Project Title: **Stop Noise Pollution From Honking**

Group No.: **DD-15**

Names and Roll Numbers:

Dimple Kochar- 16D070010

Nisha Brahmankar- 16D070019

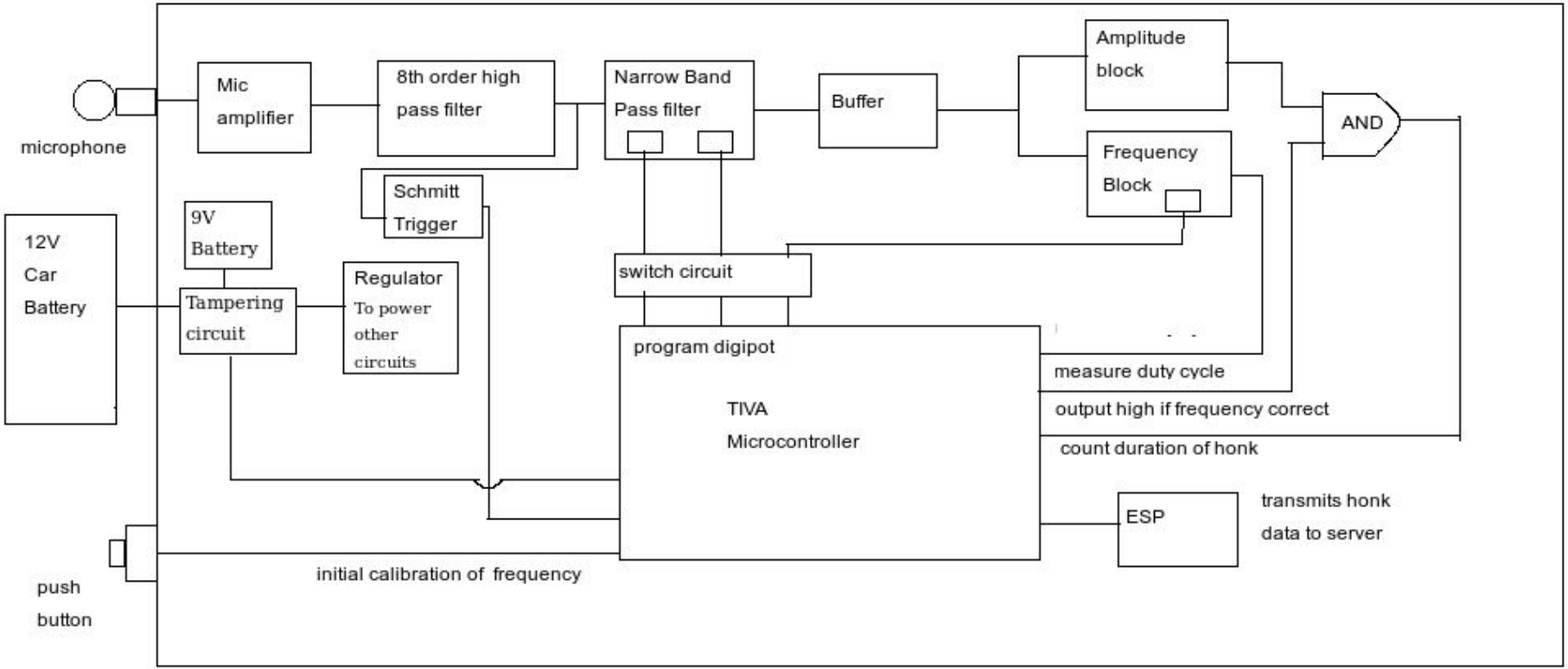
Pratyush Ragini Singh- 16D070046

Faculty mentor: **Prof. Pramod Murali**

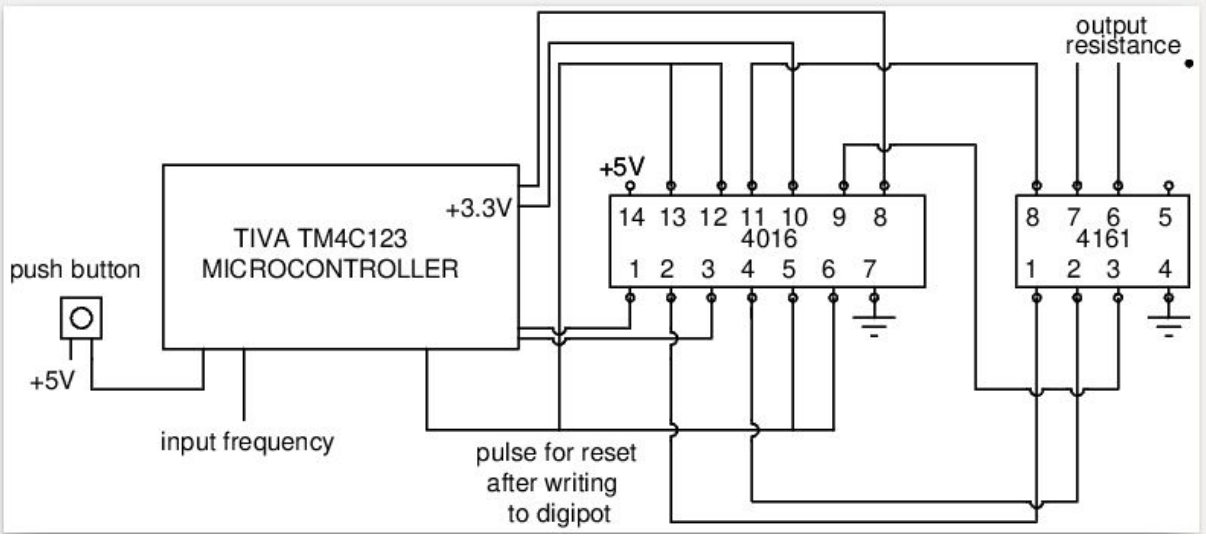
Project Objectives:

- Count the number of times a driver uses the horn of the car
- Transmit this data to a server for analysis
- Detect if our device was tampered with

Block Diagram

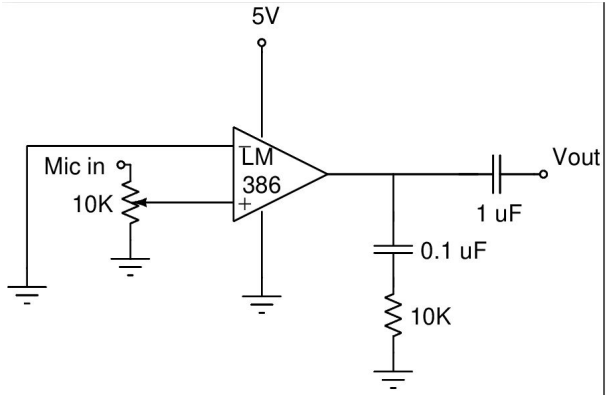


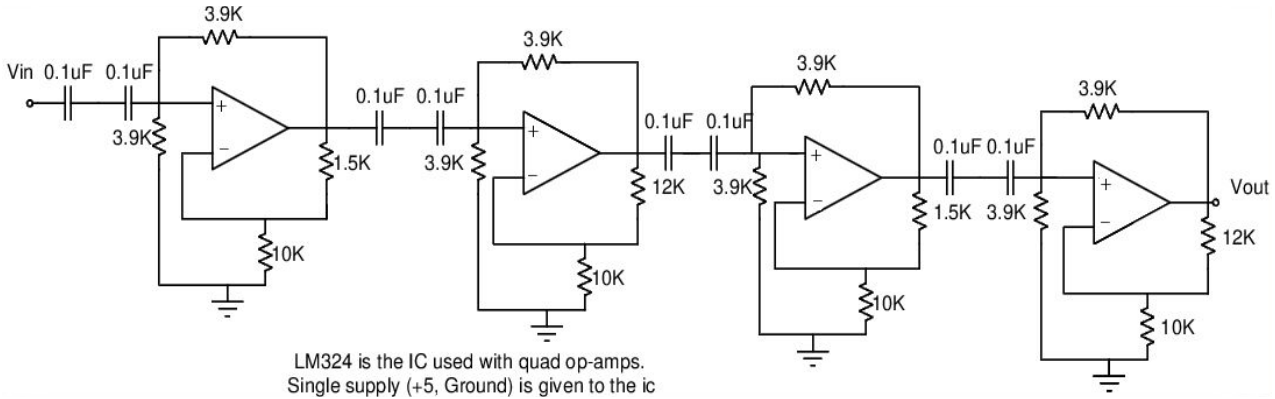
Calibration

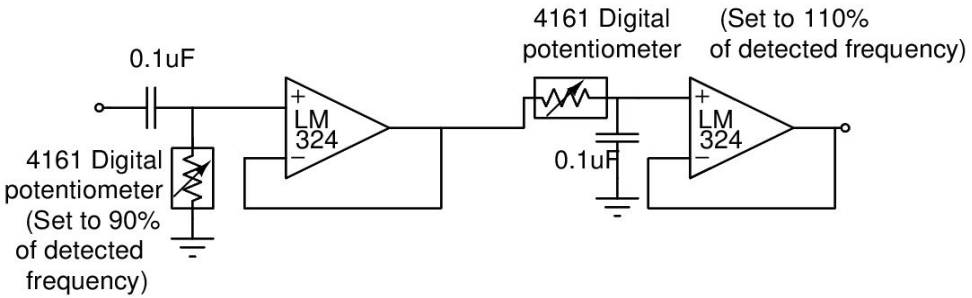


Before the device is put to use, we have to calibrate it for the frequency of our horn. For this, we press the push button for 2 seconds, during which the input signal is read by the microcontroller, and frequency is obtained. Then, the digital potentiometer writes this accordingly to the digital potentiometers. For the written value to reflect, we need to disconnect all connections to the digital potentiometer, for which we use a switch.

Mic amplifier and Filtering

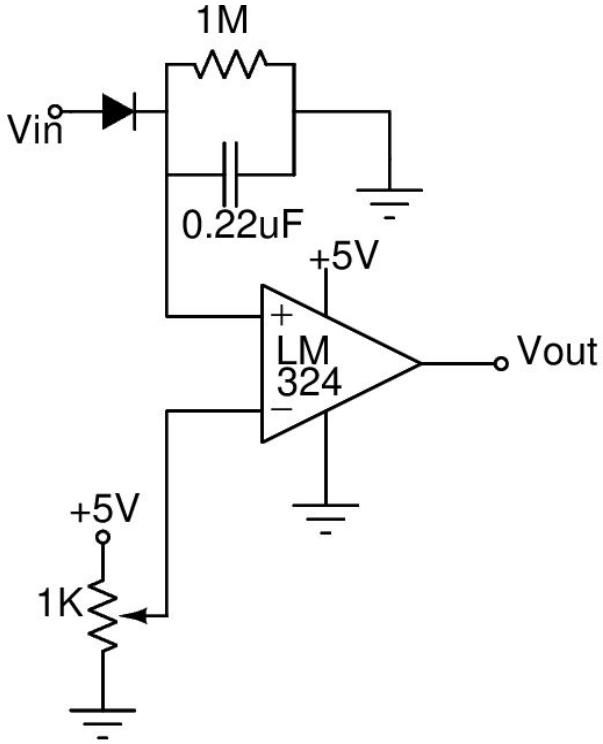






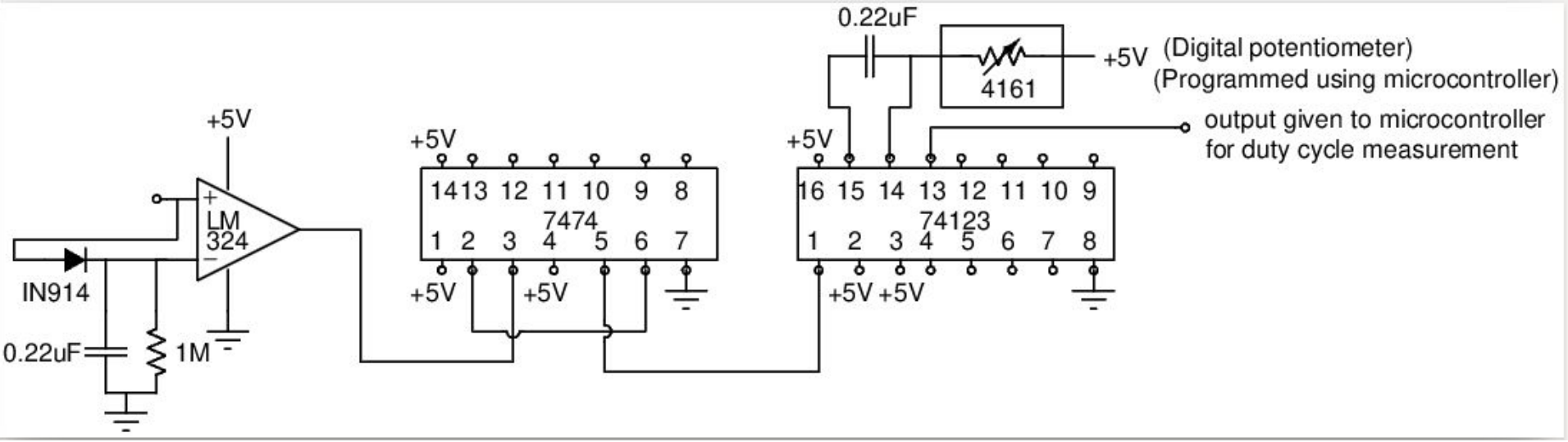
- We need to amplify the signal obtained from the mic which is a very low signal. So, we use an audio amplifier which amplifies 100 mV signal to about 1.5V. This amplification can be controlled by the pot in the initial stage.
- We then have a high pass filter, from which a schmitt trigger is connected for calibration stage (seen in block diagram).
- We then have a narrow band filter for restricting our signal to the frequency of interest, whose potentiometer values were set during calibration.

Amplitude Block

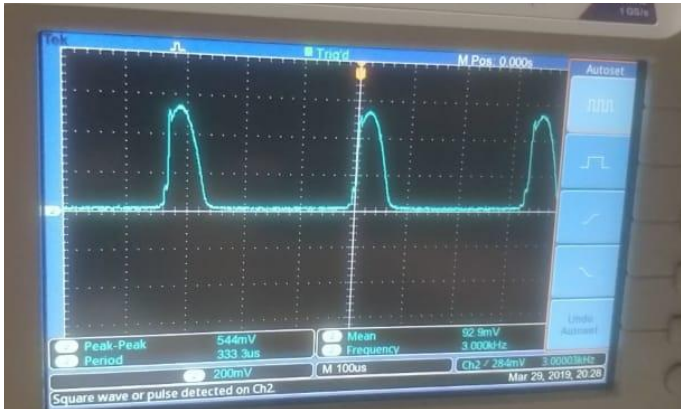


- The signal that we receive from the small filter is converted to a DC voltage. If this voltage is above a certain threshold, the signal is detected as our honk.
- The threshold has been selected after considering how horns sound in different cars and what the final input amplitude is approximately like to the block.

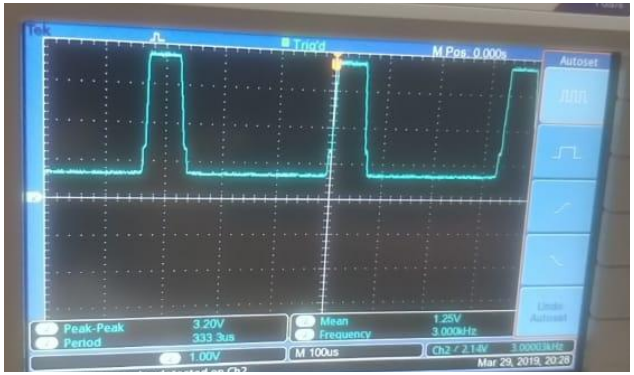
Frequency Block



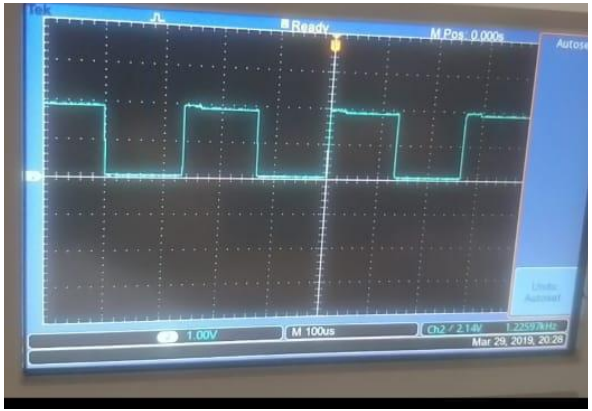
- The narrow band signal we receive is converted to a pulse wave of unknown duty cycle of the same frequency.
- Then, using the 7474 IC we convert it to a 50% duty cycle wave with the half the frequency, because 74123 IC requires a nearly 50% duty cycle signal to function.
- The 74123 outputs a signal as follows: 1) If input frequency is higher, it gives a >50% duty cycle pulse.
- 2) If input frequency is lesser, it gives a <50% duty cycle pulse. This is measured by a microcontroller which gives a high value if the duty cycle is between 49%-51% (thresholds decided)



1) Output of high pass filter



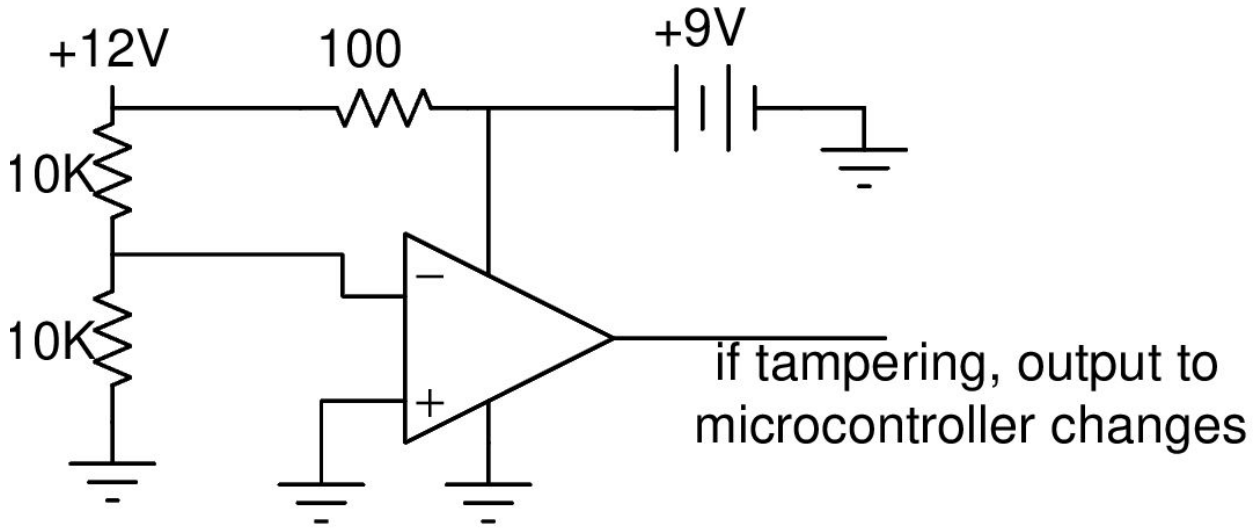
2) Comparator output



3) Duty cycle correction

4) Frequency comparator

Tampering



If the 12V supply wire is cut, microcontroller sends a signal through esp that our device is tampered with.