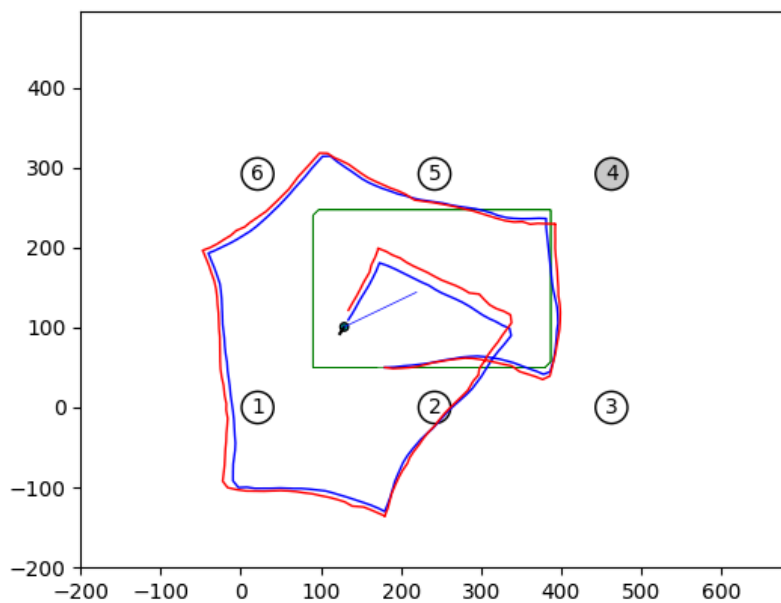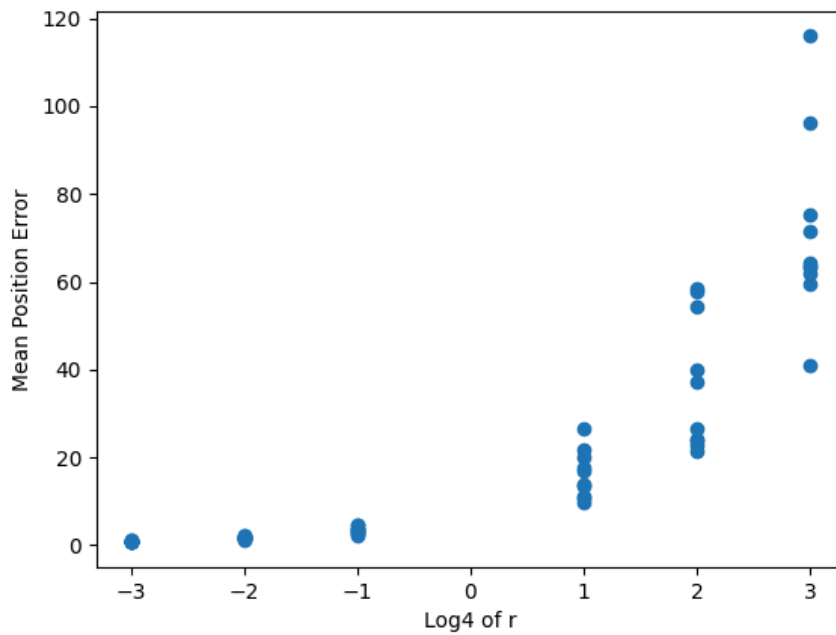# PLOTS MADE IN TASK 3

EKF GRAPHS

(a) Plot the real robot path and the filter path under the default parameters provided.

(b) Plot the mean position error as the α and β factors range over
r = [1/64, 1/16, 1/4, 4, 16, 64] and discuss any interesting observations. Run 10 trials
per value of r.

We can see an increase in the mean position error as we increase the α and β factors. The rate of increase can be seen increasing as we move along the x axis.
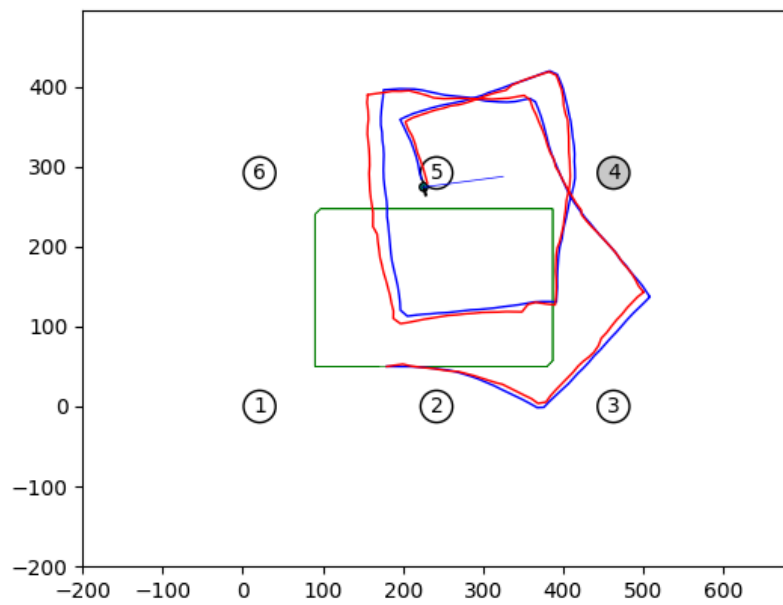
(c) Plot the mean position error and ANEES (average normalized estimation error squared) as the filter α, β factors vary over r (as above), while the data is generated with the default. Discuss any interesting observations.
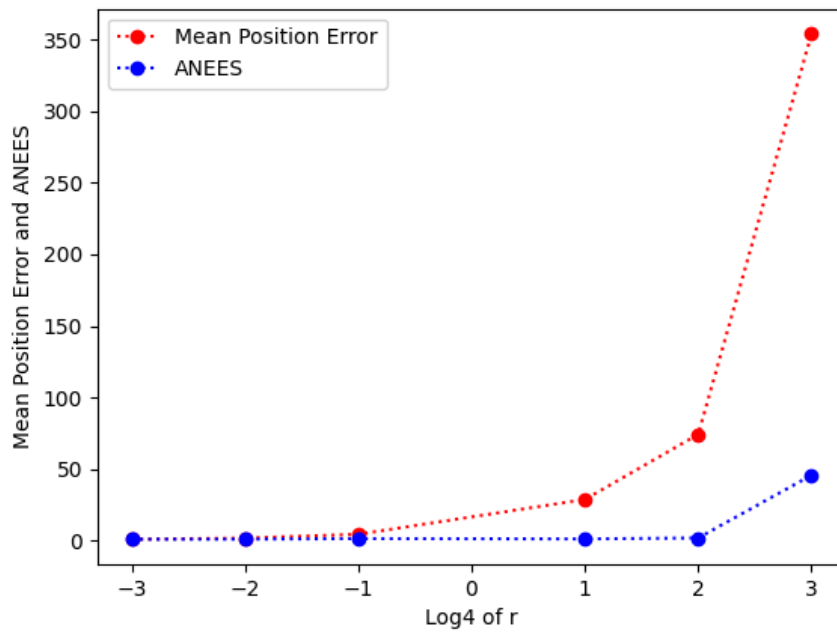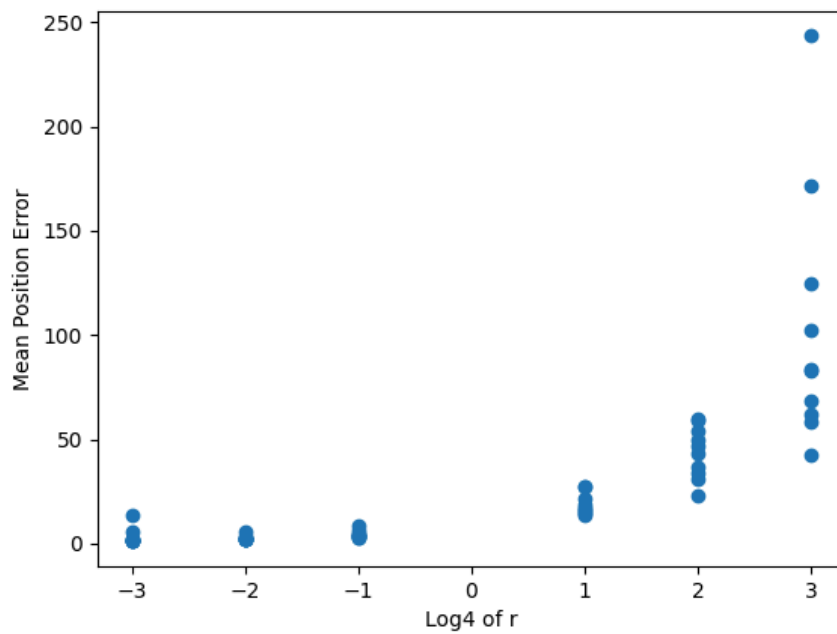

The increase in mean position error is similar to the pattern observed in part b. However, the increase in ANEES is slower by a considerable margin, with the increase only visible when the factor goes from 16 to 64.

PF GRAPHS

(a) Plot the real robot path and the filter path under the default parameters.
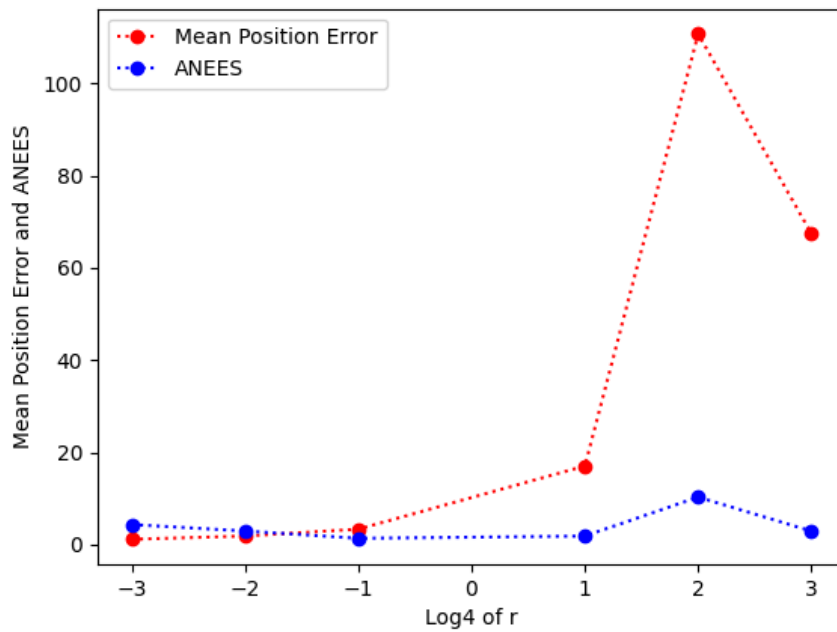
(b) Plot the mean position error as the α, β factors range over r and discuss.

In the particle filter as well, we see an increase in the mean position error, with the graph being similar to what was observed in the EKF graph.

**(c) Plot the mean position error and ANEES as the filter α, β factors vary over r while
the data is generated with the default.**

At seed 0, we see an abnormal dip in error when we increase the factor to 64, which contradicts the readings obtained in part b. The ANEES also dips with this change, after a sudden increase when the factor goes from 1/4 to 4.
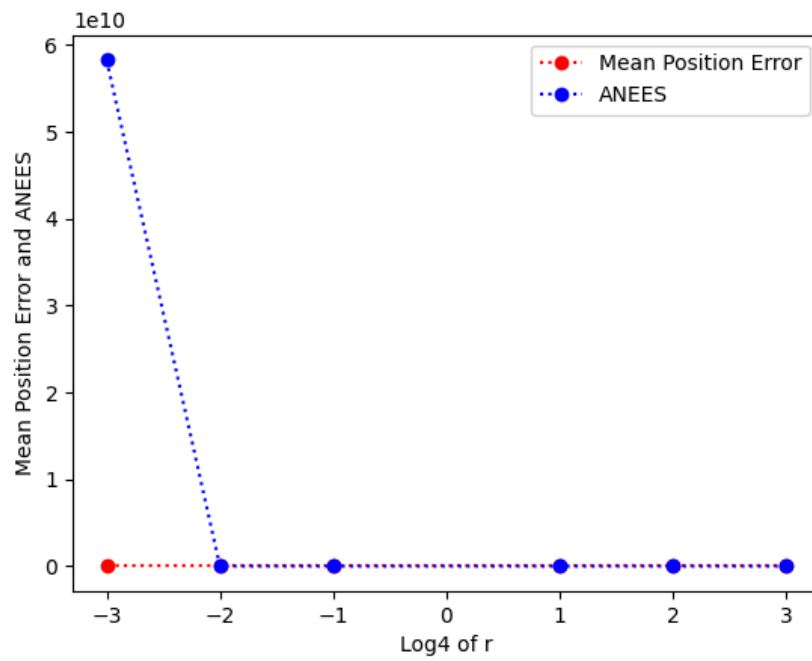
(d) Plot the mean position error and ANEES as the α, β factors range over r, and the number of particles varies over [20, 50, 500].

i) Number of particles= 20
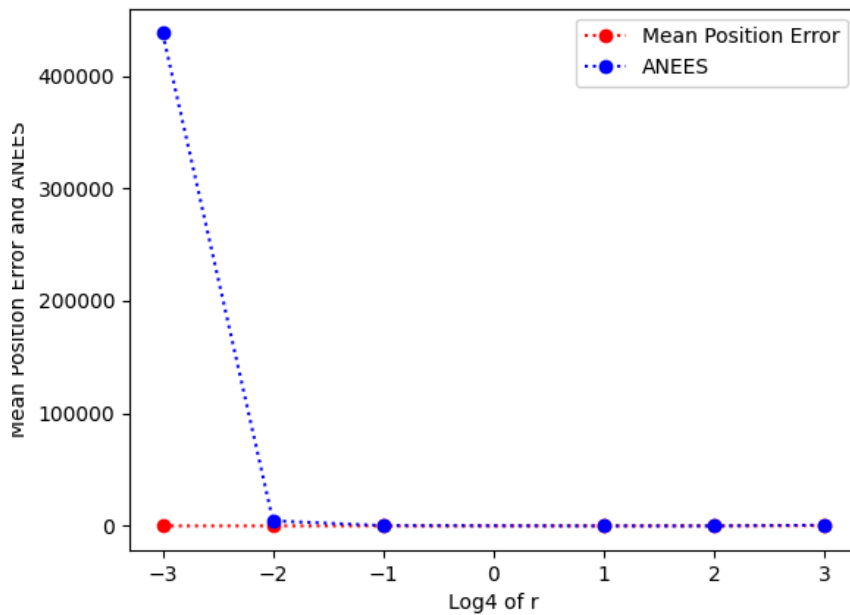
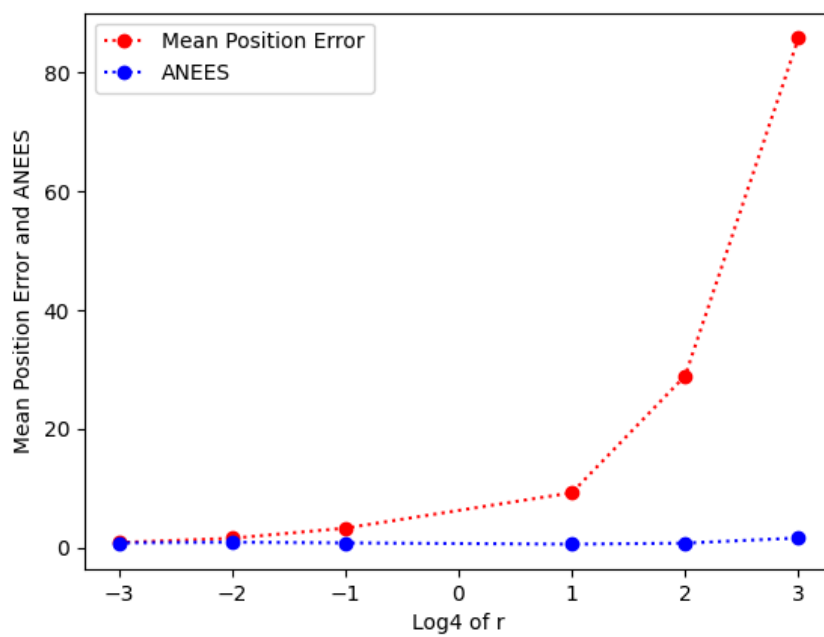We observe that the mean position error when factor is 1/64 is abnormally large and reduces largely when factor changes to 1/16.

ii) Number of particles= 50

We observe a similar graph to when number of particles =20.

iii)Number of particles = 500

We can observe the mean position error is increasing as we increase the factor with the rate of increase increasing as we move along the x axis. However, ANEES remains almost constant and negligible.