**Environmental Requirements**

To set up the required environment for the robotic arm, the front edge of the robot’s base must be 12 inches from the center of the paper. Directly line up the center point of the robot with the center of the paper as well. A camera needs to be centered above the paper as much as possible using a boom. The boom can either go over the top of the paper or can reach in from the side of the paper. There needs to be approximately 5 inches of cleared space from either edge of the base to allow for the arm to properly deposit shapes to the sides. There also needs to be approximately 20 inches in any direction behind the arm as well for the rack to extend. The front of the rack should extend 7.75 inches in front of the edge of the rotating base. There needs to be two DC power supplies, one set at approximately 4.7V and the other set at 7.3V.

**Startup Procedures**

Open Visual Studio, Arduino, and the Simple Motor Control Center G2 application. Connect the webcam to your computer via USB. Click start on the Visual Studio project and center the camera view over the page, fully capturing all parts of the paper. Connect the 7.3V Ground cable to the Simple Motor Controller ground, and connect the 7.3V VIN to both the Simple Motor Controller VIN and the wire connecting to the power line on the right half of the breadboard. This wire is only connected to the power for the electromagnet. Turn on the 7.3V Power Supply. Next, plug the USB cable for the Simple Motor Controller into the laptop. Ensure that the Simple Motor Controller is connected to the computer. Connect the 4.3V Ground cable to the wire connecting to the negative line of the left side of the breadboard. Connect the 4.3V VIN cable to the wire connecting to the positive line of the left side of the breadboard. Turn on 4.3V power supply, and connect the Arduino via USB cable to the laptop. Ensure that the Arduino is connected to the computer. Upload the Arduino code to the Arduino board. Place shapes on the white paper. Click start on the Visual Studio project. When you press start, ensure that the Simple Motor Controller is not stopping the DC motor (seen in errors section of GUI or in the bottom left corner). If it is, click the green resume button in the bottom left corner of the GUI. The robotic arm is live and will pick and place all shapes on the paper at this point.

**Shutdown Procedures**

Turn off both power supplies. Unplug both motor controllers from the computer. Unplug the camera from the computer. Close out of Arduino, Visual Studio and the Simple Motor Control Center G2 Applications.

**Known Issues**

Occasionally, the calculated rotation angle is slightly off. The robot arm swings quickly, so make sure there is a cleared arc of space behind the center of the base with a radius of at least 20 inches.