

GRAPHICAL LCD BASED DIGITAL OSCILLOSCOPE

Ms.Ghazala Ansari

Assistant Professor

Department ECE

SRM University NCR Campus

Ghaziabad

Abhinav Khanna,Aakash Gupta,Pawan Kumar

Electronics and Communication Department

SRM University NCR Campus

Ghaziabad

ABSTRACT:

In this paper , we present the development of existing digital oscilloscope which is used for research and development purpose, .instead of using cathode ray oscilloscope we used PIC18F4550 IC circuit have been successfully realized as complete system. To convert costly device into an affordable device and which consume less space as well as handy device which leads to save time and money. In this way we will try to overcome the problem like space occupied by oscilloscope as well as cost.

KEYWORDS:

Graphical LCD, PIC18F4550, proteus software, cost effective , compact size , embedded system, Research and development.

1. INTRODUCTION:

An **oscilloscope**, previously called an oscillograph, and informally known as a **scope**, **CRO** (for cathode-ray oscilloscope), or **DSO** (for the more modern digital storage oscilloscope), 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 (horizontal or x-axis).

Many signals can be converted to voltages and displayed this way. Signals are often periodic and repeat constantly so that multiple samples of a signal which is actually varying with time are displayed as a steady picture. Many oscilloscopes (storage oscilloscopes) can also capture non-repeating waveforms for a specified time and show a steady display of the captured segment.

Oscilloscopes are commonly used to observe the exact wave shape of an electrical signal. Oscilloscopes are usually calibrated so that voltage and time can be read as well as possible by the eye. This allows the measurement of peak-to-peak voltage of a waveform, the frequency of periodic signals, the time between pulses, the time taken for a signal to rise to full amplitude (rise time), and relative timing of several related signals.

Oscilloscopes are used in the sciences, medicine, engineering, and telecommunications industry.

The oscilloscope is one of the most important tools to be used by any electronics hobbyist but not everybody can afford to have one. As commercial scopes are often too expensive, almost every electronics hobbyist thought at a certain time to build one from scratch. The classical oscilloscope (cathode ray tube) is difficult to build at home because of its size, mechanical fragility, high voltages presence, etc An alternative solution is the modern "PC oscilloscope", having the advantage of post-processing and recording capabilities, and kind of reduced complexity.

However, this solution is often non-portable, expensive (requires an PC) and dangerous for the PC if not isolated from it's chassis. The third solution, commonly used these days by all commercial oscilloscope manufacturers, is the digital oscilloscope with LCD screen. Therefore, we decided to use this solution, and tried to develop it using common parts from today's component retailers.

2. PIC18F4550 MICROCONTROLLER:

PIC18F4550 is an 8-bit microcontroller of PIC18 family. PIC18F family is based on 16-bit Instruction set architecture. PIC18F4550 consists of 32 KB flash memory, 2 KB SRAM and 256 Bytes EEPROM. This is a 40 pin PIC Microcontroller consisting of 5 I/O ports (PORTA, PORTB, PORTC, PORTD and PORTE). PORTB and PORTD have 8 pins to receive/transmit 8-bit I/O data. The remaining ports have different numbers of pins for I/O data communications. PIC18F4550 can work on different internal and external clock sources. It can work on a varied range of frequency from 31 KHz to 48 MHz PIC18F4550 has four in-built timers. There are various Inbuilt peripherals like ADC, comparators etc. in this controller

3. GRAPHICAL LCD:

Graphical Liquid Crystal Displays add versatility to any project. We took a graphical LCD JHD12864E . Characteristics JHD12864E Series Display content: 128 x 64 dots ,
Display mode : STN/ Yellow Green , Driving method : 1/64 D , Type : COB(Chip On Board) , Number of data lines : 8-bit parallel .

4. DESCRIPTION OF NEW SYSTEM:

The probe of the oscilloscope reads the voltage wave signal, sends it to the input of the oscilloscope, which is designated to pin. The other part of the probe is connected to ground. The oscilloscope then converts the signal from Analog to Digital data, which is then saved to a buffer called data.

The trigger sets the time sweep based on the number of signals sampled. The voltage signal is displayed on the GLCD as a two-dimensional graph of voltage against time.

The switches are used to adjust the amplitude and the time base to a suitable range which are MENU to RUN HOLD.

ALGORITHM:

The system will work as follow.

I. It started from the analog input signal which is taken from the device.

II. After that analog signal is converted into digital signal through the ADC which is inbuilt in the PIC18 microcontroller

III. Then Changes has been done as per the requirement of the user and then display the data on the Grapical LCD

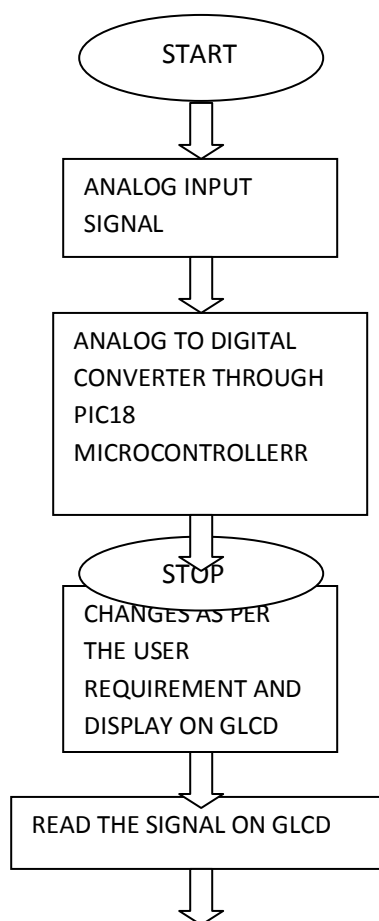


Fig. 1 FLOW DIAGRAM

5. DESCRIPTION OF CIRCUIT DIAGRAM:

The power supply from main circuit board is converted to 12 v dc through the dc power jack where adaptor is connected. Now this power supply will provide this power to two main blocks as PIC18F4550 Microcontroller (5 v), and GLCD(5 v).

In order to explain the figure, the probe of the oscilloscope reads the voltage wave signal, sends it to the input of the oscilloscope, which is designated to pin. The other part of the probe is connected to ground. The oscilloscope then converts the signal from Analog to Digital data, which is then saved to a buffer called data. The trigger sets the time sweep based on the number of signals sampled. The voltage signal is displayed on the GLCD as a two-dimensional graph of voltage against time.

The switches are used to adjust the amplitude and the time base to a suitable range which are MENU to RUN HOLD. Graphical Liquid Crystal Displays add versatility to any project. We designed a graphical LCD driver for use with the Crystal fonts 12864B 128 x 64 pixel. In brief the pic18f4550 microcontroller is connected to the eight pins of glcd, 9V power supply is supplied to the controller. The hardware is designed on a copper cladded board with a 16MHz crystal oscillator used for setting of microcontroller to a particular frequency, two (two each) capacitors are connected to the oscillator which remove voltage fluctuation, two 50kilo ohm potential divider are connected, one to the ground and other to the controller along with bridge rectifier(LM7805) and voltage regulator to convert the signal from AC to DC and to tune down the voltage to 5V from 10V. The software used for controller programming is mikroc PRO for PIC V.6.5.0, Proteus design suite is used for simulation. Pins A0,A1,A2 are used for signal, frequency change and amplitude change of the signal on the glcd screen. Thus the explanation of circuit diagram.

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