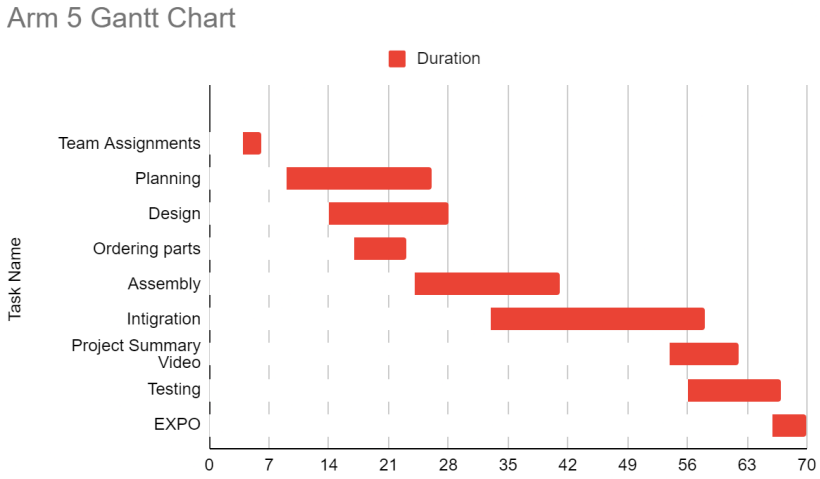
Project Summary

Initially, the project had 5 requirements, with 2 being added later.

- The ability to draw more than 4 inches per second.
- The ability to draw a 10 inch line that deviates no more than ¼ inch.
- The system must use SCARA topology.
- The system must accept inputs in the form of the following G-code commands: G0, G1, G90, G91, G20, G21, M2, M6, M72.
- The system must be able to use different types of writing tools.
- The ability to eject the top sheet of paper in under 4 seconds.
- The ability to remove and return the writing tool from the paper.

The SCARA topology requirement narrowed down the list of possible designs quite a bit, there would be an arm that rotates at two points on a single axis. There were two ideas about how to remove the writing tool from the paper, either move straight up and down, or rotate like a wrist. The second was easier to implement, so it was chosen. An articulated paper model was made to test concepts. The project was broken down into several blocks, which could then be addressed independently: the motor controller, the microcontroller, the arm, the paper ejector, and the code.



These blocks were completed more or less independently, and then united in the final system. Initially the microcontroller was planned to generate the PWM signal to drive the servos, and that signal would be amplified by the motor controller, but the plan was changed when the motor controller which took serial input was selected.

The inverse kinematics were completed in the program at the same time as the arm was being designed and built, so actual testing was delayed until after both had been completed. In the final weeks the third member of the team left, although this was after the independent blocks had been completed.

Our team mostly worked independently, which allowed each of us to focus our efforts only on the components we were responsible for. However, in retrospect we likely would have produced a better overall product if there had been more communication. Although this might have been due to one third of the team departing and the remaining members simultaneously trying to finalize the device and learn about the systems that member had been incharge of; it would still have been a good idea to have a better picture of how the individual systems would work together.