# Led Cube

## Abstract:

Our project consists of building a 3 dimensional LED array that will be able to display various graphics through the concept of persistence of vision. The array will also be sensitive to motion in three directions, allowing it to focus certain graphics to a targeted audience through motion detection. There will be several options for display including non-directional animations and direction focused graphics. We will be using infrared sensors to design and build a motion detection system that will be fed into our processor. The processor will, through several inputs, decide what graphic to present and will feed it to Microcontroller. The microcontroller will then process the necessary data and output to the 512 LEDs to be used in the 3D array.

## Features/Objectives:

The goal of this design is to be able to output and modify the LED array fast enough to see a persistent image:

- The first issue that must be dealt with is the physical construction of the array. The array will be 8x8x8 LEDs, accounting for a total of 512 devices. Due to lack of accessibility we will have to make certain that each LED is functional and stays so throughout the construction.
- A sturdy base and casing will also have to be provided for the array, as the construction doesn't allow for a large amount of structural integrity. A wooden base and a

Plexiglas case is proposed to deal with this issue and to protect the LED array from general jostling and movement.

- Due to the very large number of LEDs that need to be used at once, current considerations will have to be taken into account, verifying that we have enough power to supply a good level of luminescence so that we may not only turn on all LEDs but also modify them through pulse width modulation.

- The microprocessor will be in charge of user inputs, motion detection and general code development for the graphics. It will process all inputs and verify what set of parameters need to be outputted to the microcontroller. It will also control the pulse width modulation that will be used to modify the dimness of the LEDs

- The microcontroller will process the various inputted signals and implement the digital hardware necessary to output the +64 signals required to functionally modify the LED array. We are looking to make the code as fast as possible, so as not to create a bottle neck in our refresh rate.

- Since each LED needs to be controlled individually, memory issues will have to be considered when adding more graphic options. Otherwise, we will have to find ways to streamline our code to allow for more variety without a significant increase in the memory needed.

- The motion detection system will be built from scratch using infrared detection. It will be able to detect motion and focus an image to wherever the motion is detected.

# Final Project: