

Project Summary

For the Junior Design project, our team was assigned the 3D LED Matrix. For this project the animations must: be colorful, be visible, not flicker, have some animations, have a GUI, and be usable with a bluetooth smartphone alone. The main purpose of this assignment was not some grand product that allows for an immediate practical application to streamline the user's life, but rather to introduce beauty into the user's experience. To ask the question of what purpose this project serves is to ask what purpose beauty serves. This is much more a philosophical question than an engineering one.

Once the project's functionality was decided upon, the project design stage was broken down into 6 individual blocks. The interaction between blocks is incredibly important to the overall functionality of the system. As such the block diagram was adjusted several times as ideas were investigated more. Once the blocks were defined, each of the members in the group selected two blocks which they were responsible for completing. Looking back on the term, the term could be split into 3 sections. Our first phase was primarily focused on hardware. One idea we had to investigate was how to send information to the microcontroller quick enough. The second phase of the project was the software. Though we did not run into many fundamental project breaking roadblocks, this was when the GUI was born. Finally, the last part of the project was the enclosure. An example of some trouble we ran into was a rigid enclosure that could also be disassembled easily for repairs. The successful integration of the project's components marked the completion of the project.

Having met the requirements, the group decided to aim even higher. The team created a wish list of tasks that we would like the LED matrix to be able to do. Some of the larger tasks included the ability to break an image down into the resolution of the cube and then to be able to translate that image into the corresponding image on the animation frame. Another was for adding a text based processor that could take a sentence and based on some input create a location specified animation. Another was to have animations saved between sessions, so even if the user closed it, the animations would still be there. Though there were quite a few additional ideas, only a few of them were accomplished. For example, an animation demo was added to preview animation before playing them. An effect selection was added to add an ability to quickly fill the animations. Finally to a lesser scope, adjustable speed and frame counts were added.

This project taught each of the members many valuable skills and lessons. The most significant hurdle that needed to be overcome was the problem of remote work. Each of the members were located over an hour away from each other. This meant that we were only able to meet up in person for very important occasions. The majority of the work needed to be coordinated and accomplished fully remotely. This allowed us to practice organizing a complex project with multiple members completely remotely. We learned how to work together effectively, how to accomplish the tasks that needed to be done in a timely manner. In addition to team working skills, there were also many technical skills that this project was able to teach us. These skills include PCB design, GUI creation, woodworking, SolidWorks design, and the process of taking an idea and bringing it into fruition.

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE
1	Project Conception and Initiation	Everyone	4/2/21	4/14/21
1.1	Project Charter	Everyone	4/2/21	4/10/21
1.2	Additional Project Requirement	Everyone	4/2/21	4/5/21
1.3	Communication Plan	Everyone	4/2/21	4/5/21
1.4	Projections	Everyone	4/6/21	4/9/21
1.5	Block Diagram	Everyone	4/6/21	4/9/21
1.6	Research	Everyone	4/6/21	4/13/21
1.7	Project Initiation	Everyone	4/14/21	4/14/21
2	Project Definition		4/10/21	4/25/21
2.1	Scope and Goal Setting	Everyone	4/10/21	4/16/21
2.2.1	Budget	Everyone	4/10/21	4/16/21
2.2.2	Purchase Parts	John & Timothy	4/15/21	4/25/21
3	Build		4/19/21	5/21/21
3.1	Create Breadboard	Henry	4/19/21	4/23/21
3.2.1	Create Simulation	John	4/24/21	4/28/21
3.2.2	Design PCB	John & Henry	4/24/21	4/30/21
3.3	Develop Arduino Code	Henry	4/22/21	5/5/21
3.4	Develop Python Code	Henry	4/22/21	5/5/21
3.5	Assemble LED Matrix	Timothy	5/3/21	5/9/21
3.6	Refine LED Matrix	Timothy	5/10/21	5/12/21
3.7.1	Develop GUI	John	5/3/21	5/12/21
3.7.2	Test Arduino & Python Code	Henry & John	5/10/21	5/17/21
3.8	Make Animations	John	5/17/21	5/19/21
3.9	Bluetooth Compability	Henry	5/17/21	5/21/21
3.10	Build Enclosure	Timothy	5/17/21	5/21/21
3.11	Project Updates	Everyone	5/12/21	5/14/21
3.12	Chart Updates	Everyone	5/12/21	5/14/21
4	Project Presentation		5/13/21	5/28/21
4.1	Project Objectives Verification	Everyone	5/13/21	5/28/21
4.2	Edge Cases Testing	Everyone	5/22/21	5/28/21
4.3	Video	Everyone	5/22/21	5/28/21
4.4	Project Performance	Everyone	5/22/21	5/28/21