Embedded System Design

Mini Project on

Simple PC Based Oscilloscope Using PSoC

Submitted by:

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**Abstract:**
Oscilloscope is most useful instrument in laboratory, not only laboratory it is also useful in industrial applications. Oscilloscopes available in lab are bulky in size and not possible to use in many applications. So, we implemented simple Oscilloscope using PSOC, which is directly connected to PC and observe the output using data logger software. This project illustrates how to convert analog information to digital information and then send it to the PC via RS232 using UART.

**Features:**
- It is used as data logger.
- It is simple and easy to implement.
- It is cost effective than normal oscilloscope.
- It is possible to implement to multiple channels.

**Used PSoC Modules:**
The different modules in PSoC that we are using in our project are:-

- **PGA:** Used as buffer for the ADC. We set the gain as 1.
- **ADC:** Used for sampling (converting analog signal to digital signal) of input signal. We used 12-bit incremental ADC.
- **UART:** Used to send serial data (samples of input signal) to PC using RS-232 serial port. We used UART TX is an 8-bit serial transmitter.

**Block Diagram:**
Operation:

Generally oscilloscopes are used to display the signals and it gives the amplitude and frequency of that signal. The input signal which is taken from the function generator or from any device is applied to PSoC block. That analog input signal is converted to digital form by using ADC in the PSoC. That digital data will be sent to PC using RS-232 serial port. Using data logger we can draw the shape of wave form with the received digital data. Baud rate of the data logger should be eight times to the clock frequency of the UART for synchronous serial data transmission. We can observe and measure the amplitude and the frequency of signal. Allowable input voltage range is 0-20V. We can implement multiple channels using MUX. But it has frequency limitation that depends upon internal modules (ADC) used in PSoC.

Photograph: