

one_stationary Turtlebot 1 Report

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```
## Warning in gazebo$x_position - gps$x: longer object length is not a
## multiple of shorter object length

## Warning in `[<-.data.table`(x, j = name, value = value): Supplied 15592
## items to be assigned to 180 items of column 'x_err' (15412 unused)

## Warning in gazebo$y_position - gps$y: longer object length is not a
## multiple of shorter object length

## Warning in `[<-.data.table`(x, j = name, value = value): Supplied 15592
## items to be assigned to 180 items of column 'y_err' (15412 unused)
```

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

The runtime of this experiment was 0 hours, 25 minutes, and 59.2 seconds.

The total number of external pose measurements received 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.
## -2.049e-06 2.075e-05 2.507e-05 2.293e-05 2.802e-05 3.462e-05
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## 4.426e-10 1.333e-07 2.299e-07 2.758e-07 4.195e-07 7.174e-07
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -9.916e-06 2.757e-05 4.186e-05 3.913e-05 5.001e-05 8.533e-05
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## 2.980e-09 2.076e-05 2.508e-05 2.294e-05 2.803e-05 3.462e-05
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -4.63600 -0.60010  0.02317 -0.02916  0.65900  3.62900
```

```

summary(discrete$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.16700 -0.80080  0.03251 -0.02557  0.58730  2.87500

summary(discrete$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -1.044e-04  1.198e-06 2.340e-05 2.787e-05 5.102e-05 1.693e-04

summary(discrete$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000015 0.599000 1.235000 1.383000 1.952000 5.571000

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -2.094e-06  2.021e-05 2.458e-05 2.244e-05 2.751e-05 3.351e-05

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 4.101e-10 1.316e-07 2.271e-07 2.731e-07 4.152e-07 7.059e-07

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 2.980e-09 2.022e-05 2.458e-05 2.245e-05 2.752e-05 3.352e-05

summary(gps$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -4.65000 -0.62220  0.01371 -0.04723  0.65660  3.62600

summary(gps$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.16700 -0.78560  0.03638 -0.02325  0.54560  2.87500

summary(gps$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.01949 0.60320 1.24500 1.39300 1.94500 5.58300

```

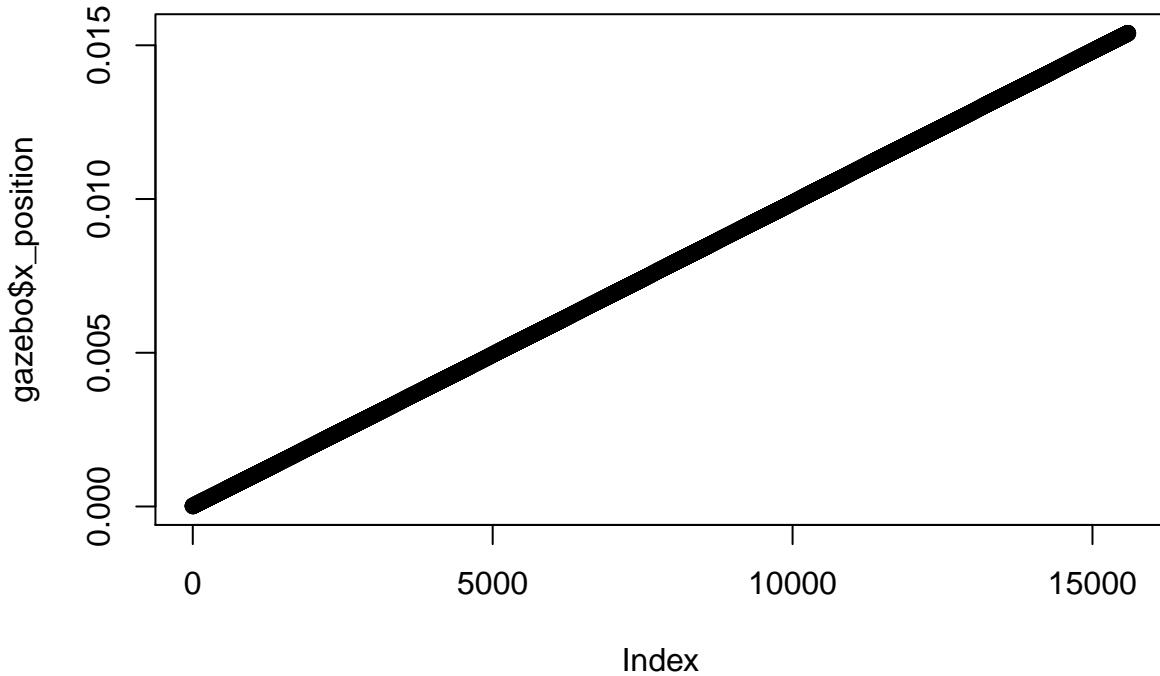
```

#sum(continuous$dist_error <= 0.25) / length(continuous$dist_error)
#sum(discrete$dist_error <= 0.25) / length(discrete$dist_error)

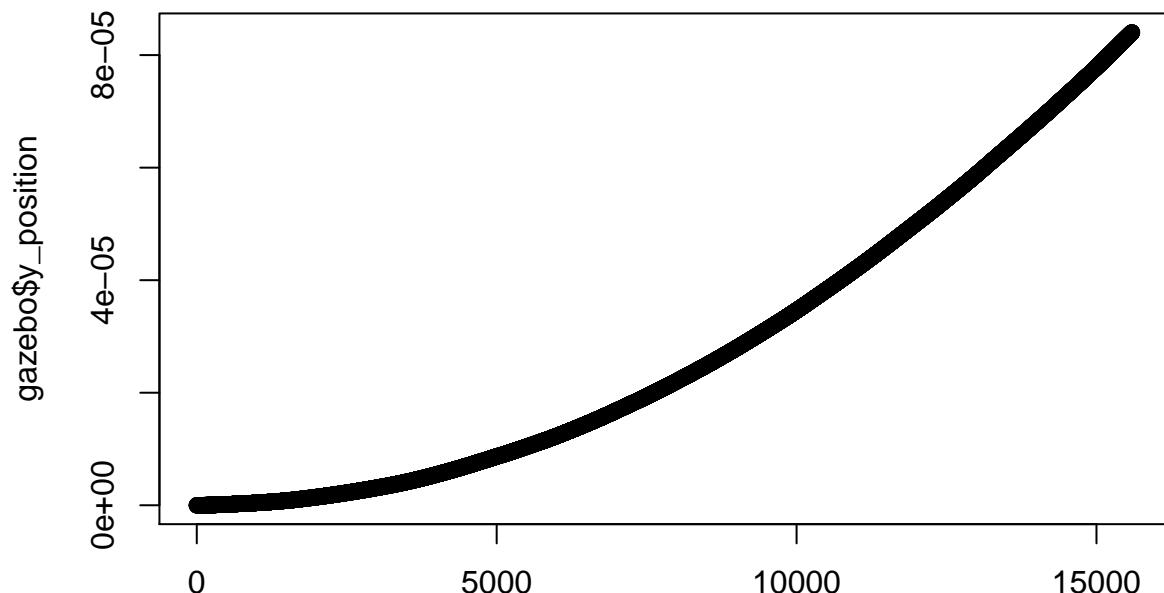
# shapiro.test(noisy_odom$x_err)
# shapiro.test(noisy_odom$y_err)
# shapiro.test(noisy_odom$dist_err)
#
# shapiro.test(gps$x_err)
# shapiro.test(gps$y_err)
# shapiro.test(gps$dist_err)
#
# noisy_odom_fit_x <- fitdist(noisy_odom$x_err, "norm")
# noisy_odom_fit_y <- fitdist(noisy_odom$y_err, "norm")
# noisy_odom_fit_dist <- fitdist(noisy_odom$dist_err, "norm")
#
# summary(noisy_odom_fit_x)
# summary(noisy_odom_fit_y)
# summary(noisy_odom_fit_dist)
#
# gps_fit_x <- fitdist(gps$x_err, "norm")
# gps_fit_y <- fitdist(gps$y_err, "norm")
# gps_fit_dist <- fitdist(gps$dist_err, "norm")
#
# summary(gps_fit_x)
# summary(gps_fit_y)
# summary(gps_fit_dist)

```

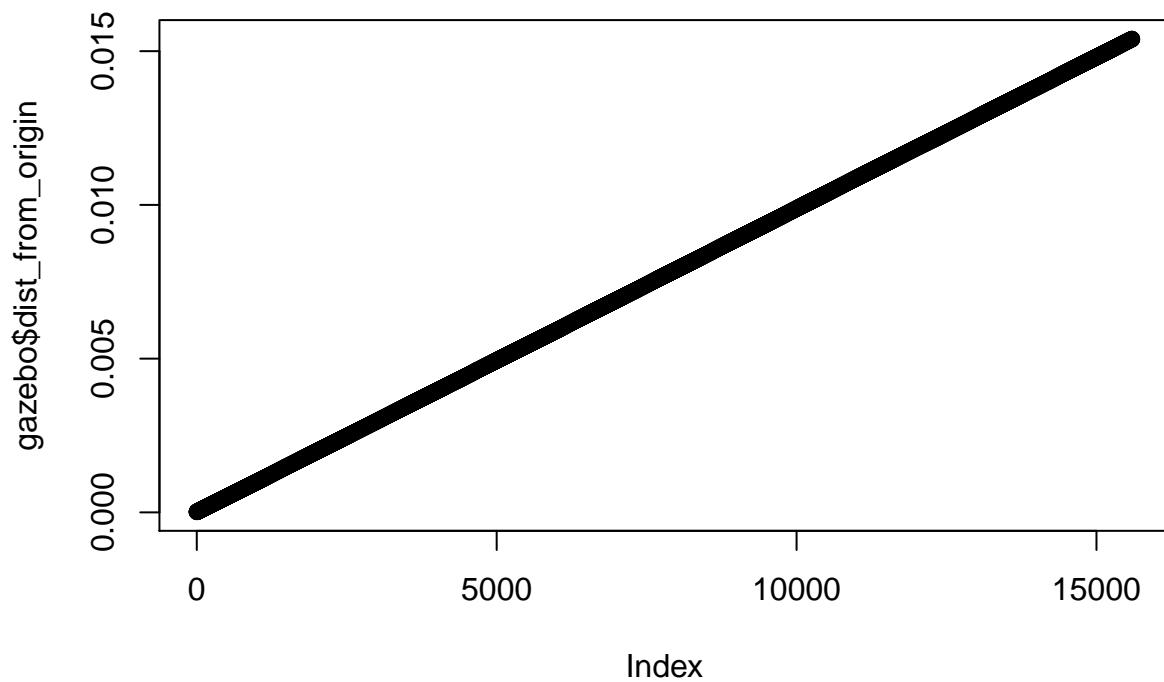
X coordinate of robot over time



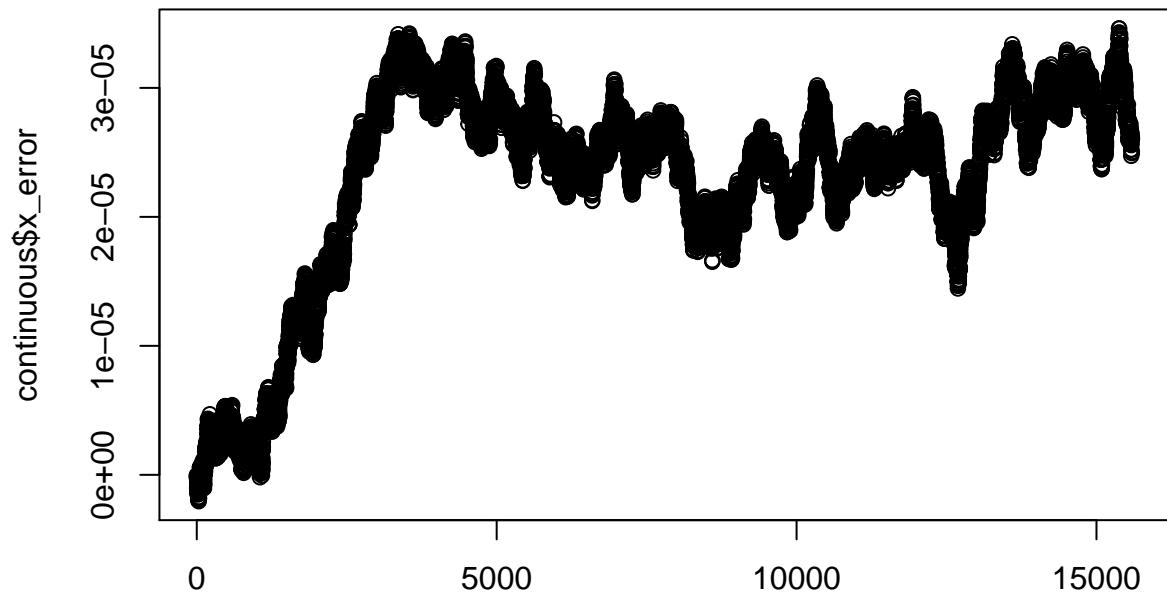
Y coordinate of robot over time



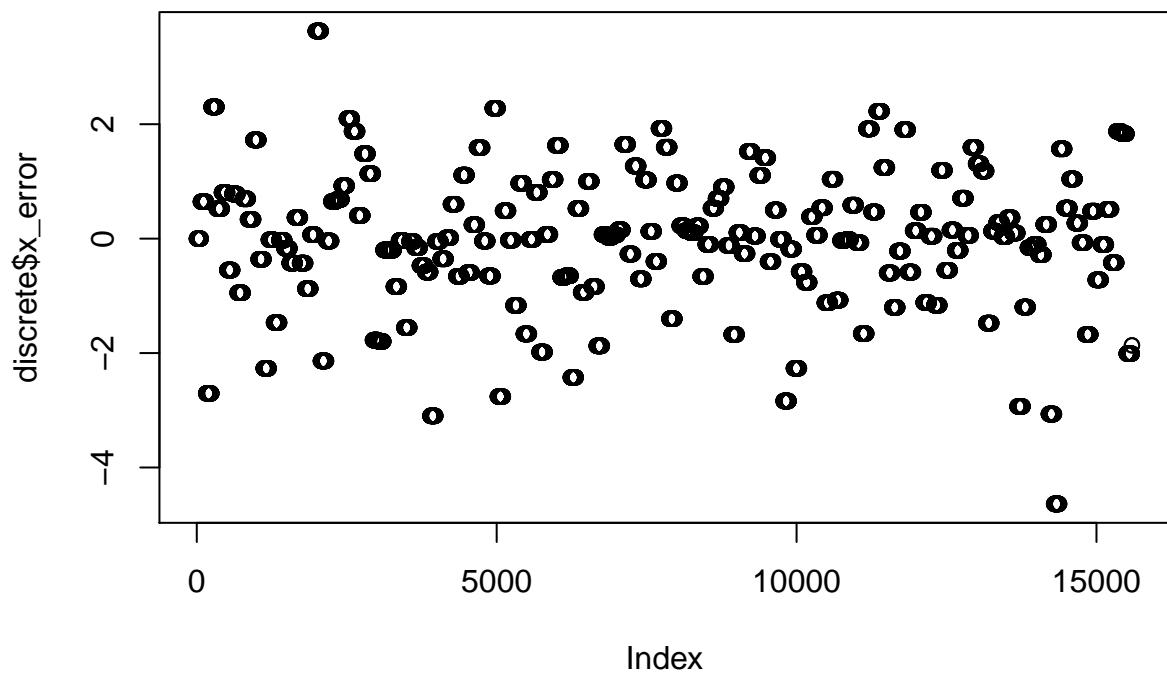
Distance from origin vs. time^{Index}



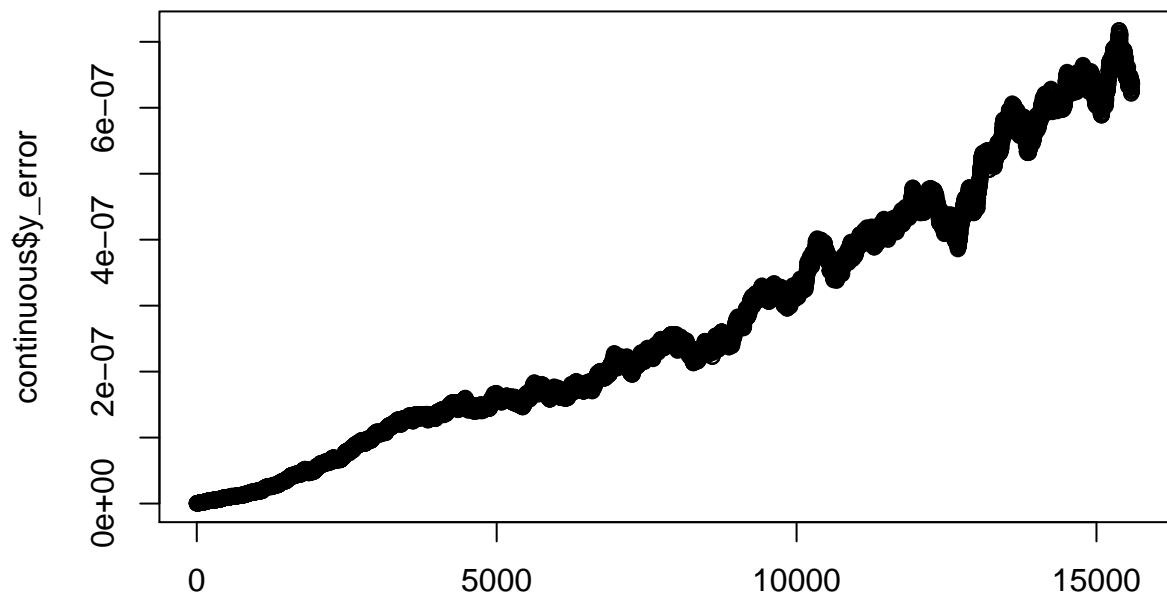
Continuous x_error over time



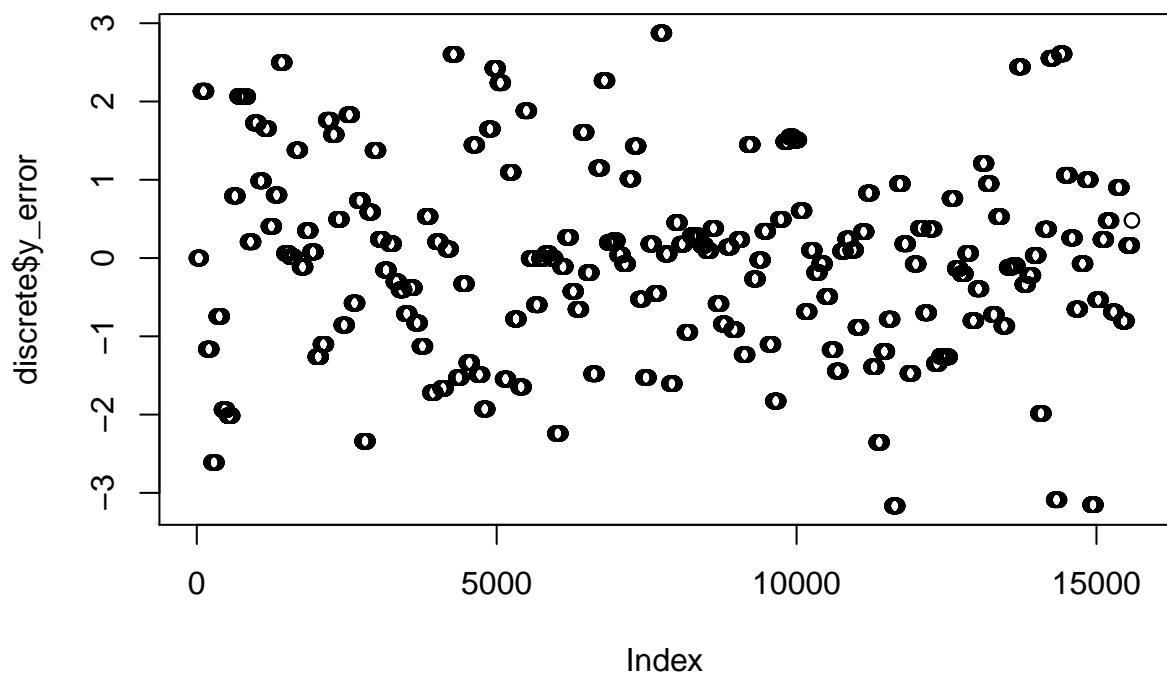
Discrete x_error over time



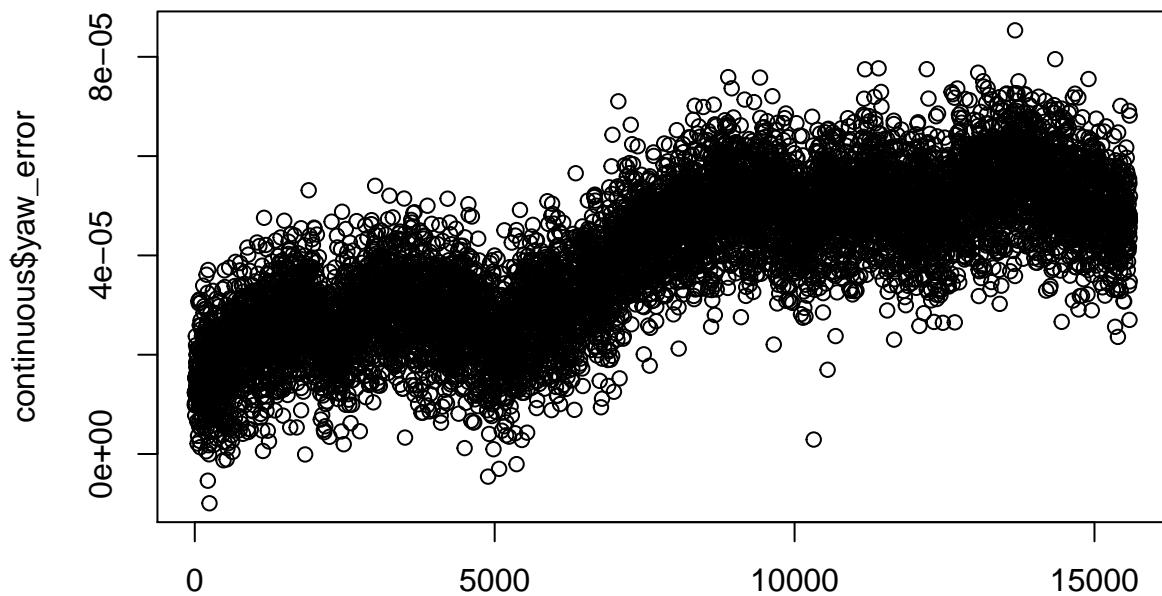
Continuous y_error over time



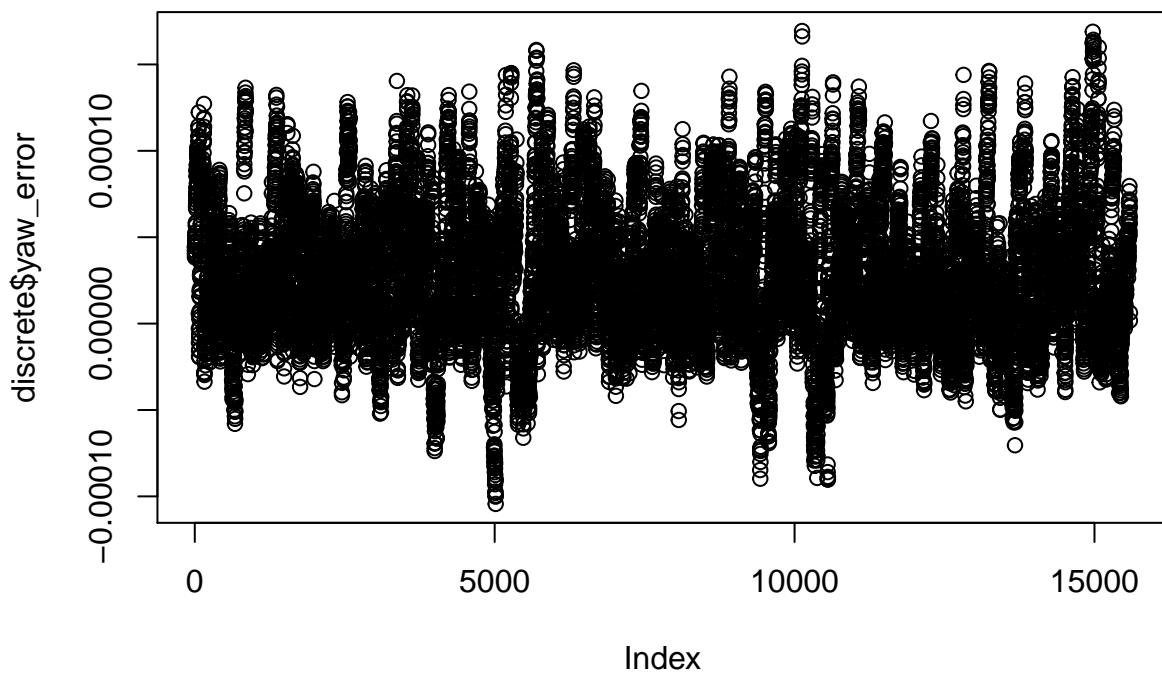
Discrete y_error over time



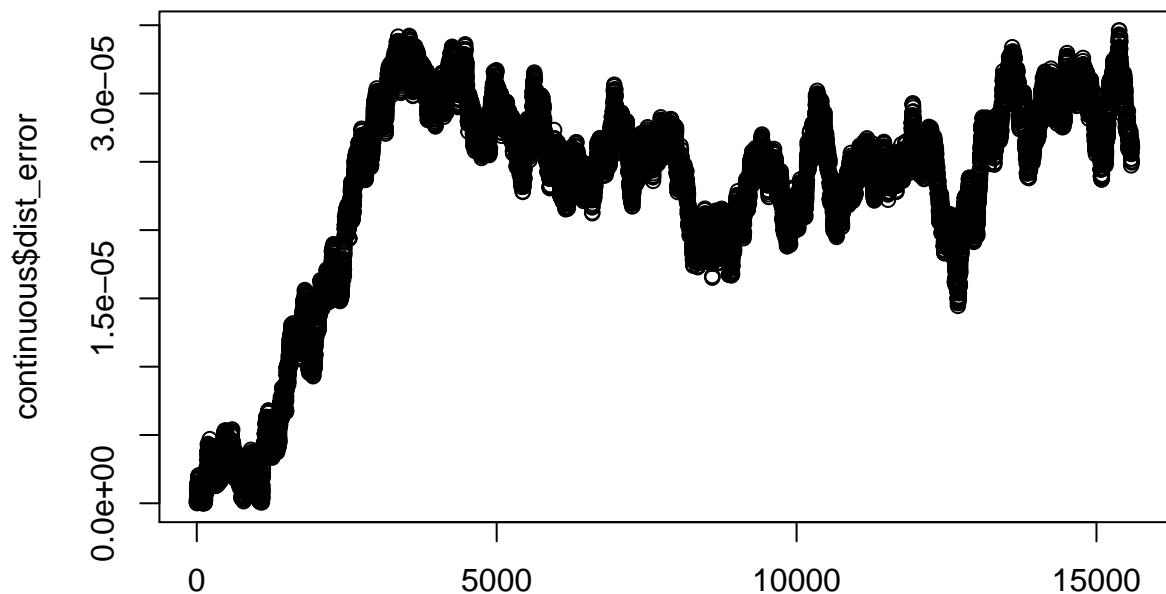
Continuous yaw error over time



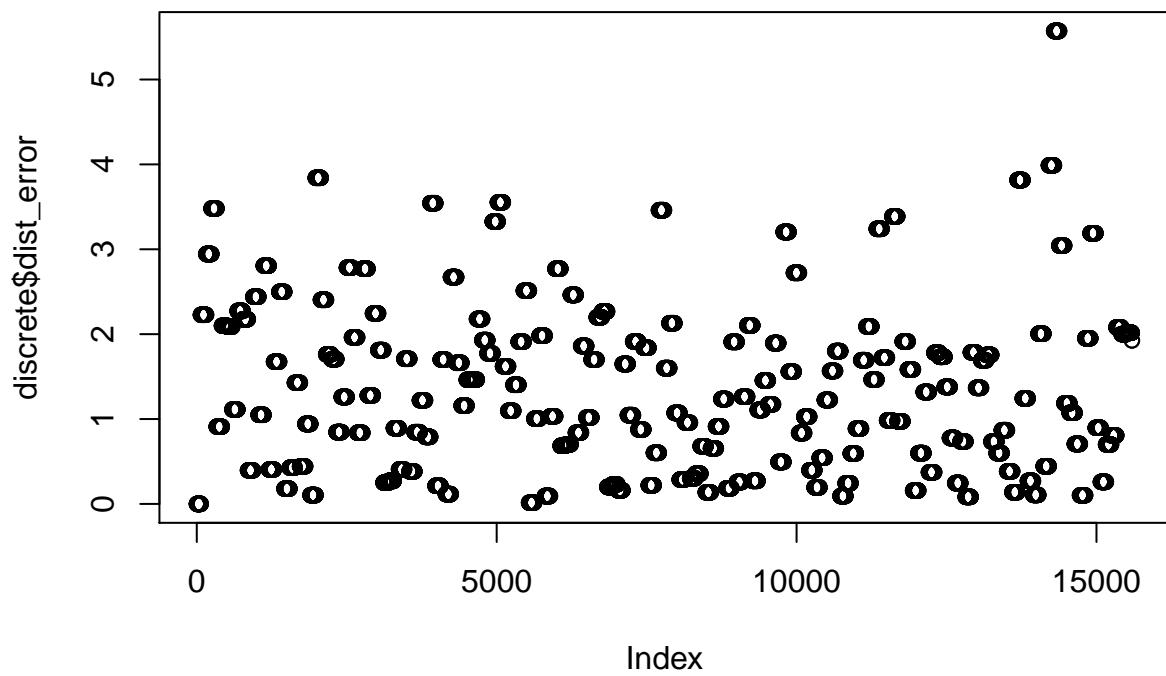
Discrete yaw error over time



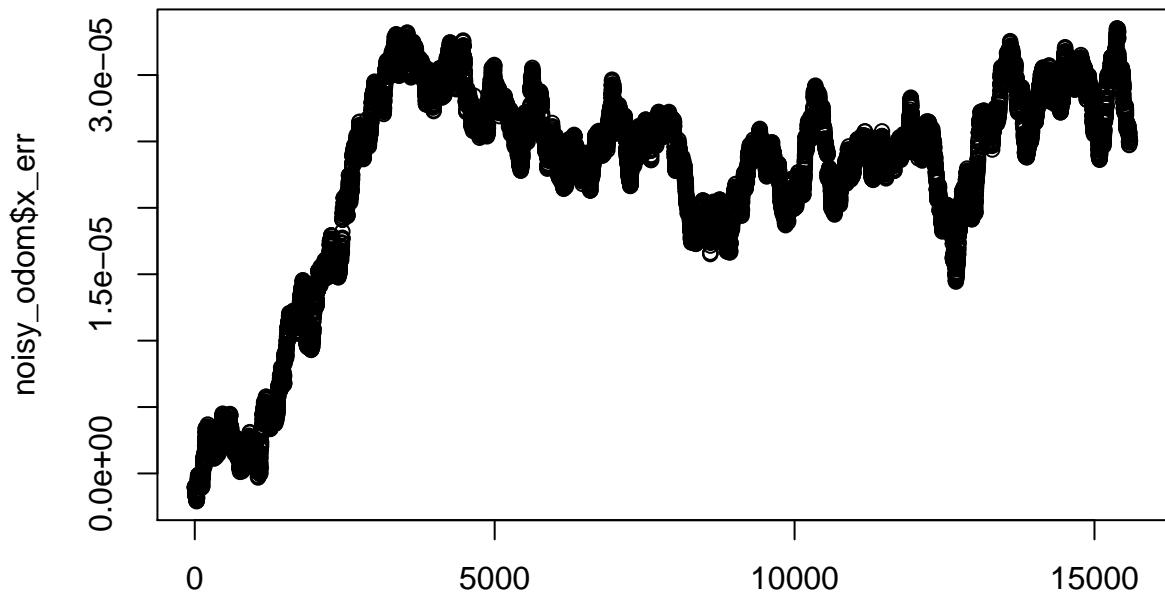
Continuous total distance error over time



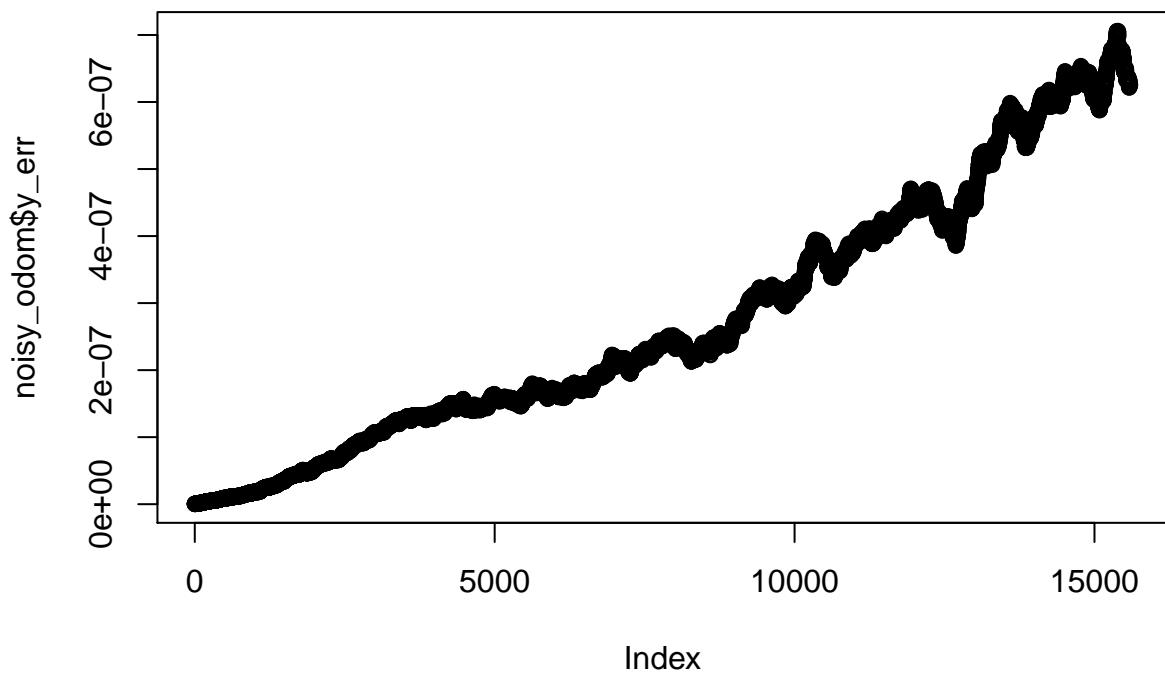
Discrete total distance error over time



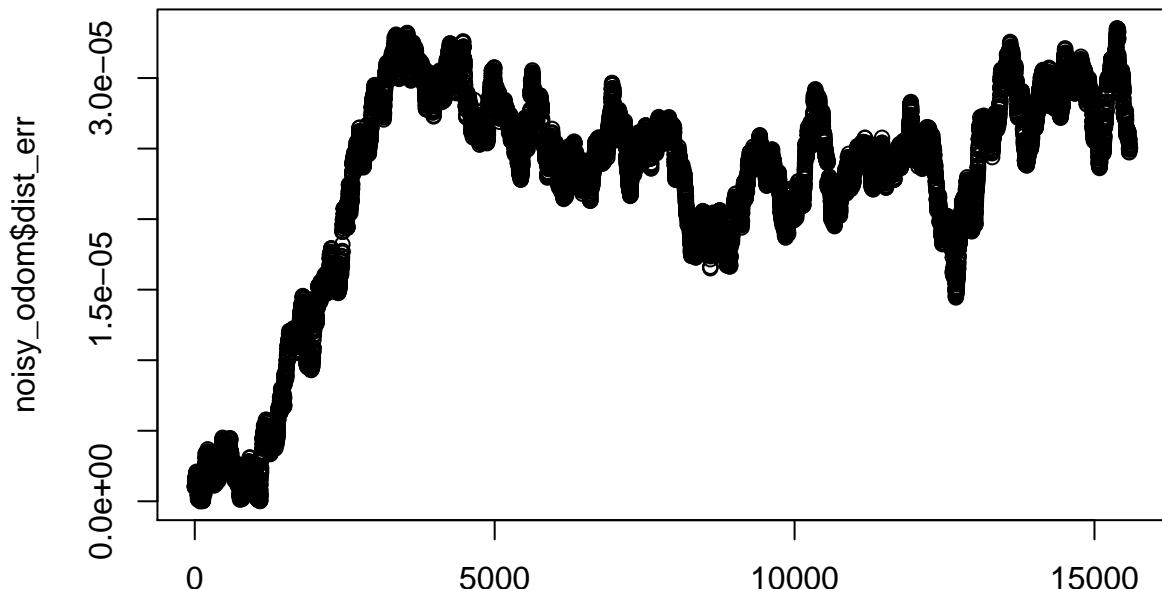
Noisy Odom X Error Over Time



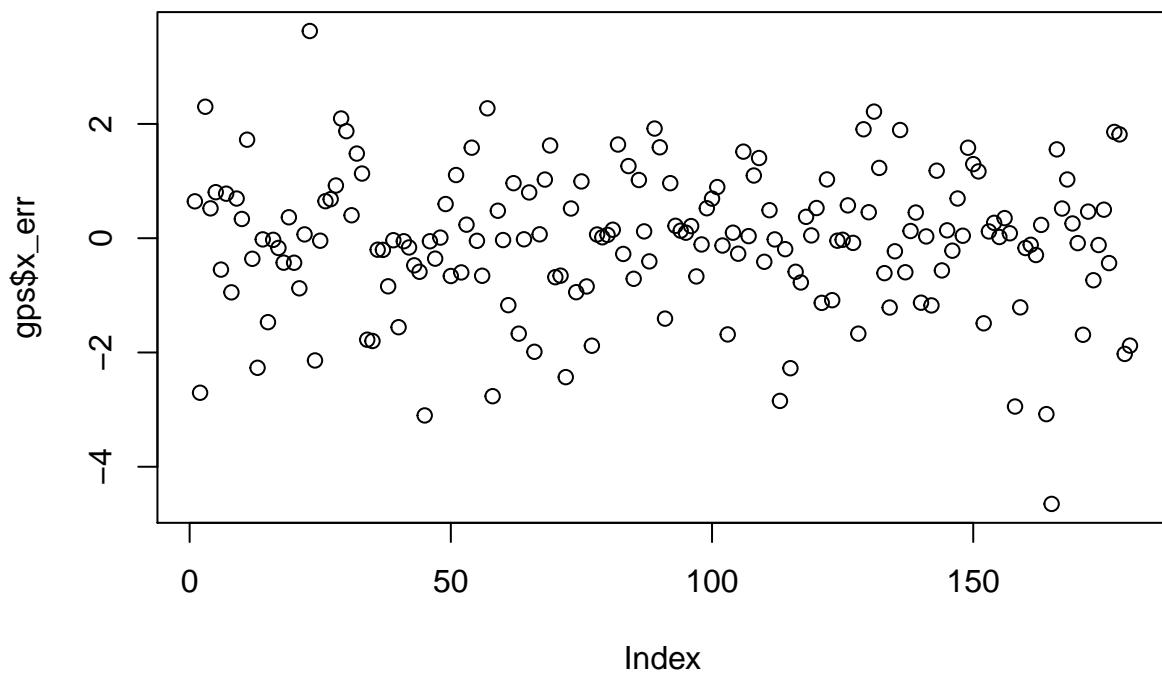
Noisy Odom Y Error Over Time



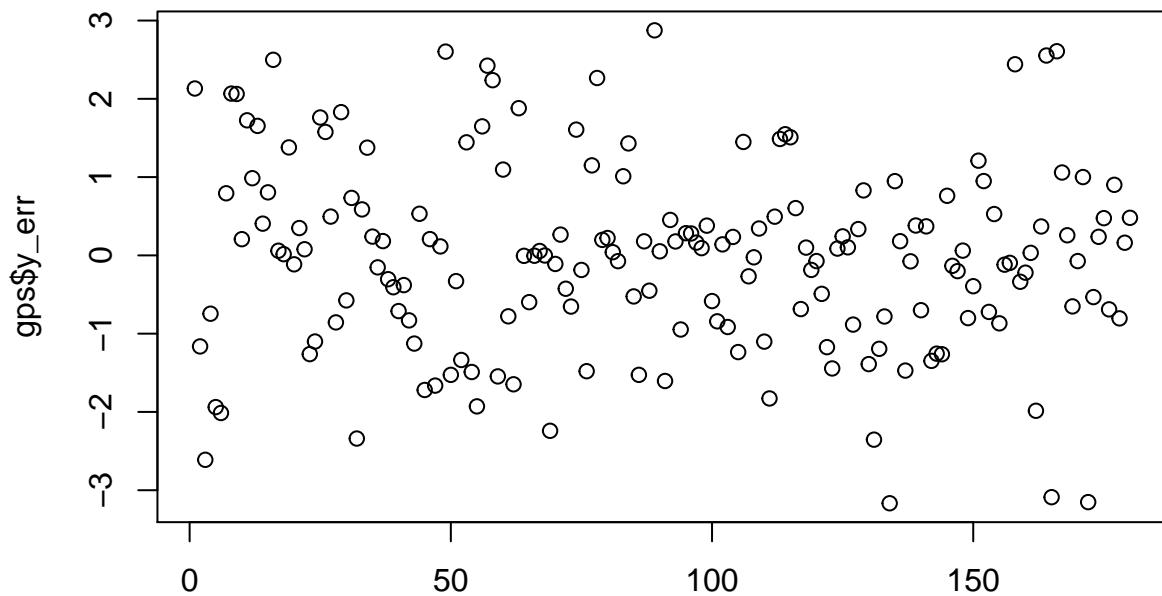
Noisy Odom Horizontal Distance Error Over Time



GPS X Error Over Time



GPS Y Error Over Time



GPS Horizontal Distance Error Over Time

