

# two\_mobile\_noiseless Turtlebot 2 Report

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This is a summary of the data from the two\_mobile\_noiseless experiment, Turtlebot #2.

The runtime of this experiment was 0 hours, 6 minutes, and 44.6 seconds.

The total number of external pose measurements received by the robot during this time was 186 which means poses were received at an average of 0.4597133 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.
## -0.9723  3.5960  5.3150  5.2740  6.4810 10.3000

summary(continuous$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -16.9900 -16.9900 -12.4300 -11.5700 -9.6830  0.2209

summary(continuous$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.14000 -1.71100  0.04227 -0.03238  1.53800  3.13900

summary(continuous$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000013 10.760000 15.790000 13.010000 17.810000 17.810000

summary(discrete$x_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -0.85740  0.00000  0.00588  2.17100  0.29990 48.90000

summary(discrete$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -9.030000 -0.124500 -0.000024 -0.246100  0.000033  3.227000

summary(discrete$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.141000 -1.137000 -0.008734  0.011240  1.173000  3.138000

summary(discrete$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.00000  0.00004  0.03317  2.32100  0.50570 49.47000

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -1.360   2.182   3.690   3.817   5.745   9.015
```

```

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -5.30300 -2.71000 -0.05617 -0.29020  0.66540  5.84200

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000005 3.860000 5.205000 4.946000 6.436000 9.120000

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

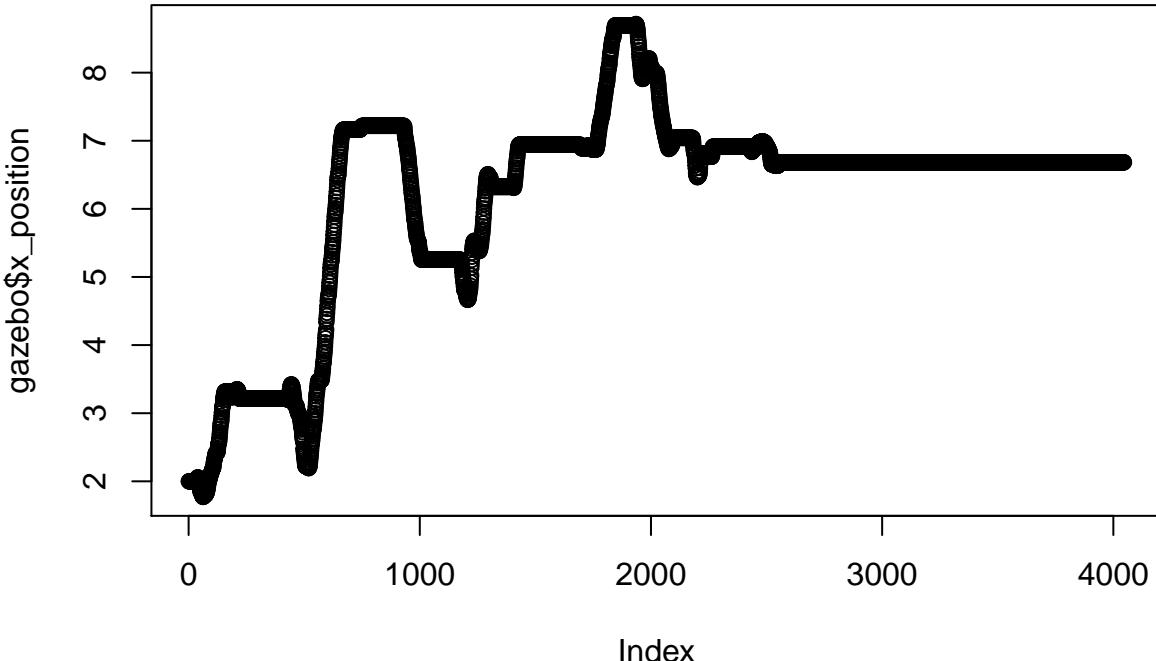
##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 2.131    7.575   8.084   7.622   8.653   9.797

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

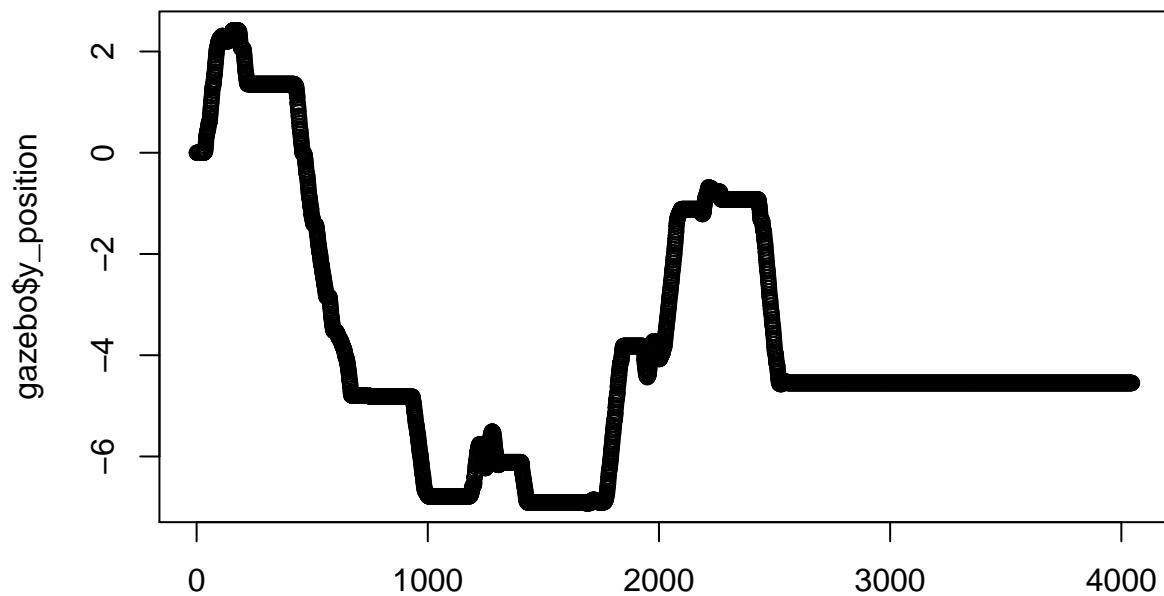
##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000e+00 2.624e-06 1.019e-05 3.662e-03 7.590e-03 8.710e-03

```

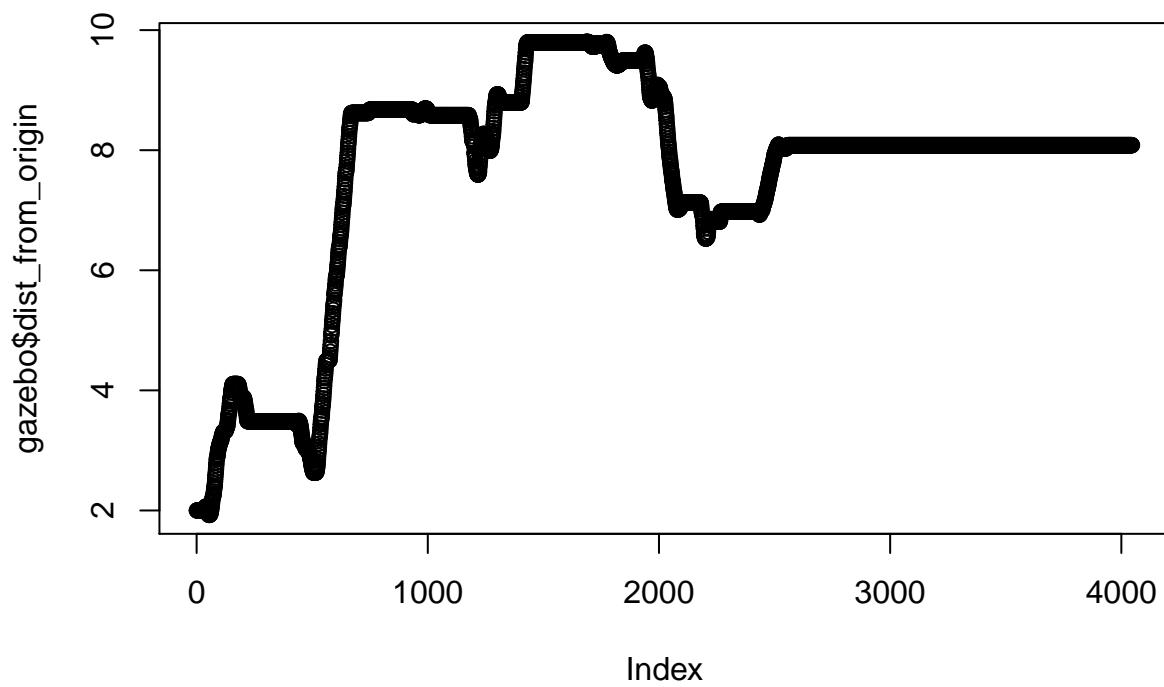
### X coordinate of robot over time



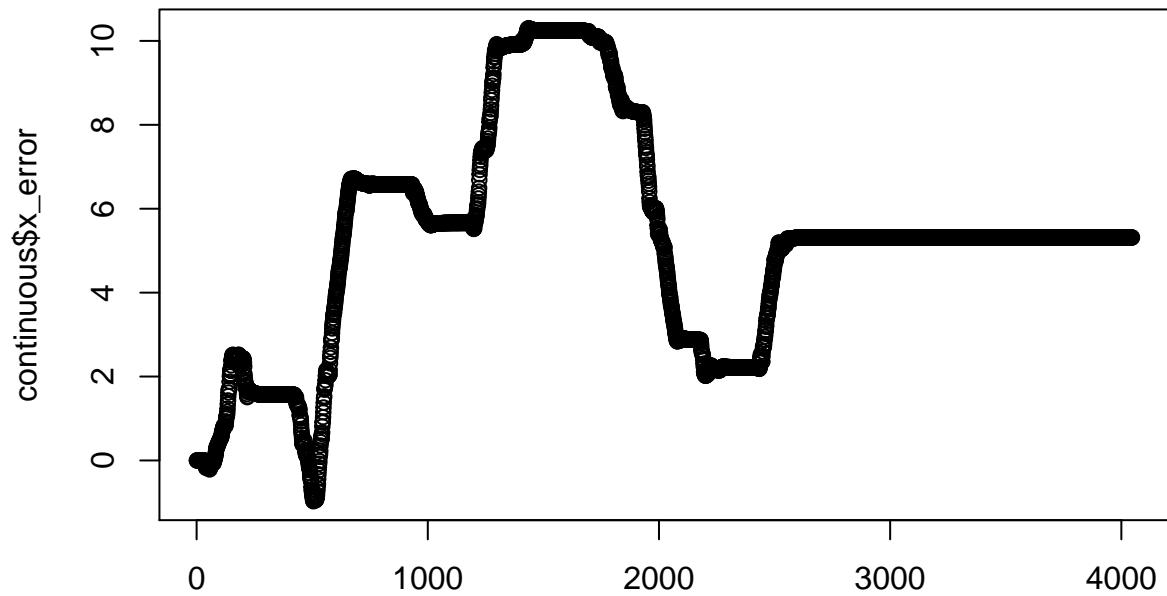
**Y coordinate of robot over time**



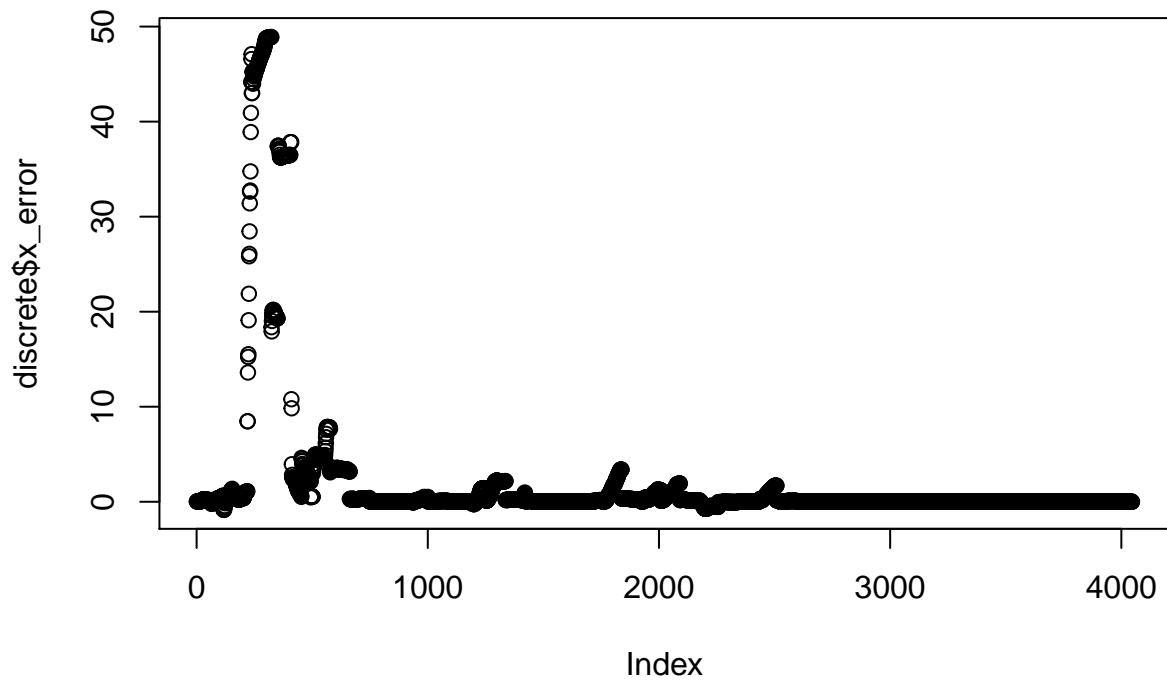
**Distance from origin vs. time**



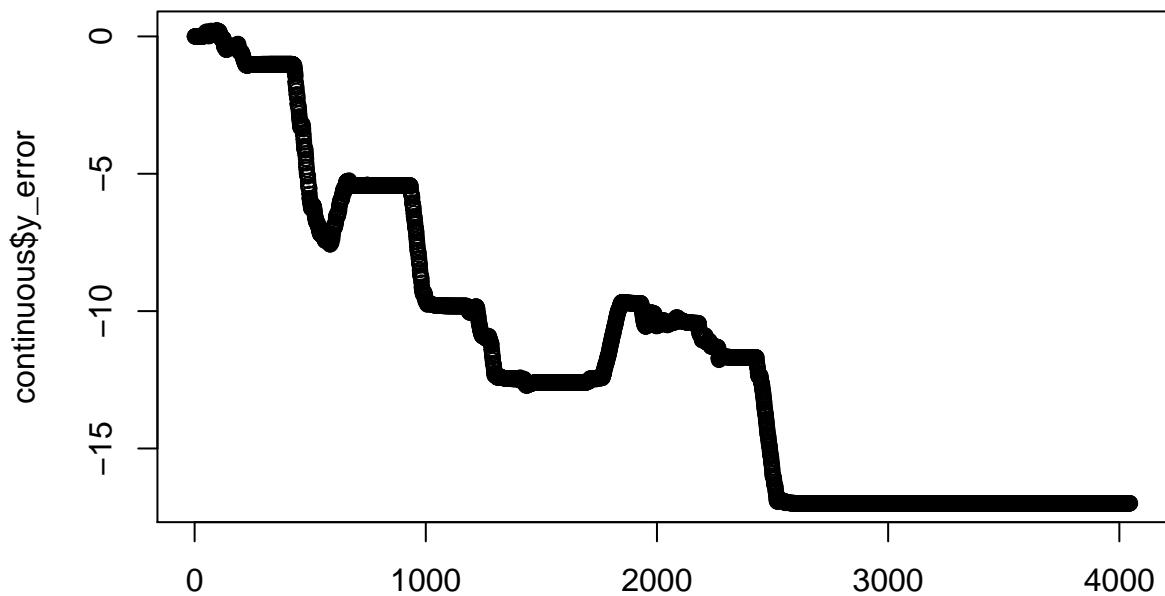
**Continuous x\_error over time**



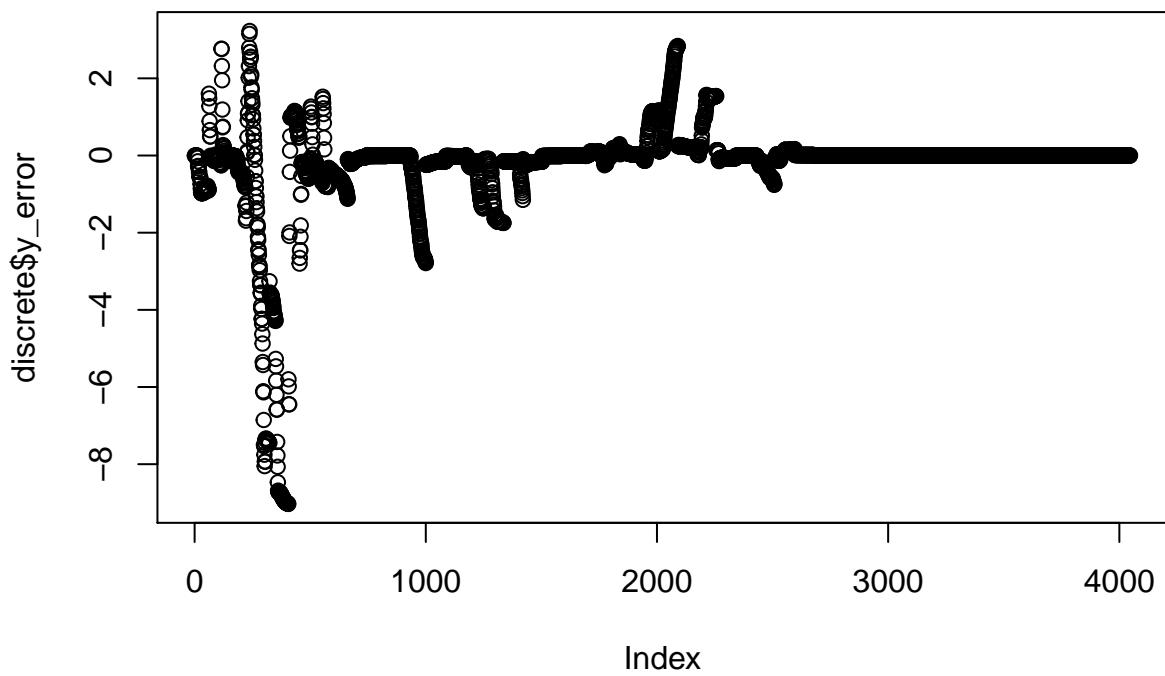
**Discrete x\_error over time**



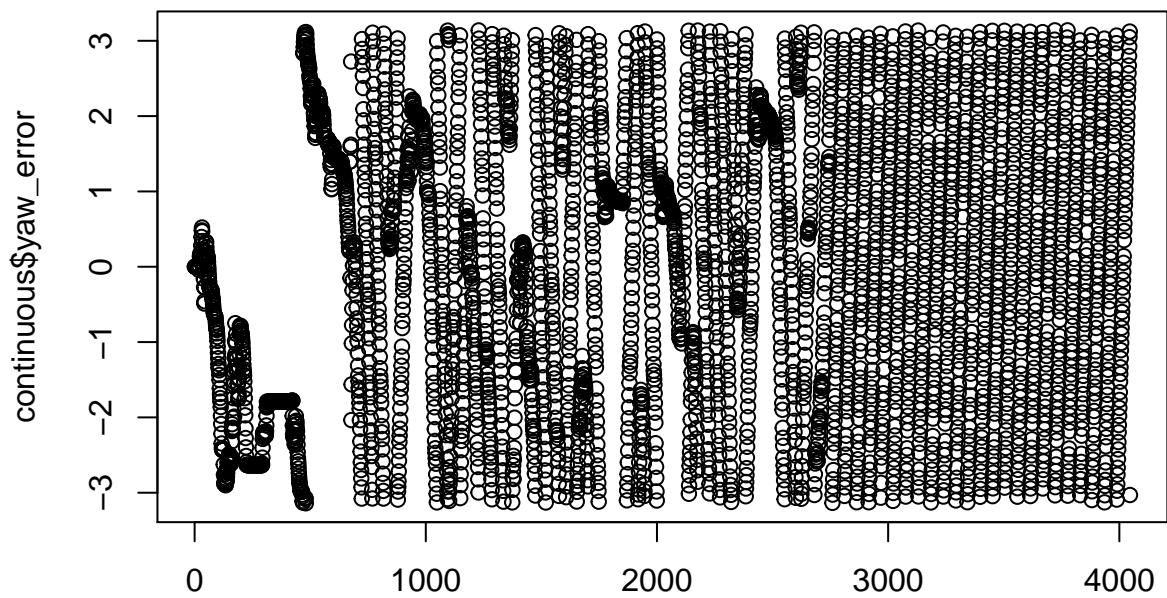
**Continuous y\_error over time**



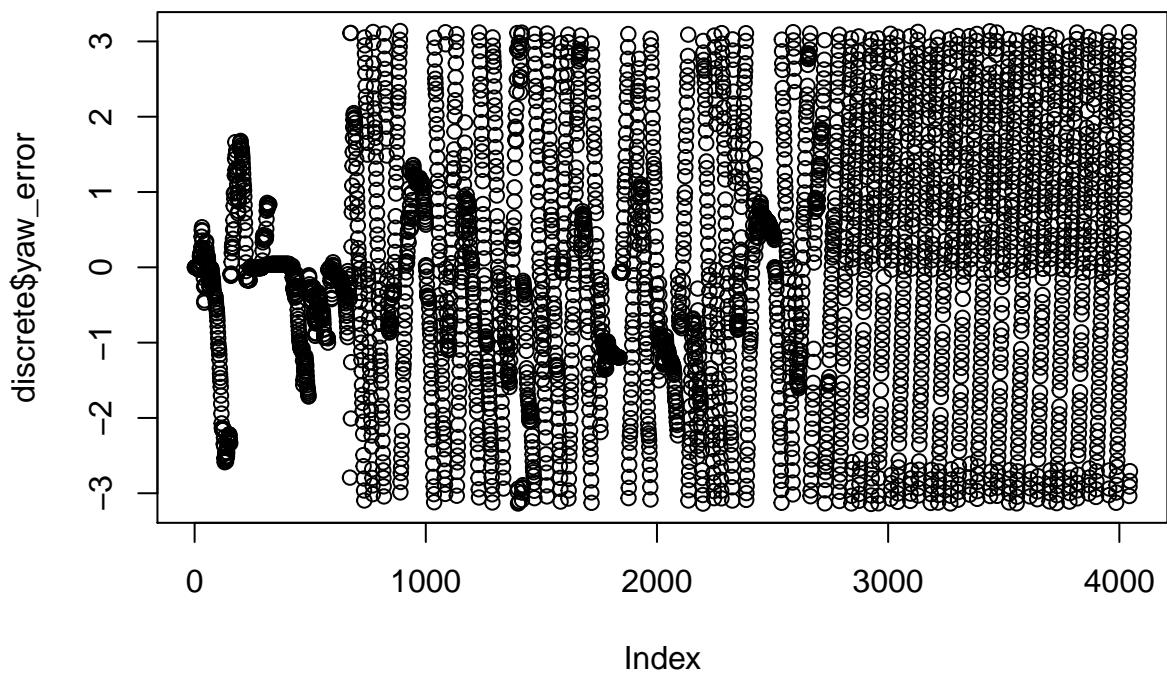
**Discrete y\_error over time**



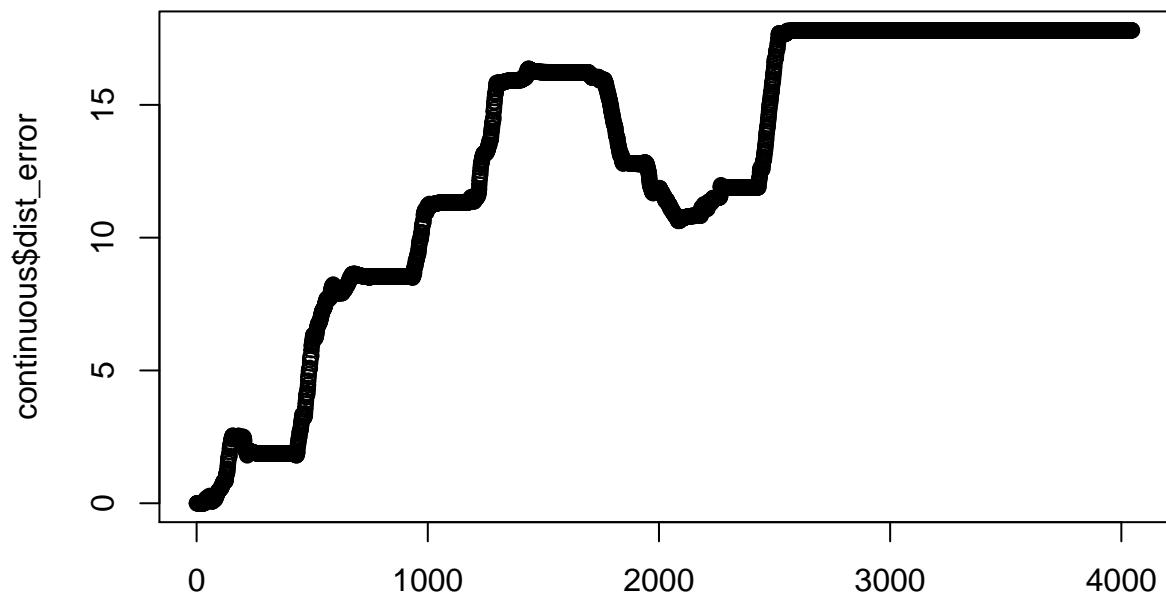
**Continuous yaw error over time**



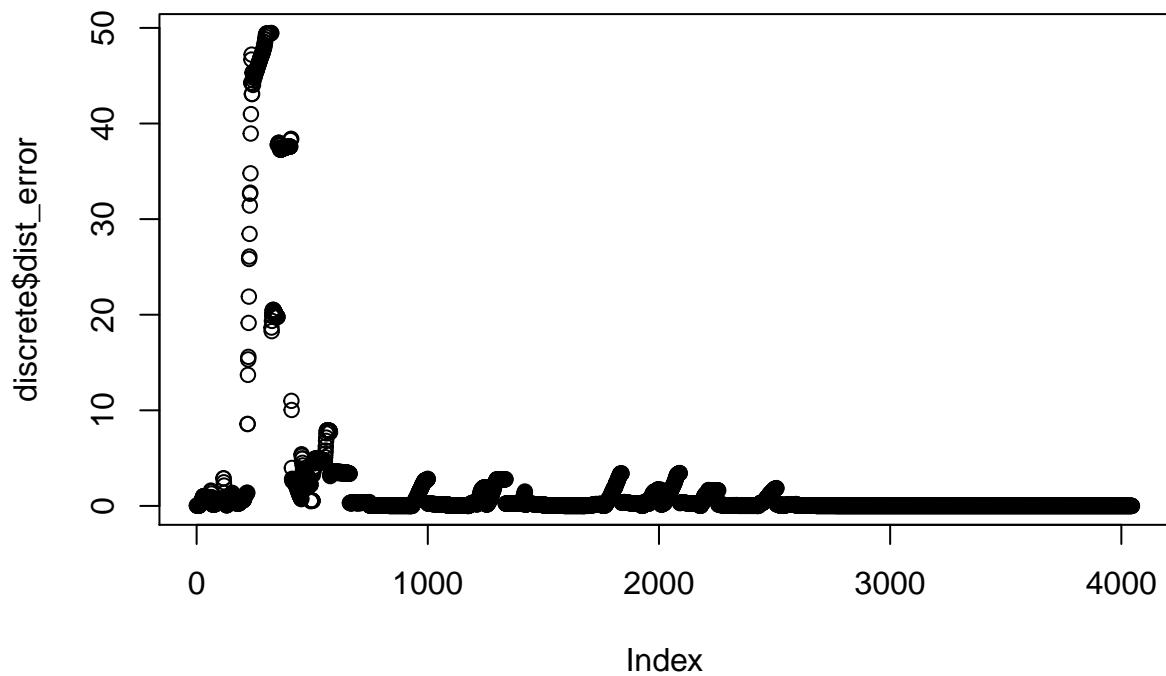
**Discrete yaw error over time**



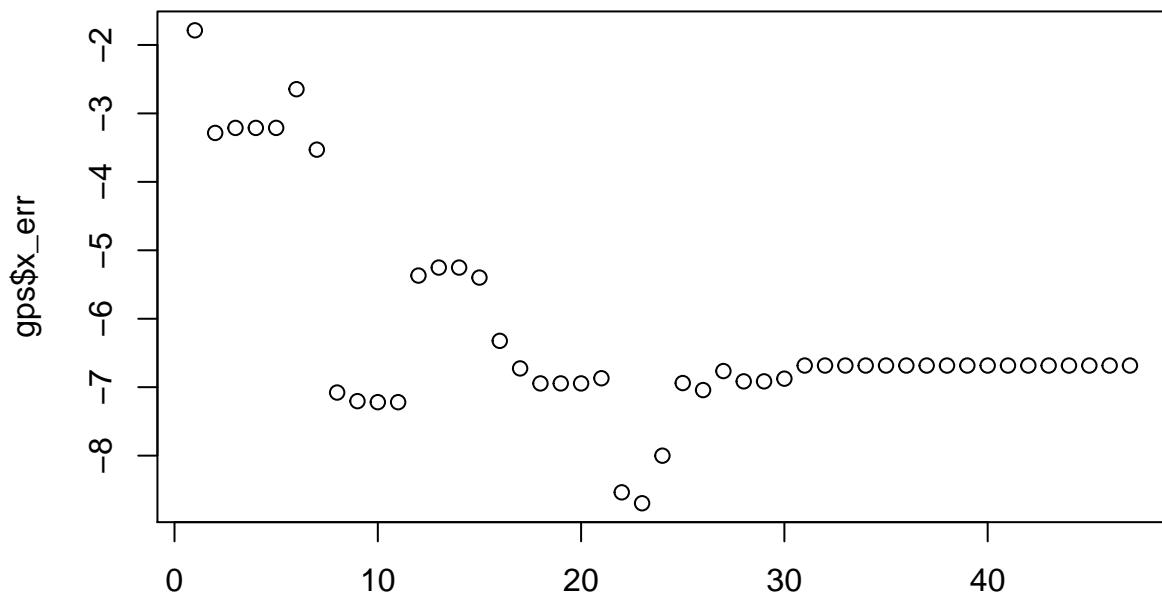
**Continuous total distance error over time**



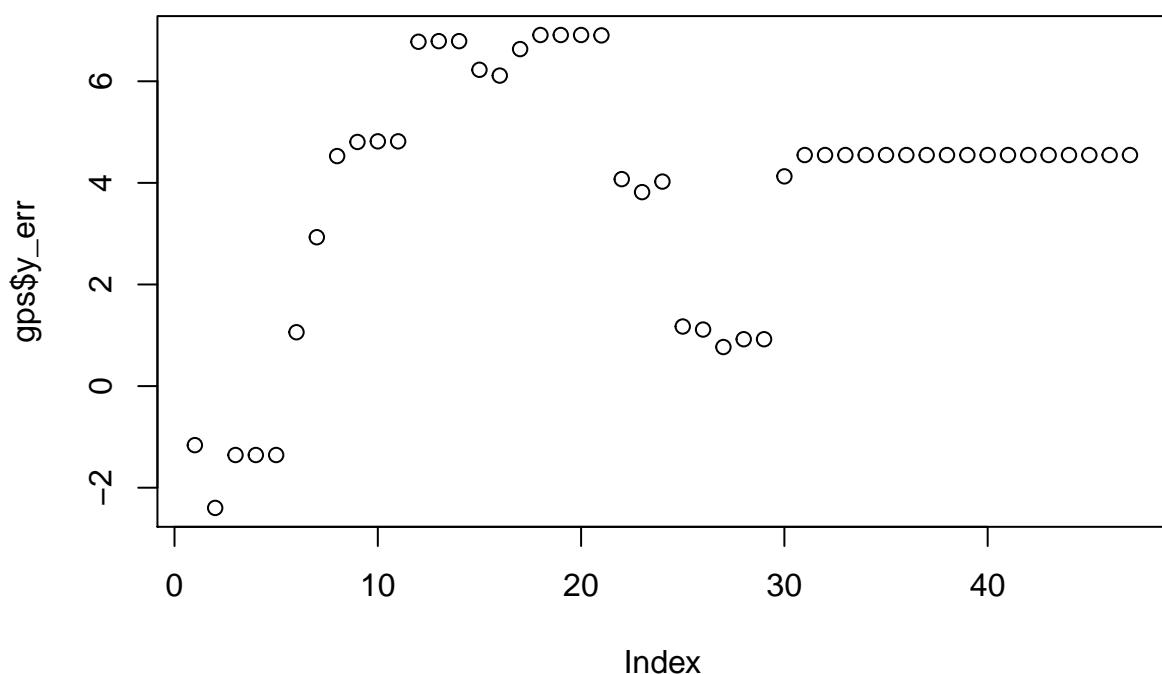
**Discrete total distance error over time**



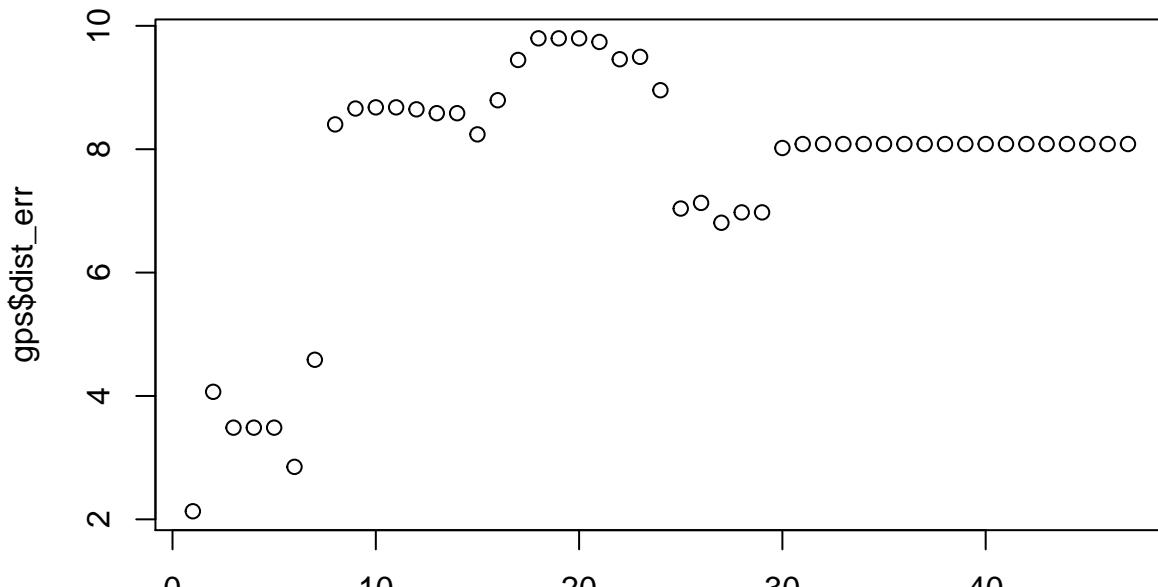
**GPS X Error Over Time**



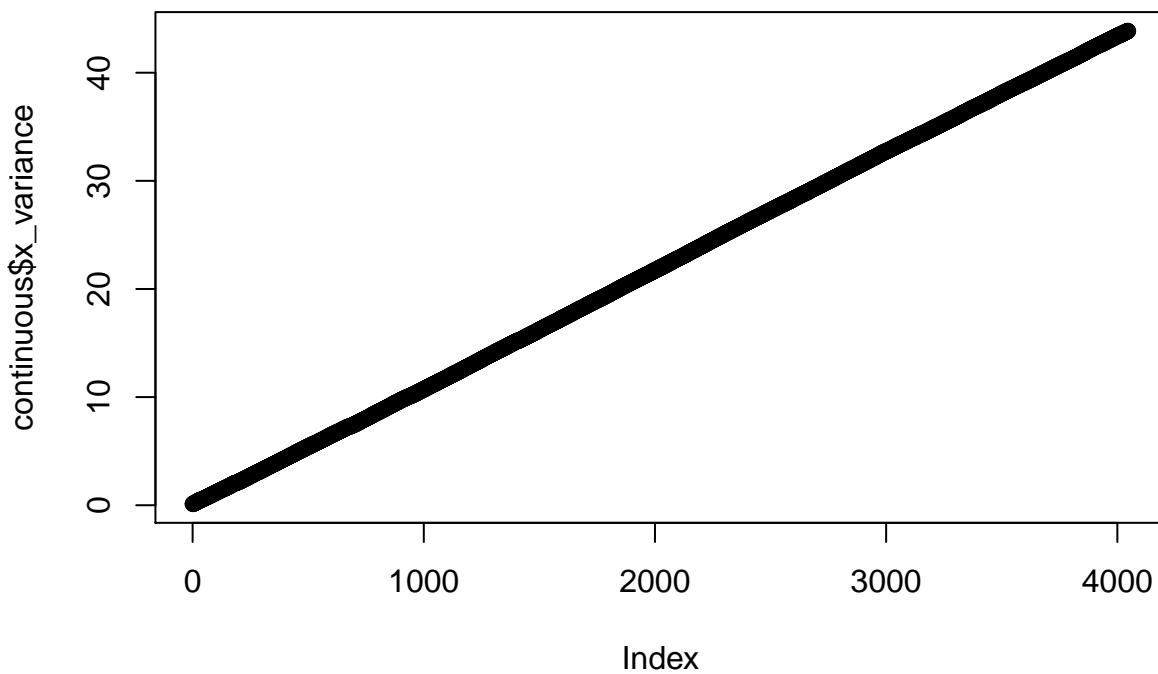
**GPS Y Error Over Time**



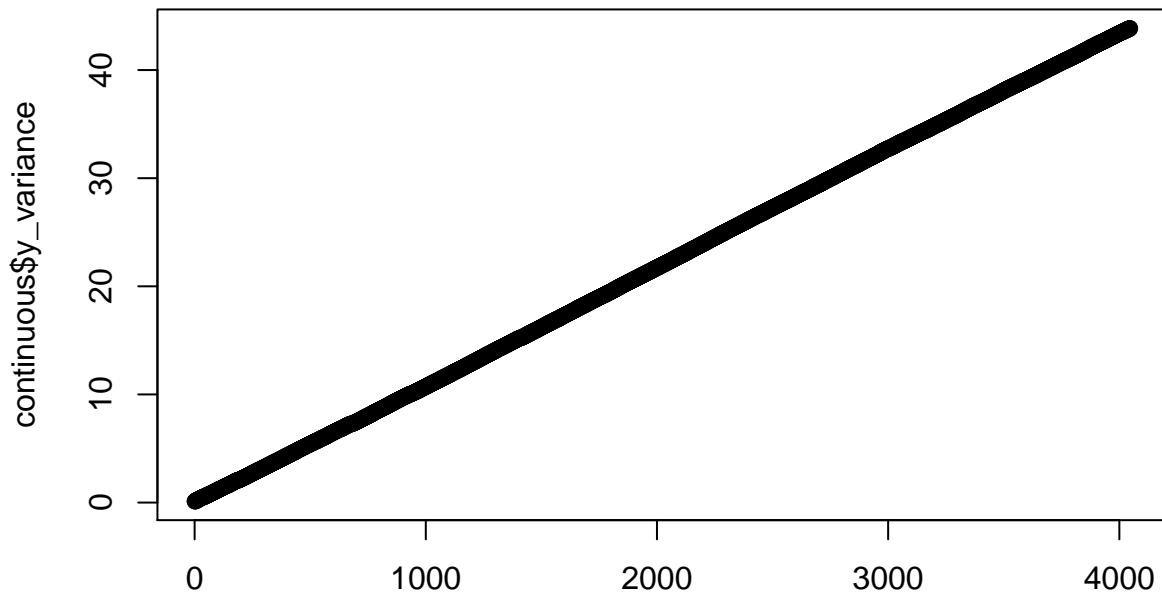
**GPS Horizontal Distance Error Over Time**



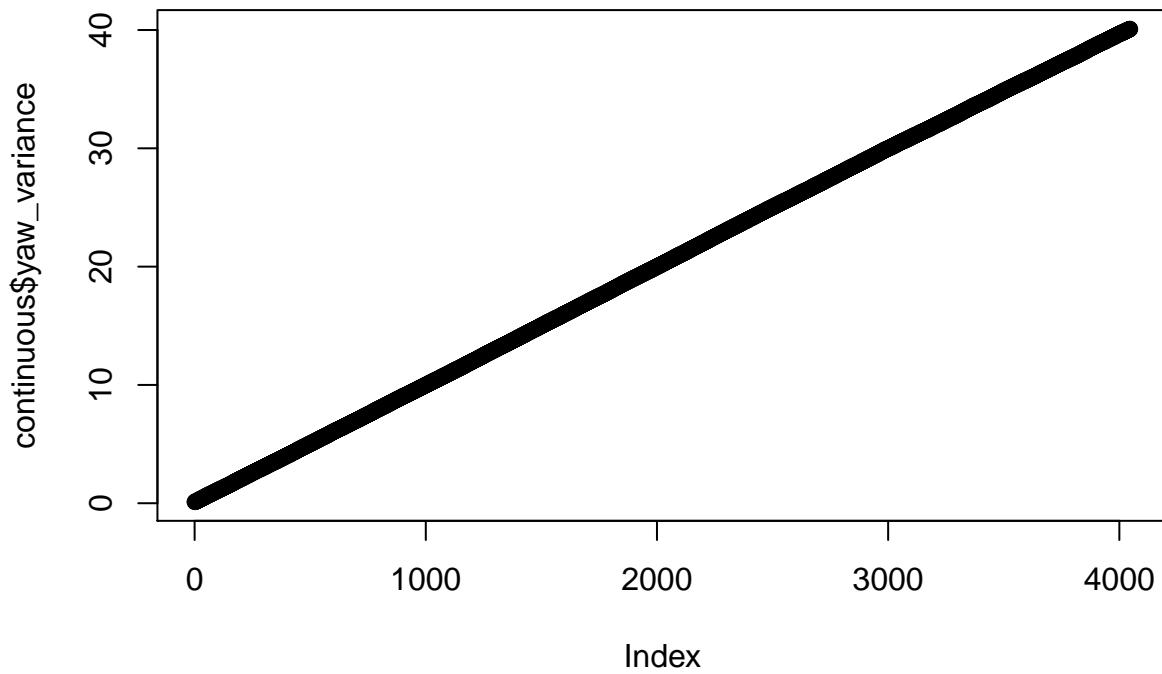
**Continuous Filter X Variance Over Time**



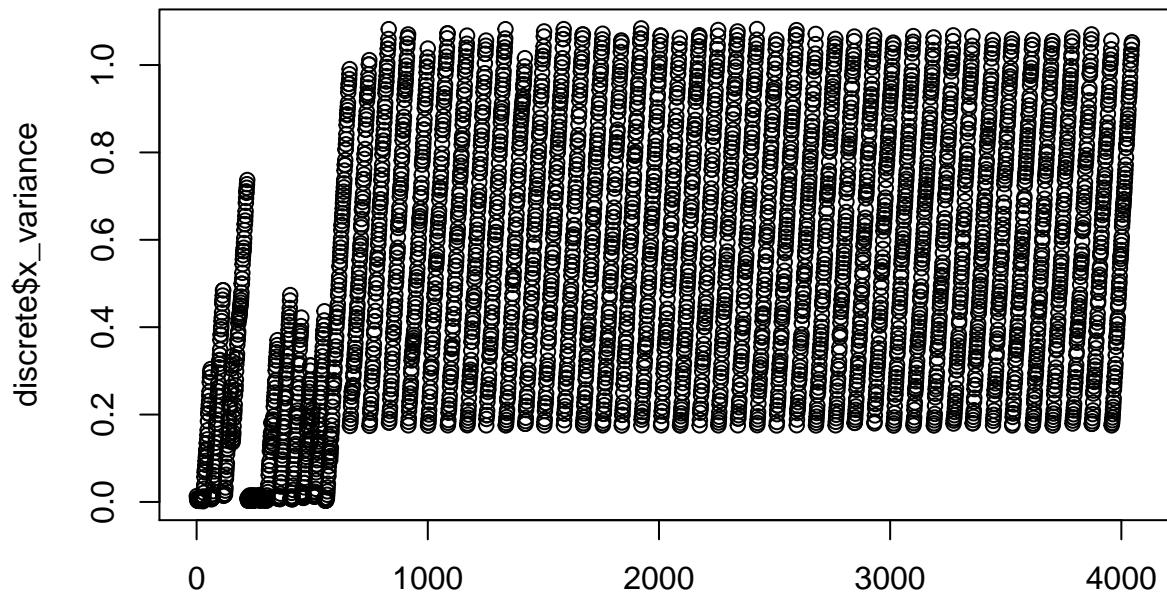
**Continuous Filter Y Variance Over Time**



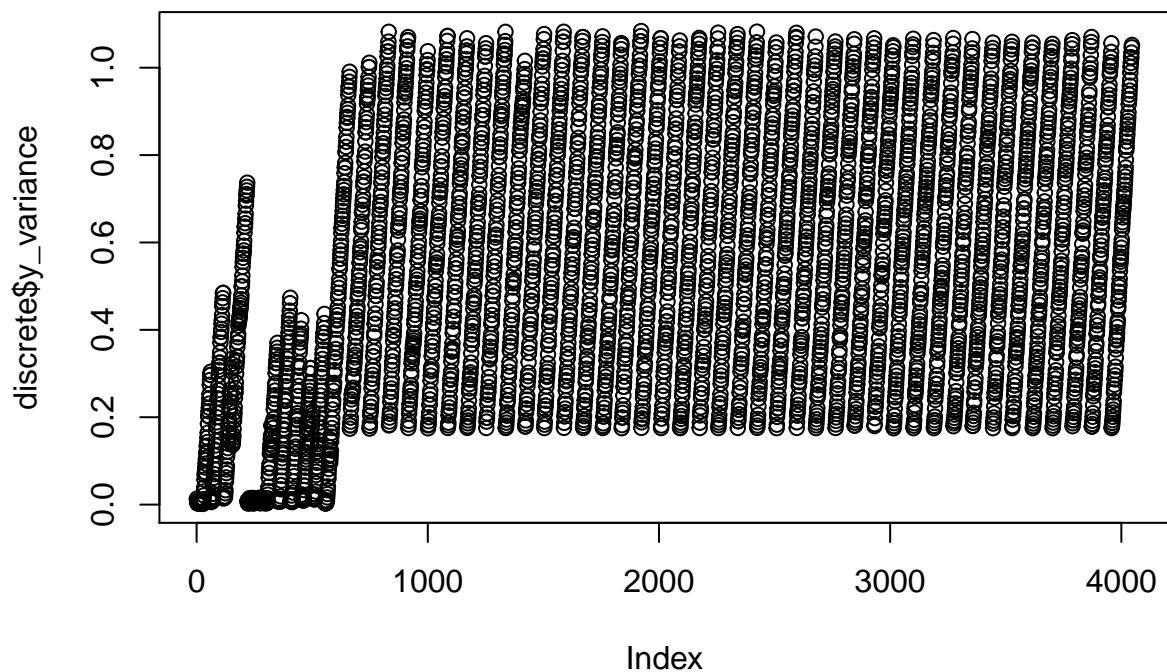
**Continuous Filter Yaw Variance Over Time**



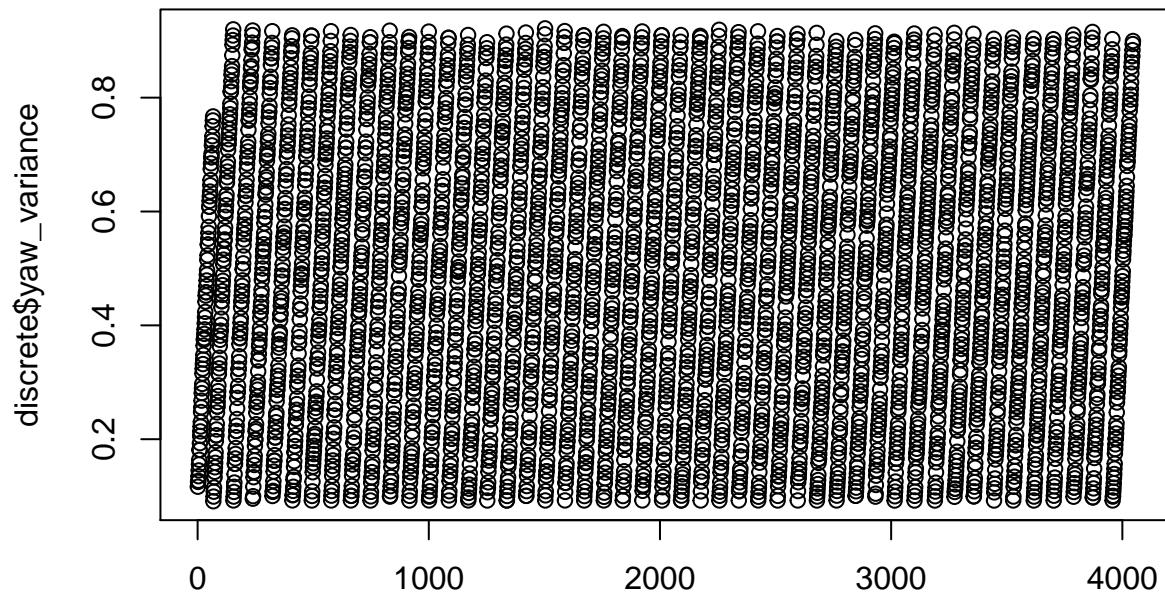
**Discrete Filter X Variance Over Time**



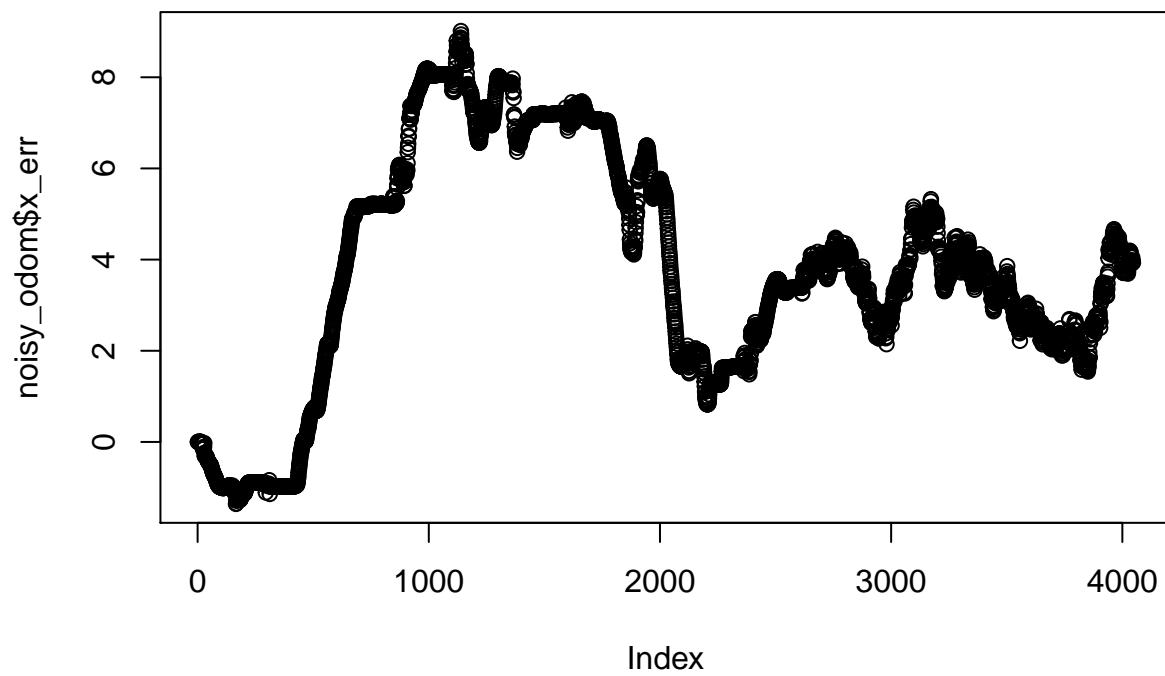
**Discrete Filter Y Variance Over Time**



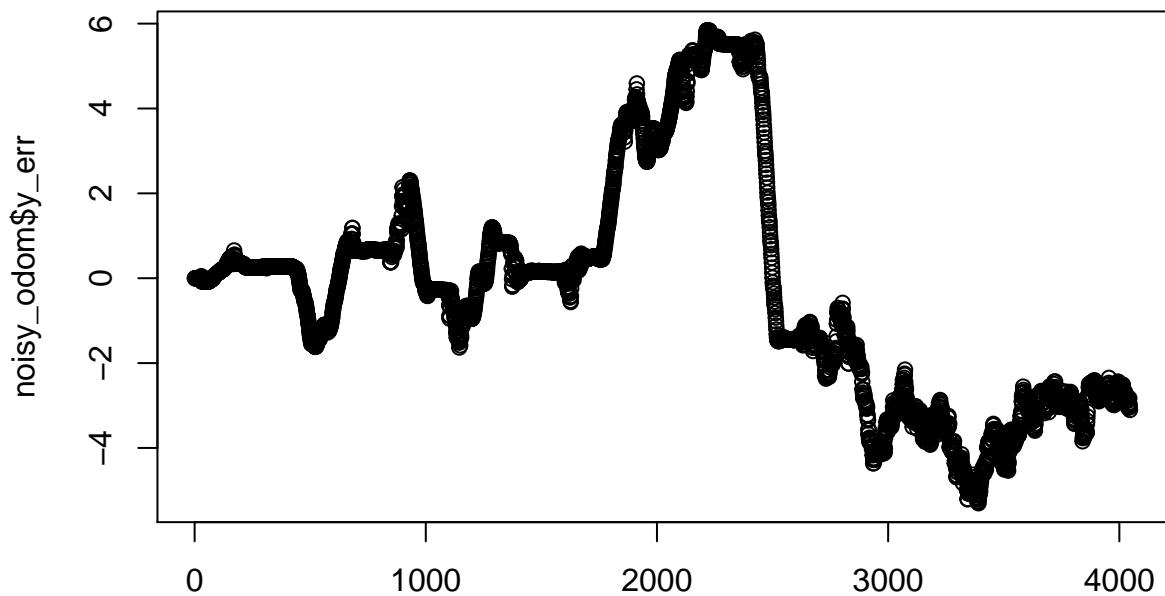
**Discrete Filter Yaw Variance Over Time**



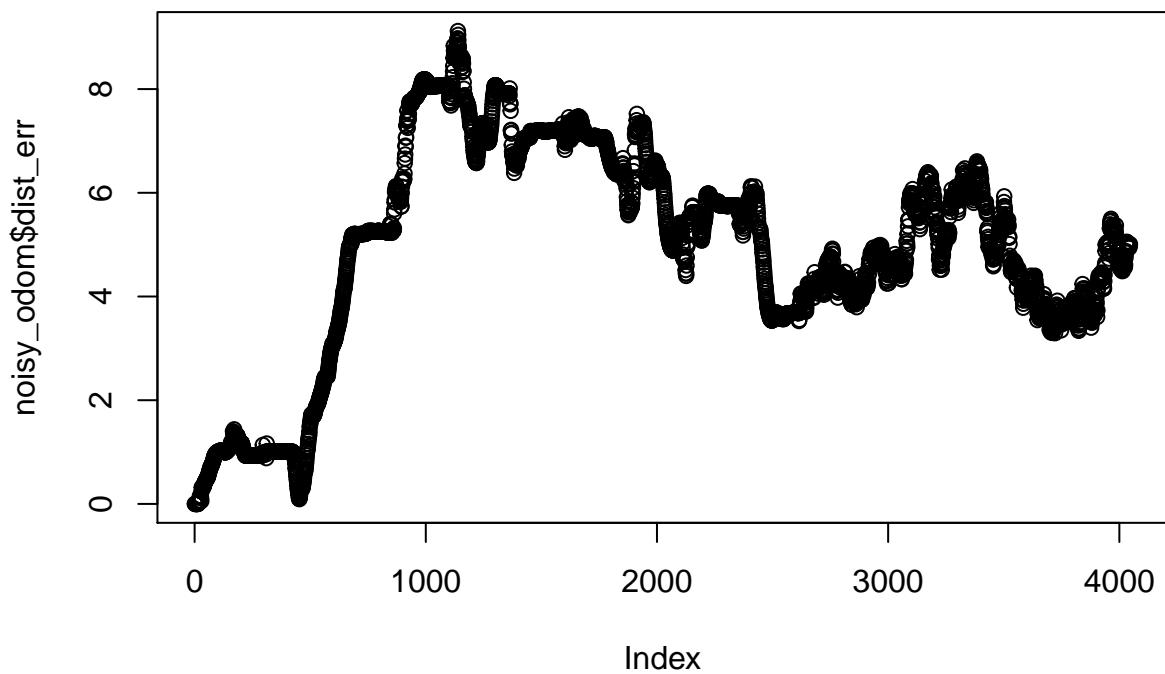
**Noisy Odom X Error Over Time**



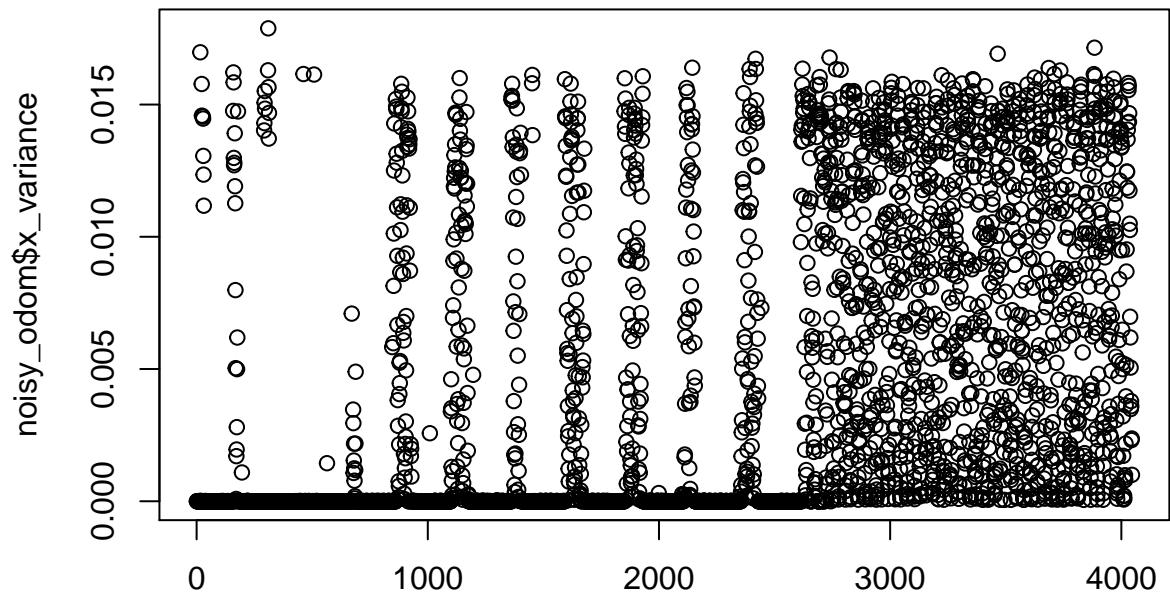
**Noisy Odom Y Error Over Time**



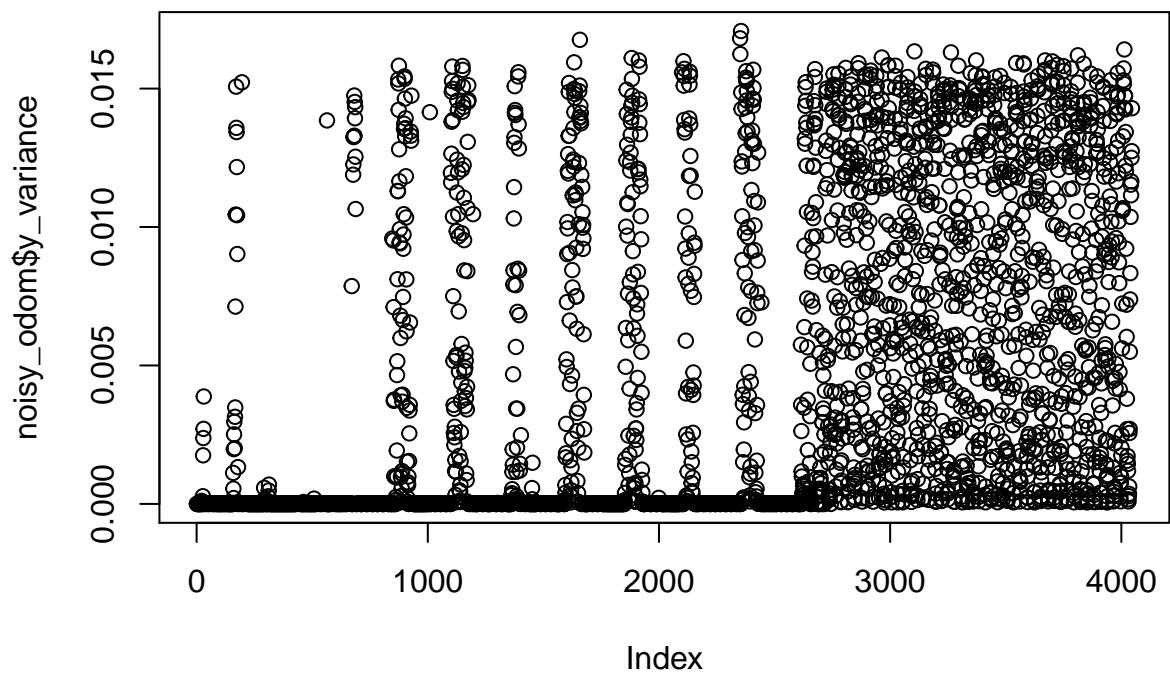
**Noisy Odom Horizontal Distance Error Over Time**



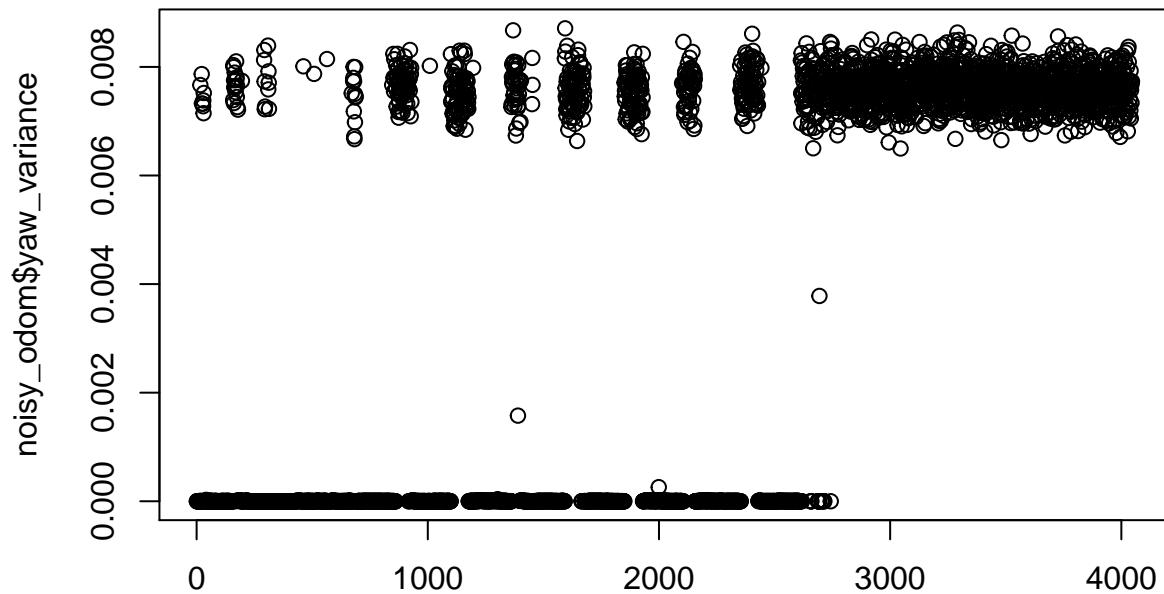
**Variance of X Coordinate in Noisy Odometry**



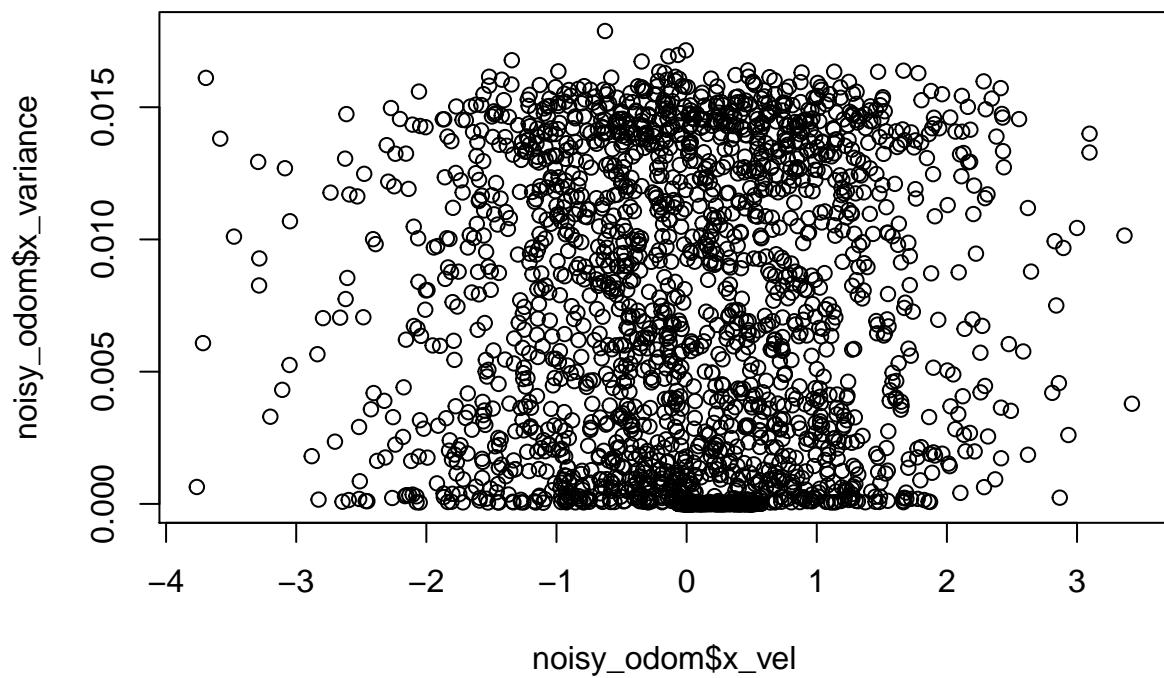
**Variance of Y Coordinate in Noisy Odometry**



### Variance of Yaw Coordinate in Noisy Odometry



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



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

