

Executive Summary

The original problem of the project design was to modernize and implement more functionalities that would create a better user experience for the laser painter. This includes an Arduino Nano, image processor, OLED display, temperature sensor, distance sensor, and the five volt DC power supply. The project can detect an object via an Android phone by projecting a word from the database by displaying the word of the object that was scanned. When someone comes in direct proximity to the laser, the automatic power-off feature activates and the laser painter will stop projecting. Another feature that has been implemented is when the laser painter reaches a temperature of 75 degrees Fahrenheit, the fan activates to help the system cool down so that it doesn't overheat. Furthermore, the knobs on the enclosure permit the ability to move the image in the leftward and rightward directions. The knobs also allow the user to move the image up and down as well. The size of the image can also be increased and decreased via the knobs. The enclosure was designed to be portable and light enough so that it can be easily transported. The case is very durable and it is crafted in a manner to hold all of the required components to ensure that the system is operational.

The approach that was taken in the project is to formulate a reasonable plan at the beginning of the project by advancing through the project gradually by sticking with the assigned plan. When new challenges or problems arise, the plan is altered and revised accordingly to enable enough time and to actively seek solutions. At the beginning of the project, we spent a lot of time discussing and formulating the top level block diagram of the project. A good initial design can provide clarity by ensuring that the research was done correctly, providing a lot of knowledge, and pointing us in the right direction. We spent a lot of time on the initial design to make subsequent design and research easier. As the project progresses, we modified the initial design to complete the project. For example, for the choice of microcontroller, we initially chose the Arduino Mega as the main processor of the project, but as the project progressed, we decided to switch to Arduino Nano to make the project work. Secondly, the completion of the project is inseparable from the correct time management and from the on-time completion of each member of the team. The ability of team members to complete their individual blocks on time is the basis for the advancement of the project and for the overall plan. The team should complete the plan as quickly as possible to deal with unforeseen conundrums. For example, the delivery of the PCB board may take at least one week. The assembly of all the components and the board also takes time. Therefore, it was preferable that we should have the completed design and the order of the PCB board as early as possible to ensure that we can complete the task a few days before the deadline.

We learned a lot of lessons from the project. For example, how to achieve good teamwork. The team holds regular meetings every week and every member attends the meetings on time and is actively participating in the discussion of the project by formulating the plan. Effective communication between each team member and personal time management helped make the project progress more smoothly. With regards to the technology, we learned how to use the CAD software to design the PCB board and the 3D model of the enclosure for the project. Additionally, the usage of the 3D printing technology helped us implement the enclosure of the project. Also, we learned how to manage our system integration from our teamwork. We need to

prepare alternatives for our design and allow enough time to implement them. In fact, the process of assembling each module together to synthesize the system is not smooth. For example, we found that the initial design of the PCB did not allow current flow well, and that the Arduino Nano did not have enough memory to implement all the equations. This is not what we envisioned, luckily we have alternatives and enough time to experiment and modify.

Visual Timeline Chart

Figure 1: Timeline Part 1

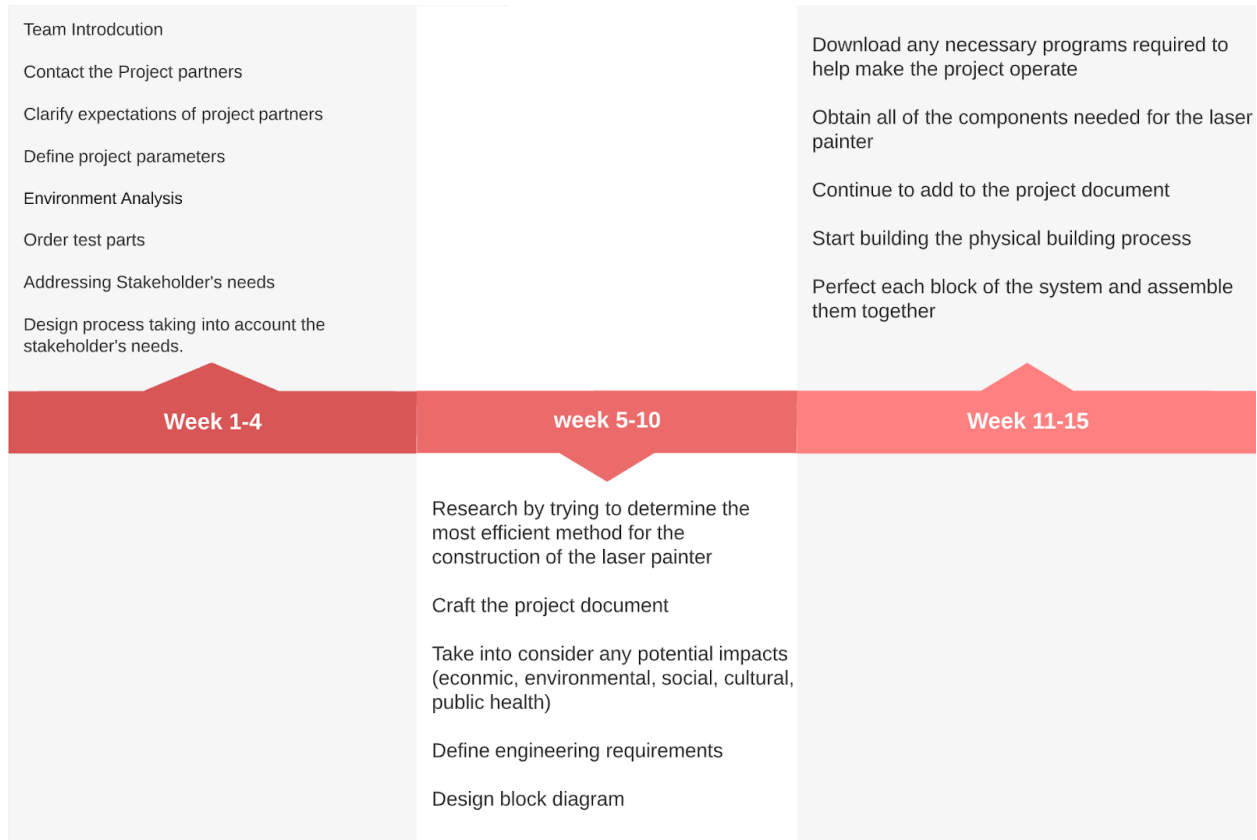


Figure 2: Timeline Part 2

