

Project Phase 1

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September 18, 2022

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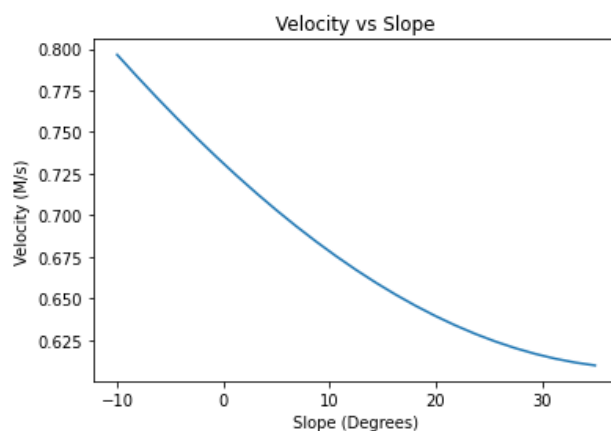
Question 1: I believe that defining acceleration due to gravity as a variable and then using it throughout the code is very advantageous. This ensured that the code is modular and easily modifiable. It helps when we want to test different values for gravity, instead of having to change it in several different places, we only need to change it in one place.

Question 2: The program will throw an exception. This is desired behavior. We assumed that past a 75-degree angle of inclination the gravitational force pulling the rover downhill will be greater than what the motor can produce to move the rover uphill. Therefore, making anything above a 75-degree angle of inclination impossible to climb for this rover.

Question 3: The maximum torque the motor can give is around 300 Nm, at that amount of power, the shaft speed is 0 rad/m

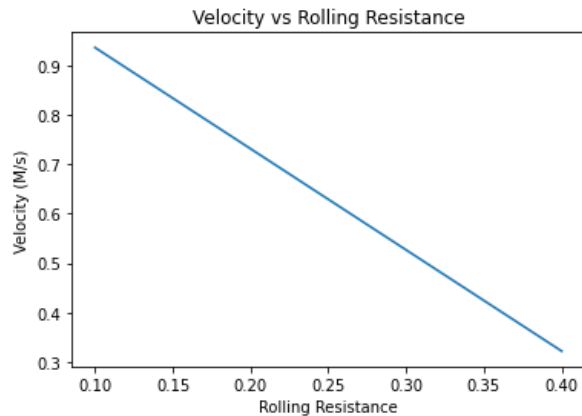
Question 4: The speed reducer converts the rotational velocity of the motor into torque. This is because the DC motor often does not provide enough torque and has too much rotational velocity.

Question 5:



There's a linear relationship between the slope and velocity. As the slope of the terrain increases, the velocity of the vehicle will decrease. This is because the gravitational force will increase as the slope increase, therefore acting against the force that is output by the drive wheel trying to push the rover up the slope.

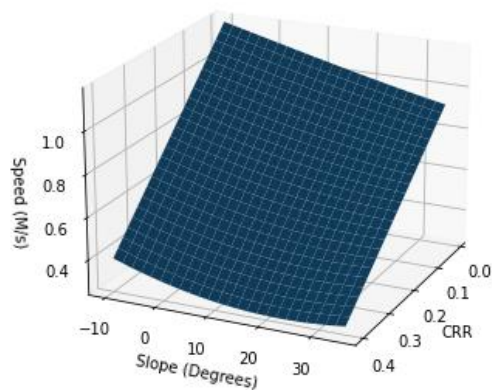
Question 6:



There's a linear relationship between the rolling resistance and the velocity. As the rolling resistance increases, there will be more force acting in the opposite direction of the drive wheel.

Question 7:

Speed vs Slope and Rolling Resistance Coefficient



It is best to operate the rover on flat surfaces with minimal rolling resistance. The rolling resistance coefficient is the biggest factor in determining how fast the rover would be able to go. This can be determined by observing that rolling resistance at 0 allows the vehicle to go faster than even if the vehicle has a negative slope. The gradient is greater in the direction of the rolling resistance.