Industrial Automation 2

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Ping Pong Ball Sorter

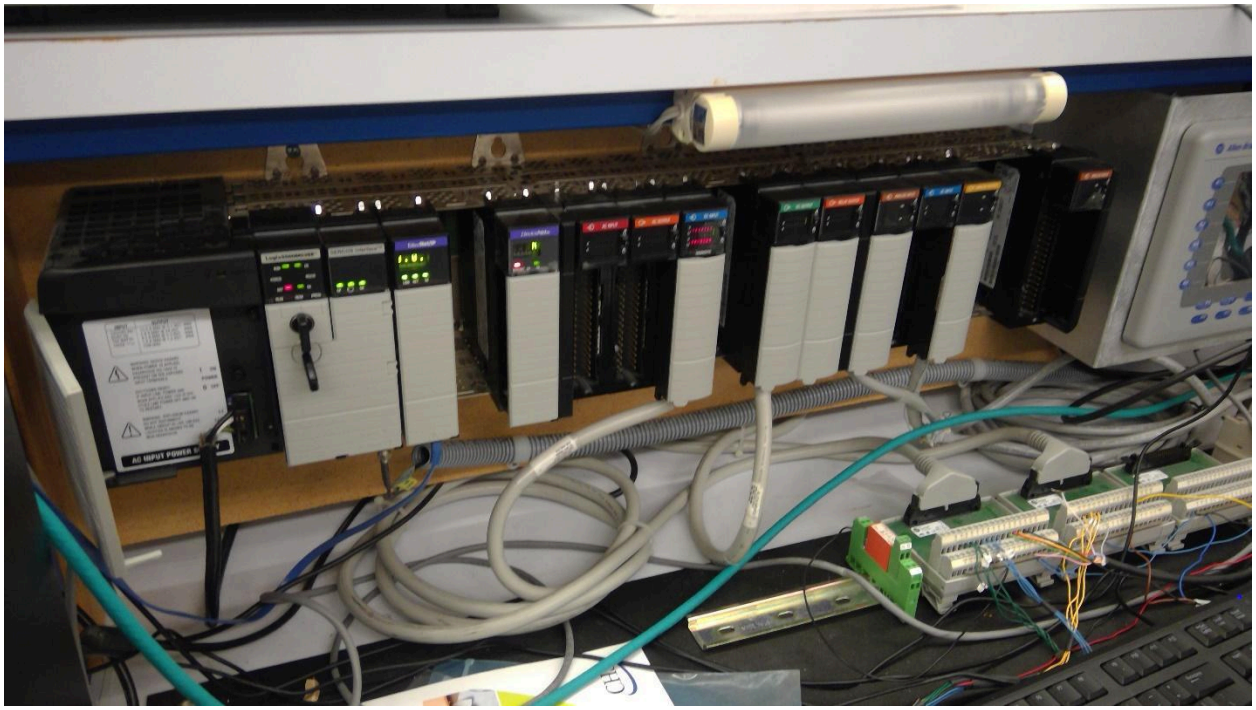
4/14/16

Introduction

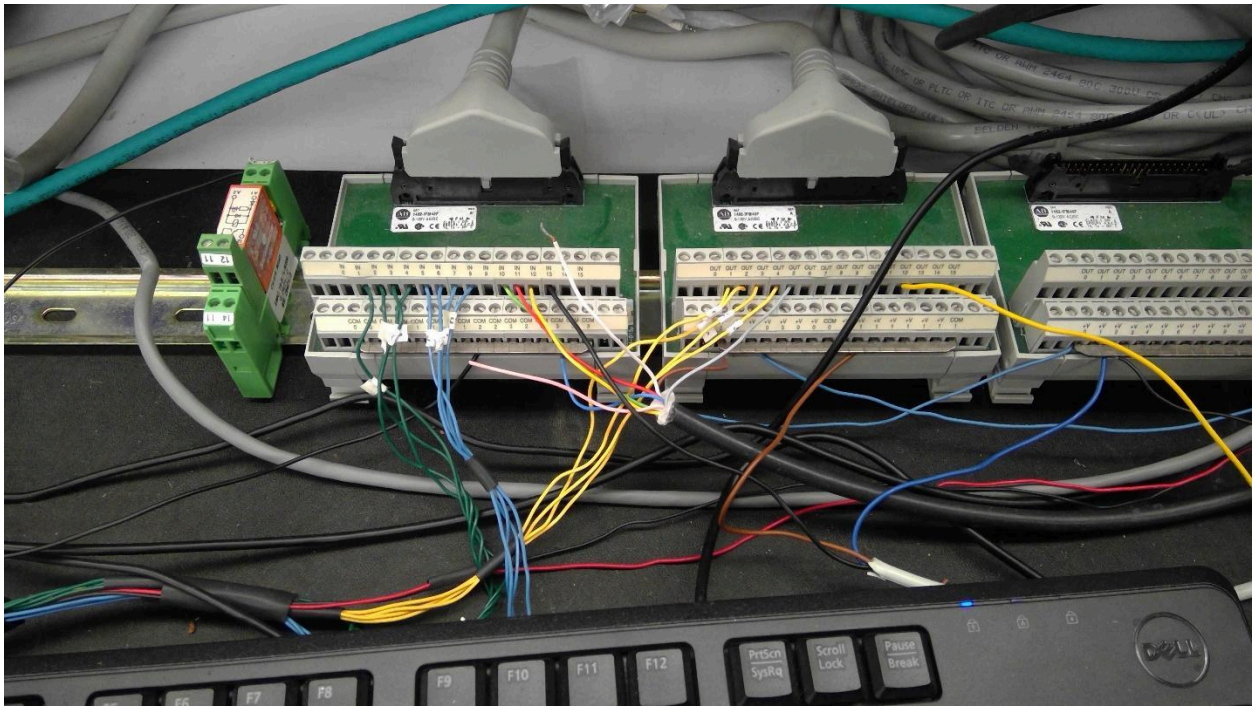
The project we worked on for out senior design was a system to detect ping pong balls with a camera and determine if the ball is good or bad. Once this is determined the ball is then moved with a XY platform to its designated spot. The ping pong ball is then dumped out and the XY platform moves back to its starting location to accept another ping pong ball. The project includes an Allen Bradly multisite camera, a light sensor, a servo and an Arduino.

PLC connection

The system all works off the Allen Bradley PLC. There is a main controller and then there are modules for inputs, outputs and more. Each input and output runs to a breakout board to easily connect wires.



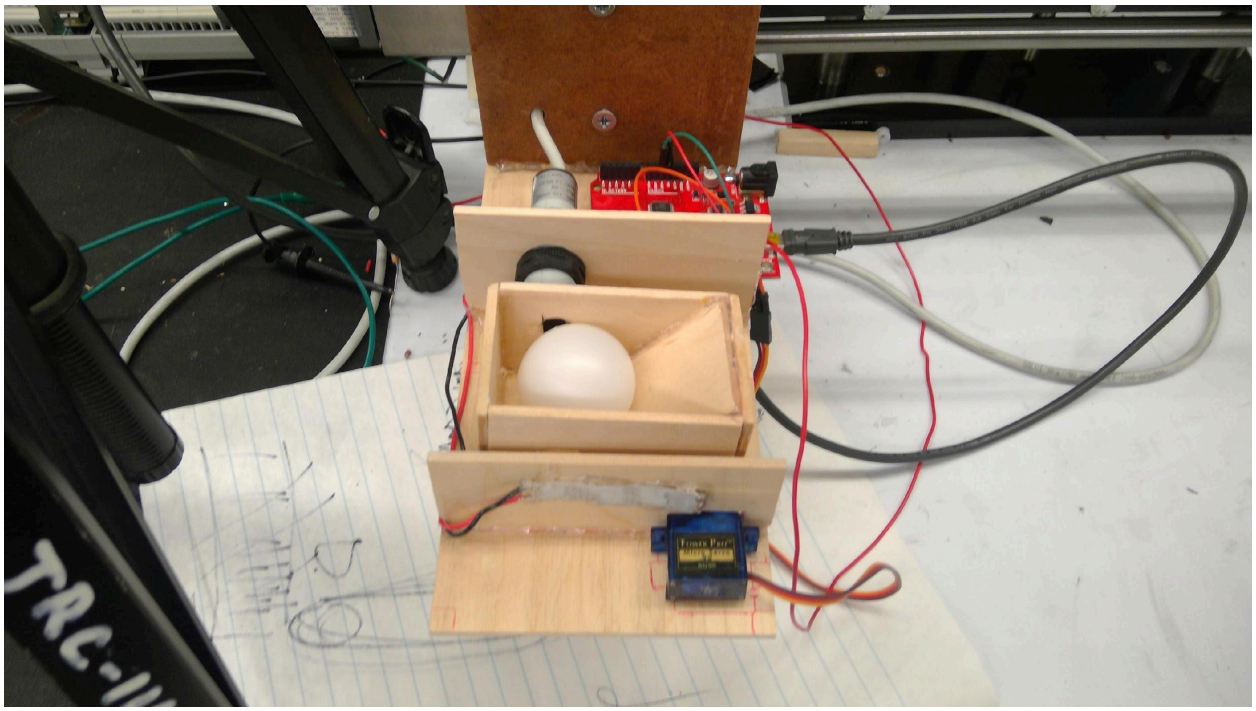
The left has a breakout board for inputs and the right has a breakout board for the outputs. Each has a screw terminal so the wire can be secured. We are using a camera and two light sensors for inputs and one output wire sent to an Arduino to send a signal to flip the ping pong ball out of the basket.

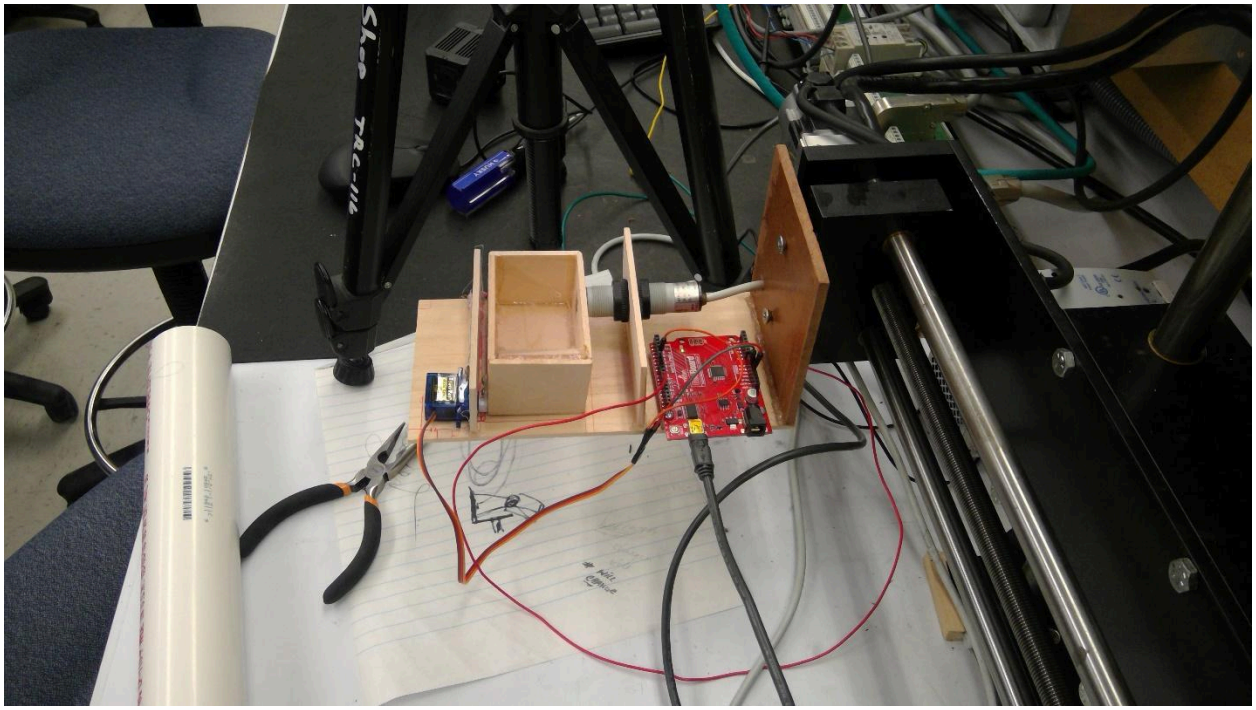


Ping Pong Ball Dump

The beginning of the project starts with the ball being fed into the wood box on the XY platform. The wood platform seen in the picture has an Arduino, servo and a light sensor. The Arduino accepts a high or low signal from the PLC and will flip the box with the ping pong ball in it when it gets to its drop zone. The light sensor detects if there is an object in the wood box.

The grey object is the light sensor to determine if there is an object in the basket. The blue object is the servo to flip the box and the red circuit board is the Arduino platform.

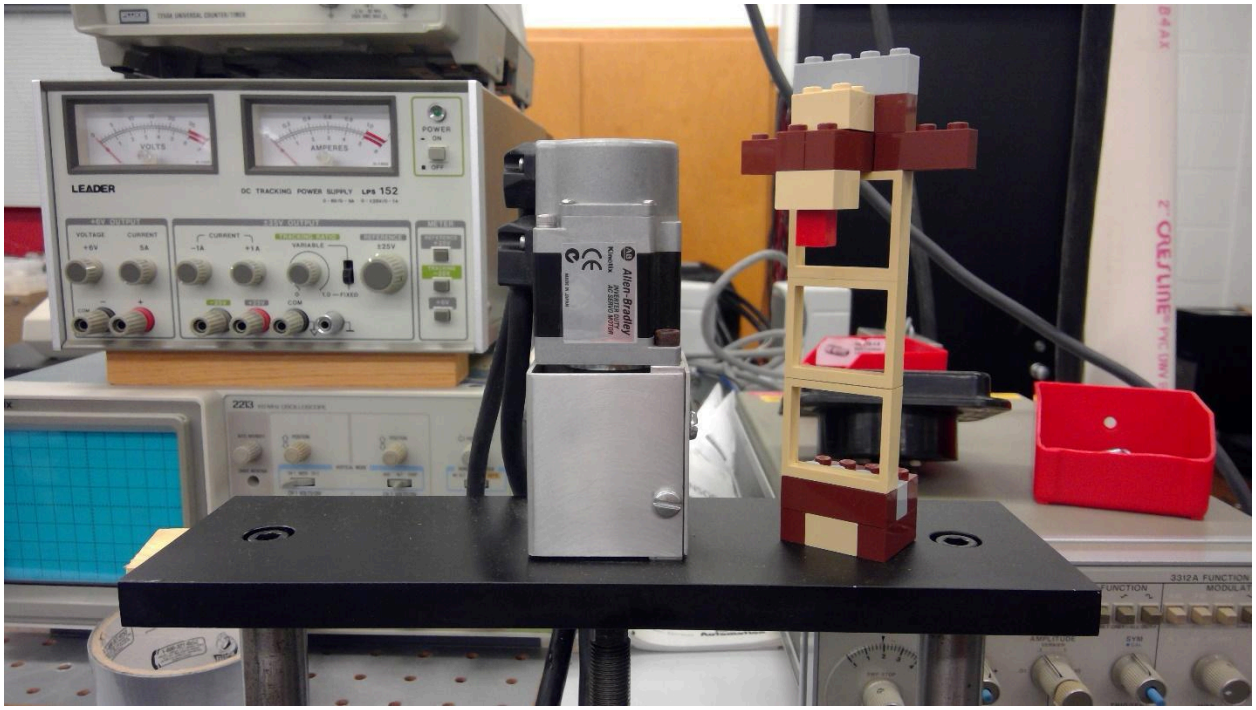




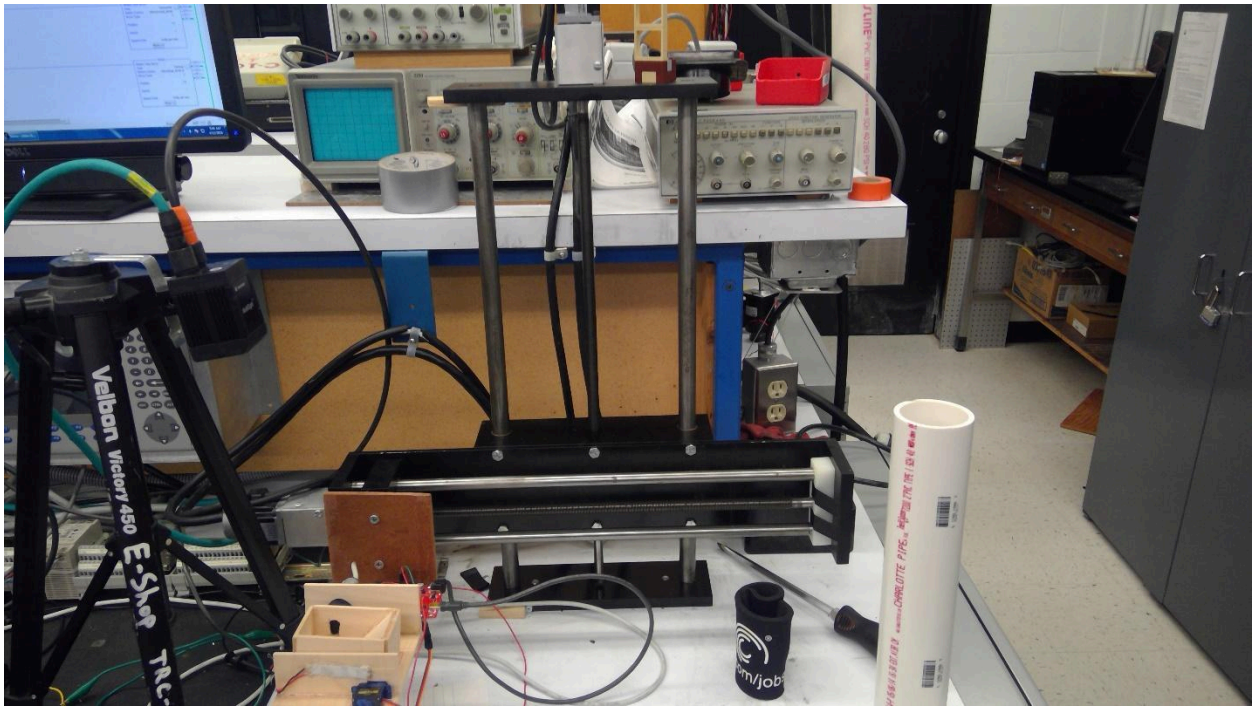
XY Platform in detail

The XY platform is setup using two servo motors and connected to servo controllers. The PLC controls the Servo motor controllers directly. The XY platform is shown here holding the wood platform that will move it over to the right when a ball is dropped.

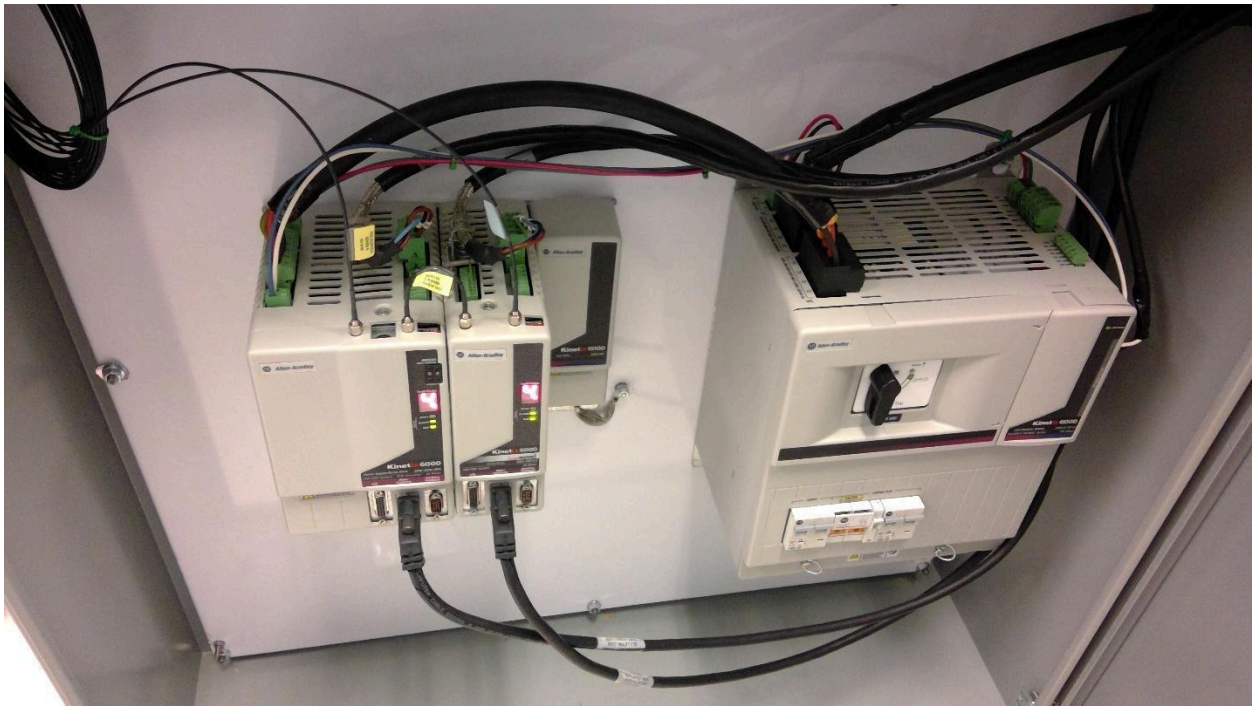
Y Axis Servo Motor.



Overview of the XY platform.

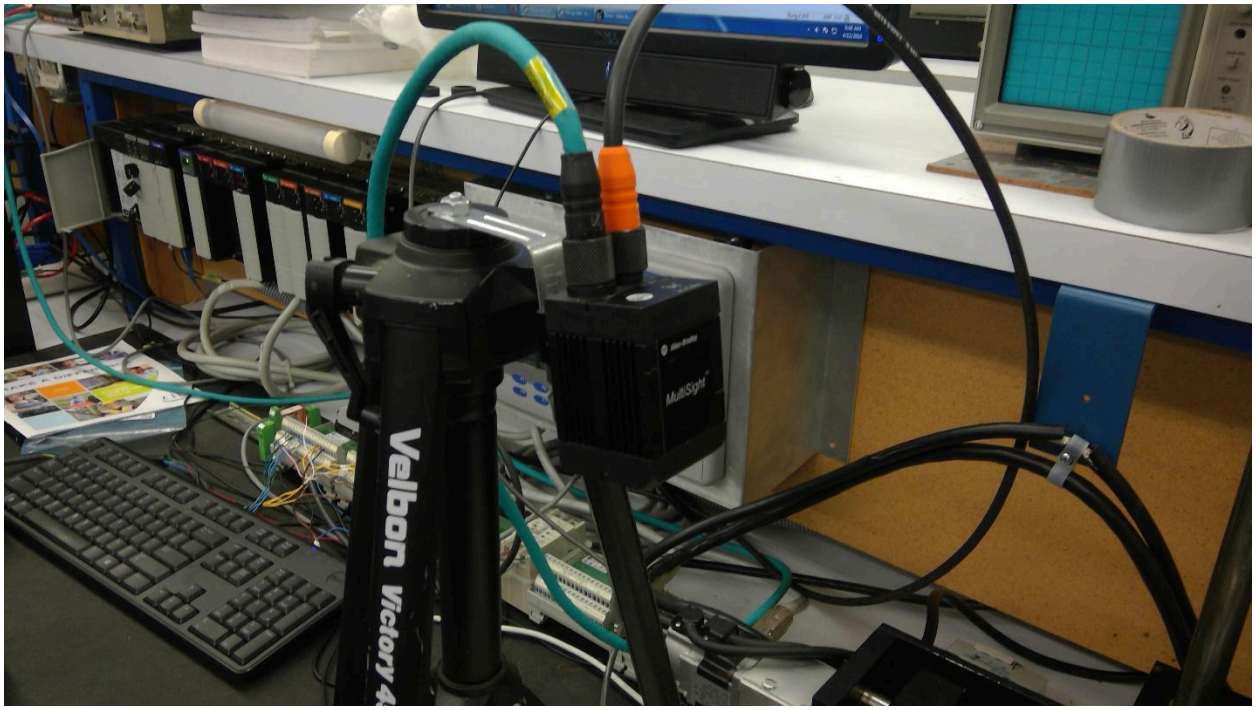


The Picture shows the motor controller and the breaker box all contained in a metal box to the right of the lab bench.

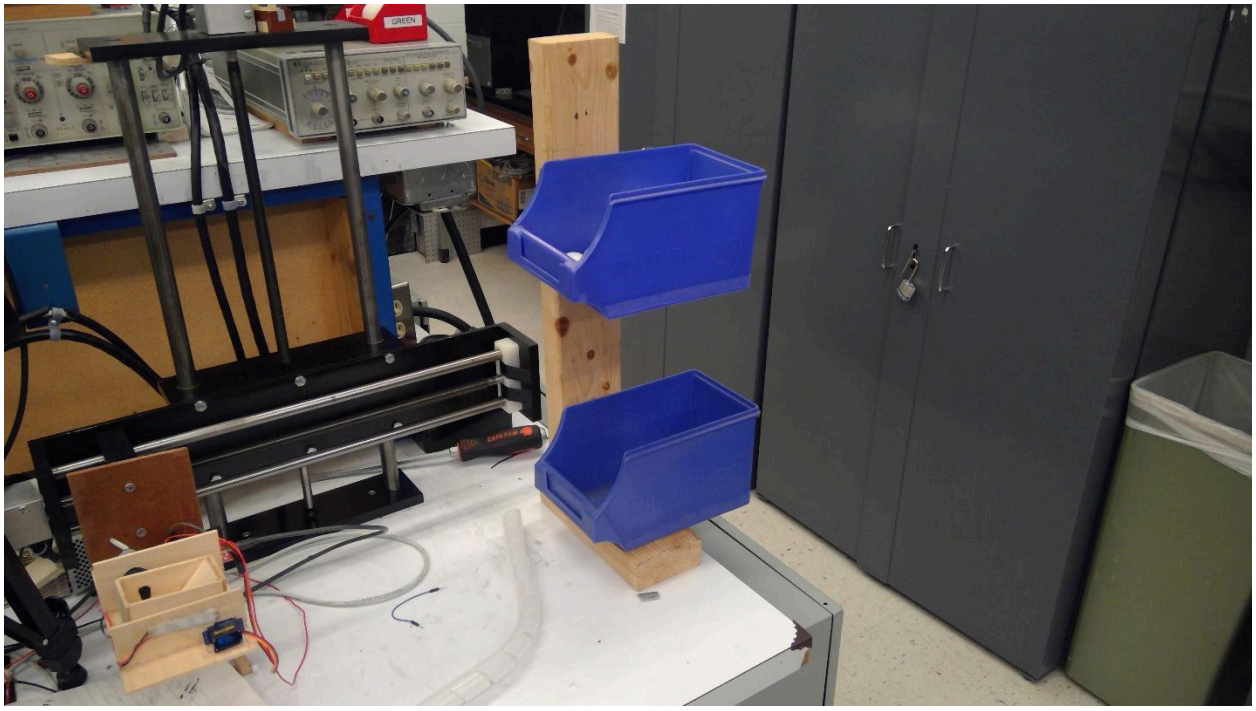


Pass or Fail Detection

The object of the setup is to take a ball and determine whether it should pass or fail. There is a camera setup when the ball enters the XY platform looking for a specific image of a ball. If the color or shape is off enough then the camera will reject the object.



Here are the baskets to hold the Ping-Pong balls that passed of failed. The passed ones go to the top and the failed ones go to the bottom.



Conclusion

The project was a success and when a ball is placed will bring the ball to its respective basket and dump into that basket. This demonstrates the basic concept and anything added on would be an extra feature.