

one_mobile 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 16675
## items to be assigned to 180 items of column 'x_err' (16495 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 16675
## items to be assigned to 180 items of column 'y_err' (16495 unused)
```

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

The runtime of this experiment was 0 hours, 27 minutes, and 47.5 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.
## -4.408   3.383 14.670 12.890 23.110 30.870
```

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

```
##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## -11.820  -6.216 -3.784  -4.123 -2.067  2.249
```

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

```
##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## -6.181000 -2.246000 -0.150000 -0.007546 2.282000 6.187000
```

```

summary(continuous$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.00001 5.18800 15.39000 14.17000 24.13000 31.58000

summary(discrete$x_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -4.25200 -0.70570 -0.02002 0.02013 0.73090 4.74200

summary(discrete$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.83200 -0.69950 -0.01569 -0.03868 0.73360 3.37600

summary(discrete$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -6.24100 -1.57300 0.04948 0.07794 1.73700 6.22700

summary(discrete$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000015 0.682600 1.303000 1.547000 2.190000 5.057000

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -4.398   3.381  14.660  12.890  23.110  30.870

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -11.820  -6.215  -3.782  -4.123  -2.069   2.224

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.00001 5.19000 15.40000 14.17000 24.13000 31.58000

summary(gps$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -8.6250 -3.6300 -1.2540 -1.5710  0.4207  6.2260

```

```

summary(gps$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## -9.549 -4.001 -2.225 -2.379 -1.013  5.270

summary(gps$dist_err)

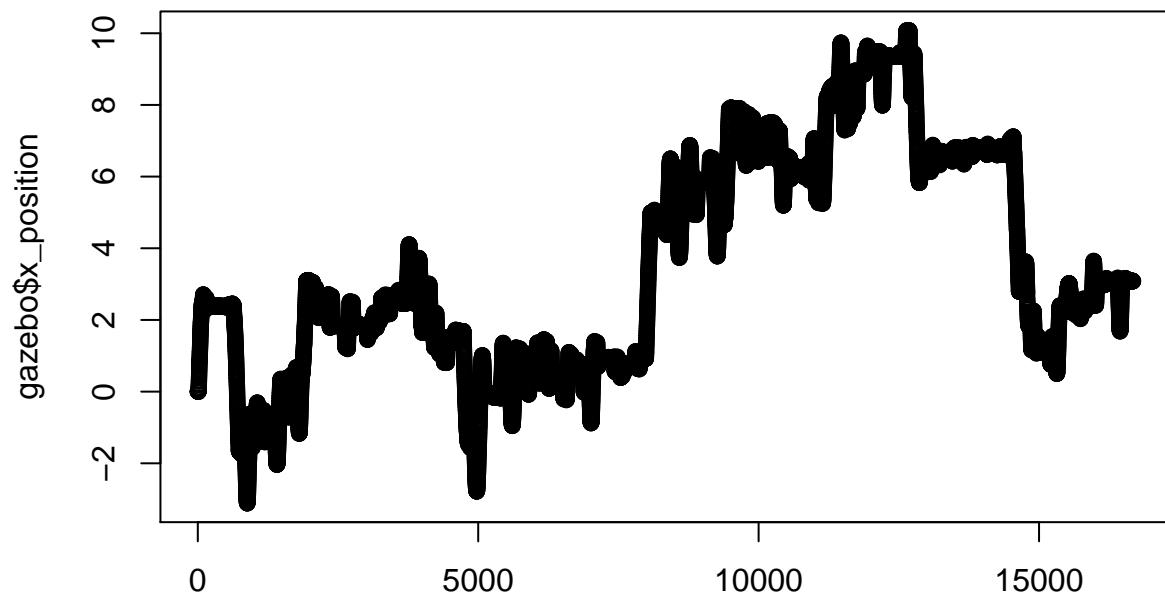
##      Min. 1st Qu. Median     Mean 3rd Qu.    Max.
## 0.3191 2.7520 4.0170 4.1860 5.6580 9.5740

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

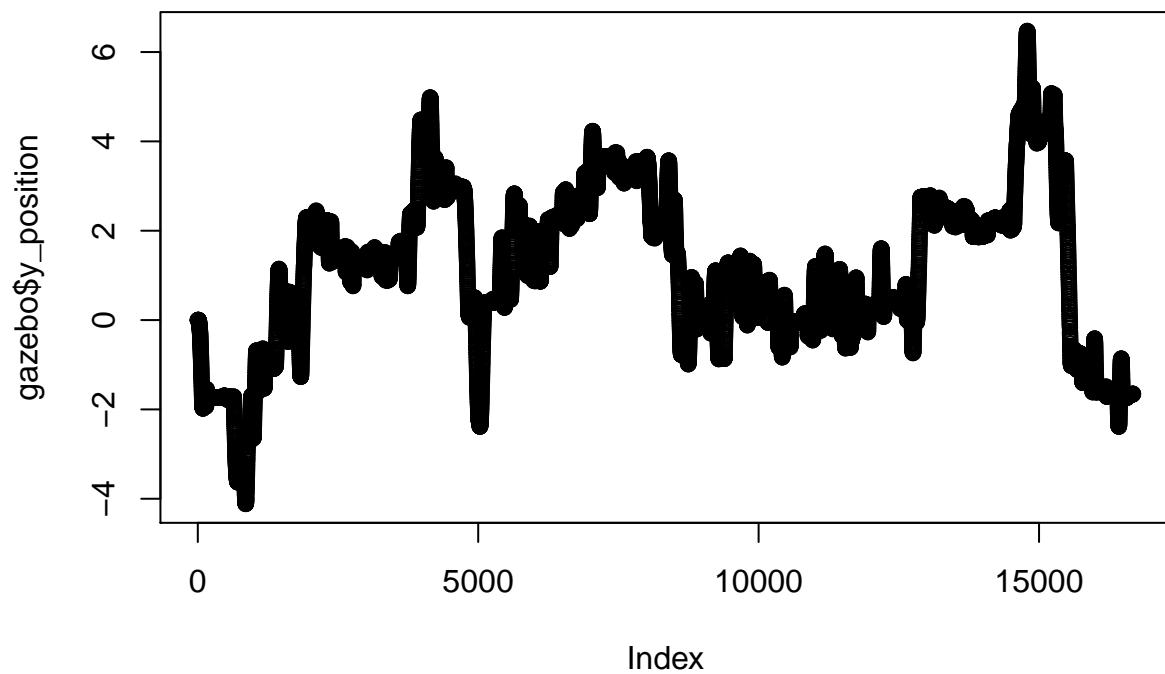
# shapiro.test(noisy_odom$x_err)
# shapiro.test(noisy_odom$y_err)
# shapiro.test(noisy_odom$dist_err)
#
# shapiro.test(gps$x_err)
# shapiro.test(gps$y_err)
# shapiro.test(gps$dist_err)
#
# noisy_odom_fit_x <- fitdist(noisy_odom$x_err, "norm")
# noisy_odom_fit_y <- fitdist(noisy_odom$y_err, "norm")
#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

```

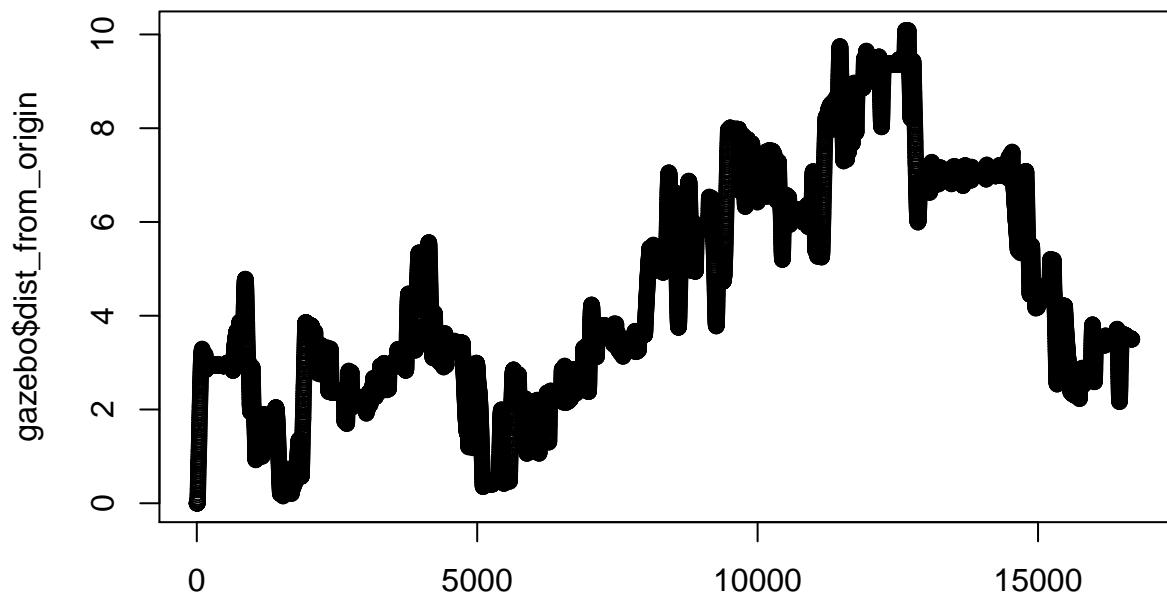
X coordinate of robot over time



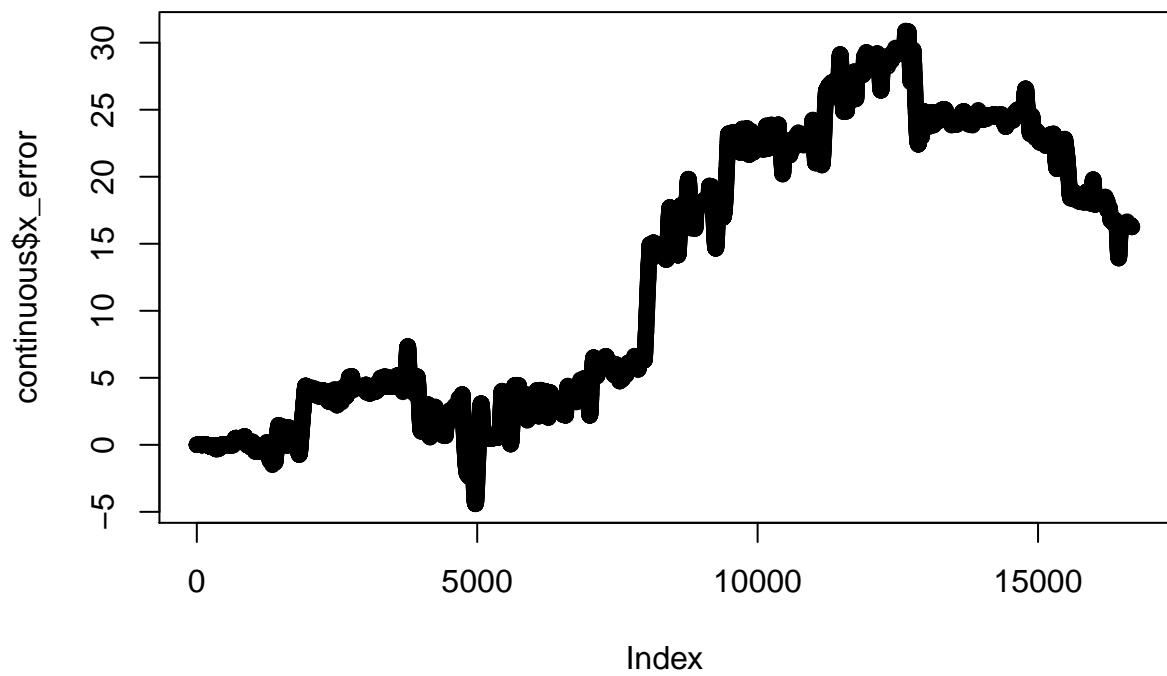
Y coordinate of robot over time



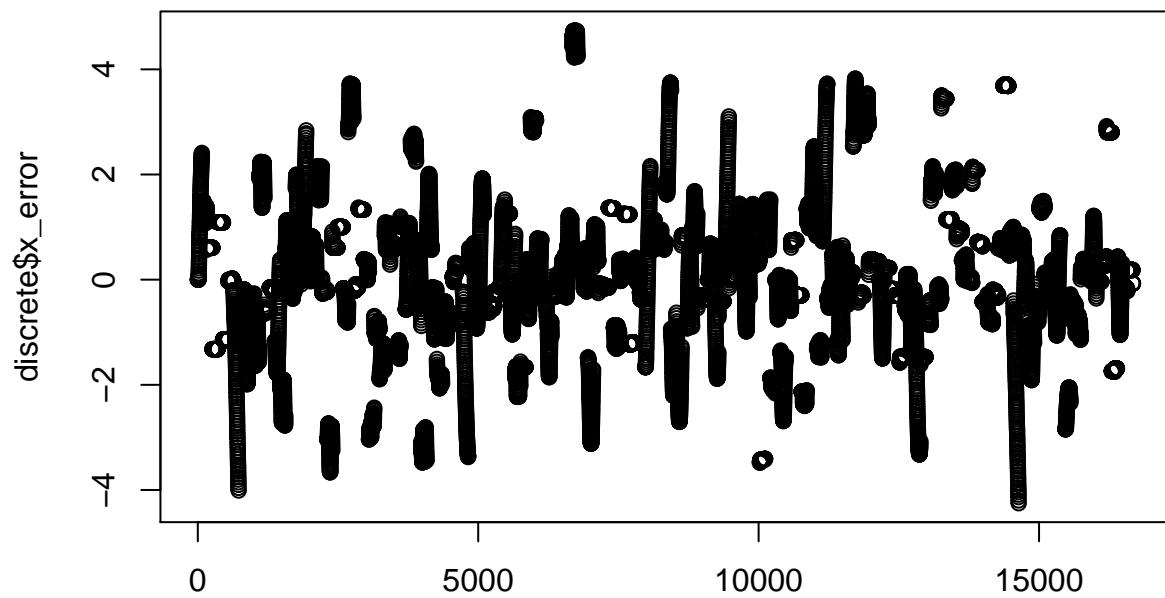
Distance from origin vs. time



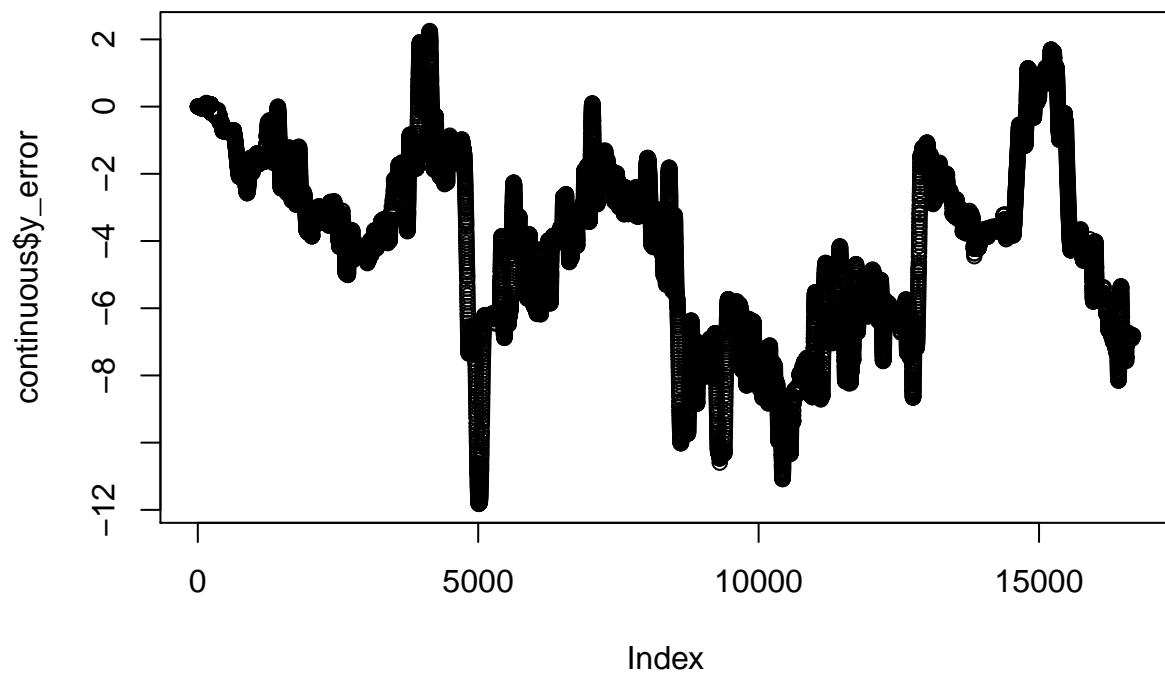
Continuous x_error over time



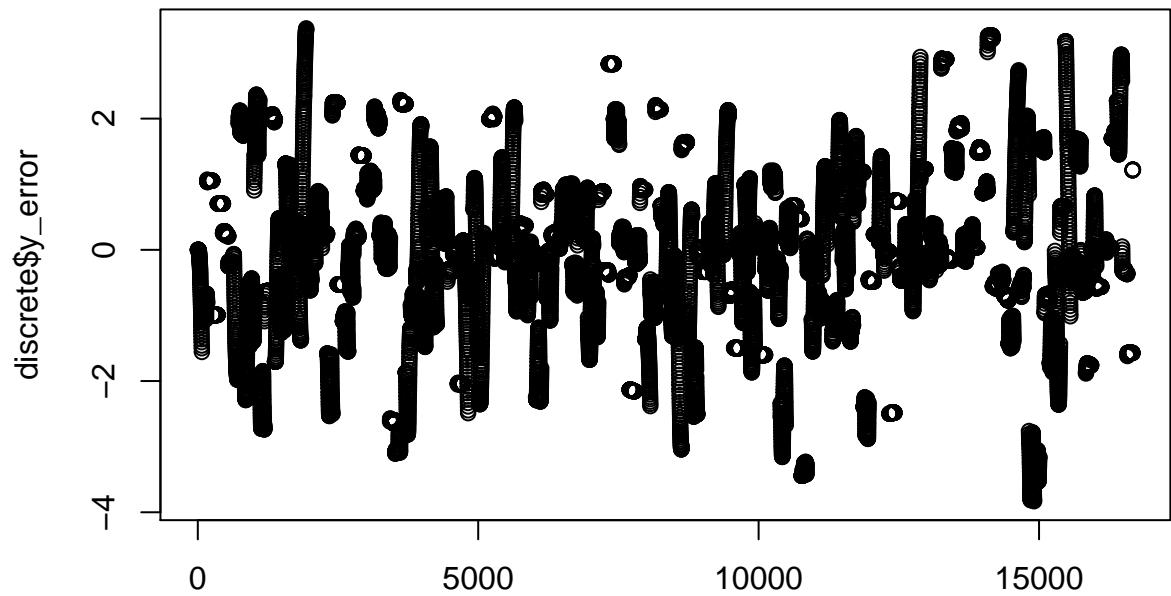
Discrete x_error over time



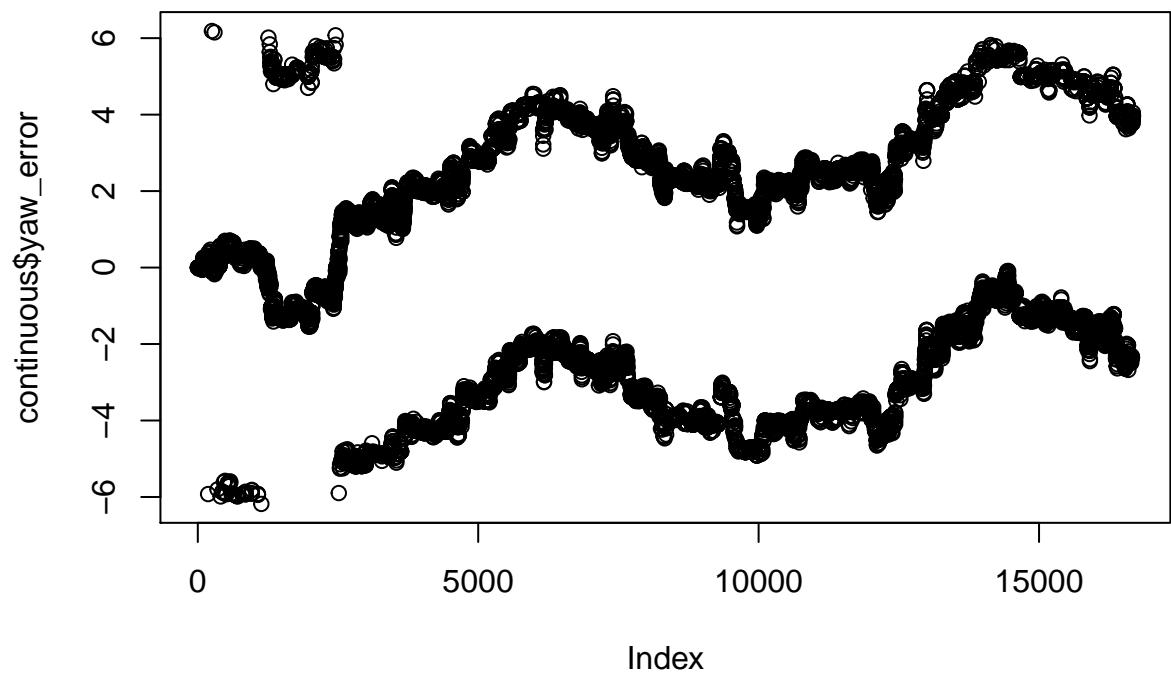
Continuous y_error over time



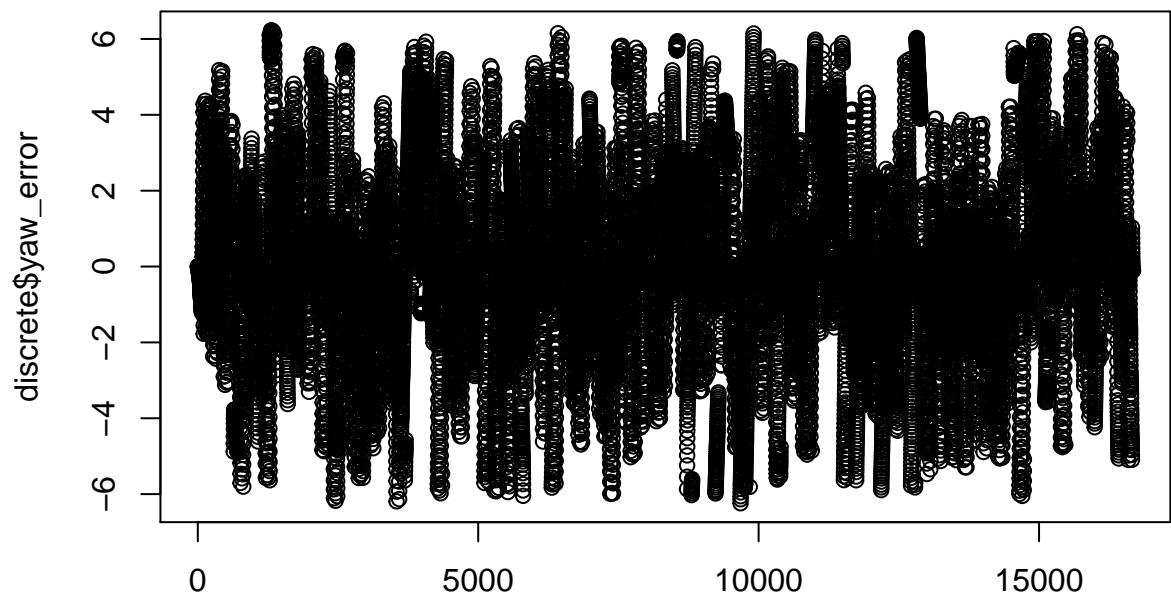
Discrete y_error over time



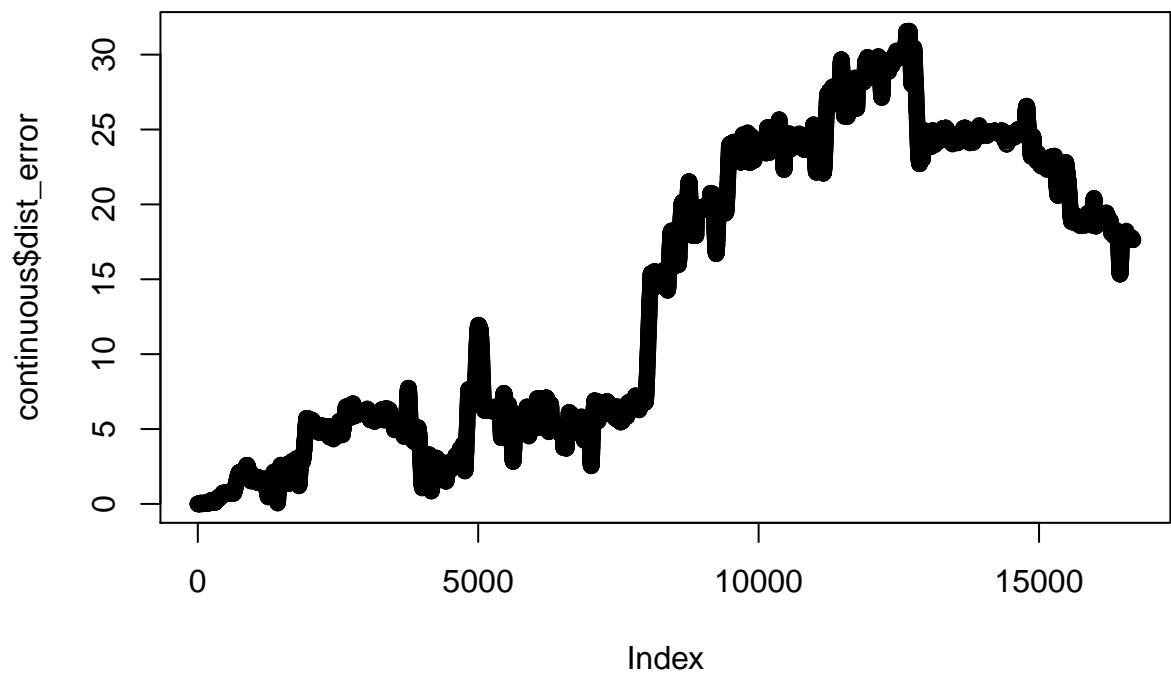
Continuous yaw error over time



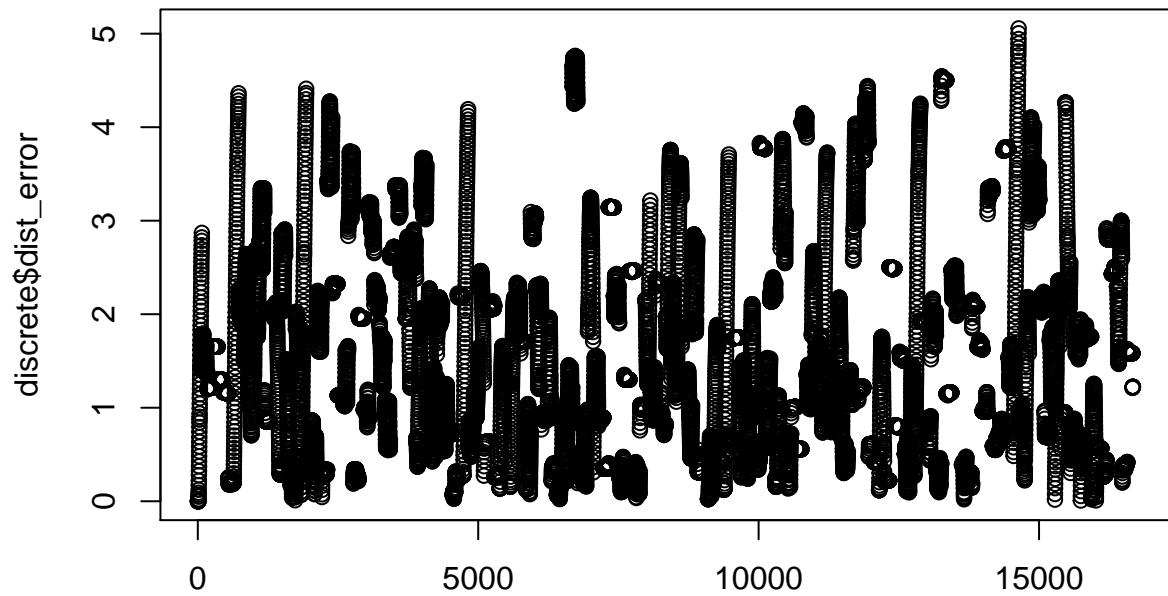
Discrete yaw error over time



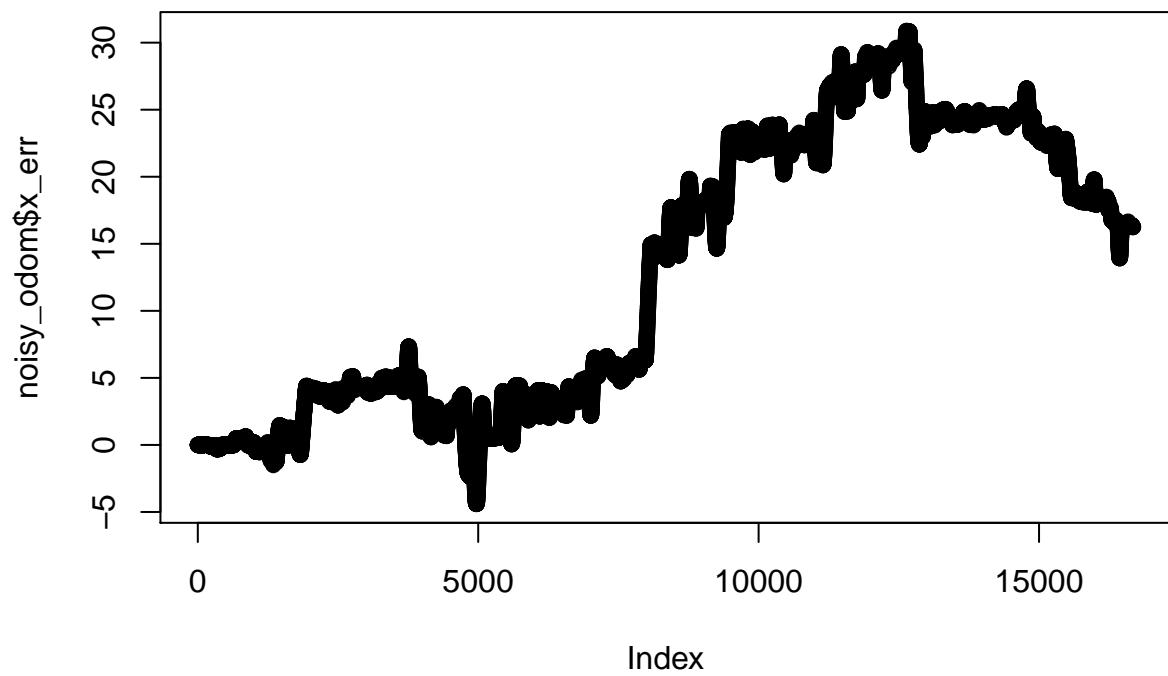
Continuous total distance error over time



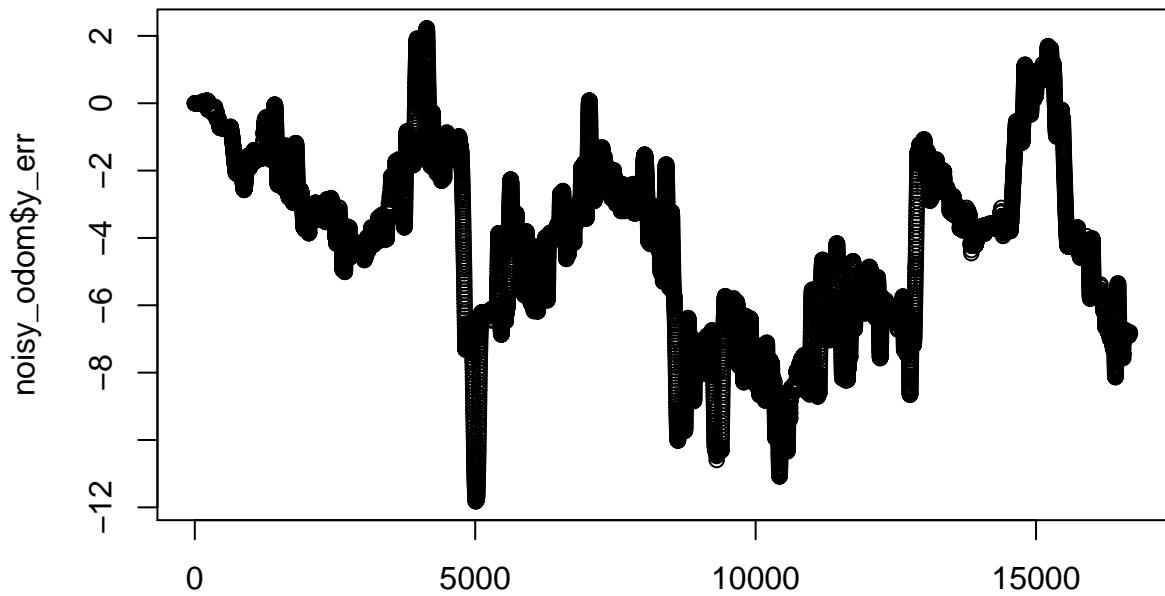
Discrete total distance error over time



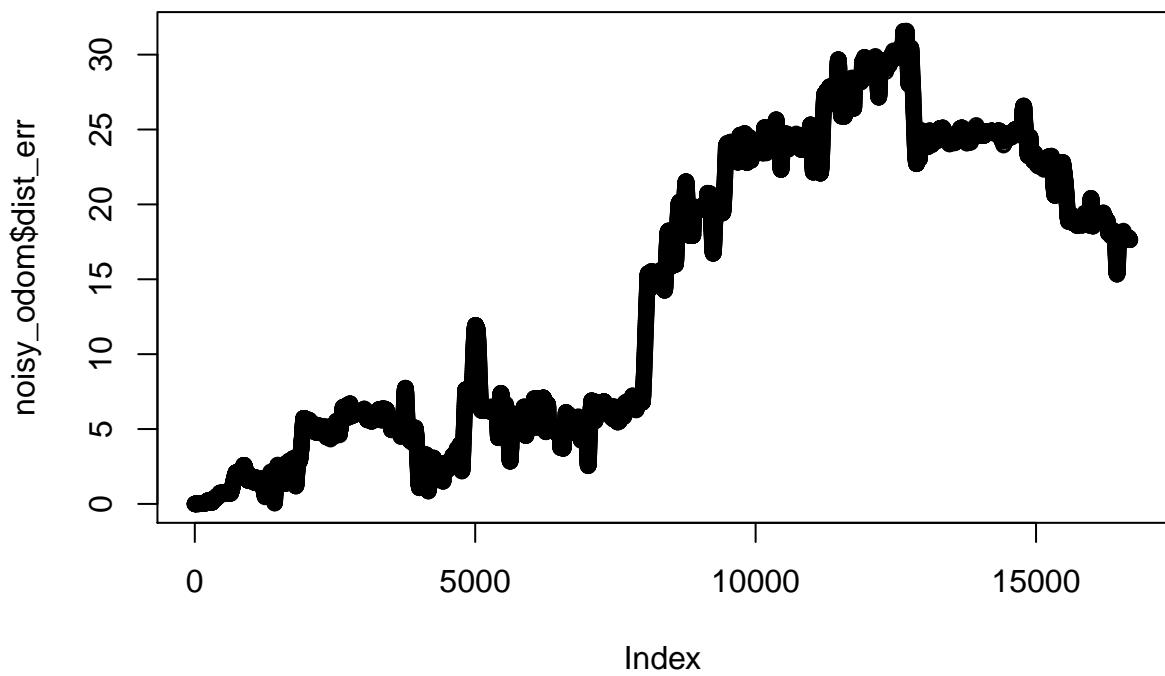
Noisy Odom X Error Over Time



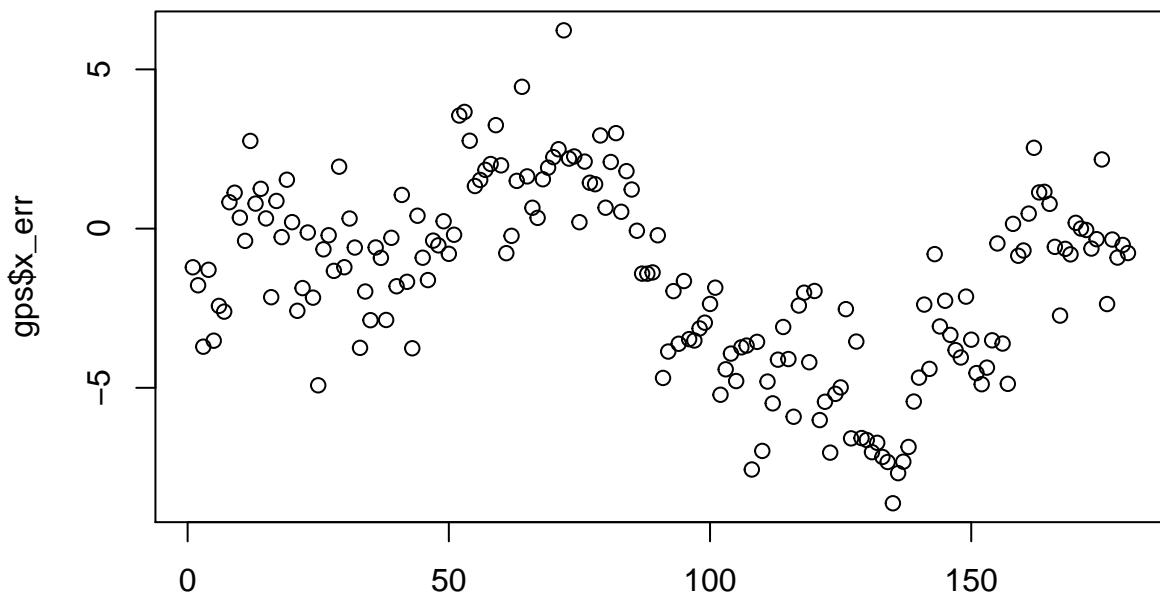
Noisy Odom Y Error Over Time



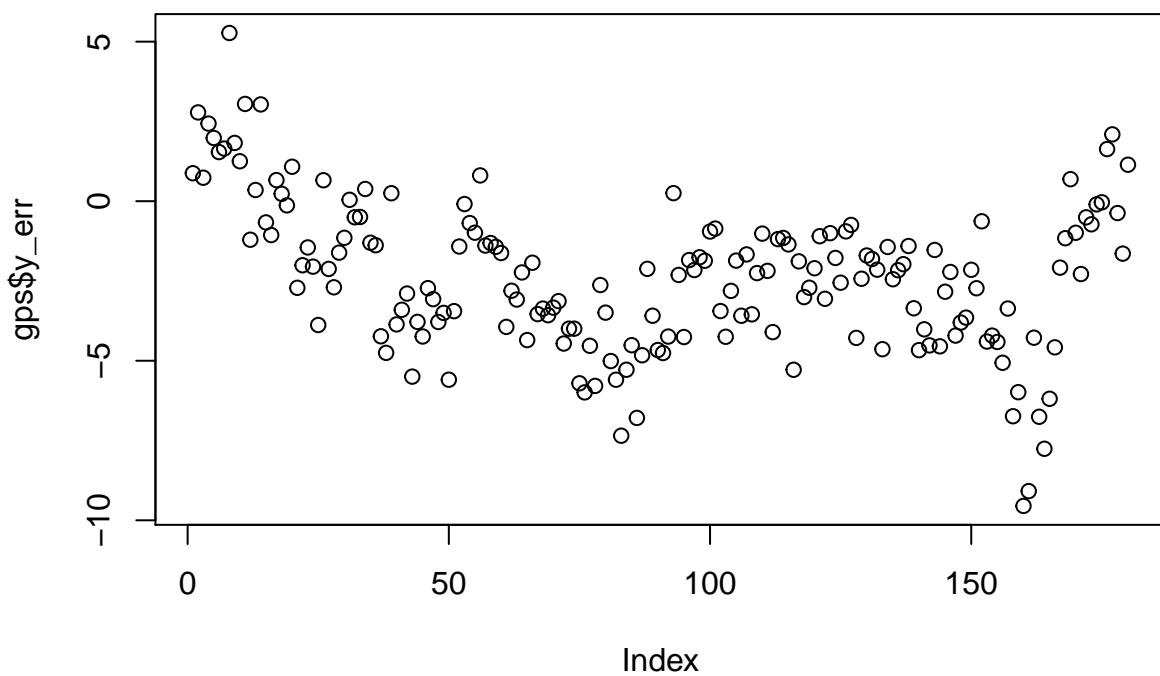
Noisy Odom Horizontal Distance Error Over Time



GPS X Error Over Time



GPS Y Error Over Time



GPS Horizontal Distance Error Over Time

