HACETTEPE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
ELE 401-402 GRADUATION PROJECT

# LOW COST AUDIO FREQUENCY SIGNAL GENERATOR FOR LAB-AT-HOME ELECTRONICS EXPERIMENTS

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## Introduction

- ❖ Signal generators run over the audio range, typically from about 20 Hz to 20 kHz , and are often used as sine wave generators.
- ❖ They are often used in audio measurements of frequency response and for distortion measurements.
- ❖ As a result they must have a very flat response and also very low levels of harmonic distortion.
- ❖ The purpose of this project is to make low cost battery operated audio signal generator for lab at home.

## Application Areas

- ❖ Application areas are to generate sinus, triangular square and sawtooth signals from battery powered, affordable audio frequency signal generator in experiments done in home environment.
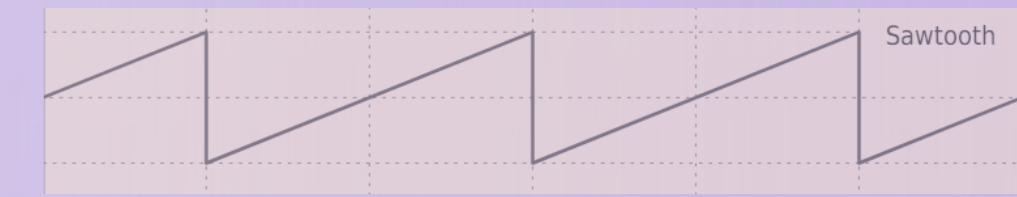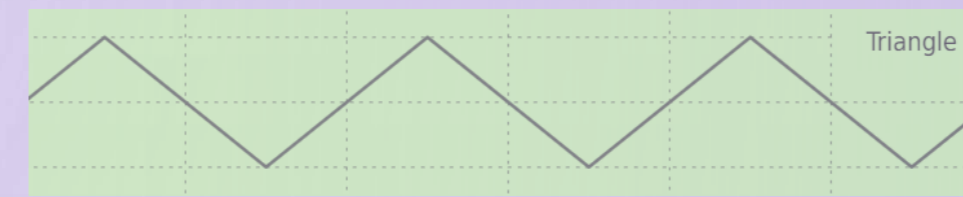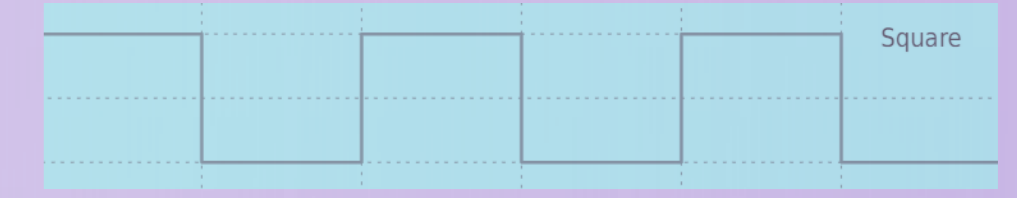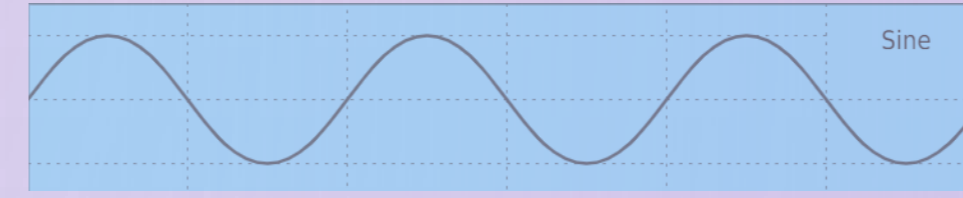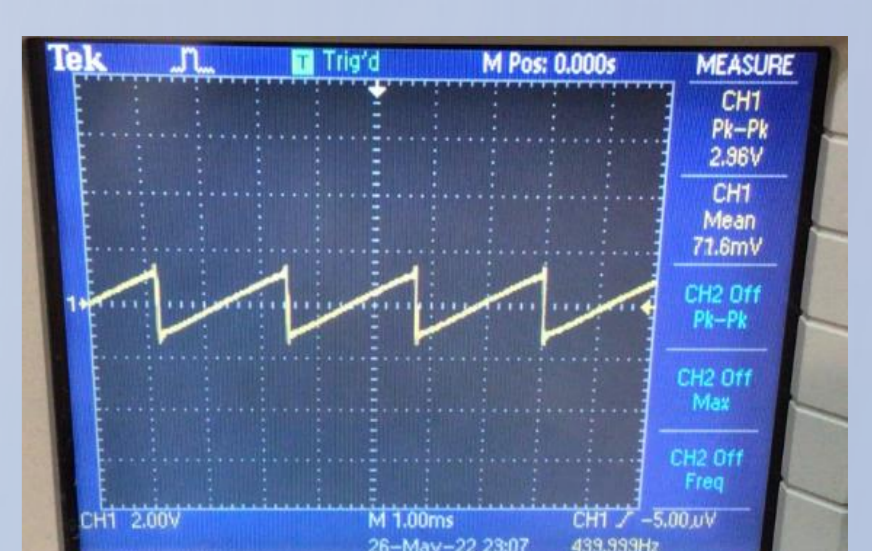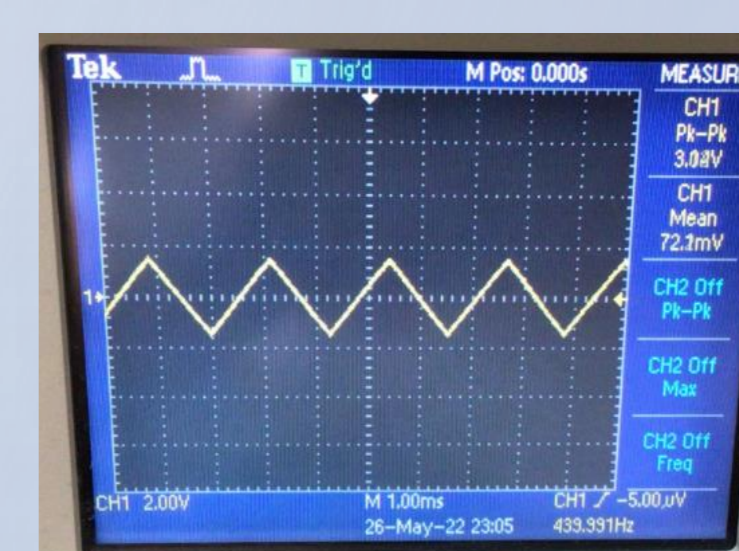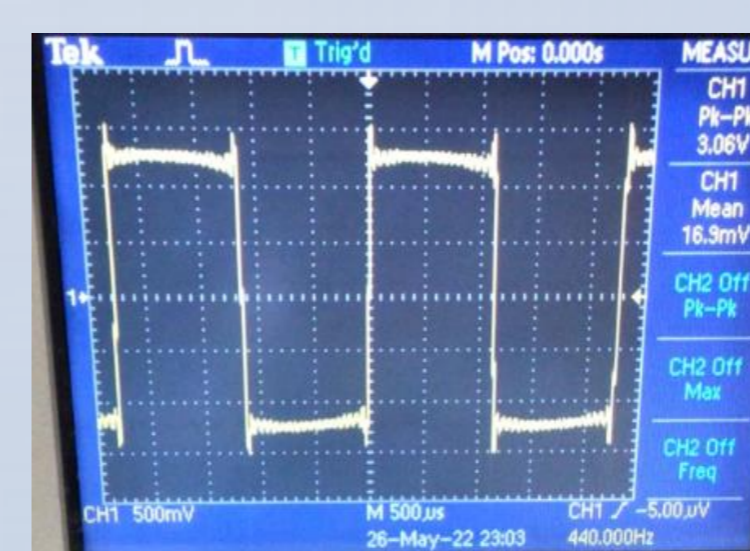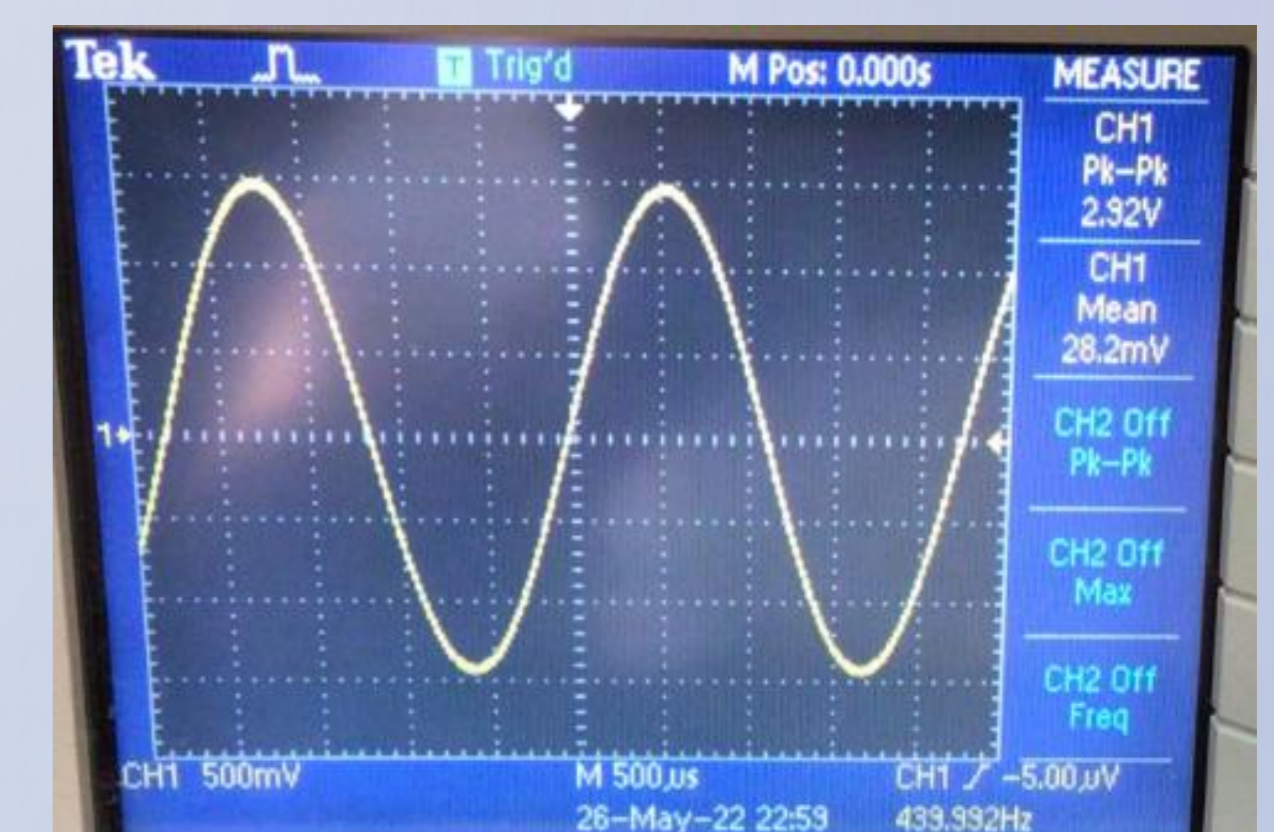


## Specifications and Design Requirements

The components used in the system and their features are as follows:

- ❖ Microcontroller : Arduino NANO(Atmega328p)

- ❖ Power Supply : 9V Battery

- ❖ Communication Protocol : I2C(Inter-Integrated Circuit)

- ❖ Screen:2x16 LCD Display

- ❖ Easy to use, compact and portable

## Solution Methodology

- ❖ Using the signal generator application installed on the smartphone, I made a homemade signal generator that produces sine square triangle sawtooth signals at different frequencies using the aux cable from the audio output. I am showing the amplitude value on the screen using Arduino.
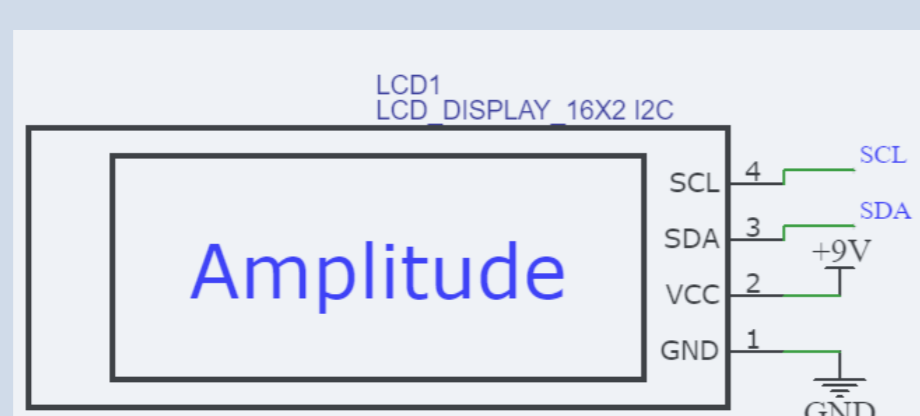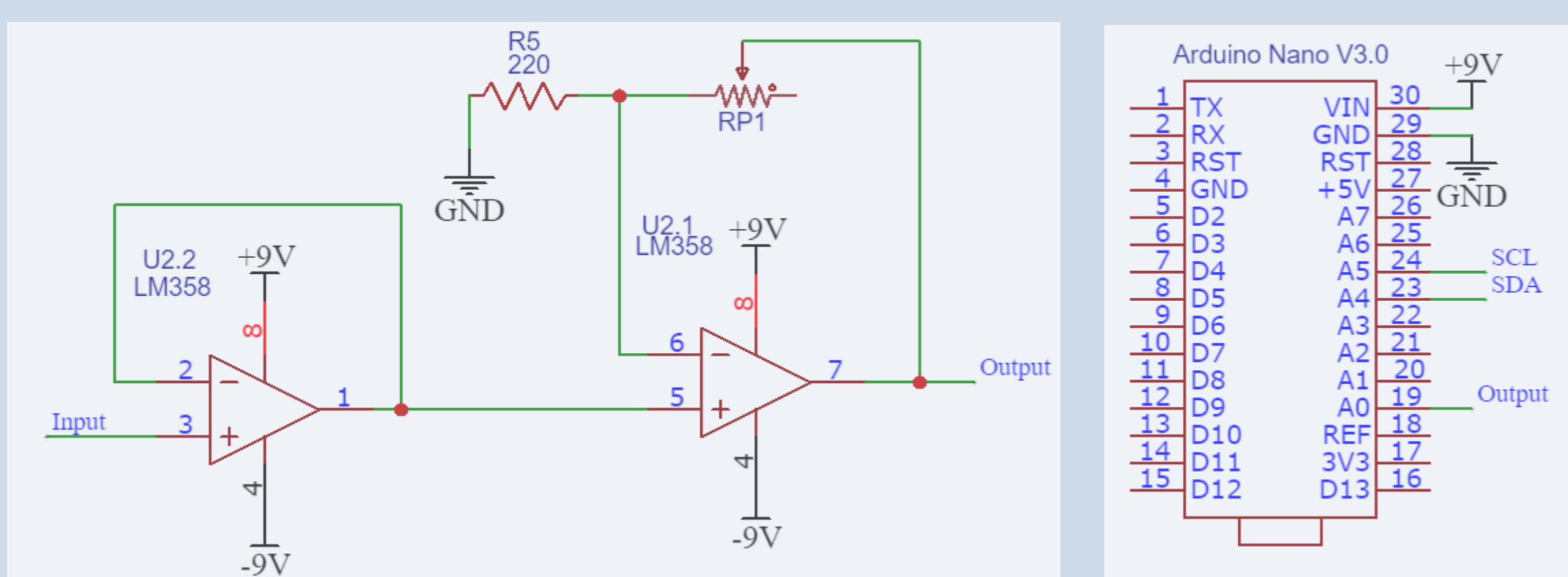


- ❖ I feed my system with two 9V batteries, and I turn them on and off with the buttons I connect to the ends of these batteries.

- ❖ The system turns on when the buttons are pressed at the same time, and shuts down when they are pressed again.

- ❖ With the potentiometer I use in the system, I ensure that the shape of the wave is smooth and I can adjust its amplitude.

- ❖ My system can be improved by increasing the quality of the materials used and the output can be made more error-free.

- ❖ By developing this system, amplitude and offset value can be adjusted.

## Results and Discussion

- ❖ To use the program, I downloaded to my smartphone, I connect the phone to my circuit with an aux cable and take output from the oscilloscope.

- ❖ I fix the smoothness and amplitude of the outputs I get with the pot in my circuit. The frequency output matches the frequency displayed by the smartphone app.

- ❖ The values of the output wave on the oscilloscope and on the LCD display match each other. I made observations at different frequencies and waveforms.



## References

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- Types Of Signal Generators & Applications, Block Diagram

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- https://www.nutsvolts.com/magazine/article/seven-common-ways-to-generate-a-sine-wave

## Acknowledgements