DIGITAL OSCILLOSCOPE

Project Report by Aswin

Project description:

My project is used to find the type of signal produced with frequency, duty cycle and voltage supplied. It is powered with 9v battery. It can be even capable of running in 5v input.

It is the minimized version of Cathode Ray Oscilloscope.

Project Components used:

- Arduino Nano with ATmega328p microcontroller.
- 128x64 OLED Display.
- 1M POT for voltage calibration.
- Push buttons for function swapping.
- 1N4148 diode for switching application.
- Some resistors and capacitors for biasing.

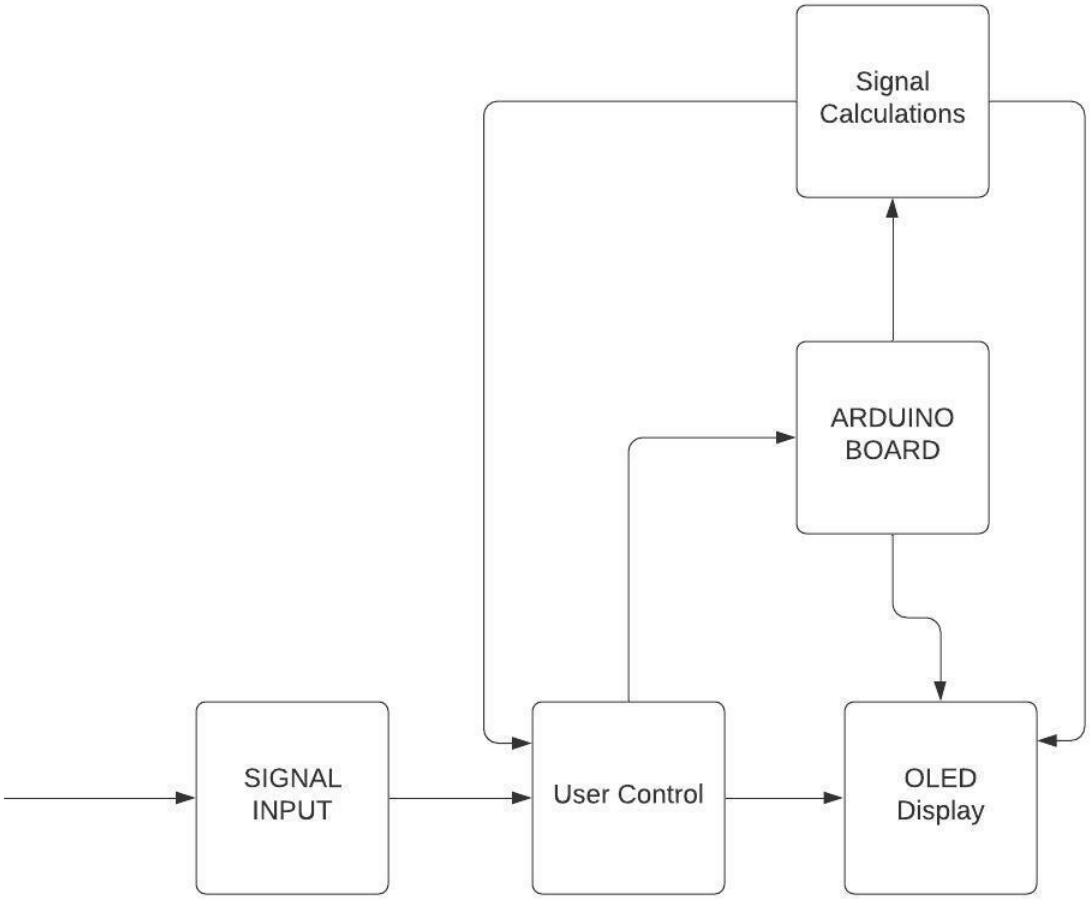
Specifications:

- It can able to measure voltage from 0v and upto 50v.
- Time delay can be varied from 200 μs to 200 ms.
- Positive and negative cycle of wave can be viewed separately.
- 1-25KHz.

Features:

1. Volts/div
2. Time/div
3. Input voltage
4. Input Frequency
5. Duty cycle

Block Diagram:



OLED Display Functions:

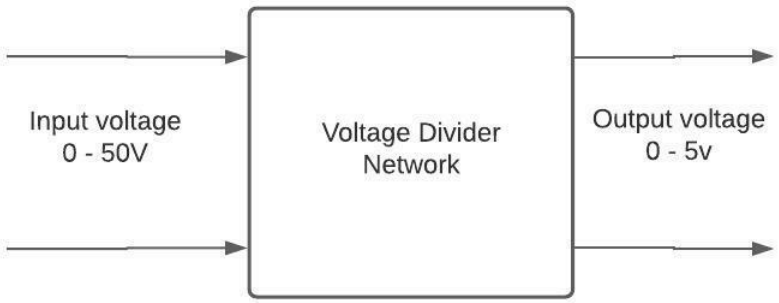
Interface Pin Function		
No.	**Symbol**	**Function**
1.	GND	Ground
2.	VCC	Power supply input: 2.8-5.2v
3.	SCL	Serial clock input
4.	SDA	Serial data input
Mechanical Data		
Item	**Dimension**	**Unit**
Dot Matrix	128x64	Dots
Display Color	Monochrome	
Driver	SSD1306	
Interface	I2C/IIC	
Size	0.96	Inch

Arduino Nano Functions:

Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output
18	AREF	Input	ADC reference
19-26	A7-A0	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

Signal Calculations:

By using 1M potentiometer the voltage level can be calibrated.



Frequency of the signal can be calculated by time period as

F=1/t

Duty cycle can be calculated by using pulse width as

D=P.W/t