

ELEC 361 Measurement and Analysis

Lab 8. Fun with three Arduinos :: The full Theremin

This 1-week lab requires you to combine two, or three, Arduinos to make a full Theremin that works nicely. This lab is only available to students who have completed the half-a-Theremin lab, and are looking for an Arduino challenge.



The full Theremin

A Theremin has distance sensors that independently modulate amplitude and frequency. The modulation of both must be smooth - very smooth - so that no discernible step in frequency or amplitude occurs.

Lab Tasks

Take screenshots of your work throughout the lab and hand in your program code with the final report. Include photographs of your setup, annotated to explain functionality.

The first task is to improve the half Theremin so that frequency modulation is smooth. This can be achieved by using one Arduino to solely measure distance, and communicating the distance to a second Arduino that performs the frequency synthesis. Since distance is measured at discrete times, there needs to be some smoothing of the measured distance to use as the frequency input. The key design decisions required are: how to perform the smoothing (analog or digital); how to perform the communication (analog or digital bus).

Once you have achieved smooth frequency modulation, use a third Arduino to measure distance (traditionally orthogonal to the frequency control) that you use to modulate amplitude of the synthesized waveform.