Project Summary

Design Questions and Requirements:
Our goal was to design and build a robotic arm that could quickly and accurately draw on 8.5” x 11” paper. We needed to meet several key requirements: fast drawing (at least 4 inches per second), high accuracy (within 0.25 inches), easy and cheap to manufacture, and able to handle different writing instruments. In addition, support for G-code commands, detect the presence of a pen, and add copy functionality.

Project handling and design revisions:
In the early stages of the project, we determined the project requirements through weekly team meetings, conducted a preliminary evaluation of each design proposal, and determined the part that each person was responsible for. Our team then chose the SCARA topology for the robotic arm, using two NEMA 17 stepper motors and two A4988 drivers to drive the joints, since these parts are more student-friendly and can be purchased at Tekbots. We use an Arduino Mega 2560 Rev3 for control and use inverse kinematics to calculate the angle of each joint for precise motion control. During the development phase of the project, we adopted an iterative development and continuous evaluation approach to ensure that the project met all engineering and user requirements.

Project Schedule:

Date	Things we do
04/12	Confirm the requirements
04/29	Assign the blocks
04/26	Working on block1
05/03	Improve block1 and start block2
05/10	Working on block2
05/17	Improve block2
05/24	Check if there are any immediate changes and try to combine all blocks
05/31	Try Integration

Lessons learned:

During the course of the project, we learned many valuable lessons. We learned that teamwork and good project management are essential. Each team member must have a solid understanding of each part of the project and be ready to take on other roles when required. In addition, we also learned that the continuous evaluation and revision of the design is a key factor to ensure the success of the project, which can help us quickly identify and solve possible problems. In the end, we learned that constant attention to user needs and timely adjustments to the design are also important factors for the success of the project.