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Team G, Bobs the Builders

Teammates:

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Individual Progress

The first item that I worked on this week was interfacing our Playstation eye camera with our Raspberry Pi. The Raspberry Pi will be computing all of the vision processing for the system and sending the results to the Arduino via a serial connection. The camera will be running in python using Open CV. The issue that delayed my progress with the camera was the size of the Open CV library. The library takes approximately ten hours to install on a Raspberry Pi. The first installation failed due to lack of space. I purchased a larger SD card and tried again but this time the installation failed due to a lack of dependencies that needed to be installed first. These failures wasted such a large time that completion of the vision processing had to be delayed until the next week.

Through this I worked on the wiring for all of the motors and sensors that were needed to complete the part placer. The part placer consists of a DC motor that controls a rack and pinion, a stepper motor to control it's rail, an electromagnet, and a limit switch to detect when it is fully raised. Each of these components needed to be wired such that the movement of the rail was not restricted. Additionally, I helped with the construction of some of the part placer and with looking for a solution to the power limitations we had encountered.

Challenges

One Problem that we encountered was that we could not provide enough current to run multiple motors or a motor and an electromagnet at the same time. The power supply for the lab has a maximum current rating of .5 amps. Each motor and the electromagnet needs at least .5 amps and can take current up to 2 amps. We began work on using the 12 volt line on a computer power supply as a way to power the DC motors and electromagnets. The computer power supply can provide up to 12 amps which is enough to run multiple magnets and motor at the same time. However, we were not able to get the power supply integrated into the system before the demonstration. The power supply was on and reading 12 volts across it but we were unable to measure any current running through it. Several different power supplies were tried but with no improvements.

A second problem that was encountered was that the DC motor used for the rack and pinion of the part placer would not hold the system at rest when off. The rack would slowly fall down and stop when it hit the tray. There are two solutions we considered to resolve this. First would be to replace the DC motor with a stepper motor. The stepper motor can be enabled while resting to prevent the rack from slipping down. The problem with the stepper motor is that it does not provide as much torque as the DC motor so it may not be able to lift and hold the rack at all. The other solution would be to have a counterweight that would balance out the weight of the rack. The counter weight would add weight to the rail, which might be an issue, and also it may swing while the rail moves.

Teamwork

The construction of the part placer was mostly handled by Michael with some assistance from Christian and myself. The parts were designed by Christian and manufactured by both Michael and Christian. Michael also helped test power supplies with me to see if a working one could be found. Guillermo was in charge of the software for the demonstration and completed all of it without outside help. Also, Guillermo worked more on trying to create a standalone for the GUI software so that the software could easily be run and shared between everyone's computers. Finally, Guillermo completed the serial communication interface between the Raspberry Pi and the Arduino.

Figures

The part placer system is designed to move parts from in front of the camera to the tray system and allow for a 180 degree rotation during this movement to correct for possible disorientation in the part. The part placer is attached to one of two vertical rail systems which allow for it to slide along a single axis. The part placer has a rack and pinion controlled by a DC motor to allow for up and down movements. At the end of the rack and pinion is a electromagnet connected to a servo. Since the parts are magnetic the electromagnet allows for the part to be picked up and placed easily. The servo can spin the magnet if the part is misaligned.

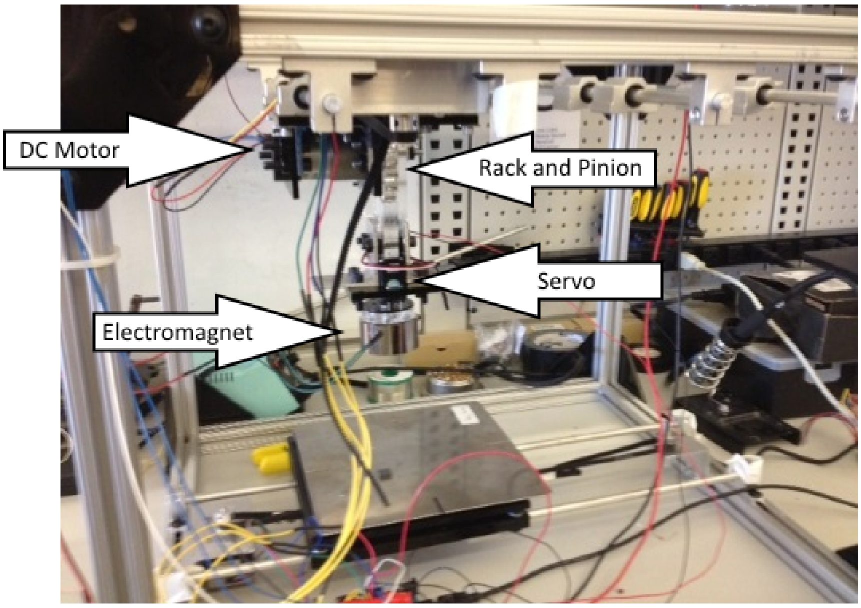

Figure 1. Part Placer

Plans

The first priority for next week is to finished some of the items we were not able to complete for this week's demonstration. Our team felt pressured to complete a large number of different tasks which ended up being too ambitious. We need to complete the flux dispenser which will be made from a plastic syringe connected to a worm gear and DC motor. Also, much of the vision processing that we wanted to be able to complete was held back due to installation issues. By next week we want to have the ability to take and complete some basic analysis of images from the camera. The next subsystem that we will be working on will be the flux and wire dispenser. We want to have the rail system complete for that system. One problem with the current system that we would like to resolve by next week is the inability to run multiple devices at the same time due to power limitations. By next week our system will be using another power supply so that we have all the current that we need.

Of these tasks I will be focused on the vision processing and the power supply. Michael and Christian will be working on making improvements to the current part placers and completing the rail system for the flux and wire dispenser. Also, they will be working on printing additional hopper designs. Guillermo will be improving the part placer code with additional sensors and feedback including using information from the optical encoders on the DC motor.