

EE447 Project Preliminary Work

In this project, a stepper motor is driven according to audio signal's frequency. Audio signals are obtained by GY-MAX9814 microphone, and the frequency is calculated by using ARM CMSIS DSP library from audio signals. According to the frequency value, stepper motor's speed changes.

Audio sampling is done by using ADC and sampling frequency should be 2 kHz. Sampled data should be stored in 256 element array and converted to frequency. Highest frequency value should be detected, and operation should be done based on highest frequency.

Stepper motor speed is determined according to three thresholds. Firstly, audio signal's amplitude should be higher than amplitude threshold to change its speed. If it is lower than amplitude threshold, the stepper motor preserves its speed. Other two threshold value determine the stepper motor speed as shown in Figure 1. Stepper motor direction should be changeable from switches on the TM4C123G board.

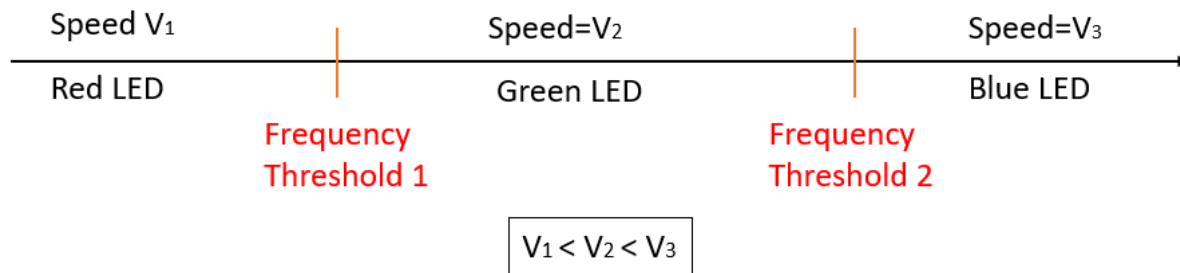


Figure 1.Speed configuration according to frequency

Moreover, according to speed value in the Figure 1, LEDs on the TM4C123G board are configured. If the audio signal can not pass the amplitude threshold, all LED should be off.

Also, detected frequency, its amplitude and threshold values should be displayed in Nokia LCD screen.

Pseudo Code

```
Initialize_Microphone();
Initialize_StepMotor();
Initialize_LCD();
Initialize_LED_Buttons();

while(1){
for(i=0,i<256,i++){
    Signal[i]=GetAudioSignal();
}
FFT(Signal);
frequency=Get_dominant_freq(FFT);
amplitude=Get_amplitude(Signal);
display_LCD(amplitude,frequency,thold_ampl,thold_freq1,thold_freq2);
//show amplitude, frequency and thereshold values.
//thold_freq1<thold_freq2
//v1<v2<v3 for step motor
if(amplitude>thold_ampl){ //compare to thereshold
    if(frequency<thold_freq1){
        Red_led=1;
        speed_step_motor(v1);
    }
    else if(frequency>thold_freq1&&frequency<thold_freq2){
        Green_led=1;
        speed_step_motor(v2);
    }
    else if(frequency>thold_freq2){
        Green_led=1;
        speed_step_motor(v3);
    }
}
else(){//turn of leds and preserve speed.
    Red_led=0;
    Green_led=0;
    Blue_led=0;
}
if(SW1==1){//if SW1 is pressed
    direction_step_motor(CW);
}
else if(SW2==1){// if SW2 is pressed
    direction_step_motor(CCW);
}
}
```

Flow Chart

