ICAC3'15

Mobile Function Generator Using Android

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Abstract

The project attempts to create a cell-phone application using Android in order to implement a function generator which generates different A.C. sources (like sine, sawtooth and square) so as to power different circuits. Function generators are available only in labs. Hence, if implemented on phone which is commonly available, it can be used extensively at home or on field. The audio port capability of the cell-phone is also explored in more detail. Replacing the function generator used in the lab with the android based function generator in times of emergency is the ultimate aim of the project and ways and means to accommodate the same along with extensive programming is the scope of this project.

Keywords: function generator; power; mobile application; audio port; android

1. Introduction

Researchers and on-field engineers face an acute need for a function generator generating sinusoidal waves of different frequencies. These needs usually occur in remote areas (i.e. at home, on-field, etc) where labs cannot be easily accessed. Also, if a large number of function generators are needed, it is impossible to meet large demands in short intervals of time. The high cost and the bulkiness of function generators makes it impossible and unnecessary for researchers to buy these function generators for their personal use. Also, the physical transfer of function generators can pose a threat to the safety of the function generators.

These problems led me to consider for a portable alternative. There was only one device which was universally in the hands of almost every individual, i.e. a cell phone. Hence, if a function generator is implemented on the cell phone, then every researcher could possess a function generator on their phone in times of need. The outburst of android devices in the last few years have given rise to the use of smart phones worldwide. Android software being freeware also greatly boosted the chances of combining the two different worlds of Telecommunication devices (like function generator) and software (like android and java programming). Thus, this project aims at implementing the function generator on the cell-phone using the android platform.

Thus, this option provides solution to all the problems mentioned above i.e. Researchers and on-field engineers can use the function generators on their cell at any hour without having to approach labs. The high cost and bulkiness are cut down making it a zero-cost approach. Also, this is a highly portable and safe option. If function generators are required in large numbers, it is easily made available to all through the android market.

There are also some disadvantages which will be acutely evident but as said before, this application is not a replacement to the traditional function generator but a great boon when it is unavailable and inaccessible. The range of frequencies over which this application works is the biggest disadvantage as it is designed only for audio frequencies (from 20 Hz to 20,000 Hz). The fact that not more than 2-3 volts are obtainable is another inherent disadvantage. This is because the power of the battery of the cell-phone is used and hence high power cannot be generated. Hence, the traditional function generators in the labs can never be replaced.

The applications of the function generator on-field are many, some of which are as follows: the set up of digital devices and their hold can be tested, receiver/wireless sections comprising of RF and IF are tested and calibrated, amplifiers are tested for gain and for compression point of 1dB, the differential outputs are configured in sweep mode, the drift of oscillator effect is determined on a circuit, the design margins of circuit boards driven by clock are tested. It can be used as a local oscillator. Receiver response can also be tested by using it as an RF exciter after modulating it.[1]

Our project mainly consists of 3 phases:

i.   Generating sinusoidal, sawtooth and square waveforms of varying frequencies using java

ii.   These waveforms generated then need to be transmitted to the audio port of the phone using Android capabilities and hardware along with Android and java coding

iii. The waveforms now available at the audio port of the phone then need to be interfaced to the CRO or to a working project

2. Waveform Generation Using Java

Step 1 of the project involves generating sinusoidal, sawtooth and square waveforms each of varying frequencies. If a sinusoidal wave of one frequency can be generated, then by creating a variable potentiometer (knob) on the display of the phone, the frequencies can be varied thus generating sinusoidal waves of varying frequencies. Here is a thread which generates a sinusoidal wave of single frequency.

Thus, through the following thread, we have generated a sinusoidal wave of 19 KHz.