

one_mobile_noiseless 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 8927
## items to be assigned to 96 items of column 'x_err' (8831 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 8927
## items to be assigned to 96 items of column 'y_err' (8831 unused)
```

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

The runtime of this experiment was 0 hours, 14 minutes, and 52.7 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.
## -0.1148000 -0.0096100  0.0006825  0.0001338  0.0087420  0.1094000
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -0.1067000 -0.0096240 -0.0011610 -0.0005484  0.0102700  0.1121000
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -6.239000 -0.032100 -0.000750 -0.002719  0.032950  6.241000
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## 1.300e-07 6.540e-03 2.016e-02 2.924e-02 5.154e-02 1.157e-01
```

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

```
##      Min.    1st Qu.     Median      Mean    3rd Qu.      Max.
## -2.92500 -0.64370  0.05619  0.04873  0.73180  3.51100
```

```

summary(discrete$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.04700 -0.90800 -0.04793 -0.19920  0.34570  3.84900

summary(discrete$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -6.280000 -0.017980  0.000968 -0.001967  0.025250  6.273000

summary(discrete$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000   0.554   1.205   1.412   2.120   4.206

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -11.4300 -3.9770 -1.4450 -0.9823  1.4490  12.3700

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -13.05000 -7.17300 -4.54900 -4.17500 -0.02178  3.95200

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.02152  2.98900  6.50600  6.69300  9.81300 14.37000

summary(gps$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -10.82000 -4.25900 -0.25140  0.04975  3.98000 10.24000

summary(gps$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -10.6500 -4.5770  1.1420   0.5405  5.8290  11.0500

summary(gps$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.6582  5.0460  7.1730  7.1750  9.3350 13.8300

```

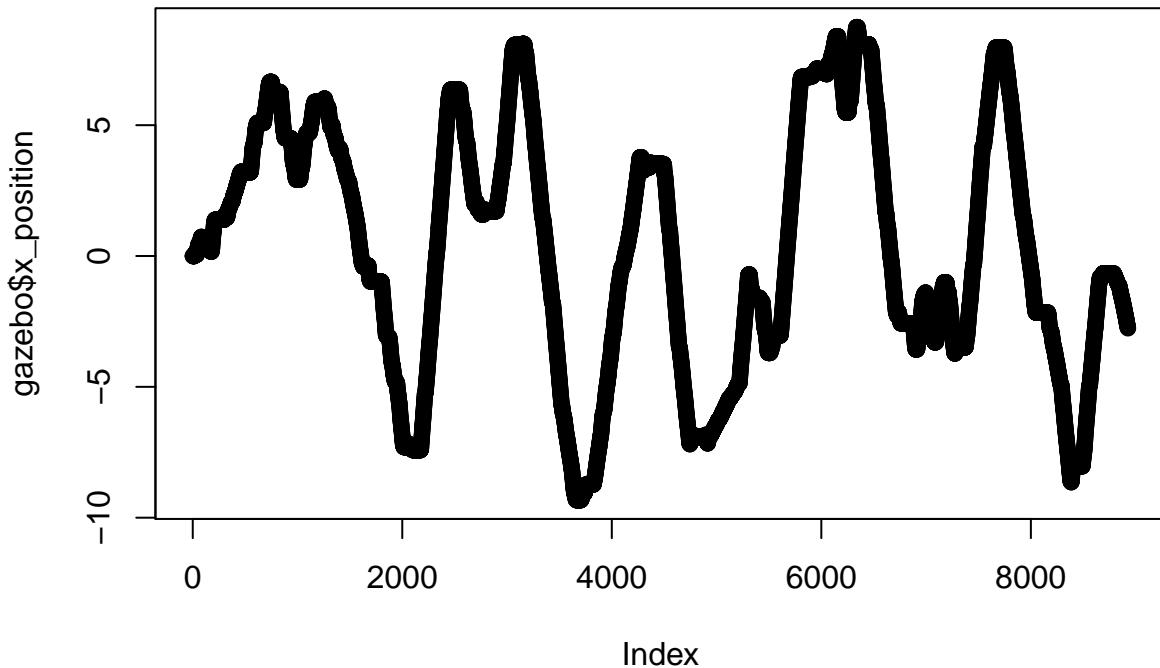
```

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

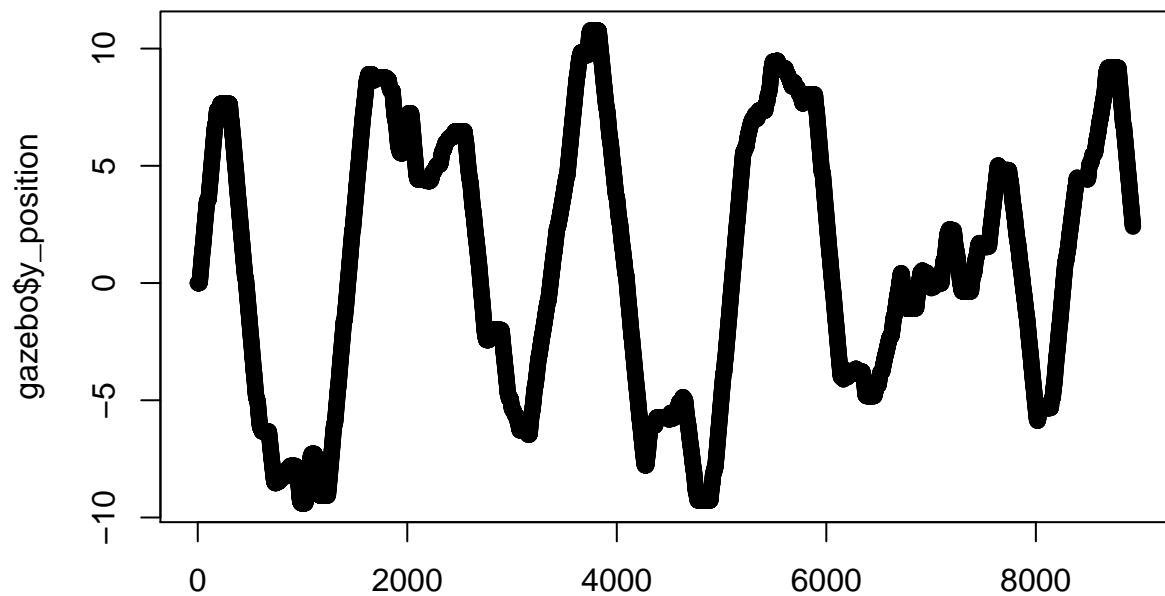
# shapiro.test(noisy_odom$x_err)
# shapiro.test(noisy_odom$y_err)
# shapiro.test(noisy_odom$dist_err)
#
# shapiro.test(gps$x_err)
# shapiro.test(gps$y_err)
# shapiro.test(gps$dist_err)
#
# noisy_odom_fit_x <- fitdist(noisy_odom$x_err, "norm")
# noisy_odom_fit_y <- fitdist(noisy_odom$y_err, "norm")
#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

```

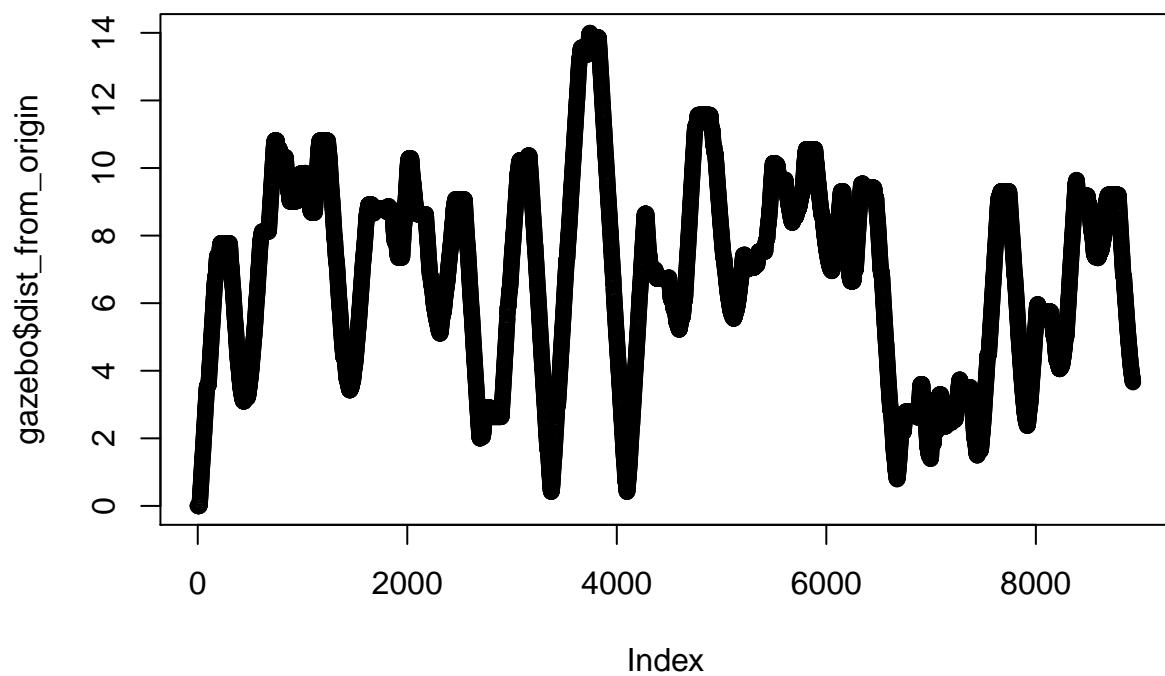
X coordinate of robot over time



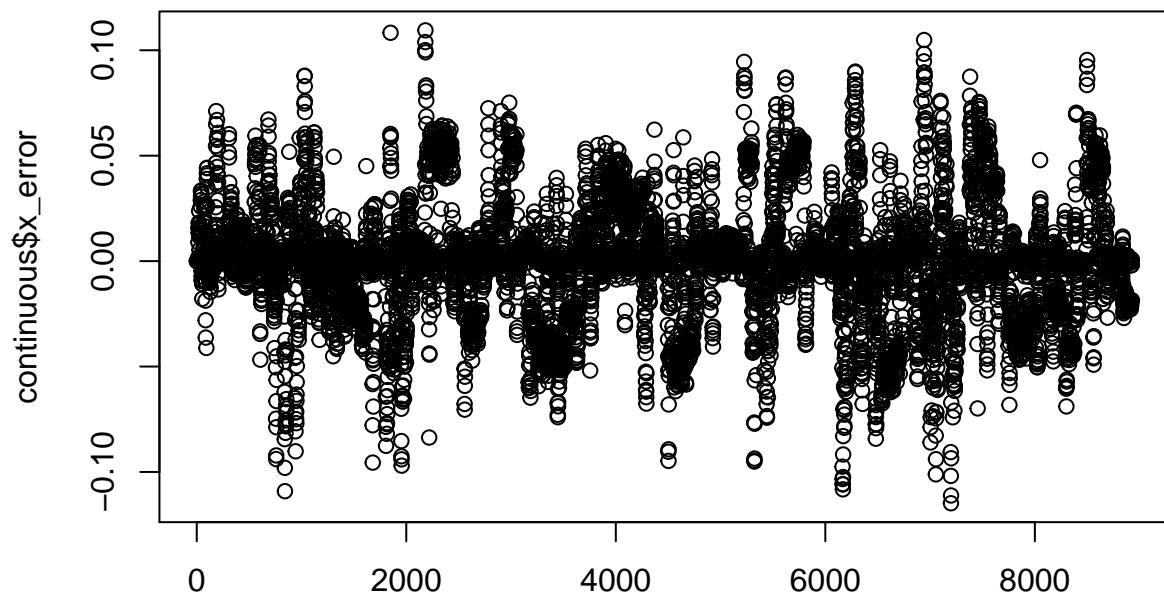
Y coordinate of robot over time



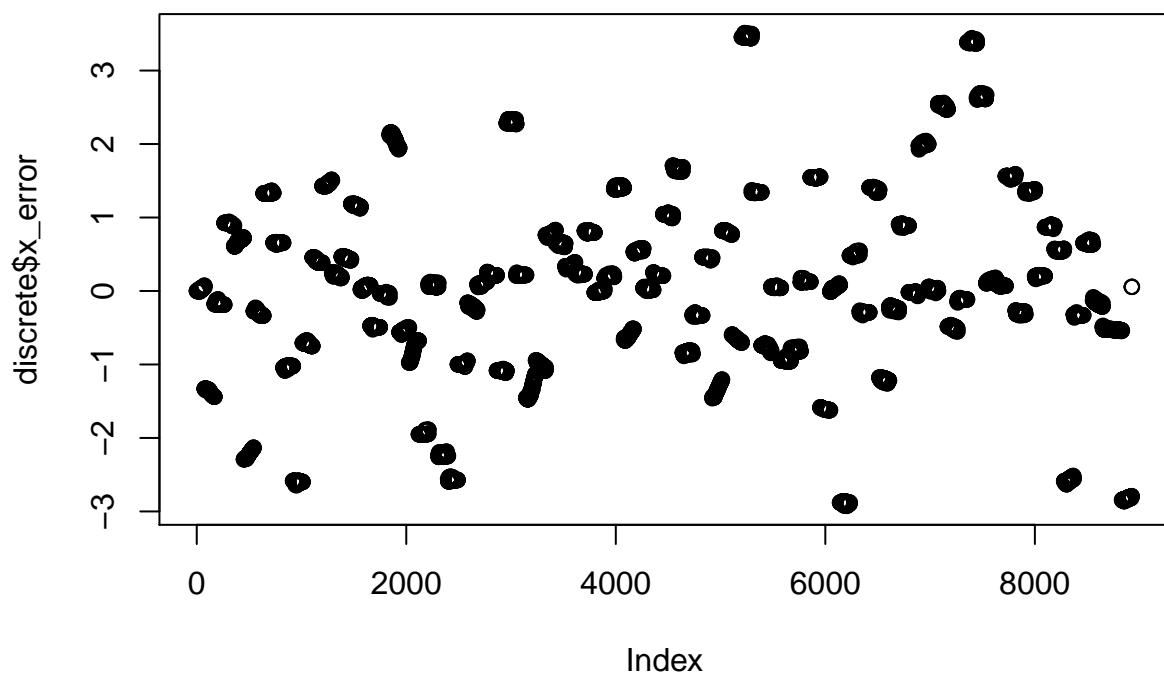
Distance from origin vs. time^{Index}



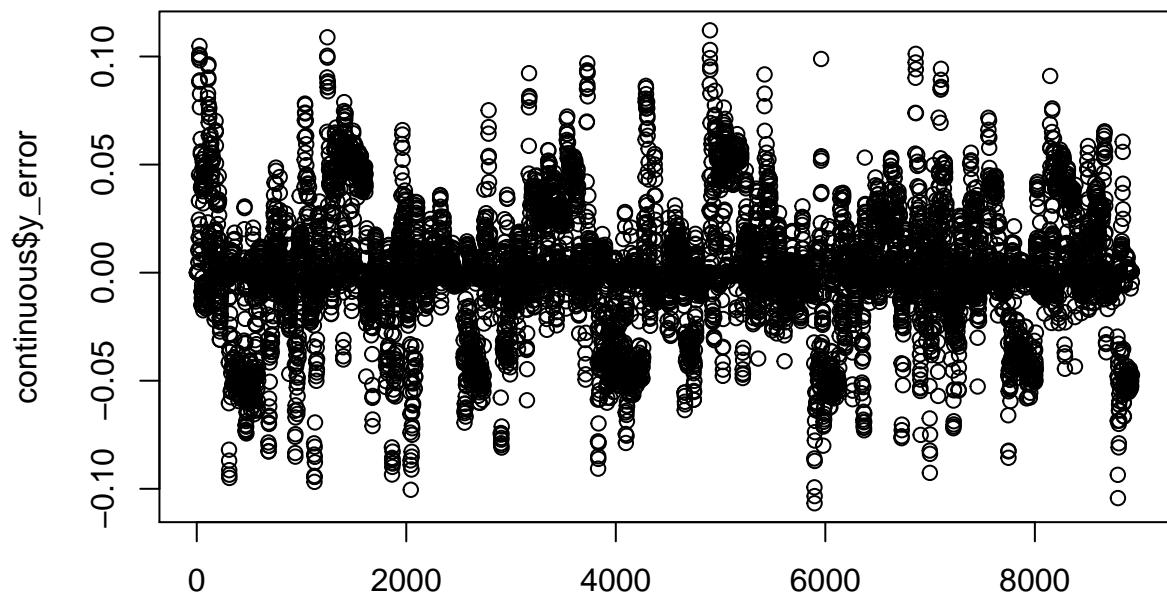
Continuous x_error over time



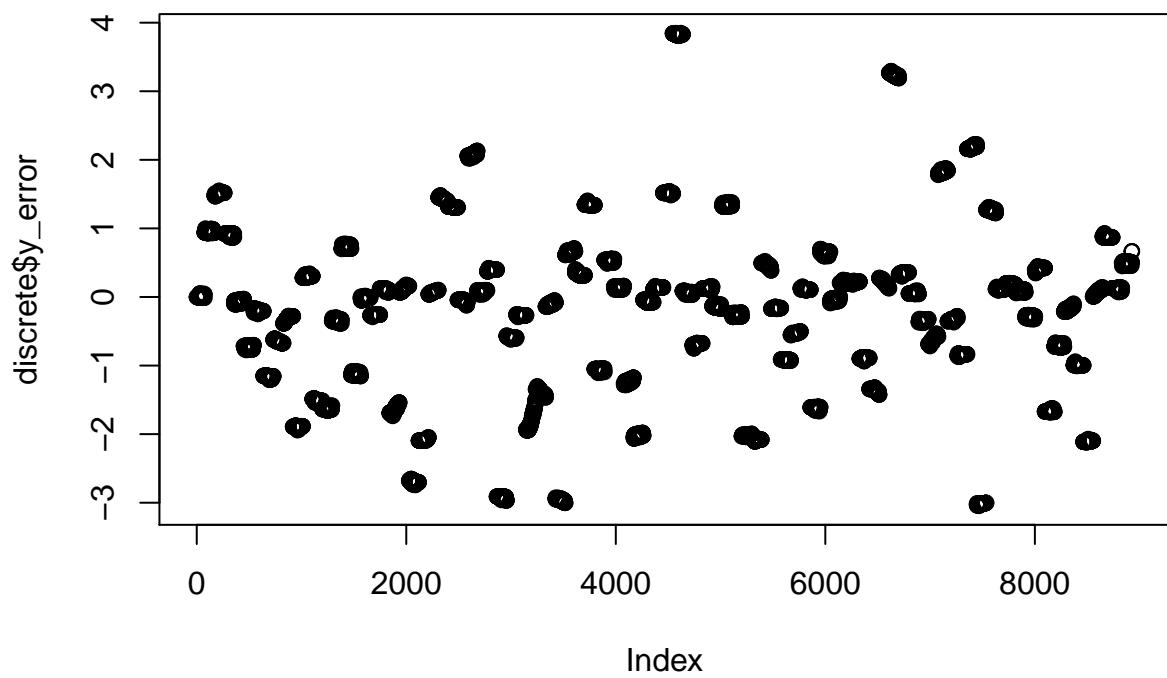
Discrete x_error over time



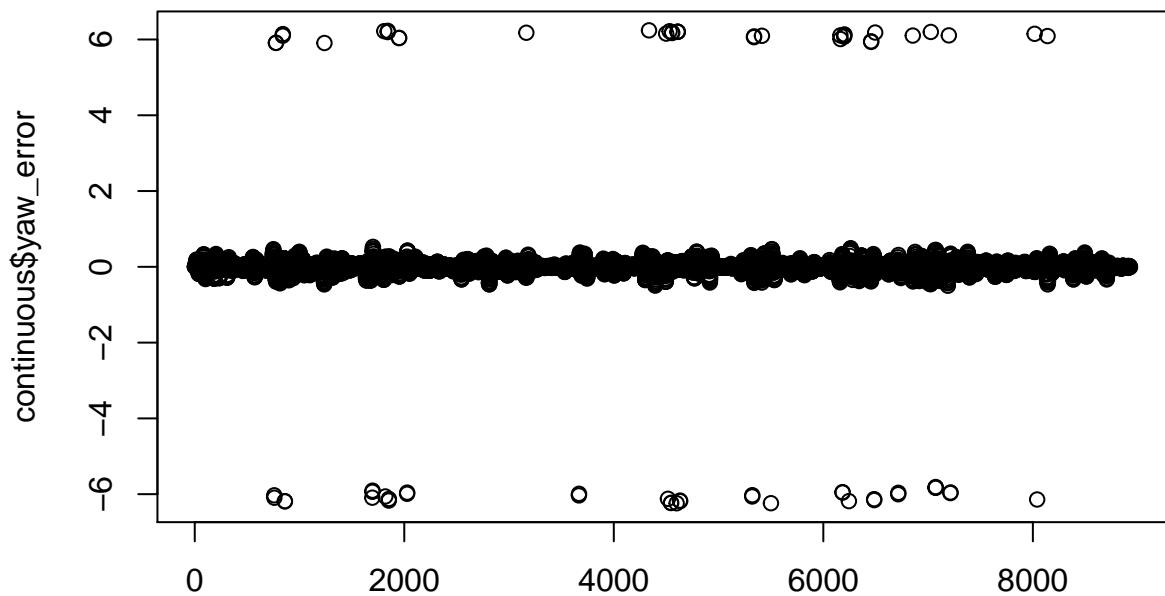
Continuous y_error over time



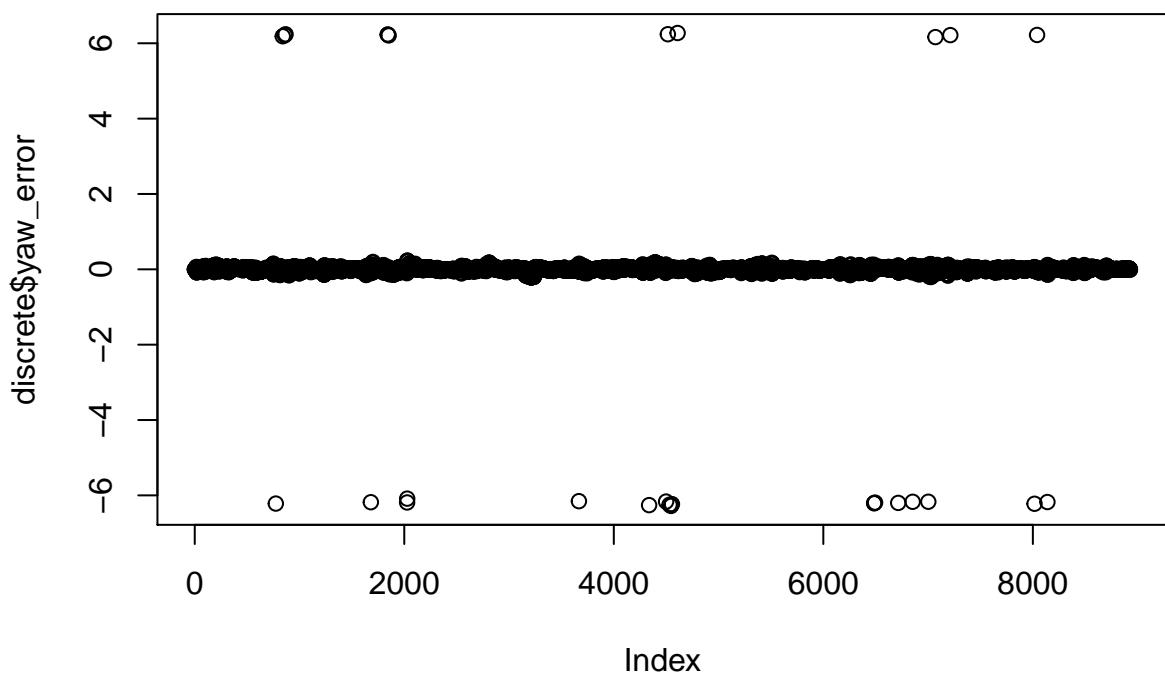
Discrete y_error over time



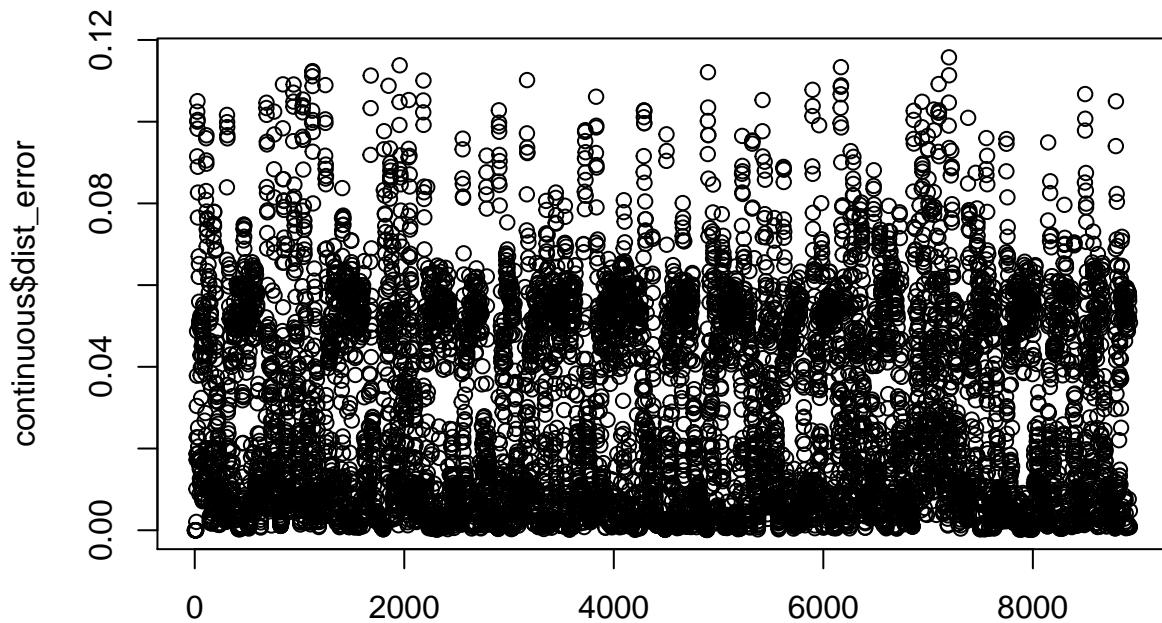
Continuous yaw error over time



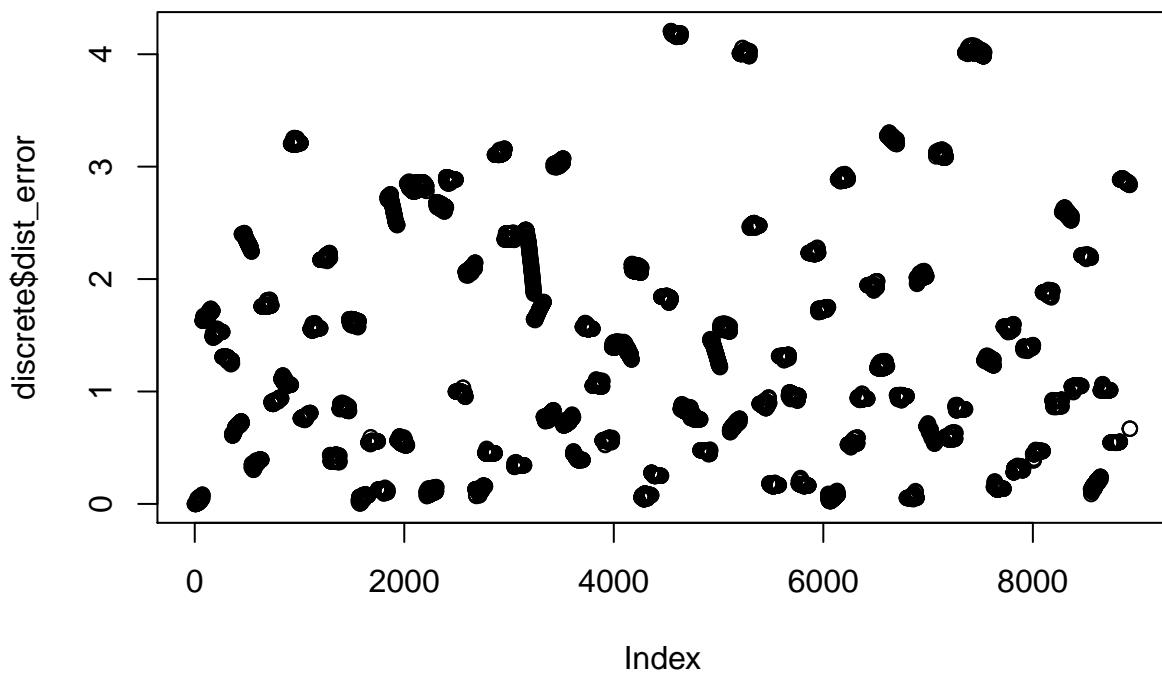
Discrete yaw error over time



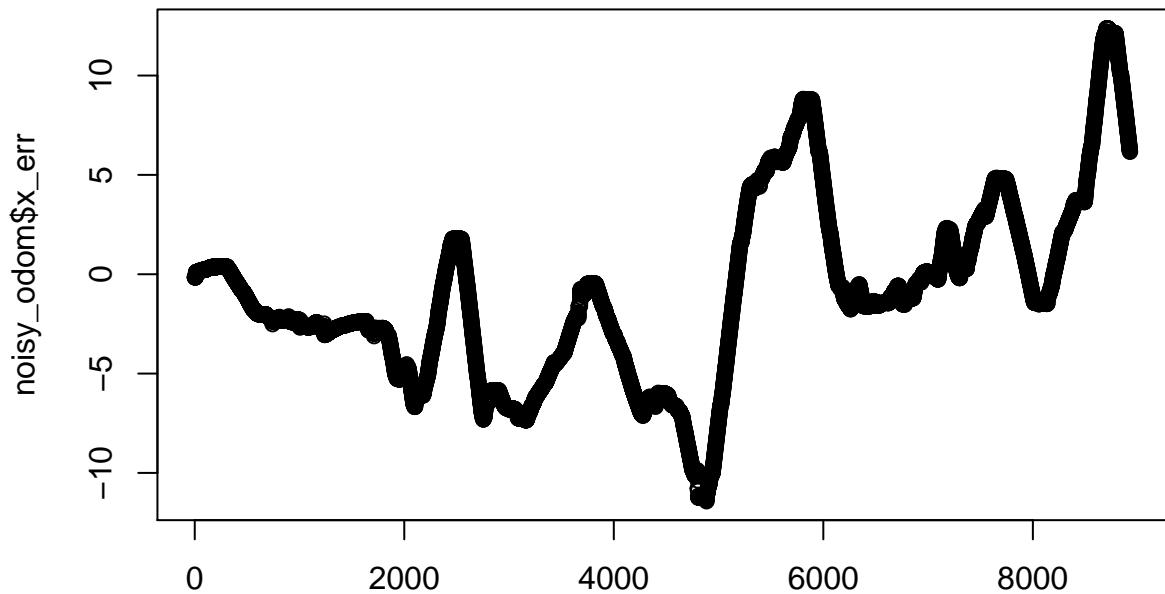
Continuous total distance error over time



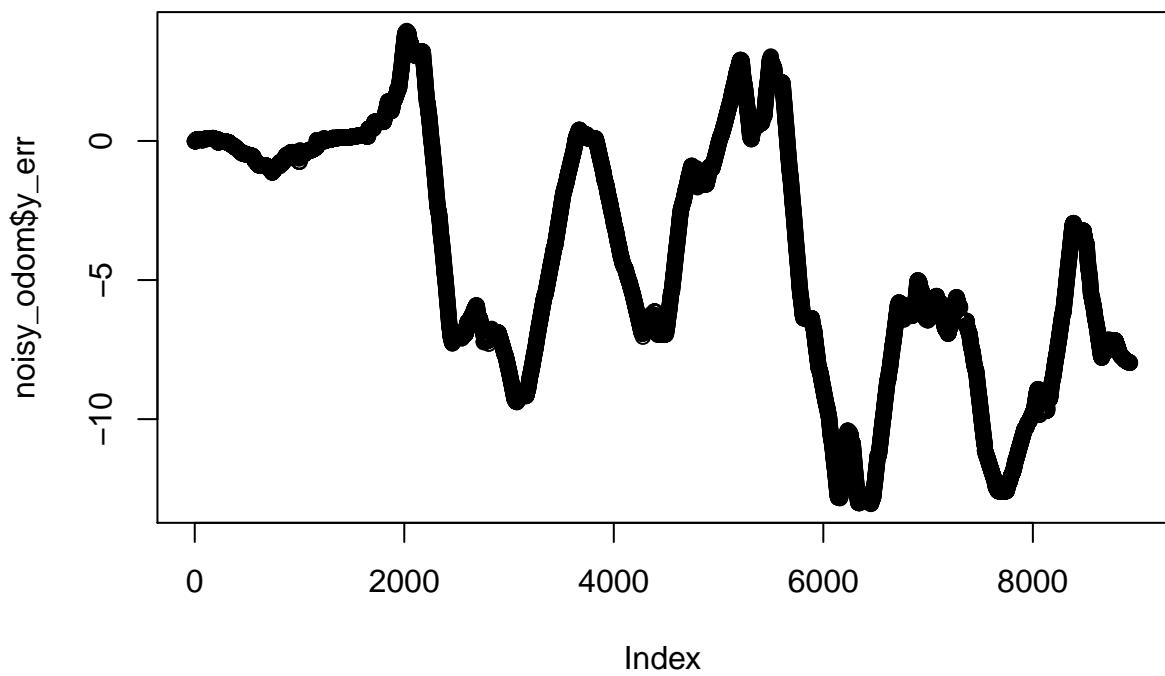
Discrete total distance error over time



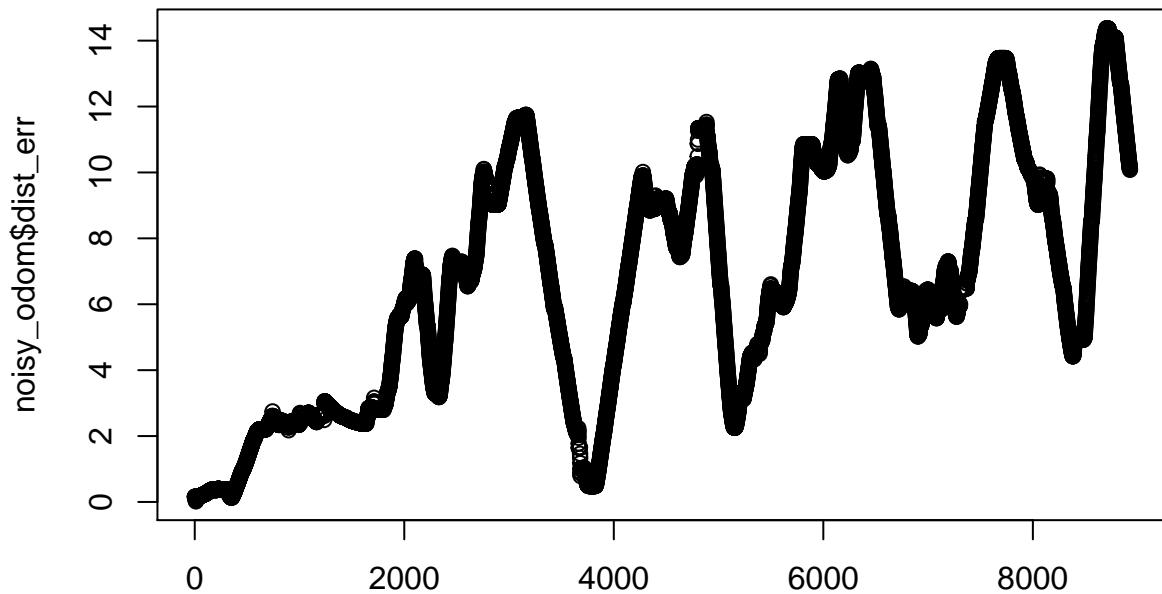
Noisy Odom X Error Over Time



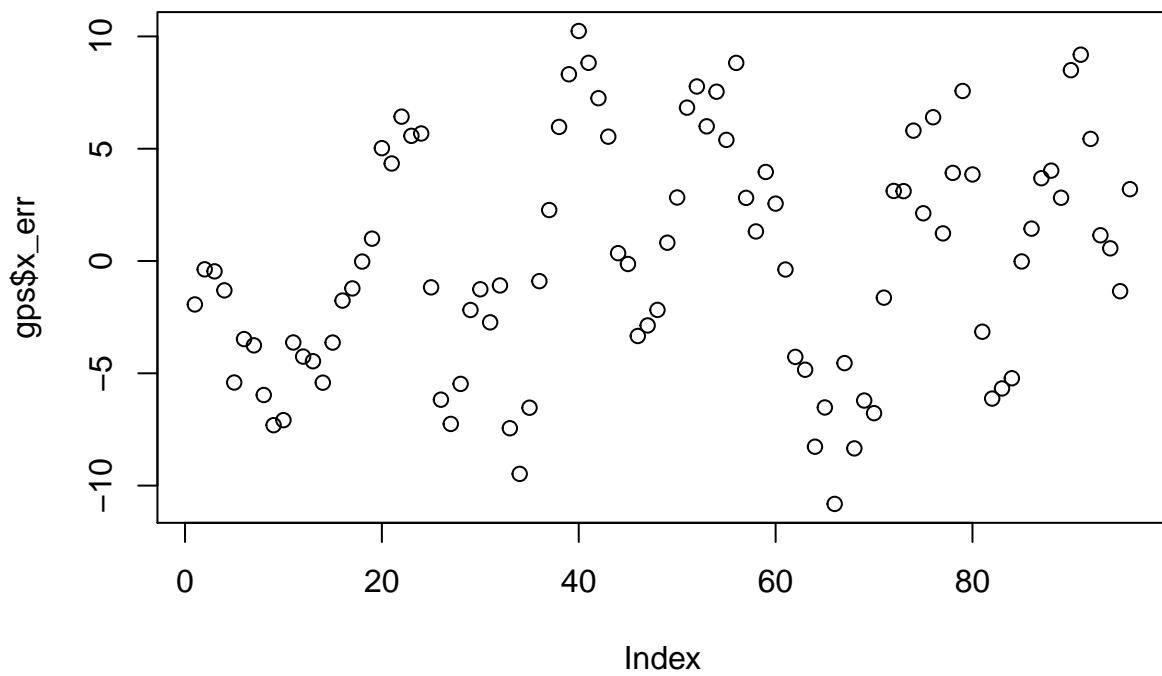
Noisy Odom Y Error Over Time



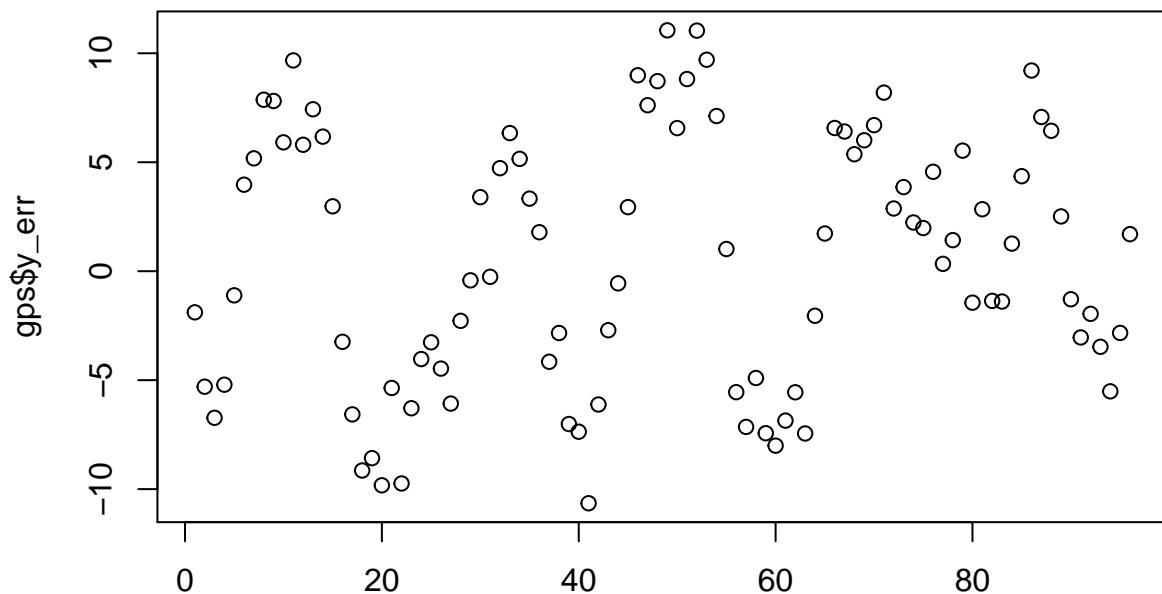
Noisy Odom Horizontal Distance Error Over Time



GPS X Error Over Time^{Index}



GPS Y Error Over Time



GPS Horizontal Distance Error Over Time

