Reconnoitres The Implementation Of Bluetooth & GSM Technology In Portable Oscilloscope

Abstract

This paper explores the implementation of Bluetooth & GSM technology in portable Oscilloscope, to give capability to handle oscilloscope quite comfortably around the places with Bluetooth & GSM module. Portable oscilloscopes currently in the market are very expensive. As we know these are heavy weight it is difficult to move. This portable oscilloscope is newly developed oscilloscope in which oscilloscope app is developed on android. Because it has wireless communication it is portable. The device is equipped with a Bluetooth module to provide connectivity to a device with Bluetooth, running the Android operating system (OS), in order to display the waveforms. Android OS is selected because there are a decent number of Android device users and most of these devices satisfy the requirements of the oscilloscope’s software application. Data transmitting through either Bluetooth module or GSM module depend on distance. This paper will focus on the protocol in using Bluetooth & GSM for transmitting data on a mobile using the ARM Board LPC2148 processor.

1. Introduction

An oscilloscope, previously called an oscillograph, and informally known as a scope, CRO or DSO is a type of electronic test instrument that allows observation of constantly varying signal voltages, usually as a two-dimensional graph of one or more electrical potential differences using the vertical or y-axis, plotted as a function of time. Handy Oscilloscope is most important gadget in this mobile
generation. Where no one is sitting at a place to finish their works. People are in hurry and needs gadgets follow their moves. People were just thinking about to carrying a gadget that will be easily carried from one place to another and work efficiently as an oscilloscope. To implement an oscilloscope using mobile instead of carrying another gadget which is a good idea Android based oscilloscope which requires nothing but a small circuitry to manage inputs and provides to android Bluetooth sensors [1]. The Android platform includes support for the Bluetooth network stack [2], which allows a device to wirelessly exchange data with other Bluetooth devices. The application framework provides access to the Bluetooth functionality through the Android Bluetooth APIs. These APIs let applications wirelessly connect to other Bluetooth devices, enabling point-to-point and multipoint wireless features. This dissertation also tries to include GSM module which send samples to android smart phone. But that will not be a real time application.

This paper presents an oscilloscope implemented using new technology, with low power consumption. It is a Bluetooth embedded device which will capture input voltage signals and transmit them to an external device, such as a smart-phone, running the Android operating system. Since the device is wireless it can make use of the Smartphone’s display and processing power.

The design and implementation stage of the dissertation, involved the Bluetooth embedded hardware device implementation and the software application development for Android. The Bluetooth embedded device is a microcontroller based system.

![Image](image.png)

**Figure 1:** General Block Diagram

**2. Block Diagram**

It is a Bluetooth embedded device which will capture input voltage signals and transmit them to an external device, such as a smart-phone, running the Android operating system. Since the device is wireless it can make use of the Smartphone’s display and processing power. The Bluetooth embedded device is a microcontroller based system figure 3.1 &3.2 shows a block diagram of the Bluetooth embedded device.

![Image](image.png)

**Figure 2.1:** Transmission section
In transmission section the microcontroller is major component, for this dissertation ARM or PIC is suitable. Power supply given to ARM. Input applied will be either AC or DC, which is applied to microcontroller through interface circuit. Then ADC convert this analog data to digital add send to smart phone oscilloscope through Bluetooth.

Now to establish the connection between a Bluetooth based hardware and android phone. To establish a connection between both devices we need to consider android device as a master slave and another Bluetooth device as a slave to pair both devices. After establishing a connection we can send commands between both devices and start operating and receiving data for Oscilloscope device. This device communication receives data in continuous form through listener’s events and collects received data into a vector form. Vector form is required to prepare graph plot on GUI. When analog input is applied to interface circuit it passes to ADC which converts analog input to digital, then microcontroller will send this data to android phone through Bluetooth module. This will be a real time application. In other way data transmission is GSM module; through this module we will send samples to android smart phone.

![Figure 2.2: Receiver section](image)

### 3. Result

[A] Data Received through Bluetooth:

When we apply analog input to ARM development board then ADC converted those signal and send through Bluetooth modem which is interfaced with ARM.

The Whole system considered both Bluetooth & GSM system so we selected first Bluetooth option for data transmission through Bluetooth modem, which Asks for connection first.

![Figure 3.1: Smart phone display1](image)
Once connection has made data which is received via bluetooth which plotted in android oscilloscope shown below.
[B] Data Received through GSM:

For data transmission GSM modem is selected by selection of SMS option.

![Plotting Using Android](image1)

**Figure 3.4: Data Received through GSM**

It sent each sample through SMS to intended smart phone & which plotted in android oscilloscope shown below.

![Sample Through SMS To Intended Smart Phone](image2)

**Figure 3.5: Sample Through SMS To Intended Smart Phone**
4. Conclusion

By interfacing of ARM modem to Bluetooth modem we received voltage in digital format on of smart phone & we plotted those samples on android oscilloscope. By interfacing of ARM modem to GSM modem we received voltage in message format on smart phone which shows mobile number on which message is displayed & message in volt, we plotted those samples on android oscilloscope.

5. References


