

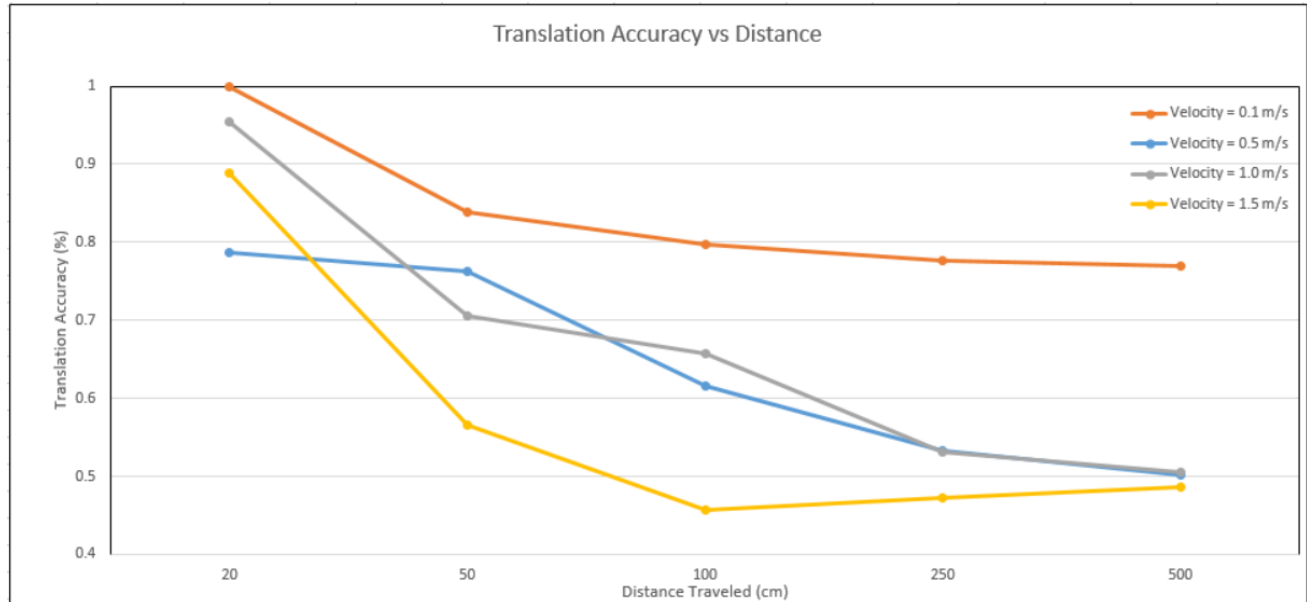
Translation Accuracy with Respect to Distance and Velocity Using a Console-Based Command Delivery Method

Procedure:

Five arbitrary distance values were selected to gauge travel accuracy (20, 50, 100, 250, & 500), all measured in cm respectively. At each of these five distances, the movement was recorded at four velocities (0.1, 0.5, 1.0, & 1.5), all measured in m/s respectively. Twenty data points were recorded in total. Rover position zeroing was accomplished through the use of an arbitrary floor marking and a square; vehicle translation was recorded with a fixed measuring tape and a square. *Note that the accuracy of these movements compared to the desired distance is not an evaluation of the rover's accuracy but rather the capabilities of this control method.*

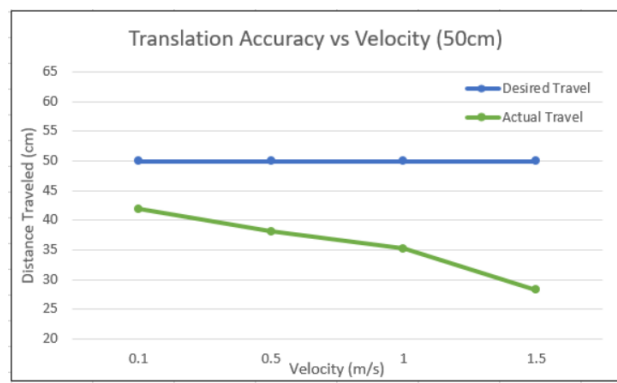
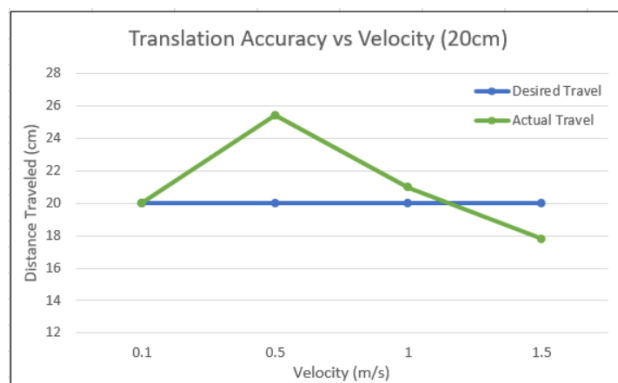
RR MINI Translation Accuracy WRT Velocity & Distance						
Trial #	Desired Travel (cm)	Actual Travel (cm)	Vehicle Velocity (m/s)	Translation Accuracy %	Average Accuracy %	Avg Actual Travel
1A	20	20.0025	0.1	0.999875016	0.907675685	18.15351371
1B	20	25.4	0.5	0.787401575		
1C	20	20.955	1	0.954426151		
1D	20	17.78	1.5	0.889		
2A	50	41.91	0.1	0.8382	0.71755	35.8775
2B	50	38.1	0.5	0.762		
2C	50	35.2425	1	0.70485		
2D	50	28.2575	1.5	0.56515		
3A	100	79.6925	0.1	0.796925	0.631825	63.1825
3B	100	61.595	0.5	0.61595		
3C	100	65.7225	1	0.657225		
3D	100	45.72	1.5	0.4572		
4A	250	194.31	0.1	0.77724	0.5781675	144.541875
4B	250	133.0325	0.5	0.53213		
4C	250	132.715	1	0.53086		
4D	250	118.11	1.5	0.47244		
5A	500	385.1275	0.1	0.770255	0.565785	282.8925
5B	500	250.825	0.5	0.50165		
5C	500	252.73	1	0.50546		
5D	500	242.8875	1.5	0.485775		

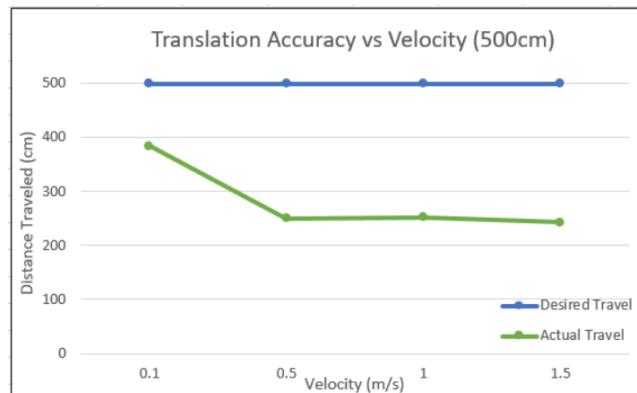
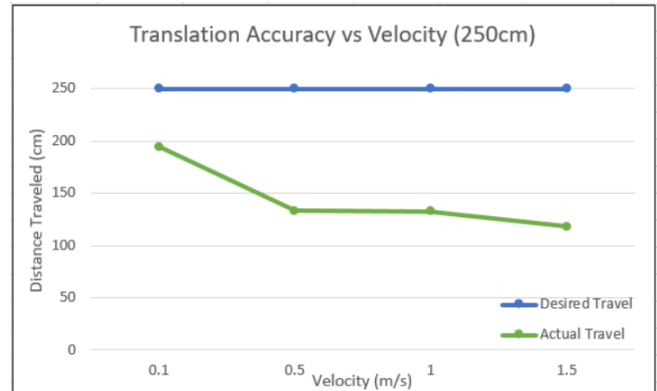
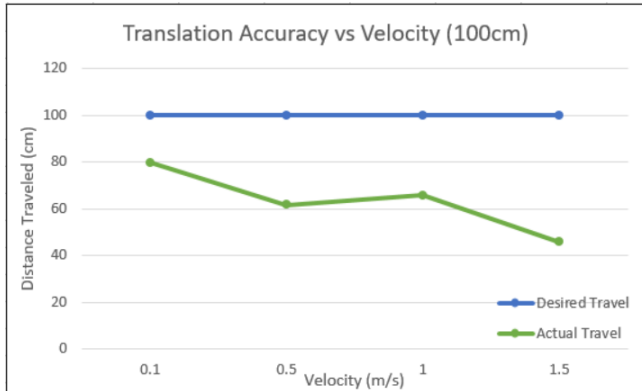
The slowest of the five trialed velocities (0.1m/s) yielded the most accurate translations, as seen in the chart below. The following three velocities resulted in significantly less accurate movements, falling into the 50% accuracy range as the 500cm mark is approached.



The four trials were unanimously closest to the 20cm marker when tested, the 0.1 and 0.5 trials held near 100% accuracy.

In all following plots, we see a consistent trend of translation values beginning below the desired mark, then continuing to fall as travel velocity increases.





Observations:

One key reason for the dramatic drop-off in accuracy as velocity increases may be the number of translation commands sent through the console. The telemetry software calculates a quantity of commands to send based on the given velocity and desired distance, but the drive base has a delay window before motion begins. This means that if the desired velocity is increased but the distance remains constant, fewer commands are sent and consequently, fewer are executed by the motors.

This motion solution is not viable for precision applications or higher velocities, though it may be sufficient for demonstrations, rapid testing, small movements, and educational purposes.