Digital Filtering using C8051F020

Course**: Bioelectronics**

Team ID: 01

Team members:

Name	SEC	BN	Seating Number
Rawan Sayed	1	30	53030
Sara Adel	1	35	53035
AlZahraa Eid	1	16	53016
Ahmed Adel Ahmed	1	06	53006
Kirolos Dawood	2	15	53060

Submitted to Dr. Ahmed Ehab

ABSTRACT

Real-time digital filtering module receives noisy analog signals simultaneously via its channels and have 2 types of digital filter. After filtration, digital signals shall be converted into analog again and accessed via the C8051F020 pins .

Table of Contents

List of Figures

Introduction

We have 2 signals so we use 2 weighted summer each one used to add three sinusoidal waves to enter to ADC then to our microcontroller C8051F020

After that, we use low pass filter for signal one and high pass filter for signal two and finally we enter the both signals to DAC

Circuit schematic

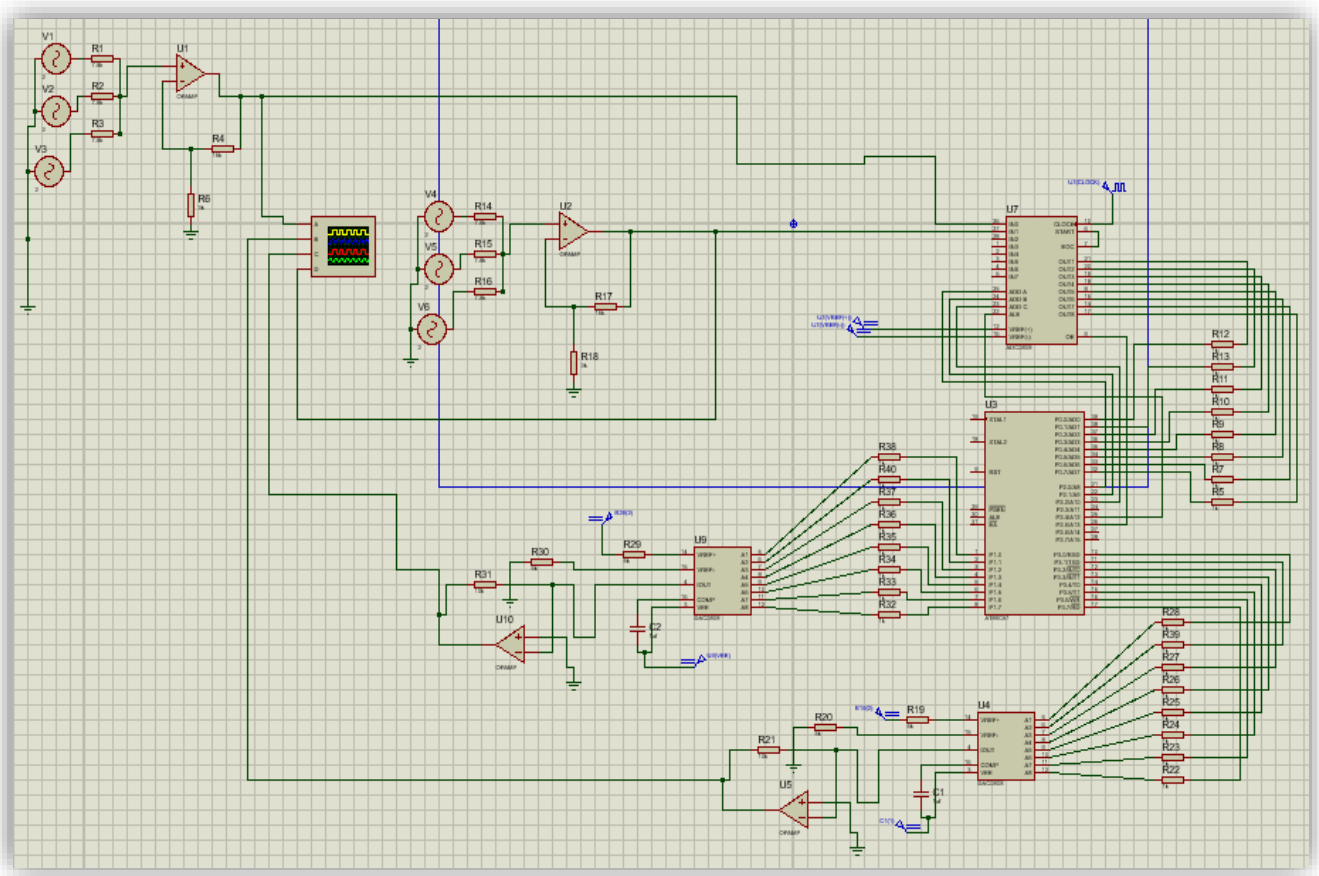

Figure 1 :Circuit Schematic

Circuit Diagram

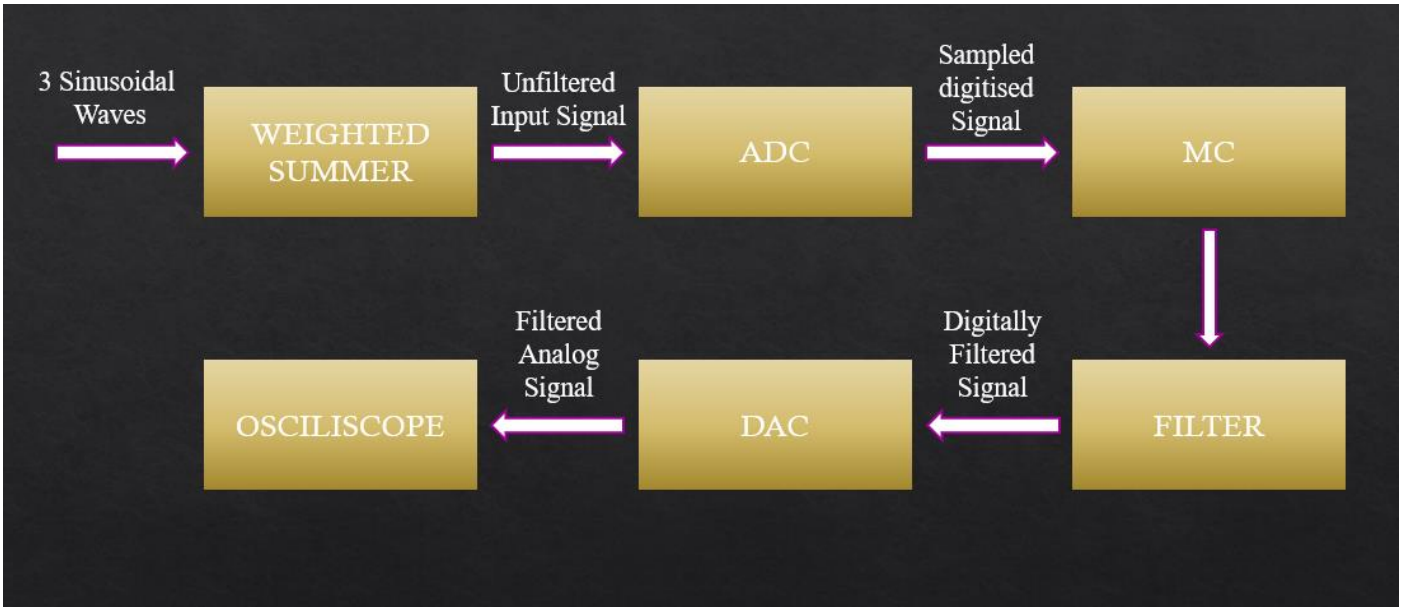

Figure2 :Circuit Diagram

Design description

- Weighted Summer

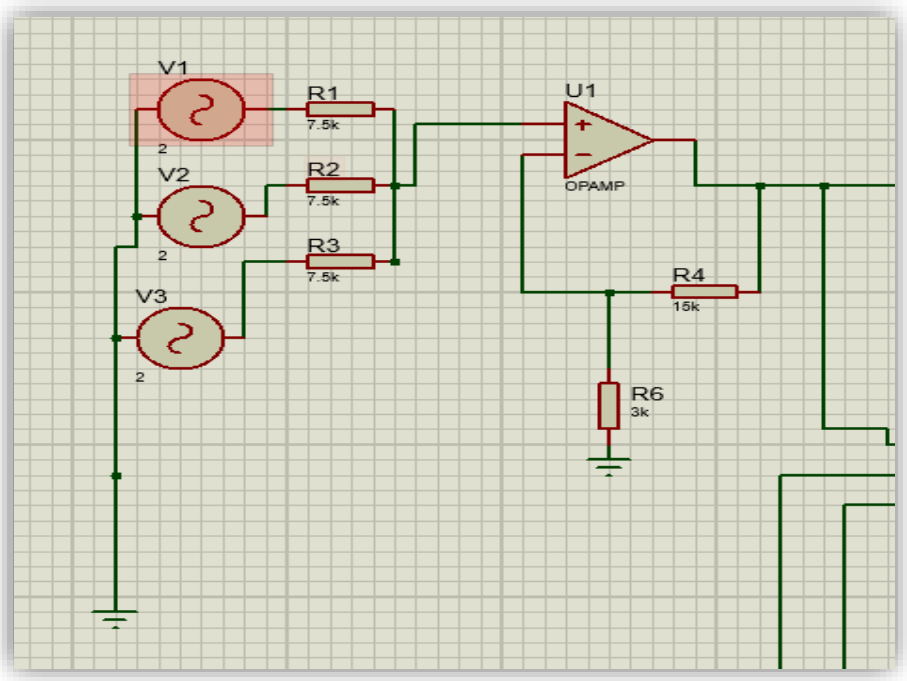

Figure3 :Weighted Summer

- Our 2 used signals after weighted summer at two different channels

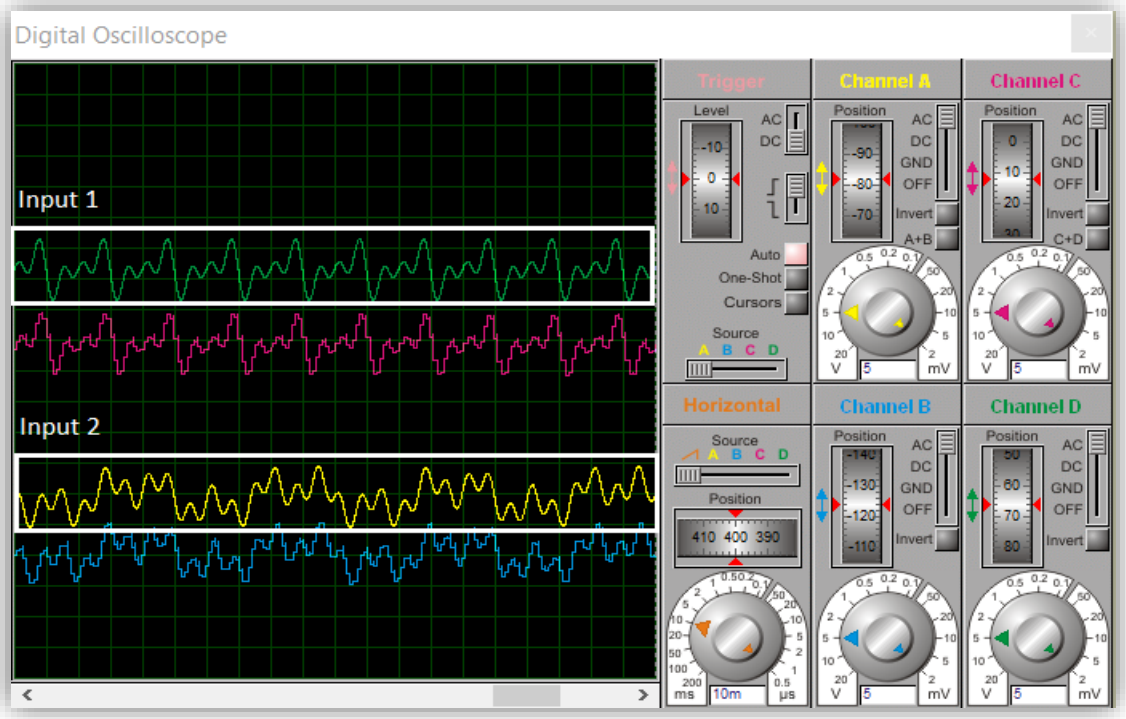

Figure4 :Used Signals

- ADC

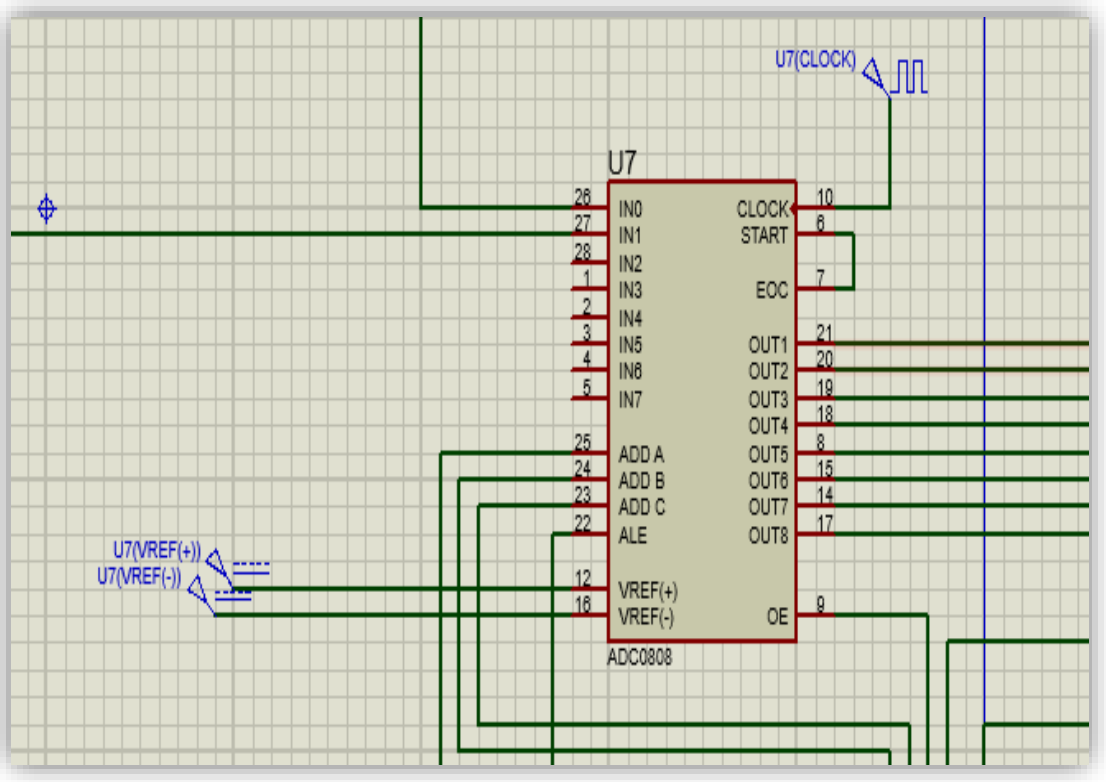

Figure5 : ADC

- Microcontroller C8051F020

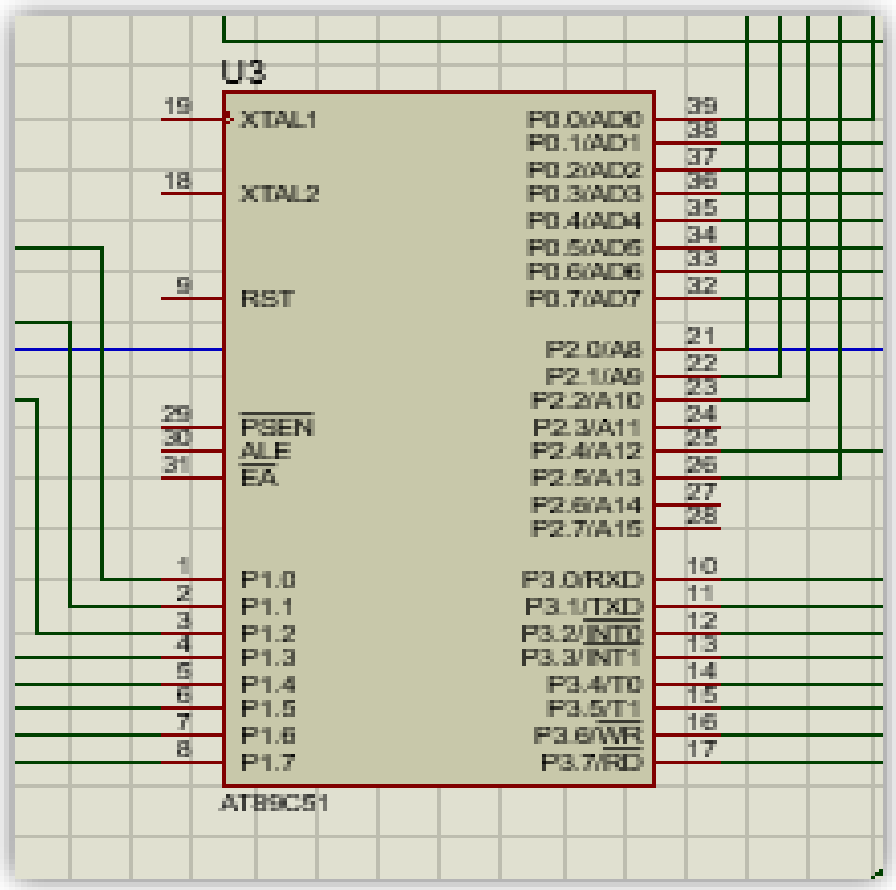

Figure 6 :Microcontroller C8051F020

- DAC

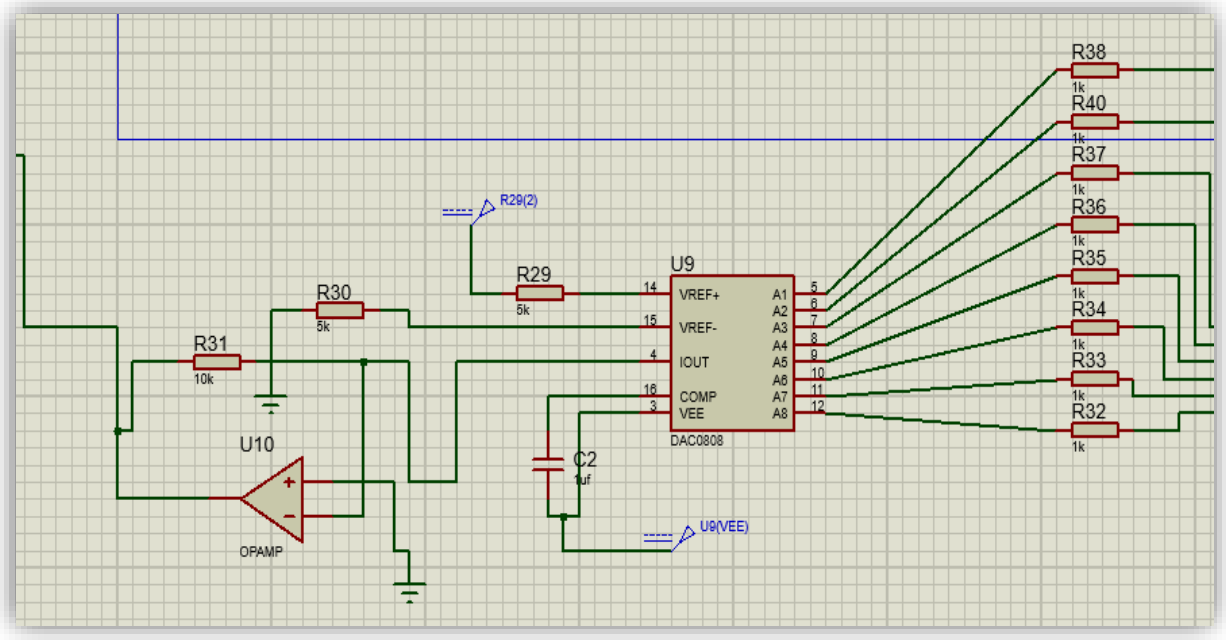

Figure 7 : DAC

- Output after DAC

  - Without Filtration and Switch ON

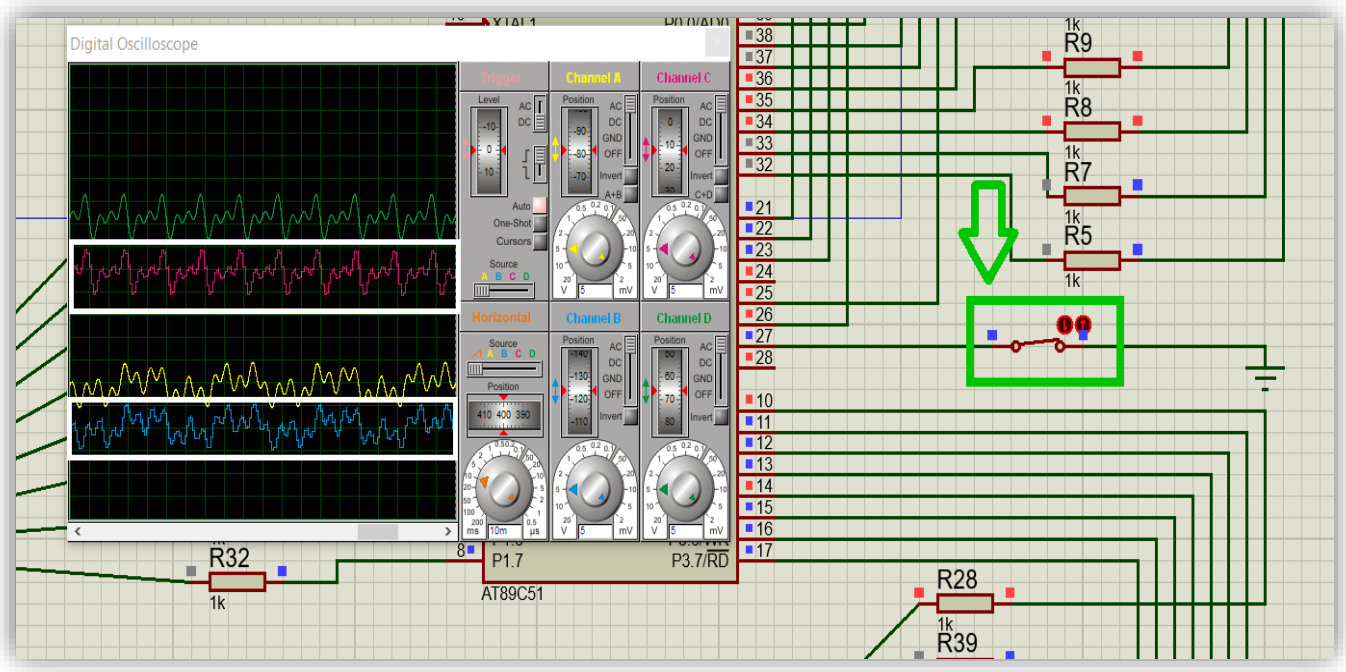

Figure 8 :Output without Filtration

  - With Filtration and Switch OFF

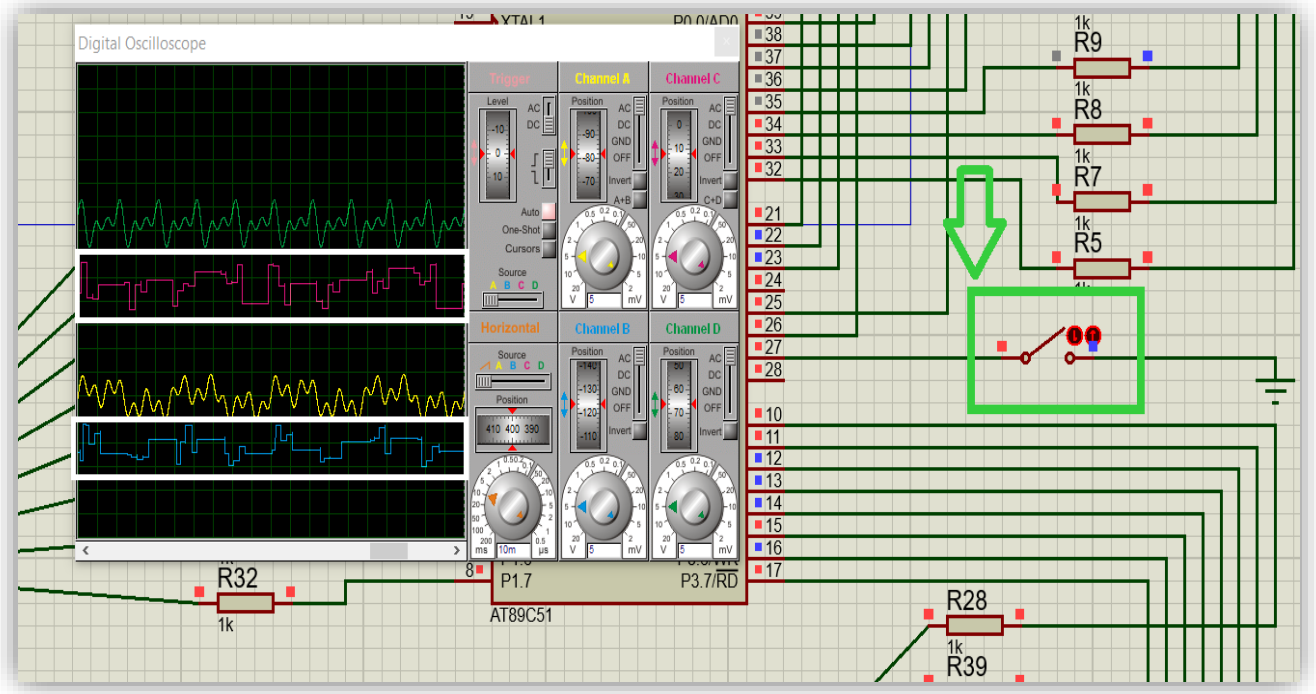

Figure 9 :Output With Filtration

Description for Digital filters used along with equations

We use two types of filters :

1. Low Pass Filter for signal one
2. High Pass Filter for signal two

Filter order N=3

- Used Equation

$$`y[n] = b\_0 * x[n] + b * x[n-1] + ..... + b * x[n-N] `$$

$$`y[n] = sum\_(i=0)^n b\_i * x[n-i] `$$

- x[n] ---------- input signal
- y[n] ---------- output signal
- bi ---------- filter co-efficients
- N ---------- filter order

Figure 10 :Filtration Equations

- Used coefficients

Low Pass Filter	0.34917535	0.229359258	0.229359258	0.34917535
High Pass Filter	-0.641653637	-0.649742213	0.649742213	0.649742213

Figure 11 : Filtration Coefficients