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Frequency Spectrum Analyser through OLED display using Arduino Controller

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Abstract -*Spectrum Analyzer is an analog input reader display on OLED,it performing FFT analysis, and displaying frequency bin bars. For apply a Fourier Transform, we are using fix FFT library. A fast Fourier transform (FFT) algorithm numerates the discrete Fourier transform (DFT) of a sequence. Its converts a signal from its original domain (often time or space) to a representation in the frequency domain and vice versa to an audio signal. The signal is acquired through a microphone and is viewed in the frequency domain on an OLED screen.*

***Key Words*: Arduino, OLED (Organic Light Emitting Diode), Microphone.**

1. INTRODUCTION

At the forefront of this advancement are handheld devices that are converting into numerating platforms. This device smaller in size and lower power consumption of such devices offers noticeable advantages over any conventional measuring device giving us opportunities to make use of them in the field of measuring instruments.

An OLED stands for Organic Light Emitting Diode. It is a light emitting device, film of organic compound acts as the light emissive electro luminescent layer and it mainly response to an electric current.

This paper mainly focusses on Arduino Uno microcontroller device, it based on the Atmega328. It has total 14 digital input/output pins. It has 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

A microphone is an electronic device; it works that translates sound vibrations in the air into electronic signals. This signal converted from an analog signal to a digital signal.

2. LITERATURE OVERVIEW OF FREQUENCY SPECTRUM ANALYSER THROUGH OLED DISPLAY USING ARDUINO CONTROLLER

There are two types of conventional analyser depending on their principle of working: First method is Super heterodyne based and Second method is Direct window based. First method is Super heterodyne based on wide frequency range of operation over increased system complexity, cost and size[1]. Second method Direct window based on simple in design but it limits the frequency range of operation[2]. Any signal measuring instrument can be divided into either Analog or Digital domain.

Analog instruments depend on greater accuracy but increased cost and components size limiting its use in specialized laboratories. Digital instruments signal using advanced digital signal processing. It increased processing powers and contraindicate a window based digital domain spectrum analyser.

In this paper we are proposed a Spectrum analyser for general purpose spectrum analysis of audio frequency by using microphone. Some spectrum analysers have integrated functions like modulation decoding and radio frequency signal generation[4]. Modern spectrum analysers use digital techniques to combine and reduce the hardware.

Fig –1: Arduino UNO

Arduino is a ATmega328 microcontroller device. It has 5V operating voltage, 7-12V input voltage,

this is recommended. It has 14 digital Input/Output pins and 6 analog input pins. Arduino has 32KB of which 0.5KB used by bootloader flash memory. It has 40mA DC current per I/O pins and 50mA DC current for 3.3V pin. It has 2KB SRAM, 1KB EEPROM and 16MHz clock speed. Arduino UNO powered by USB connection or an external power supply, power source is automatically selected. External power can come from AC to DC adapter or battery. The adapter connected plugging by 2.1mm center positive plug into the board's power jack. The Arduino UNO is used for communicating with computer[5].

In this research paper the (organic light emitting diode) OLED display is use for displaying the output from input.

Fig – 2: OLED (Organic light emitting diode)

OLED has emissive electro luminescent layer is a film of organic compound which emits light in reaction to an electric current[6]. OLED are used to make digital displays in devices such as television screens, computer monitors, portable systems such as mobile phones[7].

Microphone is used for recording the human voice and converts to the spectrum then present on OLED display.

Fig – 3: Electret Microphone Amplifier

Characteristics of microphones such as frequency response, frequency range, dynamic range and directionality[8]. The frequency response of microphones should be flat i.e. variation of less than 2dB.

3. CONCLUSIONS

From overview of Frequency Spectrum Analyser through OLED display using Arduino Controller, it is observed that we can make freely handheld, small in size and low power consumption device. We will put a completely new approach of analysing signal in frequency domain. In this new research technique, we are using Arduino, OLED display and microphone.

We are presenting the human voice or any other voice by using microphone and then analysing the voice and displaying on OLED display in the form of spectrum.

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