# Project Team Description

Goals and Objectives: Our goal is to design and build a three dimensional persistence of vision display system, working from our proof of concept, the two dimensional persistence of vision display. Our main objective is to refine and/or redesign components in order to move to the PCB layout stage. From there, our next objective is to lay out the PCB and the final objective is to have our finished product polished and working consistently.

Our team consists of two electrical engineers and two computer engineers. This blend allows us to be able to do more sophisticated design work in both our hardware and software. Additionally, we have experience in mechanical design and fabrication, PCB layout, and many different programming languages. Our skill sets were specifically chosen and will lead us to success, alongside our passion for our project.

# Project Description

## Objectives Description:

One of our main target areas for this device, is the 3D printing market. The idea is that the user could visualize a to-scale version of their 3D model before printing to see if they actually wanted to print it, saving time, money, and materials.

Our main criteria for success, is our ability to display a crisp, clean 3D image which is stable and recognizable as a 3D image. We also require a high level of safety due to the moving parts involved with the system.

## System and Architecture Description

The system will take a predefined data image (converted to the proper data structure for our uses) and display that image. We do this by taking advantage of persistence of vision: the idea that the brain keeps the sensorial data captured by the eye in memory for approximately 1/16 of a second. Thus, if we spin something quicker than 16 Hz, the eye won’t be able to perceive the spinning object and it will merge into a solid washer/circle; think of a helicopter blade or a fan blade.

To be precise it will be spinning at 30 Hz and we will have 8 layers, each with 32 monochrome LEDs. These LEDs will be pulsed on and off over the course of a revolution in order to build an image and the multiple layers of LEDs make it 3D.

There are 3 main components to the system: the electro-mechanicals that drive the system, the mechanicals that allow a stable, smooth, consistent rotation, and the hardware & software that produce the image.

## Engineering Challenges Description (1 paragraph)

Many challenges have already been tackled in doing our proof of concept. We still have some issues to address, however. Firstly, we have components that run at different voltages meaning we may have to incorporate voltage regulation on each individual layer. Another concern is that the sheer number of LEDs means we will be drawing a considerable amount of current, likely more than 5A. We also have key decisions about whether we want to use an SD card or whether we want to communicate with the system wirelessly.

We also have to consider how we want to enclose the system for safety (likely with plexiglass) and various other small components, such as updating hardware. Finally, we need to design a PCB for our project once the hardware is finalized.

## Quality Assurance Description (1 paragraph)

Testing will take place throughout the semester. One metric for deeming the quality of the system is simply its ability to display a quality 3D image. Additionally, we need to assure that the system will run for extended time without blowing out and we also need to make sure it is relatively quiet.

# Customers/Users

As was mentioned before, our project is targeting a hobbyist, 3D printing market primarily. Although this could serve purpose in museums and other venues where one would need to display 3D images. The demographics is really worldwide for our product, as 3D printing has taken storm worldwide and museums and conferences also happen worldwide.

# Competition/Similar Products

What products and companies will compete with you? List your major competitors:

None. There are similar 3D products out there that use a different system – for instance, stationary LEDs or optical trickery involving mirrors (e.g. the Tupac hologram).

Will they compete with you across the board, or just for certain products, certain customers, or in certain locations?

They aren’t targeting 3D printing, they generally target conferences, museums, and large scale, high budget performances.

Will you have important indirect competitors? (For example, video rental stores compete with theaters, although they are different types of businesses.)

No.

How will your products or services compare with the competition? Write a short paragraph stating your competitive advantages and disadvantages.

Since our product targets a generally un-treaded business area, we have a competitive advantage over the market. If we are able to deliver a relatively low-cost alternative for 3D displays, the outcome would be quite significant.

# Startup Expenses and Capitalization

Costs!!

8 layers x 32/layer = 256 LEDs - $50

10 PCBjoards - $200

New hardware - $100

Plexiglass enclosure - $125

Many, many engineering hours – Over 150 hours for proof of concept alone.

## Project Plan (2-3 paragraphs)

For this project to be a success we need both active design and communication and active planning and leadership to happen. Our team has the players necessary to make this happen, as was demonstrated by our proof of concept. Our lab is the perfect environment to test and build all the hardware and we Roman and Alex have access to the metal shop in link hall for machining (and can get access to the wood shop as well). The main risks involved are in moving to more data and getting everything done in our limited (130 microsecond) time frame. Additionally, getting certain new components working will present a design and development workload for us.