

# one\_stationary Turtlebot 1 Report

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*August 19, 2016*

This is a summary of the data from the one\_stationary experiment, Turtlebot #1.

The runtime of this experiment was 0 hours, 0 minutes, and 45.8 seconds.

The total number of external pose measurements recieved by the robot during this time was 0 which means poses were received at an average of 0 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.
## 9.357e-07 2.395e-06 3.595e-06 3.555e-06 4.540e-06 6.938e-06
```

```
summary(continuous$y_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 7.677e-10 1.059e-08 2.309e-08 2.430e-08 3.713e-08 5.177e-08
```

```
summary(continuous$yaw_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 5.396e-05 9.146e-05 1.053e-04 1.018e-04 1.121e-04 1.423e-04
```

```
summary(continuous$dist_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 9.358e-07 2.395e-06 3.596e-06 3.555e-06 4.540e-06 6.939e-06
```

```
summary(discrete$x_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -0.38770 -0.21910 -0.02515 -0.09512  0.03390  0.06671
```

```
summary(discrete$y_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
##  0.0000   0.1016   0.2531   0.2217   0.2668   0.5130
```

```
summary(discrete$yaw_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -4.011e-05 -1.320e-05 -4.191e-06  5.644e-06  9.276e-06  9.864e-05
```

```
summary(discrete$dist_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 0.0000014 0.1071000 0.2680000 0.2601000 0.3347000 0.6326000
```

```
summary(noisy_odom$x_err)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 7.890e-07 2.584e-06 3.505e-06 3.936e-06 5.535e-06 7.582e-06
```

```
summary(noisy_odom$y_err)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -2.236e-09 -1.167e-09 -1.026e-09 -1.032e-09 -7.851e-10 -4.056e-10
```

```
summary(noisy_odom$dist_err)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 7.890e-07 2.584e-06 3.505e-06 3.936e-06 5.535e-06 7.582e-06
```

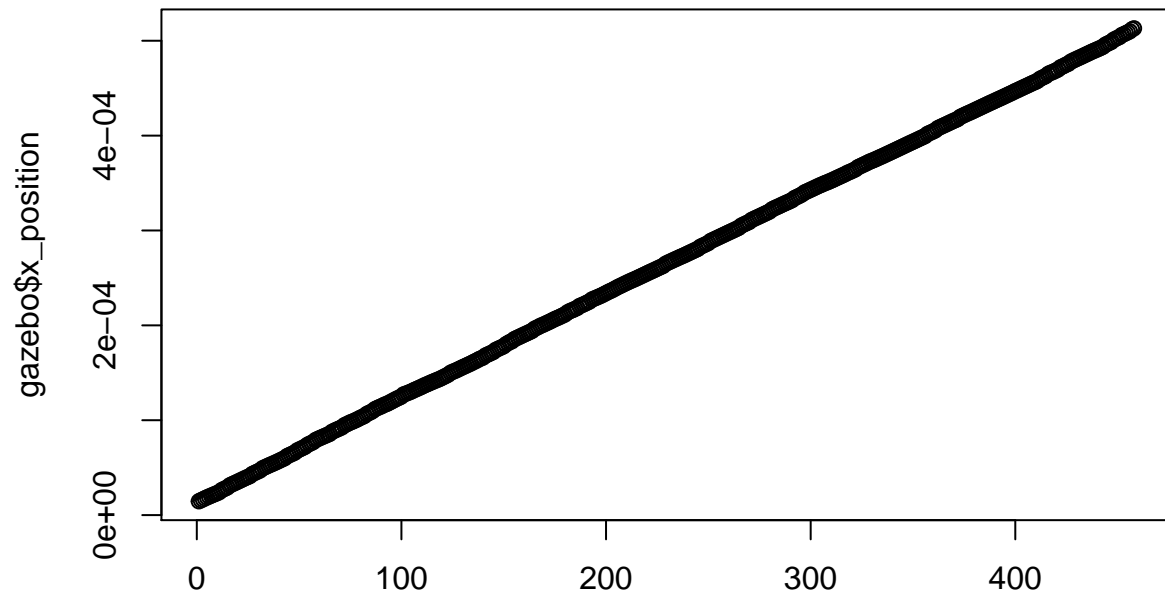
```
if (NROW(gps) > 0) {
  summary(gps$x_err)
  summary(gps$y_err)
  summary(gps$dist_err)
}
```

```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.
## 0.1103 0.3890 0.4956 0.6304 0.7402 1.5050
```

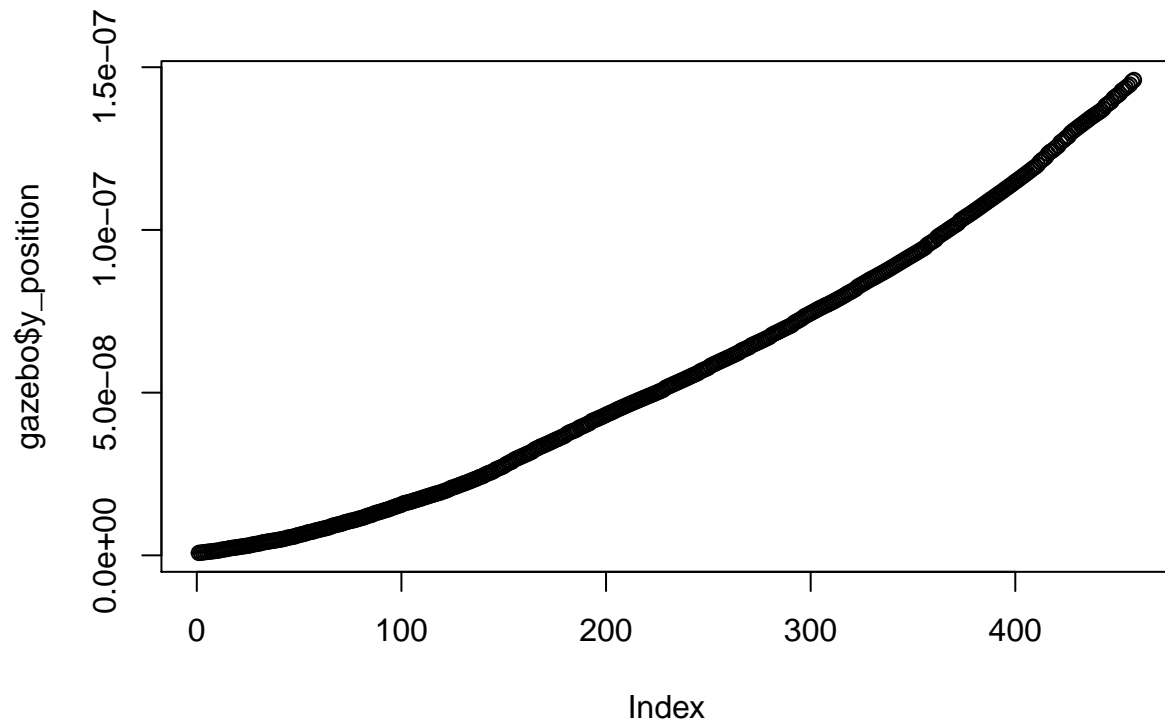
```
if (NROW(noisy_odom) > 0) {
  summary(noisy_odom$x_variance)
  summary(noisy_odom$y_variance)
  summary(noisy_odom$yaw_variance)
}
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.130e-15 8.598e-15 1.697e-14 2.418e-14 3.483e-14 1.317e-13
```

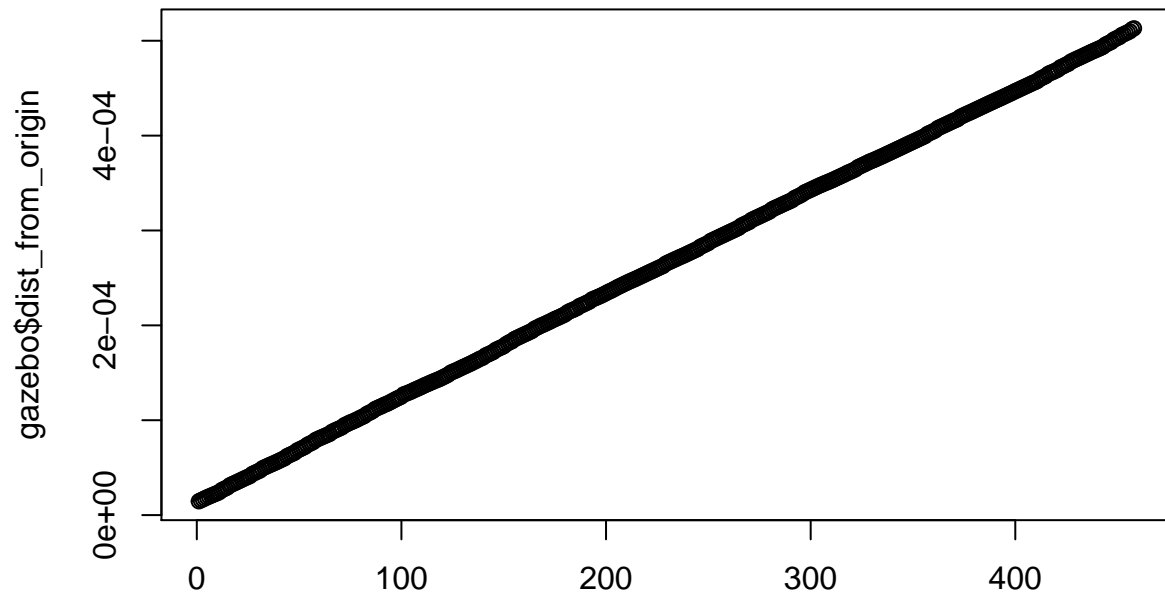
**X coordinate of robot over time**



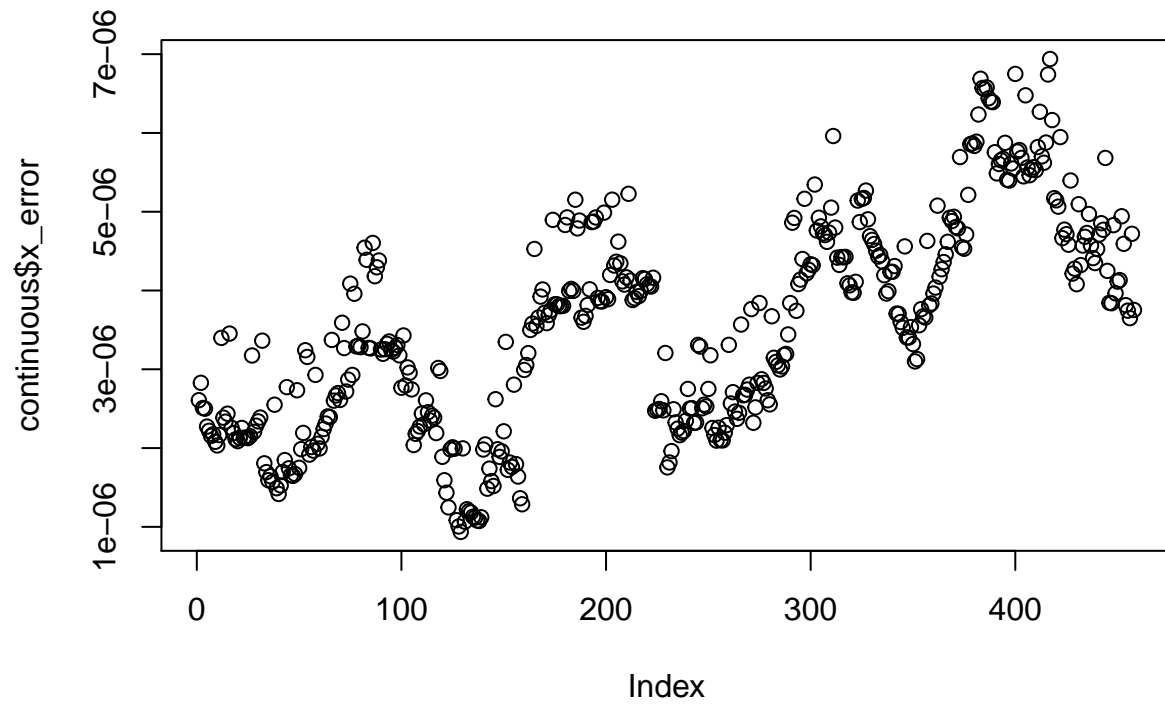
**Y coordinate of robot over time**



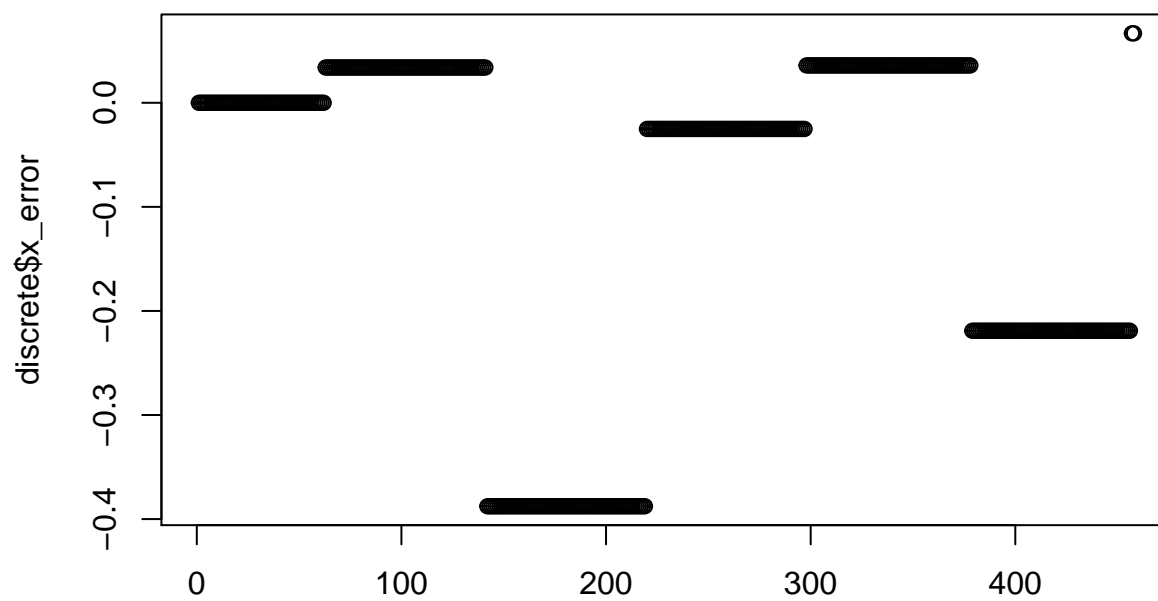
**Distance from origin vs. time**



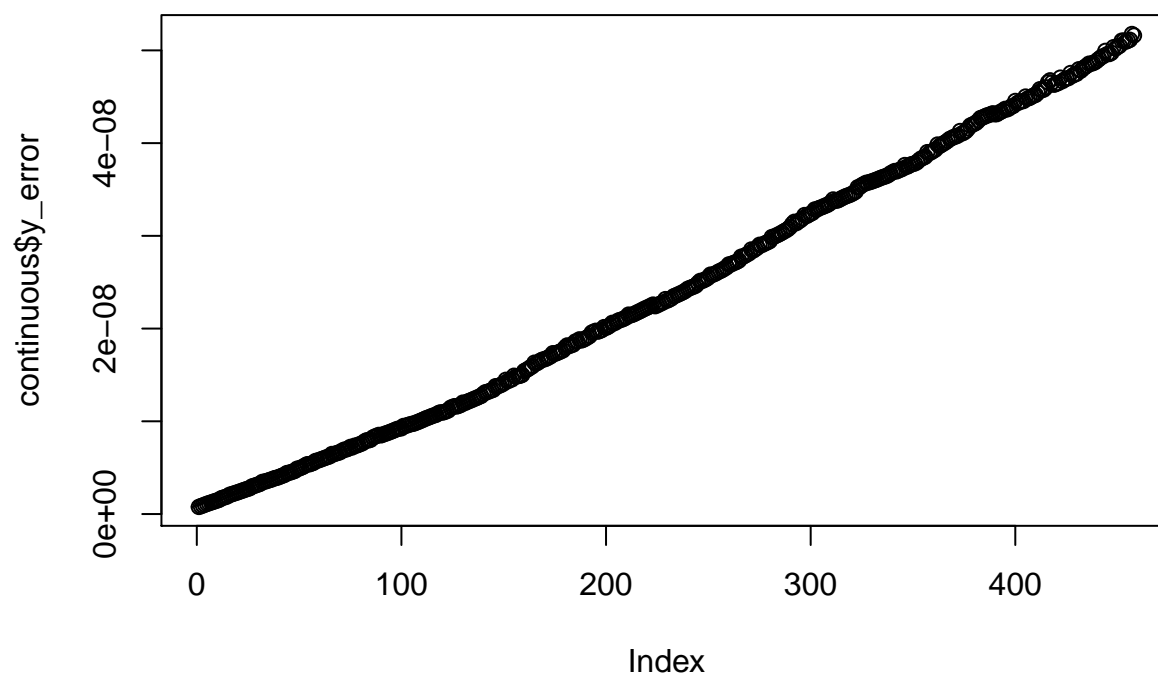
**Continuous x\_error over time**



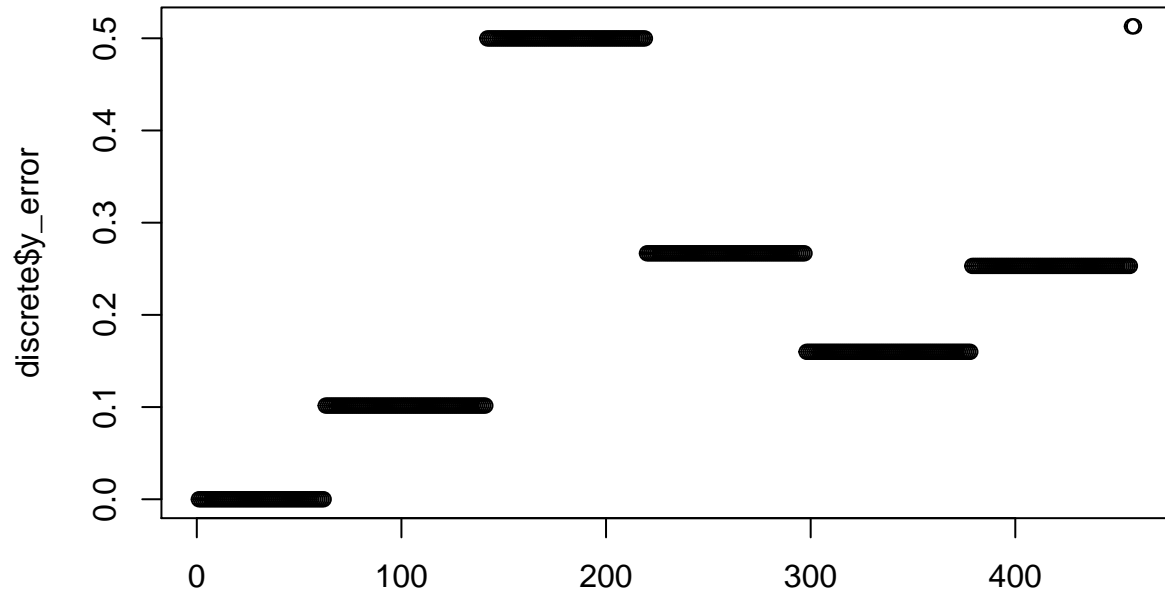
Discrete  $x_{\text{error}}$  over time



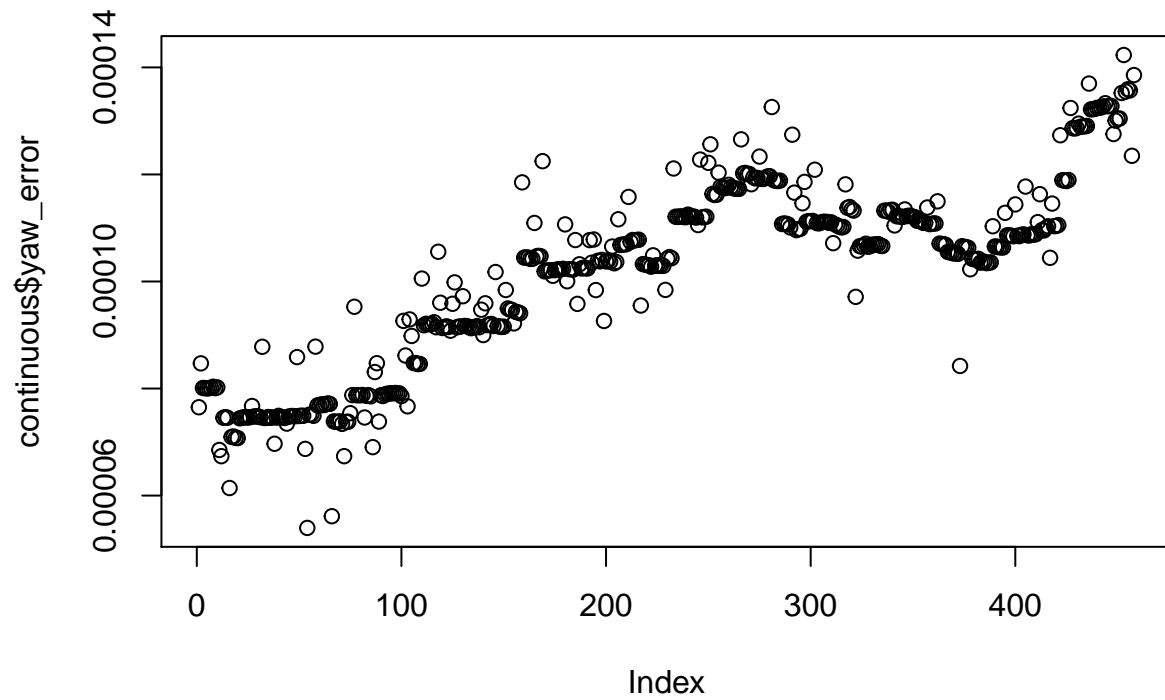
Continuous  $y_{\text{error}}$  over time



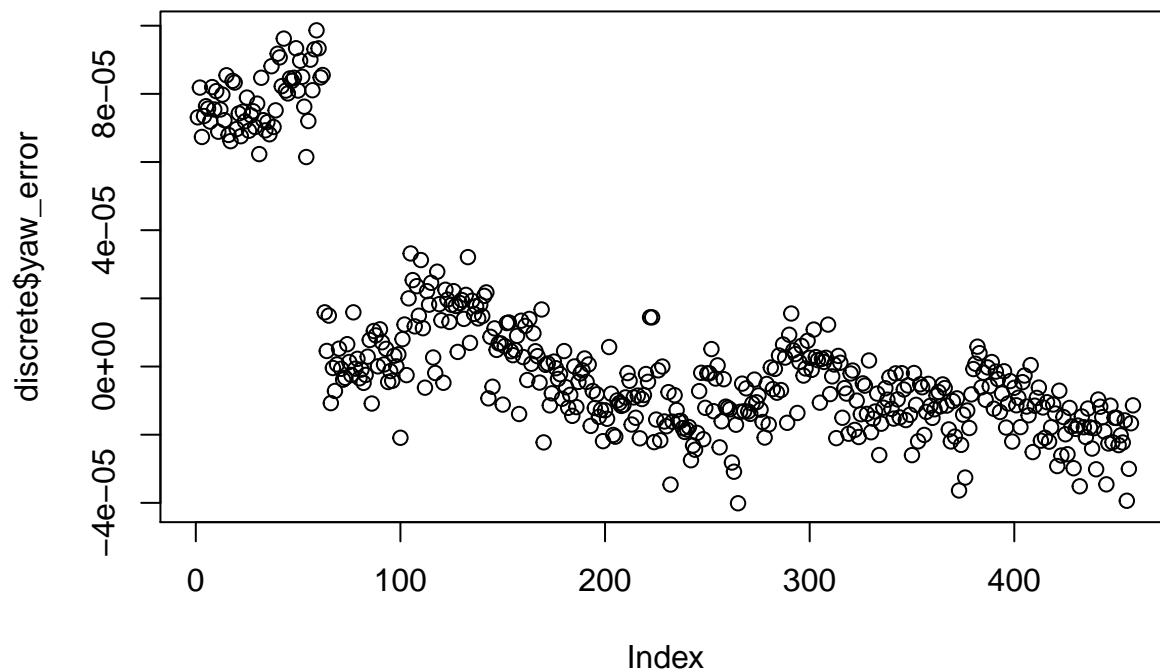
**Discrete y\_error over time**



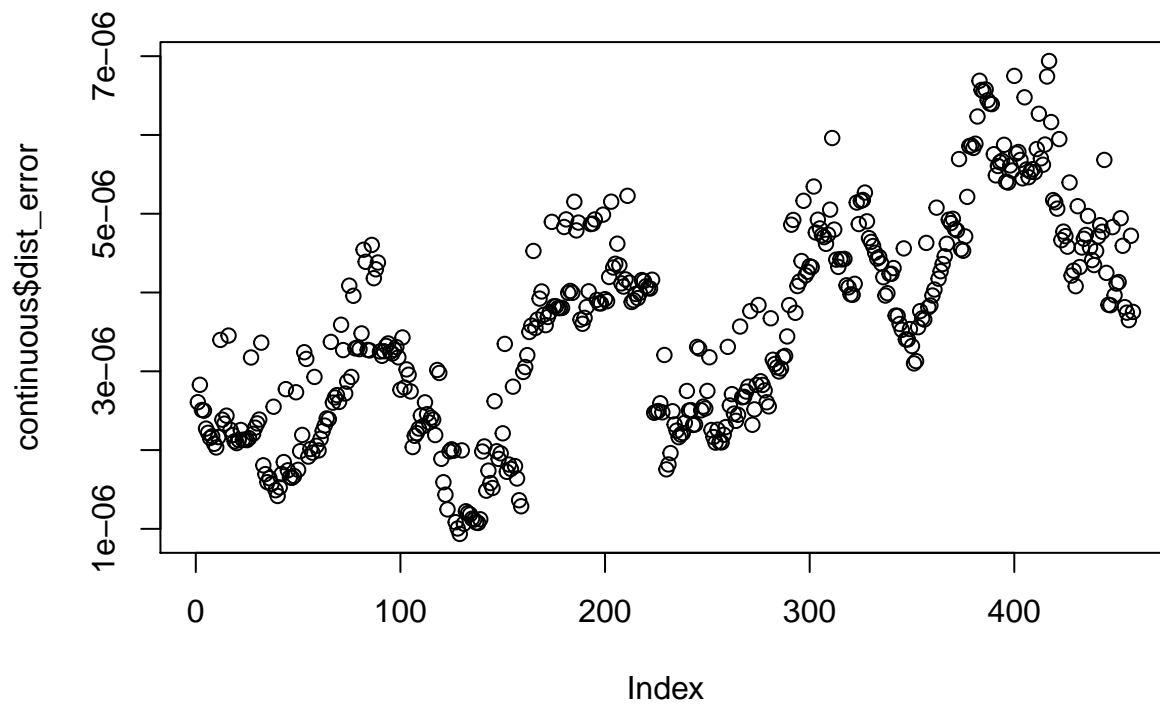
**Continuous yaw error over time**



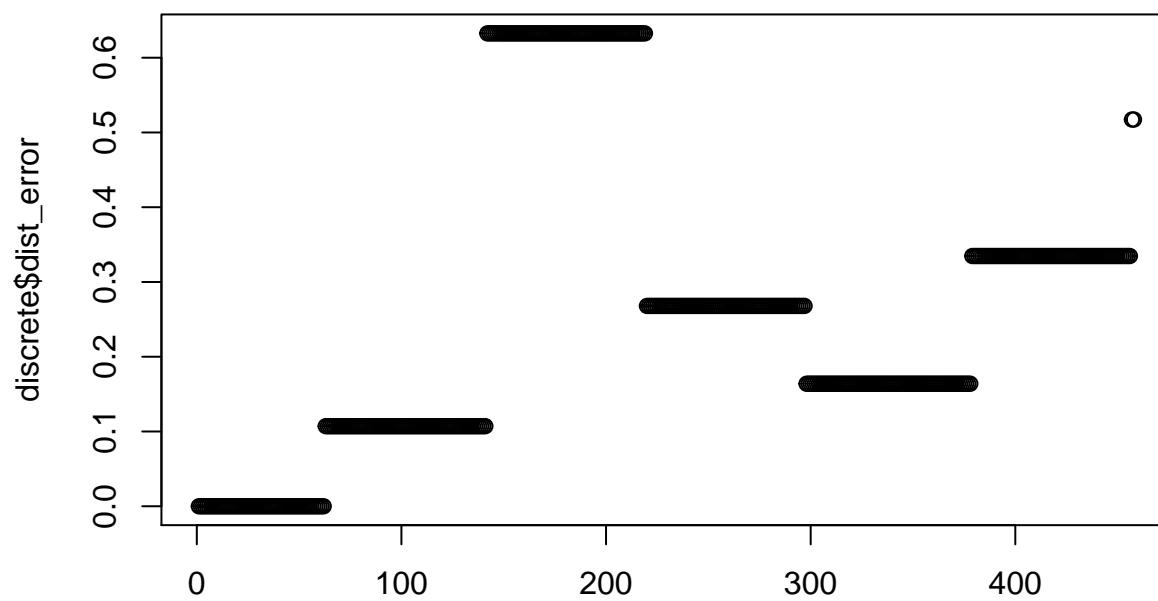
**Discrete yaw error over time**



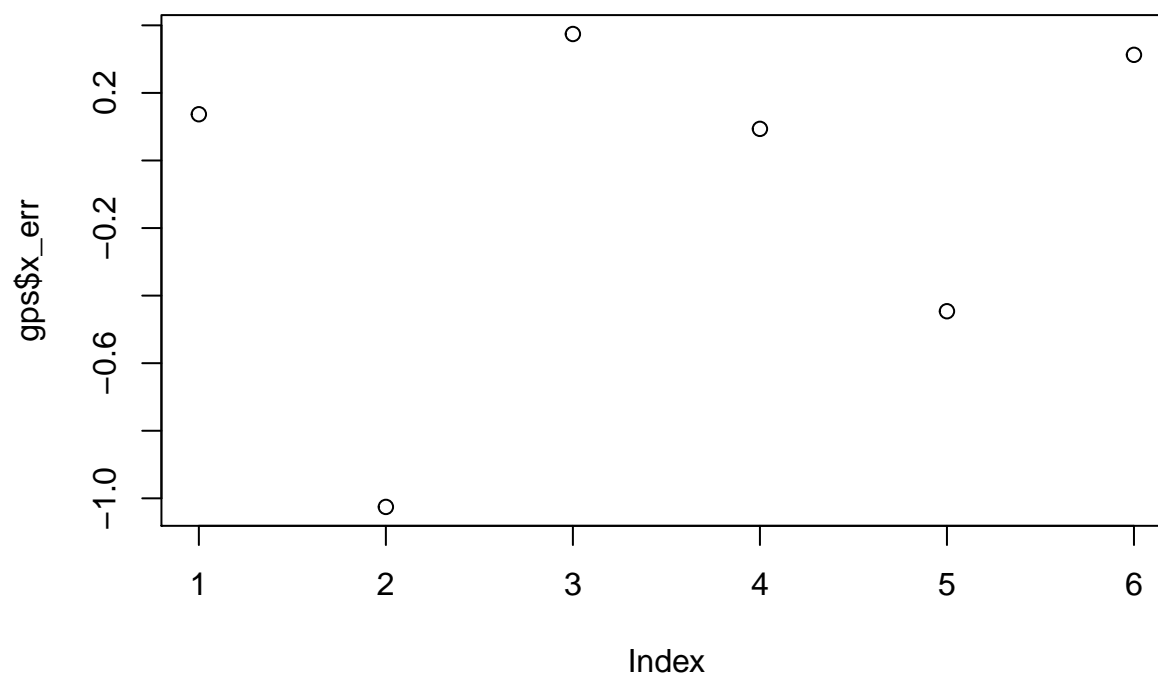
**Continuous total distance error over time**



**Discrete total distance error over time**

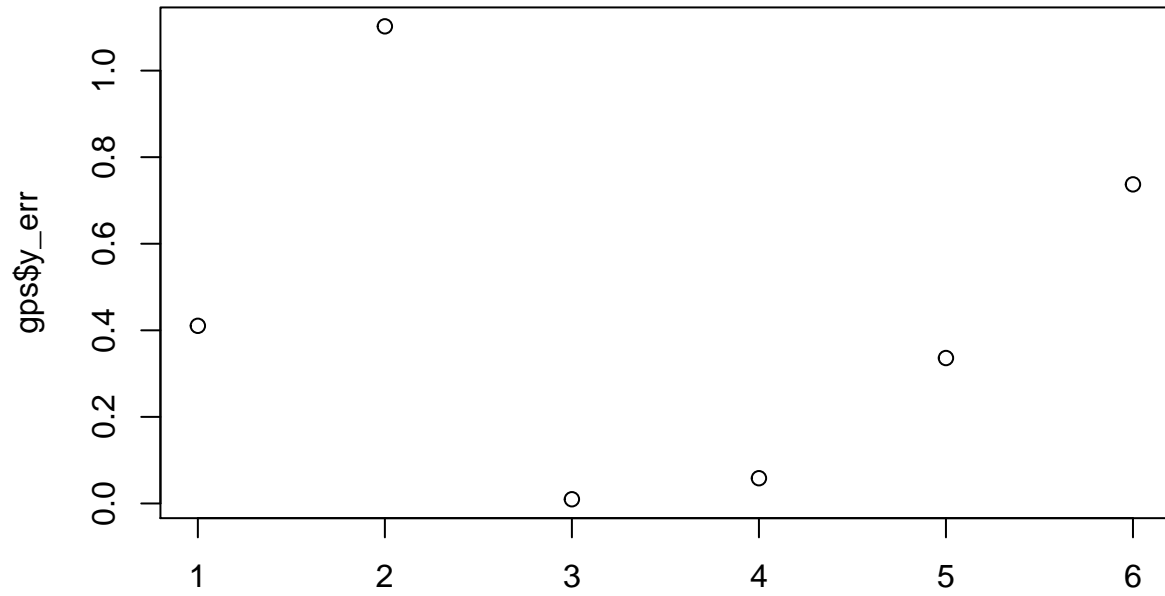


**GPS X Error Over Time**

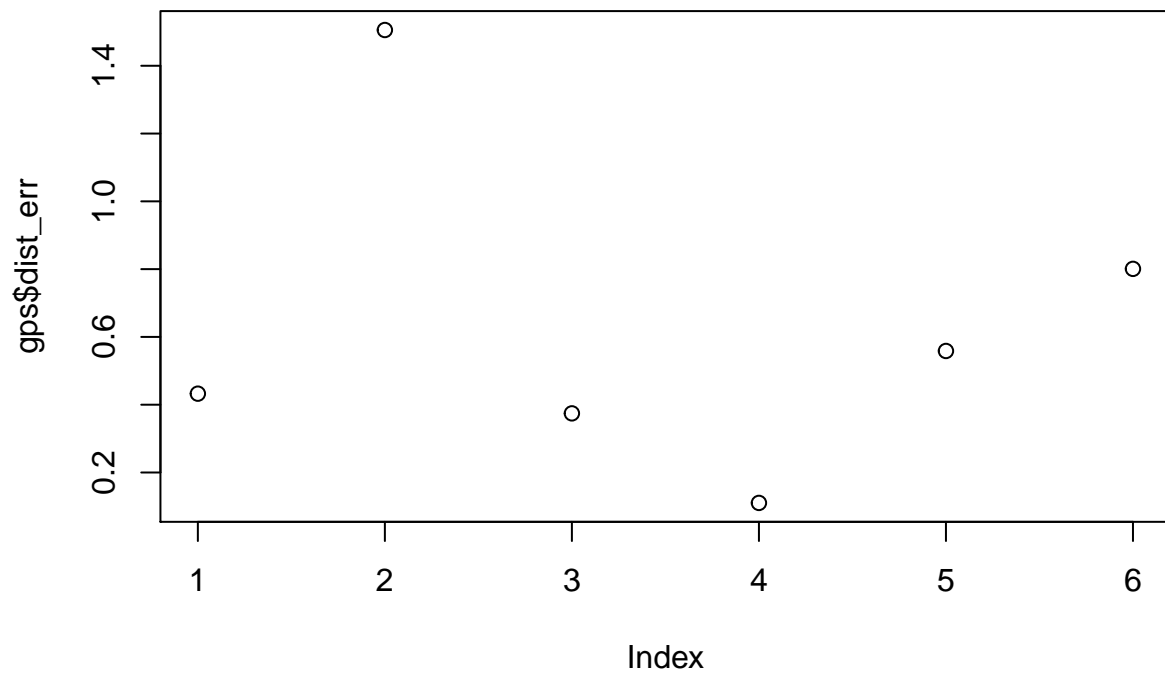




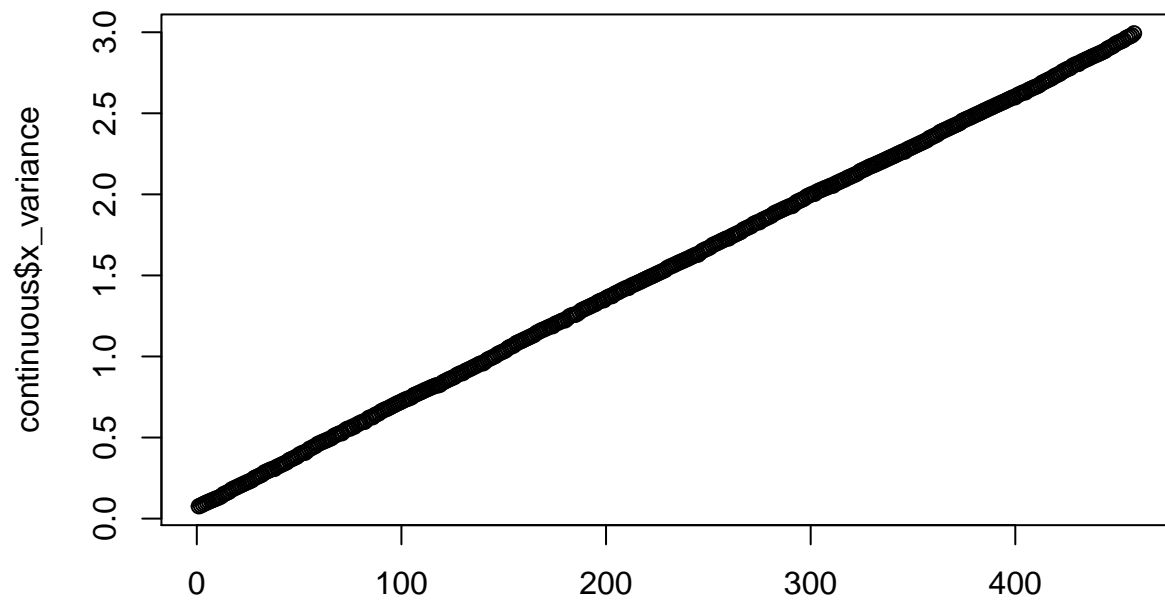
**GPS Y Error Over Time**



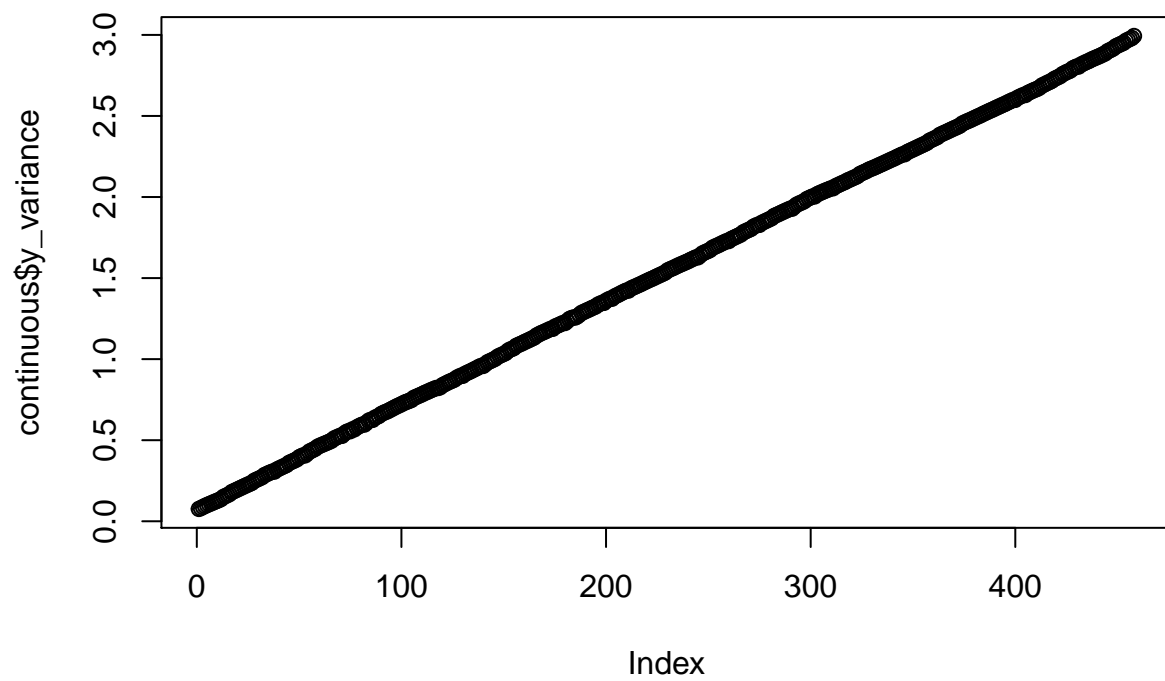
**GPS Horizontal Distance Error Over Time**



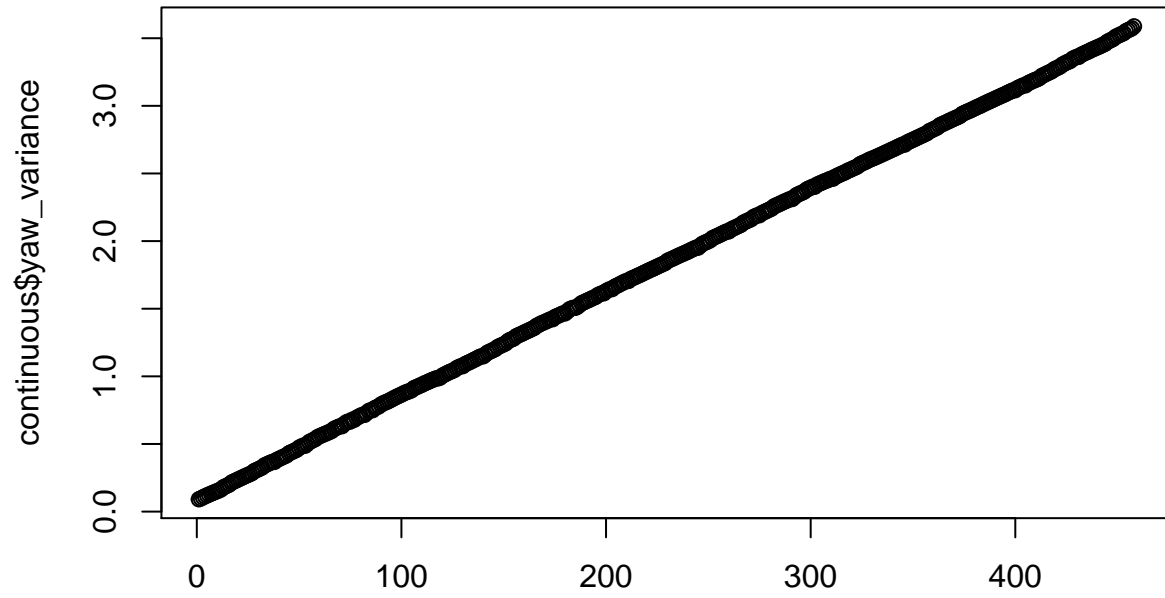
**Continuous Filter X Variance Over Time**



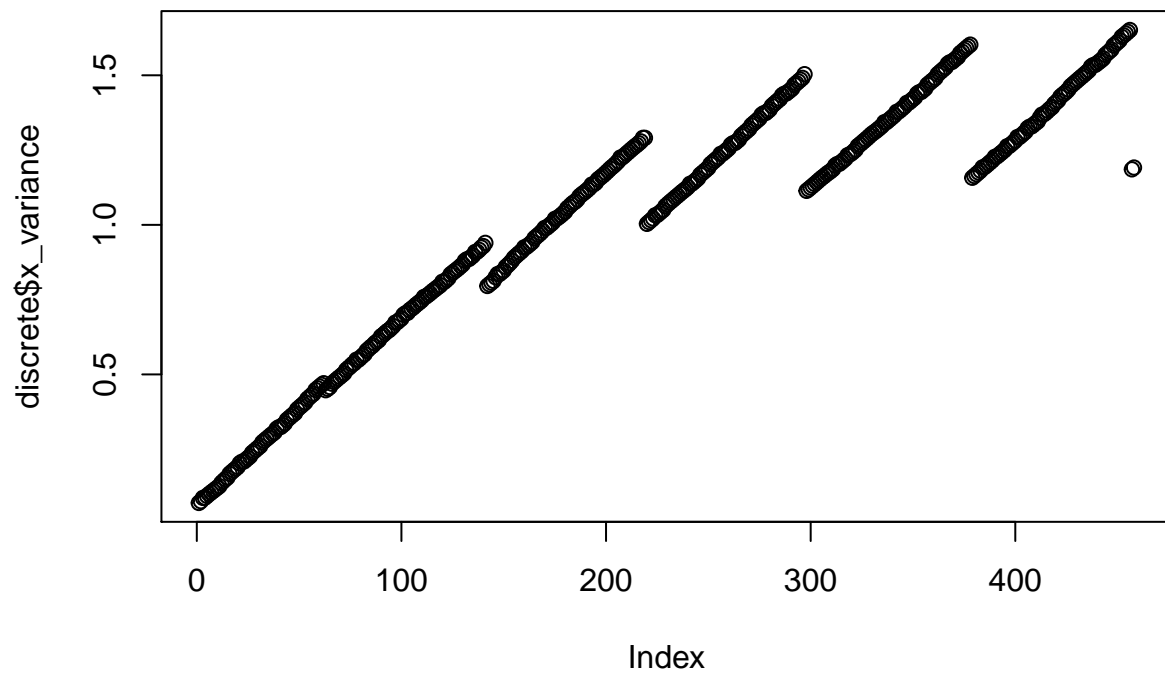
**Continuous Filter Y Variance Over Time**



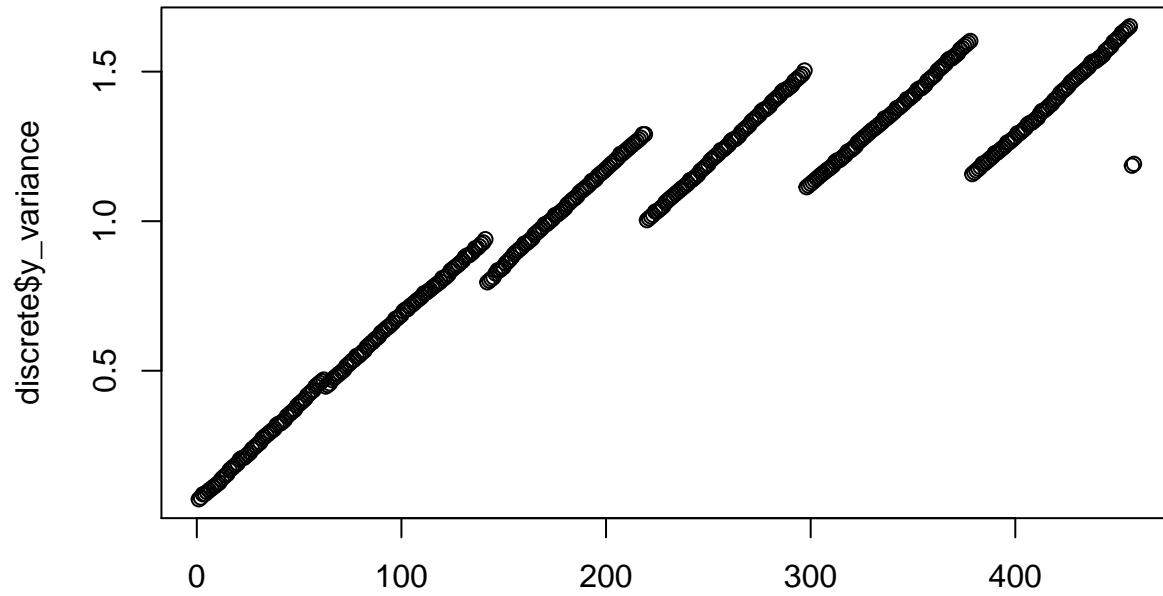
**Continuous Filter Yaw Variance Over Time**



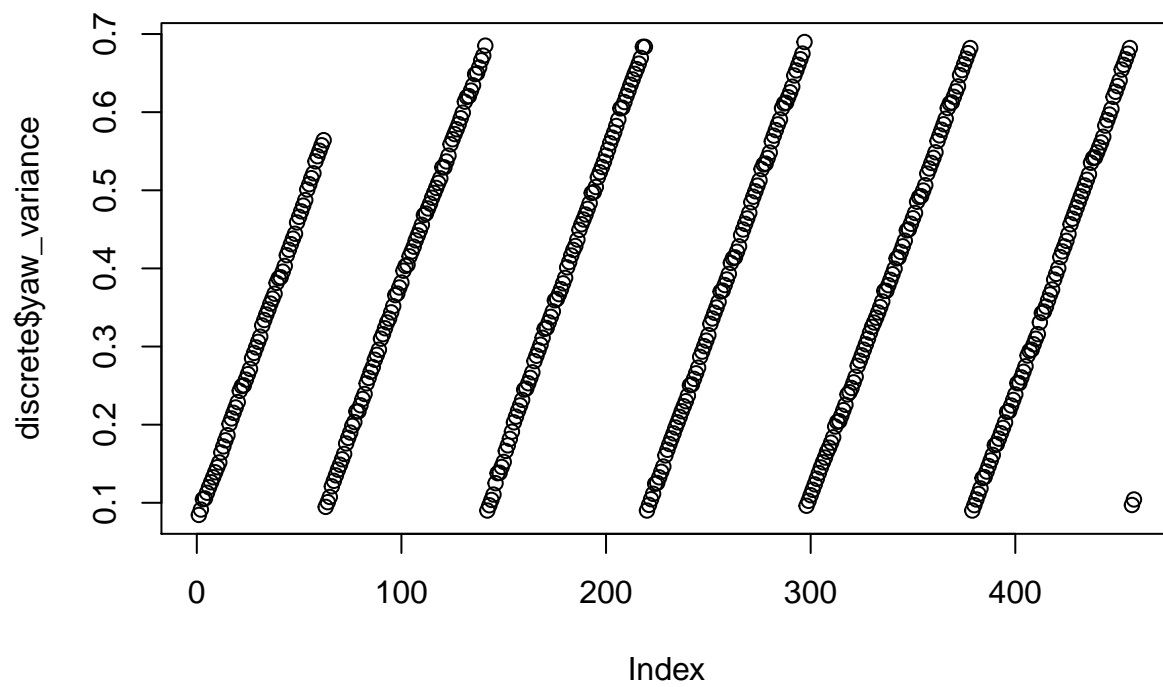
**Discrete Filter X Variance Over Time**



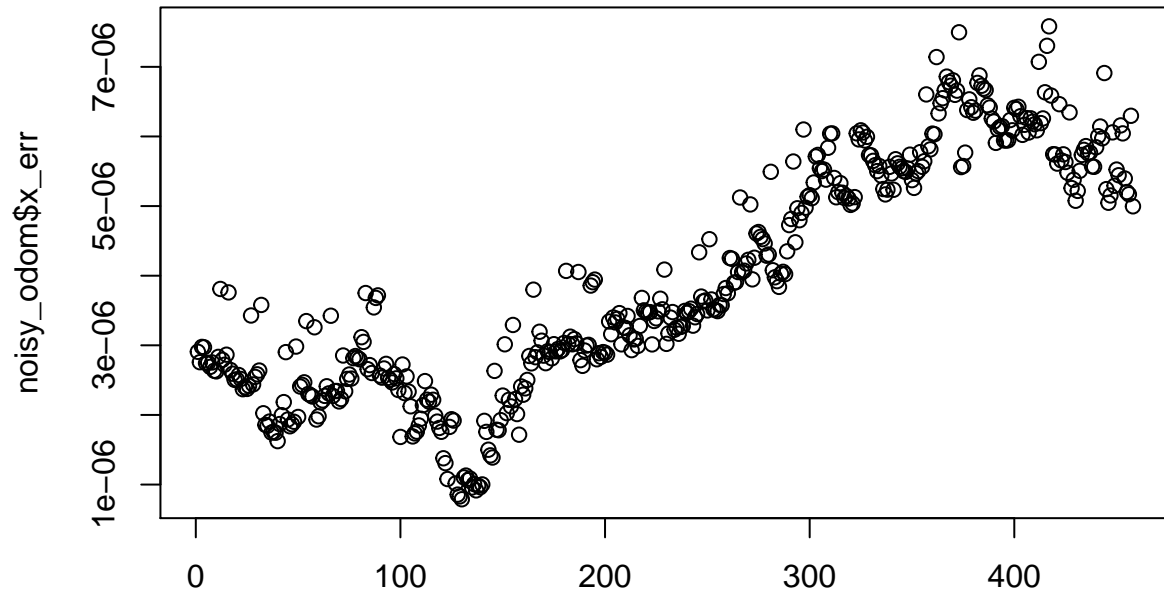
**Discrete Filter Y Variance Over Time**



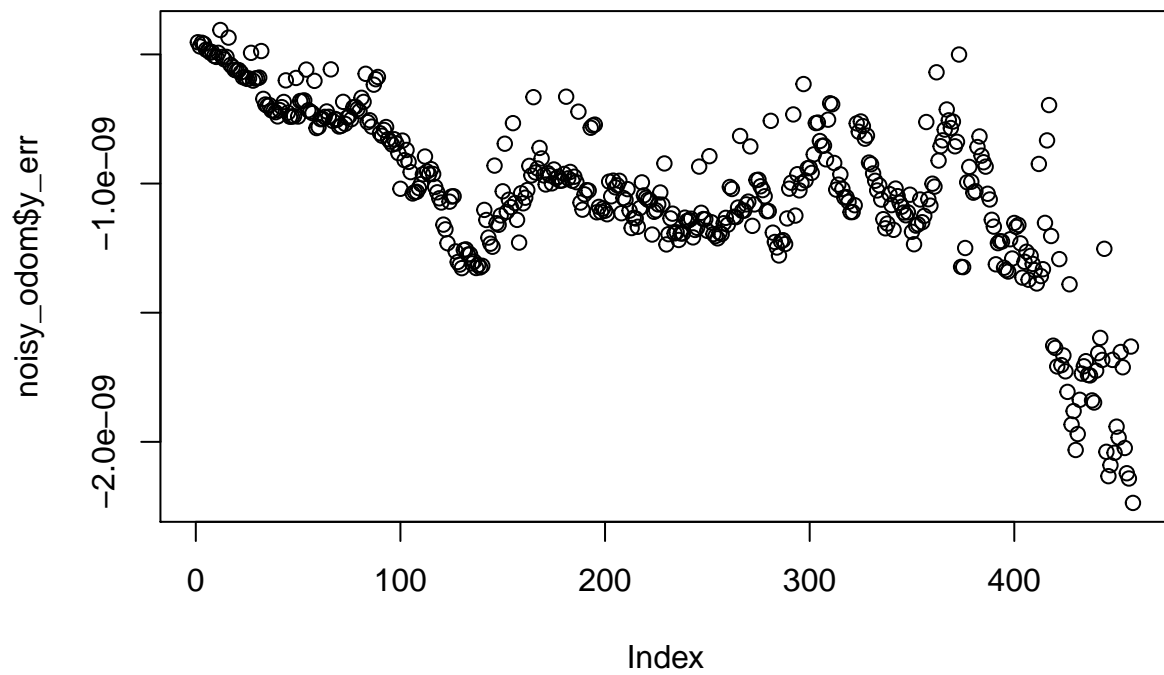
**Discrete Filter Yaw Variance Over Time**



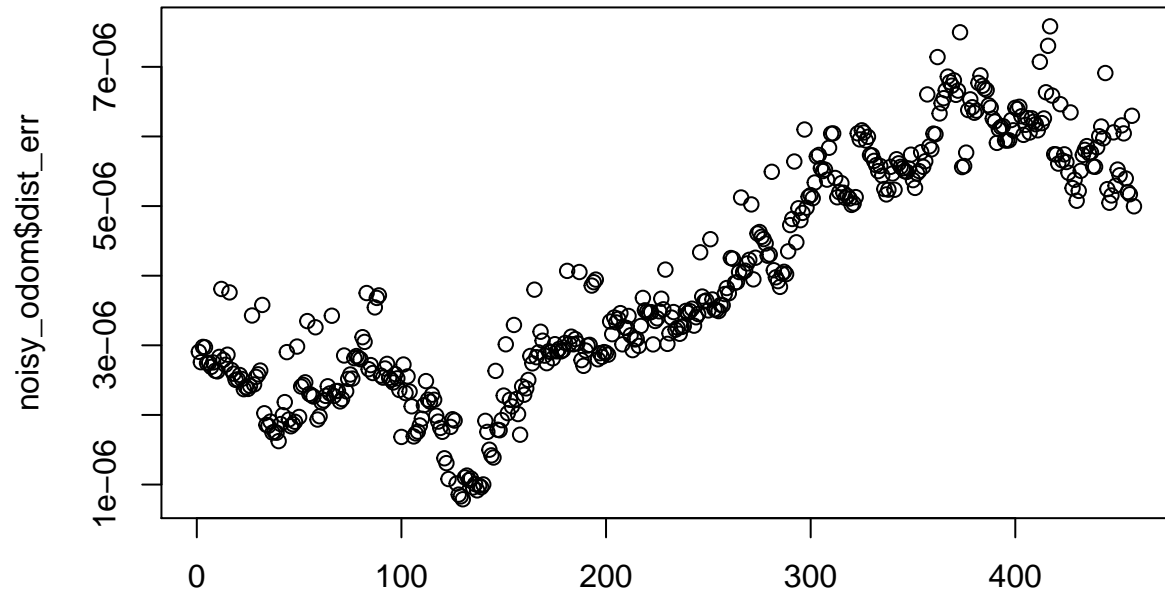
**Noisy Odom X Error Over Time**



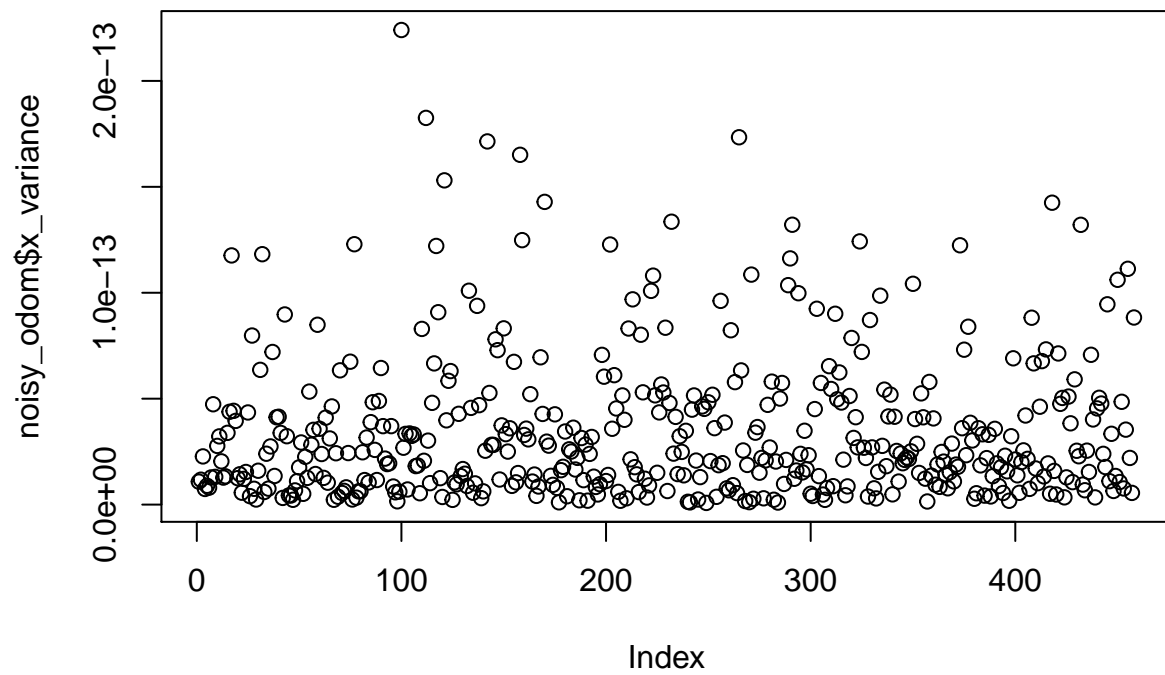
**Noisy Odom Y Error Over Time**



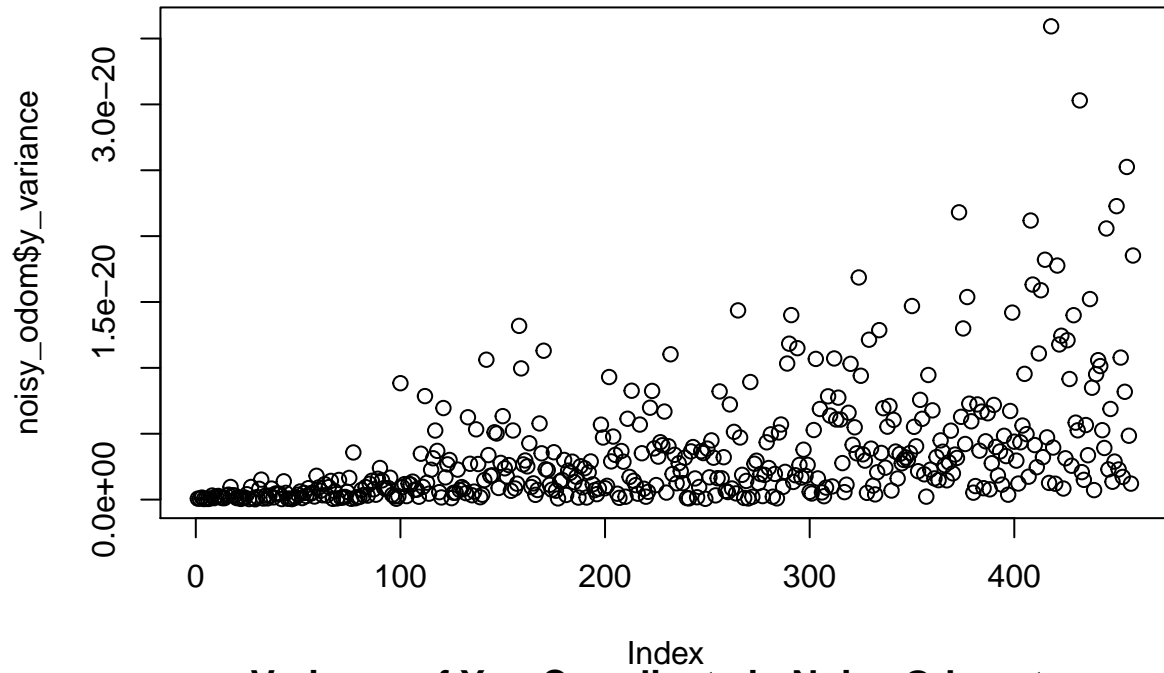
**Noisy Odom Horizontal Distance Error Over Time**



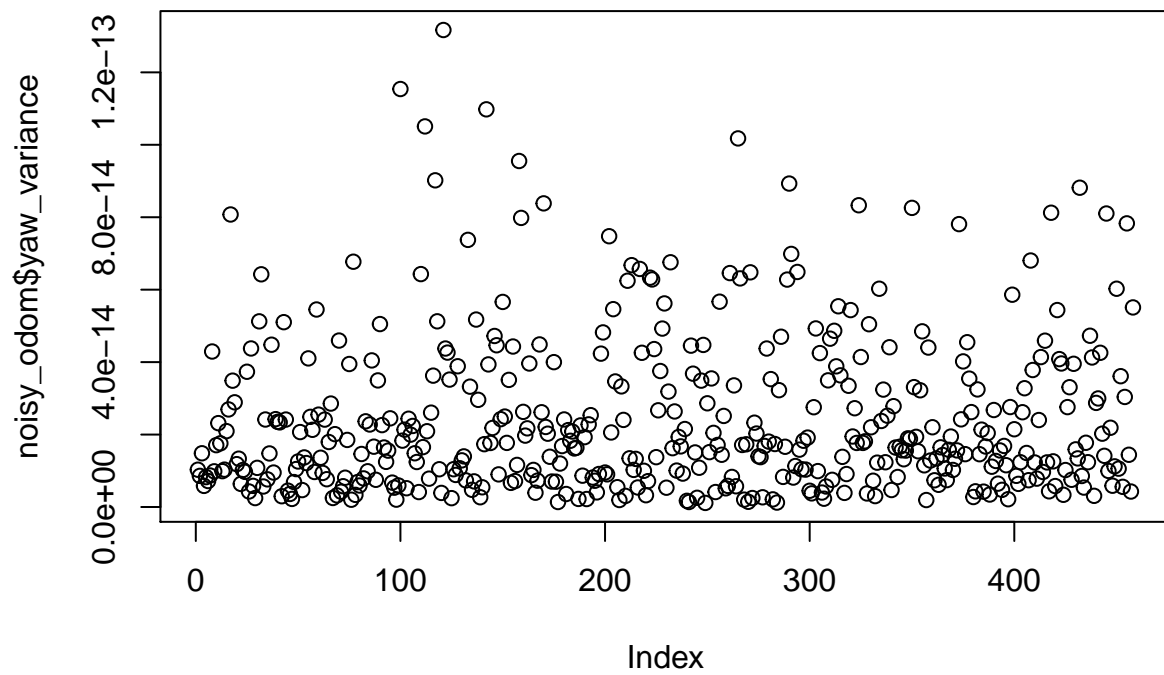
**Variance of X Coordinate in Noisy Odometry**



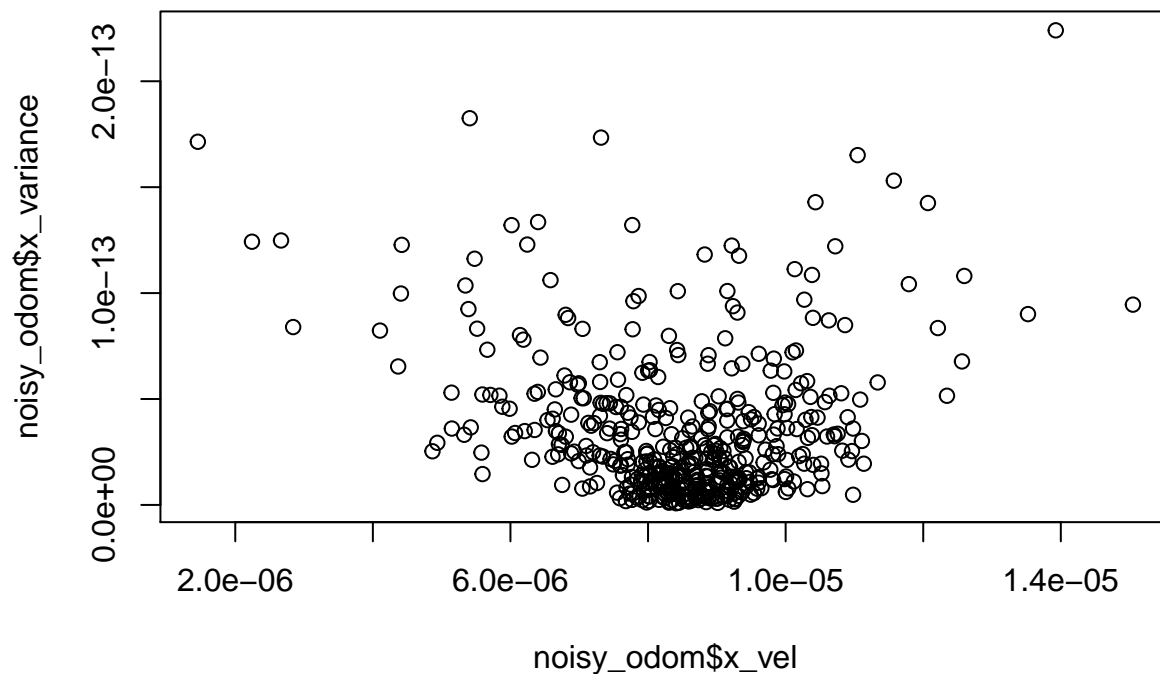
**Variance of Y Coordinate in Noisy Odometry**



**Variance of Yaw Coordinate in Noisy Odometry**



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



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

