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Ecg Monitoring Using Android Smart App

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ABSTRACT
This paper describes a mixed-signal ECG system that is capable of implementing configurable functionality with low-power consumption for portable ECG monitoring applications. A low-voltage and high performance analog front-end extracts 3-channel ECG signals and single channelelectrode-tissue-impedance (ETI) measurement with high signalquality. Design effective and low cost solution for ECG machine. . Wave forms of ECG can be observed on Android smartphones. Its availability and cost is significant and affordable. That makes this system upgradable and effective for every class of people.. Our system is portable so anyone can handle this in a simple way with android based smartphone. It doesn't cost much. It reduces work, efforts and expenses for patients and their relatives.
Index terms : ARM7,Android Smartphone, ECG Sensors, Bluetooth.

I. INTRODUCTION

Patient Monitoring is very critical and important task nowadays. So many patient monitoring systems are available. ECG monitoring is trending idea. Unfortunately no more development is done on the same. Even all hospitals don't have ECG machines. ECG machines are so much costly systems. Also these machines are very bulky. We cannot carry those from one place to another. Here we are giving a solution for so. We will have ECG sensor electrodes connected to patient's body. These electrodes will interface to ARM based Microcontroller. An embedded Bluetooth module will interface to Microcontroller. This will pair to Android smartphone. Android smartphone will have customize android app which will continuously plot real time waveforms of patient's ECG. We are doing this project todesign effective and low cost solution for ECG machine. System will be tested on ARM7 based LPC2138 microcontroller. Wave forms of ECG can be observed on Android smartphones. Its availability and cost is significant and affordable. That makes this system upgradable and effective for every class of people. Now ECG systems are available in specific hospitals only. It is costly also. Everyone cannot afford these hospitals. Those who can afford can't move to the hospital every time. One option for them is they can have that machine to their place. But these machines are so bulky, so not portable. Here system we are designing is low cost as well as portable ECG for patient monitoring using Android Smartphone.

II. PROBLEM STATEMENT

Heart problems are so much common in every class of people. Every heart patient has to go to doctor for ECG analysis. We are designing this system for effective and low cost solution for ECG machine. System will be tested on ARM7 based LPC2138 microcontroller. Wave forms of ECG can be observed on Android smartphones. Its availability and cost is significant and affordable. That makes this system upgradable and effective for every class of people.

III. BACKGROUND

A. ECG

Patient Monitoring is very critical and important task nowadays. So many patient monitoring systems are available. ECG monitoring is trending idea. ECG checks for problems with the electrical activity of your heart. An ECG machine translates the hearts electrical activity into the line tracing on paper. Unfortunately no more development is done on the same. Even all hospitals don't have ECG machines. ECG machines are so much costly systems. Also these machines are very bulky.

B. Android Smartphone

Commonly we are using computer screen for displaying ECG waveforms here we are using android smartphone for display purpose.Android smartphone will have customize android app which will continuously plot real time waveforms of patient's ECG. We will have ECG sensor electrodes connected to patient's body. These electrodes will interface to ARM based Microcontroller. An embedded Bluetooth module will interface to Microcontroller.By using Android

Smartphone with Android App we will plot real time ECG waveforms.
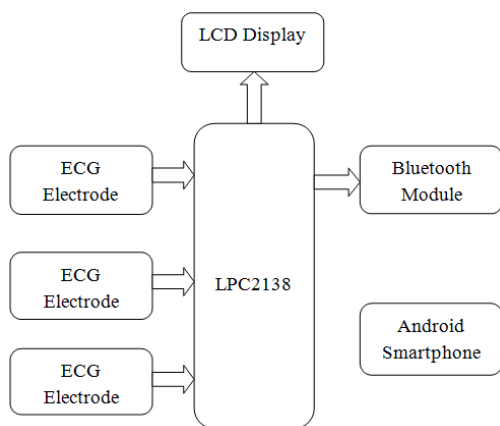
IV. SYSTEM DEVELOPMENT
A. System Block Diagram

Fig.1.Block Diagram

We will have ECG sensor electrodes connected to patient's body.These electrodes will interface to ARM based Microcontroller. An embedded Bluetooth module will interface to Microcontroller. This will pair to Android smartphone. Android smartphone will have customize android app which will continuously plot real time waveforms of patient's ECG.

B. Hardware Selection
1.Microcontroller

LPC2138 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32kB to 512kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30% with minimal performance penalty. Due to their tiny size and low power consumption, LPC2138 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8kB up to 40Kb.

2. ECG Sensor

This Sensor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG and output as an analog reading.

3. Bluetooth Module

Bluetooth serial module is used for converting serial port to Bluetooth. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands. Module has limited broadcast range og less than 10 meters.

4. Android Smartphone

Now a days people mostly use android smartphone which is easily available for this system.Android OS basic screen provides a beautiful and intuitive user interface. Android has native support for multi-touch which was initially made available in handsets. User can jump from one task to another and same time various application can run simultaneously.Android smartphone will have customize android app which will continuously plot real time waveforms of patient's ECG.

E. Implementation and Results

PCB manufacturing and coding of adc channel is done. Pot is an input and Output is displayed on LCD. Here, adc channel selection is done and code is working fine. Design of an android app is done for ECG plotting to make connectivity between android hardware and software. Finally at the end of system we will get output like ECG will be monitor and plot runtime on to the smartphone.
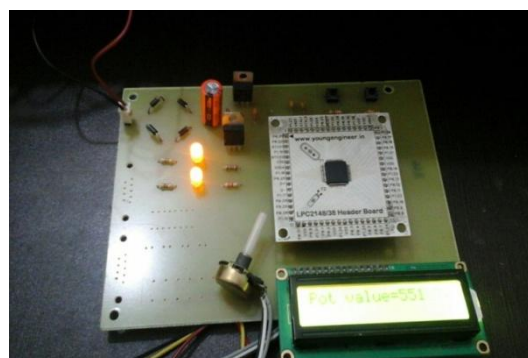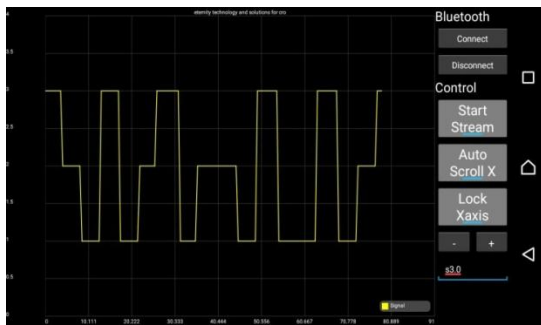

Fig.2. System Hardware Implementation

Fig.3.Android App Design

Above fig. shows (fig.3) Android App design for ECG plot. When we interface ECG sensors with the system we will get ECG waveforms on Android Smartphone.

IV.   CONCLUSION

Pot is an input and Output is displayed on LCD.Design of an android app is done for ECG plotting to make connectivity between android hardware and software. Finally at the end of system we will get output like ECG will be monitor and plot runtime on to the smartphone.

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