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**LAB 2: ODOMETRY**

Data

Data Analysis

Observations and Conclusion

The error would not be tolerable for larger distances because this would cause our robot to diverge from its path even further. In fact, we expect this error non-linearly because of multiple factors affecting our robot and the track. One example that we noticed almost immediately was how much dirt was present on the floor and on the board. It is logical to believe that the accumulation of this dirt after many trials will negatively affect our robot’s traction. These errors will accumulate the longer the robot runs and grow exponentially.

Further Improvements

1. In order to reduce the slip, the solution would be to reduce the robots speed. This will not only reduce the chance of slippage but also result in smoother turns and precise movements. This is because the reduction of speed results in an increase of friction between the wheels and the board and thus decreasing the chance of slippage.
2. i. Given two (2) light sensors, we could have corrected our robot’s angle by calculating the difference of the detection times of the black lines. In other words, the robot will be able to measure the angle at which it’s heading, calculate the error and adjust accordingly. As well, if the time difference were above a certain threshold, then we would know that the robot is turning. For this method to work, however, it’s important that the two sensors are perfectly parallel. Otherwise, the data would be inaccurate.

ii. Given one (1) light sensor, our options for adjusting the robot’s angle are much more limited but not impossible. First, we can implement a simple line counter in which the robot would be able to know which direction it is headed at all times. This method is not very accurate as it only implements 4 corrections (90, 180, 270, 360 degrees). The more precise method would be to use the same idea as discussed above and calculate the time needed to cross two successive lines and proceeding to calculate the error. Once again, this is only possible if we know the correct distance between two successive lines and the robot’s speed in advance.