Sound Source Localizer
Joren Lauwers, Changping Chen

Description
In our final project, we will build a sound source localizer - a system that positions the source of human speech on a 2d map. We will on Nexys 4 FPGA sample audio data at high frequency from three carefully positioned, cheap condenser microphones, and triangulate the source of the signal in real-time based on its difference in time of arrival. Five main components of the project are (a) setting up a pre-amplification stage for each of the microphones, (b) sampling signal using onboard ADC and filtering noise, (c) computing signal's delay between microphones by performing computation-intensive real-time cross-correlation in parallel, (d) triangulating sound source through trigonometry, and (e) visualizing the result via a VGA-rendered spotlight.