

WORKSHOP (IN LAB GROUPS)

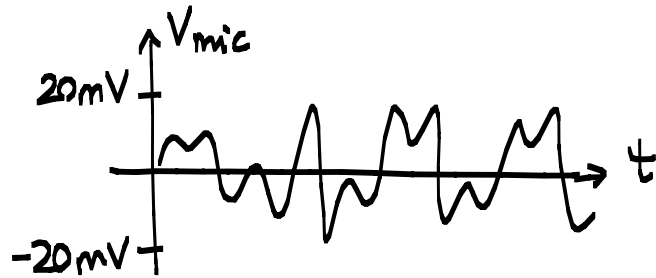
Topic: PROJECT 4 HARDWARE

Subtopic: Input signal conditioner

References: lecture notes on amplifiers

The μC Analog to Digital interface operates best when the input analog signal spans its entire dynamic range (0-5 volts).

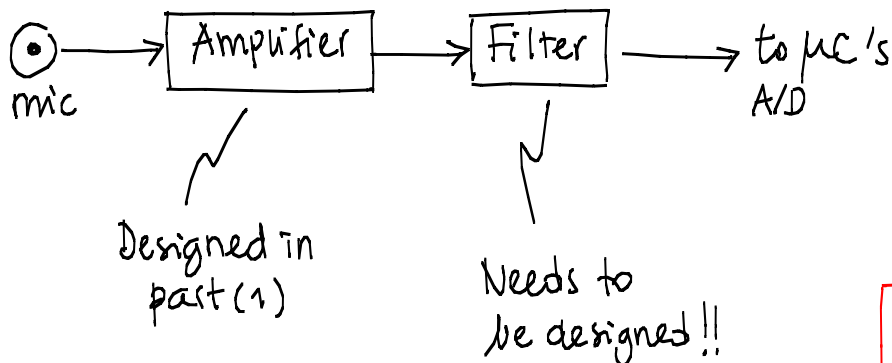
The signal coming from the microphone is a 20mV peak signal that looks like this



(1) Determine what kind of amplifier topology you want to use in order to obtain a signal that goes from 0 to 5V.

The outcome should be the circuit diagram with component values

(2) As it was discussed in class, it is best for the quality of the converted signal to filter its contents before performing A/D conversion.



Design a second order low pass filter for the anti-aliasing block in the preconditioner.

Note: You must determine the cut-off frequency of the filter !!

The outcome of this step must be the filter circuit diagram with component values

WORKSHOP (IN LAB GROUPS)

Topic: PROJECT 4 HARDWARE

Subtopic: Headphone Driver

References: Lecture notes on amplifiers

Sketch the block diagram of the electronics at the output of the μC for project 4.

Because of the headphone impedance being $32\ \Omega$, it is not recommended that we drive it with a signal directly from the filter/amplifier (WHY?)

Instead, we add an extra block, so called the headphone driver, that is capable of providing the power needed by the headphone

We will use the Op-Amp for that purpose. Download its datasheet and answer the following questions:

- (1) What voltage range should we use and from what source?
- (2) Sketch the circuit diagram for an inverting amplifier with gain of -1 .
Pick the component values and justify them
- (3) How should we connect the headphone to it?

THE FINAL OUTCOME OF THESE TWO WORKSHOPS IS A CLEAR UNDERSTANDING AND DESIGN ABILITY FOR PROJECT 4 HARDWARE.

If at the end of this process Project 4 hardware is not clear is because you did not come to class

