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6.101 Final Project Abstract

Laser Harp (v2.0)

For our final project, we intend to design and construct a laser harp. The laser harp will entail three subsystems: the harp interface consisting of laser beams, a synthesizer to generate tones corresponding to each harp “string,” and an audio amplifier to produce louder output.

Roughly, the harp interface will be set between two frames, an upper and a lower frame, and will be comprised of a number (perhaps six, for a pentatonic scale) of different harp “strings.” Each “string” is a column of laser beams passing from the lower frame to the upper frame. On the lower frame will be groupings of lasers (one per column); positioned on the upper frame directly above each laser grouping will be a corresponding grouping of photodiodes. The current from all the photodiodes in a group will be summed to provide a cumulative current proportional to the intensity of incident light. This eliminates the need to have very precise positioning of a single laser and single photodiode for each harp string. It also would allow us a measure of volume control if we can differentiate between partially or fully blocking the beam.

Each harp string can be played by passing one’s hand through the laser beam to disrupt it, reducing or eliminating the incident light on the photodiodes. This will trigger the audio synthesizer to play a tone of the frequency corresponding to that particular harp string. Lastly, we will construct an audio amplifier to boost the tones produced by the synthesizer for a louder output signal.

Time permitting, we may attempt to add additional functionalities or modes to the laser harp. One possible mode is having an additional beam that, when interrupted, can modify (for example, shift up or down by an octave) the set of tones played by each string. Another possible functionality we may consider is the ability to toggle the strings, such that disrupting the beam once will trigger a tone that continues to play until the beam is broken a second time.