one_mobile_attacked Turtlebot 1 Report

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August 19, 2016

```
## Loading required package: data.table
```

```
## Loading required package: fitdistrplus
```

```
## Loading required package: MASS
```

```
## Loading required package: survival
```

```
## Loading required package: methods
```

This is a summary of the data from the one_mobile_attacked experiment, Turtlebot #1.

The runtime of this experiment was 0 hours, 0 minutes, and 46.2 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.
## -4.049000 -2.686000 -0.931400 -1.458000 -0.378700  0.002957
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.      Max.
## -7.60800 -6.30600 -3.55400 -3.62000 -0.61710  0.07425
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -3.060  -2.153  -2.116  -1.770  -1.458   2.694
```

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

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.      Max.
## 0.000001 0.724000 3.655000 3.926000 6.854000 8.618000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -4.4090 -2.1020 -0.3096  0.1977  2.8610  4.7650
```

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

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -8.49300 -4.83600 -2.44400 -2.46500  0.07406  4.64400
```

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

```
##       Min.    1st Qu.     Median       Mean    3rd Qu.       Max.
## -1.7470000 -0.0071270  0.0008007  0.0735100  0.0385500  3.0570000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.5201  3.2910  4.4760  4.5590  5.5300  8.9710
```

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

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -1.48100 -1.06700 -0.59420 -0.58390 -0.05742  0.08013
```

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

```
##       Min.    1st Qu.     Median       Mean    3rd Qu.       Max.
## -1.8710000 -0.8593000 -0.2520000 -0.5364000 -0.0001966  0.2759000
```

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

```
##      Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## 0.0000224 0.1690000 0.6503000 0.8432000 1.4030000 2.3400000
```

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

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.2342  1.7000  3.1900  3.0840  4.3610  6.6280
```

```r
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 0.000e+00 2.470e-07 6.418e-04 2.450e-06 8.535e-03
```
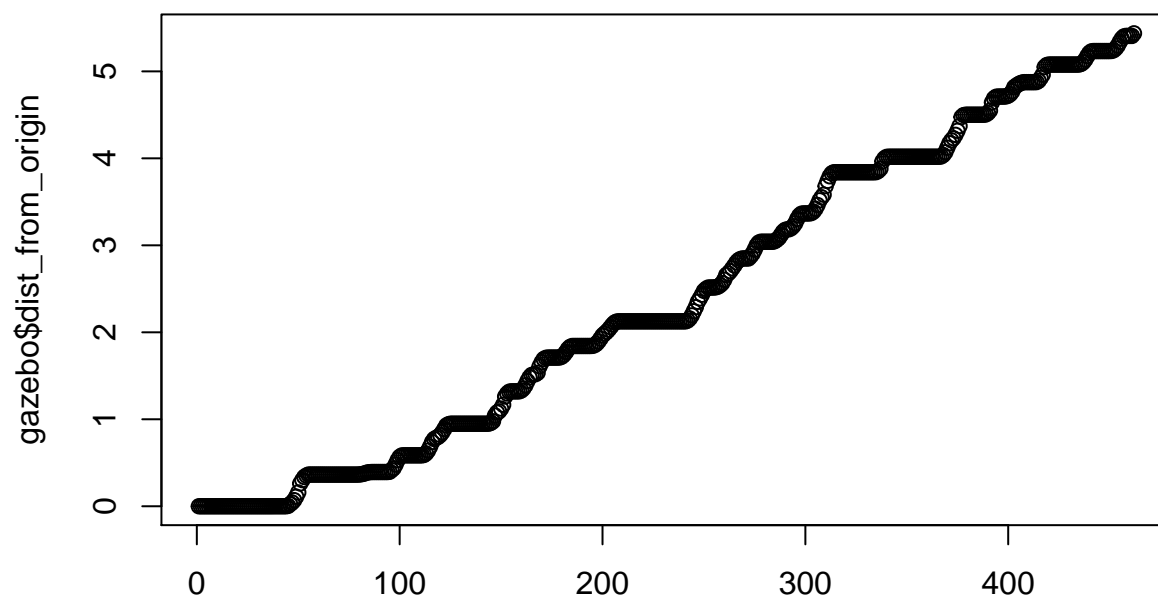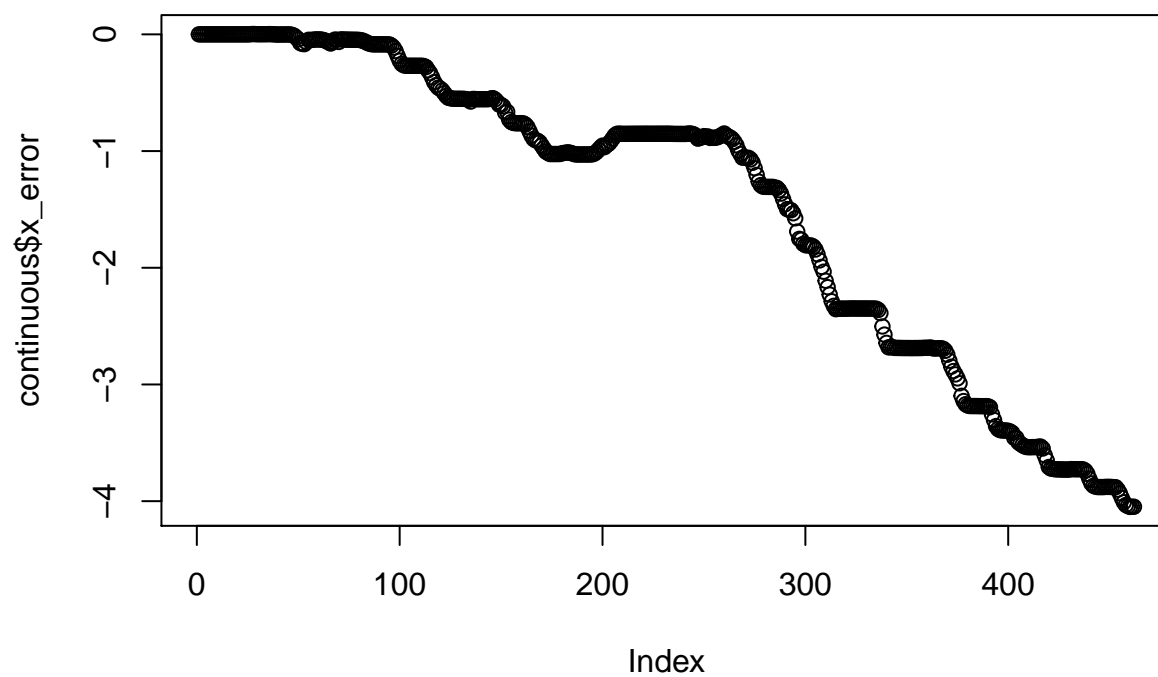
X coordinate of robot over time
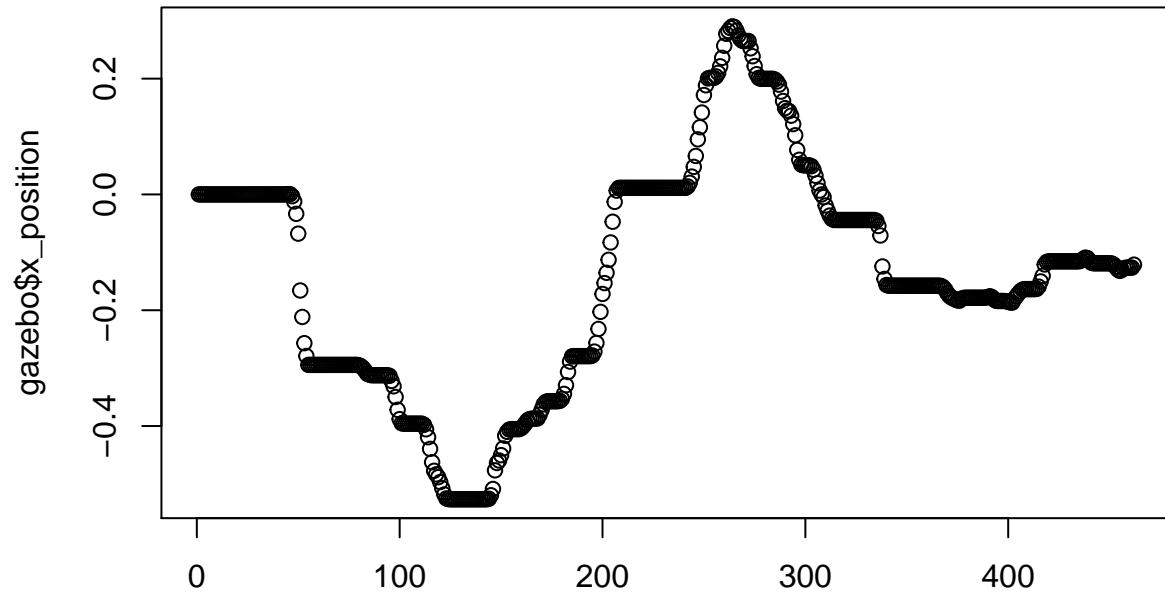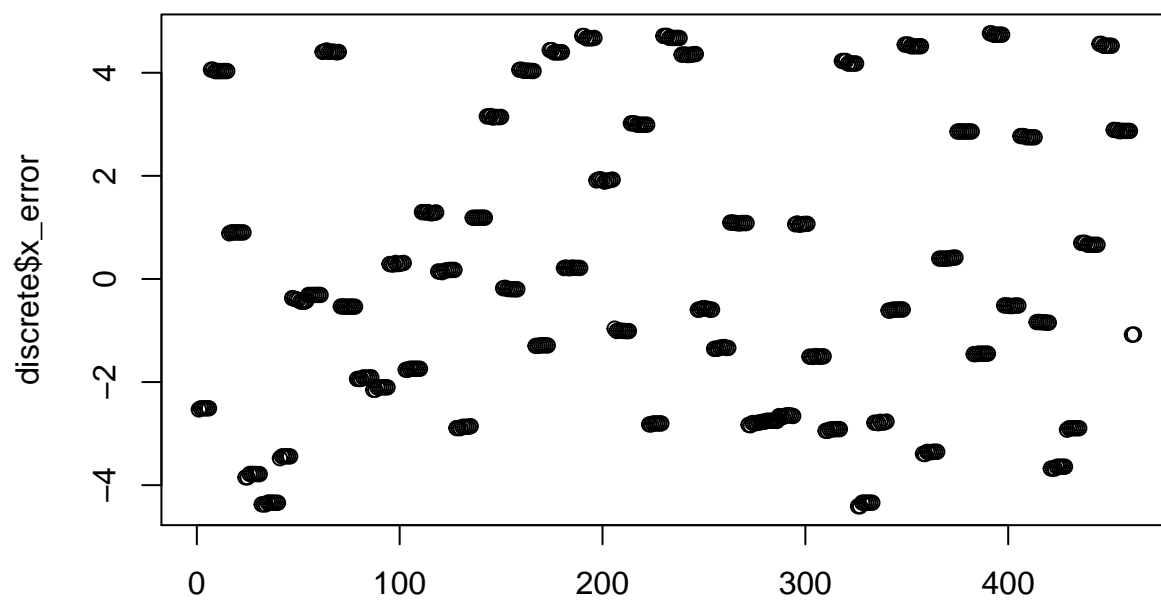

Y coordinate of robot over time
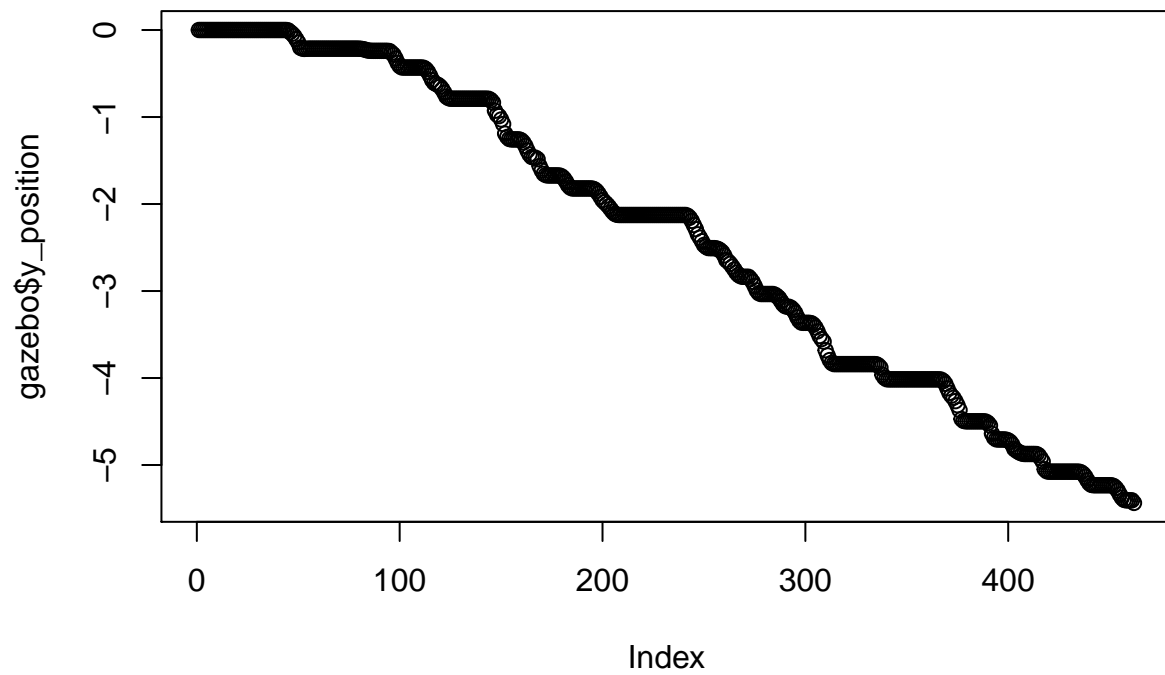
Distance from origin vs. time

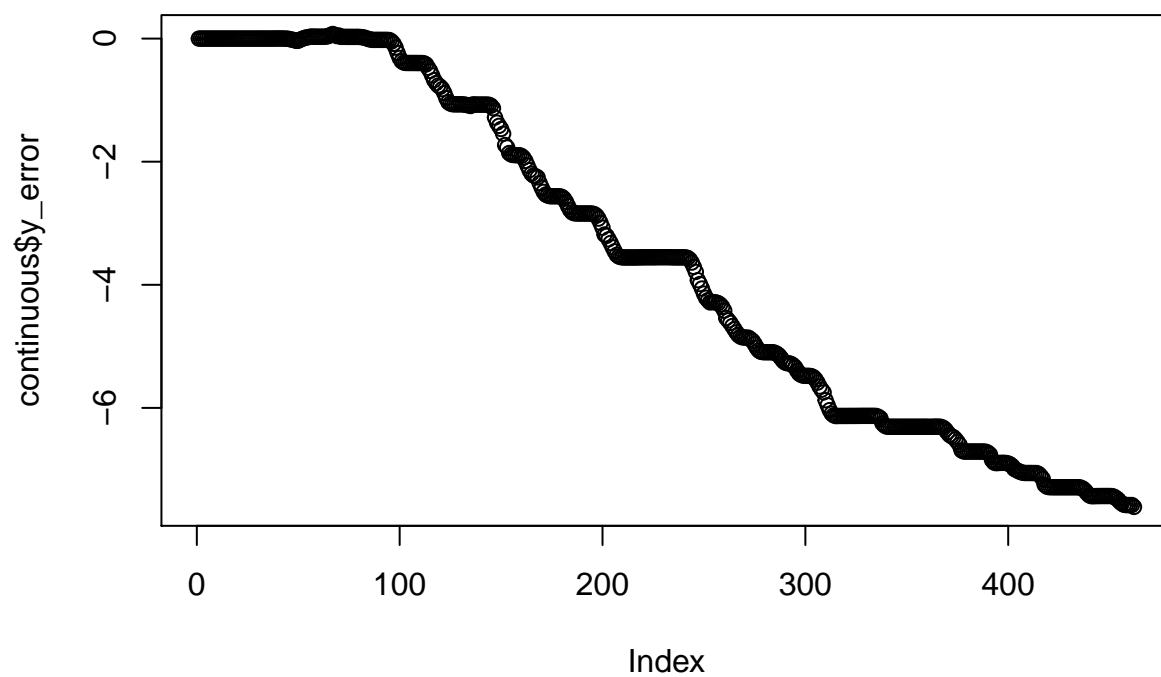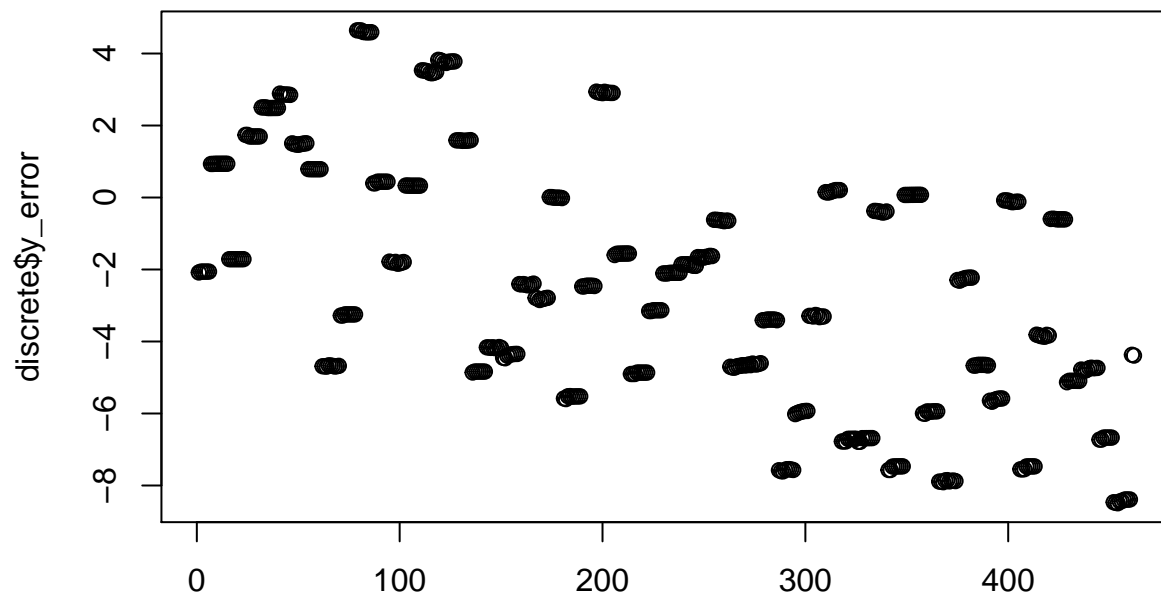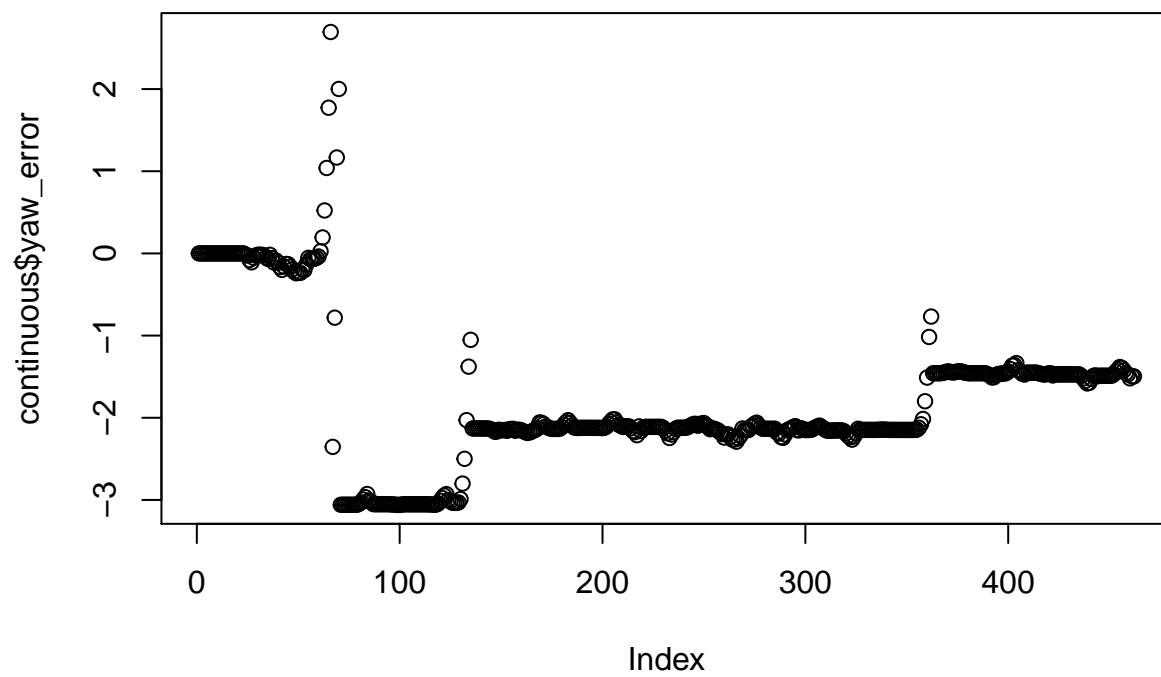# Continuous x_error over time

Discrete x_error over time

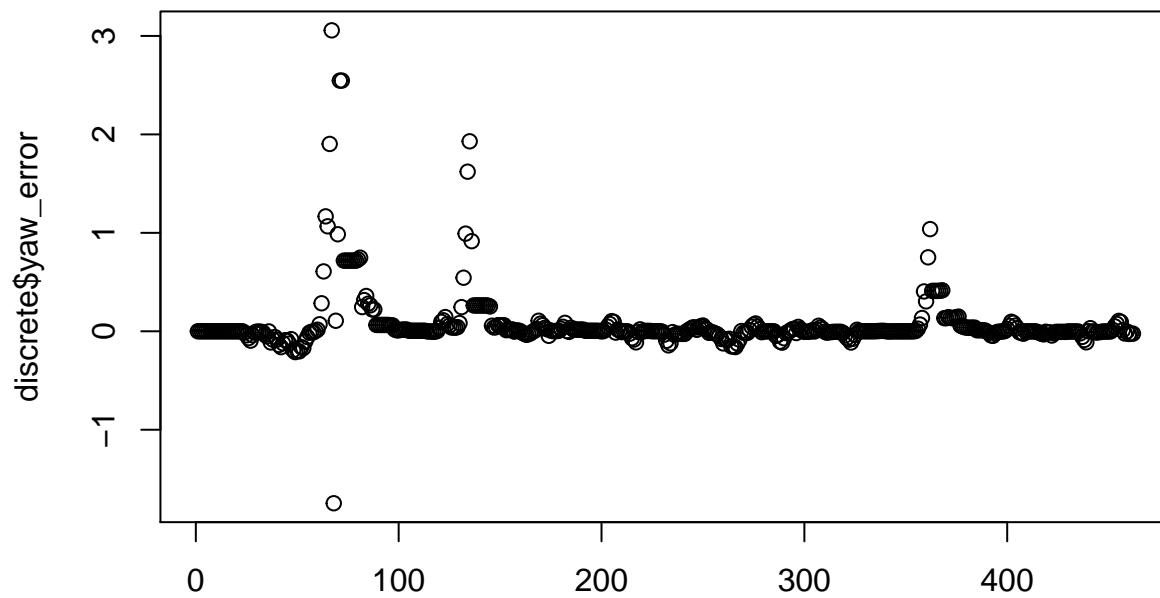

Continuous y_error over time
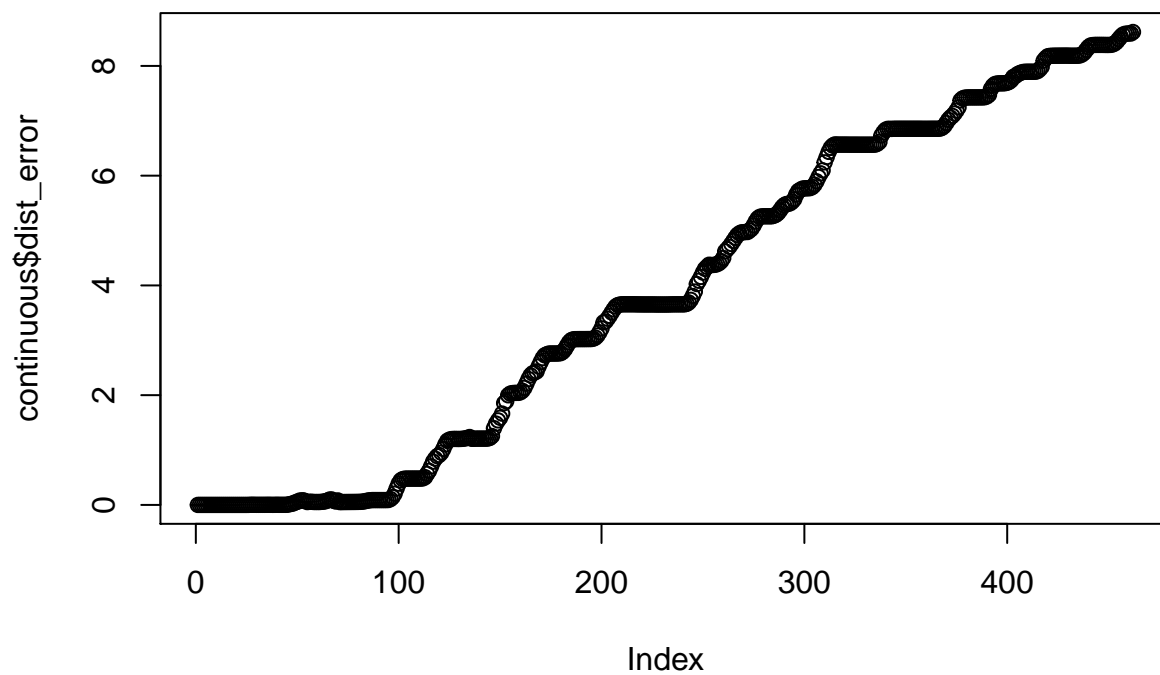
Discrete y_error over time
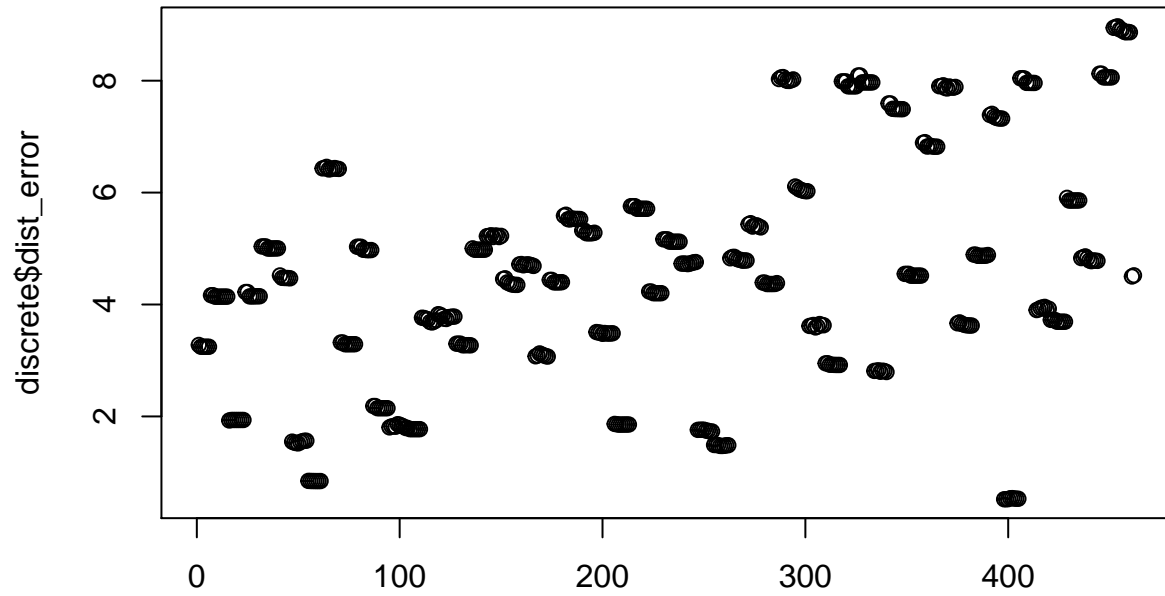

Continuous yaw error over time
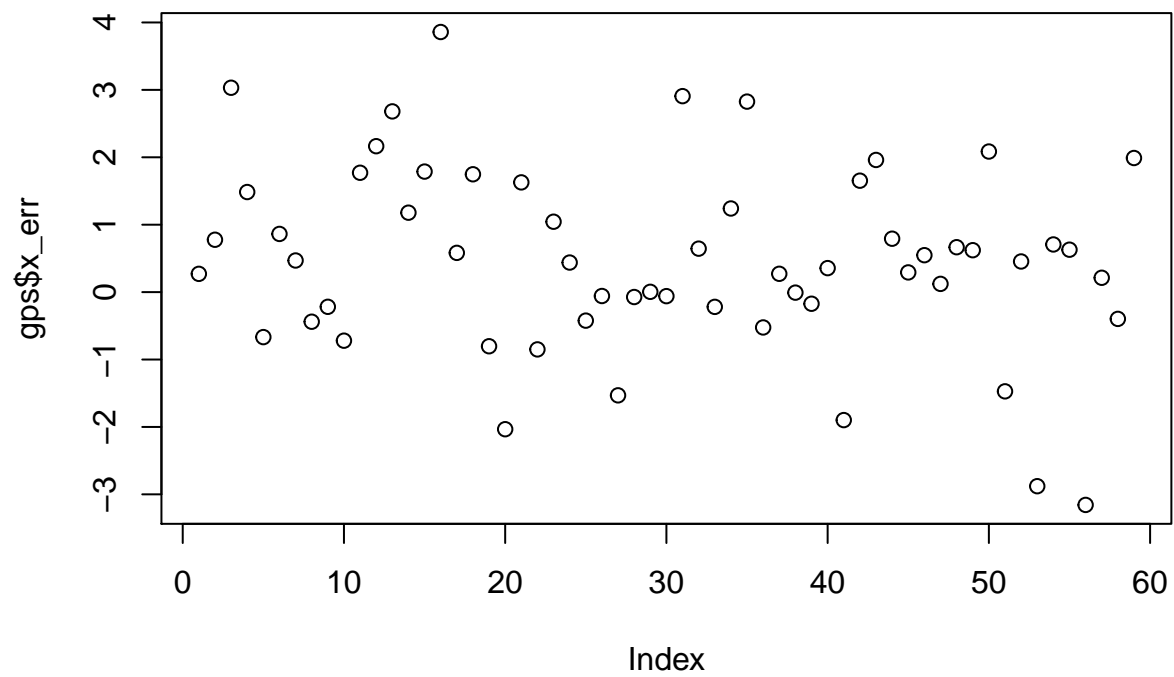
Discrete yaw error over time
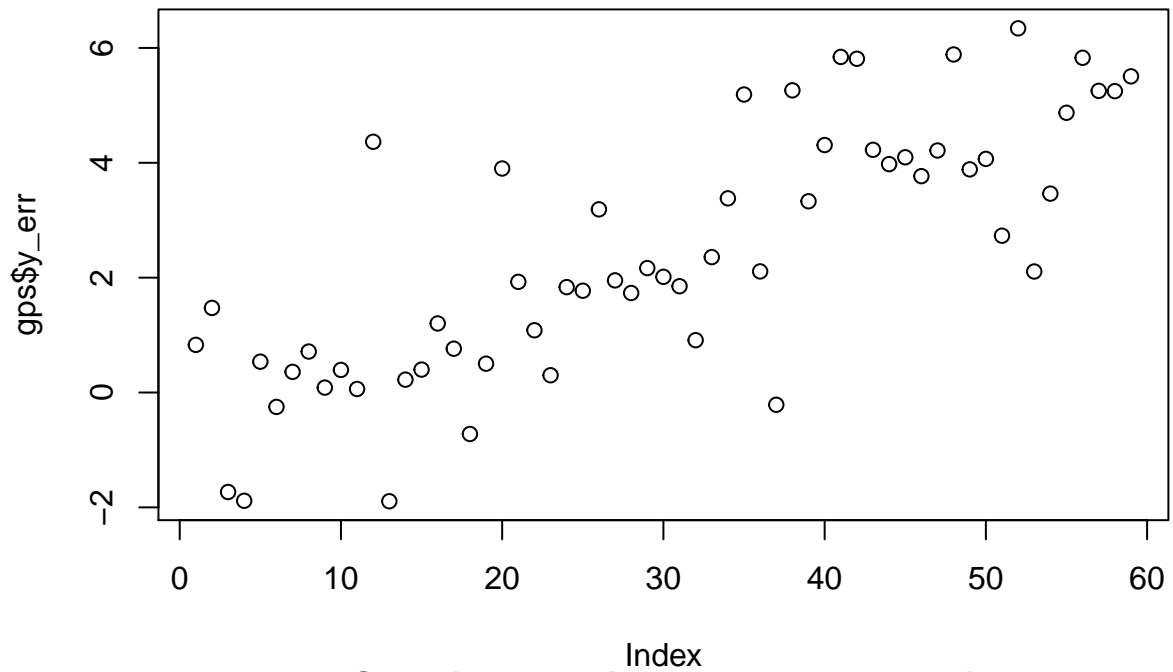

Continuous total distance error over time

Discrete total distance error over time
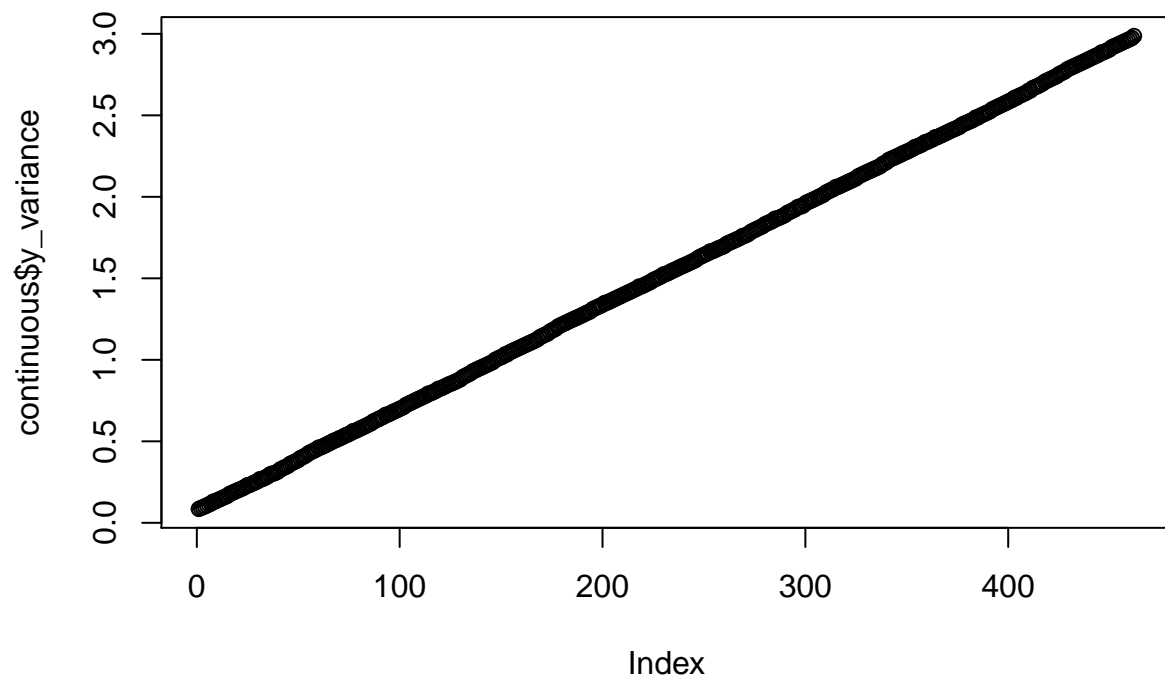

GPS X Error Over Time

GPS Y Error Over Time

GPS Horizontal Distance Error Over Time
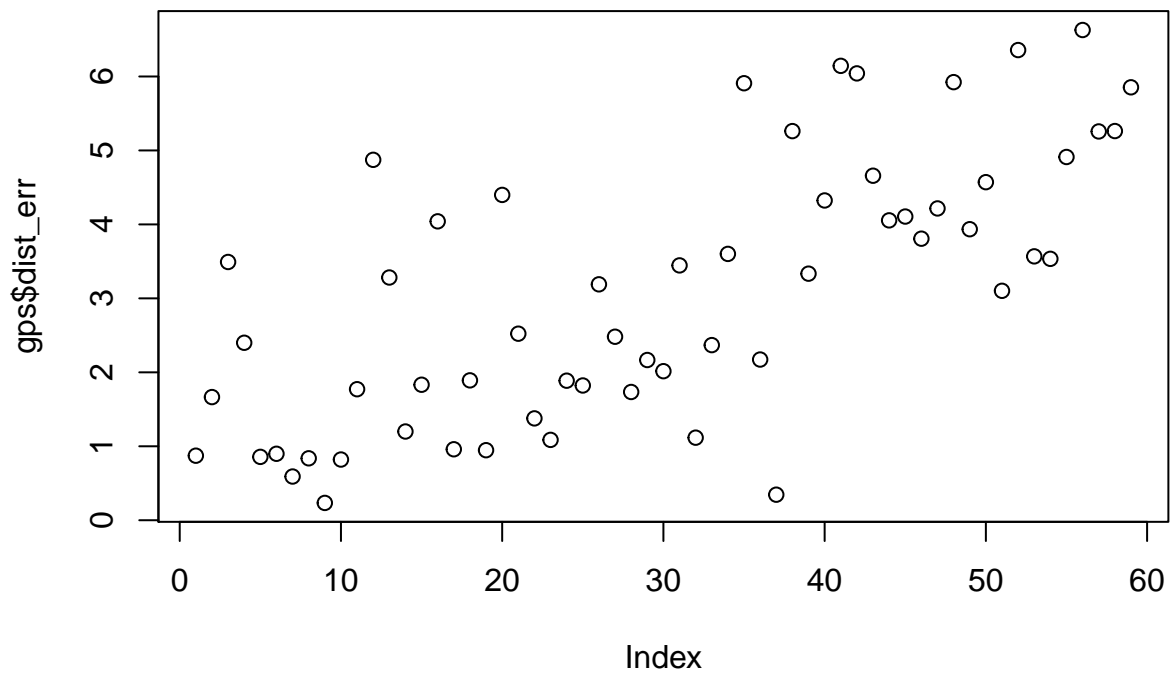
Continuous Filter X Variance Over Time
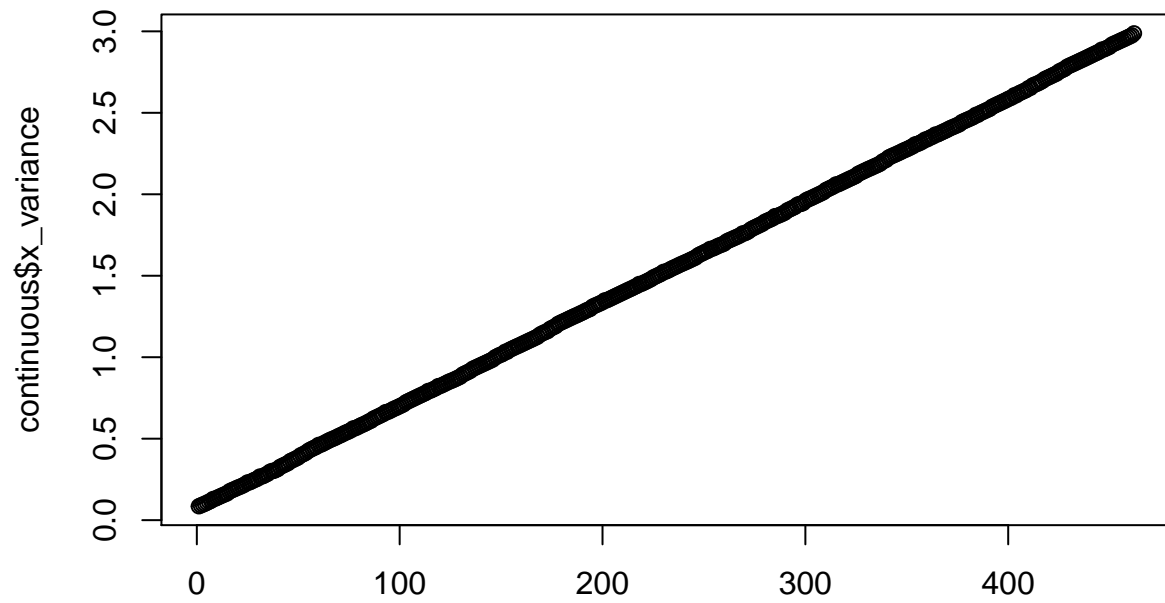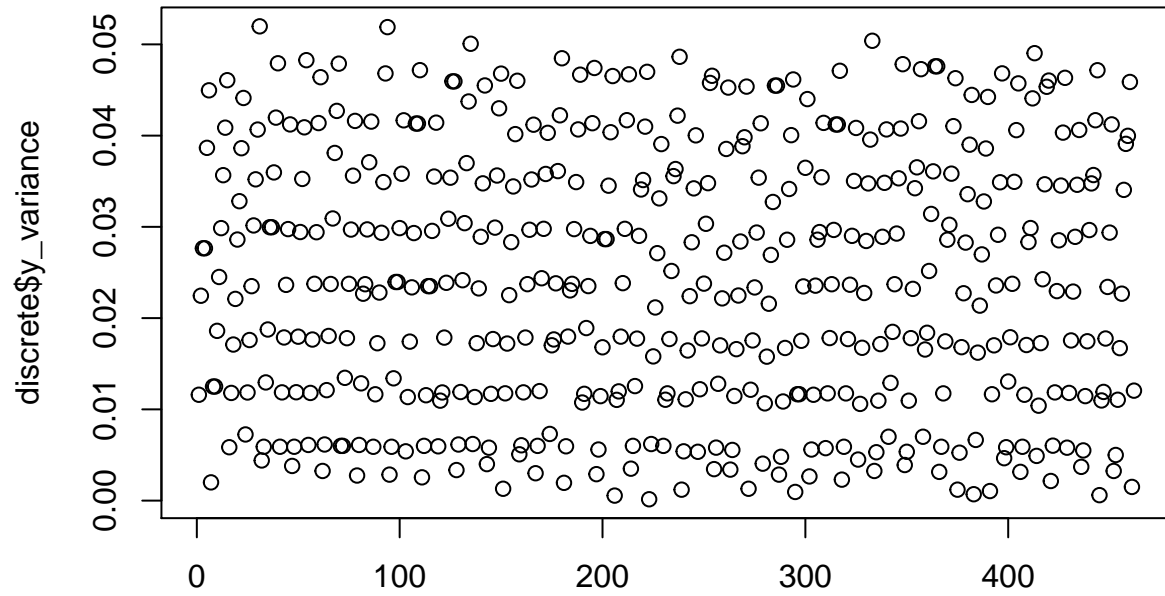

Continuous Filter Y Variance Over Time
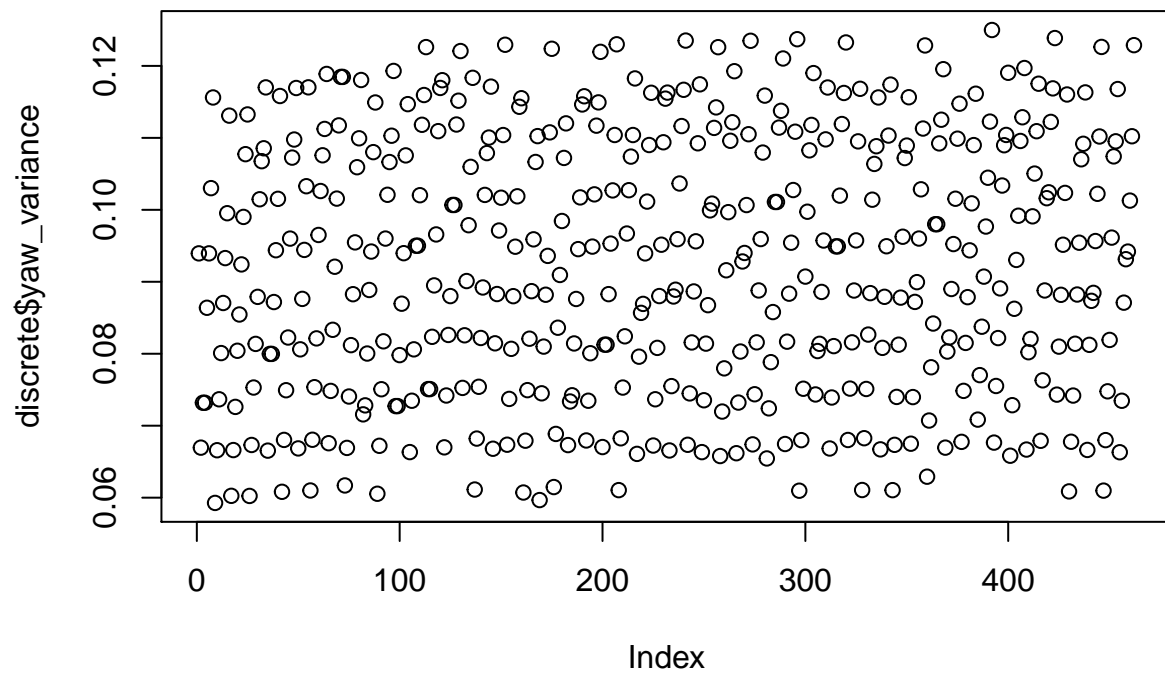
Continuous Filter Yaw Variance Over Time
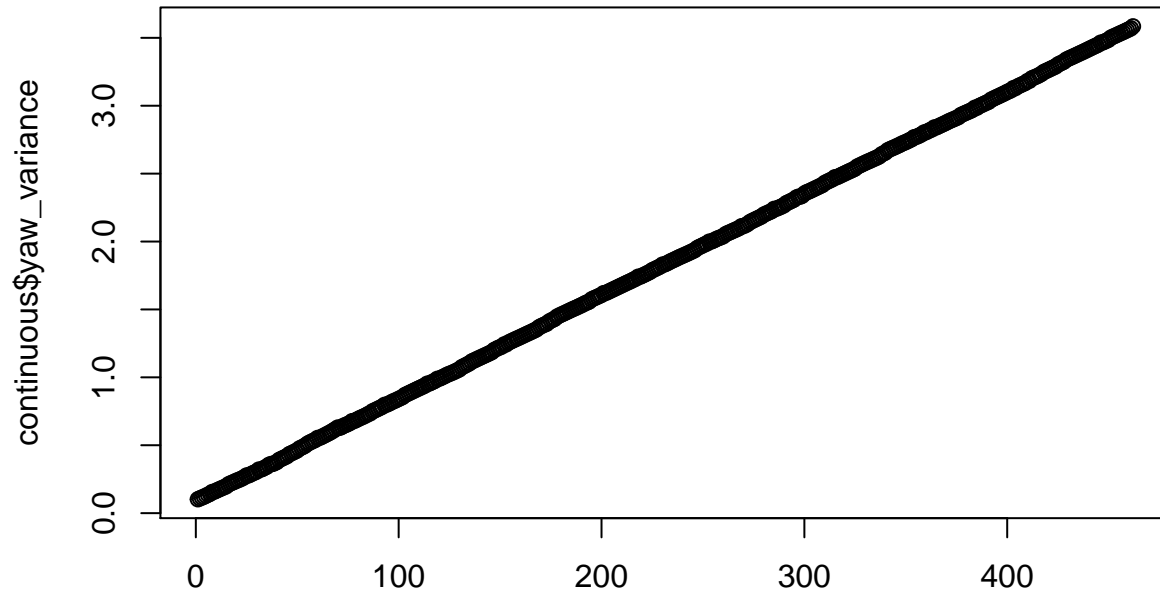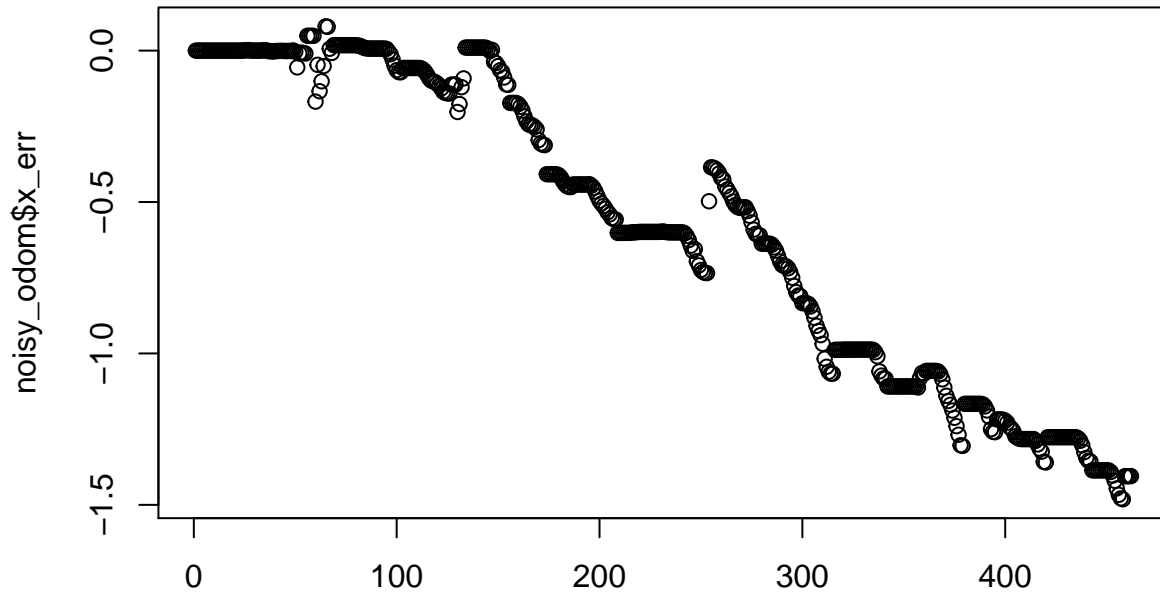

Discrete Filter X Variance Over Time
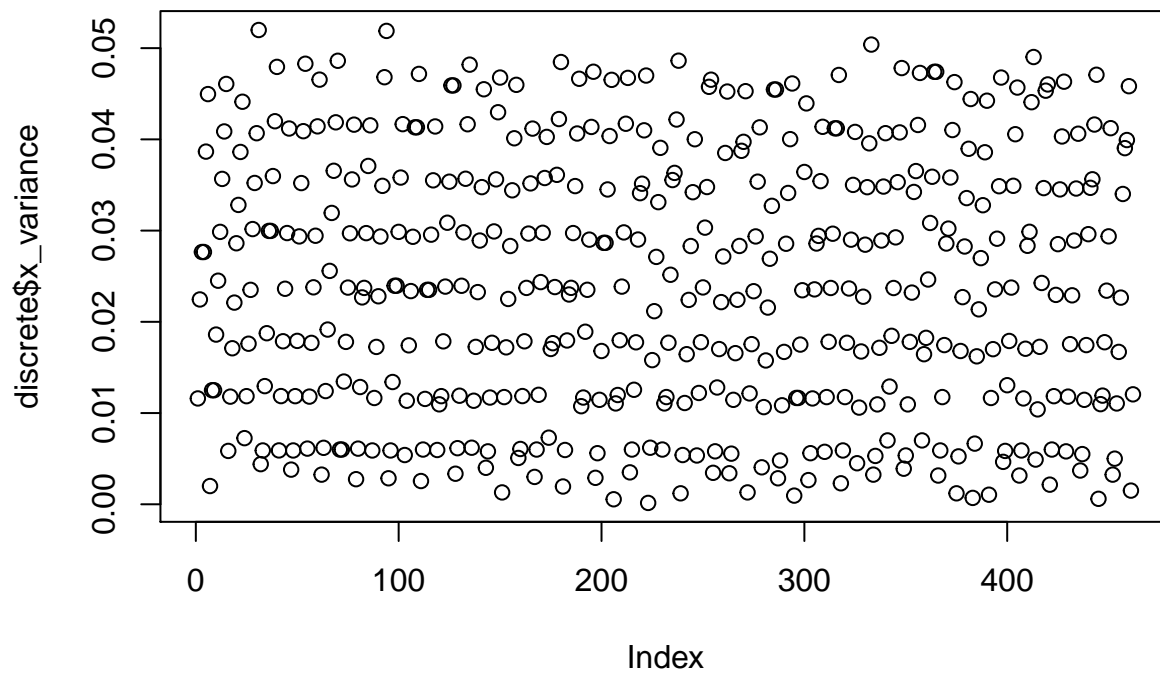
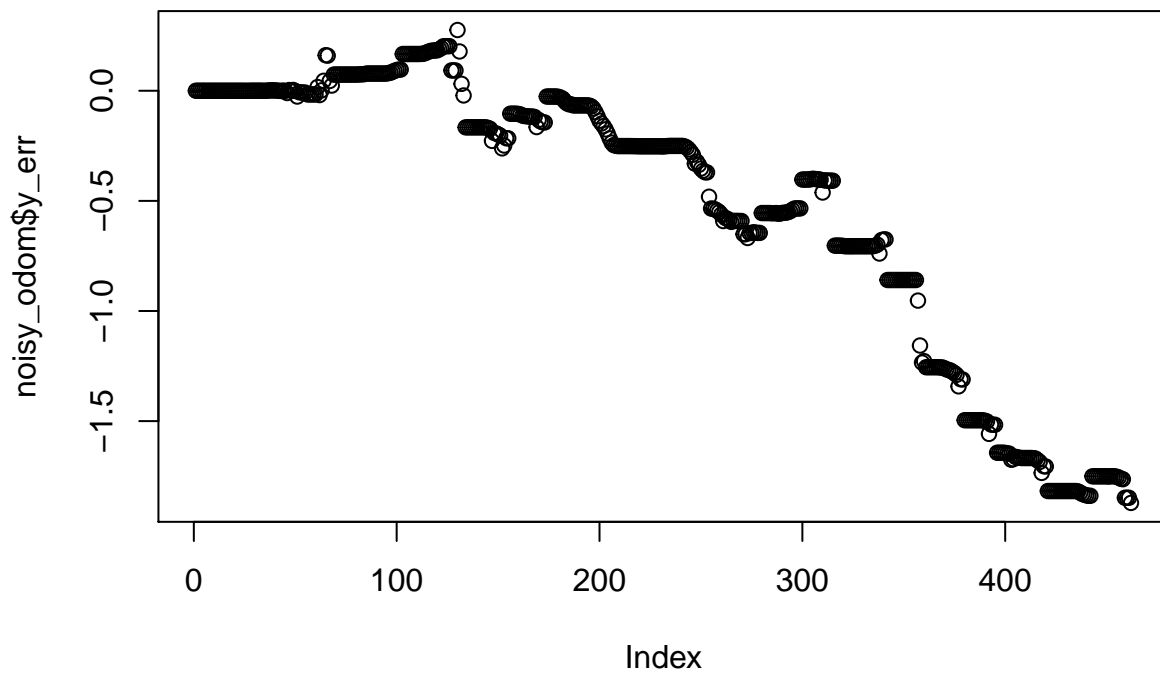**Discrete Filter Y Variance Over Time**

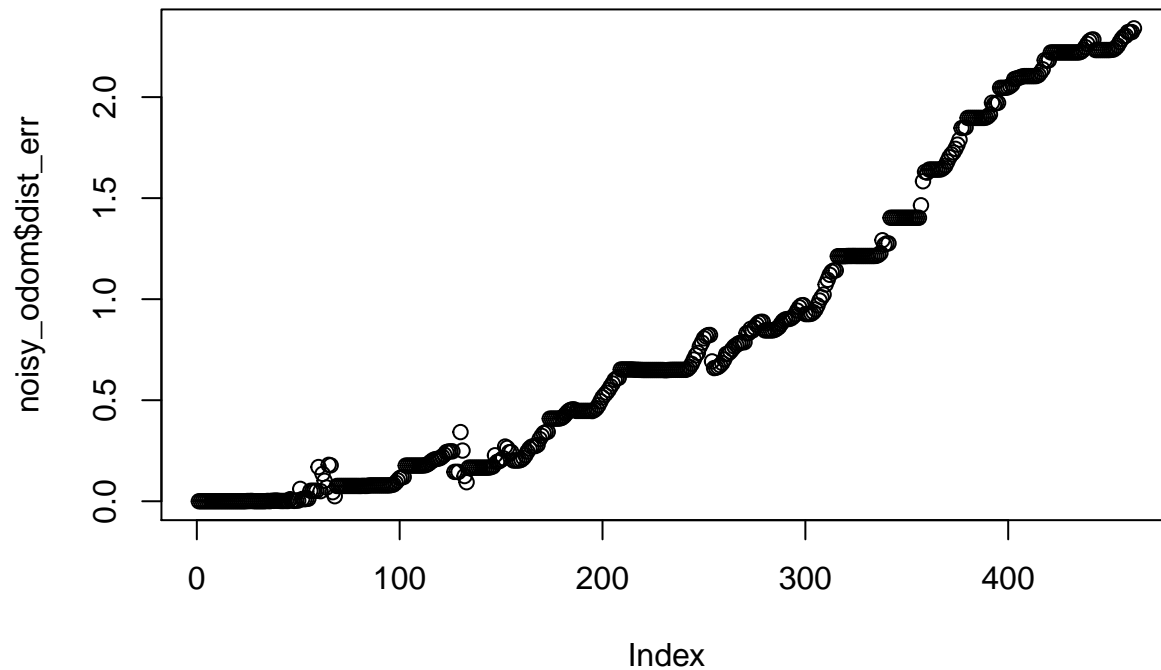**Discrete Filter Yaw Variance Over Time**
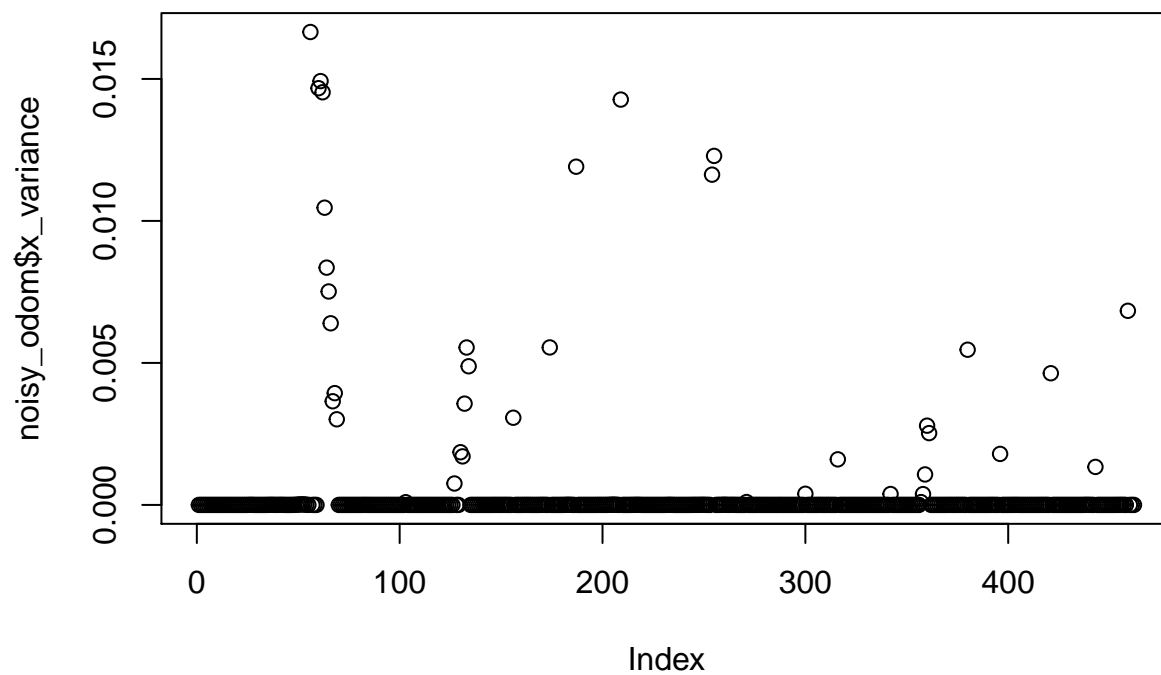
Noisy Odom X Error Over Time
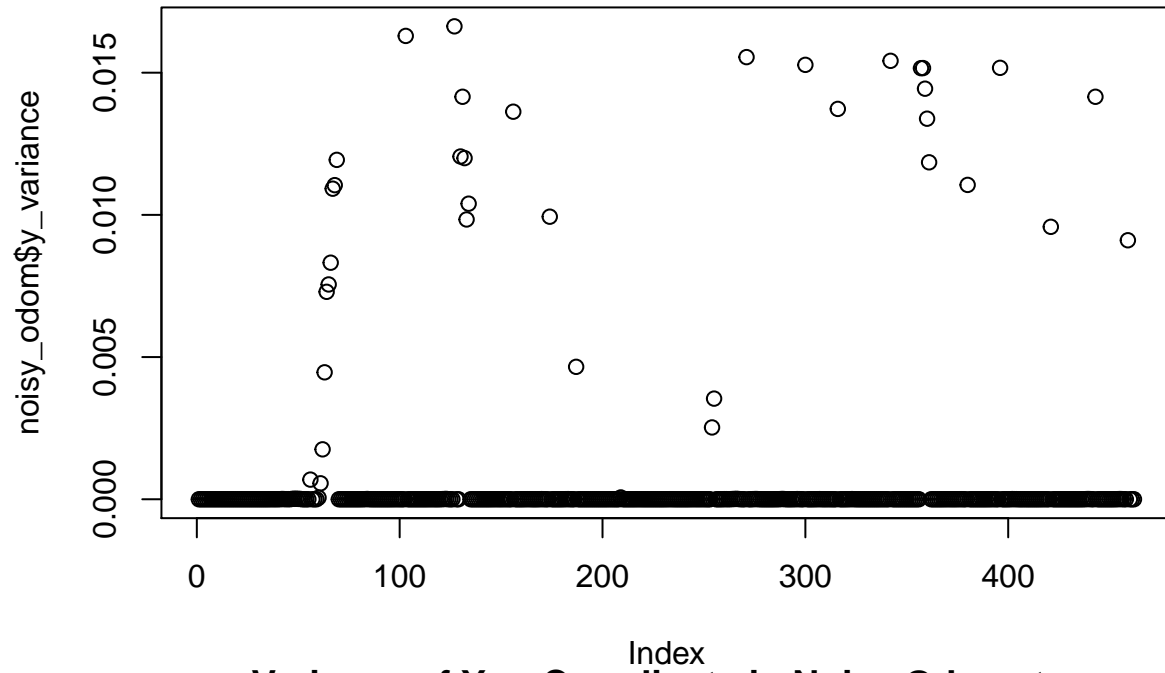

Noisy Odom Y Error Over Time

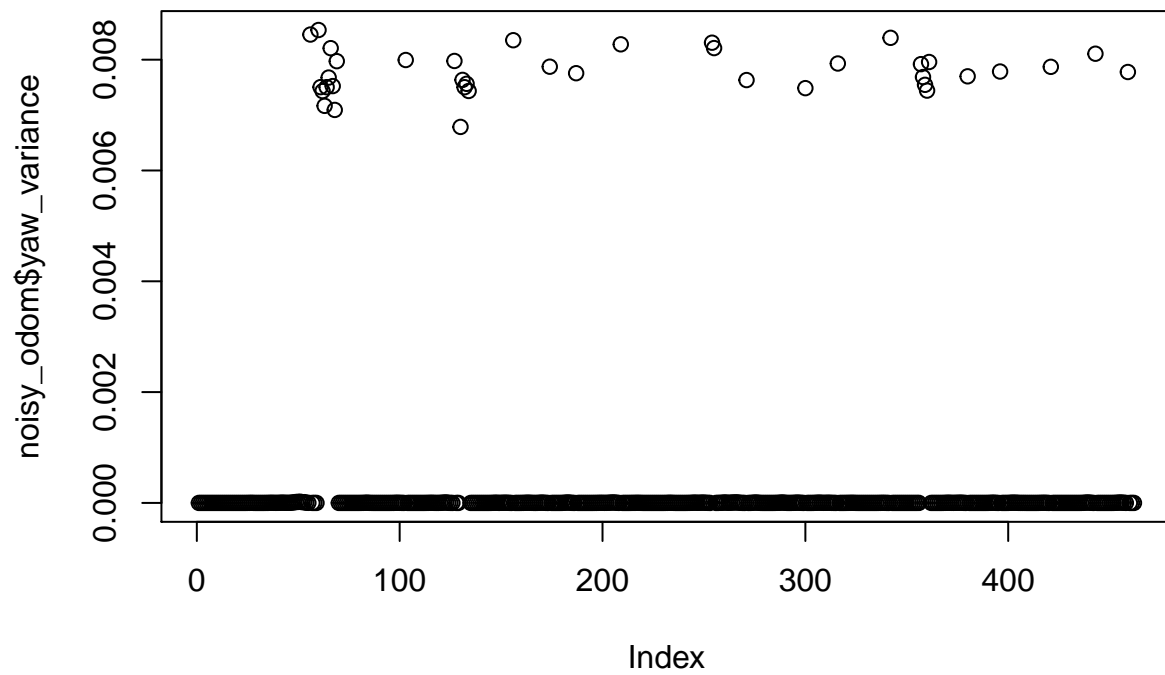## Noisy Odom Horizontal Distance Error Over Time

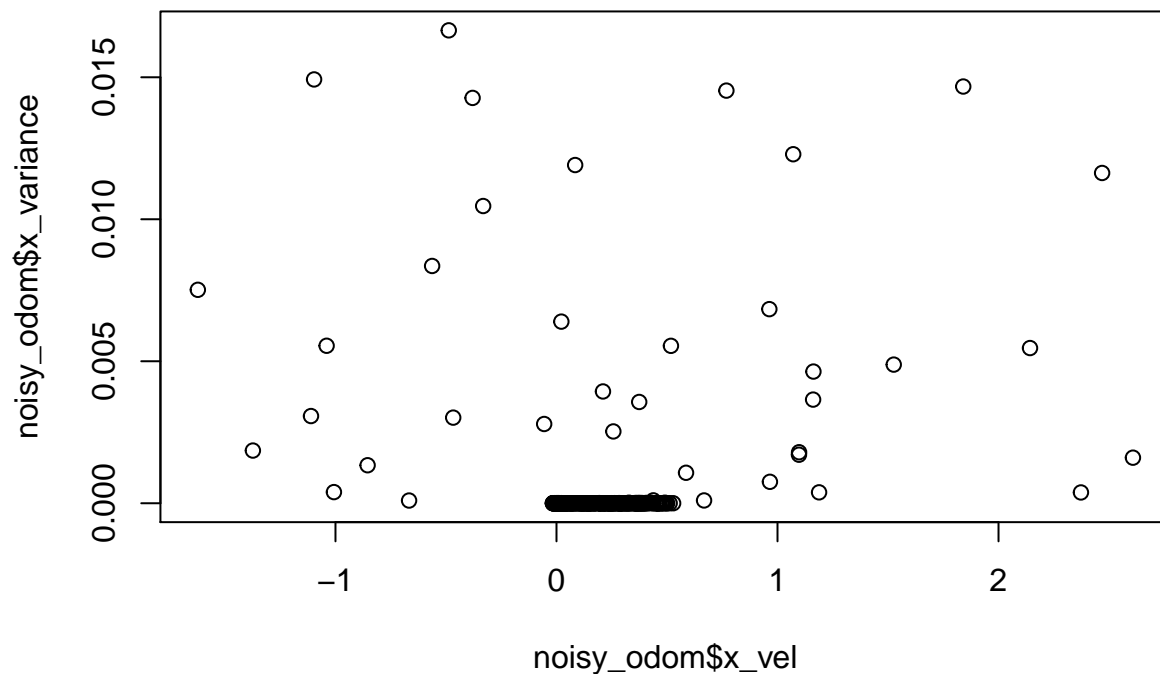## Variance of X Coordinate in Noisy Odometry

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