

Our project was an automatic pet door. The door's purpose was to enable the opening and closing of a pet door without human interference. The layout and design of the project was up to interpretation, however, specific engineering and customer requirements had to be met in order for the system to be deemed successful. The engineering requirements were as follows:

- The system clock should be less than 1 minute off every hour.
- The system should have a locking mechanism that withstands at least 30lbs of force.
- The system door should be automatically opened by a pet without human input at least 4 out of 7 days. The system should allow the user to set at least 4 lock/unlock times per day.
- The system should automatically record the day and time that a pet enters or exits for at least 7 days.
- The system will take a user input in the range of 5-20 seconds to determine how long the door will be open for.
- The system should allow the user to enter manual mode where it takes inputs on lock/unlock from the "inside" of the door. In manual mode, it will no longer lock/unlock with the programmed time periods. It will take less than 3 seconds for the door to lock/unlock with the manual inputs.

After deciding on a rough system design and plan, as a team, our first goal of the project was to delegate tasks. Based on preferences of the team members, individual blocks were delegated to specific people. Our first phase was research. At this phase, we researched hardware components that were needed for our system and how to use specific tools such as AutoCAD or Arduino Programming. Once the research phase began, we sketched a rough drawing of our final system design. This way we were able to visualize the same goal for the final product as one another.

Next, the building phase began. In this phase, individual blocks were completed one at a time. These blocks had a plan for integration into the entire system, however, plans were constantly changing on how individual blocks would coordinate with each other. Because of this, the team had active communication via Discord to discuss new findings and possibilities. Keeping an open dialogue was vital during this phase, as we were all still learning.

As the project progressed, several blocks were combined together in order to make integrating the system later on more feasible. For example, the PCB was integrated into the

buttons block and the open/close and lock/unlock blocks were put together. Once most blocks were completed, the integration of the entire system commenced.

While working alone was productive and important for the team, the few times we worked together and were combining blocks would probably be considered our most efficient and successful time. In just a couple of meetings, we were able to build the system and integrate our code together. Because of how our planning allowed the blocks to coordinate together, it only took a bit of troubleshooting to get the system to work as a whole.

The main lessons learned from this project were time management and organization. In order for us to be successful, we had to hold each other accountable to the tasks given to us. If we continued to delay finishing certain tasks or assignments, we would never be able to move on or finish the project. Planning ahead was very important for us as a team. We allocated more time than we thought we would need for certain tasks to prepare for errors that would come our way. Because of this, we finished our project just on time.

