Electrical Design

Project A

Design a Buck-Boost Convertor. To learn about buck-boost convertor, look at the vieos in the link below. Buck Convertor starts from the 15th video.

https://www.youtube.com/playlist?list=PLmK1EnKxphikP6c9Yc9kGYO0kvrbEoWN8

To Do:
1. Design a schematic and upload it on the canvas.
2. After the schematic review, design the pcb and upload it on canvas.

P.S. Watch all the videos as they will be very helpful in general

You may use either Altium or Eagle/KiCAD.

Project B

Design a filter for Transcranial Magnetic Stimulation – Electrocorticography experiments (TMS-ECoG)

To design this low-pass anti-aliasing filter, use the following specification:
- cut-off frequency: 500Hz
- Gain: -80 dB/dec

You may use Op-amps/instrumentation amps and passive components to design this circuit.

Ensure that the filter can be bypassed upon a stimulation trigger. (Else you end up with ringing artifact due to the impulse response of the filter)

Input channels: Channel 1 and Reference Channel (From raw electrode signal)
Output channels: Filtered Channel 1 and Reference Channel (To main ECoG amplifier)
(You can make it for 4 channels sharing the same reference channel if you have time)

Potential application: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3499764/

To Do:
Design the filter topology
(great series of videos here:
Filtering 101: https://www.youtube.com/playlist?list=PL64A193CF0B94C5D3
Sallen-Key 101:
https://www.youtube.com/watch?v=DEV7l66D6Ys&list=PLiwaj4qabLWxp1kilM2Pa6H-db8zygpNo

Design a pcb for the filter – Use either Eagle/KiCAD or Altium