

## PC BASED OSCILLOSCOPE USING ARDUINO

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### Abstract:

The aim of this paper making a pc based oscilloscope using arduino. This arduino kit is ineterfaced or connected to the laptop. We can get the input from the arduino kit. The oscilloscope is a device or an instrument which is used for so many purpose as like frequency and peak voltage measurement .for measuring the analogue quantity the oscilloscope is used. While converting the analogue quantity into a digital the sampling and data acquisition process is used .the microcontroller is used for the programming .it is low cost device and also portable. This system will operate up to5 kHz frequency and it operated on 230 A.C.

**Keywords:**Arduino kit,CRO,Oscilloscope, Data conversion, low cost CRO.

### 1. INTRODUCTION

Oscilloscope is a very important and integrated digital devices for signal conditioning, acquisition and analysis. Increasing modern electronic system the various types of oscilloscope is use for completing the task. Oscilloscope is the one of the most intelligent programmable computer. This electronic instrument is use for so many purpose in day to day life that is in labs, collages etc. That's allow observation of various types signal. We had an idea to develop the oscilloscope in low cost and easy to understand as compare to market device. The digital oscilloscope has very useful for solve this problem of simple CRO. The oscilloscope working on analogue signal conditioning, ADC unit as well as data acquisition system. For digitalising analogue signal and transfer data are transfer via USB port, this port is connected to the pc or laptop for display the waveform. The oscilloscope are also use for measuring the maximum peak voltage, rise time of the waveform. This oscilloscope design is in terms of hardware and software. This design endorse the advantage of PC based oscilloscope.This document is a template. An electronic copy can bedownloaded from the conference website. For questions onpaper guidelines, please contact the conference

publicationscommittee as indicated on the conference website. Information about final paper submission is available from the conference website.

### 2. OVERVIEW OF OSCILLOSCOPE

This system is divide into two part in the first part analogue signal is taken as input signal for the calibration circuit after the calibration the signal are send to the microcontroller AT mega16 328.This Microcontroller are used for analogue to digital operation or conversion. During this analogue signal is converted into analogue into digital signal. Microcontroller is generating up to 5khz sampling frequency. This digital data is transfer via USB to the pc. In which the c language is use for the programming to achieve the programming.

### 3. LITERATURE SURVEY

This section present the detail literature review of the waveform measurement and presentation on the oscilloscope. This idea of waveform sixteen century for technological growth, scientific study is necessary. Observation of the system include making measurement of a system parameter and is

output from various kind of input signal. In such cases study can be greatly simplified this since electrical signal are readily measured using analogue to digital converter .This is the idea how the idea of oscilloscope originated by the [6] Bojan Banko. (2004, August 16). Turn your PC into a free oscilloscope [Online]. LPTscope. .Oscilloscope is an automated measuring instrument which sample analogue signal, process and then display the waveform on the screen. After some time of research has been in the field of oscilloscope technology.

Some of the popular features available in conventional digital oscilloscope such as triggering, math function, etc. were used in our project. The properties of signal observed by several factors varying amplitude frequency and phase. Oscilloscope are used in collage, medicine, engineering and telecommunication industry. The scope of design principle and overall solution.

#### 4.BLOCK DIAGRAM

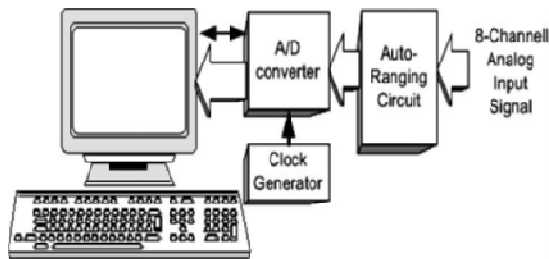


Figure 1:Block diagram

In the data acquisition system is out like using sensor or transducer that means that sense the multiple analogue signal and this convert into digital signal and this digital data passed through the USB to the PC .this data is sorted in the PC and also it display on the screen of the pc or laptop. This project is like the embedded system.it also contain the clock generator module, this module is used to give the clock input to the ADC. For this purpose the LM 555 is used, this module can generate 1.34 MHz frequency. In this block diagram the auto ranging circuit is used which convert the signal range from +\_100 to +\_2.5, this is arrangement is controlled by using potentiometer.

In our project the software is used for data conversion system. This device convert the output into binary. The performance of the system is depend upon bandwidth and signal to noise ratio. The resolution of the ADC is 10 bit.Turbo C++ software is used for coding. The programme is consist of main programme as well as several sub-programme. The other programme are merge from turbo c++ and java programme, this programme are taken from arduino and given to the processing ID application for the software windows

#### 5. HARDWARE DISCRPTION

##### I. Arduino kit:

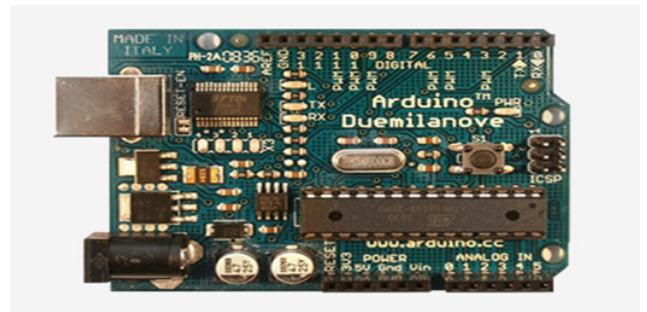


Figure 2: Arduino board

Arduino is circuit board which have contained the microcontroller IC input output port USB, port resets switch UART required this things in our project. By using arduino as oscilloscope we can display several types of waveforms. We can get maximum voltage applied to arduino is 5 to 10.

##### II. Laptop or PC



Figure 3: Laptop device

Laptop or pc is used for displaying the waveform and the value of maximum or peak voltage and frequency. Whenever an arduino is compile the programme and upload it via a USB and the output comes to the screen of the laptop or pc by a serial communication. The graph of any voltage, current value or peak to peak voltage can be seen by connecting the port of the arduino.

### III. FLOW CHART

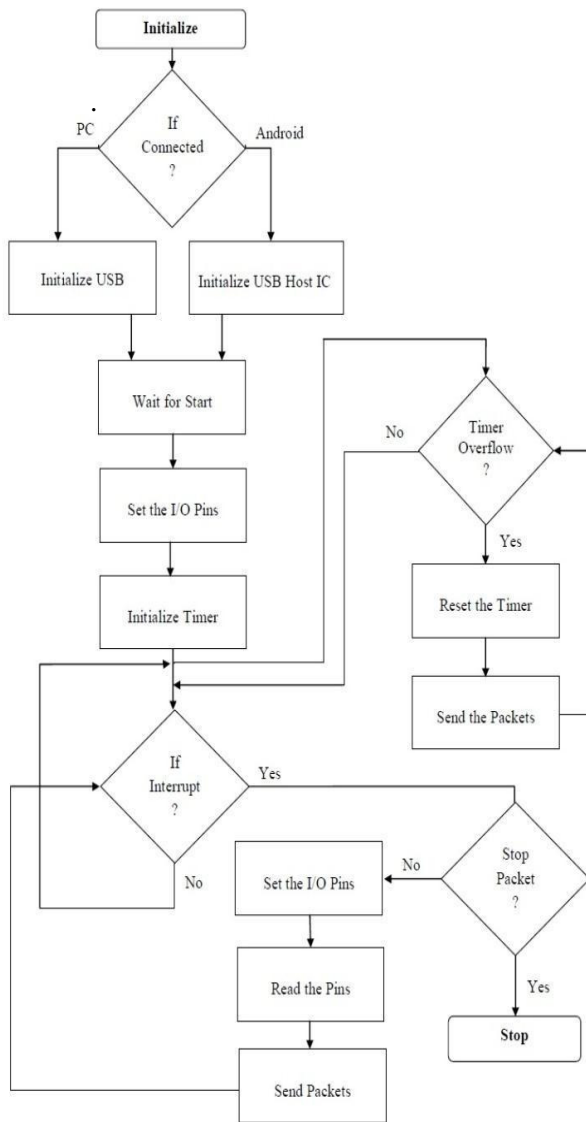


Figure 4: Flow chat

In this experiment an arduino board is used at in ATmega 328IC is used to interface in the various component. When the system is start it will check analogue or not .USB will initialize the input and transfer the output. When the USB initialize is start IC AT mega 328 will getting for the data. It will set input or output .after some time input or output pin of the system will start the timer .if the timer is overflow it will reset the another data. This process is continuously running .when the output running at this time it will send the IIO is microcontroller will set high or low .this process will continue till the application sendstop the input then the connection will on and microcontroller will be reset.

### 6. RESULT

The input from the signal conditioning unit is given to the analogue port of the arduino and it convert this signals into digital form. This project has been check by giving the different types of input and waveform is obtain without any signal distortion. The waveform is show on laptop or pc also display voltage per division and the peak value of the signal by using PC printer port the students get output of the printout.

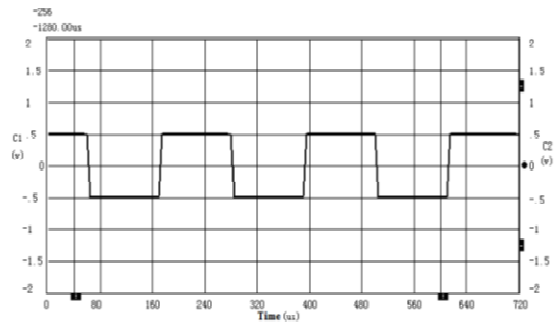


Figure 5:Generated square waveform

This fig is obtained from sampling and the decoding process of the analogue signal for obtaining the value. These value literally seen on the application of the windows.

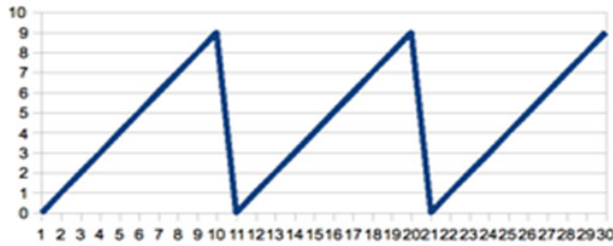


Figure 6: Generated triangular waveform

This is a triangular wave is obtain from the analogue signal after the decoding. This system is simulated by various type using MATLAB also this technic is better for getting the output. The result show the application of receive signal from 0.1 kHz to 5 kHz on the screen of laptop or PC. This signal is in the real time with less one second response of input signal, comparing the other conventional oscilloscope, this oscilloscope is better and able to detect all frequency and maximum voltage and peak to peak voltage

## 7. CONCLUSION

Integration of virtual instrument technology, the use of computers as human-machine interface, have greatly improved the instrument's scalability. Due to small size it is easy to handle and operate, therefore this system can be used in research purposes and development. A PC based is a low cost portable oscillator based on the feature of communication electronic, computer, and electrical courses. It is very affordable for the conversion of analogue signal in the digital forms.

## 8. REFERENCE

1. A. K. Sawhney, *a Course in Electrical and Electronic Measurements and Instrumentation*. Dhanpat Rai &Co., 17th Edition, Chapter 21, Pages 784-785
2. . Tektronix 2445B 150 MHz 4 Channel. [Online]. Techrecovery. Oscilloscope <http://www.techrecovery.com/ccp2451-tektronix-2445b-150mhz-4-channel-oscilloscope-2445b-1477.htm>.
3. HP/Agilent DSO80404B 4GHz 4CH 40GSa/s Infiniium Oscilloscope. [Online]. Metric Test.

[http://www.metrictest.com/product\\_info.jsp?mfgmdl=HP%20DSO80404B\(N\)](http://www.metrictest.com/product_info.jsp?mfgmdl=HP%20DSO80404B(N)).

4. PC Oscilloscope and Data Acquisition Products. [Online]. Pico Technology. <http://www.drdaq.com/low-cost-oscilloscopes.html>.
5. Colin K McCord. (2005, October 1). Low cost PC-based quad channel real-time/ storage oscilloscope. [Online]. <http://www.cmccord.co.uk/FYP/index.htm>
6. .Bojan Banko. (2004, August 16). Turn your PC into a free oscilloscope. [Online]. LPTscope. <http://www.geocities.com/LPTScope/index.html>.
7. M.M. Vijay Anand. (2002, December). PC-based Oscilloscope.[Online].Circuit1\_oscilloscopr.pdf.[http://www.electronicsforu.com/efylinux/circuit/dec2002/circuit1\\_oscilloscope.pdf](http://www.electronicsforu.com/efylinux/circuit/dec2002/circuit1_oscilloscope.pdf).