

Lab 05: Instrumentation Design

Medical Electrical Equipment (BME590L)

2023-03-27

- Design a circuit that has the following specifications:
 - Accepts two input signals:
 1. 500 Hz sinusoid, $V_{p-p} = \pm 50$ mV
 2. 5 kHz sinusoid, $V_{p-p} = \pm 150$ mV
 - Rejects all other frequencies, especially 60 Hz noise (i.e., optimize SNR)
 - Combine both signals to have equal energy (i.e., both frequencies have the same amplitude) and maximize the dynamic range of a single analog input rated 0-3.3 V tolerant.
 - Protects the analog input pin from excessive voltages (e.g., diode clipper / limiter)
- Represent your circuit as a functional block diagram, with all relevant functional specifications delineated.
- Translated your block diagram into a circuit schematic in KiCad. Use all best practices in creating the schematic. Assume 5 V DC power is available to your board through a 2-pin connector.
- Refine your circuit to be as functional as possible with the fewest number of components.
- Fully annotate your schematic and make sure that it passes ERC completely.

Please submit the following:

- Upload a PDF containing the following items to Gradescope:
 - Block diagram
 - Circuit schematic
 - ERC report output¹
- Upload a zip archive of your KiCad project to your **Drop Box** on Sakai, using the following filename: `LastNameFirstName_Lab05.zip` (e.g., `PalmeriMark_Lab05.zip`)

Next week we will layout a PCB based on your circuit to fit onto your nRF52833DK...

¹You can save an ERC . rpt file and convert that to PDF.