The robot will be relying on four wheels for driving and steering. Two rear wheels will be responsible for driving the robot (with Barber-Colman geared motors), using differential steering. Aside from being a free spinning support for the front side of the robot the front pivot wheels will also follow the tape, as they are roughly aligned with the QRD1114 sensors used for the sensor system that is responsible for tape following.

The speed required was calculated using an estimated distance that needs to be travelled by the robot throughout the whole competition (i.e. distance of the taped and untaped portion), where this distance was equal to about 8 m. The angular velocity of the wheels here is:

The torque required was calculated based on the ramp, as this is the most difficult part of the competition for the wheels. The following assumptions were made (as worst-case scenarios):

Given these assumptions a free-body diagram and the equations of motion are outlined below:

This acceleration implies that the robot will be able to get up the ramp given sufficient torque.

If we assume that a=0, the absolute minimum force required is 13.6N: we double this to about 27N to provide a factor of safety. We now have a system of equations (where is the gear ratio):

(This last equation comes from assuming that torque and angular velocity of the motors are linearly related.)

We arbitrarily choose the radius of our wheels to be 3 cm: we want the torque going up the ramp to be 0.1 N-m (for maximum power), and this yields .

Since we are overstating the weight of the robot and the force required to get up the ramp, the robot is likely to be able to go faster than this (and it will certainly go faster along flats).

The max power required is .