

TASK 3

Wheel Calibration (fix systematic errors)- The goal of this task will be to move your robot using built-in commands for a distance of 2 meters. Determine the trim values of the motor such that the robot travels in a straight line.

1. Install latest Arduino IDE, open "Sketch" menu, "Include Library", then "Manage Libraries..", and install "Romi32U4" library
2. Open "StraighLineV2.ino" found within the GitHub repository for Task 3. Note that there are several parameters established within the code which include `drive_distance`, `motor_power`, `motor_offset`, `wheel_d`, `wheel_c`, and `counter_per_rev`. These items dictate the distance one wants Romi to drive straight, the power supplied to both motors, an arbitrary offset value that constantly adjusts power to either the right or left motor depending, the wheel diameter, the wheel circumference, and the encoder counter per wheel revolutions of the motor - respectively.
3. The motor offset was selected arbitrarily and was raised and lowered until Romi could move in a straight line for the desired distance. Note that this value is used to increase or decrease motor power depending on if the left encoder count is higher or lower than the right encoder count. The adjustment in power allows for the encoder counts to stabilize.
4. The wheel diameter was pulled from the description of the robot provided by the manufacturer and was input in (mm), the wheel circumference was then found from the equation for the circumference of a circle.
5. The encoder counts per wheel revolution was found by multiplying the gearbox ratio numerator by the encoder resolution which was 12 counts per revolution of the motor shaft.
6. Following these parameters, the number of wheel revolutions needed to obtain a certain distance was found and stored in the variable `num_rev` which was then converted to a tick count and stored in the variable `target_count`.
7. Trim values were implemented when utilizing PID control in Task 5.

Video:

https://www.youtube.com/watch?v=Gp6dk6N_4XA