CS 362 Project Write Up #2

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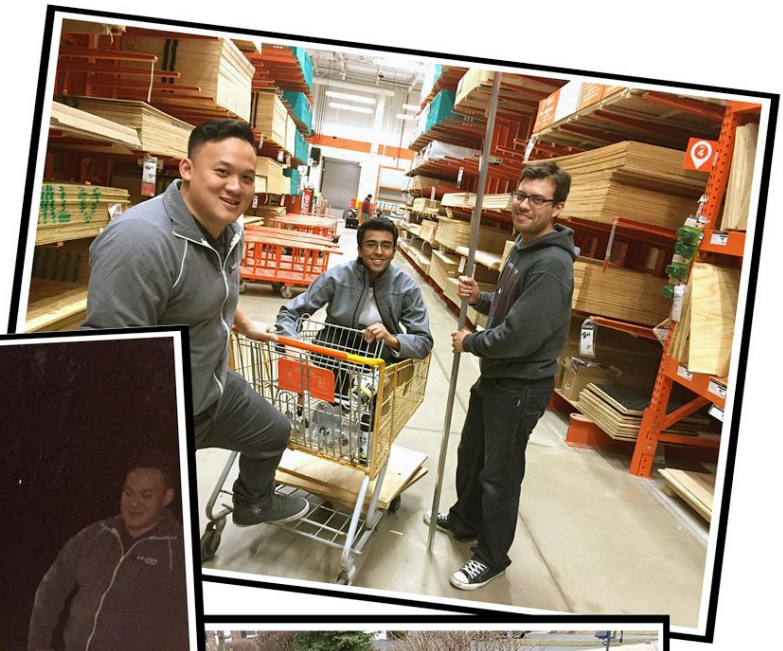

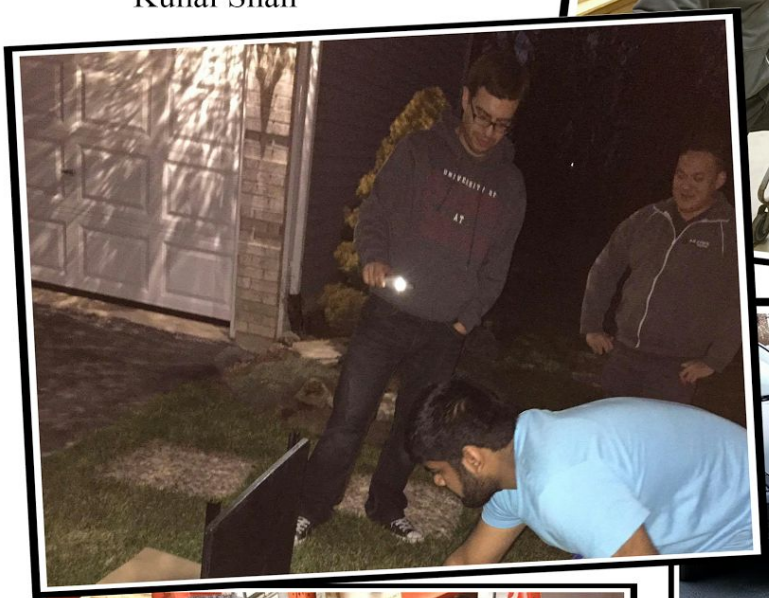

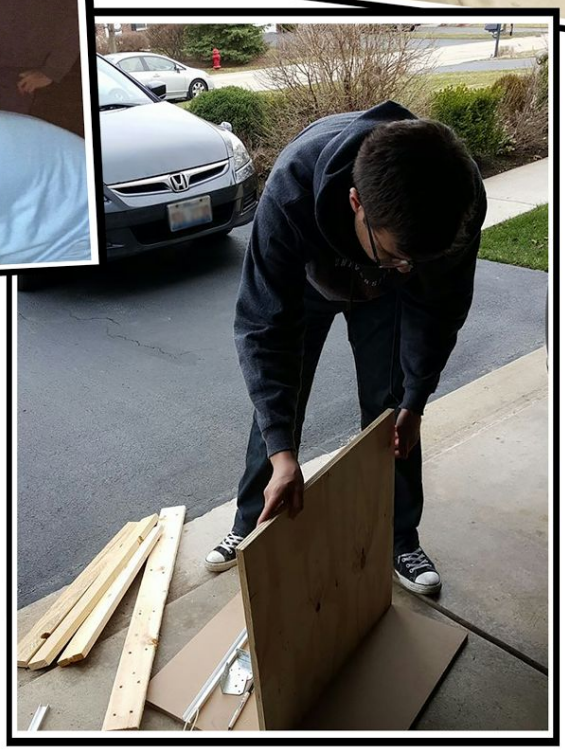

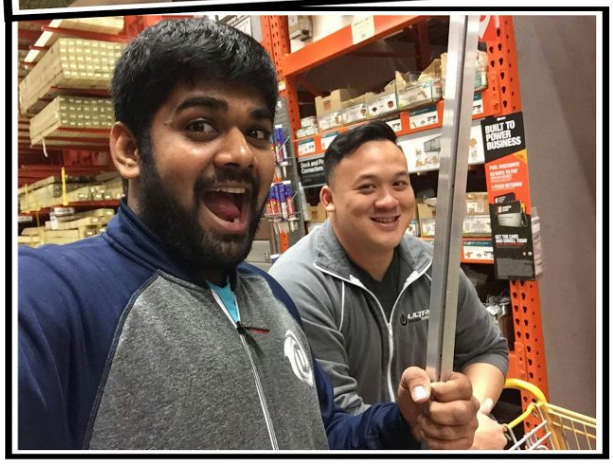

Parts Ordered and Why We Chose Them:

The following parts we order were 2' x 2' x ¾" fiberboard, two 2' x 2' x ¾" plywood, 6' x ¾" aluminum track, 6' x ½" aluminum track, 4x steel angle plates, Hitec HS-645MG, Wyndham House 4-Bottle Dispenser, washer and screws, and spray paint. The following orders are on back-order: Hitec HSR-2645CR, 531 mm x 15 mm timing belt, timing pulley, and 2x tension pulley. With these materials we will construct the framework, the track, and the liquor dispenser. Before constructing we had to consider several issues we may run into. We did not know how tall the glass was going to be, so we decided to implement the liquor dispenser component separated and have the height of the dispenser attachment to be be adjustable. We also wanted to consider the weight of the liquor dispenser, especially when we place the four bottles filled with fluid.

For the framework, we decided to go with a fiberboard for the base, because it has a heavier weight. We had the option between having a thickness of ½" vs ¾" for the fiberboard and plywood, and since we are dealing with heavy weights, we went for the ¾" thickness. One of the plywood will support the component for the liquor dispenser, and the other plywood will have the the liquor dispenser attached to it. Assuming that each bottle weighs around three pounds, we want to be able to support a total rough estimate of 15 pounds. Therefore, we bought four steel angle plates to hold one of the plywood up. In order to construct an adjustable liquor dispenser, we ordered an 6' x ¾" aluminum track. This will allow us to slide the liquor dispenser component into our base. Although, we might run into some issue when we try to slide the plywood down into the track. To resolved this issue, we will have to sanded down the edges of the plywood until it fits along with cutting tracks into the wood. We are using #6 x ½" button screws and washers to hold everything together.

Between motors and servos, we figured that the servos would be more beneficial for our project, because servos provide more precision in movement. For the mount that needs to get lifted, to activate the dispensing component, we need a decent amount of pressure. Therefore, the Hitec HS-645MG servo, a high torque servo which can handle up to 106.93 to 133.31 oz-in, is going to utilized. This servo only rotates up to 180 degrees, but we only need this component to go up by 1 inch. Therefore, we can make do with the 180 degrees of rotation. We will also have to consider a locking mechanism for the liquor dispenser component, since we will be apply high pressure against this component, we wouldn't want it to break apart or move around.

The track will need to be at least 18" long, which is a large distance for a tiny servo to handle. After researching, we found the Hitec HSR-2645CR servo, which is a servo that has continuous rotation. This servo is programmable to spin both direction, and control the speed of the rotations. This servo will be attached to the timing pulley, which will move the timing belt

between two tension pulley. If this servo cannot be obtained, there will be two Hitec HS servos that could be used. Some issues we may run into is keeping the glass stabilized when starting the servo because of jerk.

What we started building & how we were building:

The frame is one of the most crucial parts of this project. It is the foundation which everything else will be built around. The main ideas that went into building the frame are; sturdiness, simplicity, and aesthetics. Through discussion amongst the team members, the design of the frame was created. The frame is required to hold the weight of the four bottles and the dispenser. Therefore, the design of the frame was changed and there was an extra ½ inches of plywood plank added for support. The bottle dispenser, will be attached to this piece plywood, which will be then attached on another piece of plywood of thickness ¾ to make the frame rigid. The two pieces of 2' x 2' x ¾" plywood attach together via a sliding mechanism.These two pieces make up the vertical part of the frame. The vertical part of the frame will be attached to the horizontal part of the frame, which is a plywood of 2' x 2' x ¾'' thickness.The next phase of the project was constructing the frame.

Construction was started by attaching the ½ inch plywood over the ¾ plywood, for which C- channel aluminum pipe ½ inches was attached on the 2'x 2' x ¾" plywood using #6 x ½"screws. The goal was to attach the frame, which would hold the dispenser, to the main backing frame. The C-channel pipes would allow us to slide the dispenser frame into place. Three holes, each 8"apart were drilled into the C-channel. The three holes are meant to be a variable height adjustment. They were added in order to avoid any height issues between the platform, the glass, and the bottle dispenser. Because if track ends up being higher up, we want the bottle dispenser to be mounted higher, which will be dealt with by adding a screw onto the bottom hole, which would increase the height of the frame causing reasonable gap for the mechanism and the glass to fit.

After attaching the C-channel aluminum pipe 2' x 2 ' x ½" on to the 2' x 2' x ¾" plywood, the 2' x 2' x ½" plywood was suppose to slide in the channel. The channel was ½", which had the screws used to attach the channel to the board. So the ½" wood did not slide in. To make sure that it slides in, the sides of the wood about ½ inches was required to be chipped using a power carving tool.

The vertical part of the frame was built and had to be attached to the horizontal part of the frame, which is the 2' x 2' x ¾" plywood. Four Strong-Tie A steel angles were used to hold the vertical plywood over the horizontal plywood. The horizontal plywood was measured into half i.e. 1' for the track and the other part was for the electrical components.

After the frame was put together, the edges of the plywood that were chipped were polished using sandpaper, the frame was put together to test if it would hold up with pressure and it did. Since the frame was sanded and ready to go, the frame was then painted using black spray paint.

This concludes the brief explanation about the built of the frame. Pictures related to the built are attached below to help get a better understating of the design and to get between explanation of the current state of the project.

Issues:

At the beginning of the project during the thinking-phase, we assumed issues would arise and decided to resolve each issue as it presented itself. Once we started the building-phase we realized that a lot of issues would pop up, one after another as we moved along with building our project. Along the list of issues, the first one we encountered was related to the base that which would be holding up our liquor dispenser. We decided to go with an adjustable solution which involved a slide-down backsplash that would be attached to the backboard of the base. We had rails attached to the backboard with button screws. For the backsplash to work, we would need it to slide vertically along the rails. The issue here was the type of screws we used. The channels in the rails were the same width as the backsplash; when we inserted the backsplash into the rails, the backsplash would hit the screws, thus preventing it from sliding further into the rails. To resolve this issue we had to shave off about 1 centimeter from the edges of the backsplash, this would ensure that it would slide into the rails smoothly. This took quite a lot of effort because we had to chisel and powertool the pathway into the backsplash.

The next issue on our list was the liquor dispenser; the build quality of the dispenser wasn't what we were expecting. The dispenser uses a push-up tripod handle which is attached loosely to the pushrod used to dispense liquor. When we need to dispense liquor there will need to be an equal amount of force on all three "rods" of the tripod handle, otherwise the handle might break or not enough liquor will be dispensed. There is not much we can do about this except hope for the best.

After these first couple of issues, we started to see how other things required to build the project would be problematic. For the liquor dispenser to work properly, we need to have a servo below the dispenser that is able to move along with the platform holding the glass. This servo will apply force to the tripod handle on the dispenser. With the current setup of the track used for the platform, we will have issues with not having enough room for the servo used to dispense the liquor. With that in mind, the current setup of the platform itself does not allow for vertical

motion of the platform, to fix this we will need to have another platform on top of the other platform that will allow us to move the glass in vertical motion in order to have liquor dispensed. The issue with that is there not enough clearance below the platform to support a pushrod which would be used by the servo in order to apply pressure on the tripod handle.

At this point in time we are considering changing the design of the track used for the moving platform. This portion of our project might prove more challenging than we had thought.

Moving Forward:

Now that we have the necessary base built for the machine, we have a few possibilities of choosing what to do next:

One possibility of what to do next is to is to begin coding the arduino for asking for input and then sending it over to the next arduino. We would have to drill the breadboard to the wood and then add the push button and LCD input. That way the user can easily go through and input whichever drink they desire. An issue with this is that the most reliable method of communicating between arduinos is the serial connection. Others have attempted to get the wireless communication working but have not been largely successful. Therefore, we might have to use RX/TX serial communication but we need long wires in order to communicate with via serial.

Another possibility of what we could do next is begin building the track. We were not able to begin building it earlier because we were still deciding on what to make it out of. Also, we were not able to obtain the parts because we did not know the size that our frame would be. Now that we have a size for the frame and we know what we want our track to be, we can continue with that. We want to use a track system to help guide the platform along its path. Therefore, ensuring stability of the platform in order to avoid having the cup spill over from jerk caused by the servo motor. The track would be pulled on either side by a servo and a chain. An issue with the track is that that is the crucial part of our build. Therefore, we need to perfect the design before moving forward and attempting it since parts are expensive.

Lastly, a third possibility for us to move forward with is actually creating the platform that will be moving along the track. The platform is going to be holding the cup which will get filled. It will also be housing a servo which will cause the rod attached to the platform to lift at the correct time and put pressure on the dispenser. That way, the liquid can be poured into the cup. We want to use a smaller wooden square piece to hold this cup and servo. The issue we have to address is that the hole which upon the liquid gets dispensed is right in the middle of where the pressure points for activation are. Therefore, if we try to hit all three activation points

on the dispenser with the rod, we will block the hole where the the liquid is being dispensed. We resolved that we should try to hit the back two pressure points with the rod. Thus, we must find the correct placement of the rod on the platform.

We will most likely begin coding the arduino so that it does not become an issue of time later on during the project. The assembly of the frame was the simple part. Now we must get into the specifics putting together our Automatic Bartending Machine. One person can handle the coding for the input; therefore, we will also begin putting the track together after we receive our other powerful servo.