Calculating Motor Gearing

Determine the optimum gearing for the Cart project using the NPC 1200 motors. Use the FINAL TORQUE AND RPM AT THE WHEEL…not at the motor shaft.

This is a trial and error solution. Here are the resources you will need;

Web site to determine required motor performance <http://www.societyofrobots.com/RMF_calculator.shtml>

Chosen Motor Specifications.

<http://www.robotmarketplace.com/products/NPC-1200.html>

You will need to make guesses about this information:

1. Combined weight of batteries, cart, driver, motors etc.

\_\_\_\_\_\_\_\_\_Batteries

\_\_\_\_\_\_\_\_\_Cart

\_\_\_\_\_\_\_\_\_Driver

\_\_\_\_\_\_\_\_\_Motors

\_\_\_\_\_\_\_\_ wheel Diameter

\_\_\_\_\_\_\_\_ Final velocity

\_\_\_\_\_\_\_\_Acceleration

\_\_\_\_\_\_\_\_Angle of incline

\_\_\_\_\_\_\_\_Gear Reduction (This is assumed for each iteration of the calculations

\_\_\_\_\_\_\_\_\_Other (Make guesses based on some research. There are many ways to do this. You write a description of what you based each guesson.

\_\_\_\_\_\_\_\_\_ Combined Weight

Note: You will need to calculate the final torques and RPM for each of the iterations you perform. This means you will need to set up a spread sheet to do this for you…set it up after you “Figure out” what I just wrote…you will need to try and use the calculator before this makes sense. The calculator needs the torque and RPS that results from the chosen motor specs AND THE GEAR RATIO you chose…In other words you need to enter the final drive torque and RPM AT THE DRIVE WHEEL OUTPUT.

1. Calculate the chosen motor RMS. Use lbs\*ft\*rps (radians per second)

Motor RMS = Motor Torque in lbs\*ft x rps (radians per second)

Remember to calculate motor torque and RPS using the “Design” or “Rated” Motor Torque and RPS. You may need to convert RPM to RPS.

<http://www.convertunits.com/from/radians+per+second/to/RPM>

\_\_\_\_\_\_\_\_ Motor RMS

1. Use the Robot Society calculator to determine the optimal gearing for the cart project.
   1. You may need to try many different combinations so set up a spread sheet to record ALL the attempts you make.
2. Once you know the gear reduction you want to use