## WallMaps Task

1. After reading the file, there are 1887 data entries within the file as it prints there are 1088 rows x 4 columns, but the first row is allocated to naming the columns so those aren't counted. Given the diameter of the wheel, 43.2 mm, its circumference is 135.7168026 mm. To find the distance traveled, I must now find the amount of revolutions. Since the final rotational degrees are the same for both wheel, I can pick either one and then divide its number of revolutions when I take 66010/360. Now that I have the revolutions I just need to multiply it by the circumference to get the distance traveled which comes out to be 24885.18372761547mm traveled, which is roughly 81.6443035682922158 ft.

2. When I first read the file, I didn't have the usecols command utilized yet, so when it printed the data, it had a weird column of NaNs. So all I did was do the usecols=[0,1,2,3] and it fixed it.

Before:

```
      Time  Ultrasonic_p4_01  Rotation_pB_01  Rotation_pC_01
0.0   97.0               1.0             1.0             NaN
0.2   97.7              51.0            53.0             NaN
0.4   97.6             115.0           116.0             NaN
0.6   98.4             177.0           178.0             NaN
0.8   97.7             239.0           239.0             NaN
...    ...               ...             ...             ...
216.6 38.0           65790.0         65790.0             NaN
216.8 38.0           65847.0         65851.0             NaN
217.0 37.6           65905.0         65909.0             NaN
217.2 37.4           65965.0         65968.0             NaN
217.4 37.0           66010.0         66010.0             NaN

[1088 rows x 4 columns]
```

After:

```
        Time  Ultrasonic_p4_01  Rotation_pB_01  Rotation_pC_01
0        0.0               97.0             1.0             1.0
1        0.2               97.7            51.0            53.0
2        0.4               97.6           115.0           116.0
3        0.6               98.4           177.0           178.0
4        0.8               97.7           239.0           239.0
...      ...                ...             ...             ...
1083   216.6               38.0         65790.0         65790.0
1084   216.8               38.0         65847.0         65851.0
1085   217.0               37.6         65905.0         65909.0
1086   217.2               37.4         65965.0         65968.0
1087   217.4               37.0         66010.0         66010.0

[1088 rows x 4 columns]
```

3. Corrections occur when there is a spike in the data, with this as the case it looks like there are a total of 8 spikes in the data which leads to 8 total corrections.

4. Just by looking at the graph the robot goes by a door when the path shoots up, plateaus, and then goes back down to its normal path.

5. Looking at the graph, it looks like there are four doors in the path of the robot. It only looks like door is open and it is door 3. It is the only open door because



its distance increases as the door progresses on the graph, while the others slowly decline on the graph.

6. For Door 1, it is between t = 53.8 and 62 which makes its rotational degrees (using the left wheel 18817-16325/360 = 6.922 revolutions. Multiplying the circumference by the revolutions the length of door 1 = 939.462mm long. Using the same logic for the other three doors you get door 2 = 847.853 mm long, door 3 = 847.099 mm long, and door 4 =
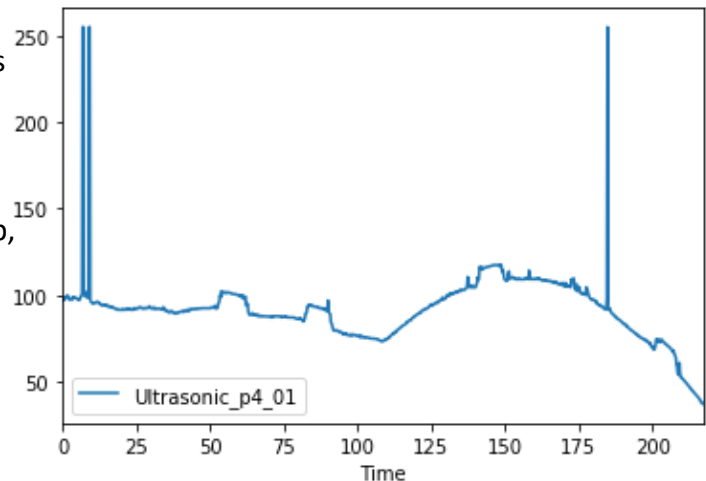
893.846 mm long. Taking the average of the four doors, it gives an average length of 882.06497 mm long which is about 2.8939 ft long, which is close to a standard 3 foot long door.