Design Evolution

Fabrication & Assembly

During our concept evaluation, our team decided on a dump mechanism for the payload drop system. En route to fabricating this part, we ran into some issues maintaining the payload block to stay in our payload system while the rover was driving and during the drop tests. To solve this issue, we added extra support to the sides and changed the geometry of the frame for the payload block to be more secure.

Test Plans

After running test plan 1, we had some issues obtaining accurate linear distances. While troubleshooting this issue we adjusted the power and delay settings in the Arduino after a couple test runs to obtain accurate results. Having deviations as high as 10' during our trial runs, we were able to modify the settings to minimize that deviation to less than 1'.

Testing linear drift in our second test plan, we saw drift deviations as high as 3' in our test runs after attempting to drive straight for 30'. The main adjustments we made to fix this issue was to increase the drive servo and steer the physical alignment of the nob. After adjusting the drive servo up to 100 and adjusting the physical alignment 45° to the right, we were able to minimize the linear drift deviation down to 1.17'.

In testing turn accuracy for test plan 3, our goal was to turn within ±5° of a specified turning radius. In attempt to turn 90° we initially had high deviations until we adjusted the drive servo on the Arduino to 1400 and delay settings 1500mS to get results within the 5° tolerance.

Following test plan 5, attempting to drive through rough terrain in uneven dirt and grass gave us some issues since it couldn't drive forward or backwards. To solve this issue, we exchanged the rear tires with thinner but bigger wheels to see if it would make a difference, yet it still wouldn't drive through grass. Since our design doesn't really allow for other treads to be tested, we figured the power of the DC motor might be too weak or that we don't have a four-wheel drive system. After considering design changes which included changing the DC motor, we decided to stick with the model we have now to maintain a low budget cost for the project.

Mission Adjustments

Rover mission modifications are mentioned at the end of the mission statements and results.