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Final Project Abstract
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We will implement a pulse oximetry monitor on the Nexys 4 DDR FPGA board. The user will wear a pulse oximeter, which will provide oxygen saturation data. Our system will first process that data and then output a smoothed signal and heart rate calculation to the user.

Data processing will occur in our signal processing block. First, we will implement a moving average filter to smooth the data. Then, by detecting local maxima of the resulting heart rate waveform, we will identify the peaks in the signal.

The output block will handle output of this data to the user in an intuitive manner. The processed oxygen saturation waveform will be displayed on a VGA monitor, and the user's calculated heart rate will be periodically announced through a recorded voice played through the mono audio output.

If time allows, we will implement more advanced signal processing methods (e.g., smoothing with a Butterworth filter or wavelet-based peak detection) on the FPGA. Other possible features include ability to save the captured data to an SD card, as well as improved graphics in the form of an animated heart beat icon with a calculated heart rate readout gauge. As a stretch goal, we would like to make the pulse oximeter sensor wireless using an Xbee wireless UART serial link.