal-processing computation schemes such as time–frequency analysis and order tracking for signal analysis and pattern recognition purposes are implemented based upon the Borland C++ Builder graphical user interface.

3. EXISTING SYSTEM3.1 RF NETWORK

RF Transmitters are used to send a radio frequency signal and modulate that signal to carry data from a system. The frequency range is from 315Hz to 64GHz with a data rate of 3kbps to 2Mbps and a power output from -30dBm to 24.7dBm.

3.2 MICROCONTROLLER (8051)

Intel introduced 8051, referred as MCS- 51, in 1981.The 8051 is an 8-bit processor. The CPU can work on only 8 bits of data at a time. The 8051 became widely popular after allowing other manufactures to make and market any flavor of the 8051.Figure 2.2 represent microcontroller (8051).

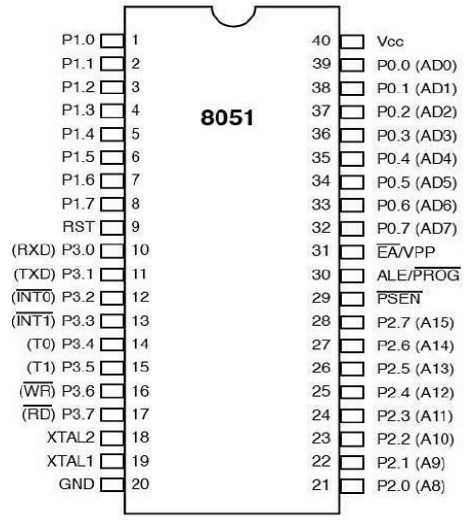


FIGURE :1 MICROCONTROLLER 8051

4. PROPOSED SYSTEM

The working of proposed system is based on Bluetooth. In this effective way we are measuring and monitoring the blood pressure of our human body. The use of this device is very simple. We have to turn the power on and we will see all zeros on display for few seconds. We have to wait till the display goes off. Now place hand on the sensor assembly, and press the start button. We will see the **LED** blinking with blood pressure and after 15 secs, the result will be displayed. Block diagram 3.1 shows the implementation of a heart monitor involves low cost amplifier and filter components coupled with a microcontroller **LCD** display and to monitoring smart phone using **BLUETOOTH.**

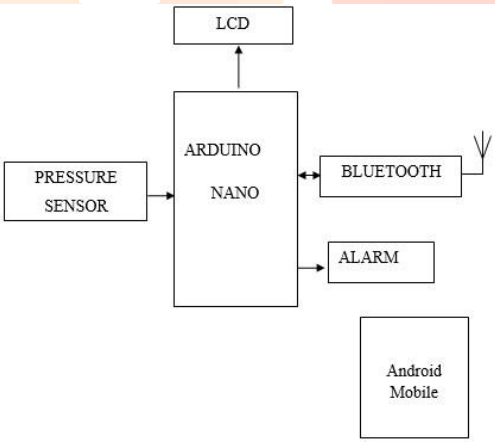
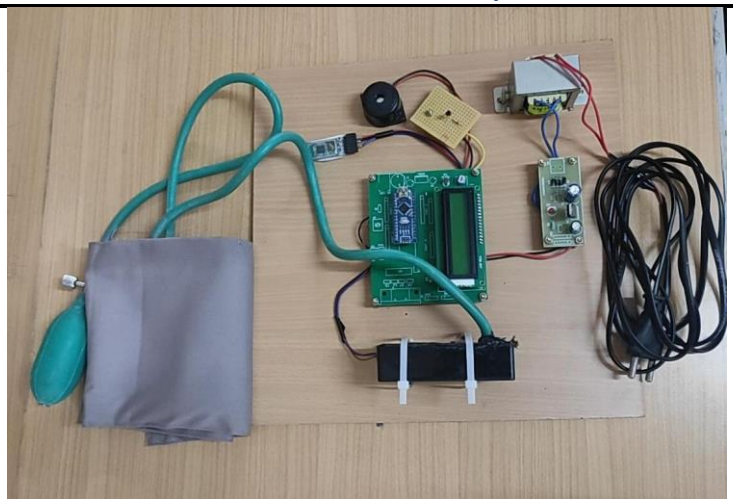
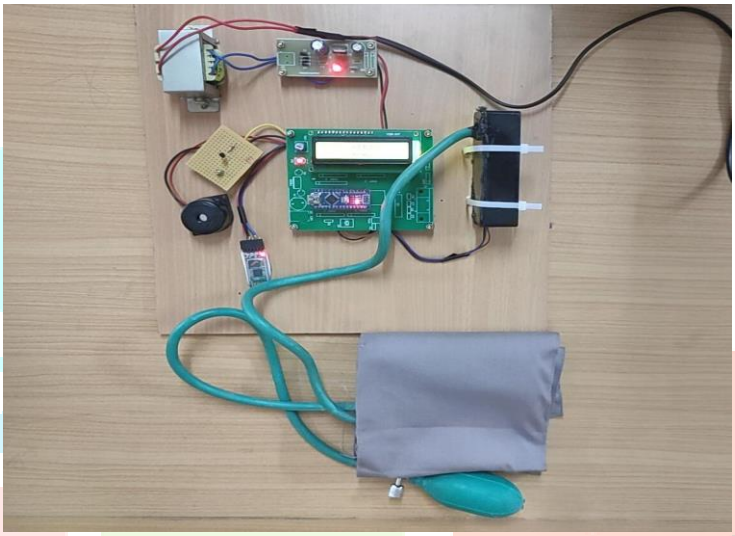


FIGURE: 2 BLOCK DIAGRAM

5. CONCLUSION

The use of this device is very simple. We have to turn the power on and we will see all zeros on display for few seconds. We have to wait till the display goes off. Now place fore fingertip on the sensor assembly, and press the start button. We will see the LED blinking with heart beats and after 15 secs, the result will be displayed. This implementation of a heart monitor involves low-cost amplifier and filter components coupled with a microcontroller and seven segment display. In this project, the design and development of a low-cost Bluetooth based device for measuring the blood pressure has been described. The device has the advantage that it can be used by non-professional people at home to measure the pressure easily and safely. The device is economic, portable, durable, and cost effective. This device could be used in clinical and nonclinical environments. This work proposes and focuses on the blood pressure monitoring and that is able to monitor the blood pressure condition of patient. Thus, doctors can monitor and diagnose the patient's condition continuously and could suggest earlier precaution for the patients themselves. It provides great flexibility and serves as a great improvement over other conventional monitoring.





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