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Task #4: Calibration

Linear Distance

The surface which I tested on was a stained hardwood floor, pictured below: it may differ from surface friction in the Bass Arts classroom #119.

A ruler on a wooden surface

Description automatically generated with low confidence

I also portioned out a 2 meter track with the same tape. Linear Distance Equation:

V=d/t

t=11s

d=2m

On average, V=5.5m/s @ 50% forward power in both tracks.

Code for Angular distance:

Possible sources of error: The mBOT seems to accelerate on a curve throughout the turning process and thus it was much harder to accurately code for the 90 degree turns because the power comes on slow.

The reason for the discrepancy in the times to turn in the angular distance measurements for all turns other than 360 is because I started with 360 degrees. Using 360 degrees as my base measurement allowed me to use trial and error, changing the time which the left track was moving, to find the time, in seconds, for a 360-degree turn, again on hardwood floors. I have observed that the power curve is not linear so to speak and the bot takes a short time to get up to speed and some more time to glide to a complete stop. I used dozens of trial runs for each degree of turn: 90, 180 and 270. Thus, 90 degrees ended up NOT being just 25% of the time it takes to turn 360 degrees, which is very counter intuitive until I observed the non-linear power curve of the bot and thus I had to trial and error each following degree separately to come up with accurate results.

Code for Vector displacement.

This last task is a simple combination of the two previous ones, however it proved to be difficult because in my trial runs I noticed that if the robot did not follow a straight line or execute an almost perfect 90-degree turn, the whole movement sequence would be negatively affected.

To calculate the time of forward motion I used an online resource to find out how many meters 5 feet is. To figure out the % power and time it takes to go 5 feet, so I divided 1.524/2 (the 5 feet in metric over 2 meters which was my trial distance) which is .762. This product I multiplied by the time it takes to go 2 meters to get 5 feet of distance in the following: 10 seconds\*.762= 7.62 seconds at 50% power. The turns were much easier to calculate as I had completed dozens of trial runs so I just used the 1.4 seconds one 1 track at 50% power measurement, which I knew to be accurate. To clean up my code, I used the repeat function with a 4 times multiplier. Finally, I repeated the sequence of travel 5 feet and turn 90 degrees 4 times to end up where I started, also conveniently facing the same way.