MEEN 357 – 501

Project Phase 1

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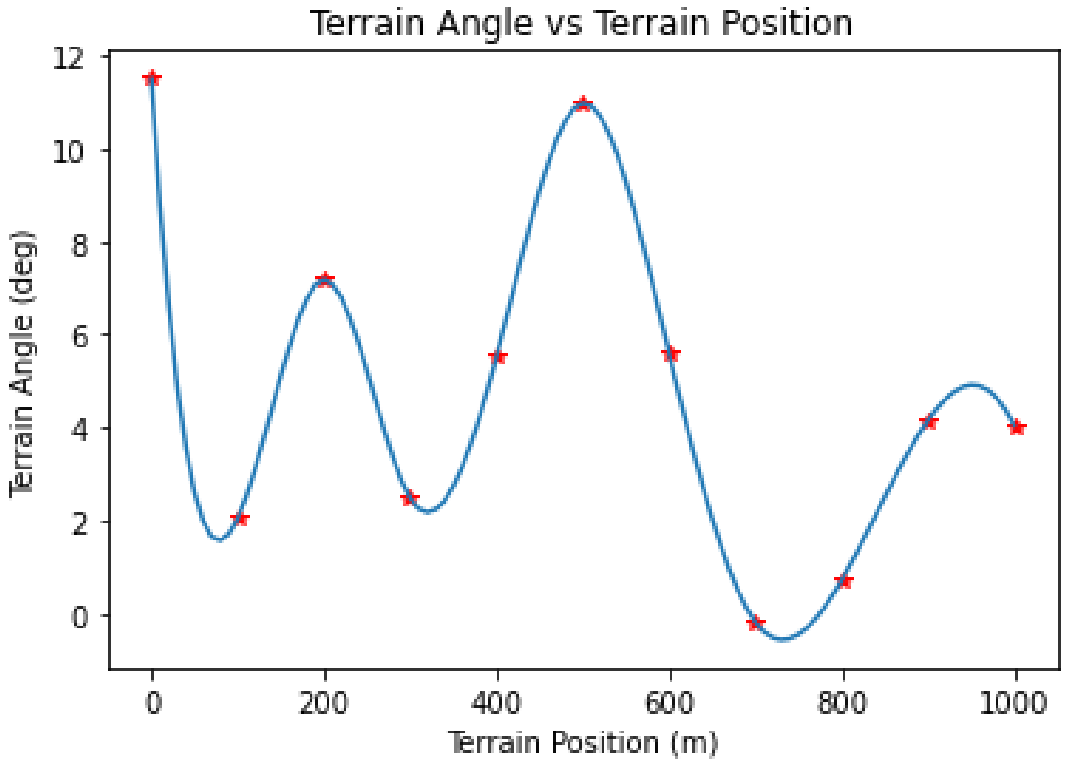
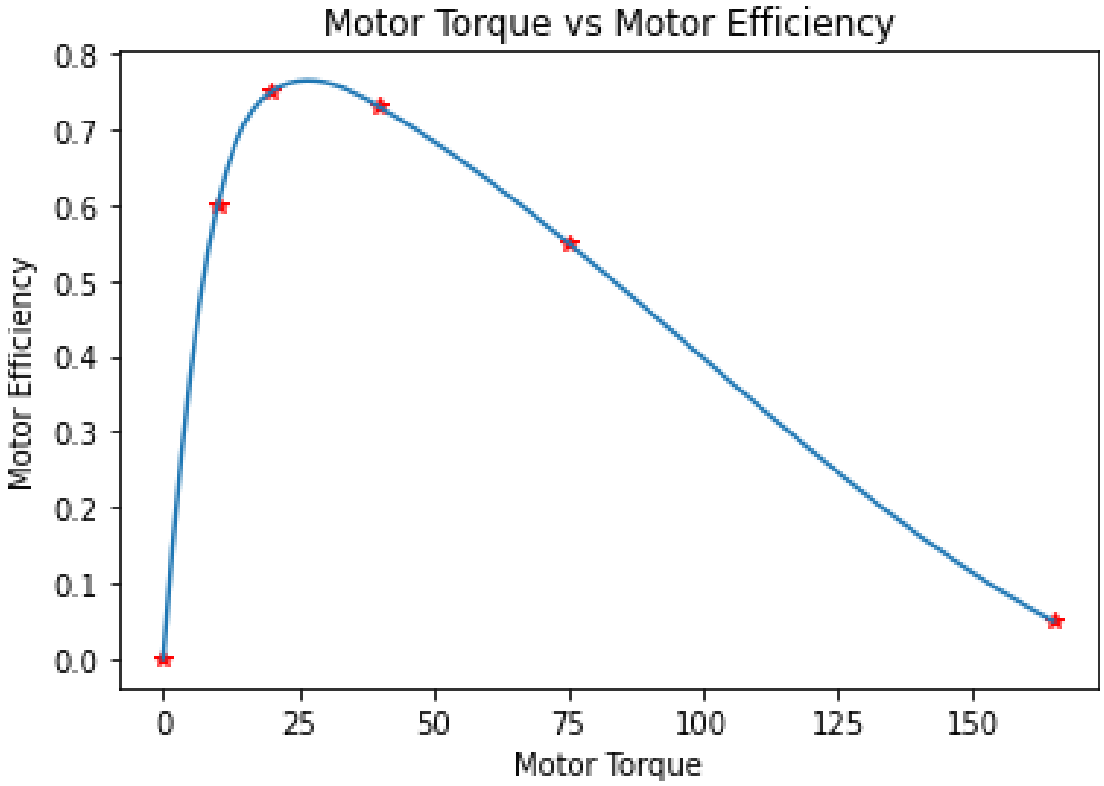
Project Phase 2

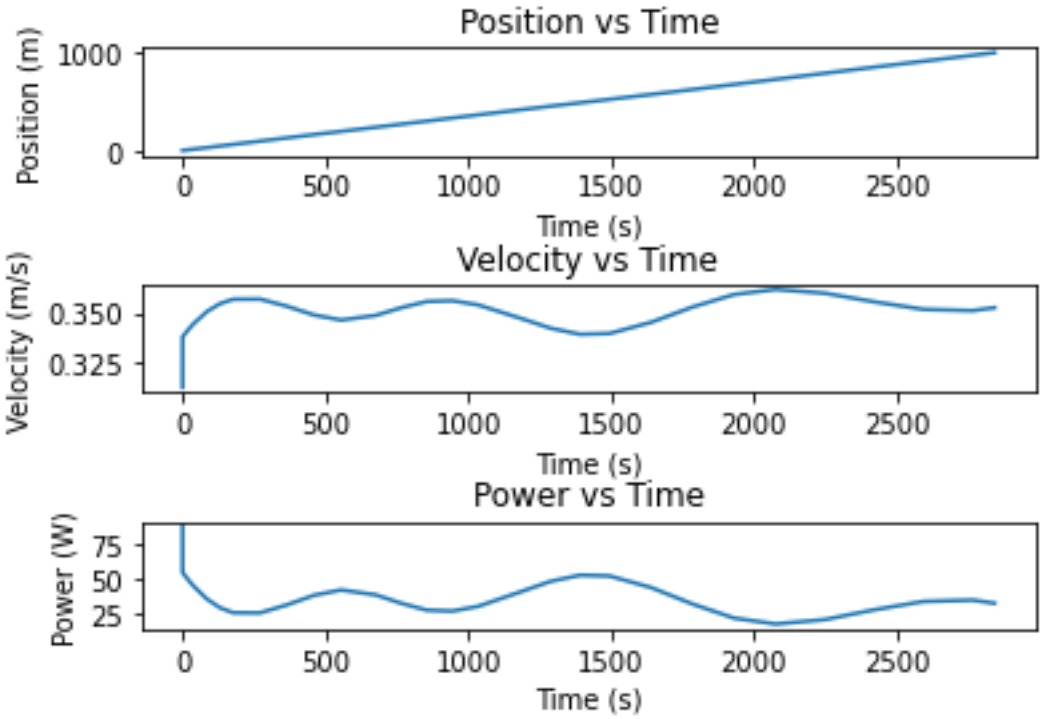
Task 2) This graph shows the change in the terrain as the rover moves along the x-direction. The red stars are the given discrete points and the blue line is the interpolated function.



Task 5) This graph shows the efficiency of the motor as more torque is applied. This shows that there is a certain torque where the motor is most efficient and should be operated at or within a range of that torque for maximum efficiency of the motor. The red stars are the discrete points and the blue line is the interpolated function.



Task 8) The Position vs. Time plot shows the position of the rover relative to the starting point. This makes sense as the rover is moving forward and not reversing. This also shows that there is a linear relationship between Time and Position which helps us make sense of the next two graphs. The Velocity vs Time plot shows the Velocity of the Rover over time. There are certain changes in the velocity due to terrain changes. This can be seen as the peaks and troughs of the Velocity vs Time graph match that of the Terrain Angle vs Position graph. The Power vs. Time graph shows the power output of the rover as time changes. This shows the most power consumed at time equal zero since the rover is starting from rest on a very high inclined angle, and that the power is also closely related to the terrain angle.



Completion Time	2842.7310227220632 s
Distance Traveled	1000.0 m
Max Velocity	0.361813876344109 m/s
Average Velocity	0.3410831149554325 m/s
Battery Energy	997735.3461779102 J
Battery Energy per Distance	997.7353461779102 J/m

Task 9)

As shown in task 8, the rover uses a total of $0.997 * 10^6$ J over the course of the experiment. As this is less than the $0.9072 * 10^6$ J of energy stored in the battery pack, the rover will not be able to complete experiment 1. Total consumed battery energy was achieved by using the total mechanical energy required to complete the experiment and then accounting for the efficiencies of the rover's motors.