

# two\_stationary\_no\_gps Turtlebot 1 Report

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*August 15, 2016*

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

The runtime of this experiment was 0 hours, 0 minutes, and 49.7 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.
## 1.416e-05 1.413e-04 2.688e-04 2.668e-04 3.928e-04 5.157e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.908e-10 1.336e-08 3.434e-08 3.827e-08 5.854e-08 9.770e-08
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.995e-05 1.273e-04 1.796e-04 1.946e-04 2.459e-04 3.857e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.416e-05 1.413e-04 2.688e-04 2.668e-04 3.928e-04 5.157e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.416e-05 1.413e-04 2.688e-04 2.668e-04 3.928e-04 5.157e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.908e-10 1.336e-08 3.434e-08 3.827e-08 5.854e-08 9.770e-08
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 6.995e-05 1.273e-04 1.796e-04 1.946e-04 2.459e-04 3.857e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 1.416e-05 1.413e-04 2.688e-04 2.668e-04 3.928e-04 5.157e-04
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 9.790e-06 1.249e-05 1.369e-05 1.385e-05 1.564e-05 1.805e-05
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -1.775e-09 -1.196e-09 -8.497e-10 -7.650e-10 -2.750e-10  4.313e-10
```

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

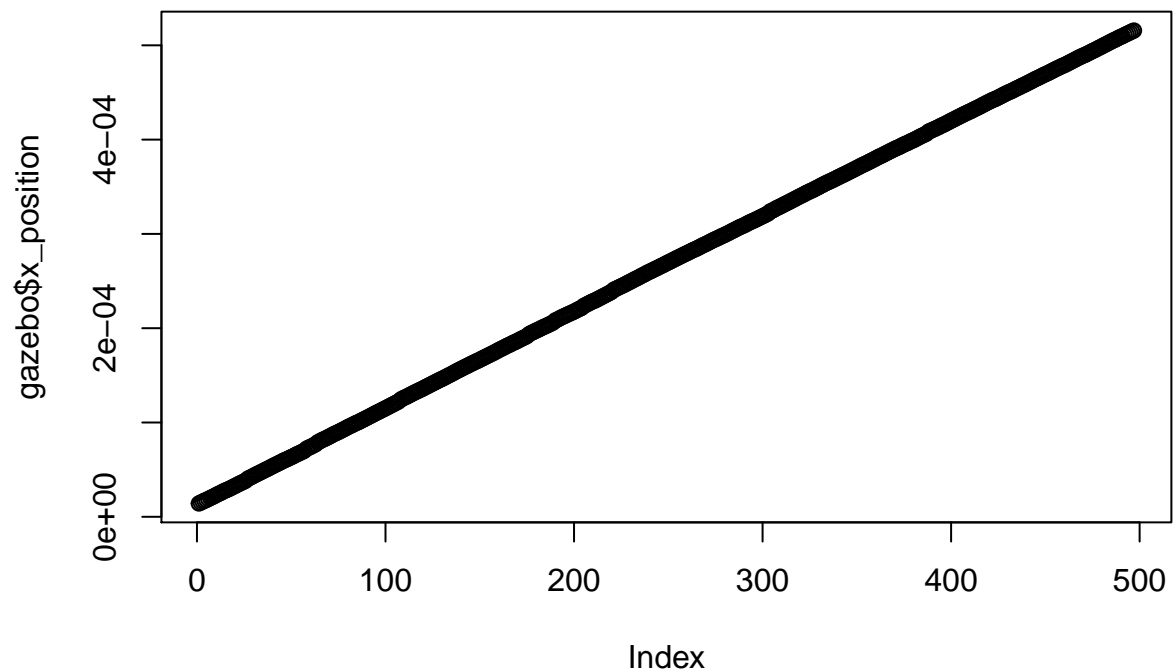
```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## 9.790e-06 1.249e-05 1.369e-05 1.385e-05 1.564e-05 1.805e-05
```

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

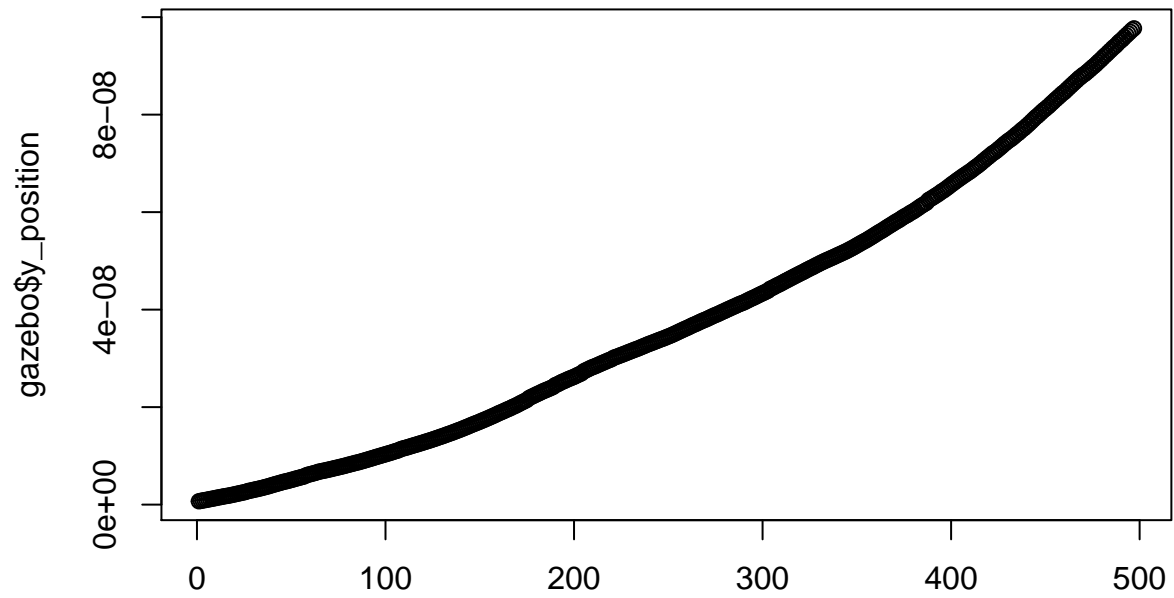
if (NROW(noisy_odom) > 0) {
  summary(noisy_odom$x_variance)
  summary(noisy_odom$y_variance)
  summary(noisy_odom$yaw_variance)
}
```

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## 9.628e-16 8.598e-15 1.681e-14 2.322e-14 3.043e-14 1.615e-13
```

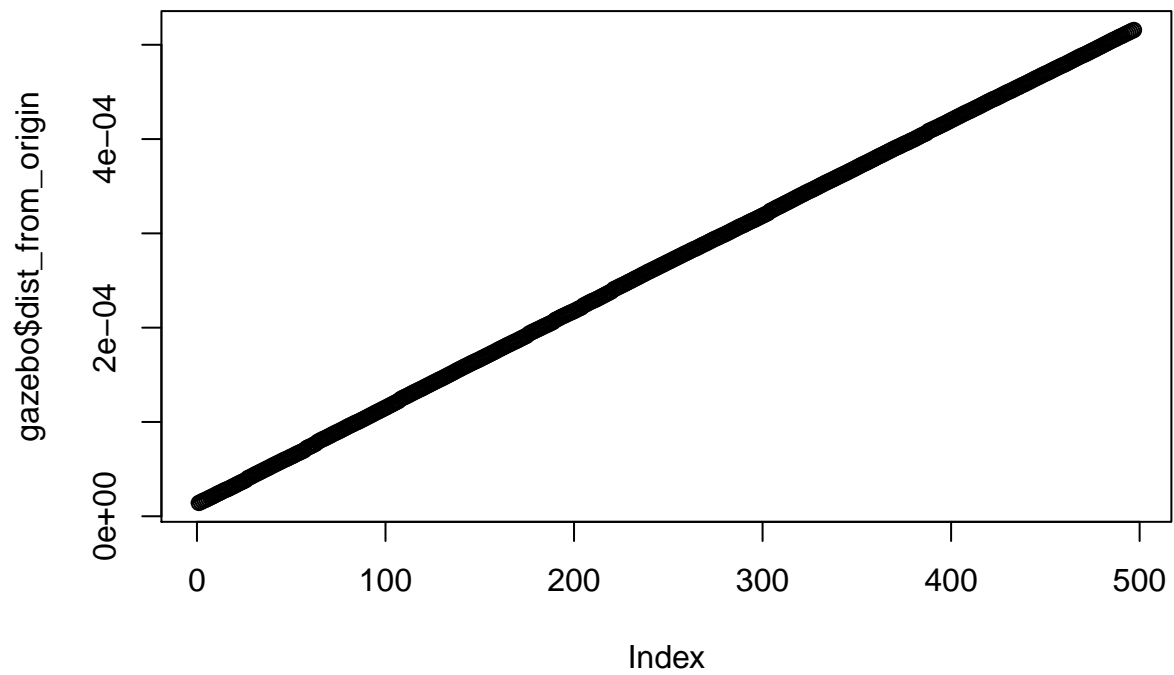
### X coordinate of robot over time



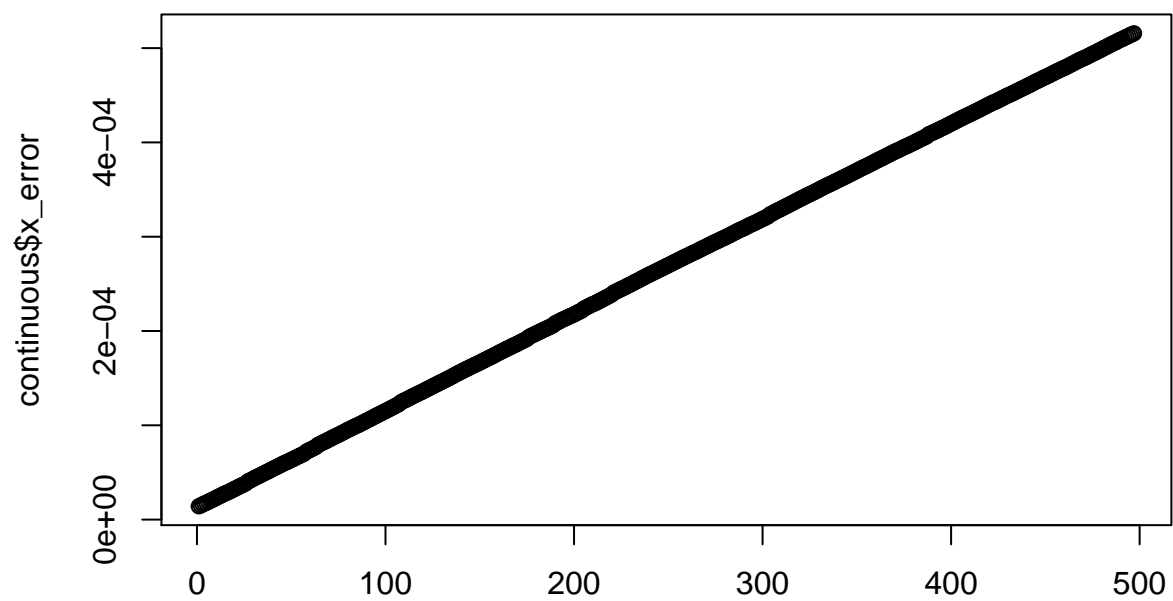
**Y coordinate of robot over time**



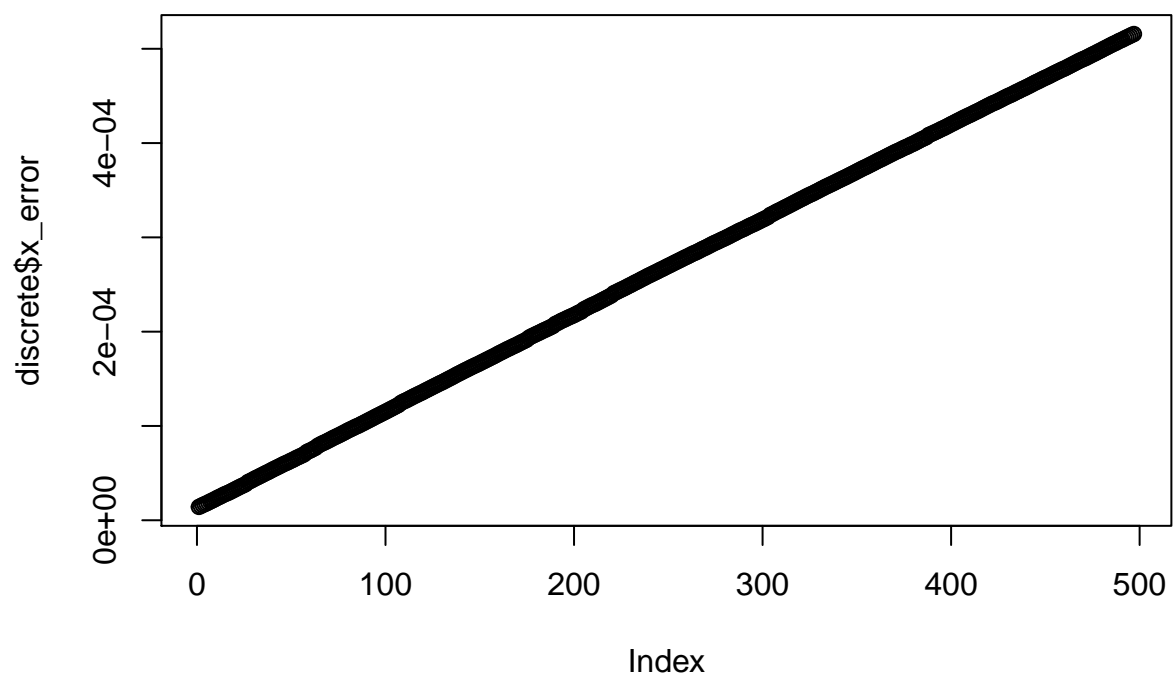
**Distance from origin vs. time**



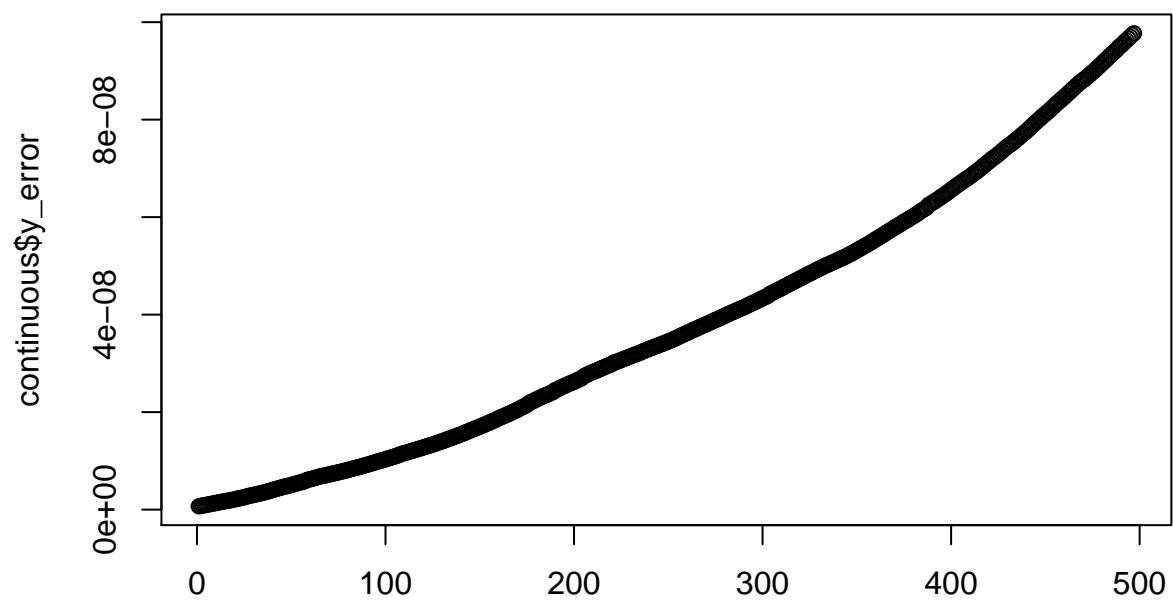
**Continuous x\_error over time**



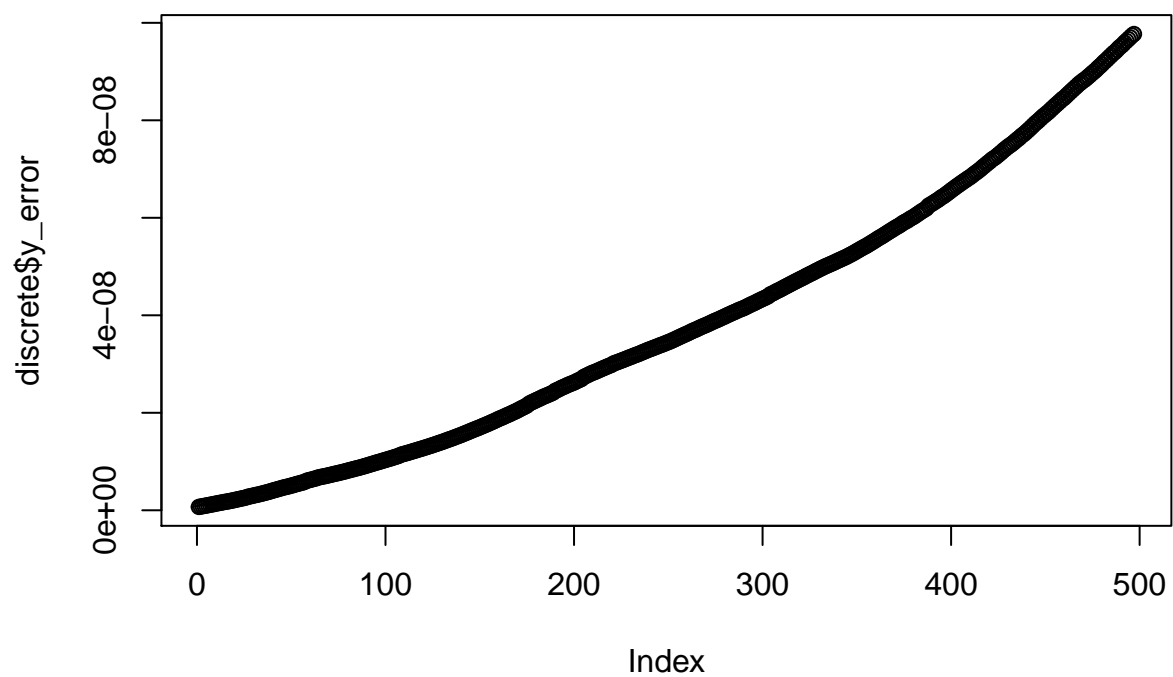
**Discrete x\_error over time**



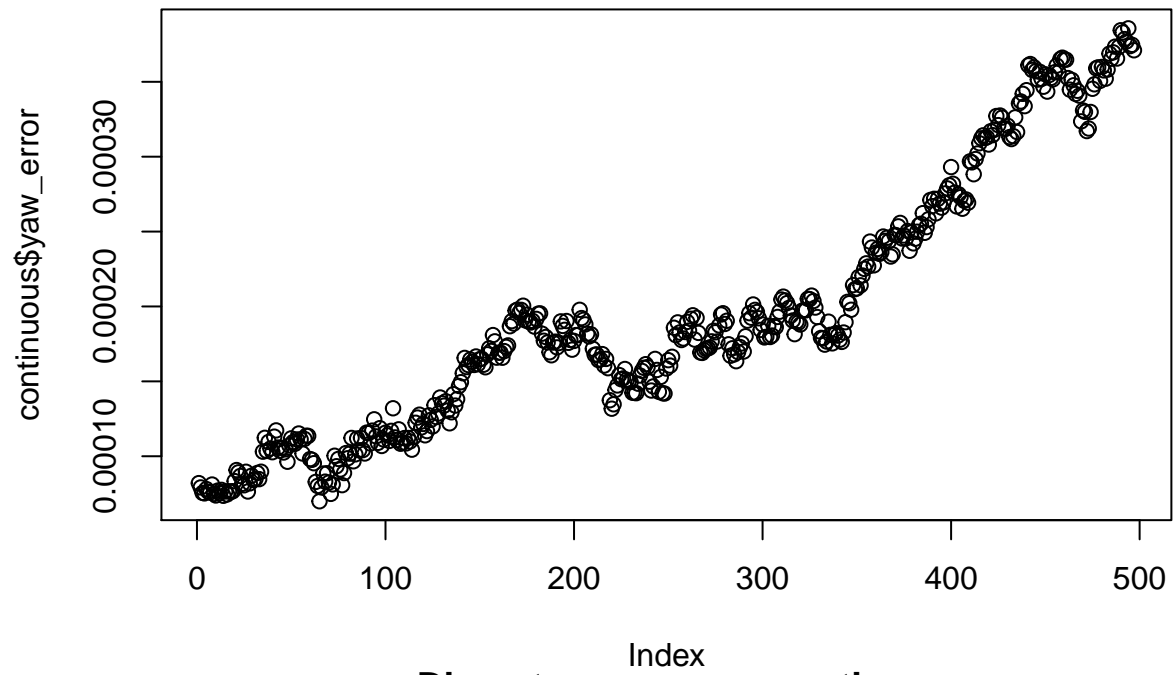
**Continuous y\_error over time**



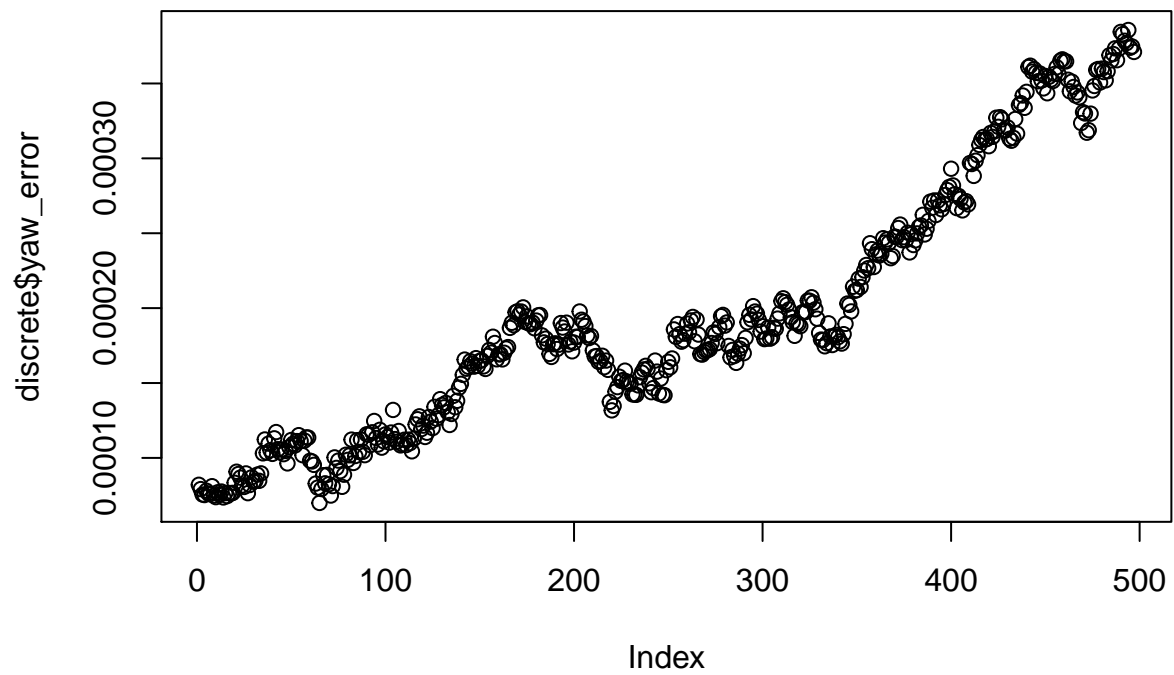
**Discrete y\_error over time**



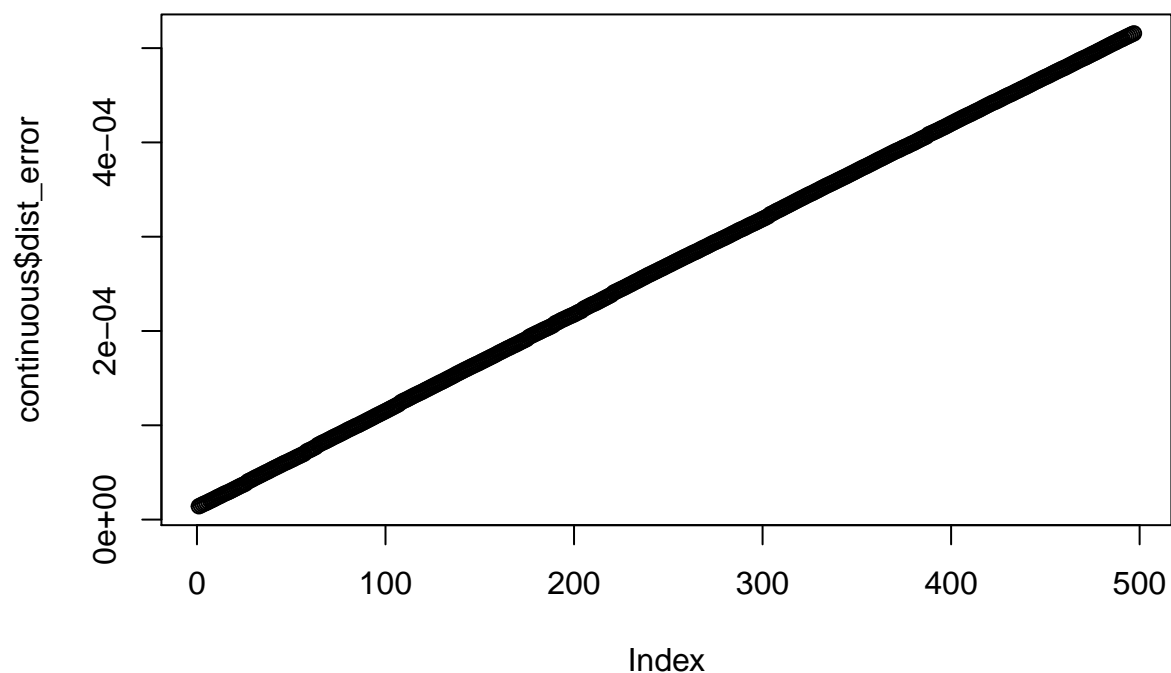
**Continuous yaw error over time**



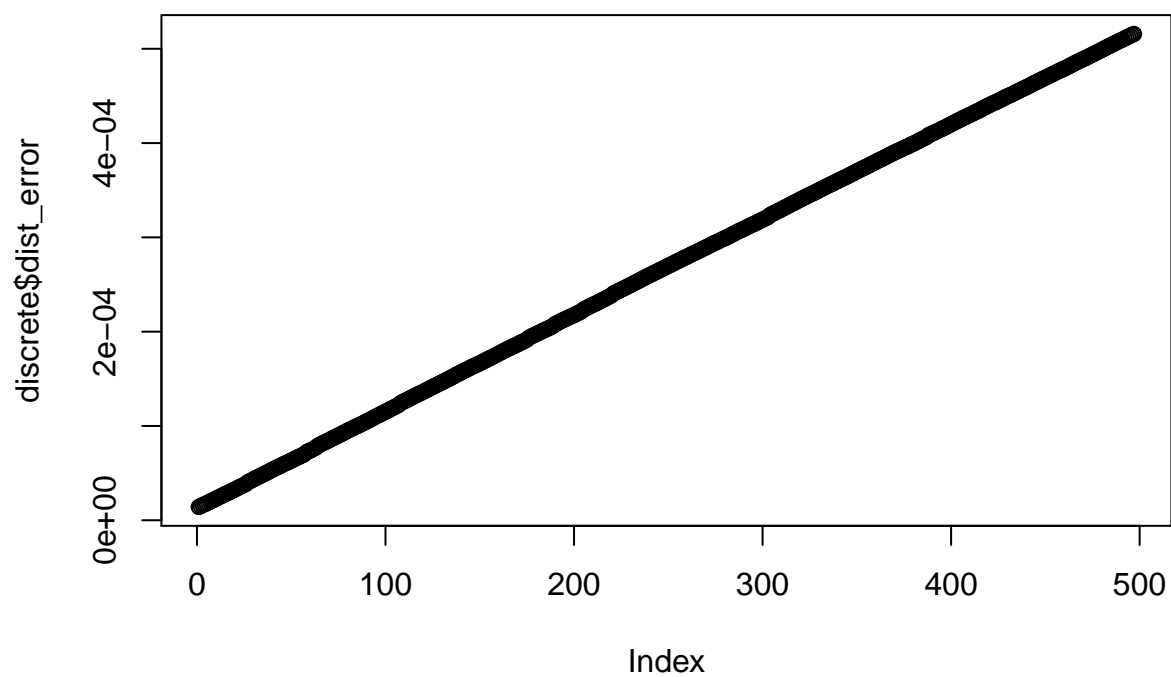
**Discrete yaw error over time**



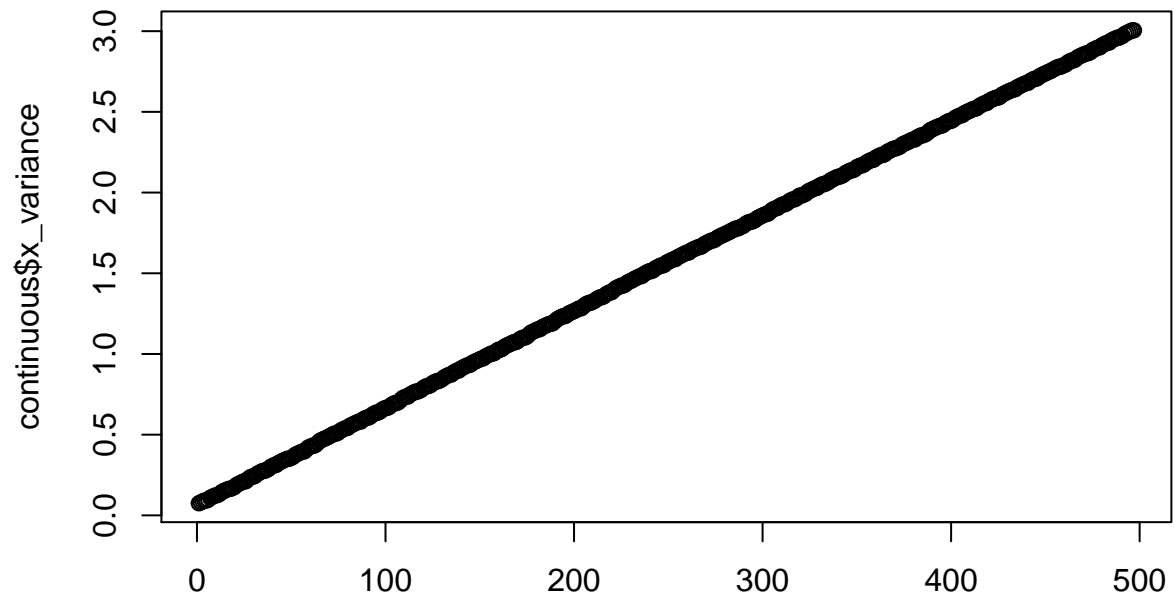
**Continuous total distance error over time**



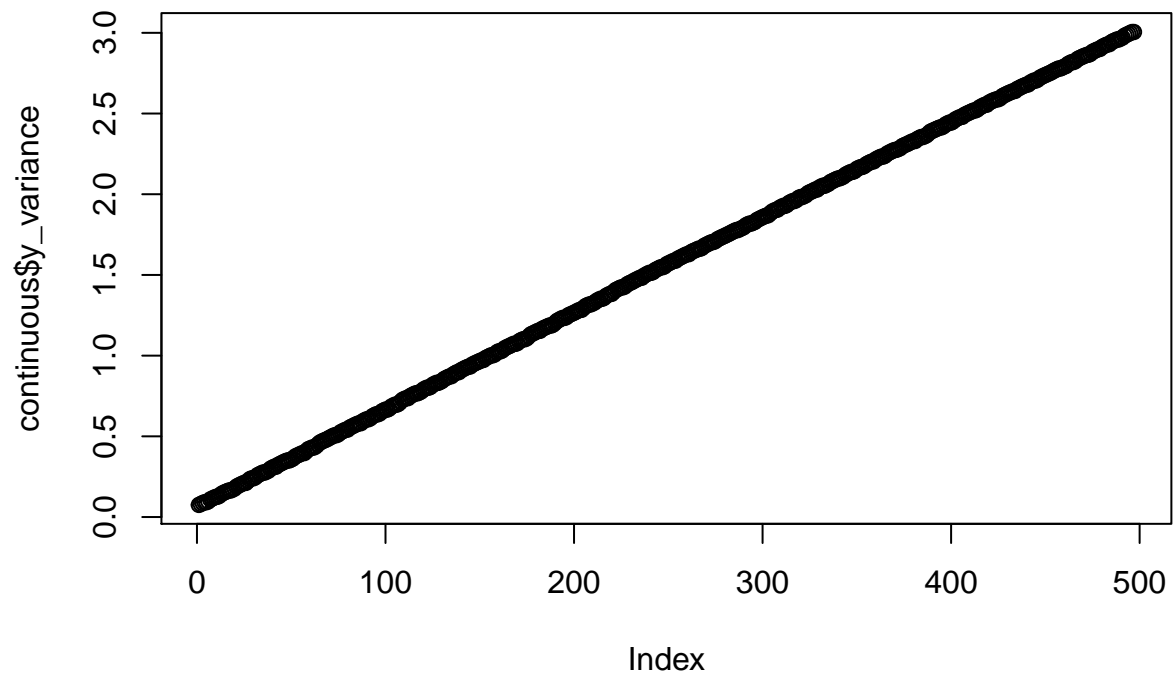
**Discrete total distance error over time**



**Continuous Filter X Variance Over Time**

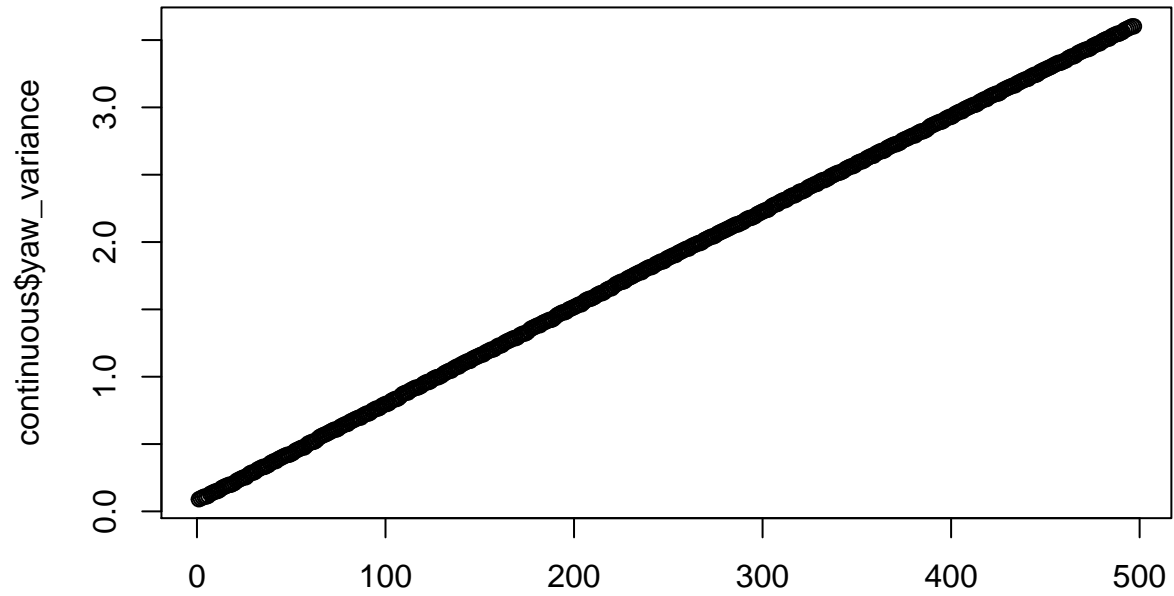


**Continuous Filter Y Variance Over Time**

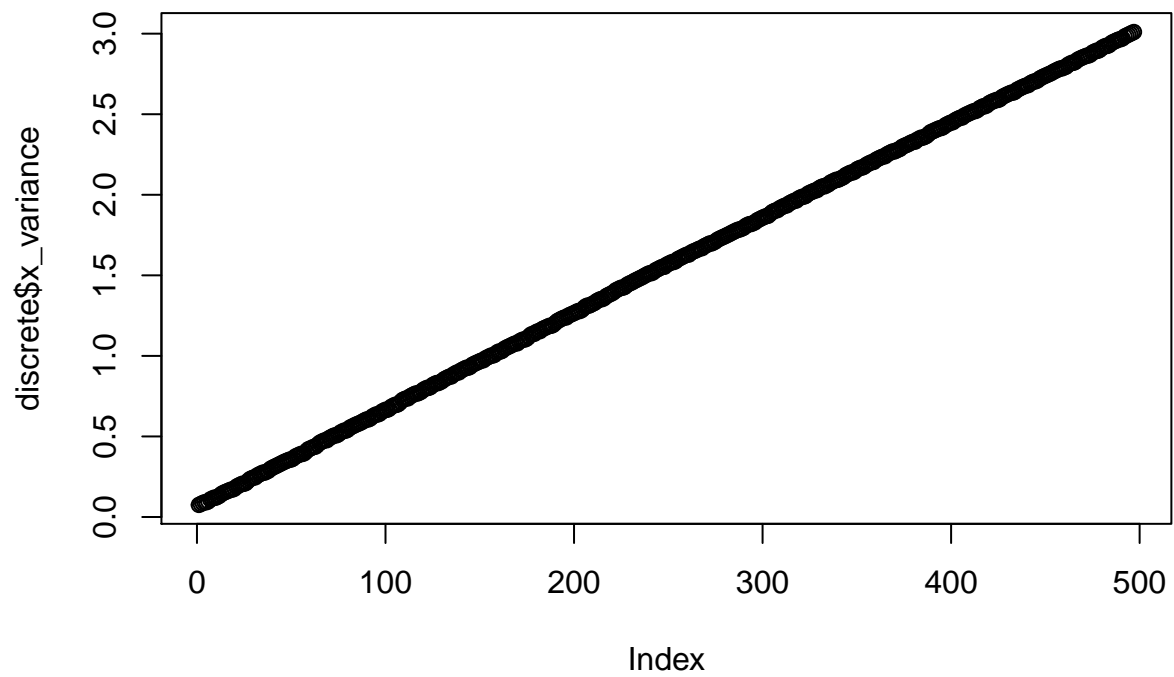




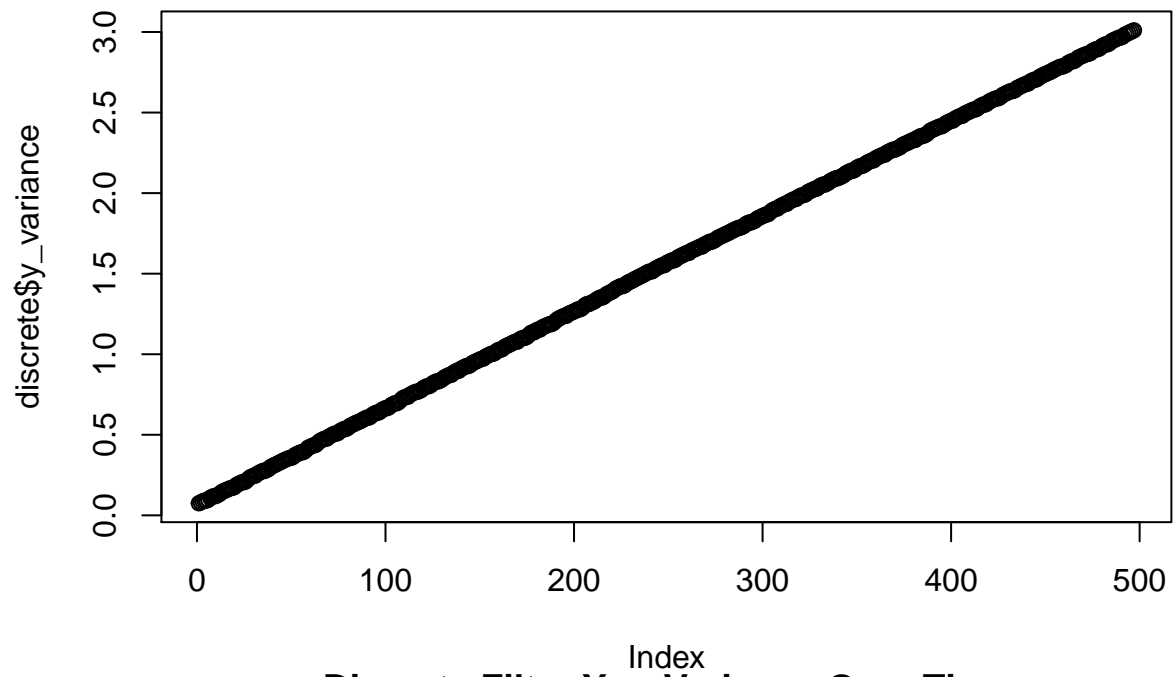
**Continuous Filter Yaw Variance Over Time**



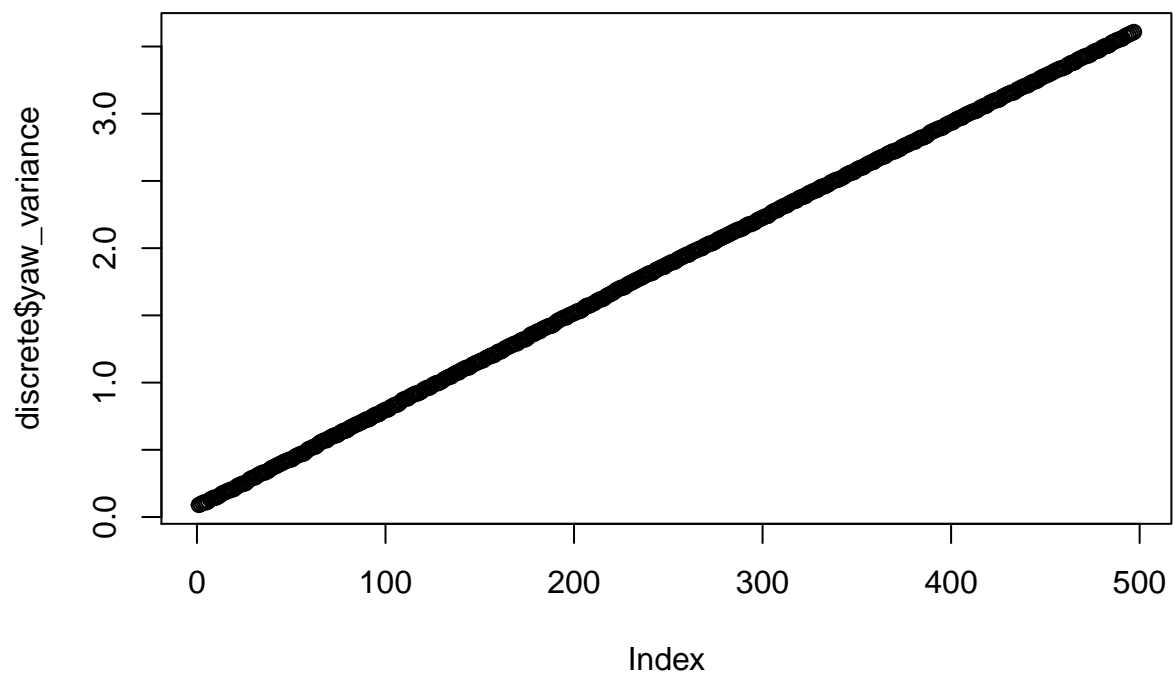
**Discrete Filter X Variance Over Time**



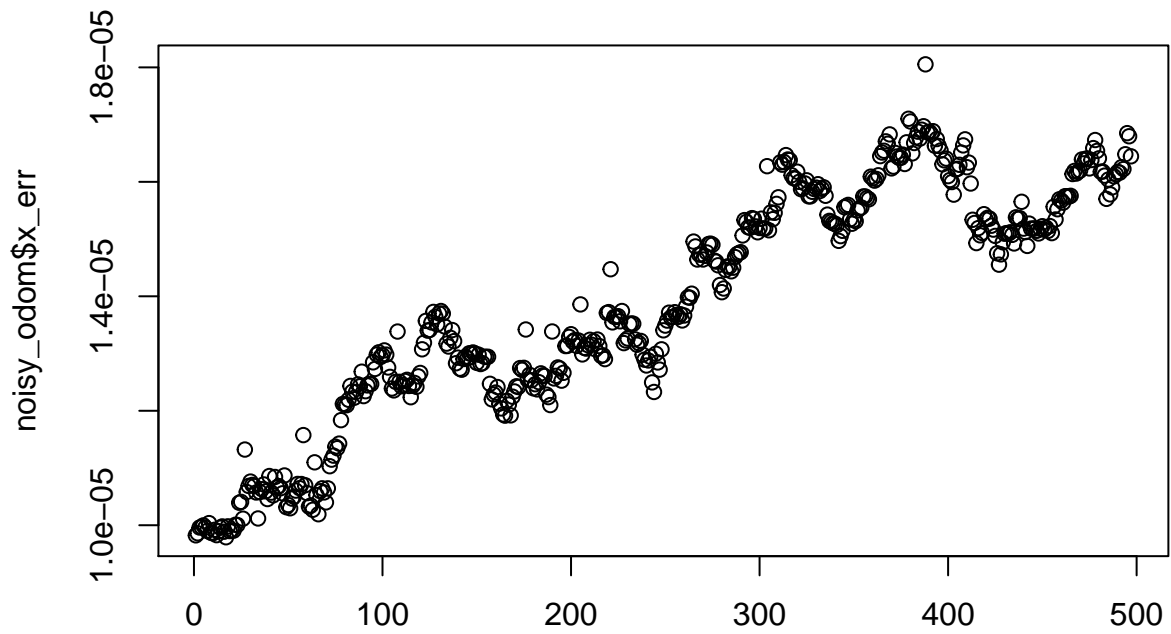
**Discrete Filter Y Variance Over Time**



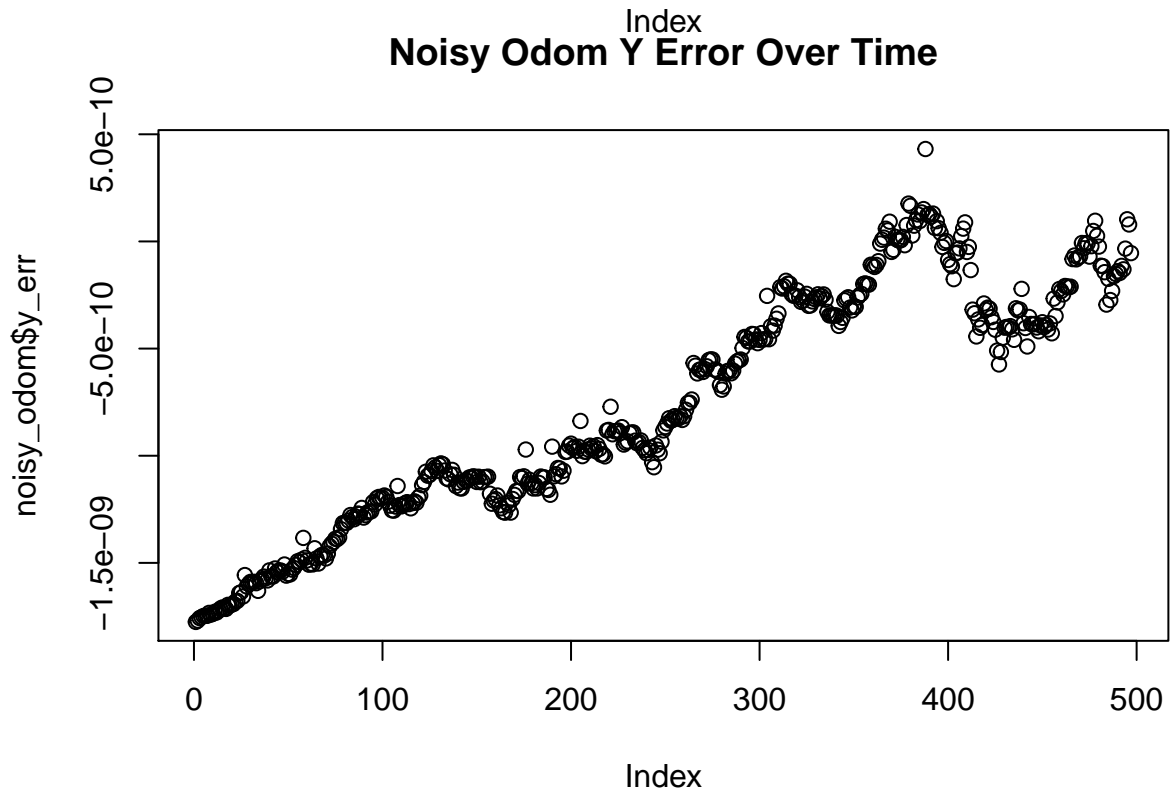
**Discrete Filter Yaw Variance Over Time**



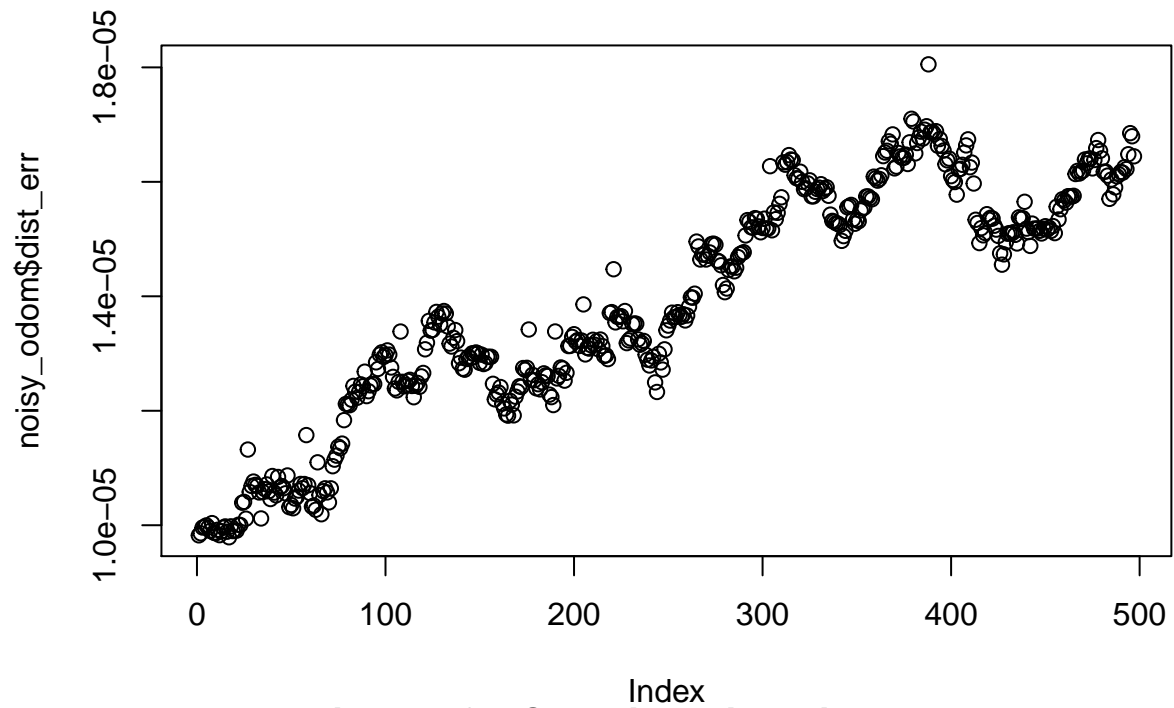
**Noisy Odom X Error Over Time**



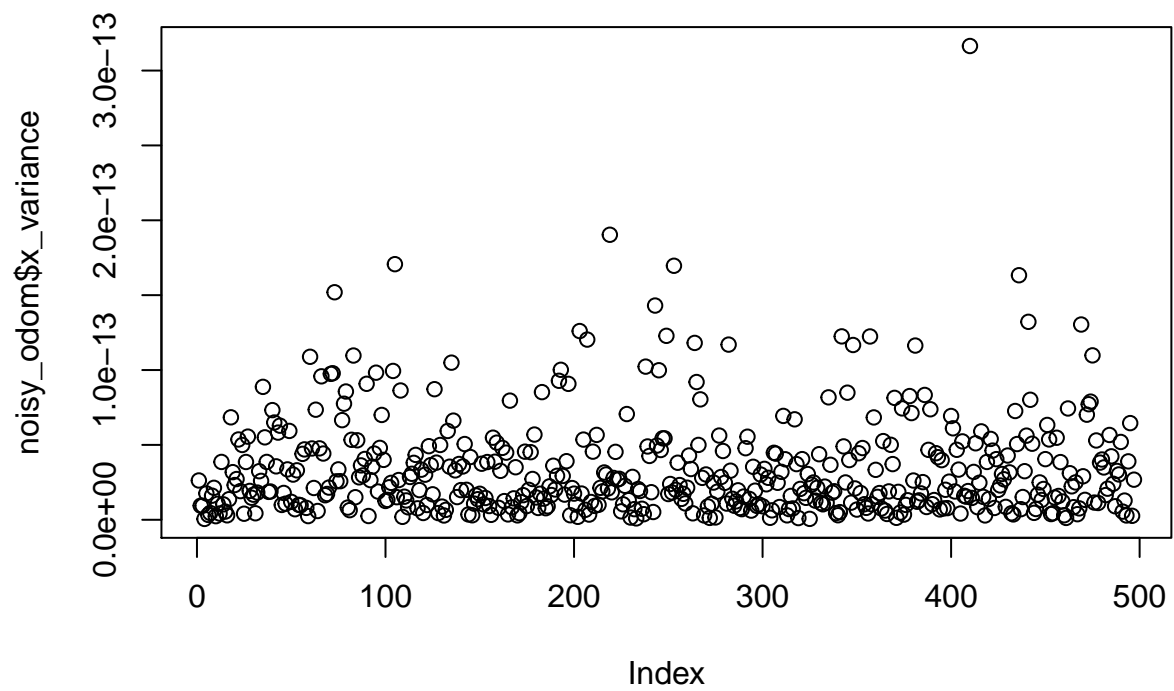
**Noisy Odom Y Error Over Time**



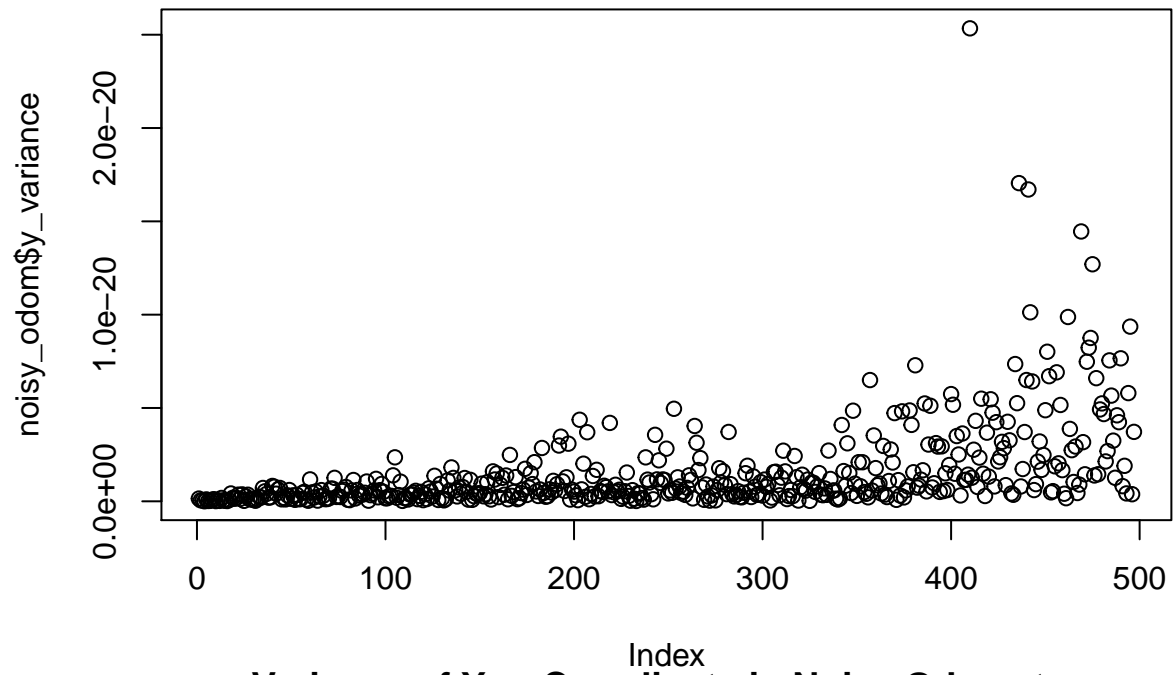
**Noisy Odom Horizontal Distance Error Over Time**



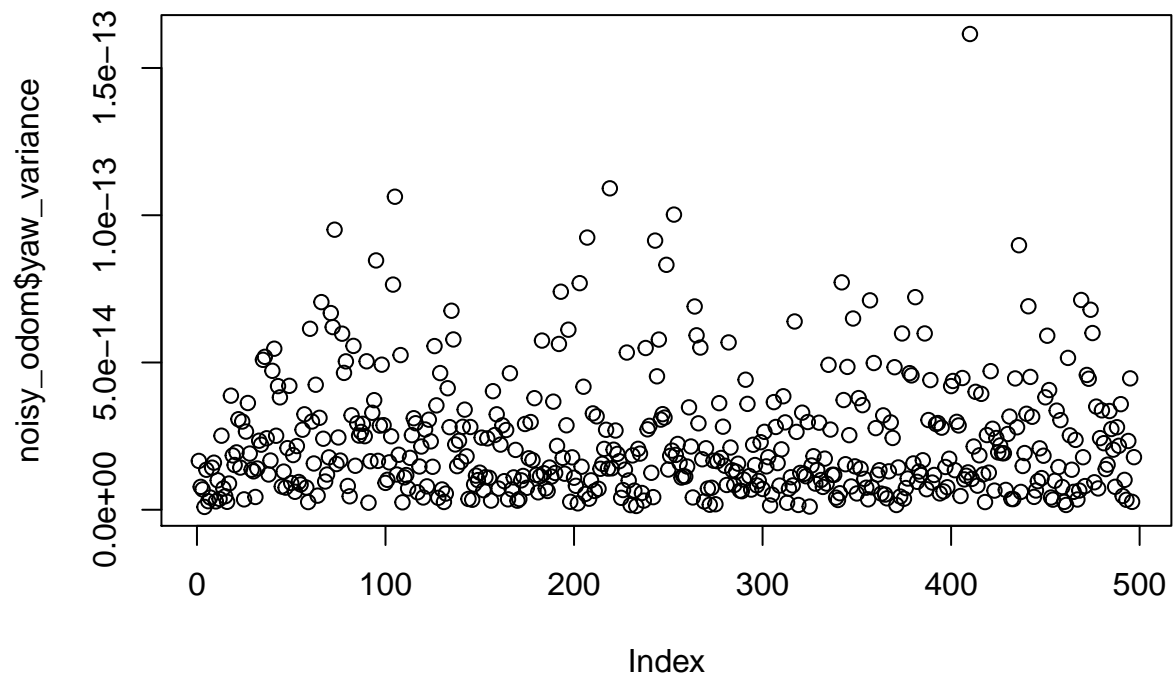
**Variance of X Coordinate in Noisy Odometry**



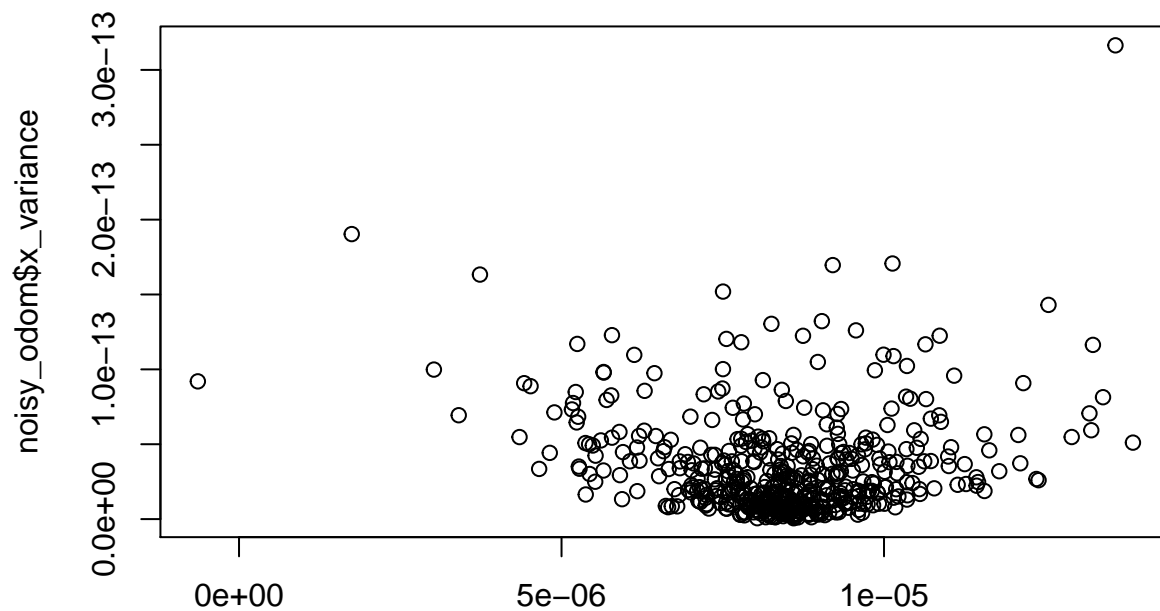
**Variance of Y Coordinate in Noisy Odometry**



**Variance of Yaw Coordinate in Noisy Odometry**



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



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

