

# two\_mobile\_no\_gps Turtlebot 1 Report

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This is a summary of the data from the two\_mobile\_no\_gps experiment, Turtlebot #1.

The runtime of this experiment was 0 hours, 25 minutes, and 10.9 seconds.

The total number of external pose measurements received by the robot during this time was 3075 which means poses were received at an average of 2.0352108 poses per second.

Shown below is the summary of each filter's error for both x and y coordinates, and also the error in total distance.

```
summary(continuous$x_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -44.81000 -37.53000 -21.08000 -23.61000 -14.19000   0.00004

summary(continuous$y_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -43.9400 -36.56000 -34.62000 -29.10000 -26.64000   0.7385

summary(continuous$yaw_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -3.14100 -1.56600  0.01704  0.01067  1.58300  3.14200

summary(continuous$dist_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
##  0.00002 30.45000 46.60000 38.36000 51.49000 56.41000

summary(discrete$x_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -27.1100 -16.76000 -6.49100 -9.90100 -2.95000  0.1659

summary(discrete$y_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -13.8600 -7.81200 -3.77800 -4.41700  0.12330  4.43400

summary(discrete$yaw_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -3.141000 -1.575000  0.016550  0.004617  1.589000  3.142000

summary(discrete$dist_error)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
##  0.000018 4.610000  8.147000 11.440000 18.980000 29.940000

summary(noisy_odom$x_err)

##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -3.2620 -2.29500 -2.05100 -1.48300 -0.57470  0.84100
```

```

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## -8.4990 -5.6080 -4.5410 -4.1300 -2.9690  0.3695

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## 0.000002 3.704000 5.074000 4.717000 5.933000 8.518000

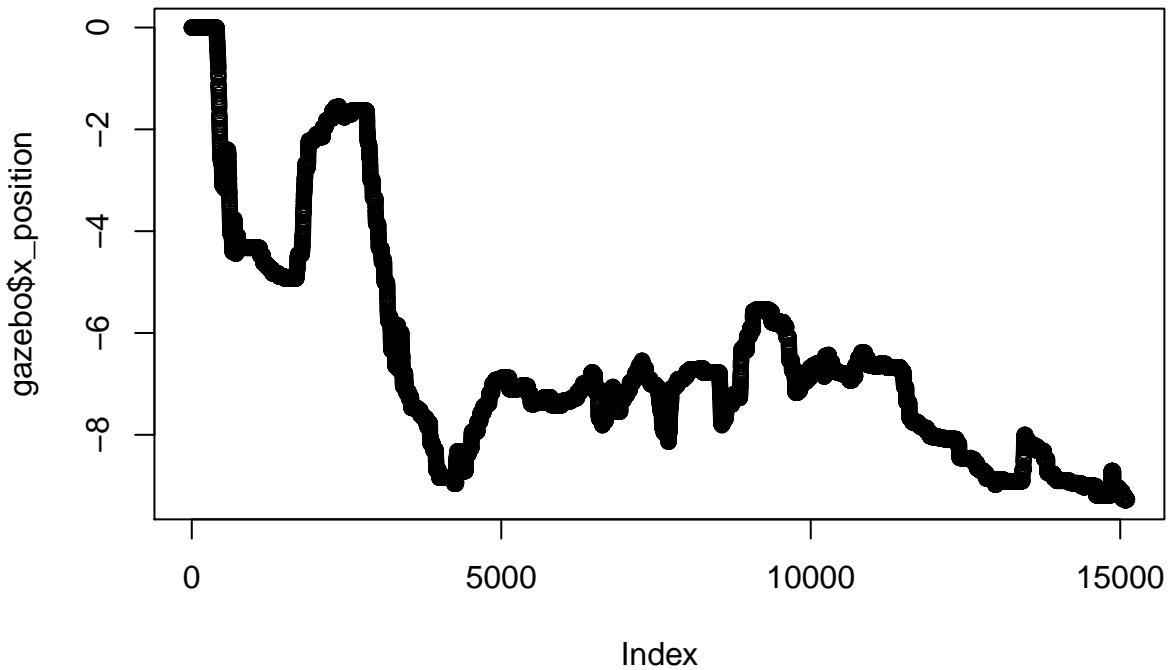
if (NROW(gps) > 0) {
  summary(gps$x_err)
  summary(gps$y_err)
  summary(gps$dist_err)
}

if (NROW(noisy_odom) > 0) {
  summary(noisy_odom$x_variance)
  summary(noisy_odom$y_variance)
  summary(noisy_odom$yaw_variance)
}

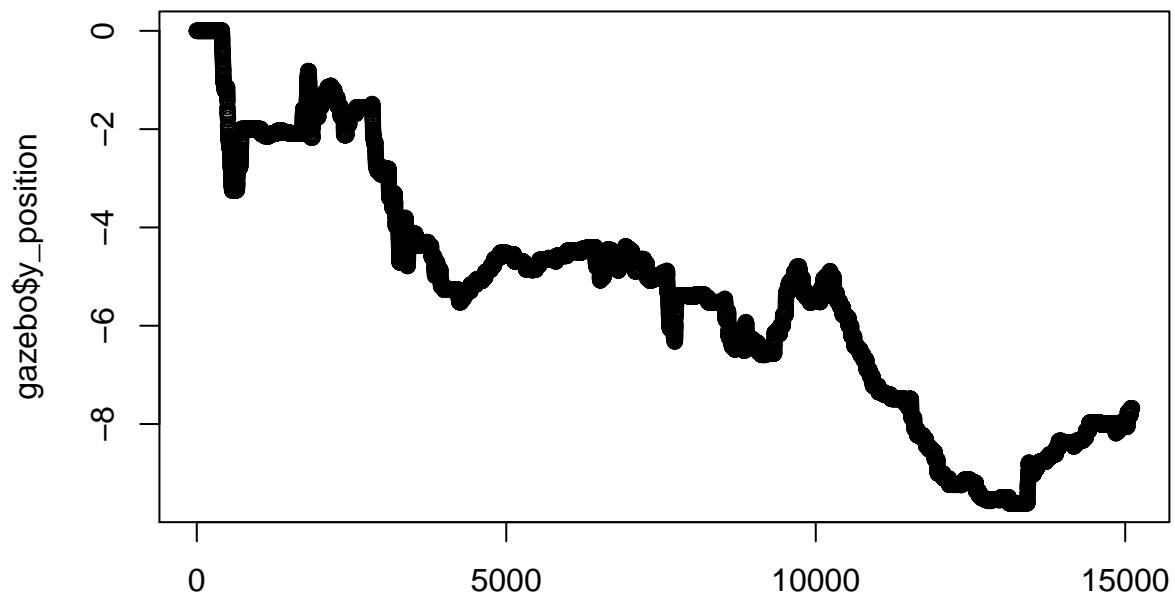
##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## 0.000e+00 2.127e-06 3.635e-06 1.863e-04 5.129e-06 8.872e-03

```

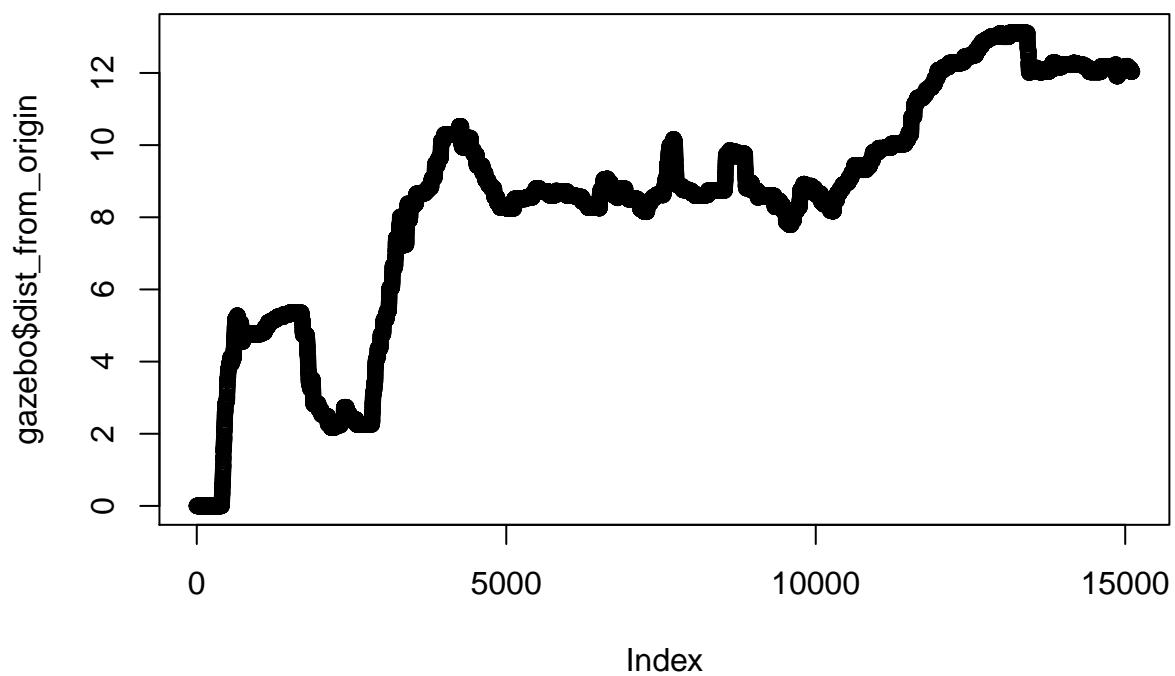
### X coordinate of robot over time



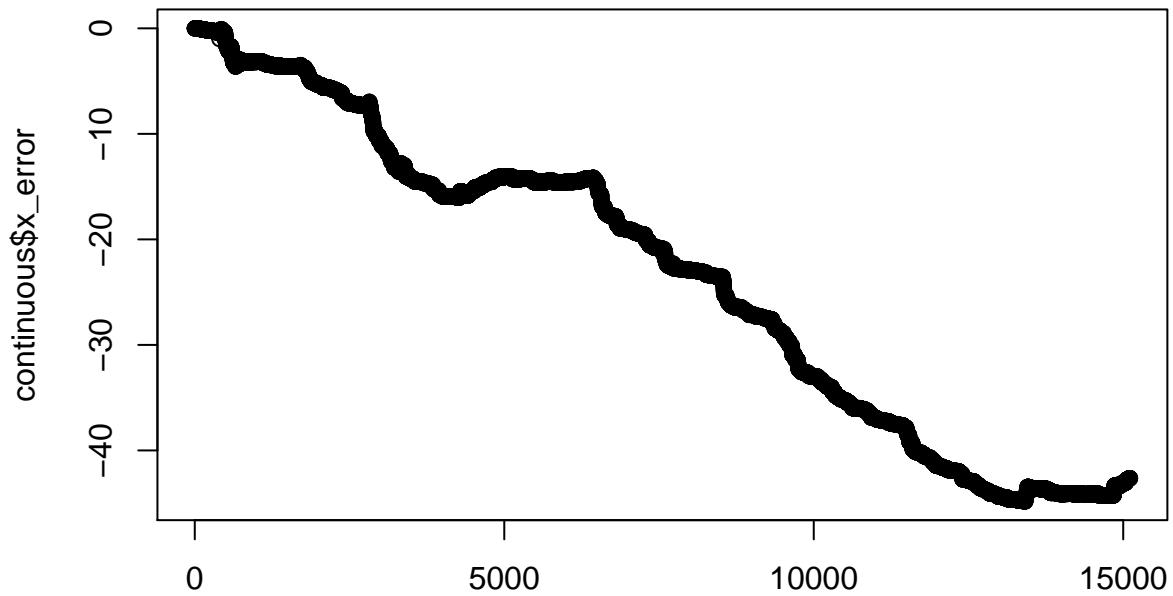
**Y coordinate of robot over time**



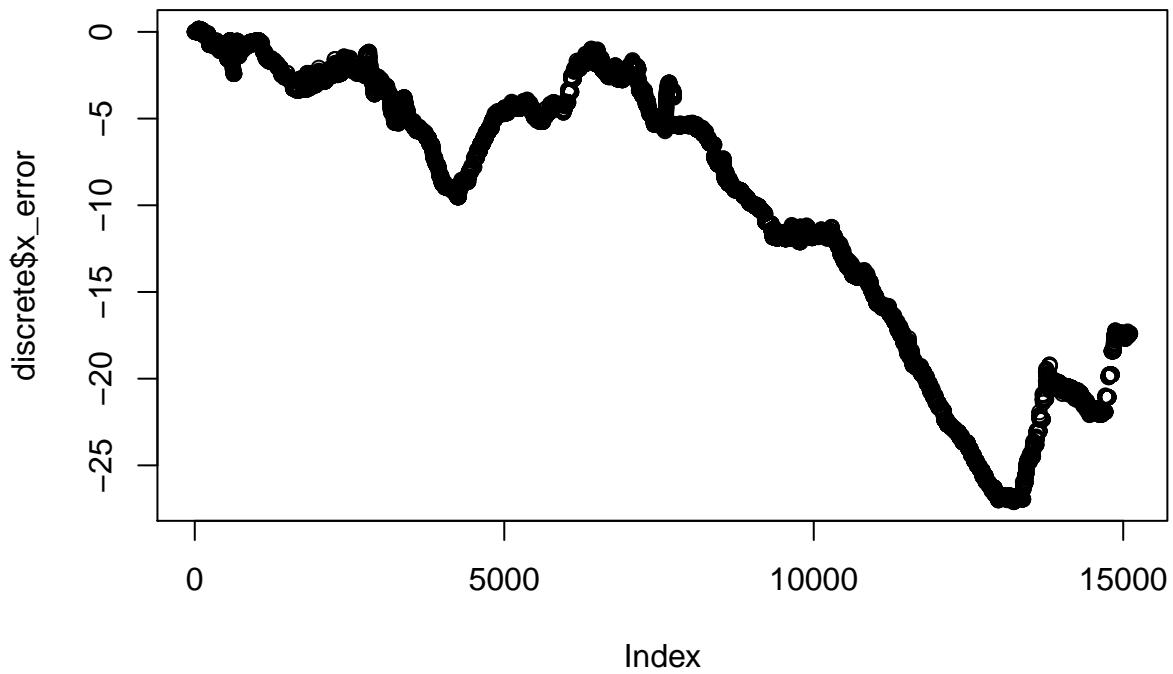
**Distance from origin vs. time**



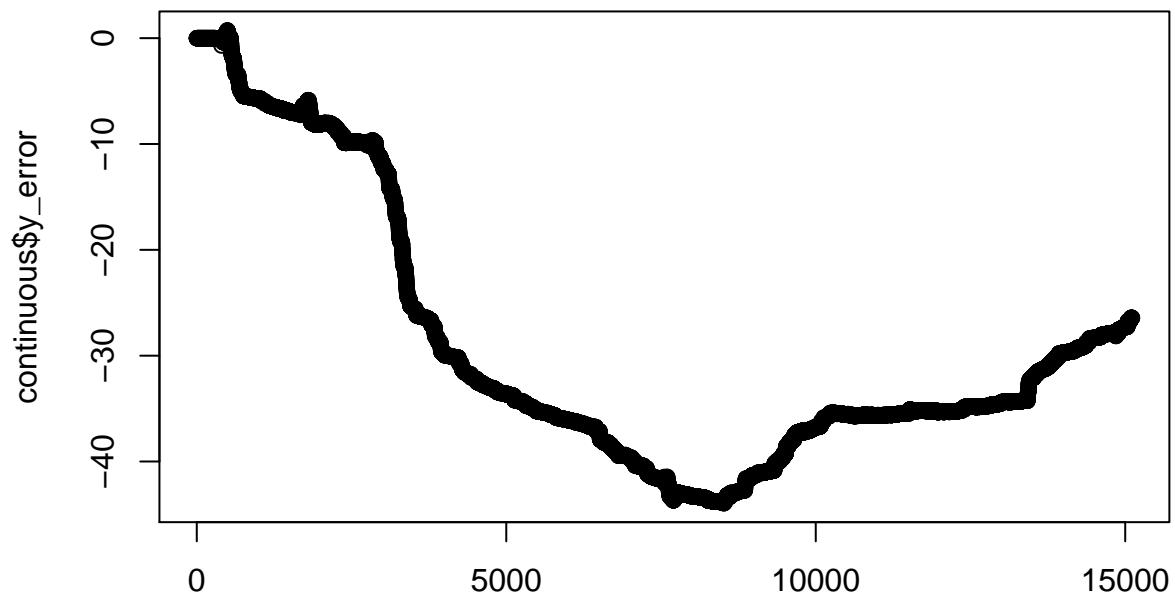
**Continuous x\_error over time**



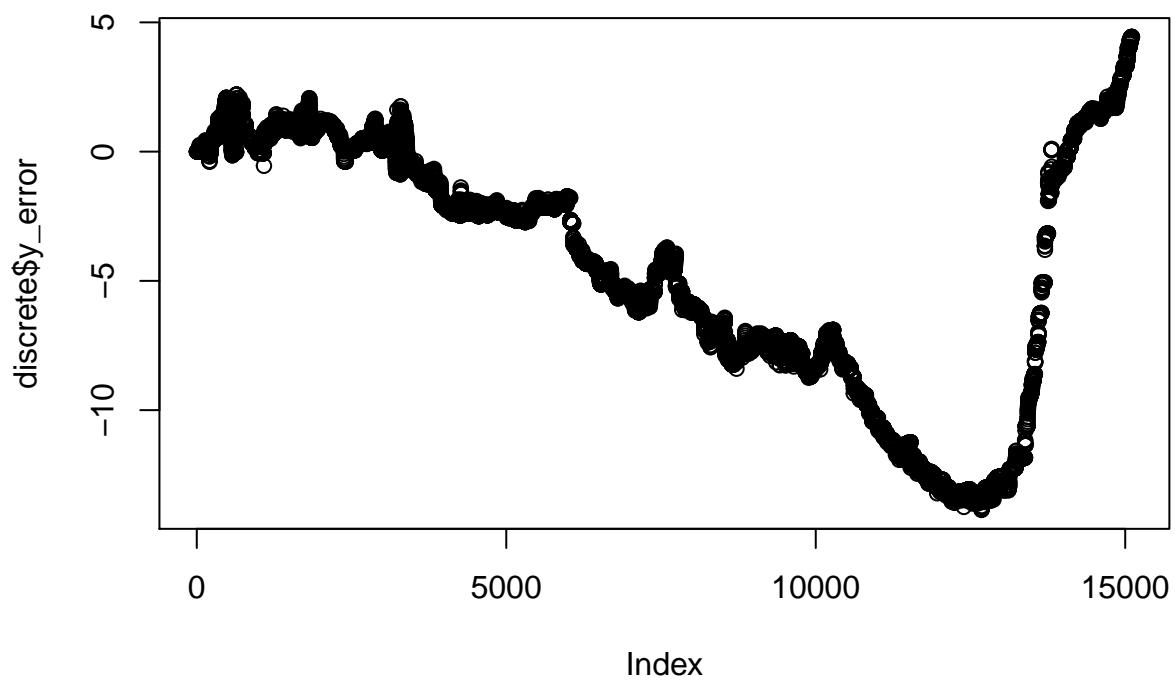
**Discrete x\_error over time**



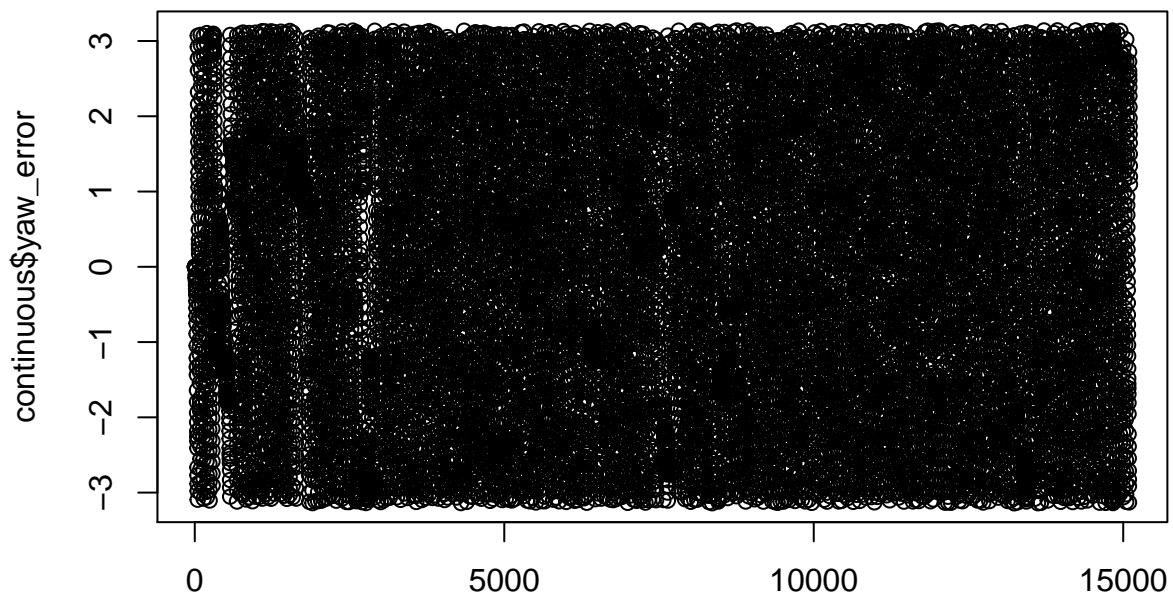
**Continuous y\_error over time**



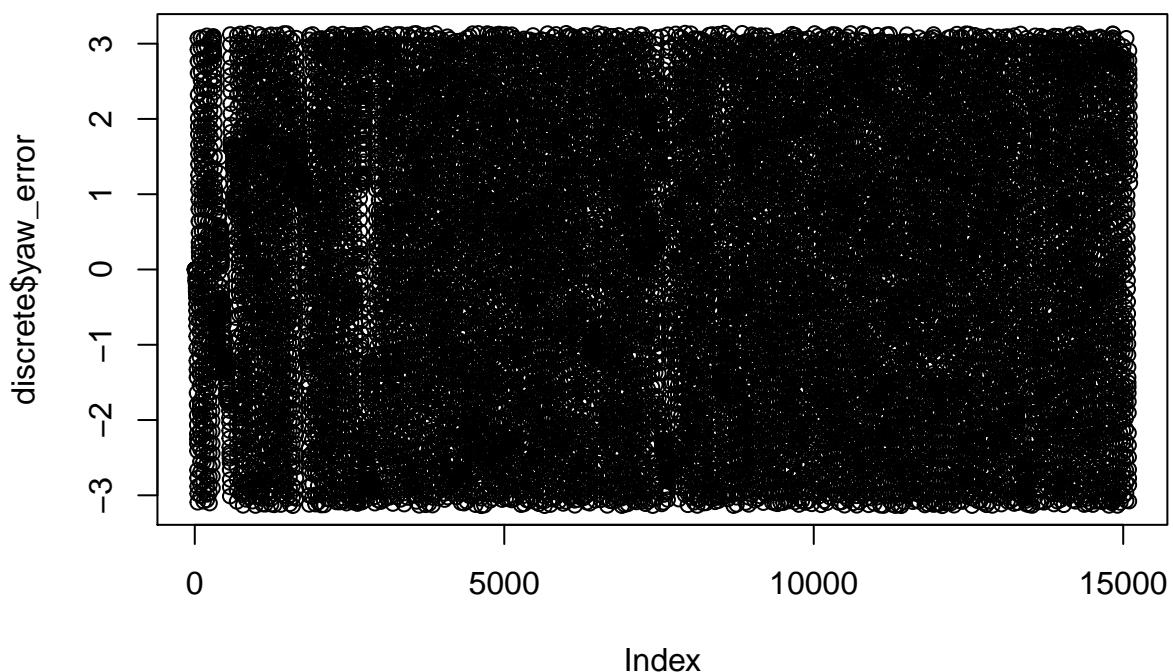
**Discrete y\_error over time**



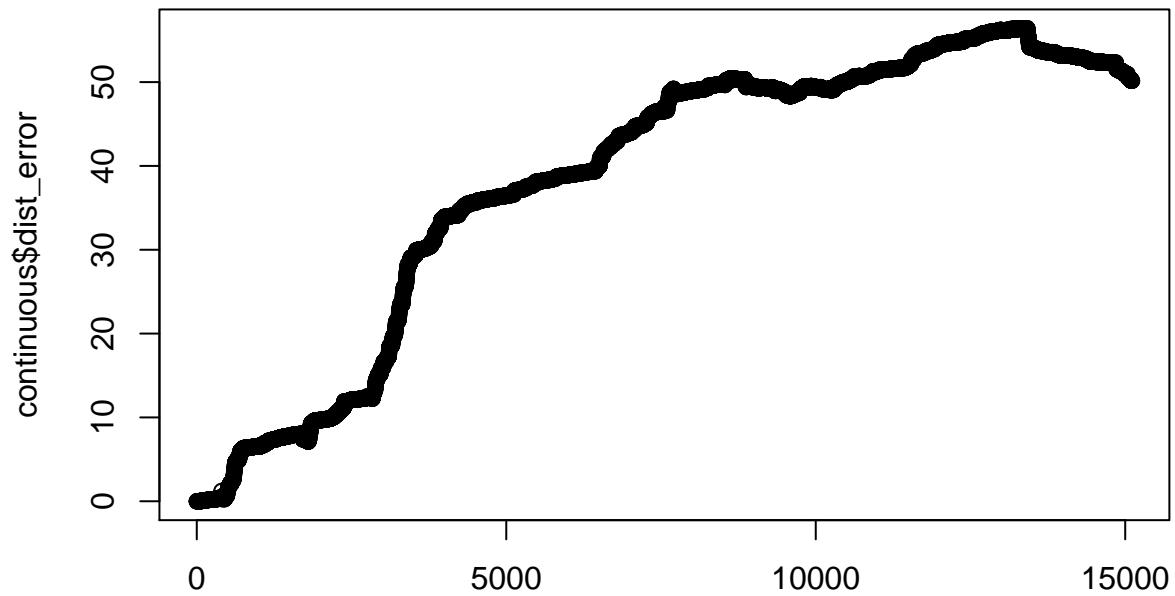
**Continuous yaw error over time**



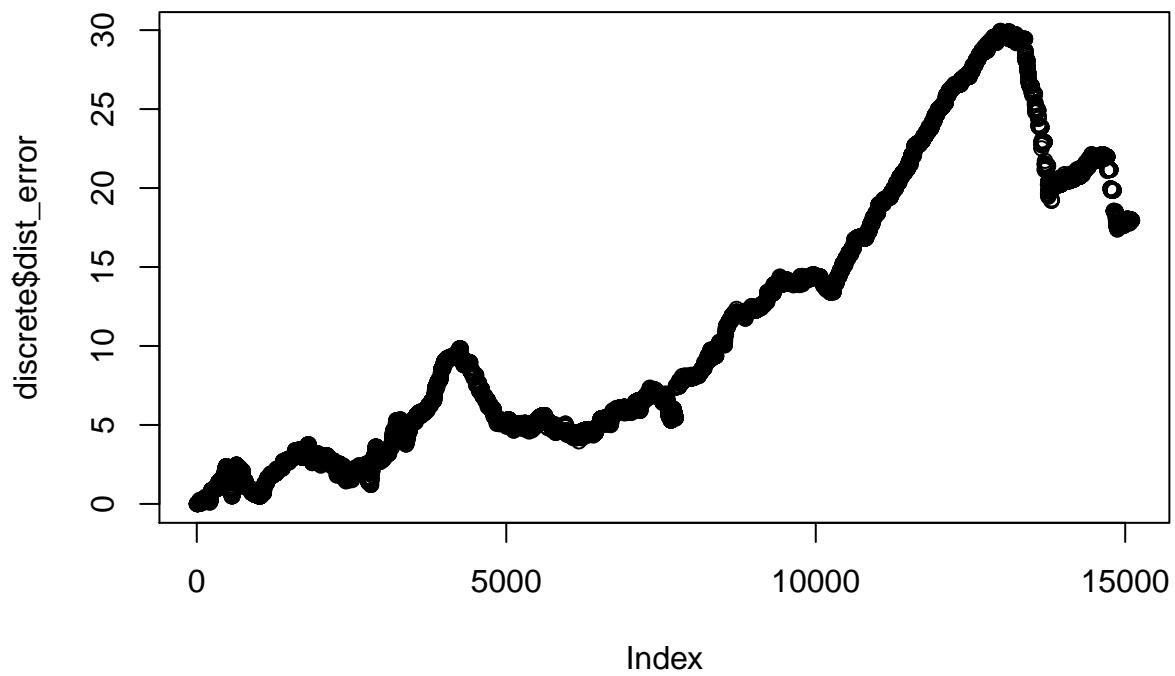
**Discrete yaw error over time**



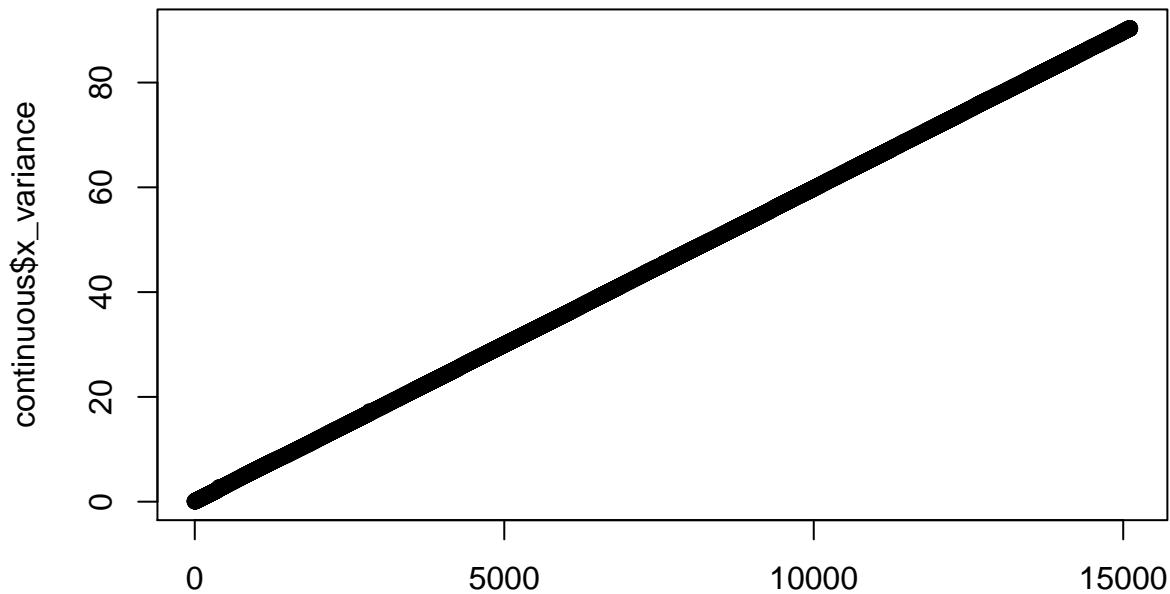
**Continuous total distance error over time**



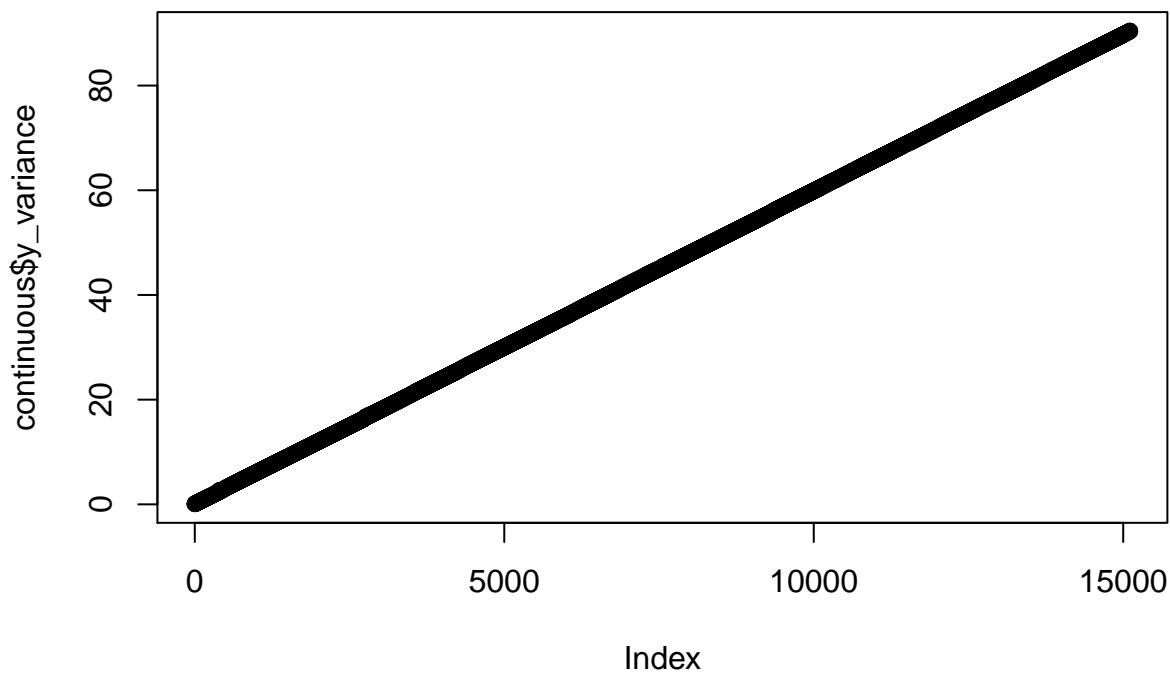
**Discrete total distance error over time**



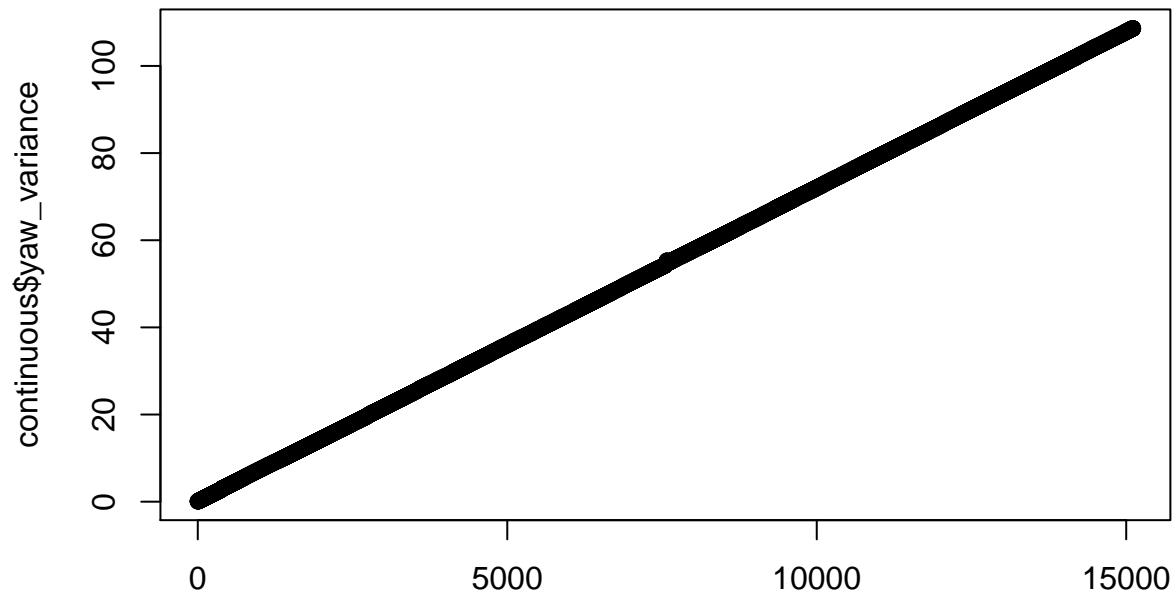
**Continuous Filter X Variance Over Time**



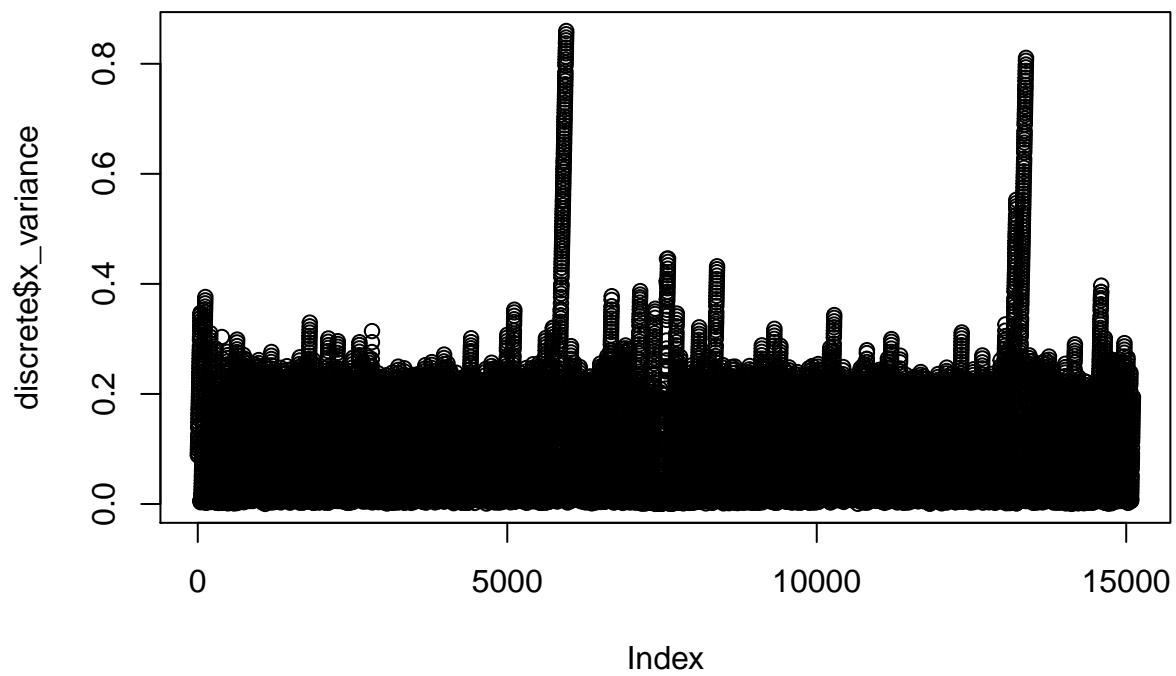
**Continuous Filter Y Variance Over Time**



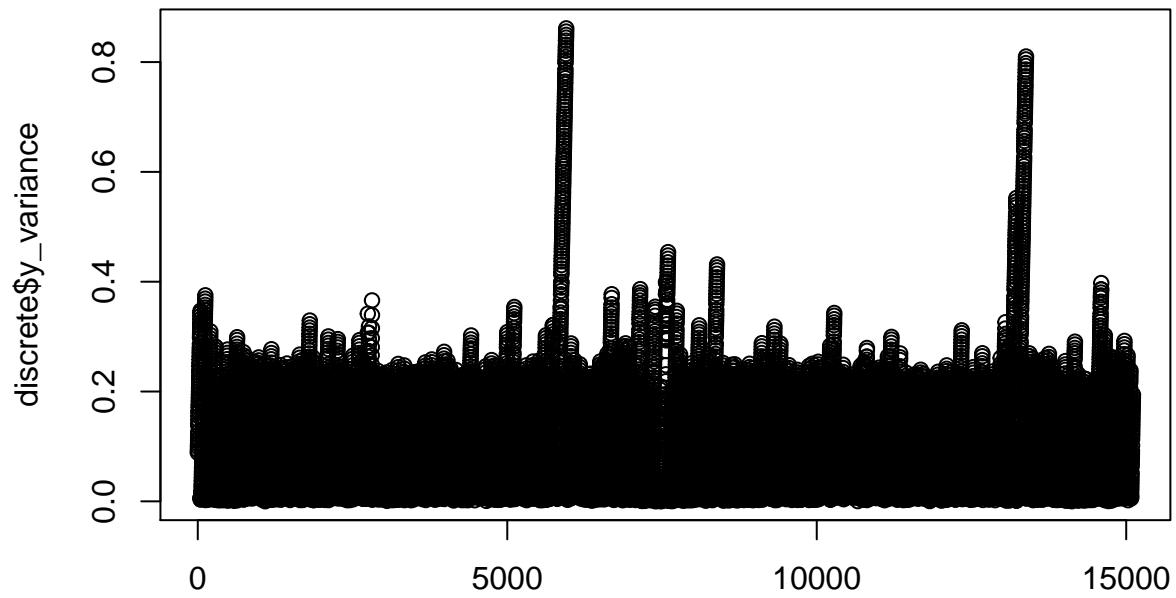
**Continuous Filter Yaw Variance Over Time**



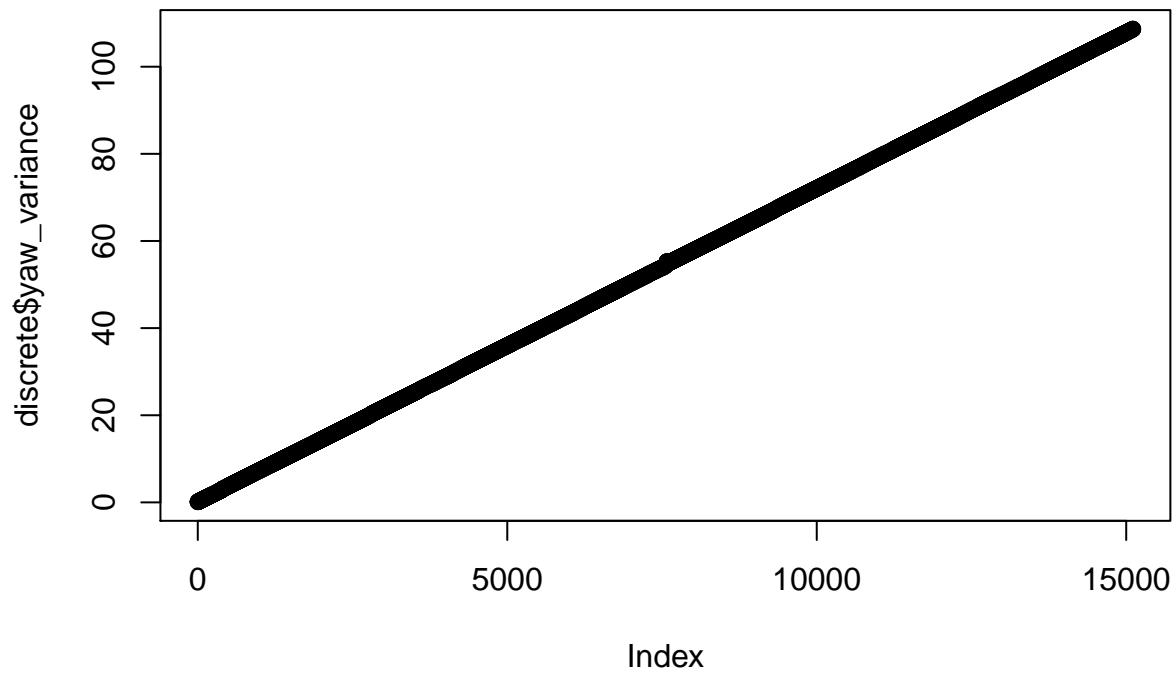
**Discrete Filter X Variance Over Time**



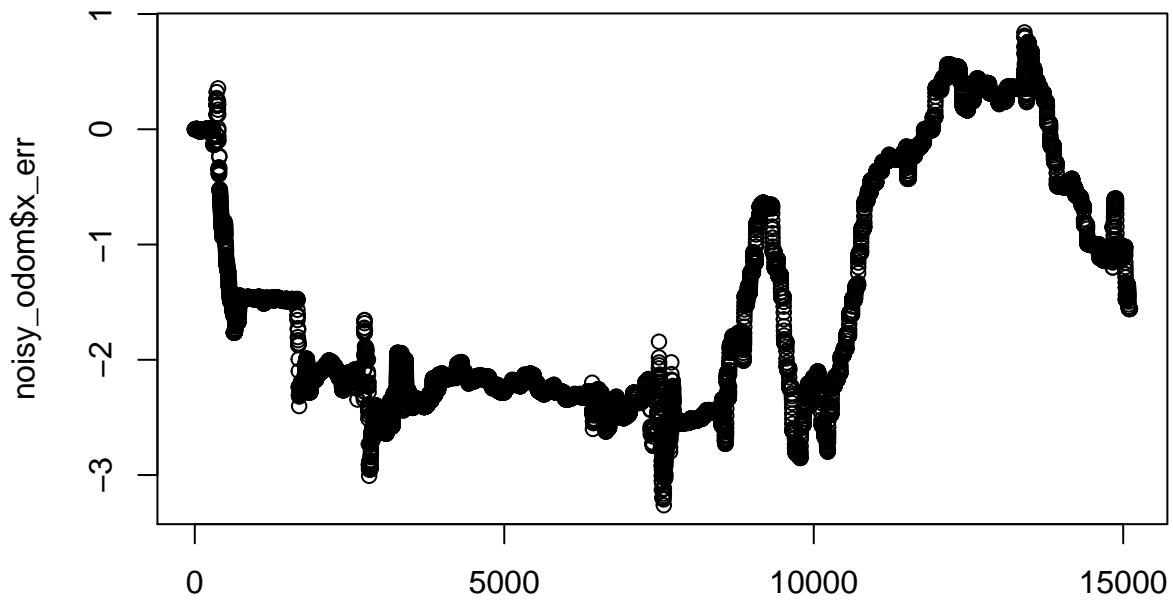
**Discrete Filter Y Variance Over Time**



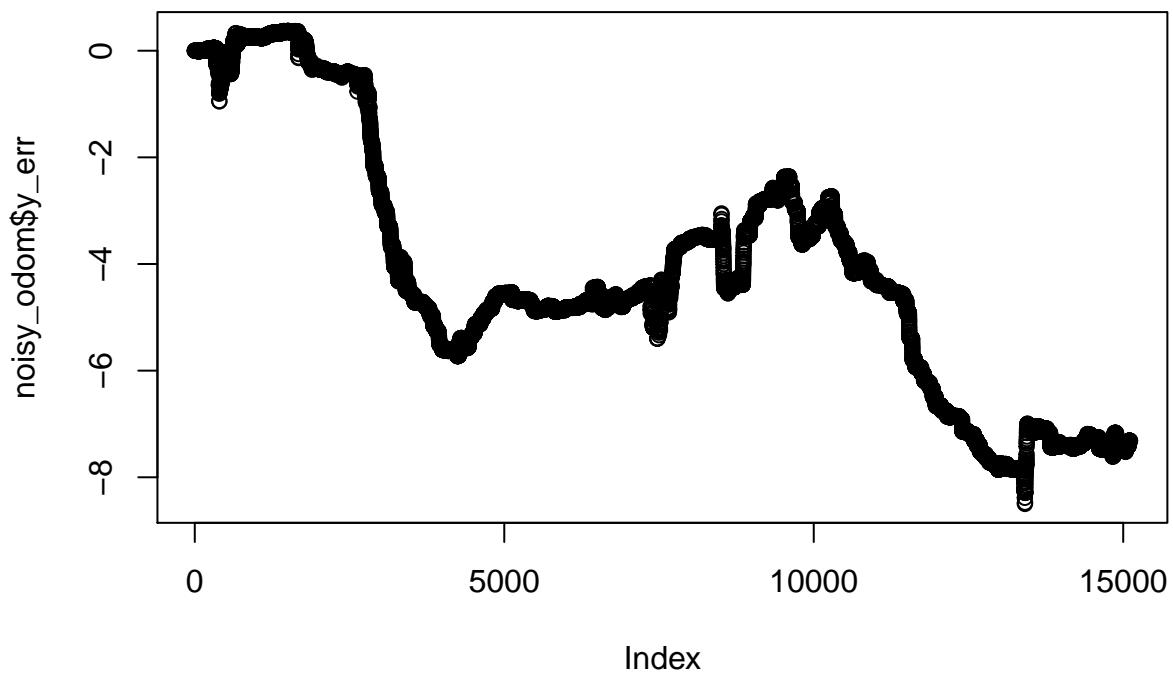
**Discrete Filter Yaw Variance Over Time**



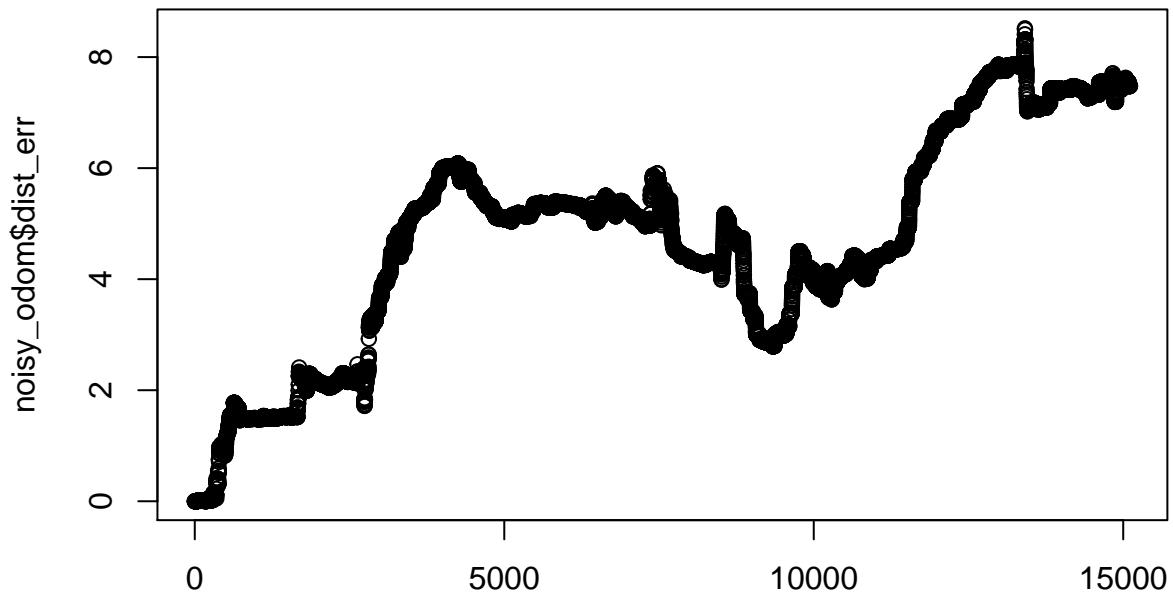
**Noisy Odom X Error Over Time**



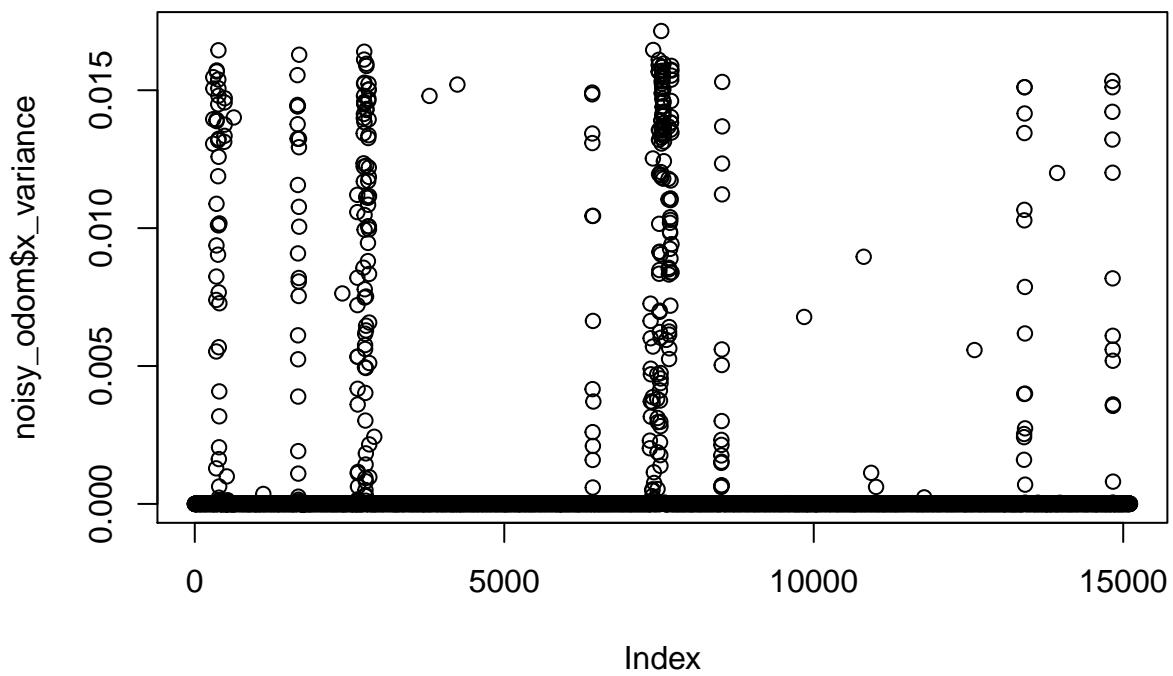
**Noisy Odom Y Error Over Time**



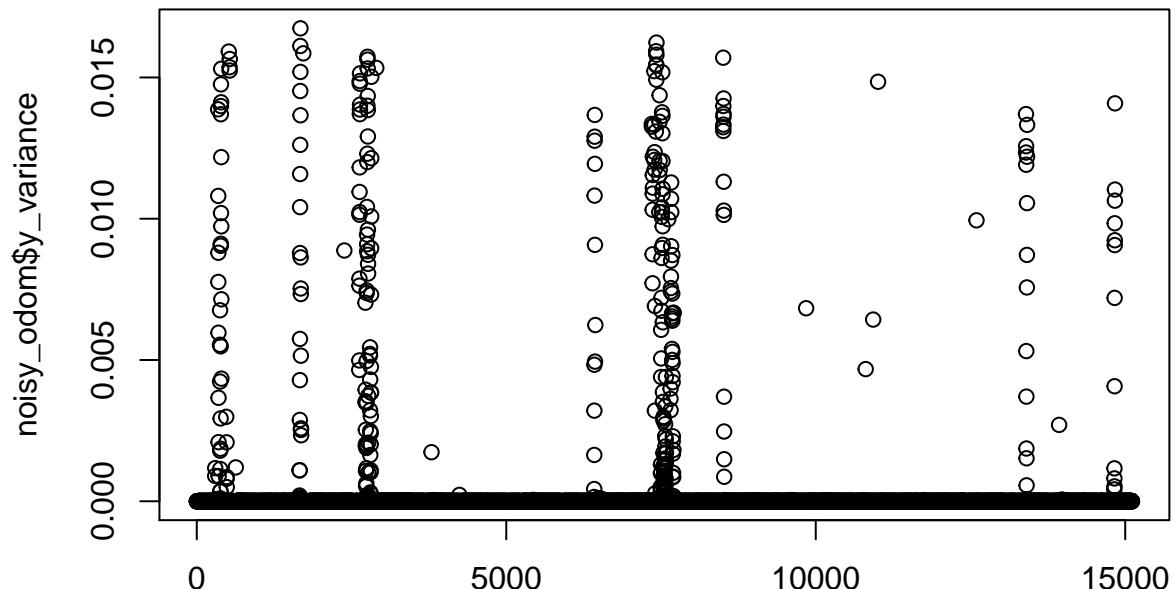
### Noisy Odom Horizontal Distance Error Over Time



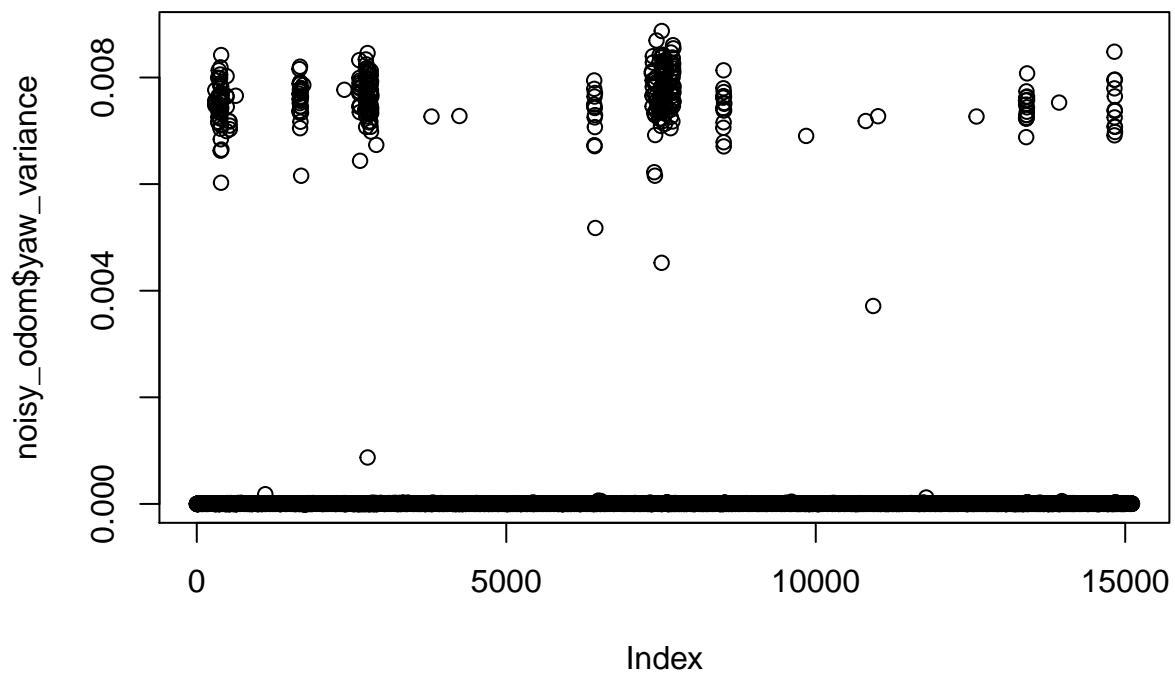
Variance of X Coordinate in Noisy Odometry



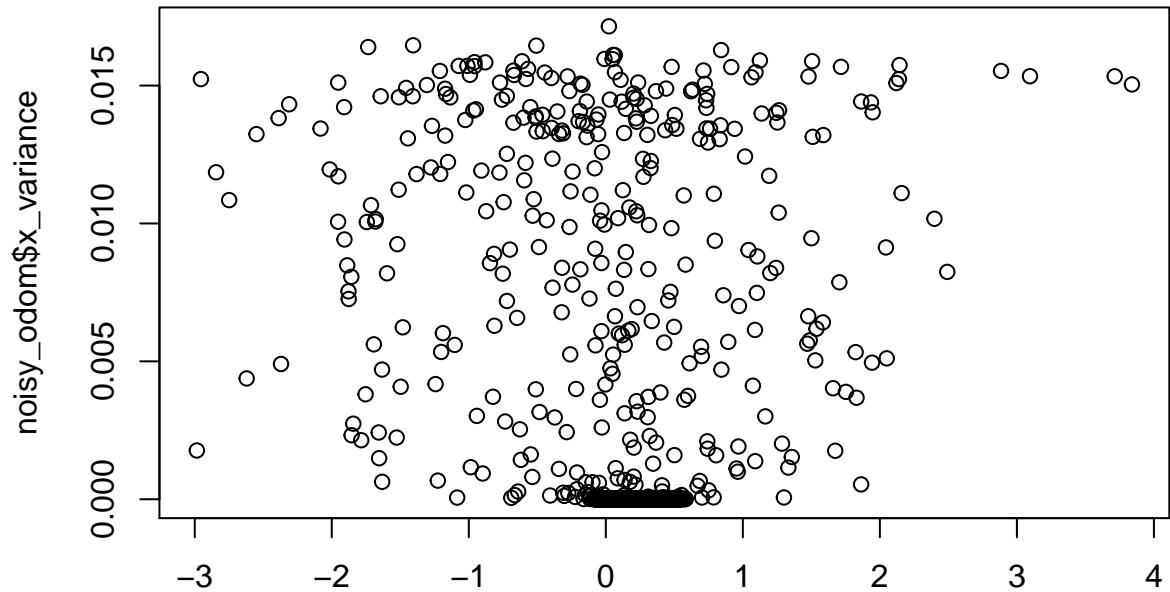
**Variance of Y Coordinate in Noisy Odometry**



**Variance of Yaw Coordinate in Noisy Odometry**



**Variance vs. Velocity of X in Noisy Odometry**



**Variance vs. Velocity of Yaw in Noisy Odometry**

