

Problem Statment:

To develop a two-axis robotic arm using embedded design, control systems, and MATLAB or Python scripting to draw on an 8.5" x 11" sheet of paper. The system is required to draw faster than 4 inches per second and be able to vary its speed between 1 and 5 inches per second. Additionally, the system must be accurate and capable of drawing a 10 in a straight line (+/- .25 in) that does not vary more than 0.25 inches of being straight. Furthermore, the system should be able to handle up to three points of input at once, then execute the motion and return to its original starting place. The system is controlled via a user interface written in python or Matlab, and G-code dictates system actions. Finally, The system must conform to a SCARA topology and have an interchangeable tool mount capable of being changed in 15 secs.

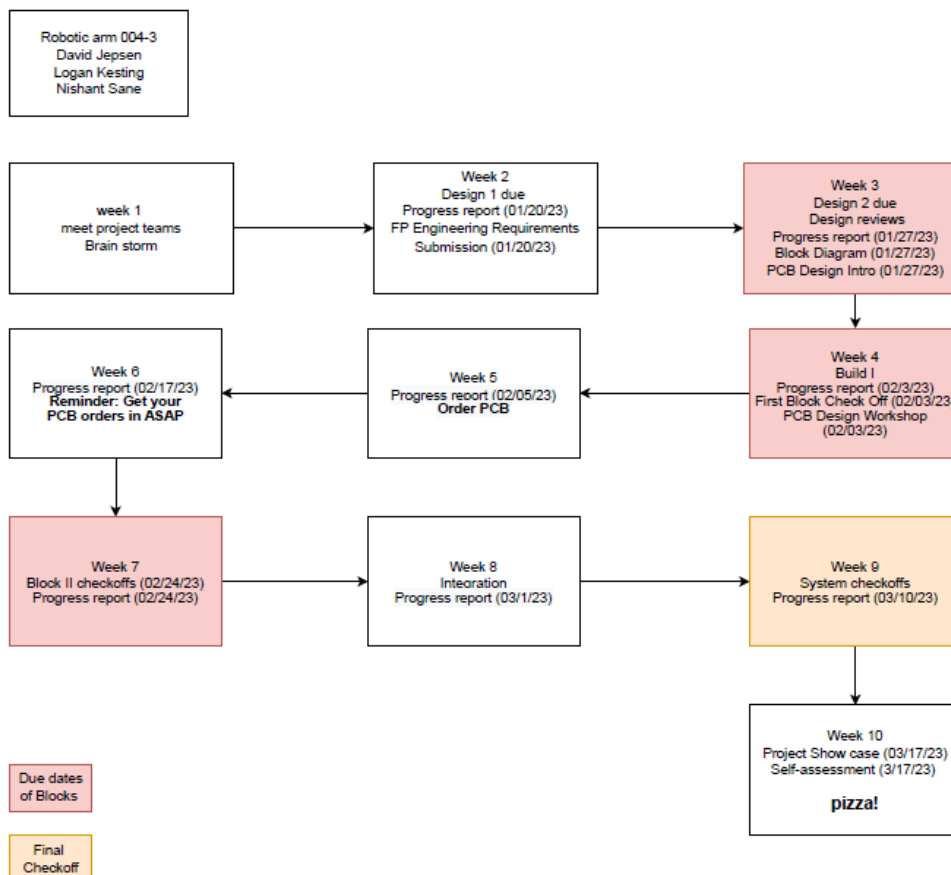
How we solved the problem:

Handling the project began with understanding the project, its requirements, and the end goal. The understanding was organized into a block diagram. An initial design was made for each block from this initial block diagram. This design included CAD, pseudocode, and system work documentation in the intended integrated project. From this point, each block was constructed as its design denoted and tested against its intended functionality. The first build was then redesigned to correct bugs or issues in the first version. All project blocks were then integrated into the entire project and then tested as a unit, and bugs in the integrated system were corrected. The process of testing, finding errors, and correcting them will be done as often as necessary.

Ongoing Elevations and Revision

The project's main failures are the ICs and the stepper motor response. These two components are undergoing an investigation as to why they are not working. It is believed that the interface between the ICs and stepper motors is causing the motors to act unexpectedly. The source of the irregularity may be the wiring, or the motors may be damaged, causing unexpected behavior.

Project Timeline:



Lessons that are taken away from this Project:

- 1 Start early and ask questions early.
- 2 Be prepared for something to break or fail. Things only work perfectly in Disney movies.
- 3 Being flexible and resourceful, solutions often require a bit of creativity.
- 4 Failures are the steps to success.
- 5 Starting with a general overview and then stepping into the details makes a complex project more manageable.