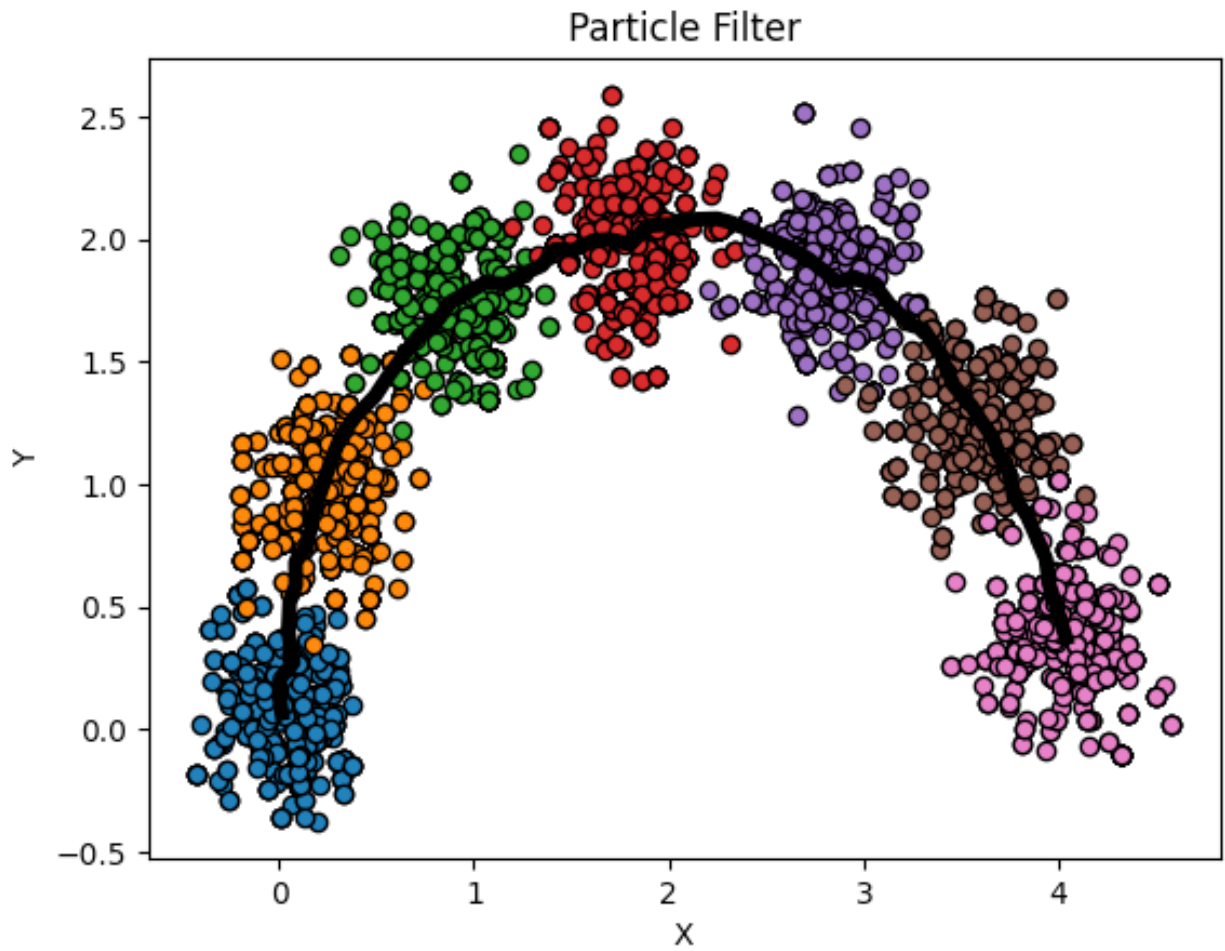
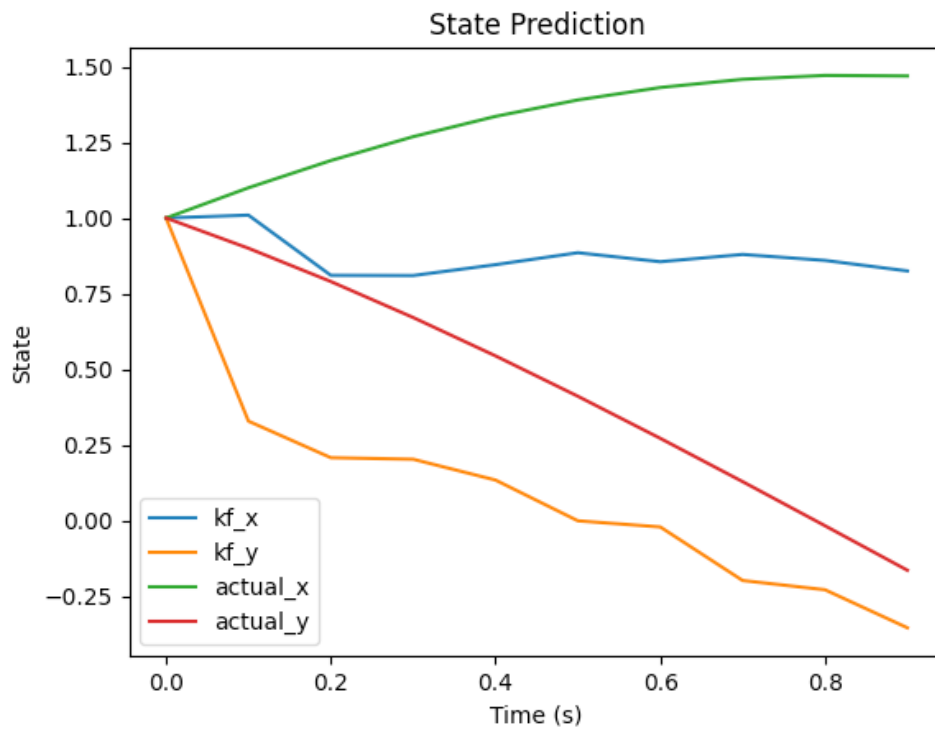


**Ian Shi**  
**ME 455 HW 3**

1. Below is a graph illustrating a particle filter for our trajectory from HW1:



2. Below is evolution of the state prediction and the covariance for 1 second. The state prediction is shown in a plot, whereas the covariance is listed in a table.



Covariance List:

```
[array([[0., 0.],
        [0., 0.])),
 array([[0.05, 0. ],
        [0. , 0.05]]),
 array([[0.06, 0. ],
        [0. , 0.06]]),
 array([[0.06153846, 0.          ],
        [0.          , 0.06153846]]),
 array([[0.06176471, 0.          ],
        [0.          , 0.06176471]]),
 array([[0.06179775, 0.          ],
        [0.          , 0.06179775]]),
 array([[0.06180258, 0.          ],
        [0.          , 0.06180258]]),
 array([[0.06180328, 0.          ],
        [0.          , 0.06180328]]),
 array([[0.06180338, 0.          ],
        [0.          , 0.06180338]]),
 array([[0.0618034 , 0.          ],
        [0.          , 0.0618034 ]])]
```

3. Below is a plot of the Kalman filter error (in average error and error vs time) as well as 10 “nearby” filters. The black graph illustrates the Kalman filter error, which is seen to be the smallest compared to our 10 nearby filters.

