

Title: FPGA EKG

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Our goal is to create an Electrocardiogram using the Nexys 4 DDR FPGA. Like most professional-grade EKG's used by medical personnel in hospitals and ambulances, we aim to create an EKG capable of detecting 12 leads (or pictures) from 10 different physical leads attached to the patient. Since the Nexys has only one ADC, we will need to use analog multiplexing outside of the FPGA to read in the various lead voltages. Leads from the patient will be filtered using low-pass filtering and a notch filter at 60Hz to prevent line noise. The device should allow the provider to view all 12 leads in real time.

Should we complete the above goals, we will add additional features including the selection of specific waveforms, for example aVR. This will allow the paramedic or hospital worker to select one lead of interest and get a larger view of that picture. We would also like to incorporate heart rate detection. If both of the above are complete, we would also like to add STEMI detection to the processing. This will allow the machine to make recommendations of treatment based on whether the patient may be experiencing a heart attack.