Beta demo short report

**Introduction**

In general, our robot was able to perform a few basic tasks at the beginning, but it also showed some flaws during Beta demo. It was able to receive the data from the Wi-fi, performed Ultrasonic and Light localization, and navigated to the mounting point of the zipline. However, after the robot started the zipline motor, it failed to mount the zipline and complete the rest of tasks such as dismounting the zipline and navigating to the flag-searching zone. Also, we noticed that our robot localized more often than it should have which was unexpected for us during the demo.

**Main Body**

After reviewing the code and analyzing our hardware design, we think we have a good idea of what went wrong with our localization. First, our robot did light localization twice before it started navigating. The way we implemented the Navigation is that the program gets the target point to go to and if the total distance is longer than three tiles, we stop at the third tile to perform a midpoint light localization and continue onward. Once we reach this target point, we localize again and continue with the routine. At the beginning of the demo, the robot did the ultrasonic localization followed by a light localization and reached the starting point (0,0), as usual. But once it did this, it localized again. We believe this is because in the wi-fi parameters, this point was passed as the green starting zone. In our code, the robot is supposed to go to the starting point (between sg\_ll and sg\_ur) before going to the zipline. Thus, it localized one time at the corner (0,0) and then reached the starting point (which appeared to be the same point) and localized again. This explains the double light localization. This was time consuming but we do not think it had an impact on the rest of the demo.

Also, the robot failed to mount the zipline. This is caused by both software and hardware aspects of our design. For the software part, we have errors in the Odometer, which caused the actual turning angle to be less than the calculated turning angle. Because we performed light localization right before we started the pulley motor, the robot was facing the opposite direction from the zipline at that point. Hence, the robot had to turn 180 degrees so that it could face the zipline. This turning was not accurate because of the Odometer, so our robot's zipline pulley could not fit on the zipline bar. Also for the hardware, the helper structure we added in front of the motor could not adjust the position of the pulley motor so that it could get on the zipline. The helper is spherical at the tip, which would allow it to slip and get on the zipline if we are within the margin of error. However, in the beta demo we got a perfect head on collision and the robot was stuck. This might be inconclusive as the chance to get a head on collision like that is very slight. Still, we will be working on increasing our precision to avoid close calls.

**Conclusion**

In summary, the beta demo was somewhat inconclusive. Since the zipline mounting failed we could not gather data regarding the rest of the tasks. This means that we will have to go back and extensively test integration once again. Tests will be made until we are sure that we do not get runs where we are very close to the maximum allowable error.