The robot will be relying on either three wheels in a triangle formation or 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 wheel (or wheels) will also follow the tape, as it is the rough location of the QRD1114 sensors used for the sensor system.

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 untapped portion), where this distance was equal to about 8 m. Ideally, the robot needs to travel this distance in about 40 seconds without picking up any pets, granting the robot 90 seconds locating, retrieving, and delivering pets. Thus the speed which the robot is required to travel 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.)

Arbitrarily choosing the radius of our wheels to be 3 centimeters, and solving the system of equations yields: