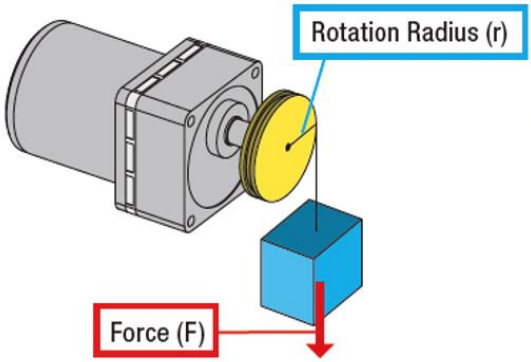
ME331 Project 6

For this project, you are allowed (and recommended) to work in a team of two students. Be sure to report who you worked with on Blackboard submission.

With the DC motor that came with the kit, you probably learned that the torque is very low without any gear system. If you touch the propeller, it easily stops. The TT motor is the same DC motor housed in a gear system that provides x48 more torque by sacrificing the RPM. To characterize the performance of the TT motor, we will obtain the torque-speed curve experimentally.

Step 1: Wire the TT motor as we did in the week8b in-class activity (potentiometer is optional)

Step 2: To measure the torque, we will attach a wheel to the motor as a pulley.



The left and middle figure show the concept.
The right figure shows what it might look like in reality…

The torque can be computed as T = X*r [g*cm]

Step 3: Attach a string (e.g., dental floss) to the pulley/wheel, and then put a small weight on the other end of the string. Make sure that sting is long enough (at least 50 cm or more will be good).

Step 4: Mark the side of the wheel with a sharpie or a sticker. This will be useful when you measure the RPM from video recording in the next step.

Step 5: Record a video of the wheel as it winds up the weight. Playback the video and count the number of rotations in the time duration to compute RPM. (I used 60 FPS on iPhone)

Step 6: Record the results (RPM, Payload, and Torque) in an excel sheet

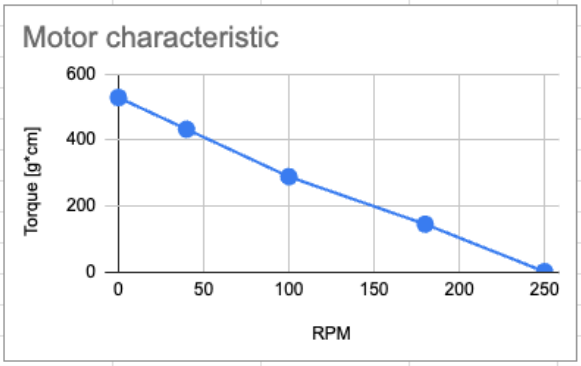
Step 7: Repeat the above steps for other weights including:

- 0 load that corresponds to maximum speed
- Maximum load that corresponds to the “stall torque”
- At least 3 data points between the above two

Step 8: Plot the results.

Sample provided below. (Note that the numbers are randomly selected- **Do not attempt to replicate these results**)

	A	B	C	D
1	Experiment #	RPM	payload [g]	torque [g cm]
2	1	250	0	0
3	2	180	60	144
4	3	100	120	288
5	4	40	180	432
6	5	0	220	528



Bonus: Repeat the above for 3.3 V input voltage.

Submit:

1. Note the name of your partner.
2. Three videos used for RPM calculation including the ones for no-load and stall torque.
3. Screenshot of the plot and data from Step 8
4. The actual spreadsheet from Step 8