

# one\_stationary\_no\_gps Turtlebot 1 Report

*Matthew Swartwout*

*August 10, 2016*

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

The runtime of this experiment was 0 hours, 0 minutes, and 48.8 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.
## 1.555e-05 1.388e-04 2.644e-04 2.637e-04 3.882e-04 5.116e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.115e-10 1.473e-08 4.040e-08 4.798e-08 7.880e-08 1.235e-07
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 5.092e-05 1.525e-04 2.836e-04 2.477e-04 3.351e-04 4.155e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.555e-05 1.388e-04 2.644e-04 2.637e-04 3.882e-04 5.116e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.555e-05 1.388e-04 2.644e-04 2.637e-04 3.882e-04 5.116e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.115e-10 1.473e-08 4.040e-08 4.798e-08 7.881e-08 1.235e-07
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 5.092e-05 1.525e-04 2.836e-04 2.477e-04 3.351e-04 4.155e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.555e-05 1.388e-04 2.644e-04 2.637e-04 3.882e-04 5.116e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -2.886e-05 -2.790e-05 -2.710e-05 -2.692e-05 -2.596e-05 -2.474e-05
```

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

```
##      Min.    1st Qu.      Median        Mean     3rd Qu.        Max.
## -7.582e-09 -1.775e-09  4.050e-09  3.792e-09  9.560e-09  1.497e-08
```

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

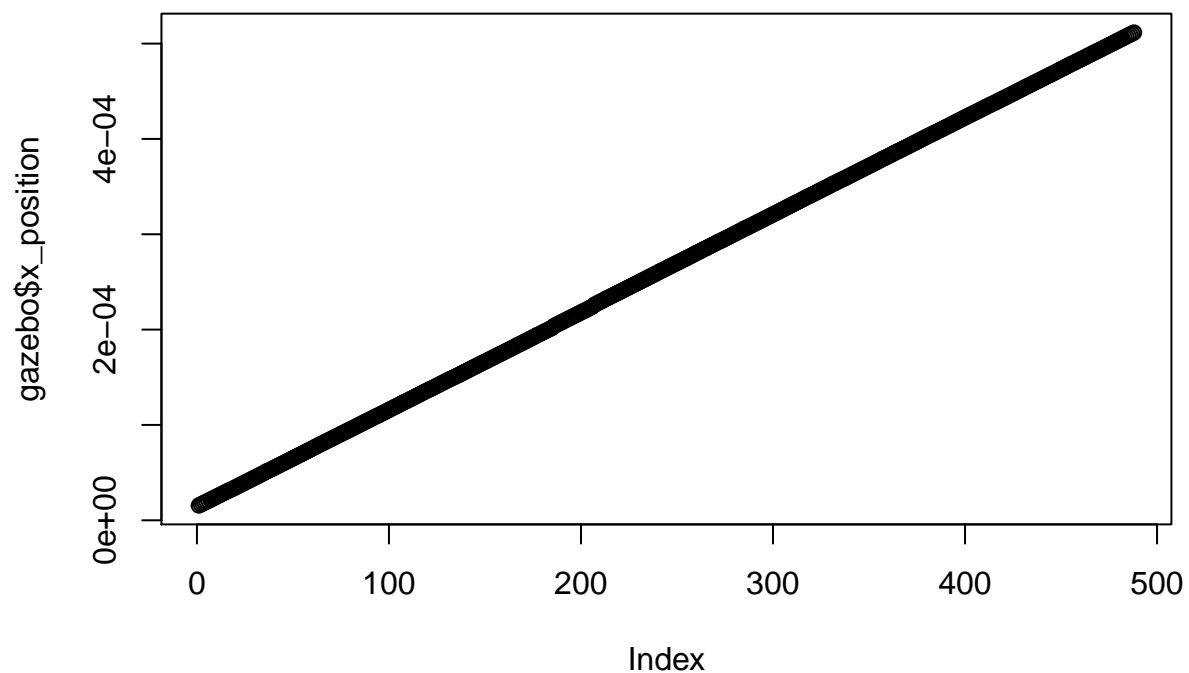
```
##      Min.    1st Qu.      Median        Mean     3rd Qu.        Max.
## 2.474e-05 2.596e-05 2.710e-05 2.692e-05 2.790e-05 2.886e-05
```

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

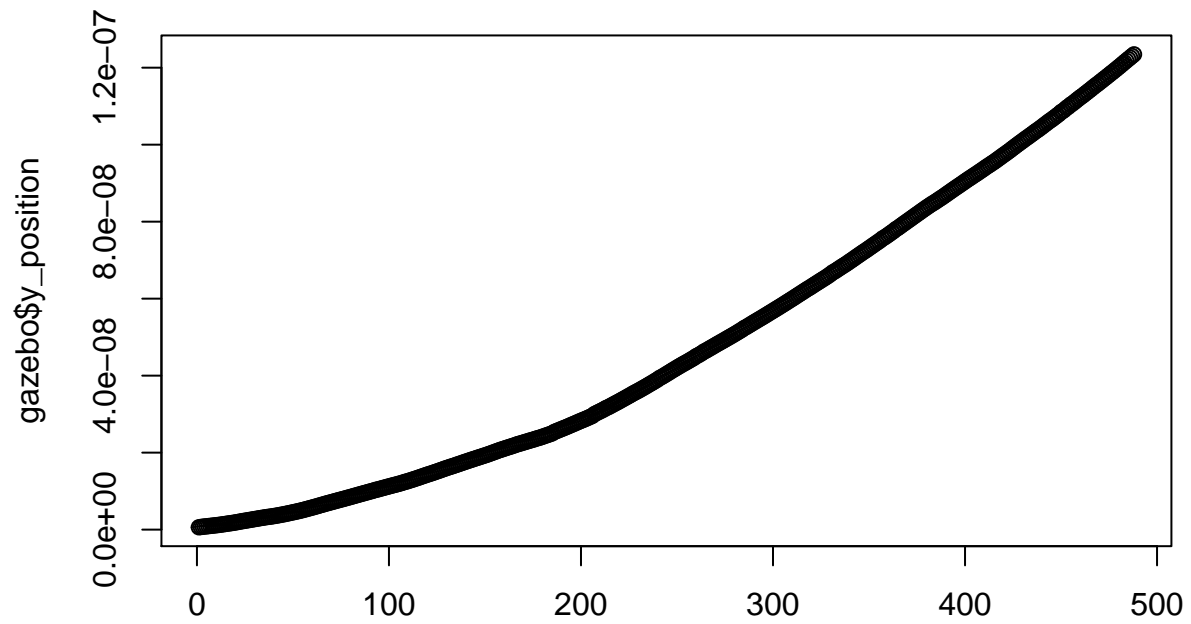
if (NROW(noisy_odom) > 0) {
  summary(noisy_odom$x_variance)
  summary(noisy_odom$y_variance)
  summary(noisy_odom$yaw_variance)
}
```

```
##      Min.    1st Qu.      Median        Mean     3rd Qu.        Max.
## 1.077e-15 8.910e-15 1.898e-14 2.386e-14 3.229e-14 1.299e-13
```

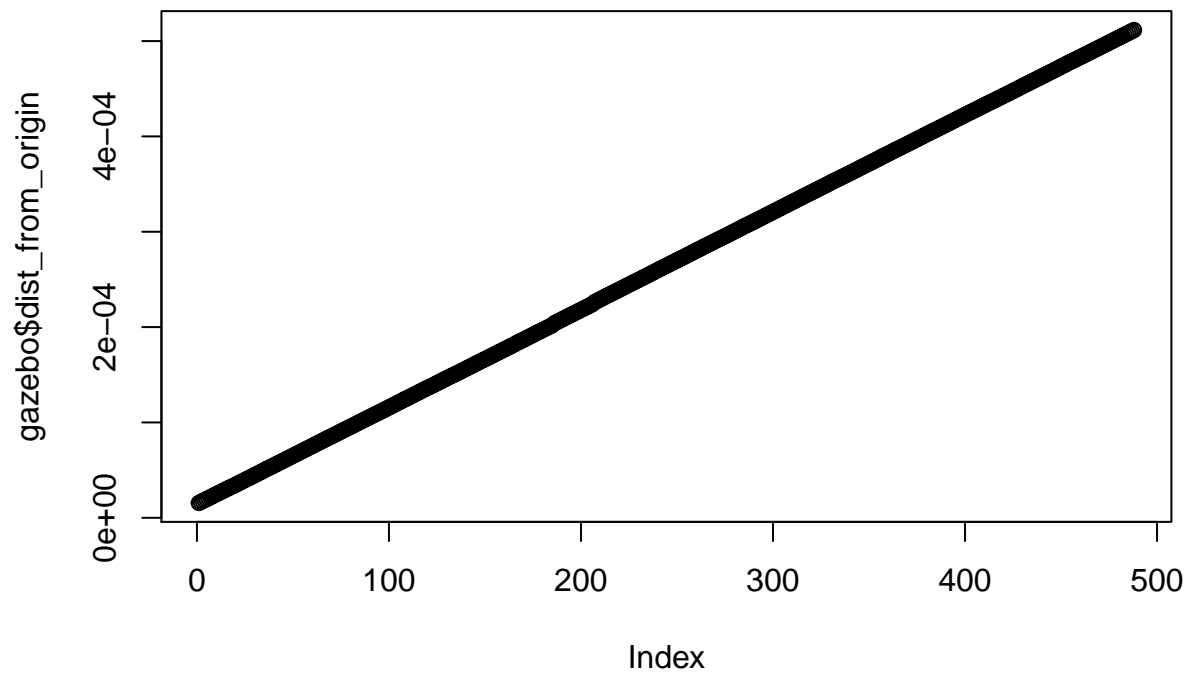
### X coordinate of robot over time



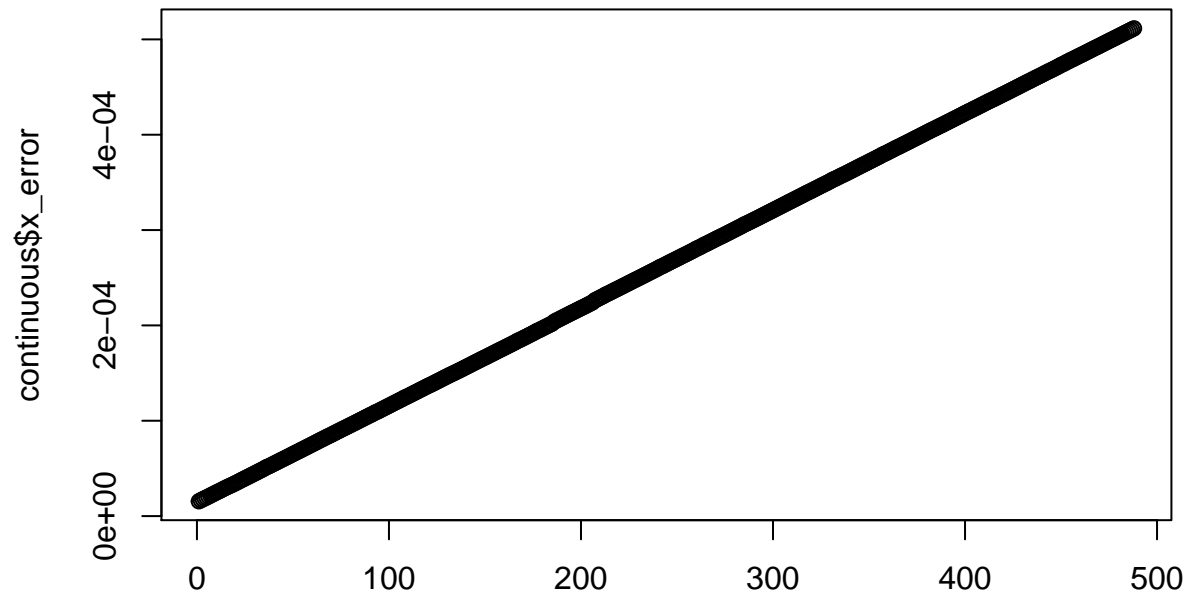
**Y coordinate of robot over time**



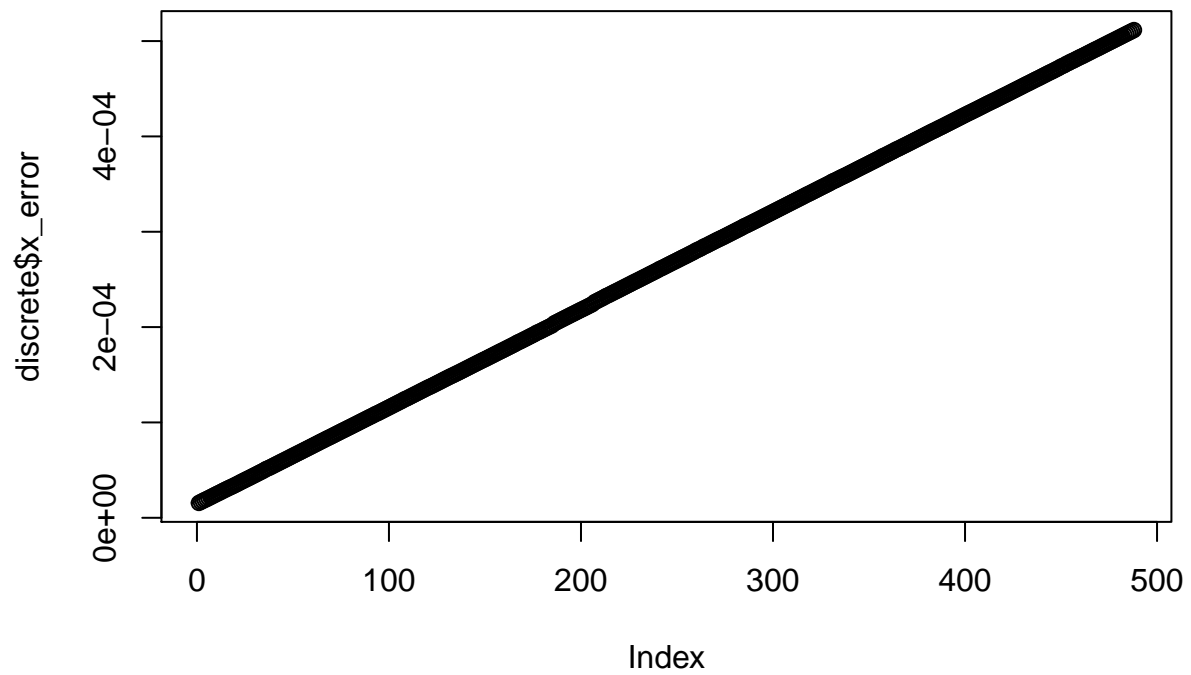
**Distance from origin vs. time**



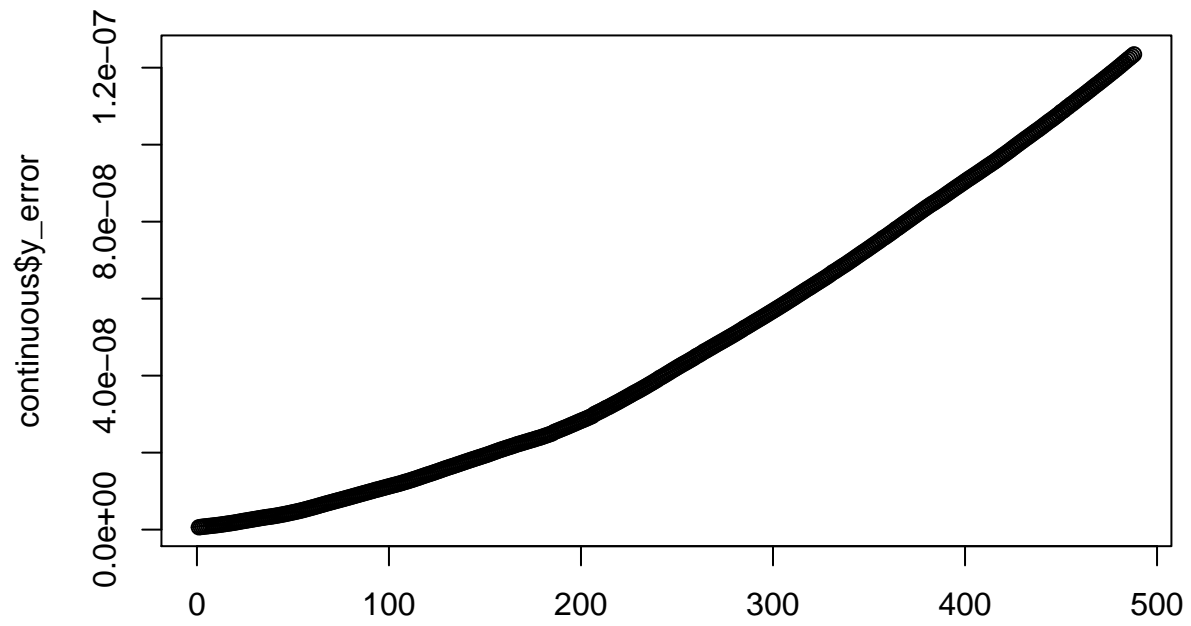
**Continuous x\_error over time**



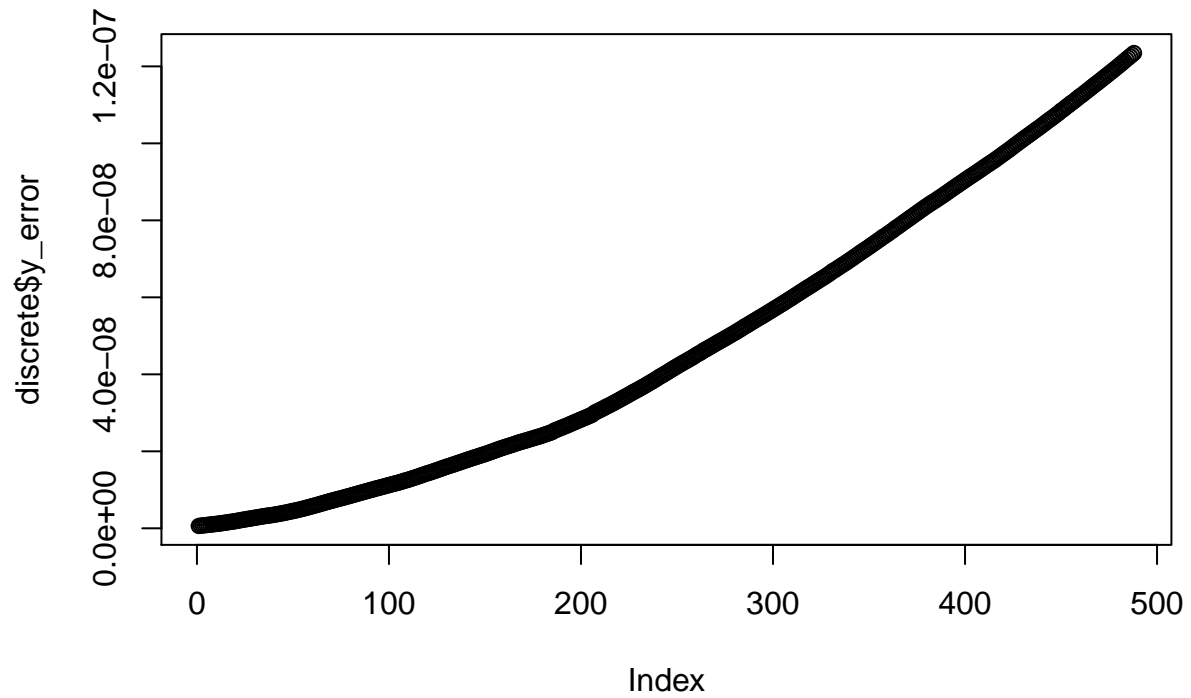
**Discrete x\_error over time**



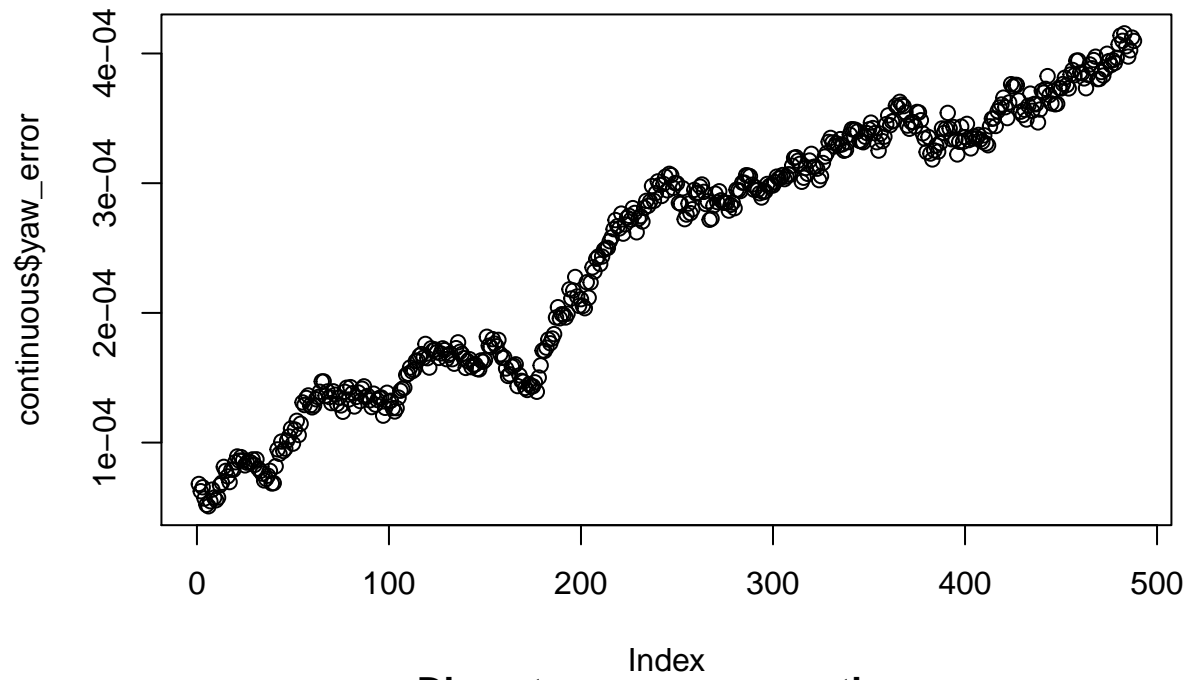
**Continuous y\_error over time**



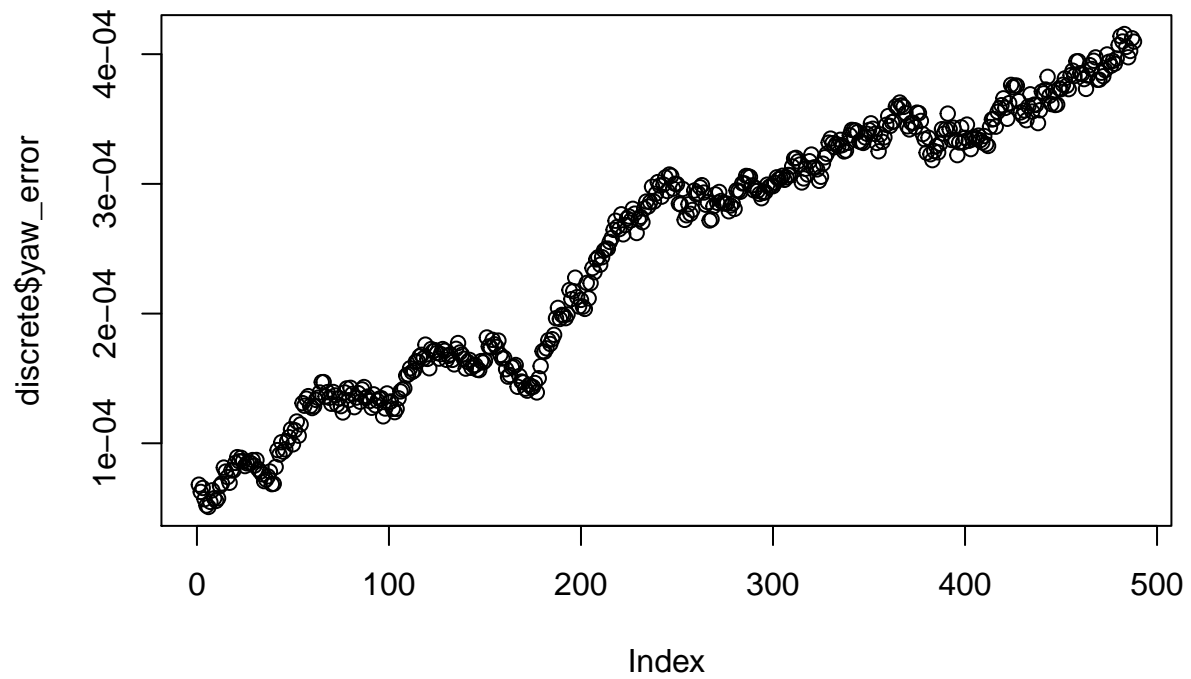
**Discrete y\_error over time**



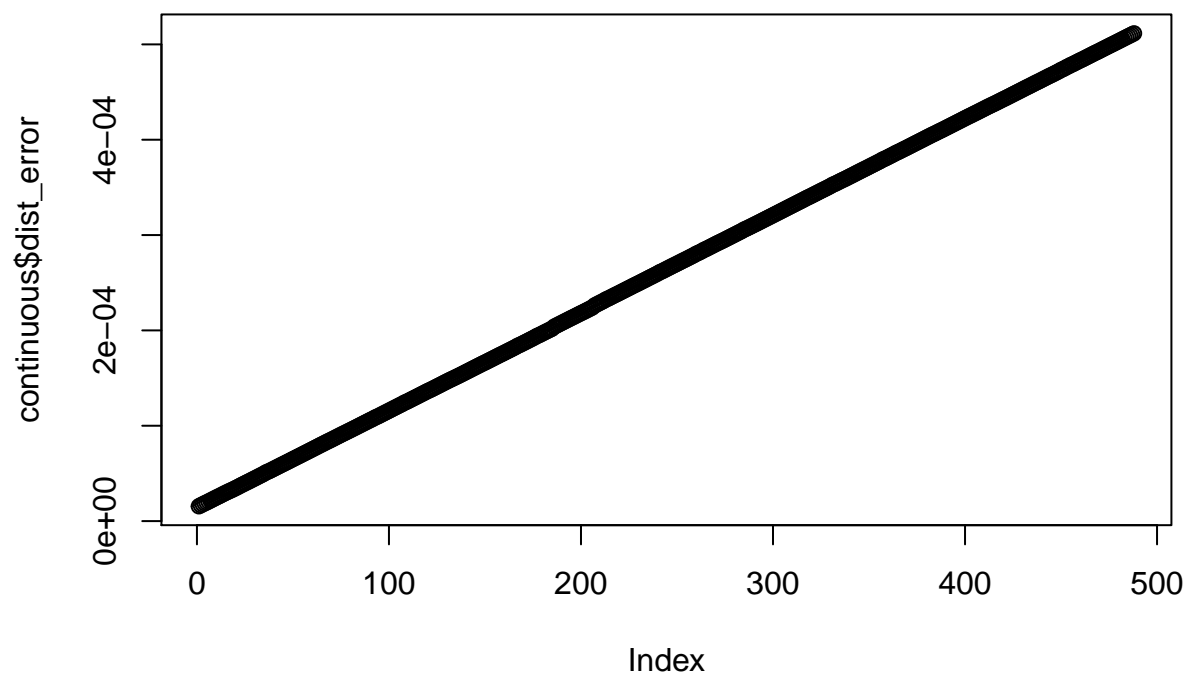
**Continuous yaw error over time**



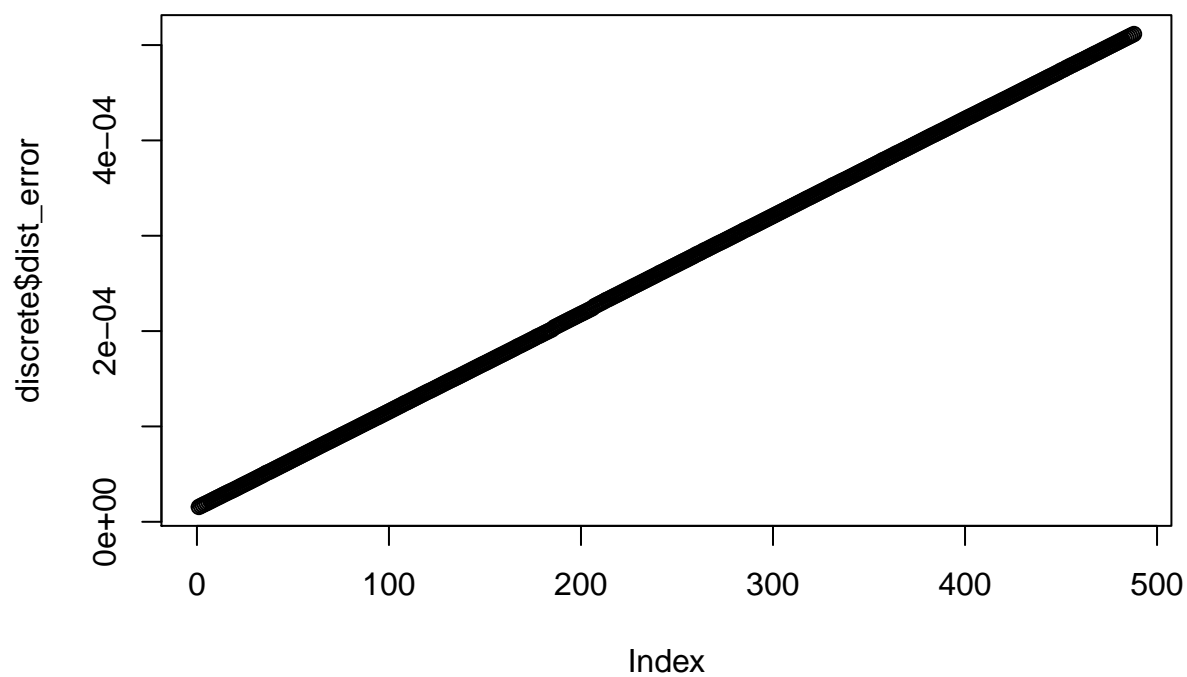
**Discrete yaw error over time**



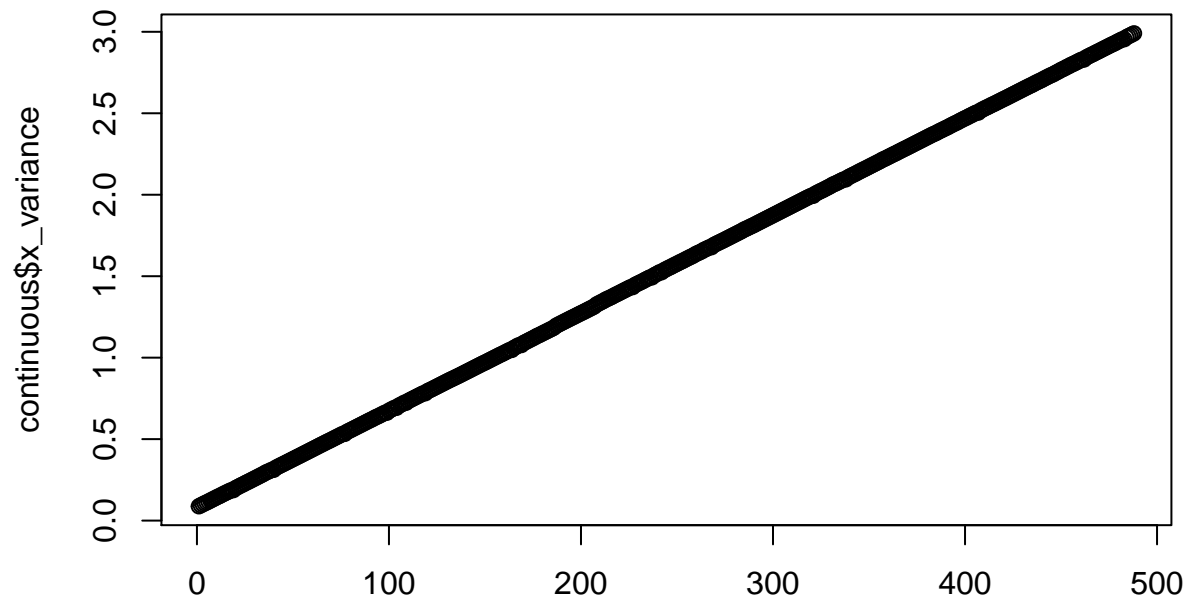
**Continuous total distance error over time**



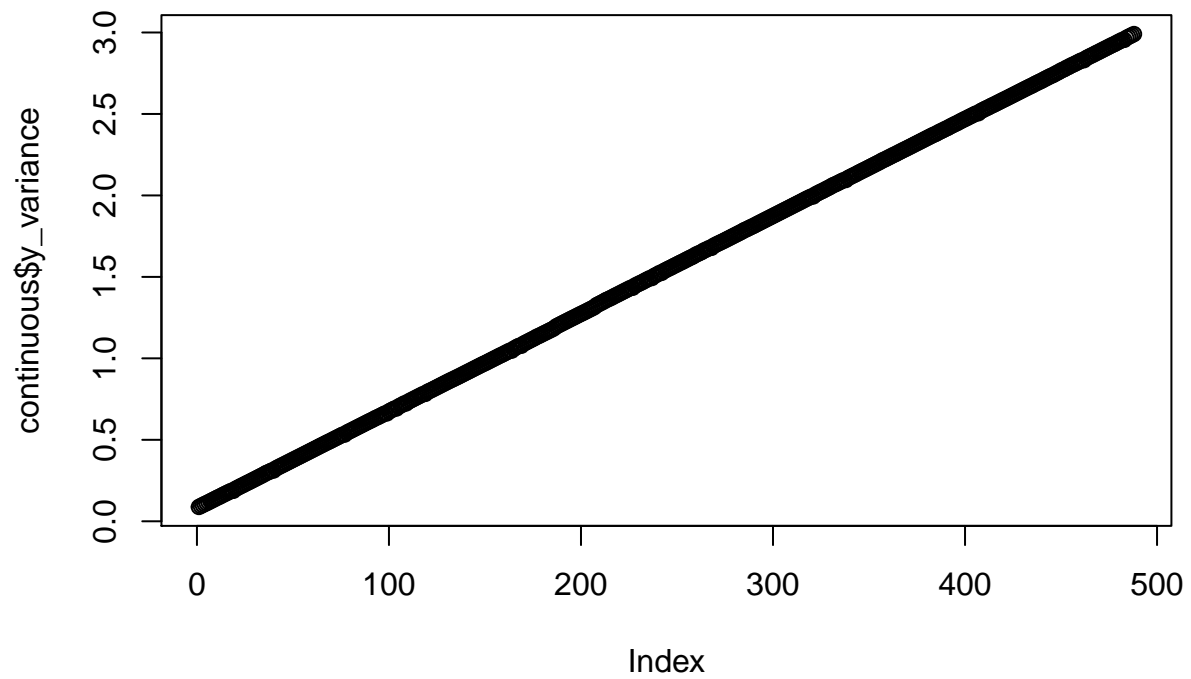
**Discrete total distance error over time**



**Continuous Filter X Variance Over Time**

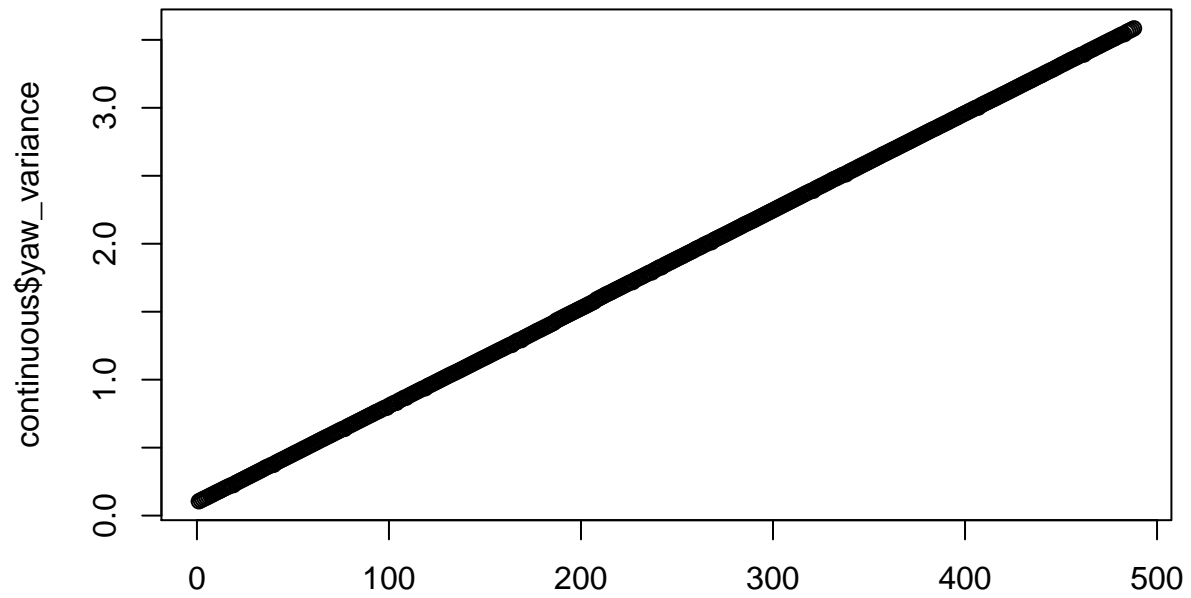


**Continuous Filter Y Variance Over Time**

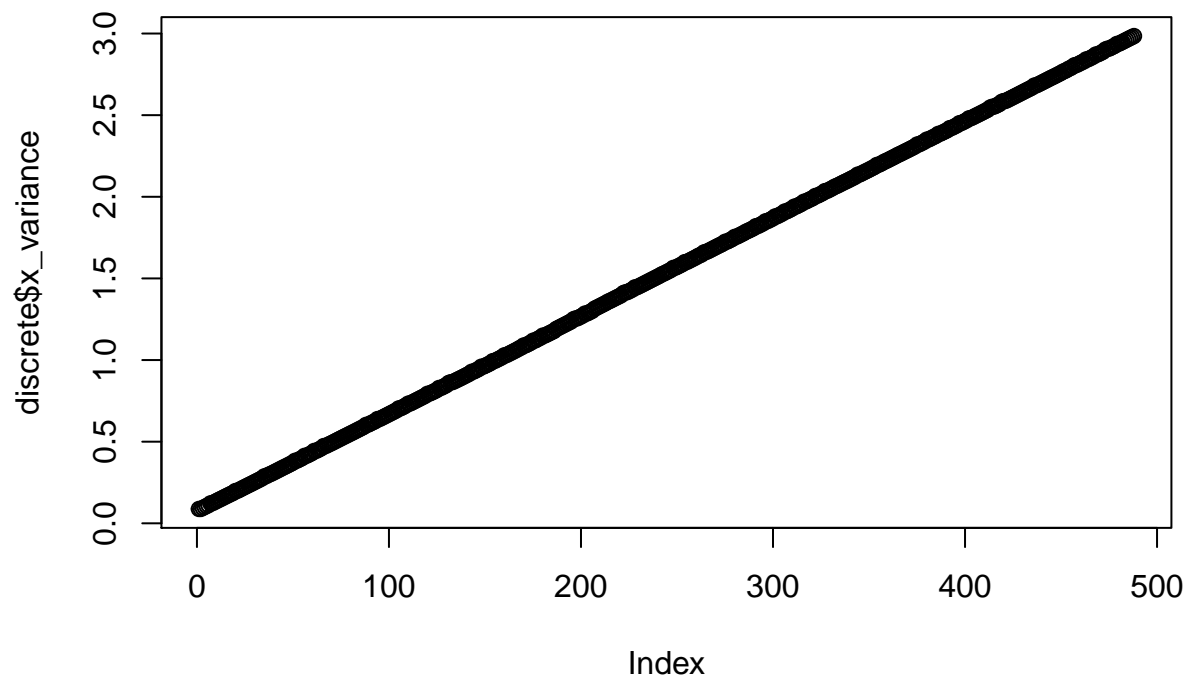




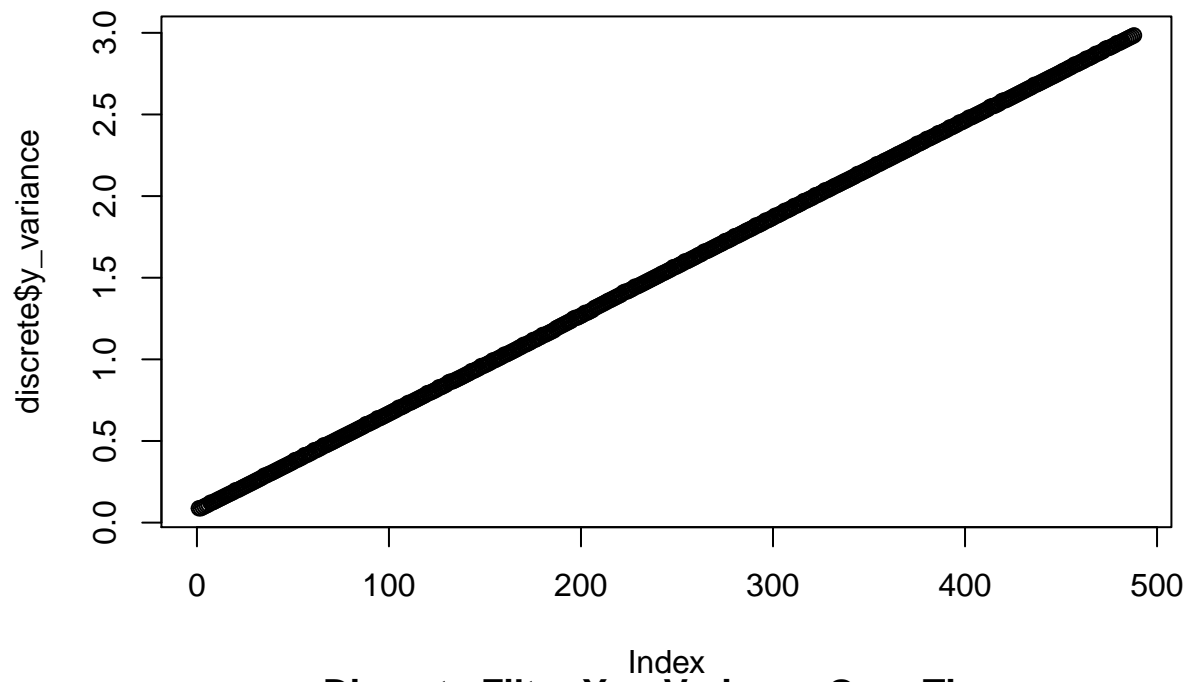
**Continuous Filter Yaw Variance Over Time**



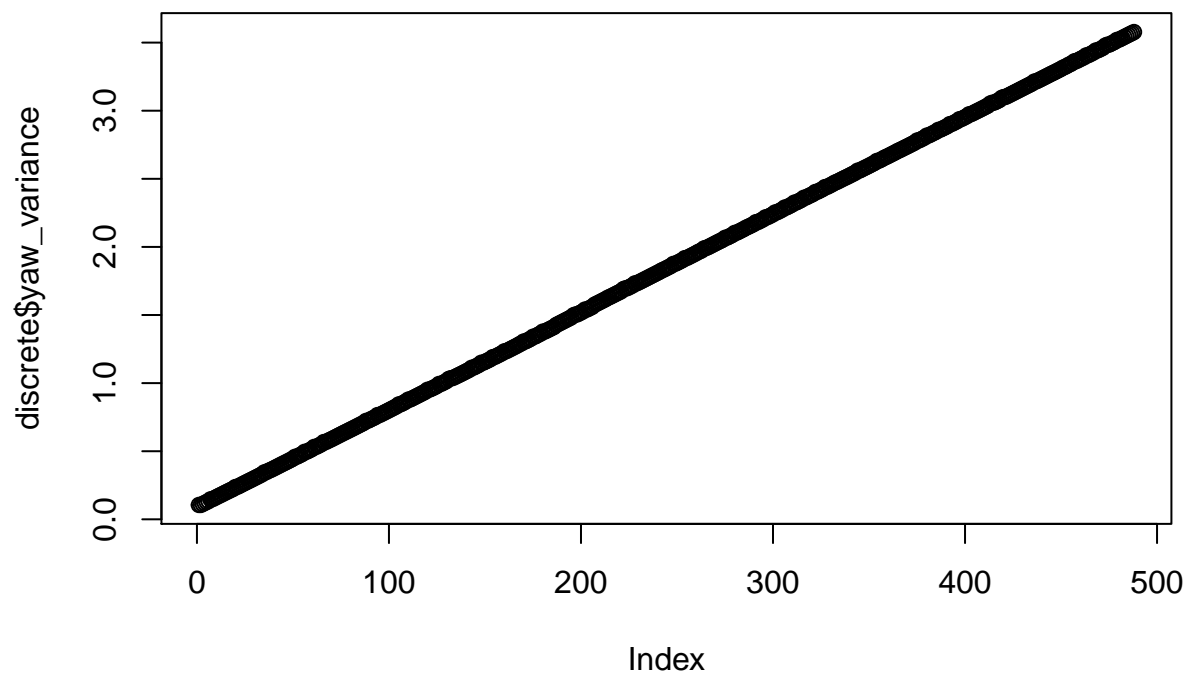
**Discrete Filter X Variance Over Time**



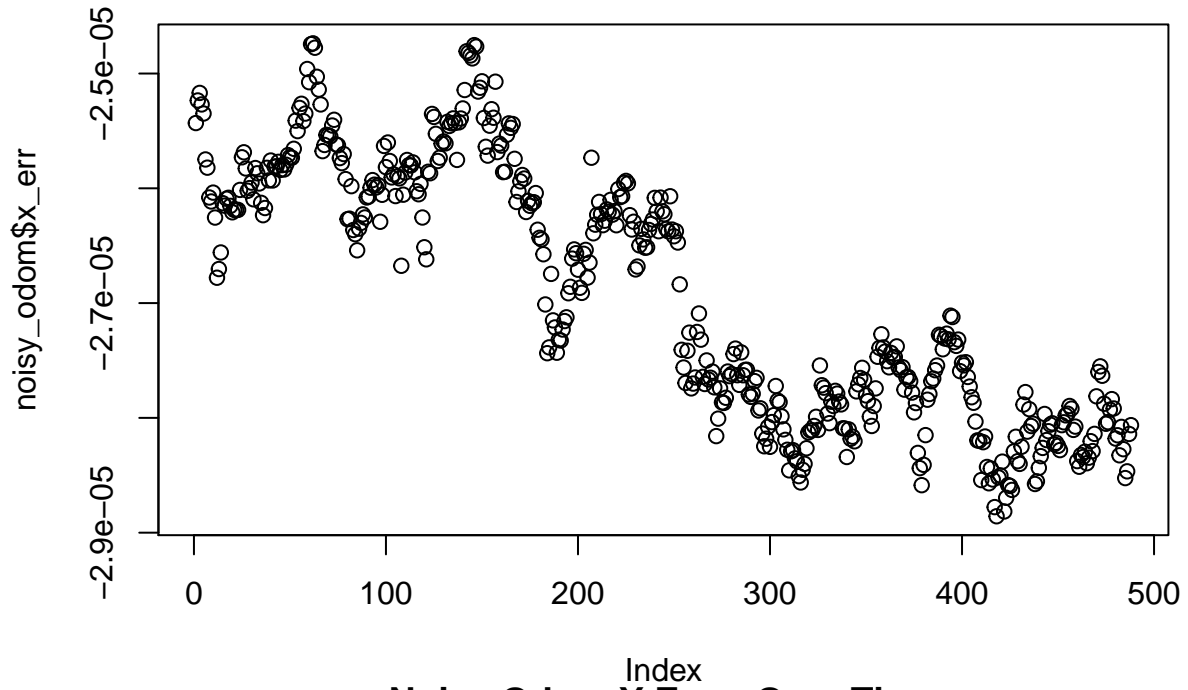
**Discrete Filter Y Variance Over Time**



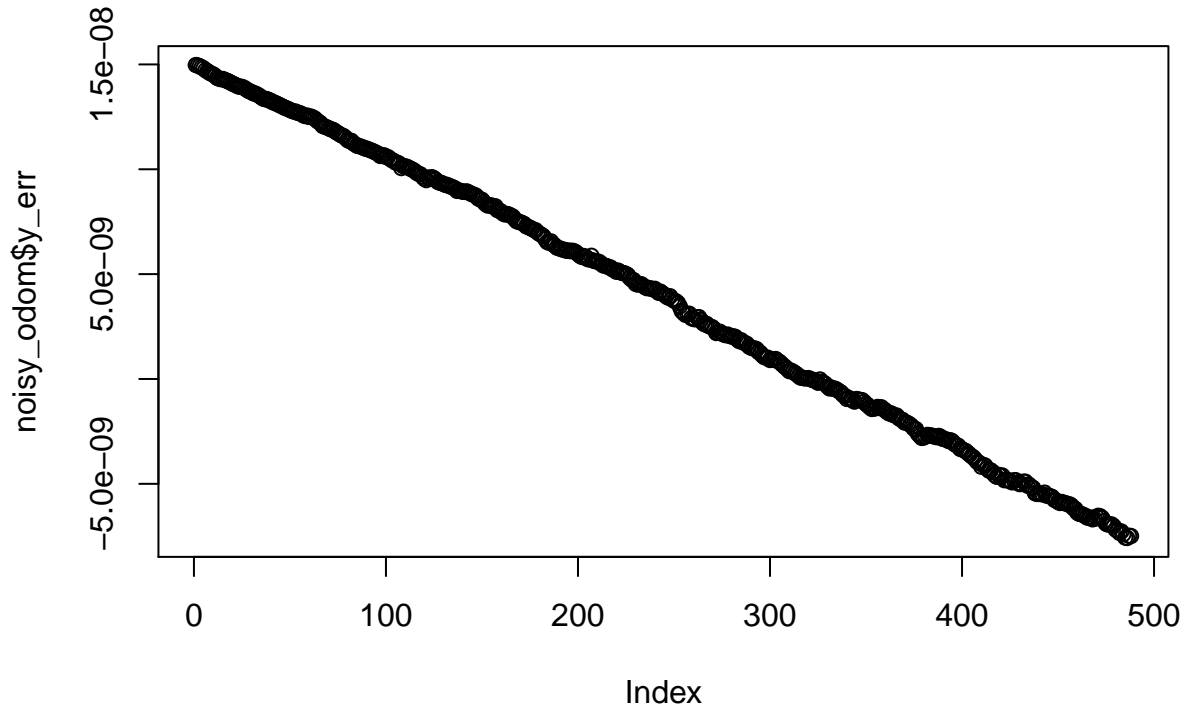
**Discrete Filter Yaw Variance Over Time**

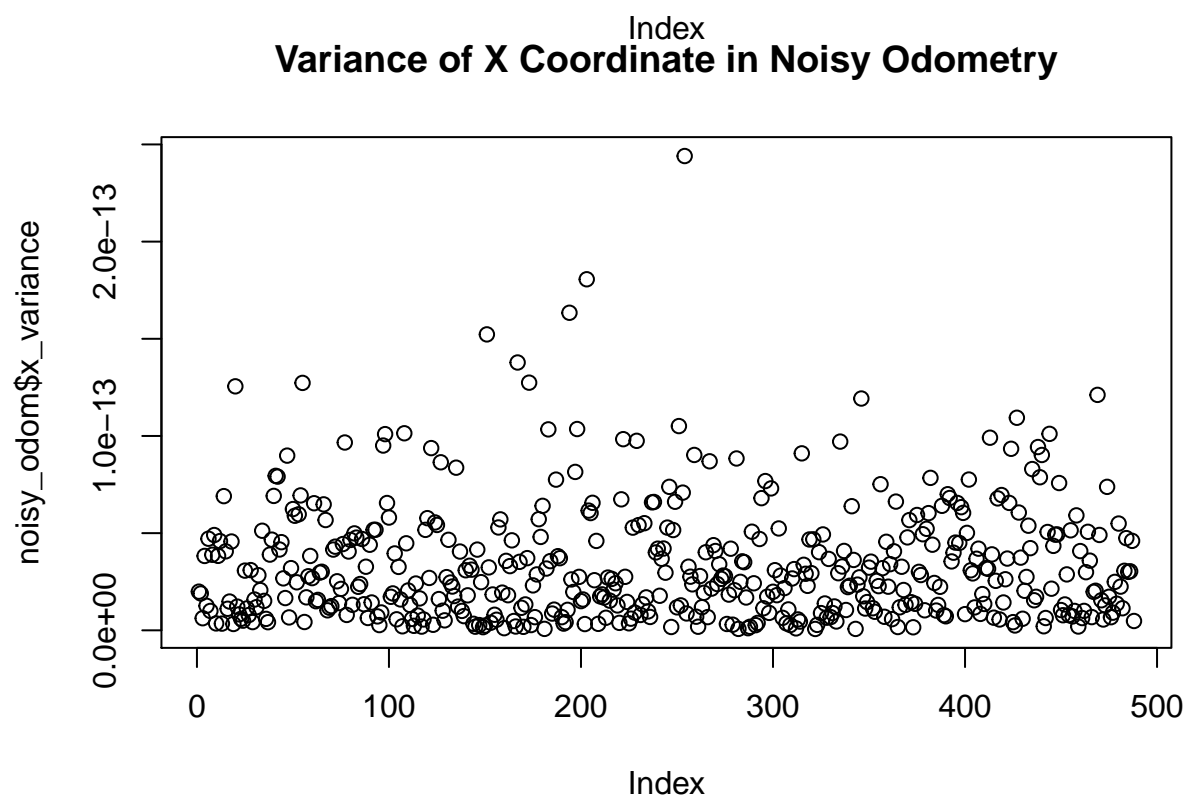
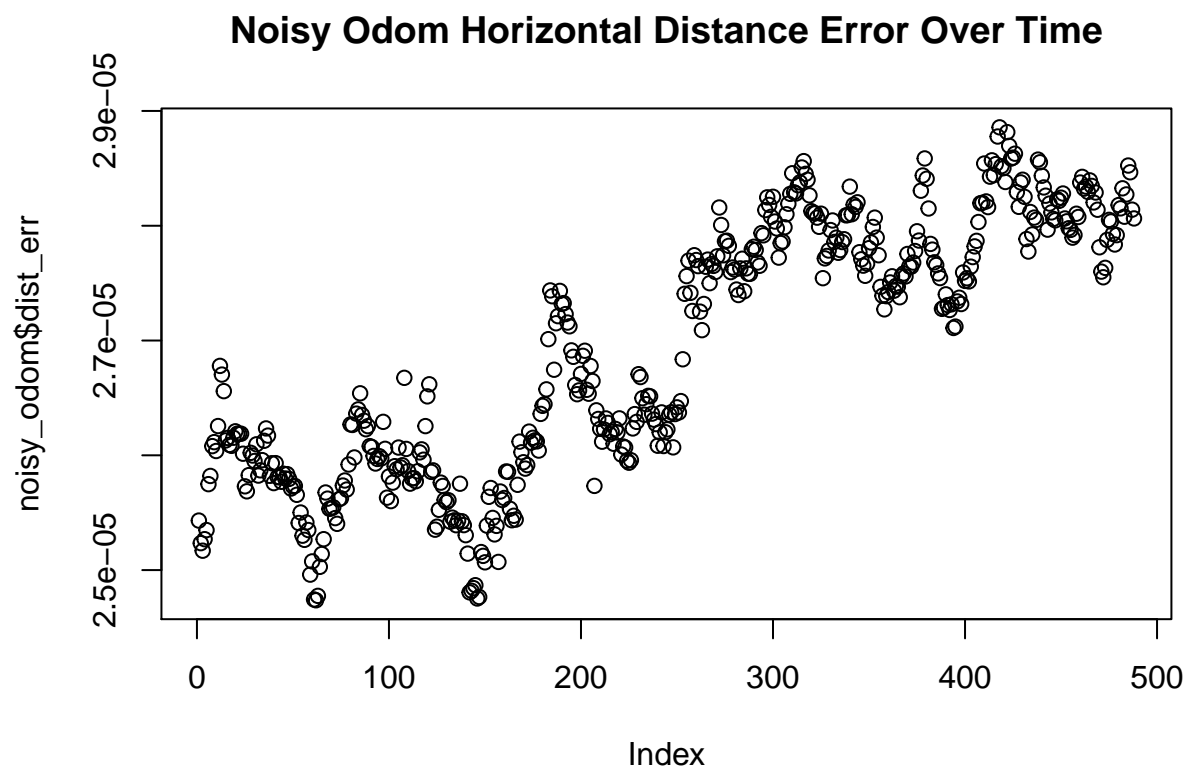


**Noisy Odom X Error Over Time**

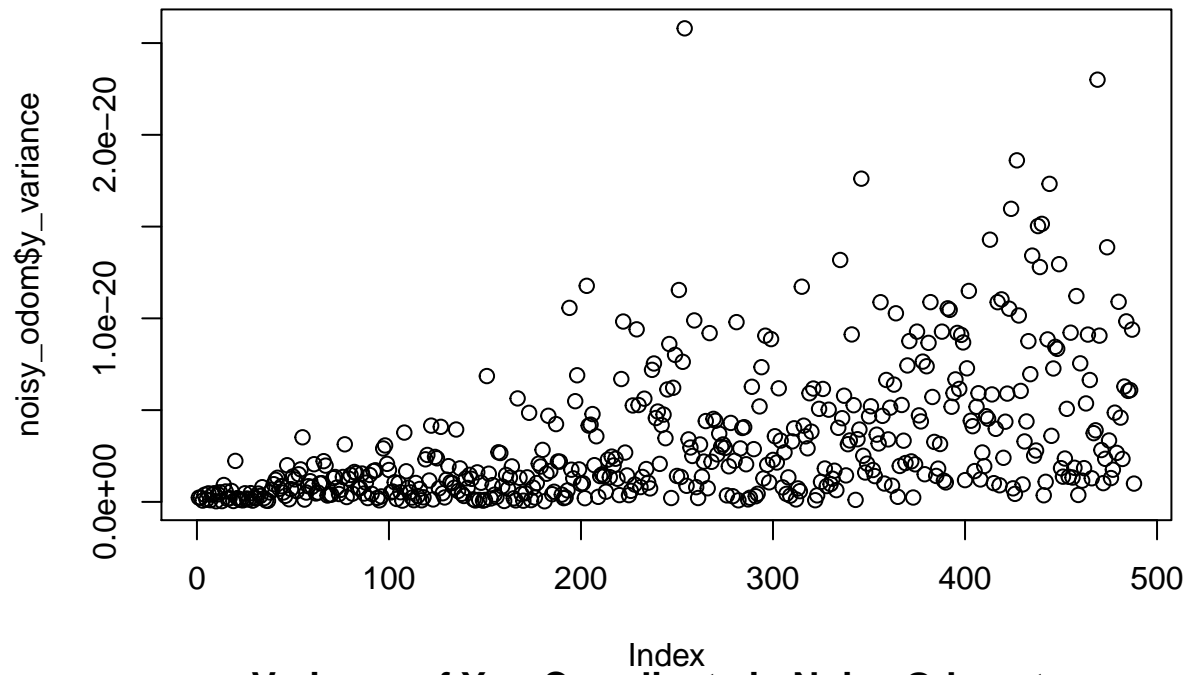


**Noisy Odom Y Error Over Time**

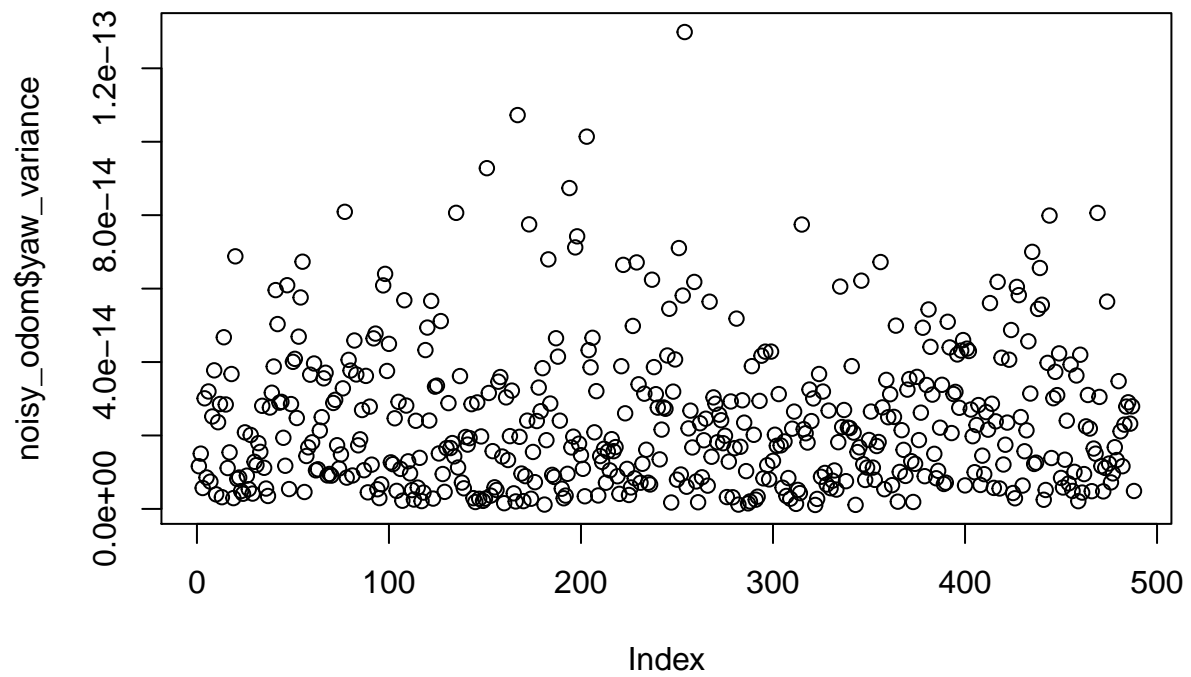




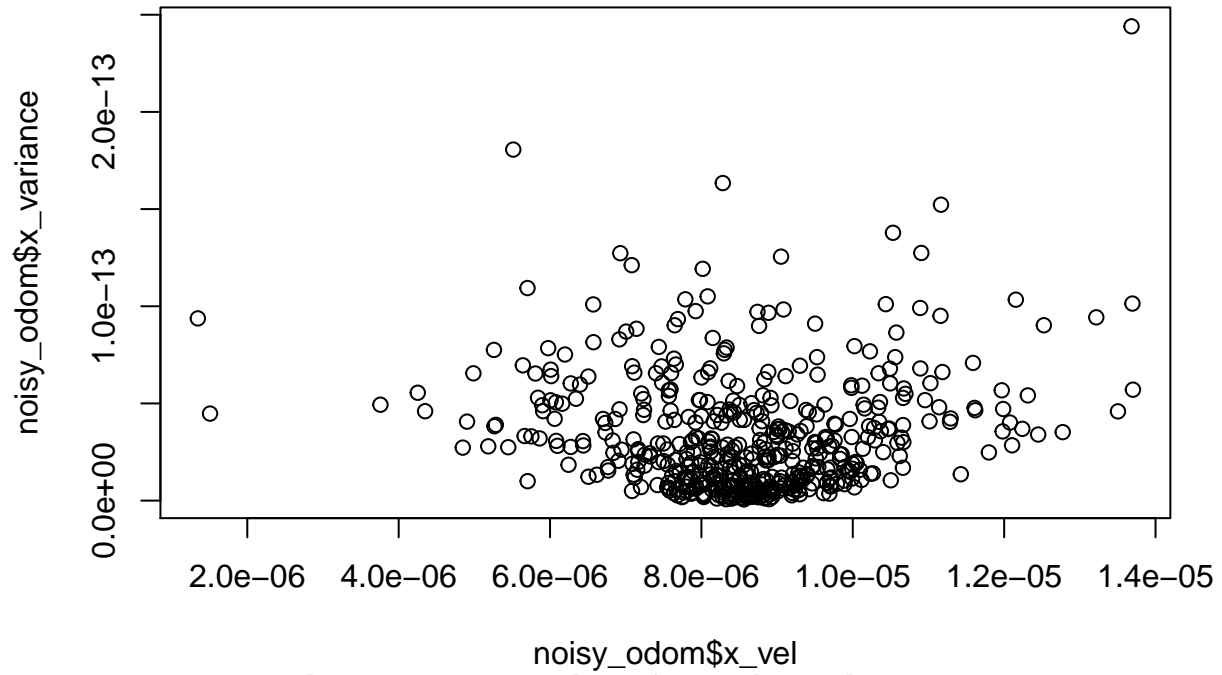
**Variance of Y Coordinate in Noisy Odometry**



**Variance of Yaw Coordinate in Noisy Odometry**



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



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

