In M3 taking a look at the following params:

Predict function: for measurements from robot about it's own movement

Q = co-variance of self position

Update function: for measurements from the robot about the external world (i.e camera)

R = covariance of external things (i.e markers/fruit)

NOTE: lower these factors are, the more spreadout the normal dist will be (i.e less accurate data is)

Q\_factors being tried:

q = 1

R\_factors being tried:

r= 1

SINGLE LOOP:

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| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.05249952233521107 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.06263513435725518 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.0451490860713499 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.05039953217811928 |  |
|  | The RMSE after alignment: 0.048598863405896135 |  |
| Q\_factors being tried:  q = 0.1  R\_factors being tried:  r= 1  Note: Circles around objects where smaller | | |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.22935972812123454 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.05772799495821509 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.05275450560958705 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.34979546100495934 |  |
| Q\_factors being tried:  q = 1  R\_factors being tried:  r= 0.1 (low cov, very high error for External measurements?)  NOTE: circle around robot (IE error of robot went up very quickly) | | |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.07422991309874279 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.06112323243422858 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.6532942609700716 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.07791713925446049 |  |

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| Q\_factors being tried:  q = 2  R\_factors being tried:  r= 1  note: circles around objects r massive  note: circle around robot expands extremetly quickly (continually grows)  NOT USEFUL | | |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.9542525255727748 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 1.1526191992606505 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.57889004631236 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE after alignment: 0.05257127532216978 |  |

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| Q\_factors being tried:  q = 0.1  R\_factors being tried:  r= 0.1  note: robot circle grows moderately fast | | |
| Run : (ticks:30, Turn ticks:5) |  |  |
| Run : (ticks:30, Turn ticks:5) |  |  |
| Run : (ticks:30, Turn ticks:5) |  |  |
| Run : (ticks:30, Turn ticks:5) |  |  |

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| Q\_factors being tried:  q = 1  R\_factors being tried:  r=  note: robot circle grows moderately fast | | |
| Run : (ticks:30, Turn ticks:5) | The RMSE before alignment: 1.530917002016045  The RMSE after alignment: 0.05206298525978552 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE before alignment: 1.5598564324542699  The following parameters optimally transform the estimated points to the ground truth.  Rotation Angle: 1.3960203853142463  Translation Vector: (-0.1438707268031742, -0.022140734165747633)  The RMSE after alignment: 0.05596276164635726 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE before alignment: 1.4813203097143561  The following parameters optimally transform the estimated points to the ground truth.  Rotation Angle:  1.3290229412524848  Translation Vector: (-0.1440494289184498, -0.06375088153005631)  The RMSE after alignment: 0.06863907961079226 |  |
| Run : (ticks:30, Turn ticks:5) |  |  |

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| Q\_factors being tried:  q = 1  R\_factors being tried:  r= 2  note: robot circle grows moderately fast | | |
| Run : (ticks:30, Turn ticks:5) | The RMSE before alignment: 1.530917002016045  The RMSE after alignment: 0.05206298525978552 |  |
| Run : (ticks:30, Turn ticks:5) | The RMSE before alignment: 1.5598564324542699  The following parameters optimally transform the estimated points to the ground truth.  Rotation Angle: 1.3960203853142463  Translation Vector: (-0.1438707268031742, -0.022140734165747633)  The RMSE after alignment: 0.05596276164635726 |  |
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| Run : (ticks:30, Turn ticks:5) |  |  |