Executive Project Summary

The custom timer project asked for a customizable timer in which the user gives input through switches and/or potentiometers. The time is displayed on four seven segment displays in minutes and seconds. We were required to design the timer to be less than 1 second off every minute, to be a safe system, to use switches and create labels that are readable from 3 feet away, to have an alarm that is easy to hear, and to include dimmable display LEDs. We also added an additional requirement to the project where the timer would warn the user of depleting time at 10 seconds left on the timer. A 440 hz alarm sound plays every second from 10 seconds until it reaches 0, where the alarm becomes steady.

The project designing process began with creating a timeline that visualizes when tasks were to be started and completed. Once that was decided, we began working on a top level design where the entire project was broken down into four blocks, two blocks for each person to be responsible for. Because we worked on our first blocks individually, it was not until the first block check-off did we realize that the top level design was unbalanced in that some of the blocks have significantly less functionality compared to other blocks. We redesigned the top level design after recognizing this issue and began working on our second block. Once the second block check-offs were finished, we worked on integrating all of our blocks together. Unfortunately, during the process of integration, it was discovered that the measurements for the user inputs on the enclosure was not accurate, so the inputs were desoldered from the protoboards and re-soldered back to properly fit the cutouts on the enclosure. In addition, during the integration phase of the process, we found that the PCB would not be functional by the system verification check-offs, and we decided to opt out of implementing the PCB into our project.

By creating this project, we have learned that it is important to buy extra parts and supplies. We ran into an issue with the PCB where the voltage regulator chip no longer functioned because it was subjected to too much heat in the soldering process. Therefore, we were not able to use the PCB as intended. Ideally, we would've replaced the chip, however, we did not have enough time to order another one. On future projects, we have discovered that it is important to buy extra parts to account for problems like this. We also found that time sensitive portions of the project should be completed early, that way, we can troubleshoot and adjust the project as needed.

Custom Timer 004-2 Timeline
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Project Start: Fri, 1/13/2023

Display Week: 1

TASK	START	END
Design Phase		
Set goals and make timeline	1/13/23	1/13/23
Submit 2 additional requirements	1/20/23	1/20/23
Work on top level block diagram	1/20/23	1/27/23
Submit top level block diagram	1/27/23	1/27/23
Assign individual blocks to team members	1/25/23	1/27/23
Build and Test Phase		
Work on and complete at least 2 blocks	1/25/23	2/3/23
Demonstrate 1 block	2/3/23	2/3/23
Iterative Unit Testing	2/4/23	2/10/23
Iterative Integration Testing	2/11/23	3/3/23
2nd Block Checkoff	2/24/23	2/24/23
Iterative System Testing	2/27/23	3/3/23
Finish project	3/6/23	3/6/23