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# A Survey on Android Oscilloscope

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**ABSTRACT**: This paper represents the design and accomplishment of a portable, light weight, low power consumption Android Measurement System. This device is easy very to handle, good range, with high speed. Oscilloscopes which are available today are CRO or DSO which is not user-friendly, handy, not portable, and it requires more power .The oscilloscope is need for industrial applications for example testing of signals etc. But the digital oscilloscopes are very bulky in size and many times we it is not possible to carry it everywhere. The system consisting of a hardware device and a software application. This Android based Measurement System equipped with Bluetooth Module which can takes input signal from the Micro-controller and transmit this input signal to the Bluetooth of An Android Smartphone's. Android Smartphone is used to display and calculate this input parameter i.e. Square Waveforms and Triangular Waveforms, Sinusoidal Waveforms. In this paper Android Software Application has been build for Android Smartphone which is use to display the information in terms of different parameters such as Square Wave, Triangular wave, Sine Wave etc. This software application will work in the area of 30 meters between the Bluetooth of the Android Smartphone and external Bluetooth device. Now a days this measurement System is very advantageous.

**KEYWORDS:** Android mobile, AVR-ATmega16 microcontroller, Android SDK, Cathode Ray Oscilloscope (CRO)

## I. INTRODUCTION

Today Cathode-Ray Oscilloscope (CRO) is very important in electronics measurement filed. CRO is mainly used to calculate the voltage across the circuit with variation in time. Cathode Ray Oscilloscope (CRO) currently available in the market is very expensive and bulky in size, it requires more power and has low resolution displays. This paper presents a low cost and portable Measurement System based on Android implemented using Android software technology, with low power consumption, user friendly low cost compared to Cathode Ray Oscilloscope (CRO). This Measurement System is also called as Mini-Oscilloscope which provide some Cathode Ray Oscilloscope features that help in the measurement of Triangular wave and Square wave, Temperature Value, Resistance Value. The External Bluetooth module equipped with the microcontroller will transfer the input signals to an Android Smartphone's, running on the Android operating system. Using external Bluetooth device and display of Android Smartphone's the system becomes more useable and portable. The selection of Bluetooth device is most important to interface with Android device in terms of data rates. In this Measurement system we used HC-05 Bluetooth module AVR-ATmega16 Microcontroller and Android Smartphone for this whole application.

Now suppose we want to make interfacing between a Bluetooth based microcontroller and android phone. To making a successful interface between both devices we needs to consider one device as a master and another one as a slave to pair both devices. Here we consider android device as master device and Bluetooth device as slave to pair both devices After a successful interfacing we can send message between both devices and start operating
and receiving data for Oscilloscope device. Android device can continuously receive the data from microcontroller via Bluetooth and store received data into the vector form. Vector form is required to draw graph on GUIs.

## II. SYSTEM MODEL AND ASSUMPTIONS

In a proposed system design, it involved the Bluetooth module that is use for transfer an input signals like Sinusoidal wave, Square Wave, Triangular wave etc to the Bluetooth of Android Smartphone's. This System is base on the AVR-ATMega16 Microcontroller.Figure.1 shows a block diagram of the overall system of this project. The input parameters like Square wave, Triangular wave are send to AVR Micro-controller by using Signal Conditioning Circuit The frequency range of the Measurement Systems calculate using the sampling rate of the Micro-controller. The Micro-controller contain an inbuilt Analog to Digital Convertor (ADC) that can be use to alter the input

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parameter(analog signal) to the digital signal(into byte). These converted digital signal (byte) given to the Universal Asynchronous Receiver Transmitter (UART) of the ATMega16 microcontroller for the transmission via Bluetooth module. The External Bluetooth device equipped with the AVR-ATMega16 Microcontroller receive input data from UART and send the parameter data to Bluetooth of Android Smartphone, where we can easily get the a graphical representation(display) of these parameters.

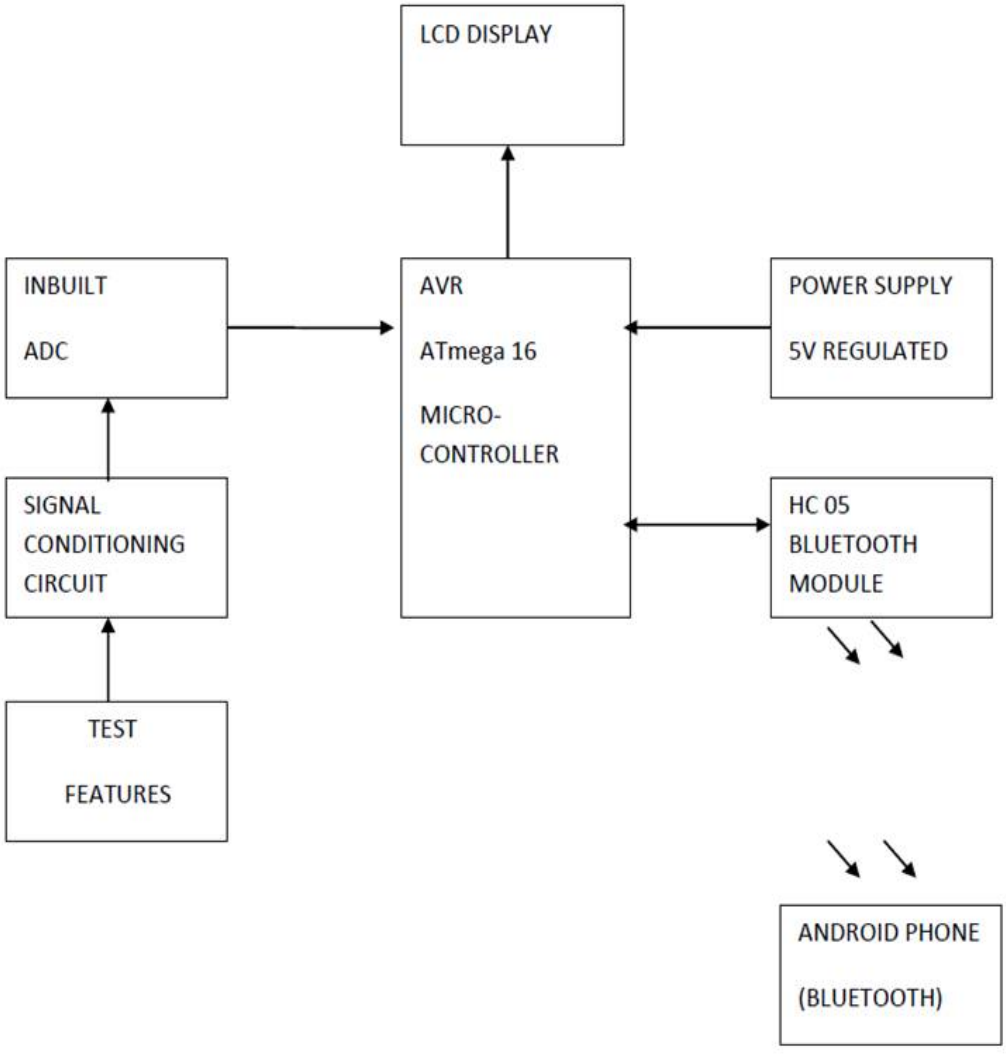


Fig 1. Proposed system architecture

**Android platform:**

Today several platform are available for building the smart phone application such as android, windows mobile, symbian, ios etc. In a proposed system we use android application on android platform because most of the phone support android OS. Android Software Development kit(SDK) to build an android application, it contains a set of development tool such as libraries, debugger and tutorials for developing android app.

**Atmega 16/32 MICROCONTROLLER :**

**ATmega16** is an 8-bit high performance microcontroller comes from Atmel's Mega AVR family with low power consumption. Atmega16 is based on the Reduced Instruction Set Computing (RISC) architecture, with 131 powerful instructions. The instruction execute in one machine cycle.Atmega16 operate on maximum frequency of 16MHz.ATmega 16 has programmable flash memory of 16kb, 1KB of static RAM and 512 Bytes of EEPROM.

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It is a 40 pin microcontroller. There are 32 input/output(I/O) lines which are divided into four ports each port of 8-bit such as PORTA, PORTB, PORTC and PORTD.ATmega16 has equipped with various peripherals such as USART, Analog To Digital Converter(ADC), Analog Comparator, SPI, JTAG etc

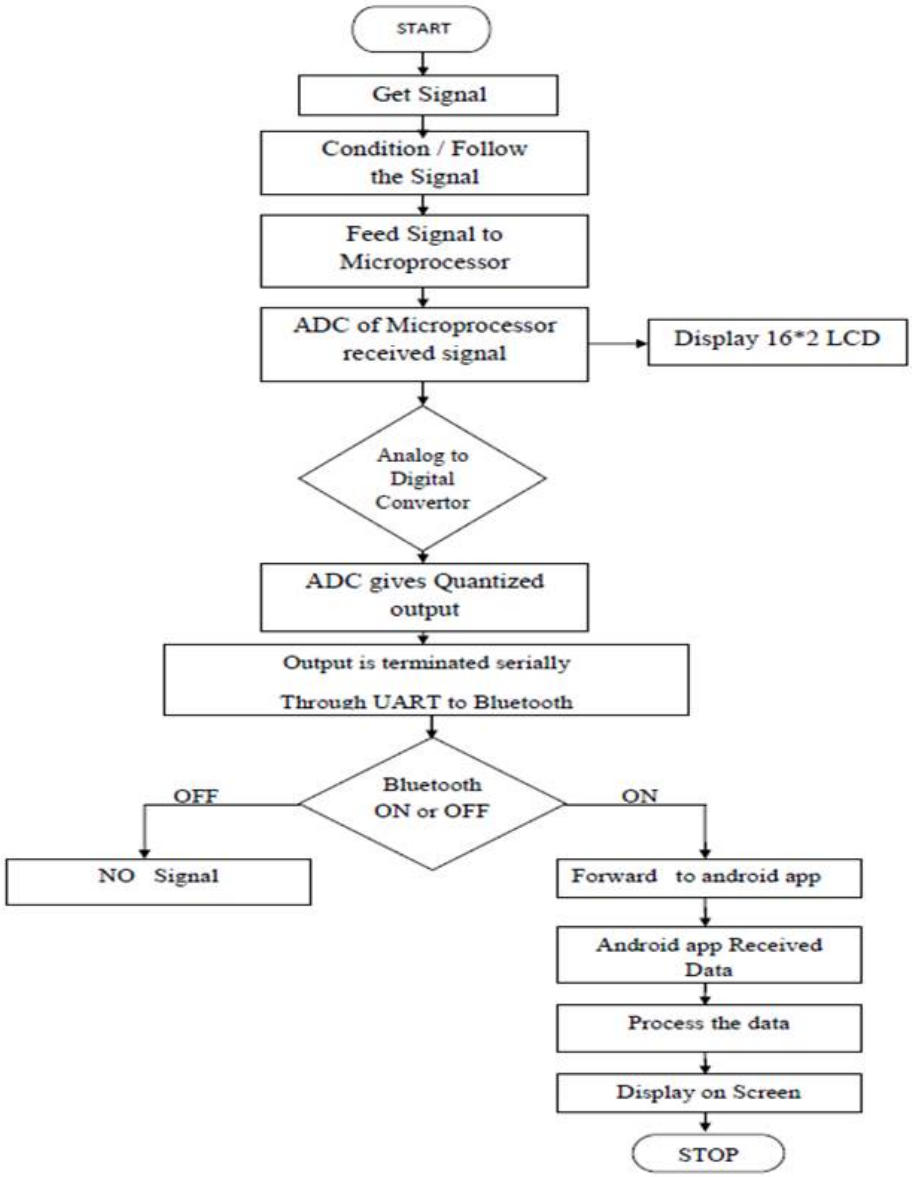


Fig 2. Flowchart for Controlling and Monitoring the system.

Initially we start the system, The input signal like Square wave, Triangular wave etc are transfer to AVR Micro-controller by using Signal Conditioning Circuit. Analog to Digital Convertor (ADC) of Microcontroller received the signal.ADC convert the input signal into quantized output and These quantized output given to the Universal Asynchronous Receiver Transmitter(UART) of the ATMega16 microcontroller for transmission via Bluetooth module. The Bluetooth module search the bluetooth of android device and connect to android device. After establishing a successful connection with android device a data is forward to the android application. Android application receive the data and process the data, after processing the output is display onto the screen of android Smartphone.

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## III. LITERATURE SURVEY

1. Cathode Ray Oscilloscope (CRO) currently available in the market is very expensive and bulky in size, it requires more power and has low resolution displays. To overcome such a problem a new technique is developed i.e. "Android Bluetooth Oscilloscope"
2. The accomplishment of an oscilloscope with Bluetooth was previously reported, by Yus in 2010[1]. It is open prototype project which is also known as "Android Bluetooth Oscilloscope", which equipped with a Bluetooth enabled transmitter circuit which is use to transfer the data to android phone, which draw the waveforms on its display. In which The transmitter circuit uses Microchip's dsPIC33FJ16GS504 And an LMX9838 Bluetooth 2.0 SPP module. However in which the bandwidth of the device is not specified. Also not ideal for Temperature, Resistance measurement. from the research it was observed that the data rates of 2 Mbps are not achievable with the existing software on module's controller. Also on single board there is no scope for measurement of the Temperature, Resistance. This is drawback of such system.
3. Therefore, in proposed system the new approach suggested for fully utilize the bandwidth of the Bluetooth, was to use the HC-05 Bluetooth module, which has a higher data rate. It can improve the bandwidth of device.

## IV. CONCLUSION

In this way we can implement this system with the help of android mobile operating system. So we can achieve our goal i.e. Oscilloscope on android phone which is becomes the portable and handy oscilloscope . with the help of this system we can see the different kind of wave like Sine wave, square wave etc.

## REFERENCES

[1] Yus. (2010, Sep. 23), "*Android Bluetooth Oscilloscope*"http://projectproto.blogspot.com/2 010/09/android-bluetooth-oscilloscope.html [Feb 24, 2012].
[2] Namseung Lee; Sung-Soo Lim; , "A whole Layer Performance Analysis Method for Android Platforms" ; LG electronics, School of Computer Science, ITRC by NIPA-2011-C1090-1131-00009.
[3] Yu-Hao Chang; Chi-Bang Kuan; Cheng-Yen Lin; Te-Feng Su; Chun-Ta Chen; Jyh-Shing Jang;Shang-Hong Lai; enq-kuen Lee; , "Support of Software Framework for Embedded Multi-core Systems with Android Environments" ; Department of Computer Science, National TsingHua University, 978-1-4577-2122-9/11/$26.00 ©2011 IEEE.
[4] Gaurav Singh; Kumar Bipin; Rohit Dhawan; , "Optimizing the Boot Time of Android on Embedded System"; Computing Platforms and Tools STMicroelectronics, 978-1-61284-842- 6/11/$26.00 ©2011 IEEE.
[5] Android Developers, "*Bluetooth Socket*", http://developer.android.com/reference/ android/bluetooth/BluetoothSocket.html."BluetoothModule",http://www.exptech.de/service/datasheet/HC-Serial-Bluetooth-Products.pdf.