

one_stationary Turtlebot 1 Report

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

## Loading required package: fitdistrplus

## Loading required package: MASS

## Loading required package: survival

## Loading required package: methods

## 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 15667
## items to be assigned to 180 items of column 'x_err' (15487 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 15667
## items to be assigned to 180 items of column 'y_err' (15487 unused)
```

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

The runtime of this experiment was 0 hours, 26 minutes, and 6.7 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.
## 2.999e-06 1.458e-05 1.830e-05 1.770e-05 2.139e-05 3.752e-05
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -9.339e-09 4.456e-08 8.527e-08 1.181e-07 1.853e-07 4.544e-07
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -9.365e-06 1.509e-05 1.710e-05 1.723e-05 1.954e-05 4.416e-05
```

```

summary(continuous$dist_error)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## 2.999e-06 1.458e-05 1.830e-05 1.770e-05 2.139e-05 3.753e-05

summary(discrete$x_error)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -4.37900 -0.45480  0.01812  0.07371  0.64580  2.95300

summary(discrete$y_error)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -4.336000 -0.564000  0.007488  0.061680  0.670600  3.743000

summary(discrete$yaw_error)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -4.816e-05 6.291e-06 2.411e-05 2.843e-05 4.674e-05 1.593e-04

summary(discrete$dist_error)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## 0.000014 0.503700 1.043000 1.277000 1.917000 4.790000

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## 2.999e-06 1.458e-05 1.828e-05 1.767e-05 2.136e-05 3.752e-05

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -9.339e-09 4.447e-08 8.512e-08 1.179e-07 1.852e-07 4.544e-07

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## 2.999e-06 1.458e-05 1.828e-05 1.767e-05 2.136e-05 3.753e-05

summary(gps$x_err)

##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -4.38100 -0.44760  0.01894  0.07555  0.64770  2.93800

```

```

summary(gps$y_err)

##      Min.   1st Qu.    Median     Mean   3rd Qu.   Max.
## -4.336000 -0.558700  0.008068  0.064670  0.657200  3.742000

summary(gps$dist_err)

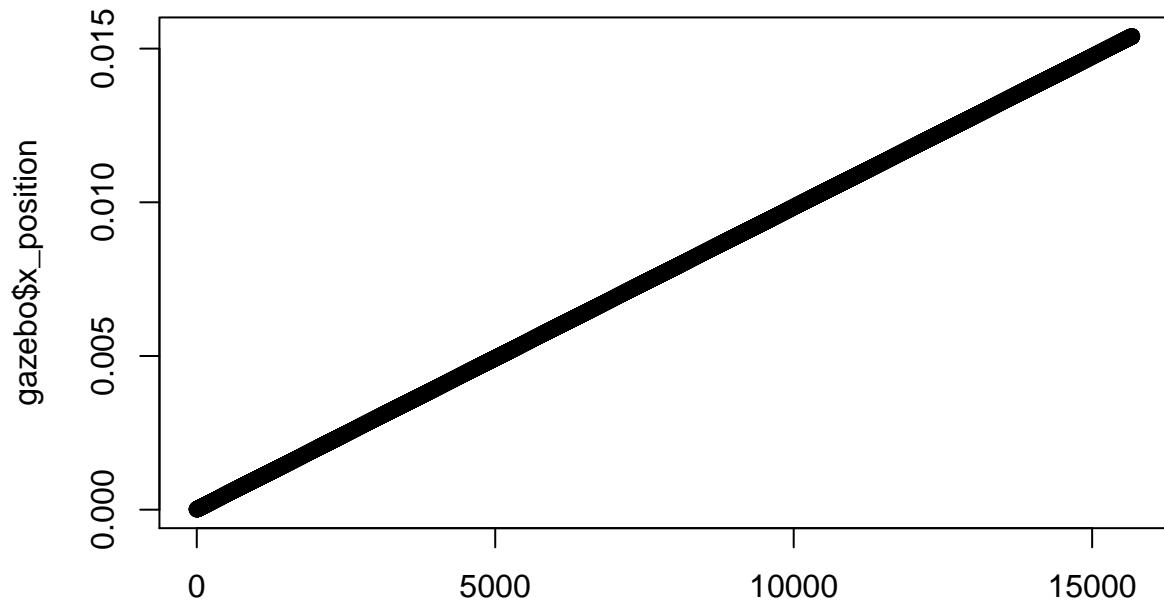
##      Min.   1st Qu.    Median     Mean 3rd Qu.   Max.
## 0.00571 0.50860 1.04400 1.28500 1.90700 4.79300

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

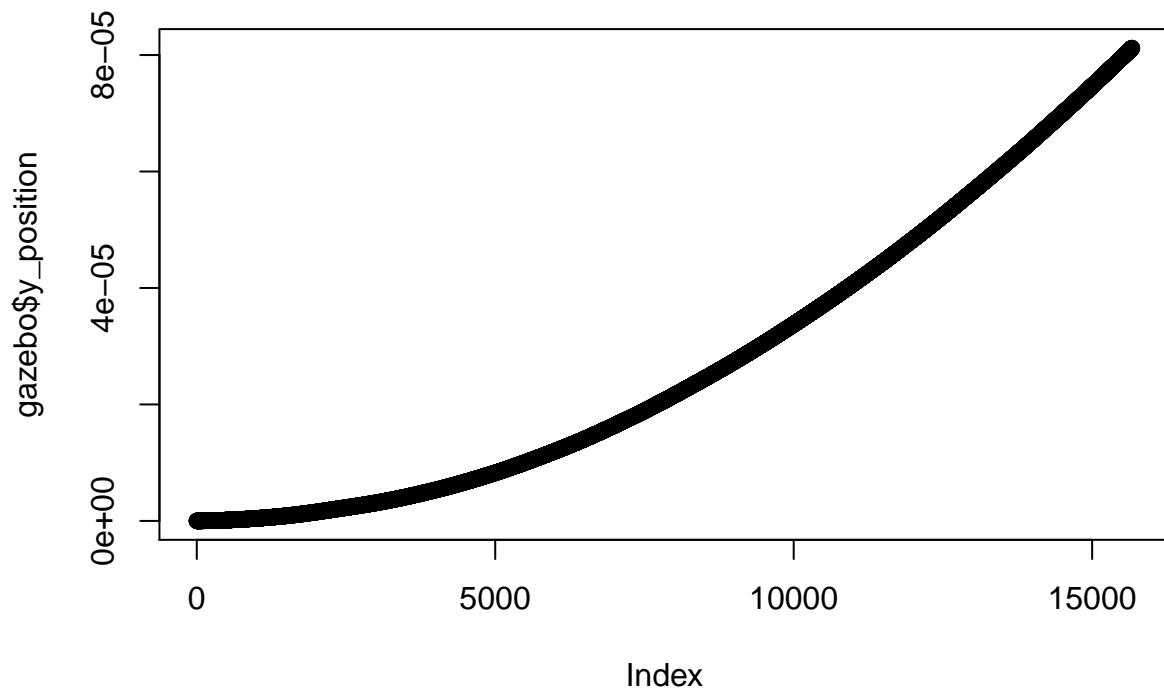
# shapiro.test(noisy_odom$x_err)
# shapiro.test(noisy_odom$y_err)
# shapiro.test(noisy_odom$dist_err)
#
# shapiro.test(gps$x_err)
# shapiro.test(gps$y_err)
# shapiro.test(gps$dist_err)
#
# noisy_odom_fit_x <- fitdist(noisy_odom$x_err, "norm")
# noisy_odom_fit_y <- fitdist(noisy_odom$y_err, "norm")
#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

```

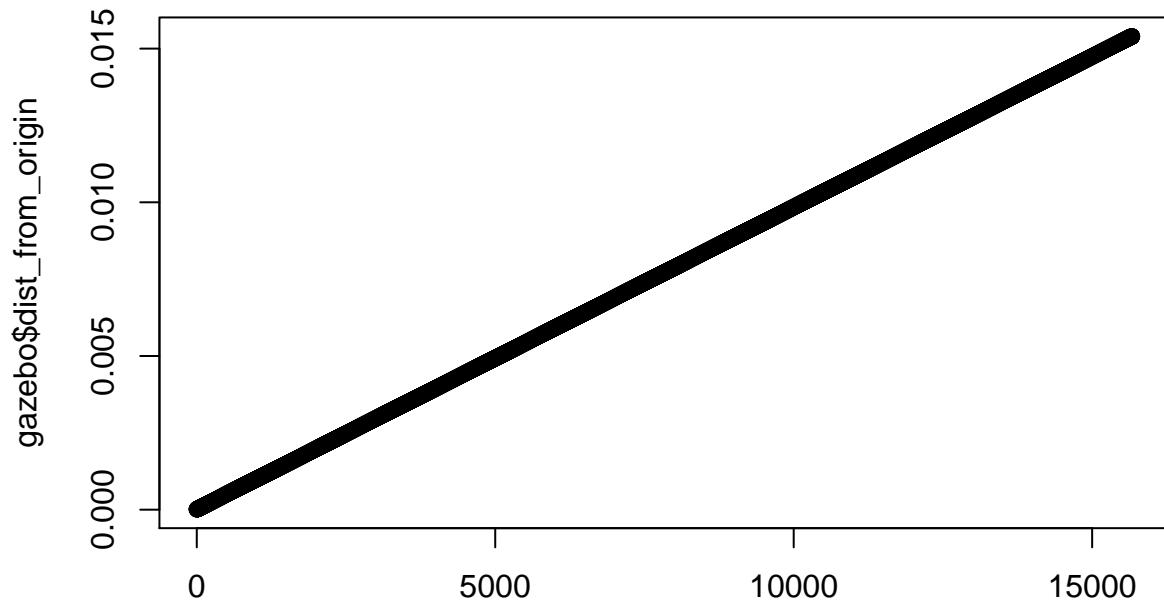
X coordinate of robot over time



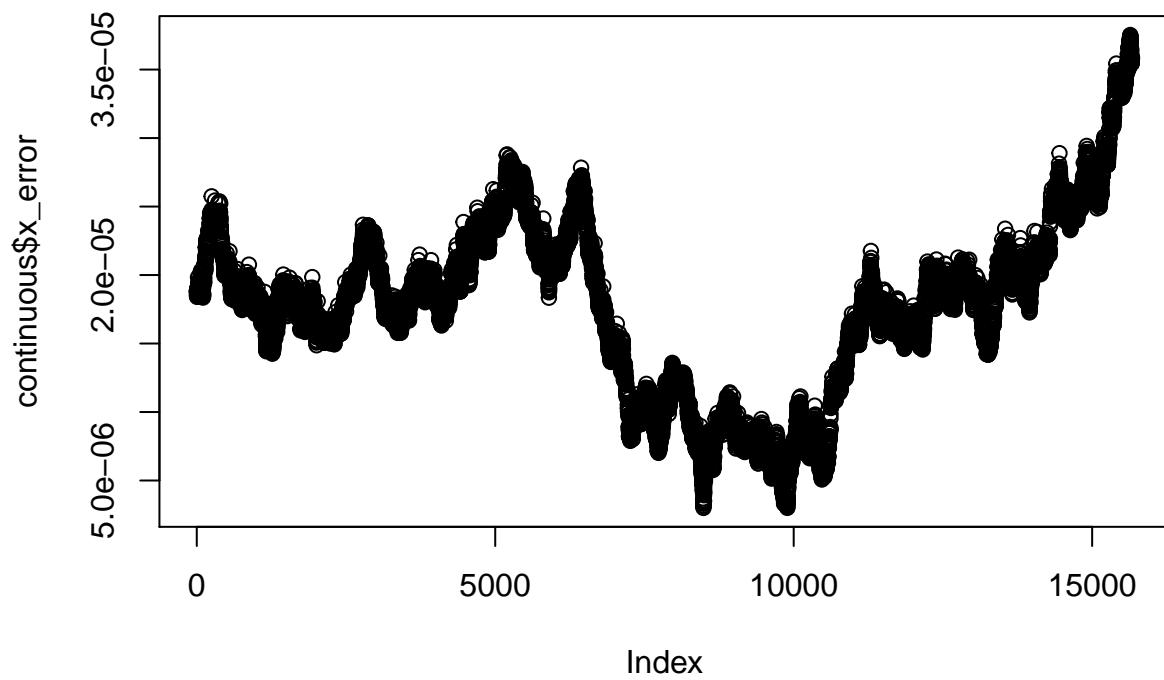
Y coordinate of robot over time



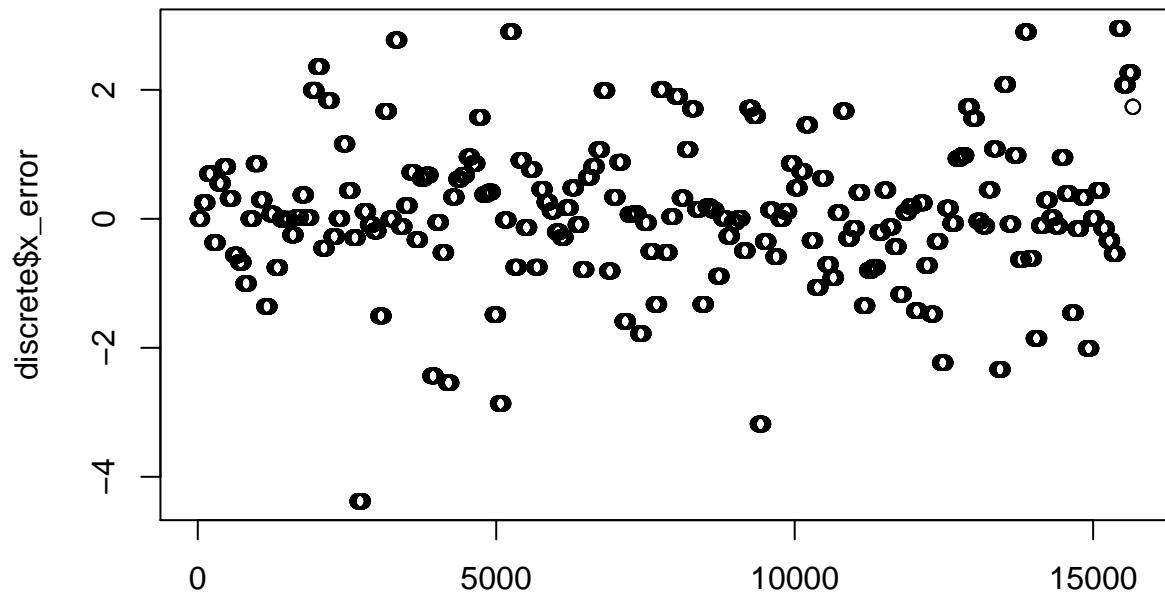
Distance from origin vs. time



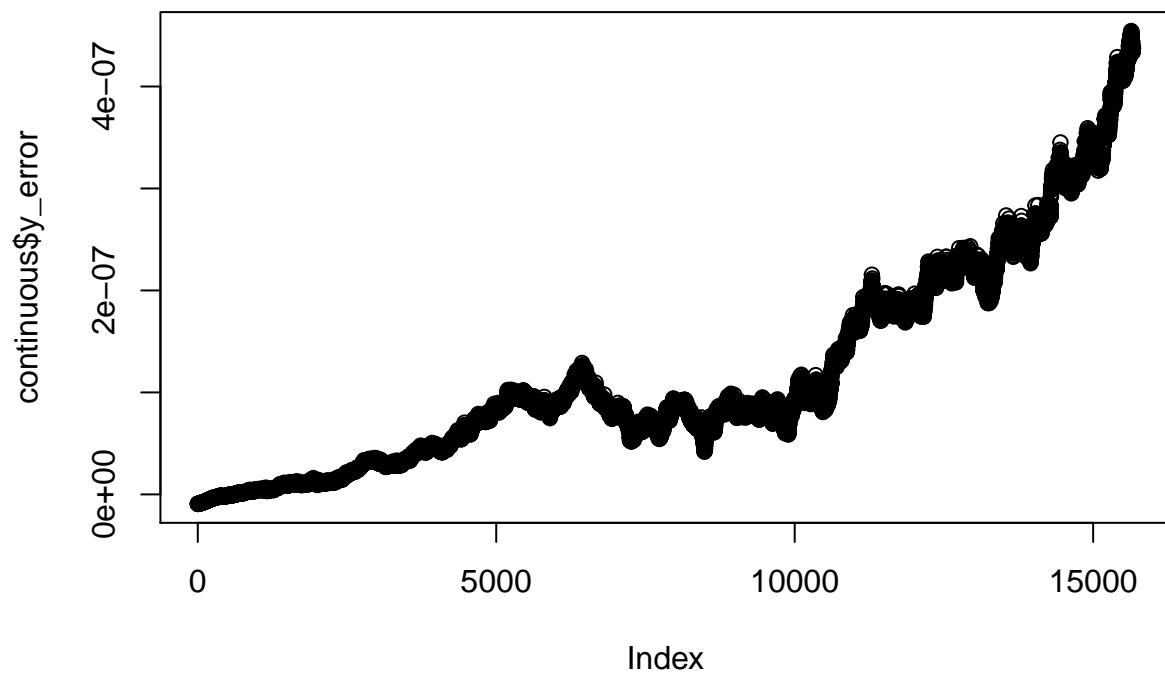
Continuous x_error over time



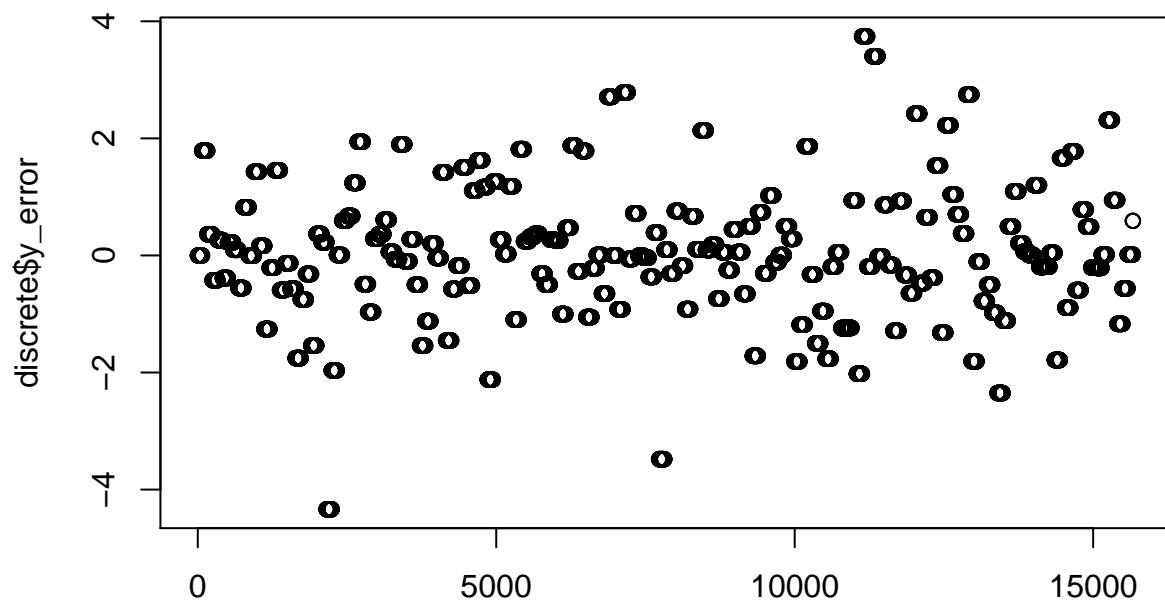
Discrete x_error over time



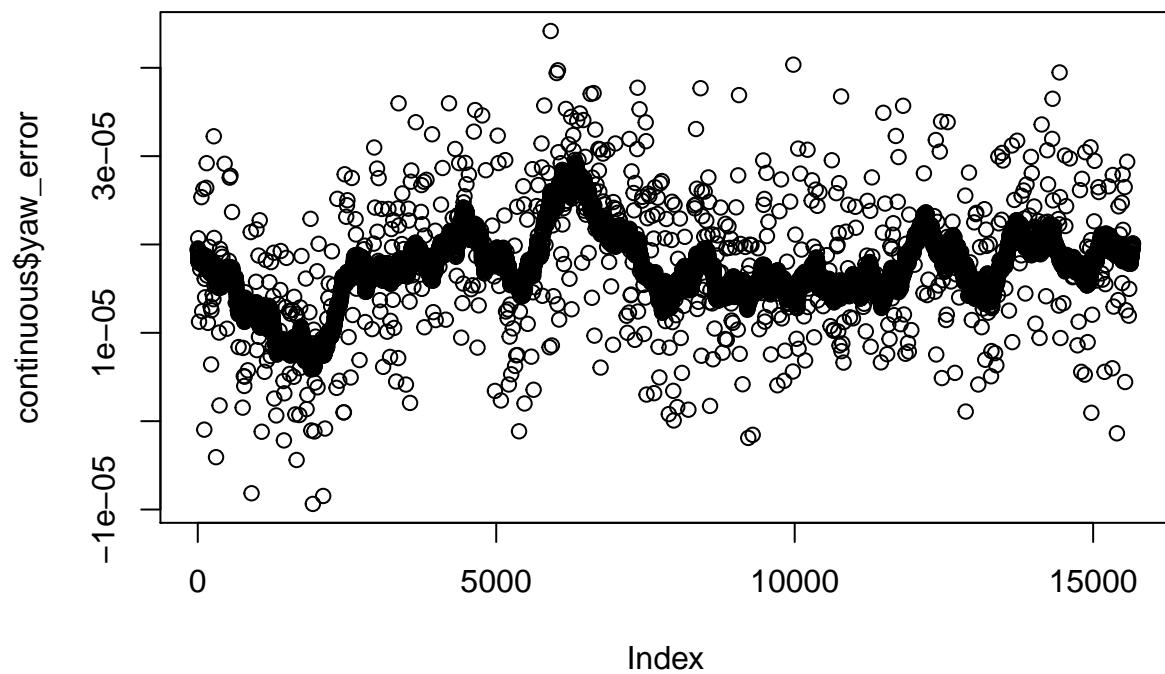
Continuous y_error over time



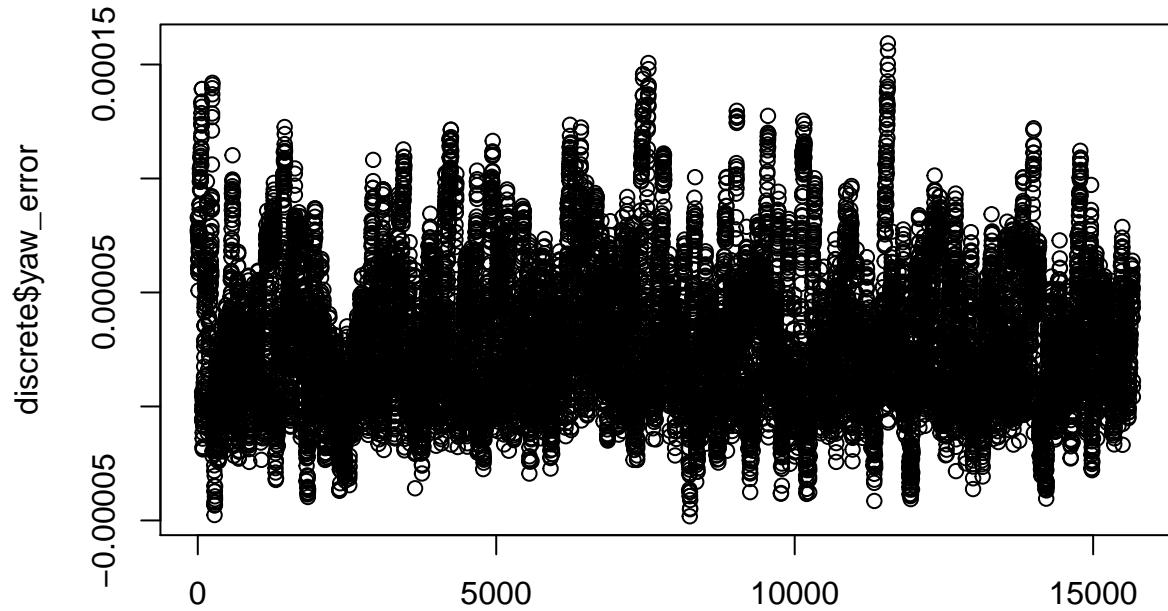
Discrete y_error over time



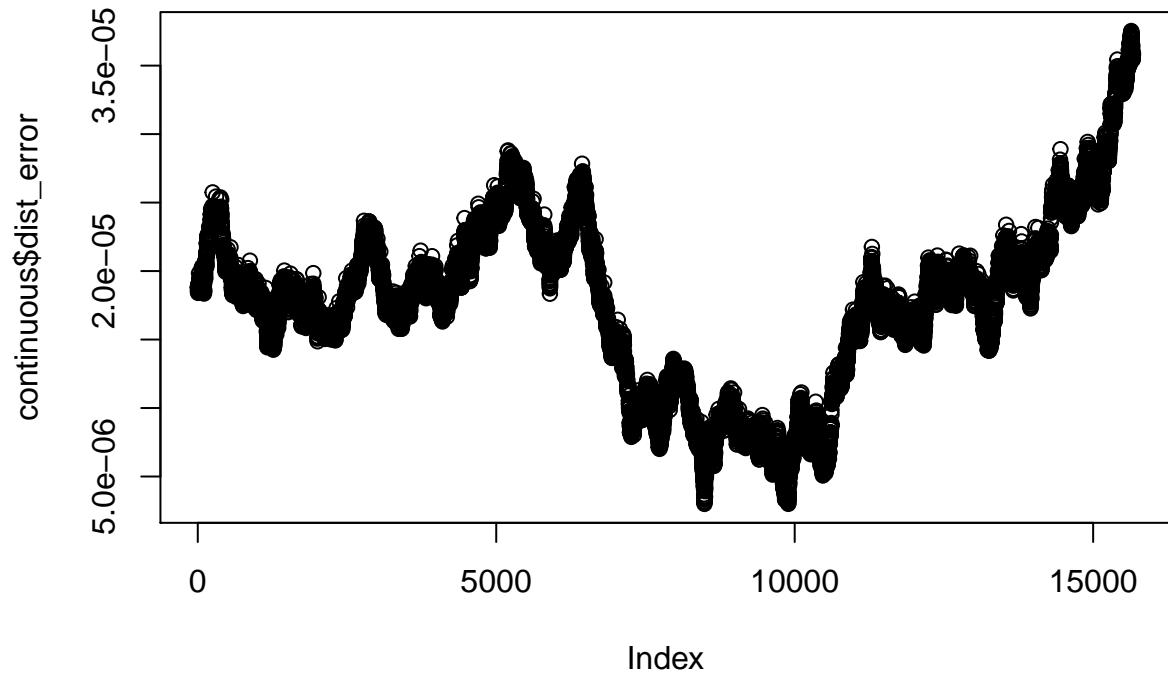
Continuous yaw error over time



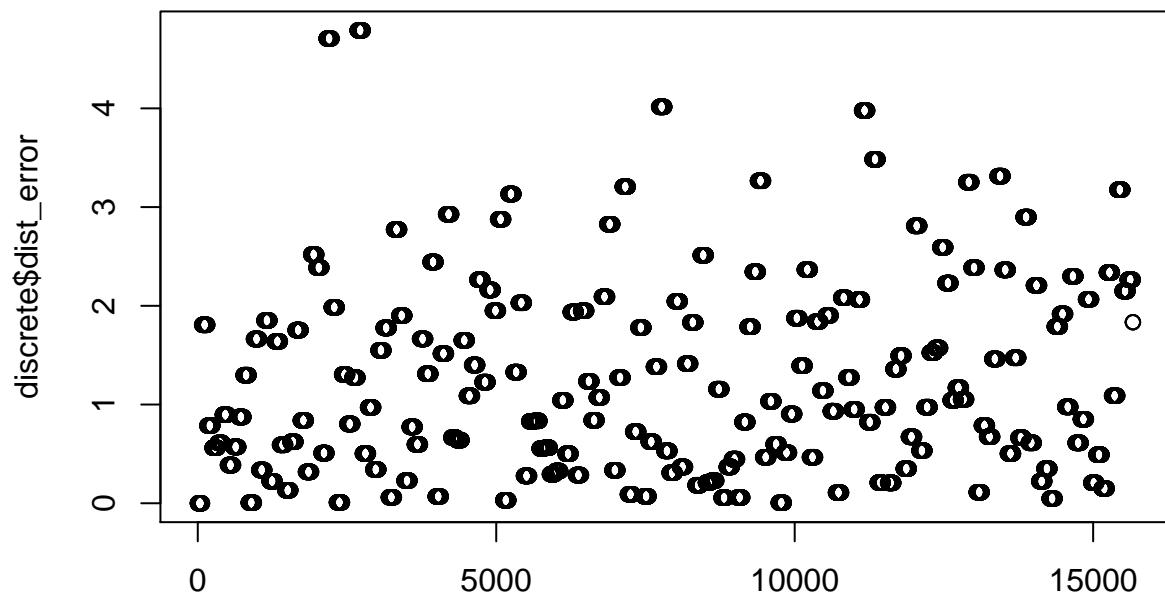
Discrete yaw error over time



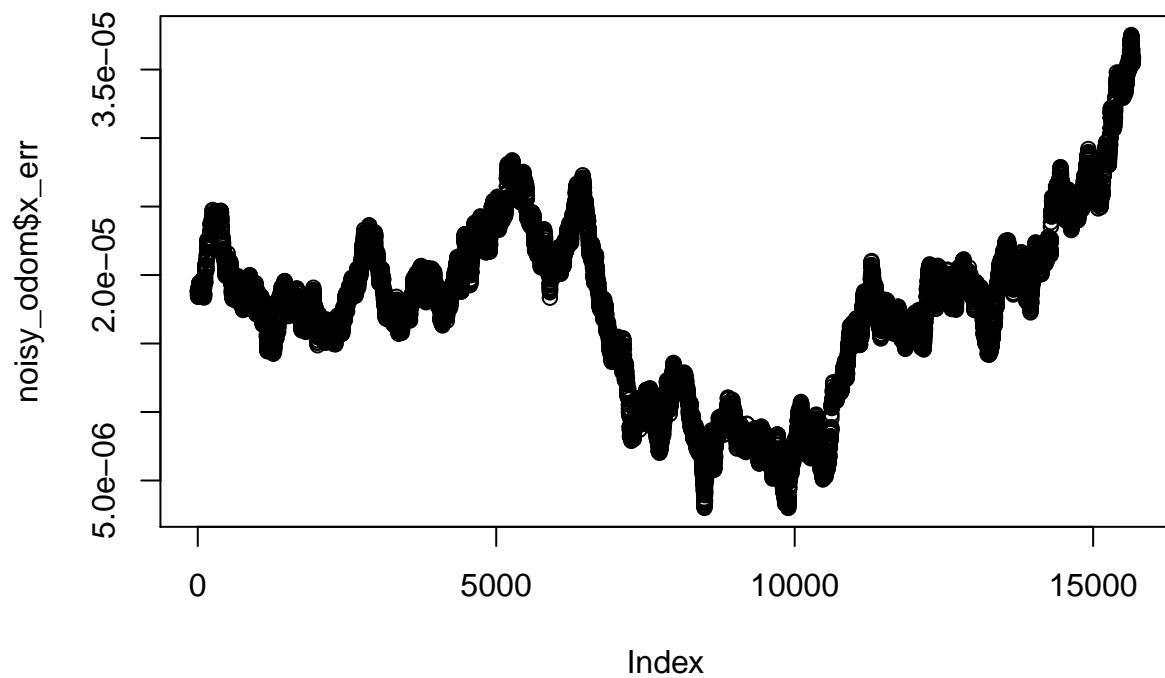
Continuous total distance error over time



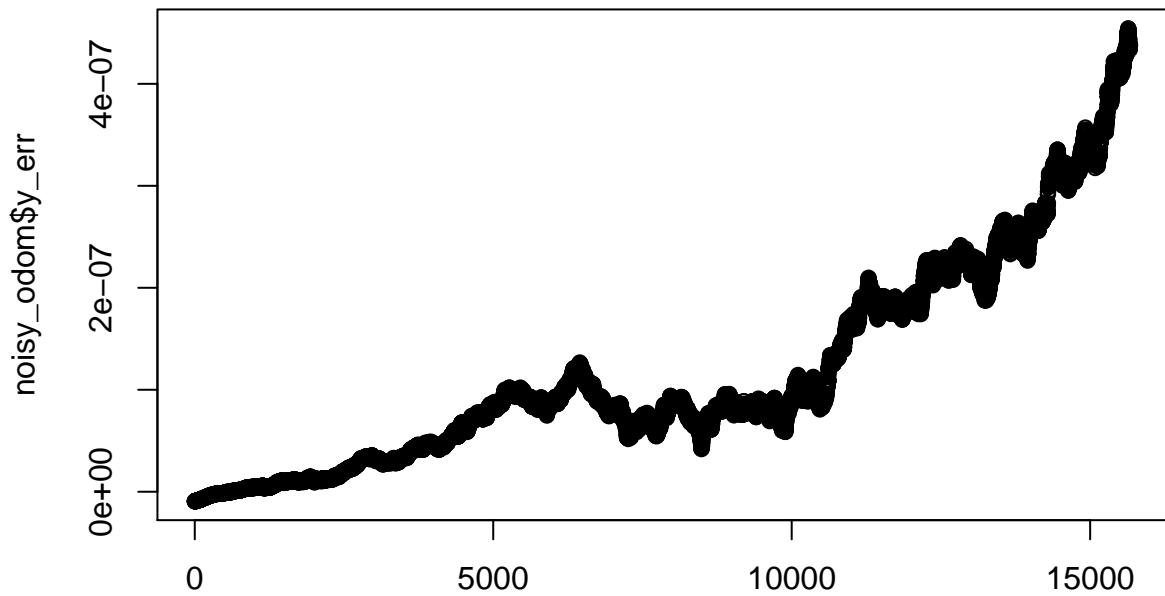
Discrete total distance error over time



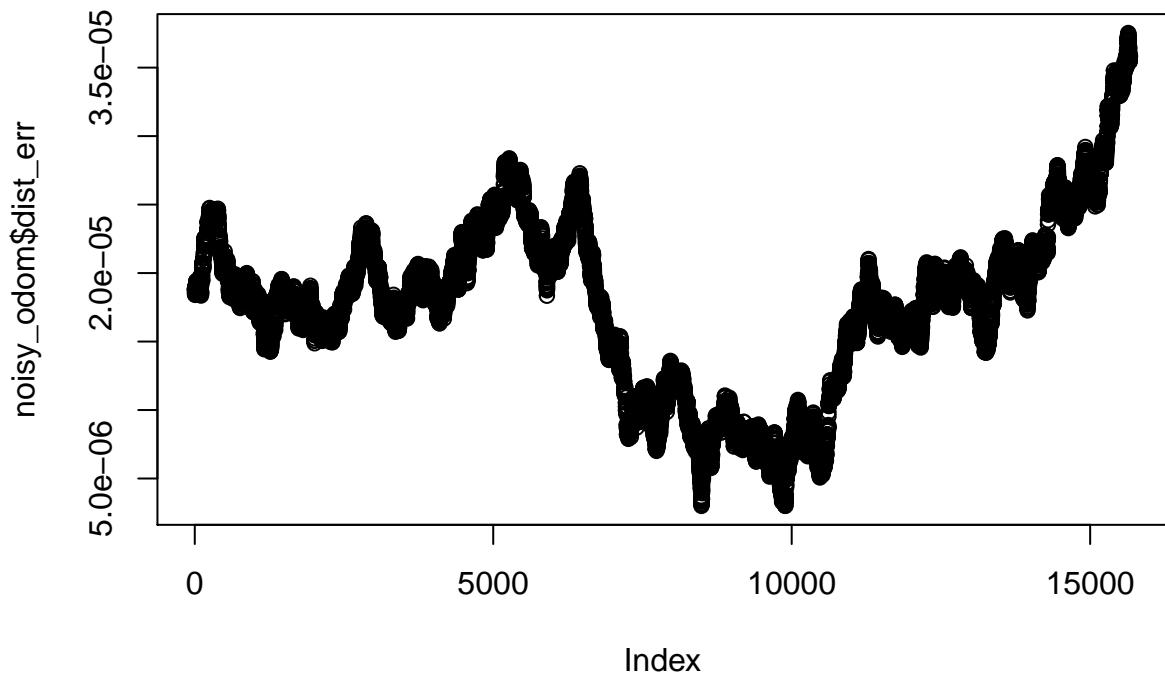
Noisy Odom X Error Over Time



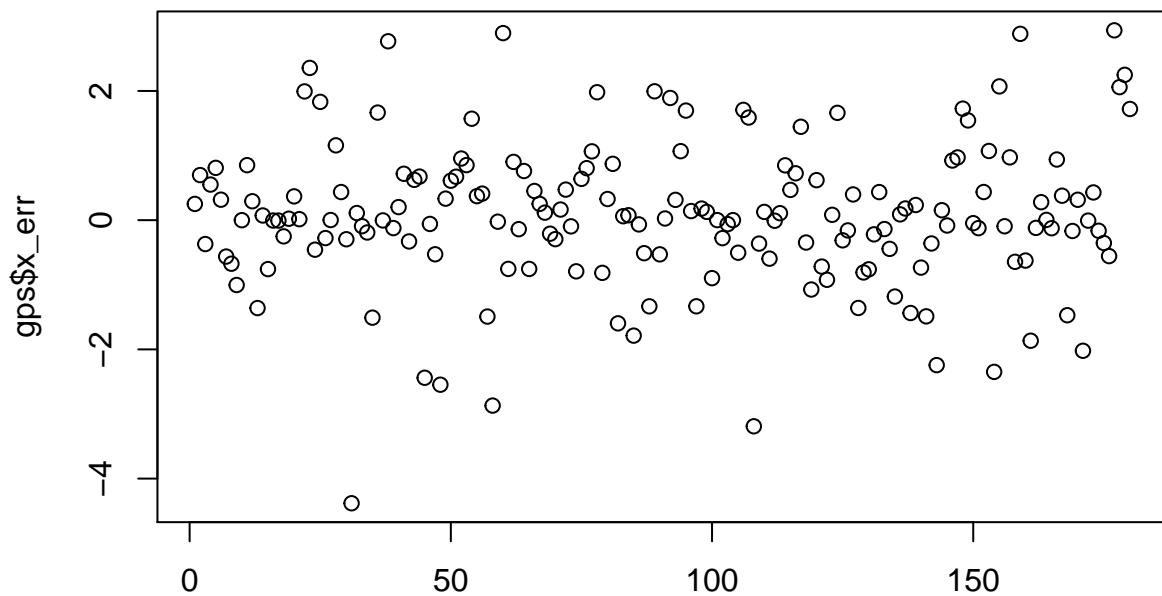
Noisy Odom Y Error Over Time



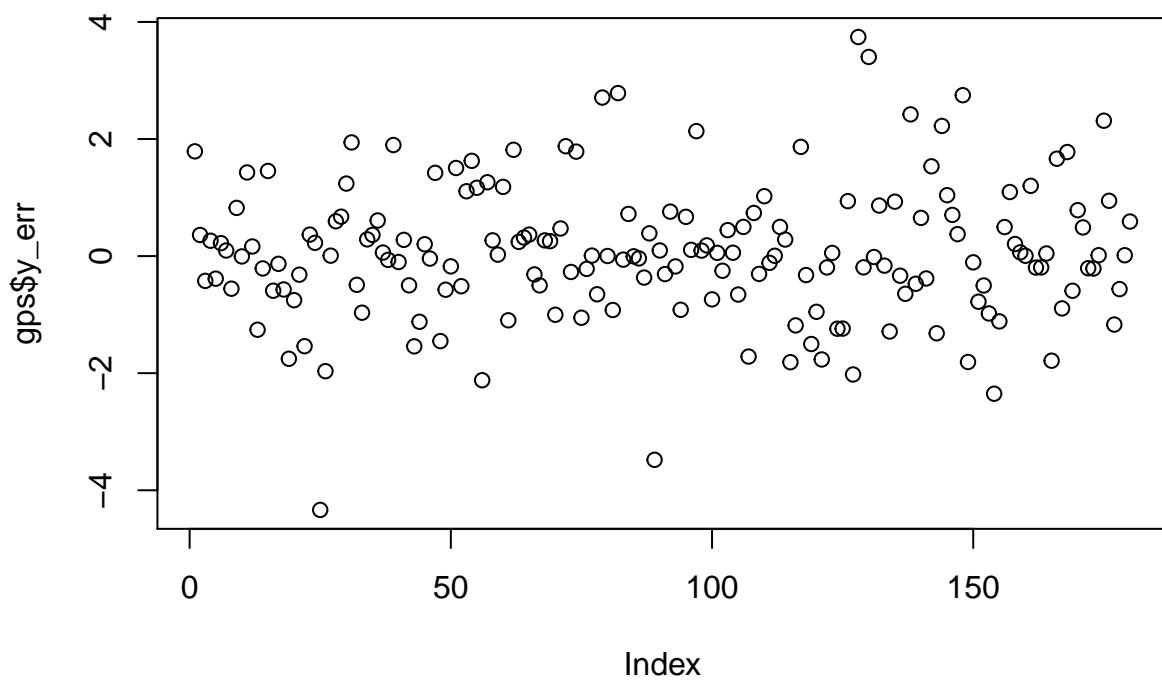
Noisy Odom Horizontal Distance Error Over Time



GPS X Error Over Time



GPS Y Error Over Time



GPS Horizontal Distance Error Over Time

