

Team 3176 White Paper

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Main Text

Abstract

The driver station is where the operators of the robot take their place to compete in the rounds of competitions. Documented below is the driver station and what has gone into the making of it. It is a folding driver station with a lifting joystick area, enclosed controller area, and a computer area where the computer can be secured in place with a series of straps and walls. This driver station differs from others by having the ability to fold inward and have a raising joystick area for comfortability at different heights.

Main parts of the assembly and their significance:

a) Joystick area-

Initially I was going to cut out an area for the joysticks out of a piece of $\frac{3}{4}$ inch plywood and secure it in place to the base of the driver station. I was then informed on the nature of the previous year's

driver station with where the joysticks had been placed on stilts to compensate for height issues. This led to my creation of a secured acrylic bottom on the joystick area to reduce the amount of additional wood that would have to be used. I then designed a lifting system similar to a scissor lift, however, not autonomously operated. I used a series of two crossing acrylic pieces to form the mechanism with a half inch plywood base and a few bolts along with washers and nuts to secure the moving pieces snug in place, but not absolutely rigid in place.

b) Computer area-

The computer is one of the main parts of the driver station, so it is only reasonable that time and effort goes into measurements and construction. At first, I was going to use a design with a rod running in front and behind the computer to allow mounting areas for retainer straps. However, due to complications with construction, I have chosen to make a cut out and carve holes for the straps into the back and front plating.

c) Button monkey area-

During the initial design phase of this project, I had created a much larger area than necessary. I was ill-informed when I started designing the button monkey area that there would be an integrated button press system. However, after a basic construction of the much too large button monkey plate, I was informed that the “button monkey” would be a console controller. With this new information, I was able to reduce the size of a single base plate.

d) Folding drive station base-

In most of the designs that I have seen for a driver station, the whole assembly is carried as a flat slab of whatever material it is made of, be it metal, plastic, or wood. This design differs because of its folding panels.

Major changes in the design; from Autodesk to Physical Assembly

a) Joystick Area-

When designing this area on Autodesk, I had initially planned on making it print compatible with the Makerbot, however, due to time constraints, I have made this out of $\frac{3}{4}$ inch plywood with a jigsaw. I have also put together a scissor lifting system to help with comfort of the operator at varying heights.

b) Button Monkey Area-

Initially, I was informed that the button monkey area would be an actual integrated button area. However, I was later informed that the “button monkey” would be a controller which gave me the opportunity to reduce the size of the button monkey area and therefore reduce the overall size of the drive station.

c) Reduced Length-

Initially when digitally designing the drive station, I had made it to be approximately 60.25 inches. However, after learning about some design changes and after swinging the station open and closed a few times, it was obvious that having a shorter driver station would be beneficial. Therefore, I shortened the length down to approximately 45 inches. There is only one more factor that has the possibility to add to length, and that is handles which I have already pre-determined to have a maximum length of 5 inches.

Future plans

At the end of the season, I would like to get the people who have attended competitions and the mentors to sign one of the white sections left on the drive station. I don't expect to have everyone's approval, (Dan), however, I feel like it would be a nice little remembrance token and a nice template to go off of for the next year. For the class of 2018, this is the last year at Brownsburg High School and the last year as team leaders. Nothing is ever perfect on the first run through. There will be critical failures and successes, but in a team it's not just one person alone trying to solve a problem and if there is a failure or uncertainty then ideas of solutions can be bounced around the room to find what the team thinks would work best.. I have no doubts that the season of 2018-2019 will learn from this seasons mistakes and make improvements to the team's efficiency as a whole. I also have to believe that someone next year will improve upon my own designs and work.

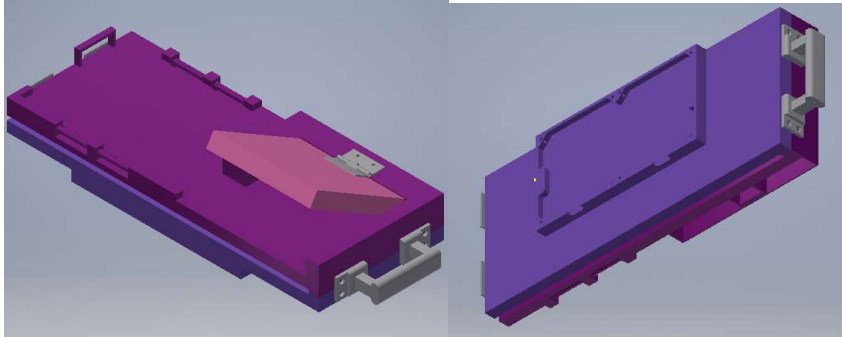
Learning Experiences

When it comes to theoretical calculations and assembly, and physically putting the pieces together, unexpected issues and new criteria can arise such as; height, weight, length, change in controlling method, along with various other constraints. While in construction, I was presented with the new criteria of changing the button monkey area from an integrated button press area to a console controller. This allowed me to reduce the size of the button monkey area and therefore reduce the overall size of the drive station. However, reducing size also came with its own disadvantages. One example of such a disadvantage is not having as much room to create and establish a mounting space for the lift of the joystick area. There is one thing that I would say bothers me, and that is the irreversible effects of a simple action; mainly I am speaking of cutting boards. You only have one shot at a single line unless you are willing to under-cut a piece and sand down to the right dimensions.

I also experienced pressure when I was told that “It would be good if the joystick area can be used by taller people comfortably.” This got me thinking about possible comfortable solutions to the height problem. I understand the importance of digitally designing a part, but there are just some things that can’t be left to theory and computer software. I did not use any computer software for this particular piece because of time and the simple fact that experimentation and everything with it, including failure, success, and results, equal results. And results are the only thing that matter; not how you did it, not what you used to do it, not why you did what you did, only results.

Photos / Diagrams

Autodesk design software



Physical assembly

