

two_stationary_noiseless Turtlebot 1 Report

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

The runtime of this experiment was 0 hours, 0 minutes, and 49 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.
## 1.388e-05 1.402e-04 2.640e-04 2.646e-04 3.894e-04 5.133e-04
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -3.983e-08 -3.689e-08 -3.103e-08 -2.670e-08 -1.643e-08 -2.042e-09
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -1.796e-04 -1.166e-04 -7.484e-05 -7.435e-05 -3.504e-05 5.719e-05
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## 1.388e-05 1.402e-04 2.640e-04 2.646e-04 3.894e-04 5.133e-04
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## 1.291e-05 3.312e-05 5.395e-05 5.447e-05 7.539e-05 9.913e-05
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -1.294e-08 -6.525e-09 -3.715e-09 -4.499e-09 -1.736e-09 1.708e-12
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -1.404e-04 -4.177e-05 7.758e-06 -7.511e-06 2.688e-05 7.542e-05
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## 1.291e-05 3.312e-05 5.395e-05 5.447e-05 7.539e-05 9.913e-05
```

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

```
##      Min.    1st Qu.    Median      Mean   3rd Qu.      Max.
## -2.460e-06 -1.384e-06 3.509e-08 -1.323e-07 1.006e-06 2.711e-06
```

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

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -1.664e-09 -1.180e-09 -7.895e-10 -6.575e-10 -3.750e-11  4.113e-10
```

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

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## 1.533e-08 7.417e-07 1.147e-06 1.128e-06 1.555e-06 2.711e-06
```

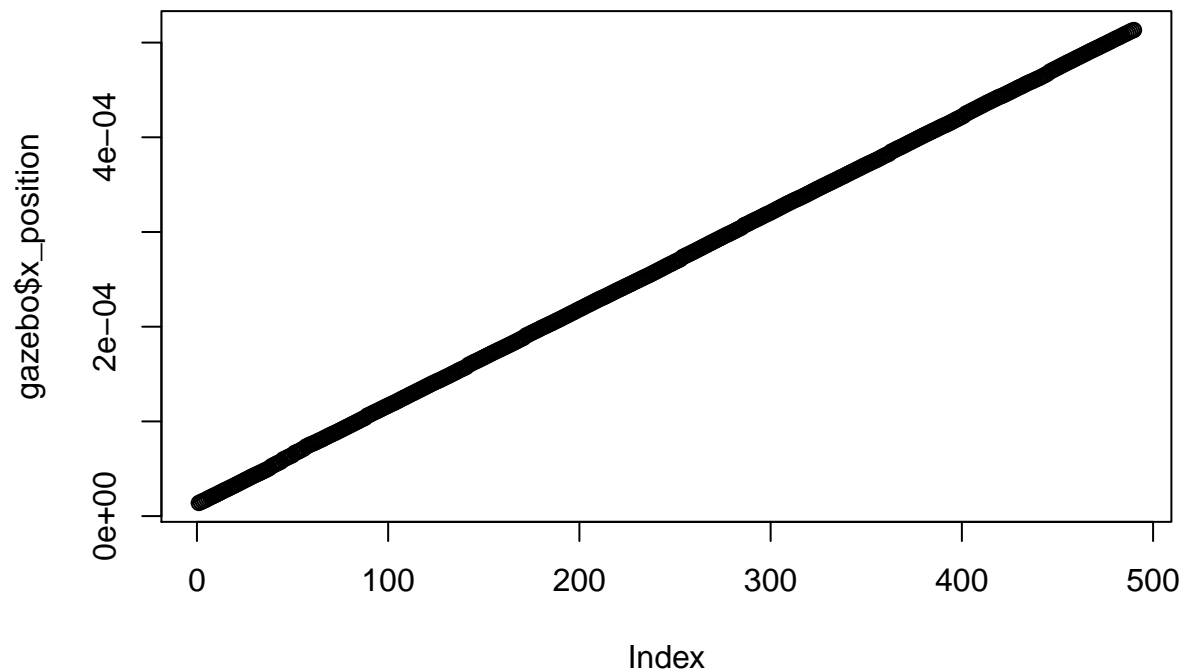
```
if (NROW(gps) > 0) {
  summary(gps$x_err)
  summary(gps$y_err)
  summary(gps$dist_err)
}
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## 8.072e-05 1.880e-04 2.951e-04 2.948e-04 4.016e-04 5.086e-04
```

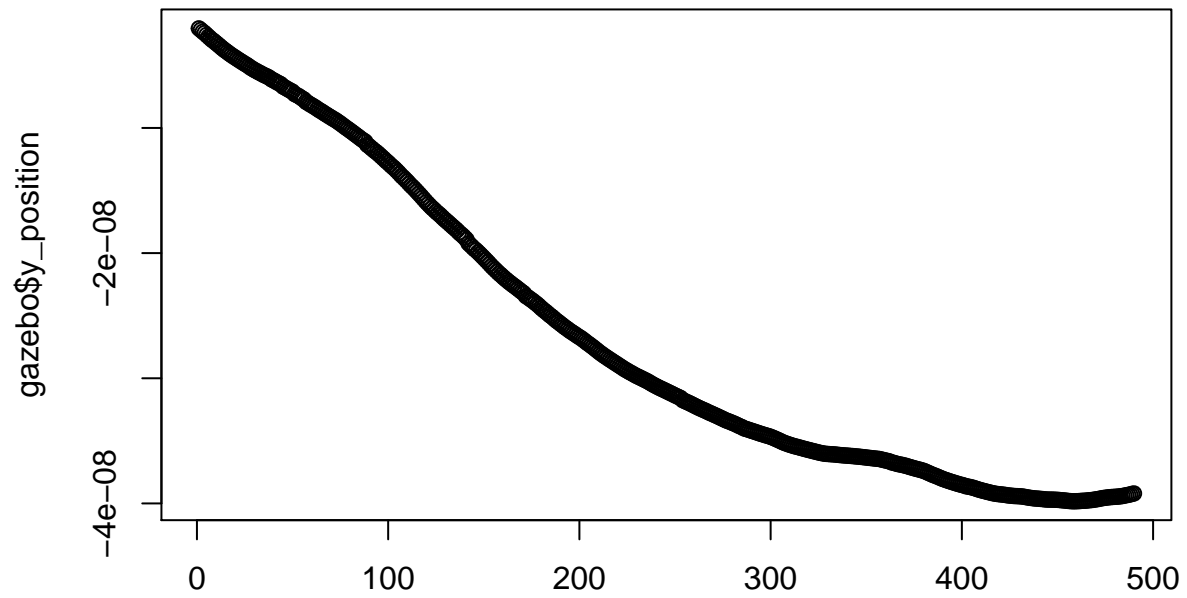
```
if (NROW(noisy_odom) > 0) {
  summary(noisy_odom$x_variance)
  summary(noisy_odom$y_variance)
  summary(noisy_odom$yaw_variance)
}
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## 9.897e-16 8.694e-15 1.718e-14 2.247e-14 3.008e-14 1.586e-13
```

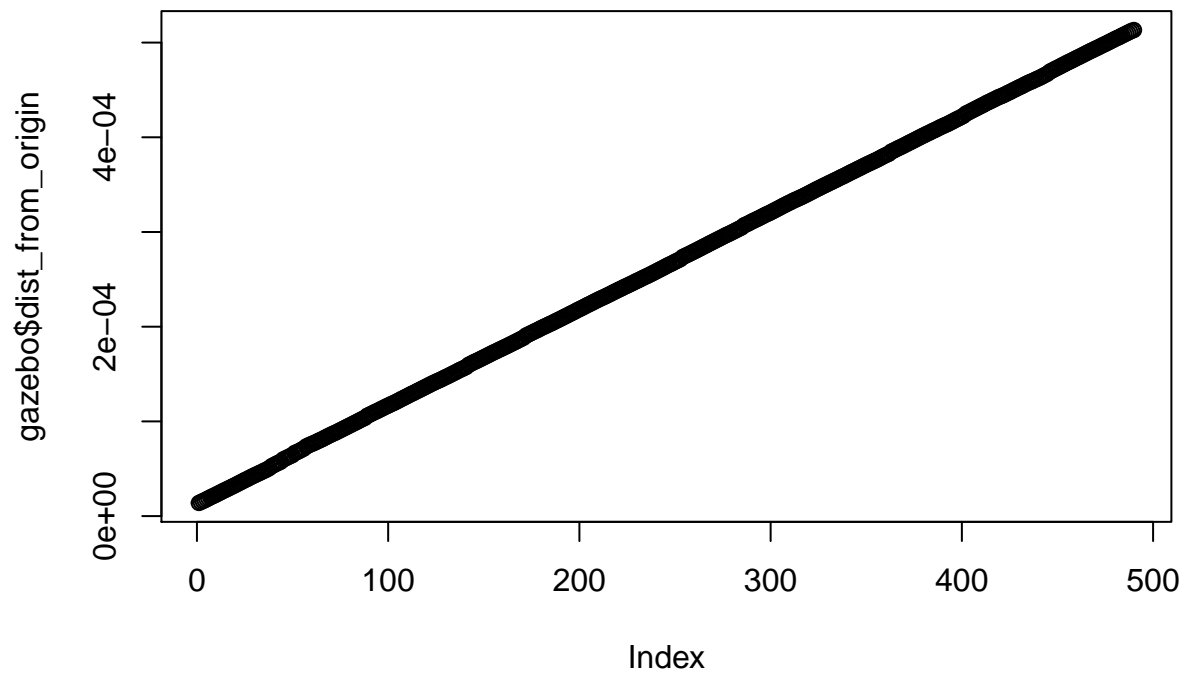
X coordinate of robot over time



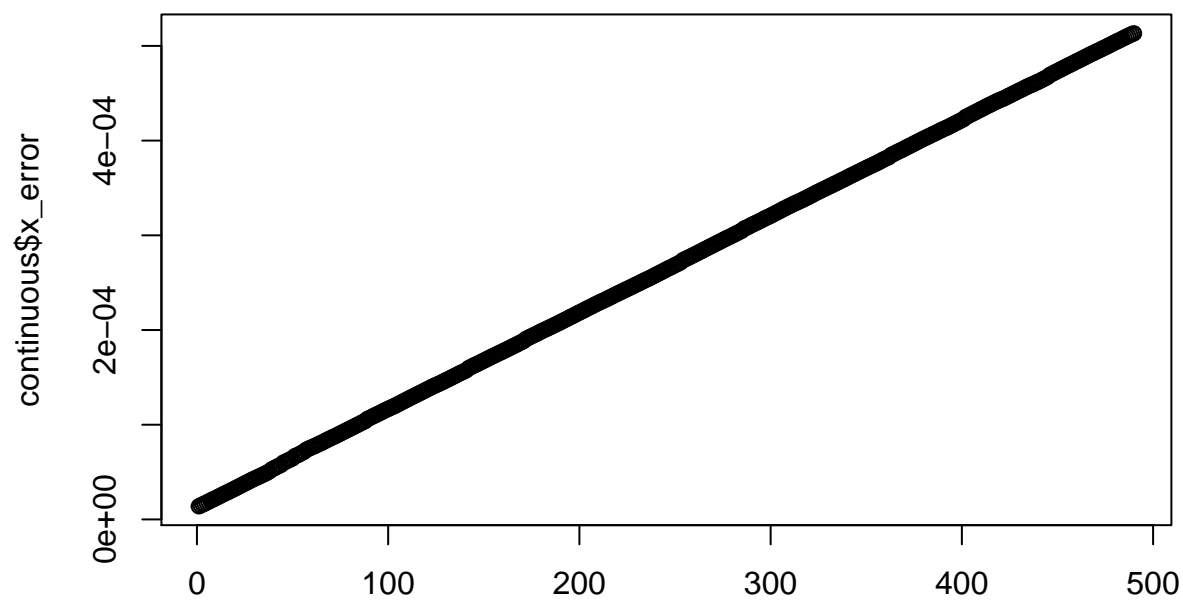
Y coordinate of robot over time



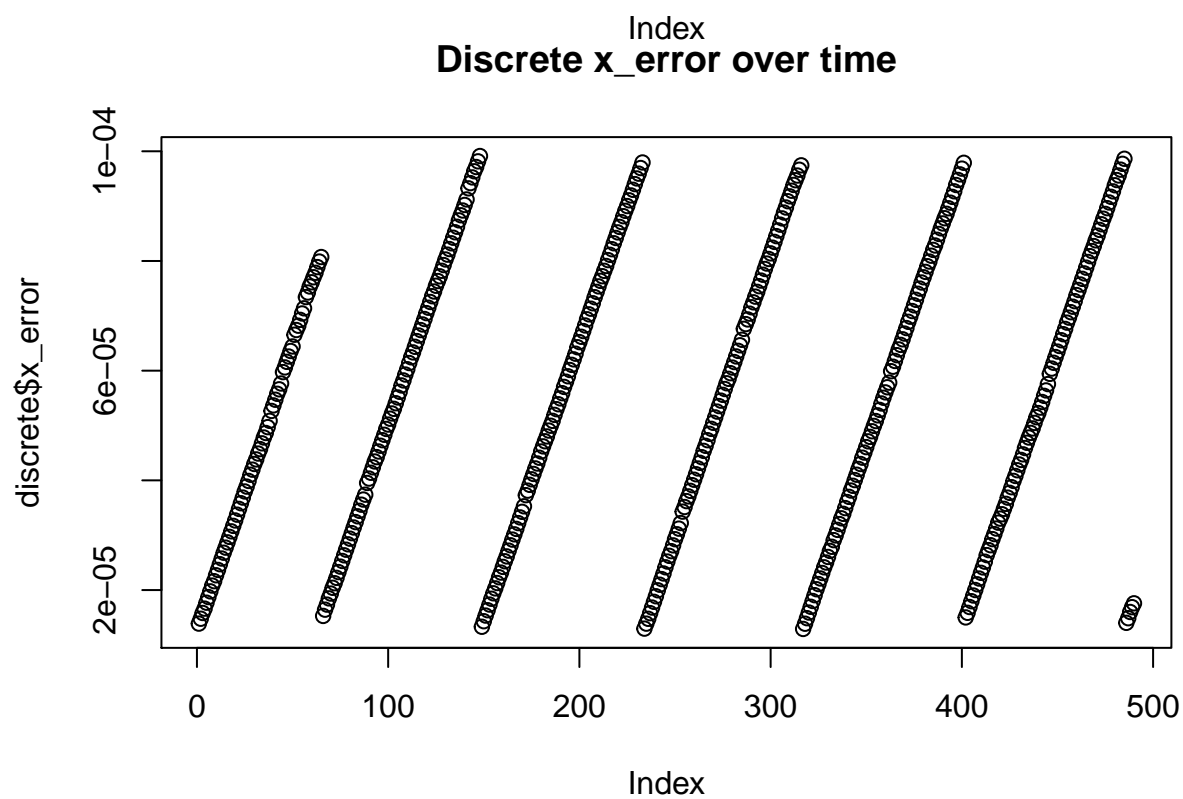
Distance from origin vs. time



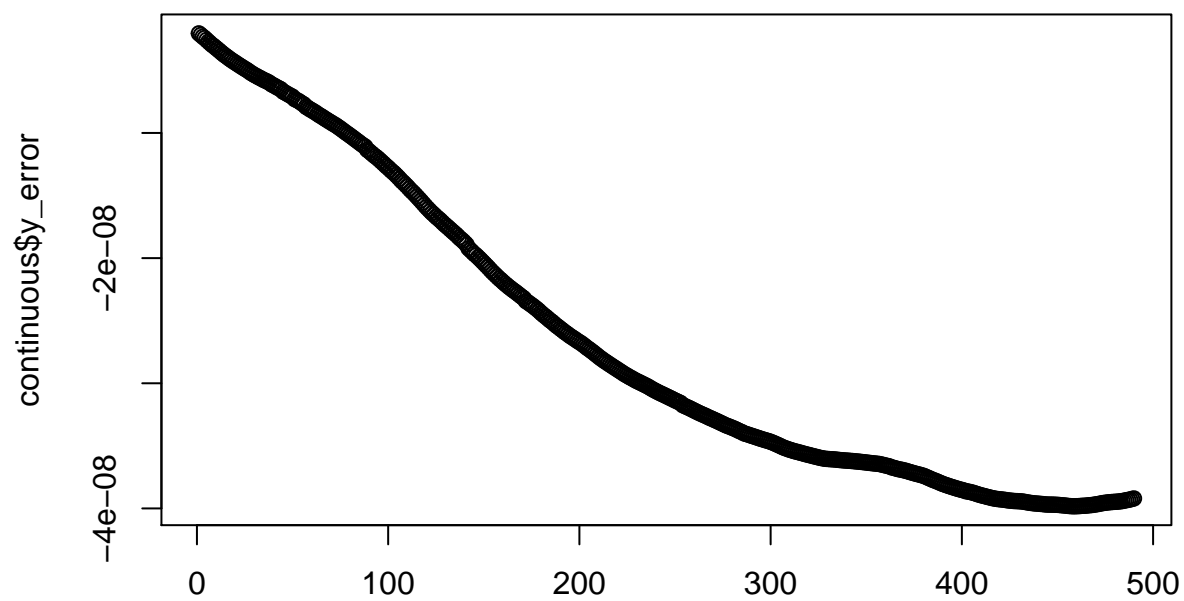
Continuous x_error over time



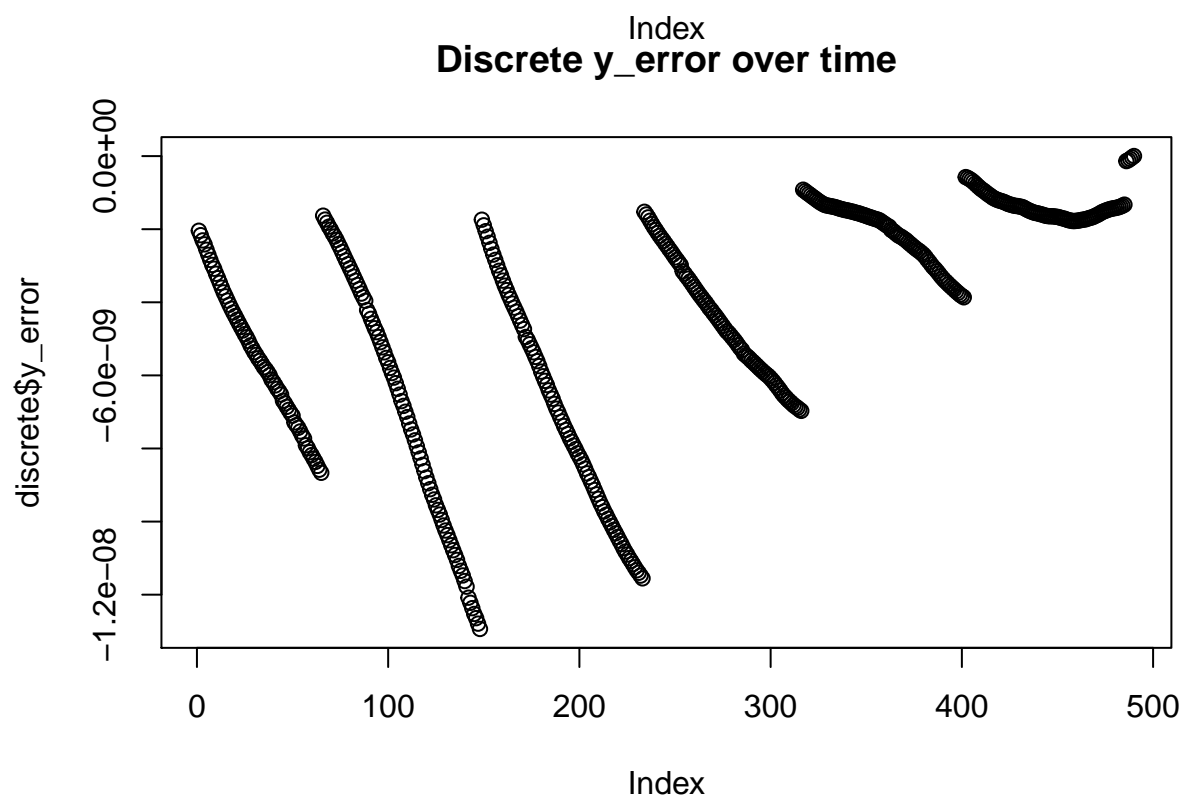
Discrete x_error over time



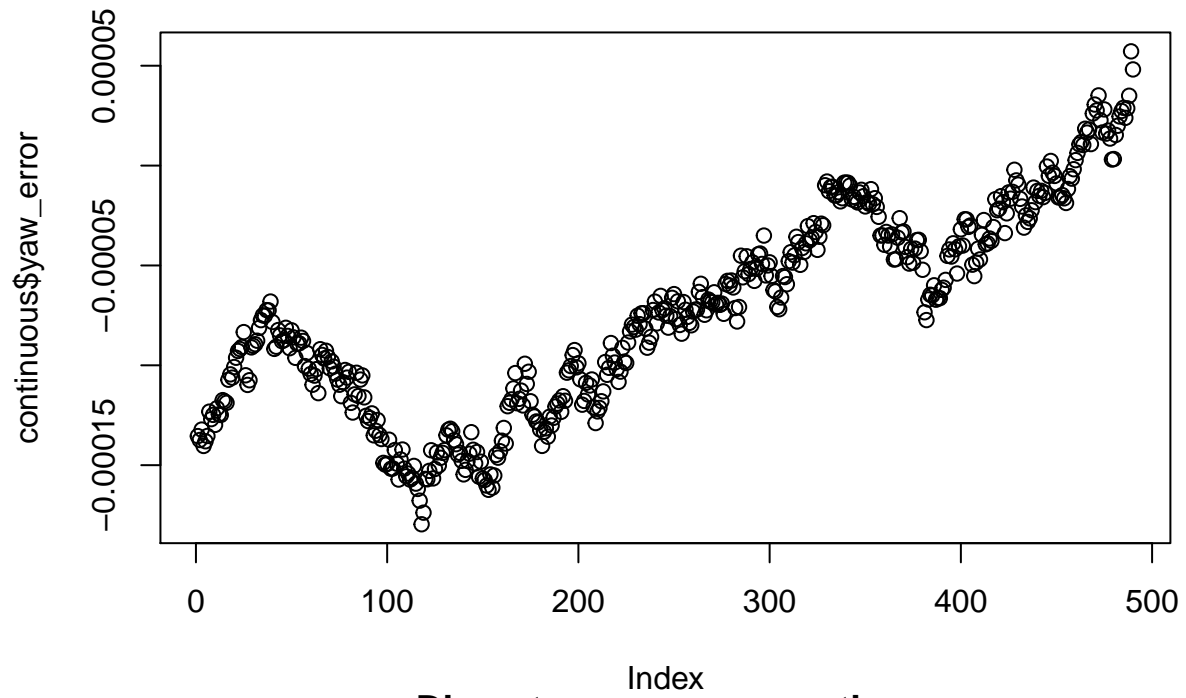
Continuous y_error over time



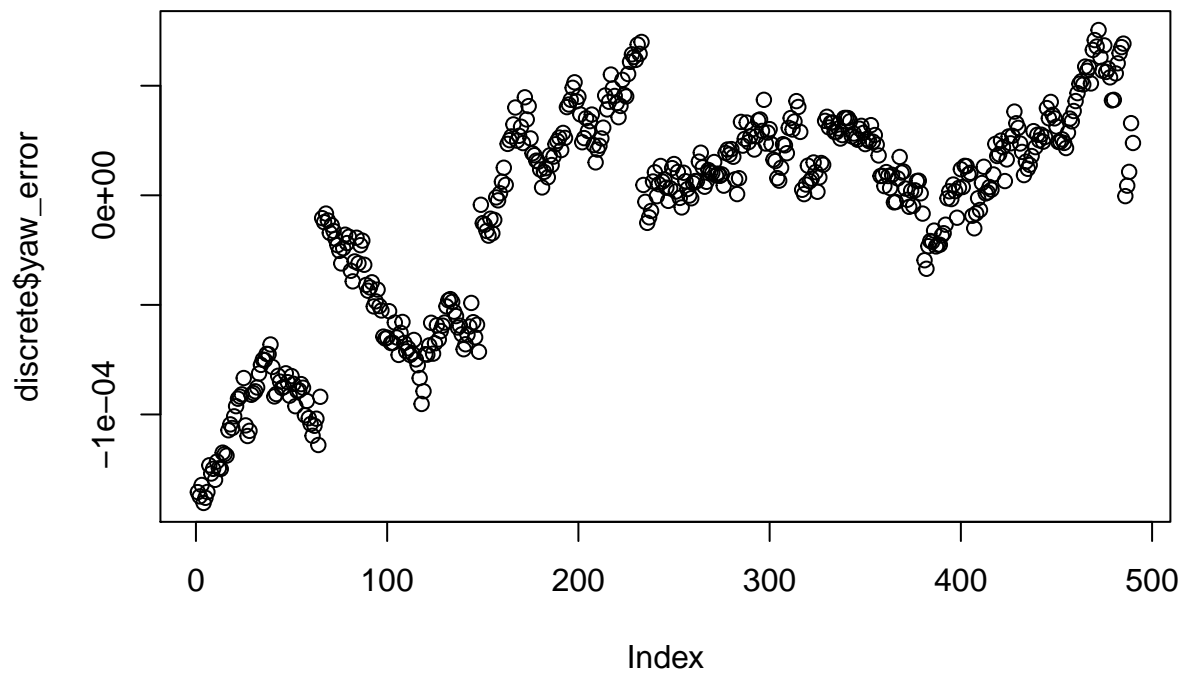
Discrete y_error over time



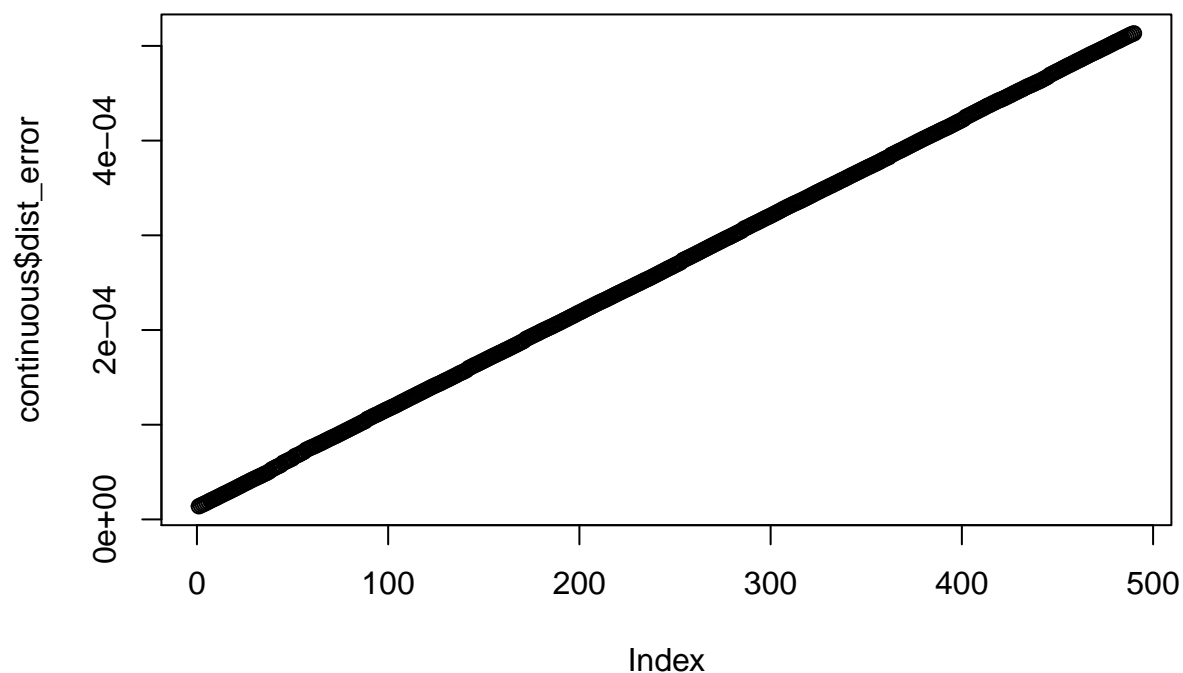
Continuous yaw error over time



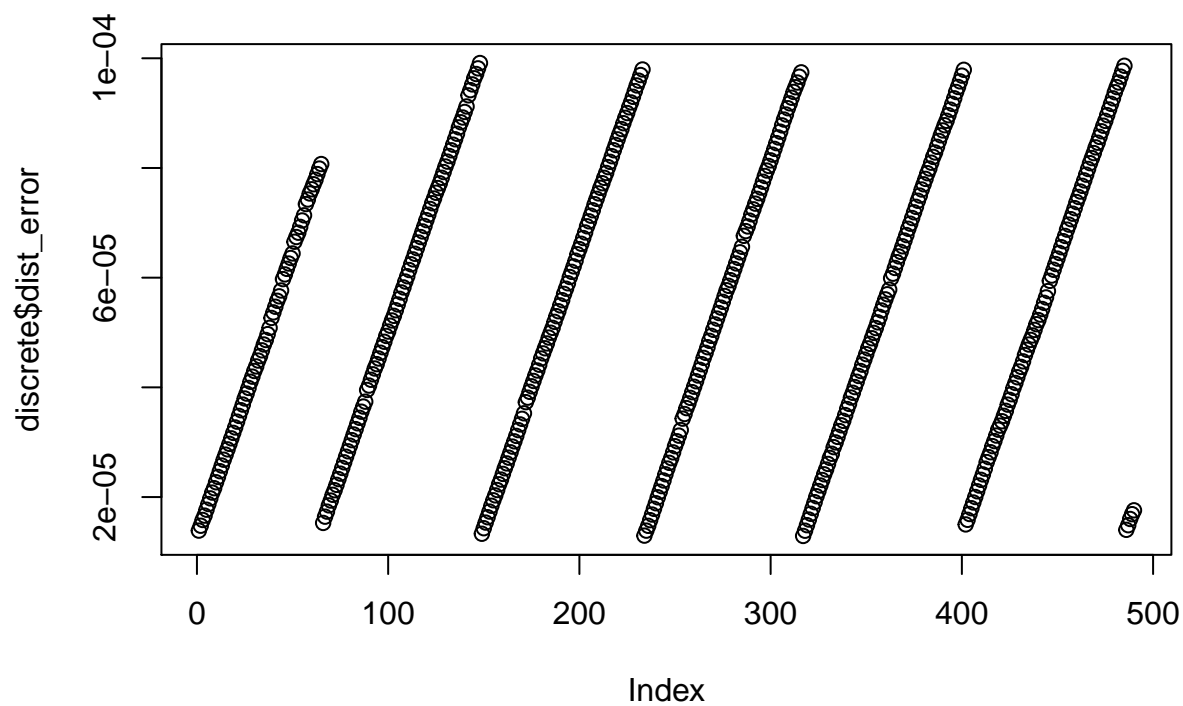
Discrete yaw error over time



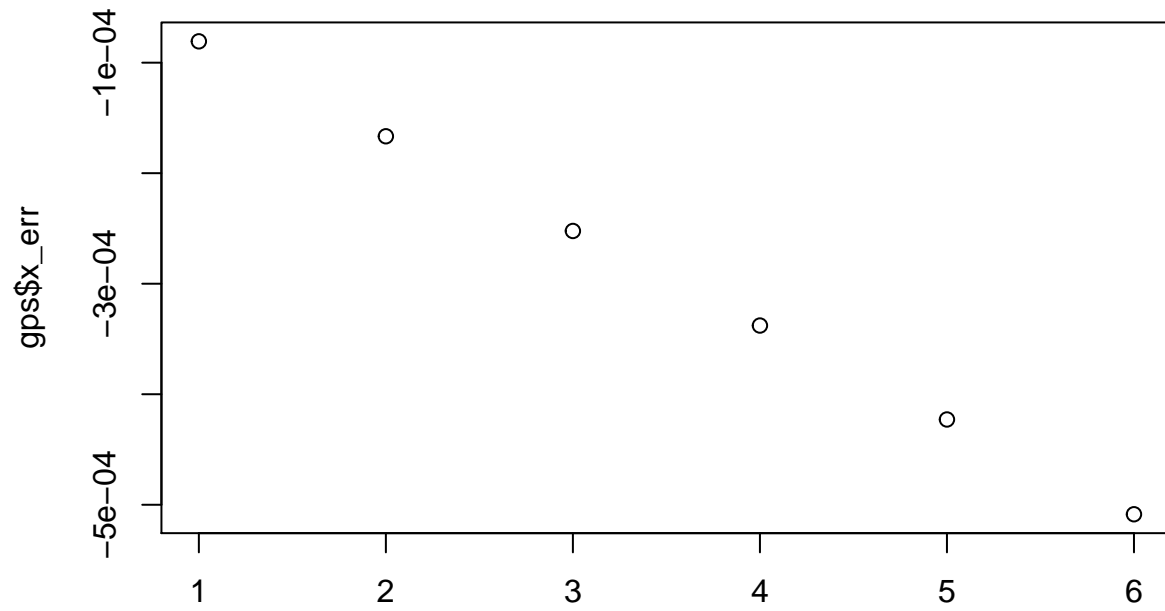
Continuous total distance error over time



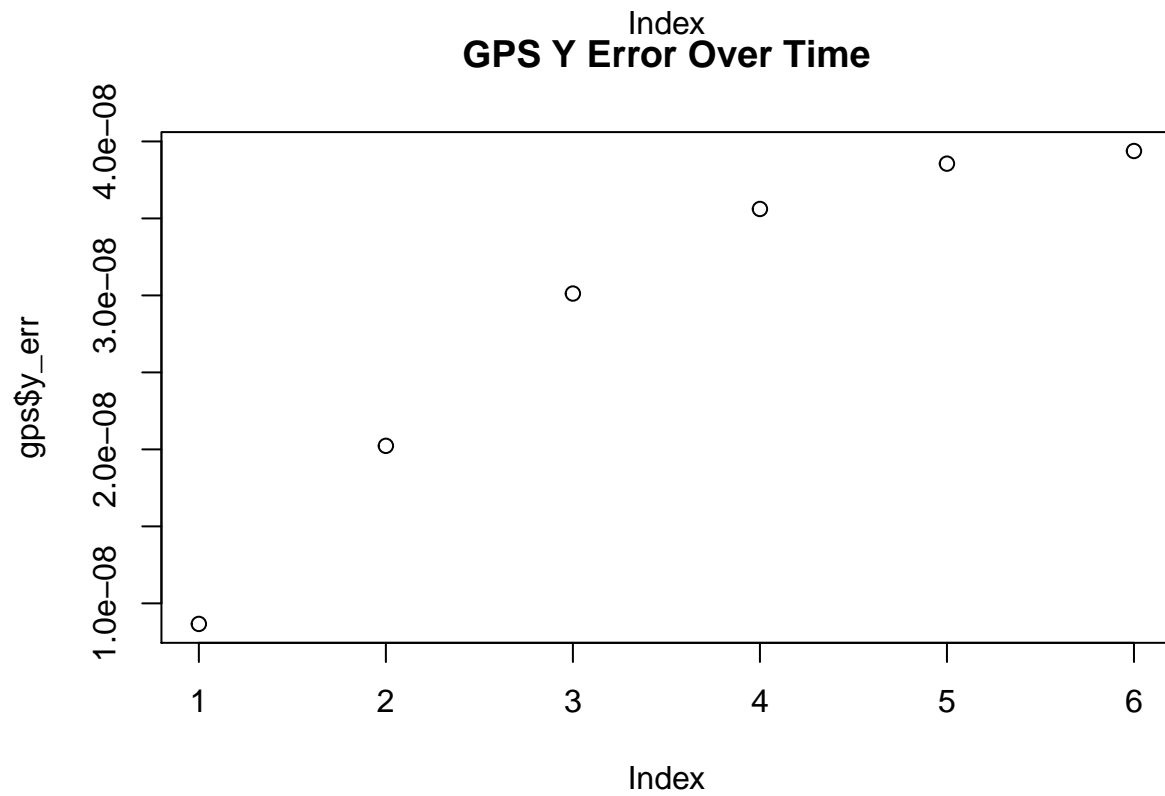
Discrete total distance error over time



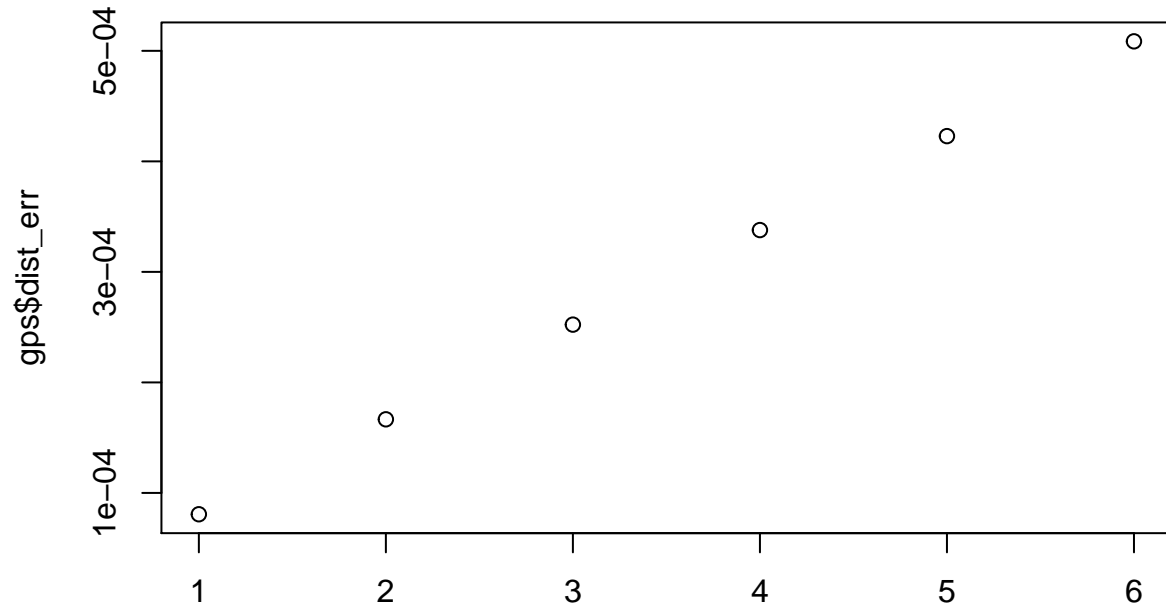
GPS X Error Over Time



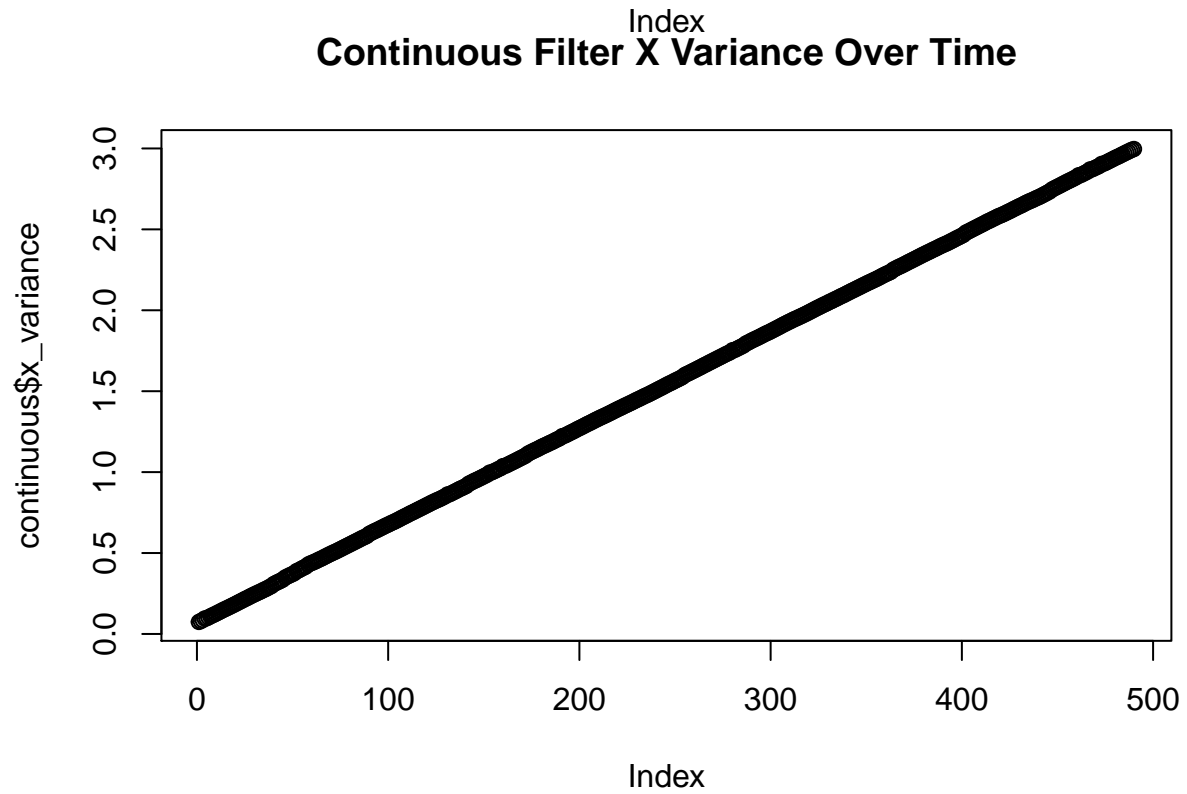
GPS Y Error Over Time



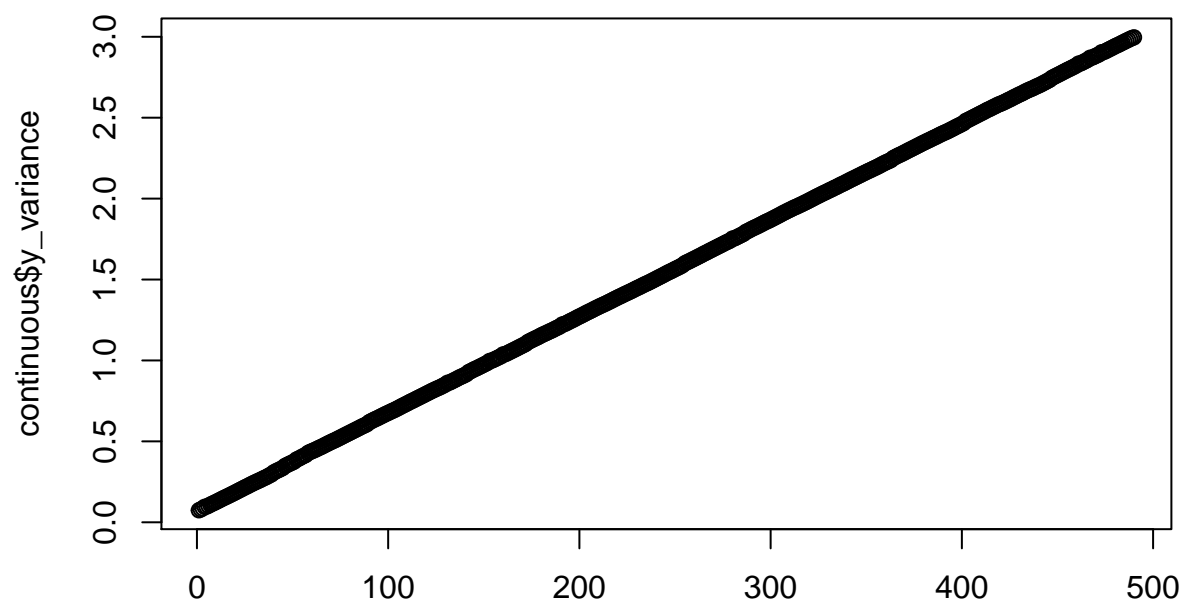
GPS Horizontal Distance Error Over Time



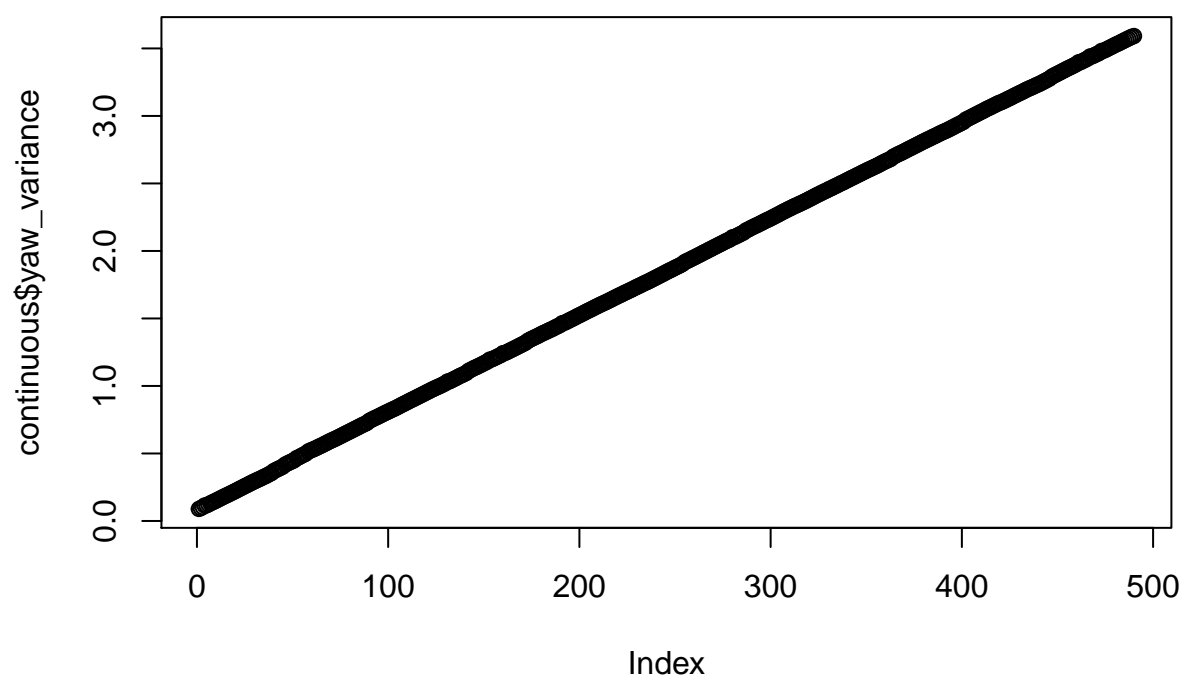
Continuous Filter X Variance Over Time



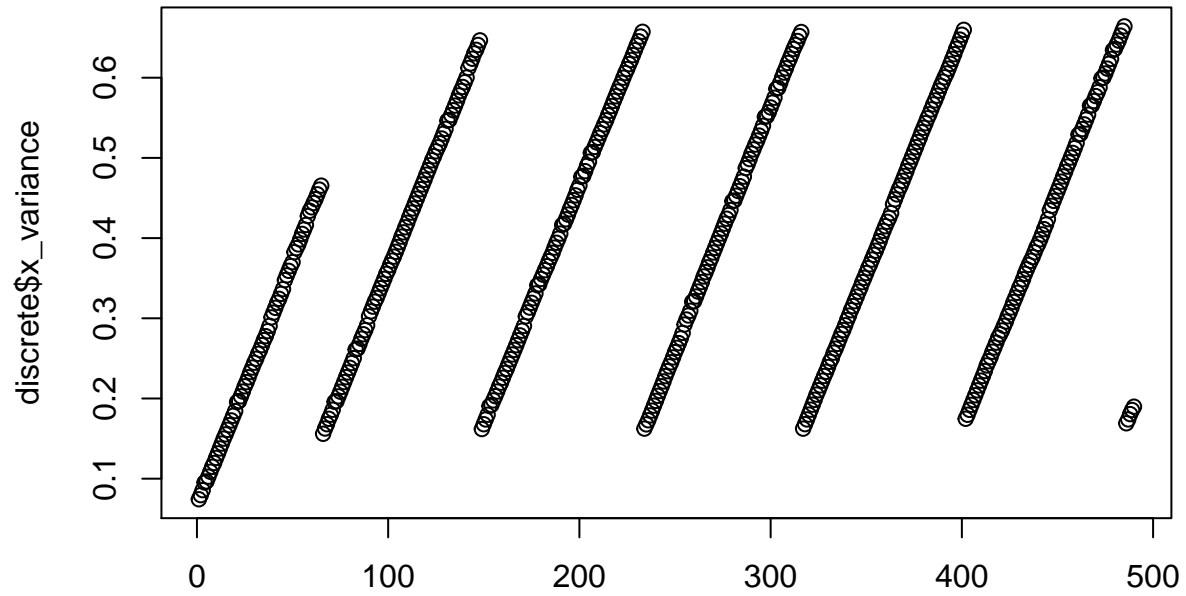
Continuous Filter Y Variance Over Time



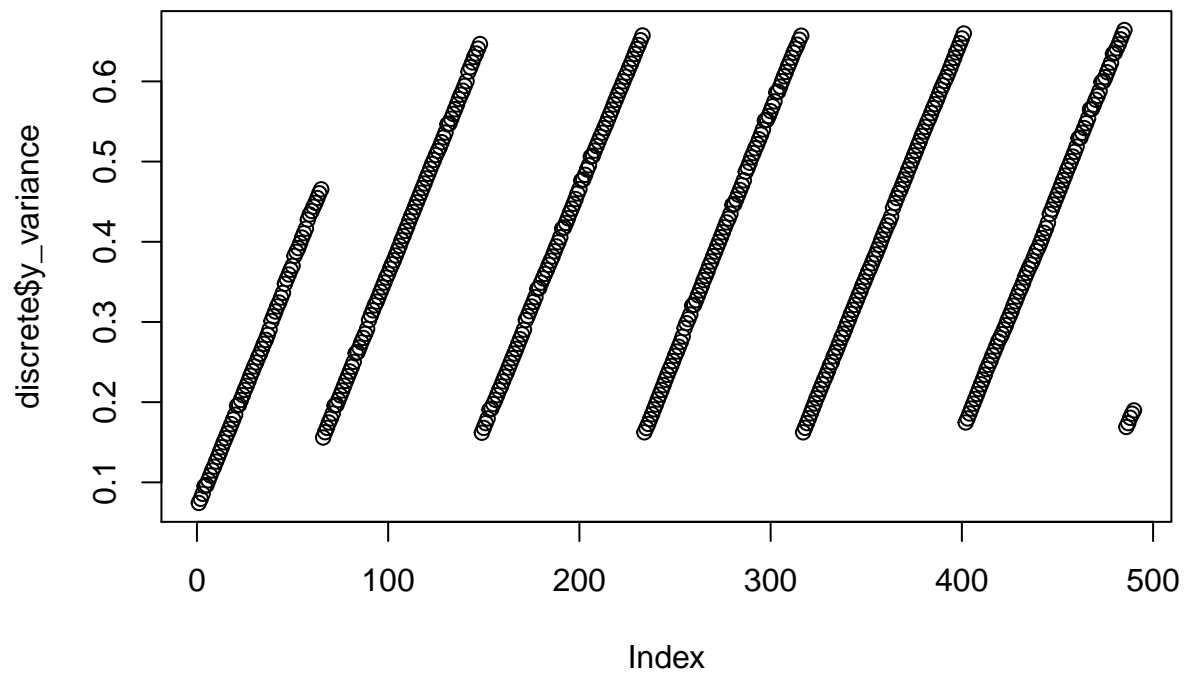
Continuous Filter Yaw Variance Over Time



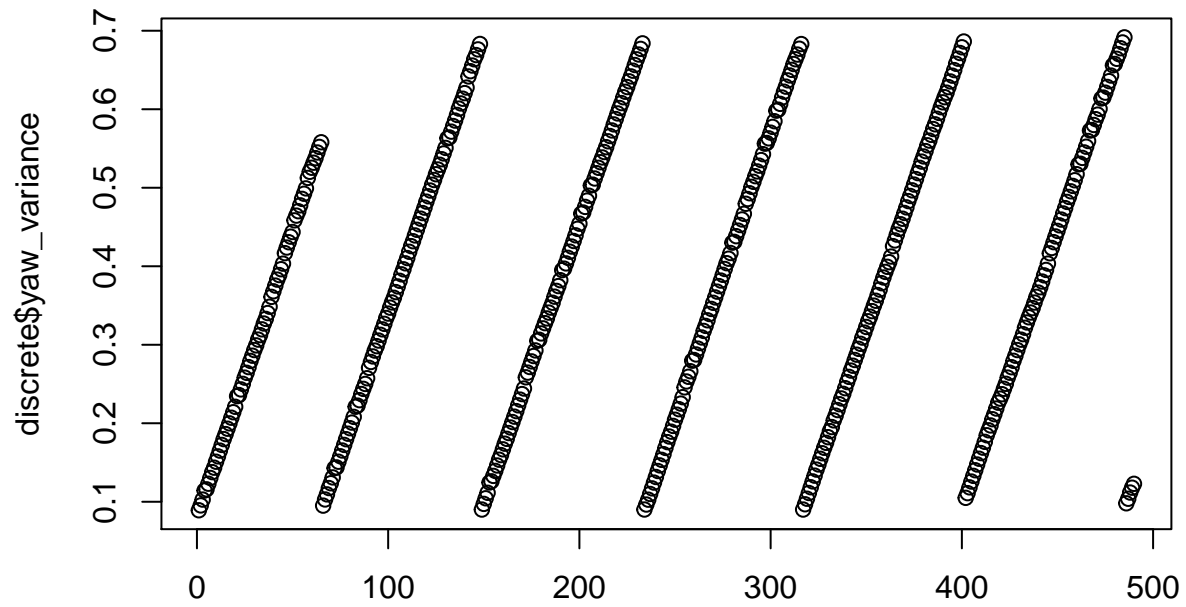
Discrete Filter X Variance Over Time



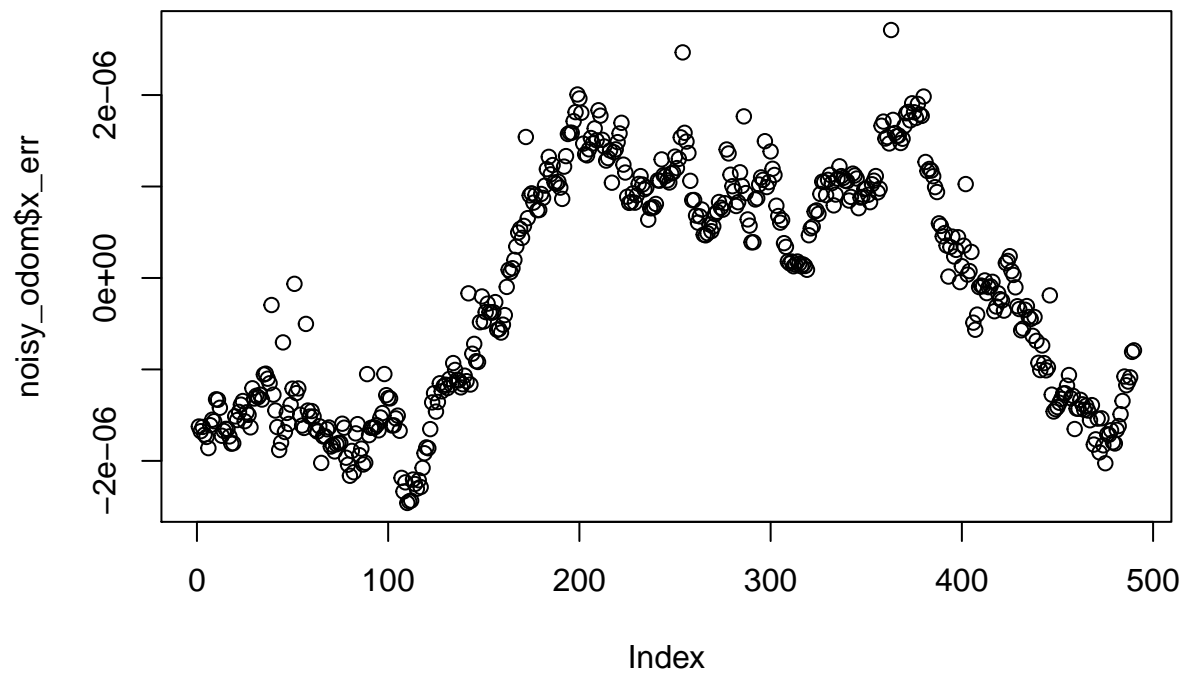
Discrete Filter Y Variance Over Time



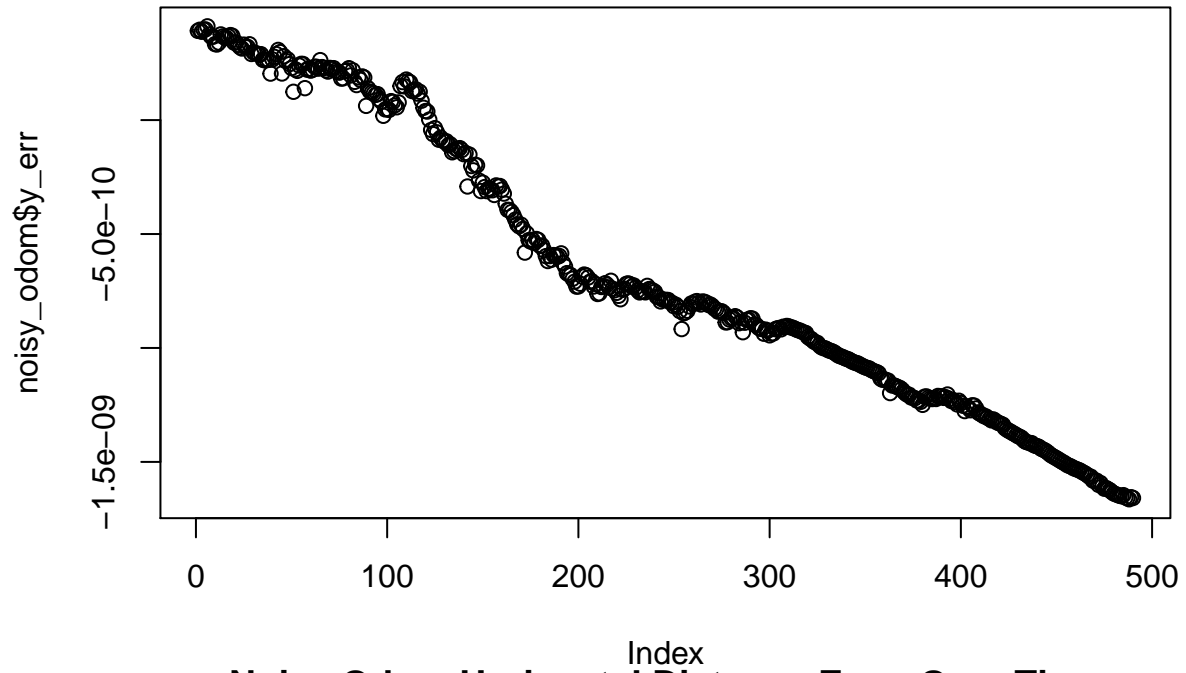
Discrete Filter Yaw Variance Over Time



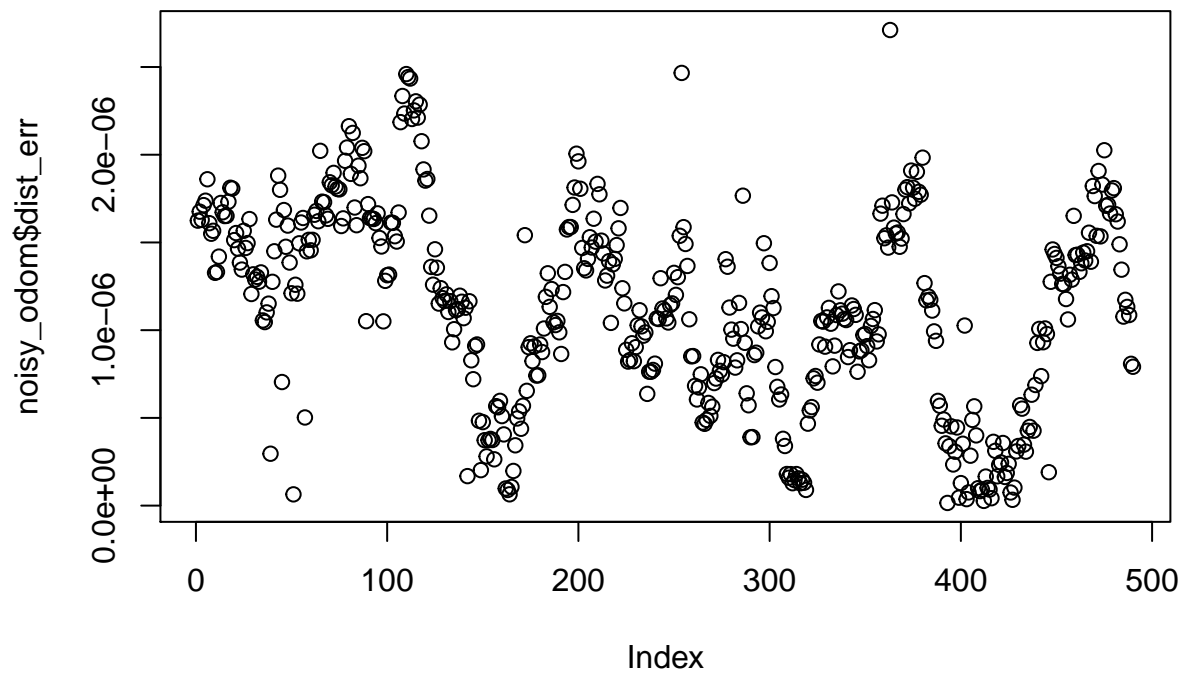
Noisy Odom X Error Over Time



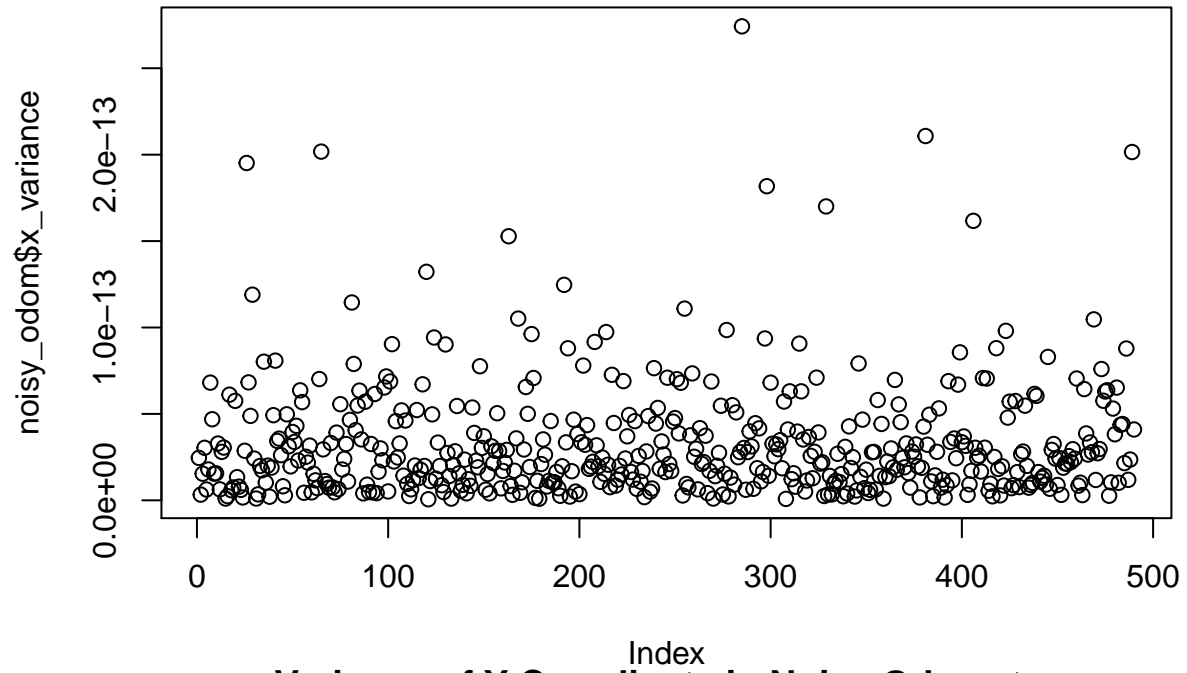
Noisy Odom Y Error Over Time



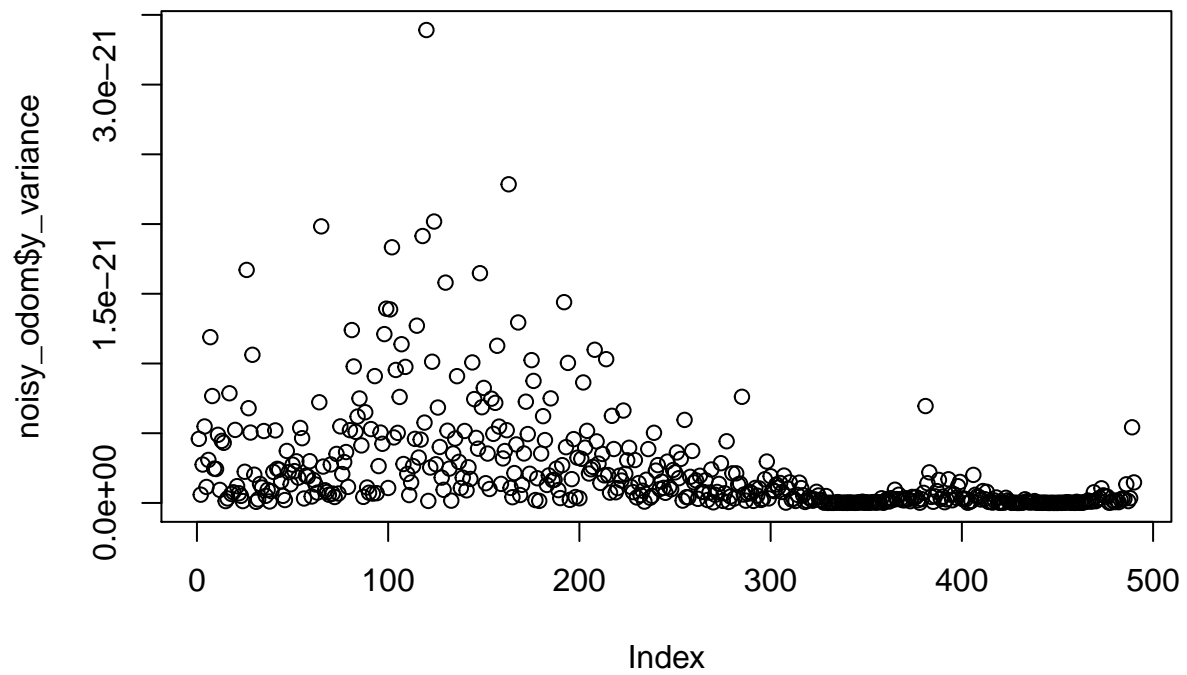
Noisy Odom Horizontal Distance Error Over Time



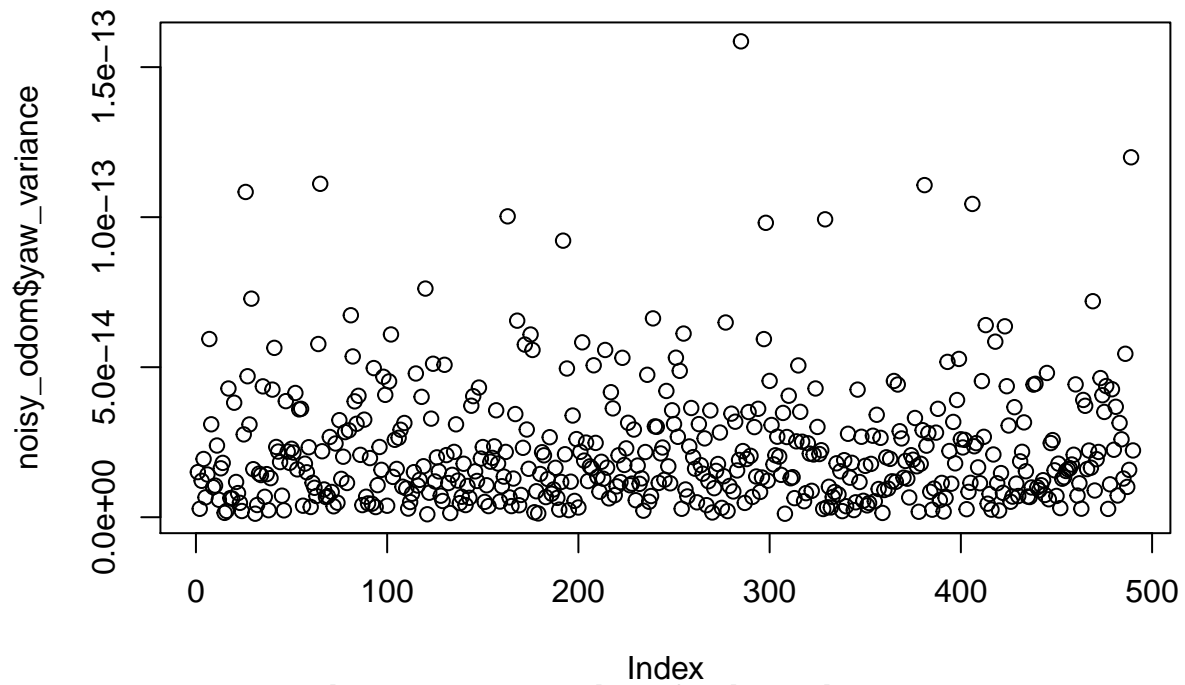
Variance of X Coordinate in Noisy Odometry



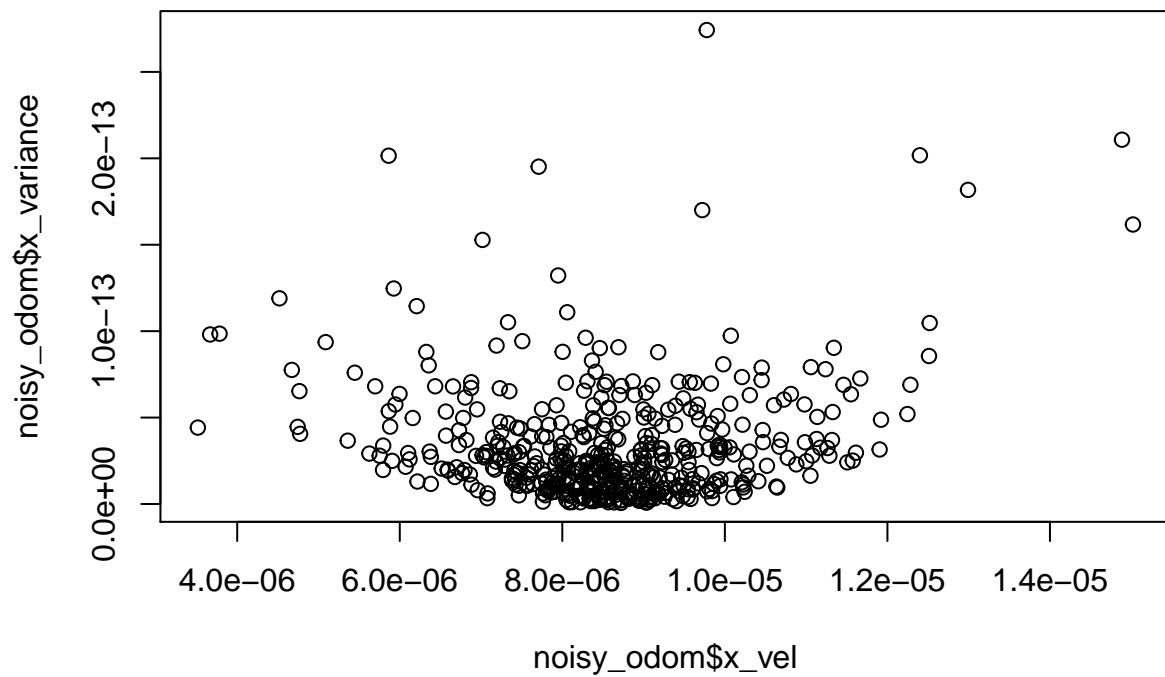
Variance of Y Coordinate in Noisy Odometry



Variance of Yaw Coordinate in Noisy Odometry



Variance vs. Velocity of X in Noisy Odometry



Variance vs. Velocity of Yaw in Noisy Odometry

