

two_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 16939
## items to be assigned to 180 items of column 'x_err' (16759 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 16939
## items to be assigned to 180 items of column 'y_err' (16759 unused)
```

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

The runtime of this experiment was 0 hours, 28 minutes, and 13.9 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.
## -0.1163 -0.1163 -0.1163 -0.1163 -0.1163 -0.1163
```

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

```
##      Min. 1st Qu. Median   Mean 3rd Qu.   Max.
## 0.01172 0.01193 0.01215 0.01215 0.01237 0.01258
```

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

```
##      Min. 1st Qu. Median   Mean 3rd Qu.   Max.
## 0.05594 0.05599 0.05600 0.05600 0.05601 0.05605
```

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

```
##      Min. 1st Qu. Median   Mean 3rd Qu.   Max.
## 0.1169 0.1169 0.1170 0.1170 0.1170 0.1170
```

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

```
##      Min. 1st Qu. Median   Mean 3rd Qu.   Max.
## -3.39300 -0.56270 -0.02762 0.02665 0.56910 3.13700
```

```

summary(discrete$y_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -4.14400 -0.74330 -0.02525 -0.03467  0.60910  4.87700

summary(discrete$yaw_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -9.865e-05 -1.039e-06  1.880e-05  2.483e-05  4.746e-05  2.181e-04

summary(discrete$dist_error)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.000015 0.598000 1.294000 1.453000 2.213000 5.181000

summary(noisy_odom$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -0.1163 -0.1163 -0.1163 -0.1163 -0.1163 -0.1163

summary(noisy_odom$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.01172 0.01193 0.01215 0.01215 0.01237 0.01258

summary(noisy_odom$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.1169 0.1169 0.1170 0.1170 0.1170 0.1170

summary(gps$x_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -3.39500 -0.57250 -0.04097  0.01206  0.55810  3.13000

summary(gps$y_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## -4.14300 -0.75780 -0.01962 -0.03294  0.61030  4.87700

summary(gps$dist_err)

##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 0.03191 0.60390 1.29300 1.46000 2.20200 5.17900

```

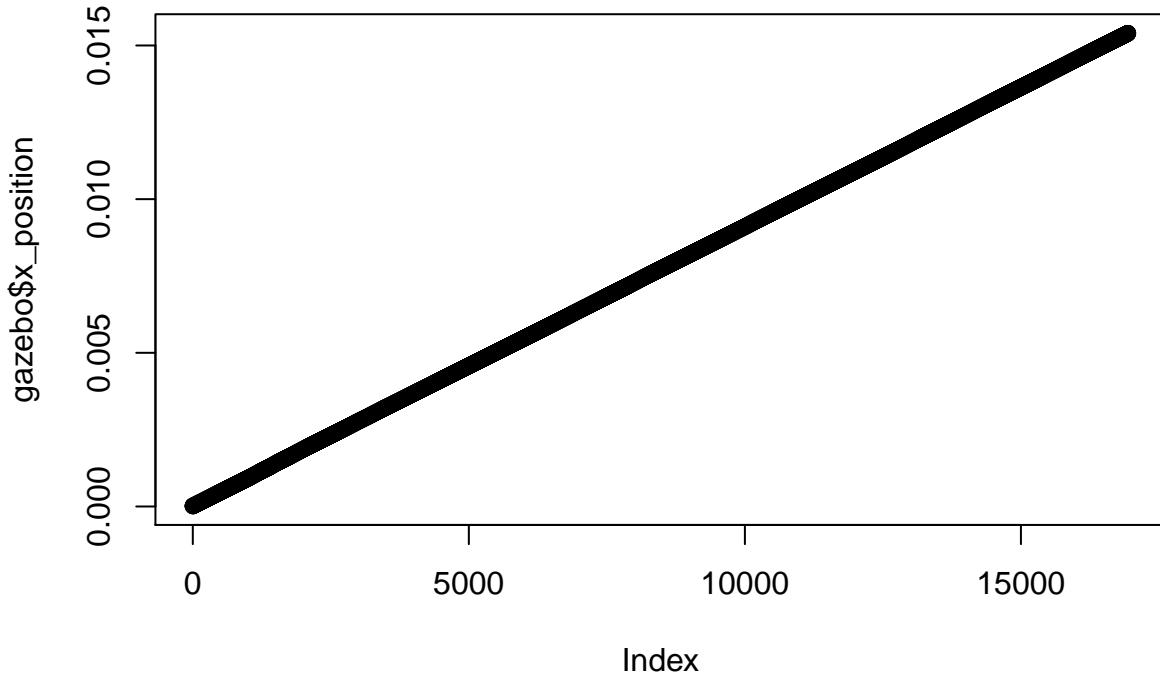
```

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

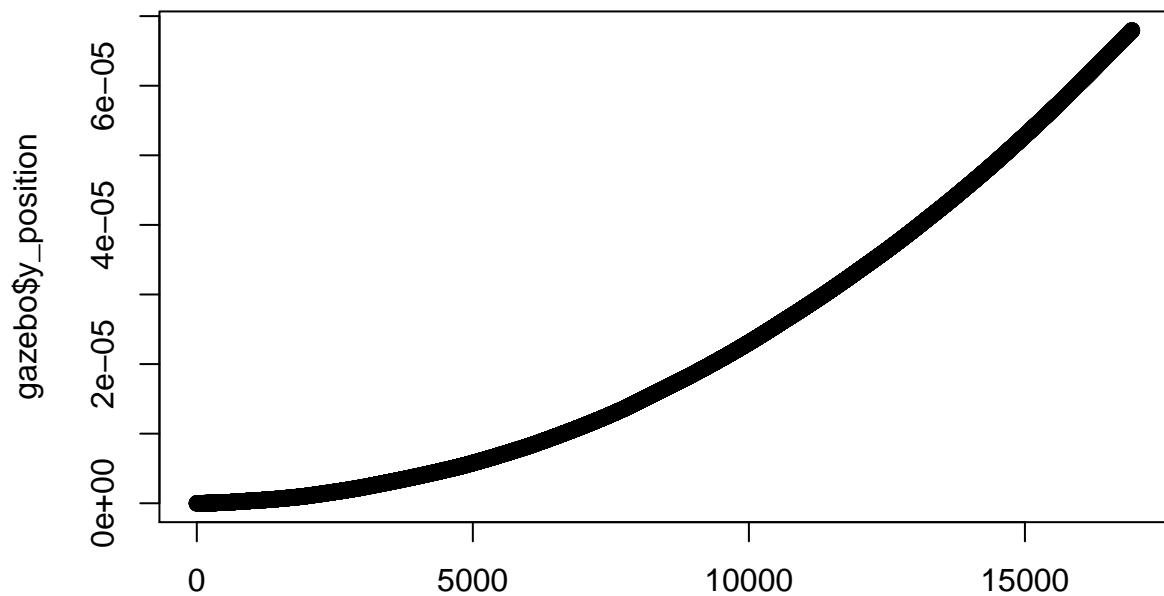
# shapiro.test(noisy_odom$x_err)
# shapiro.test(noisy_odom$y_err)
# shapiro.test(noisy_odom$dist_err)
#
# shapiro.test(gps$x_err)
# shapiro.test(gps$y_err)
# shapiro.test(gps$dist_err)
#
# noisy_odom_fit_x <- fitdist(noisy_odom$x_err, "norm")
# noisy_odom_fit_y <- fitdist(noisy_odom$y_err, "norm")
#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

```

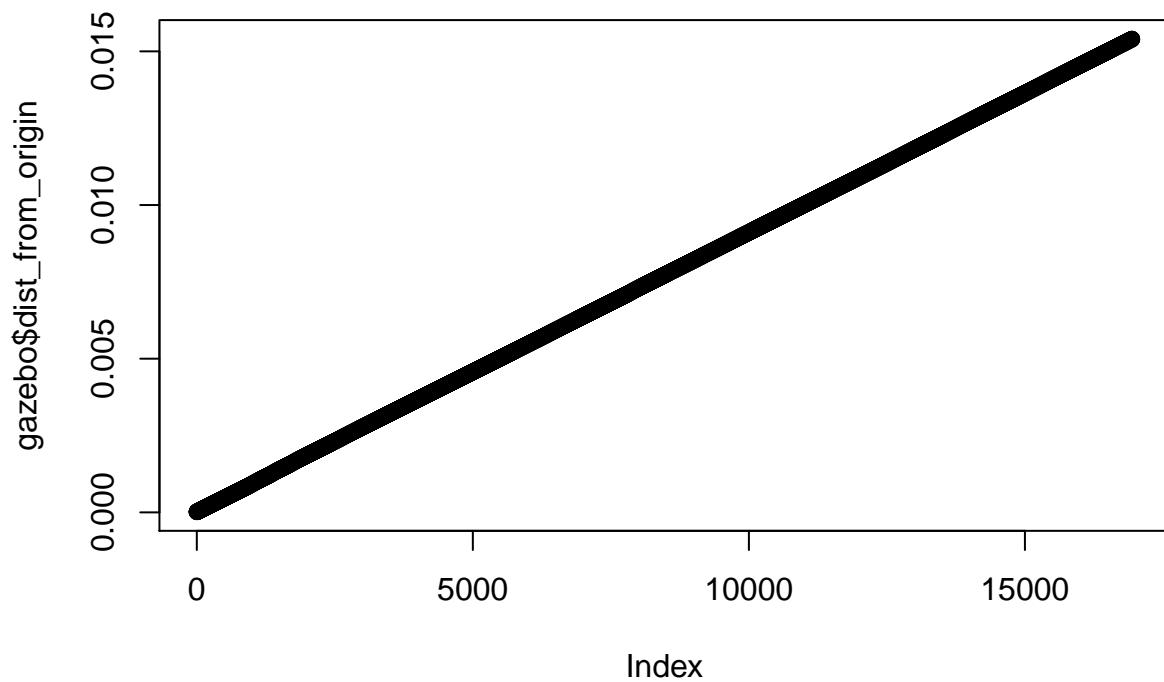
X coordinate of robot over time



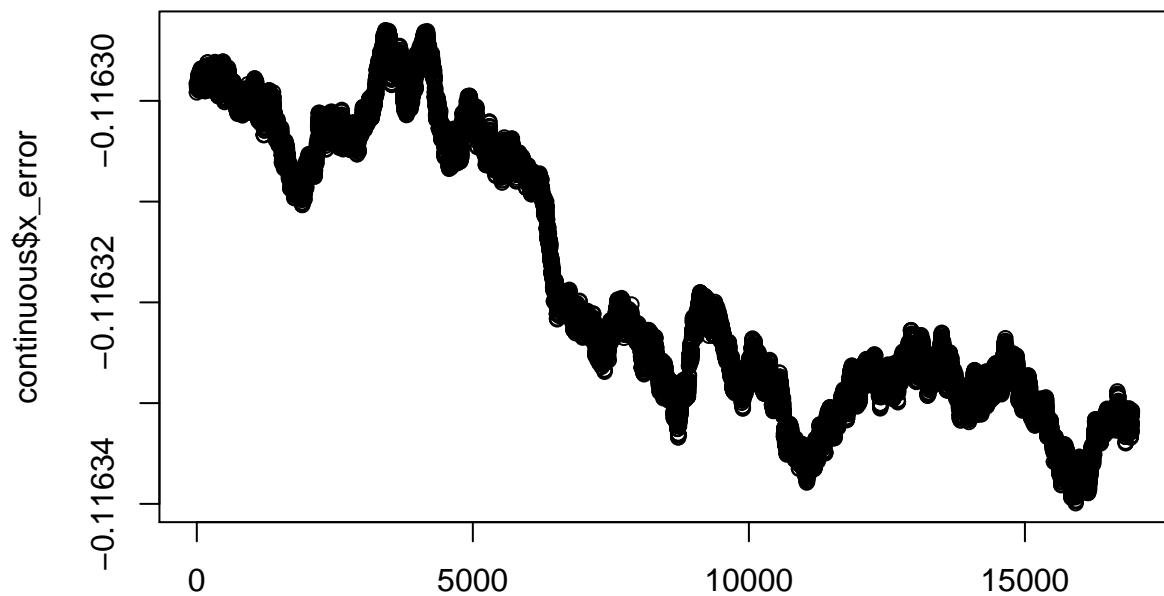
Y coordinate of robot over time



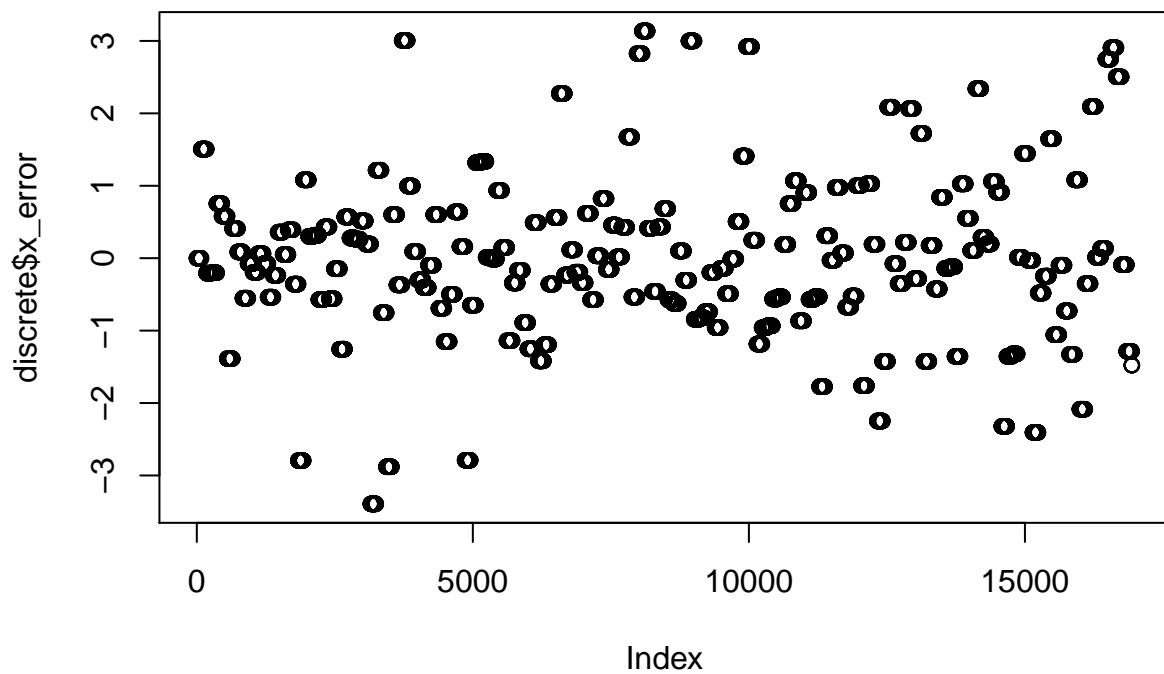
Distance from origin vs. time^{Index}



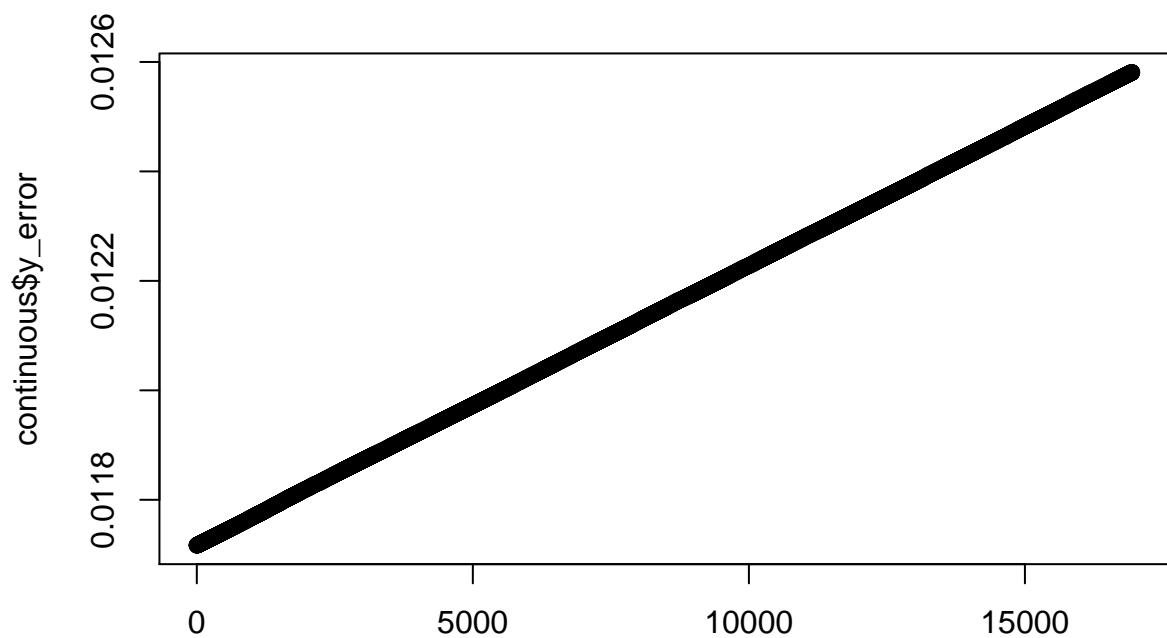
Continuous x_error over time



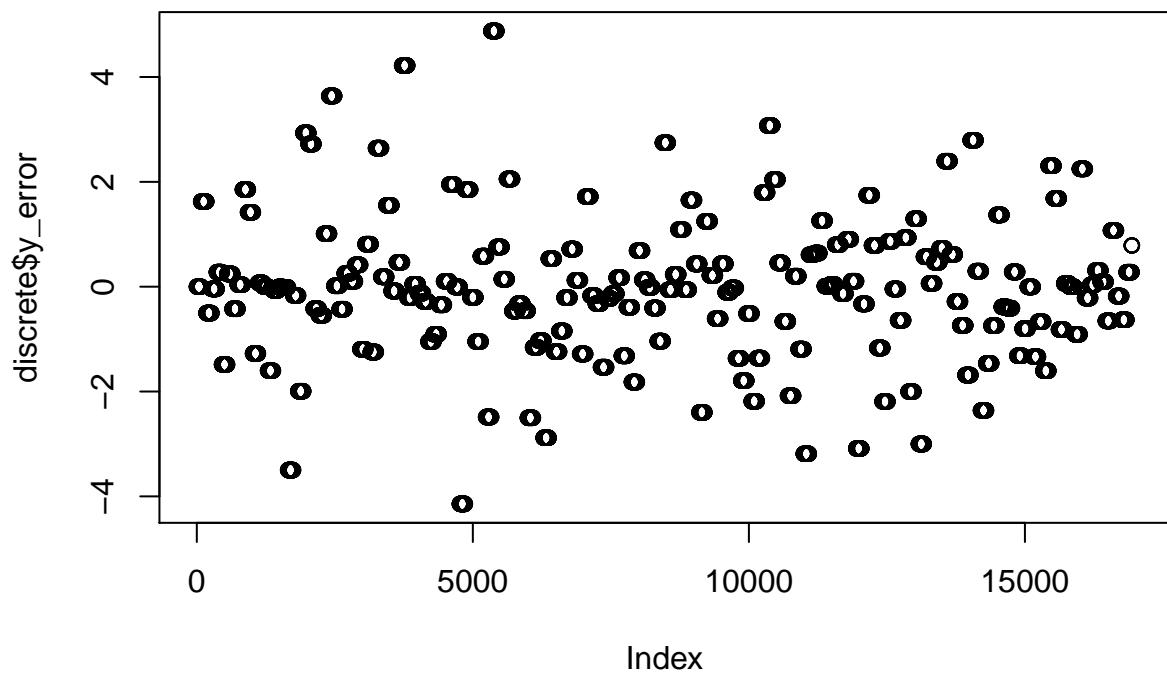
Discrete x_error over time



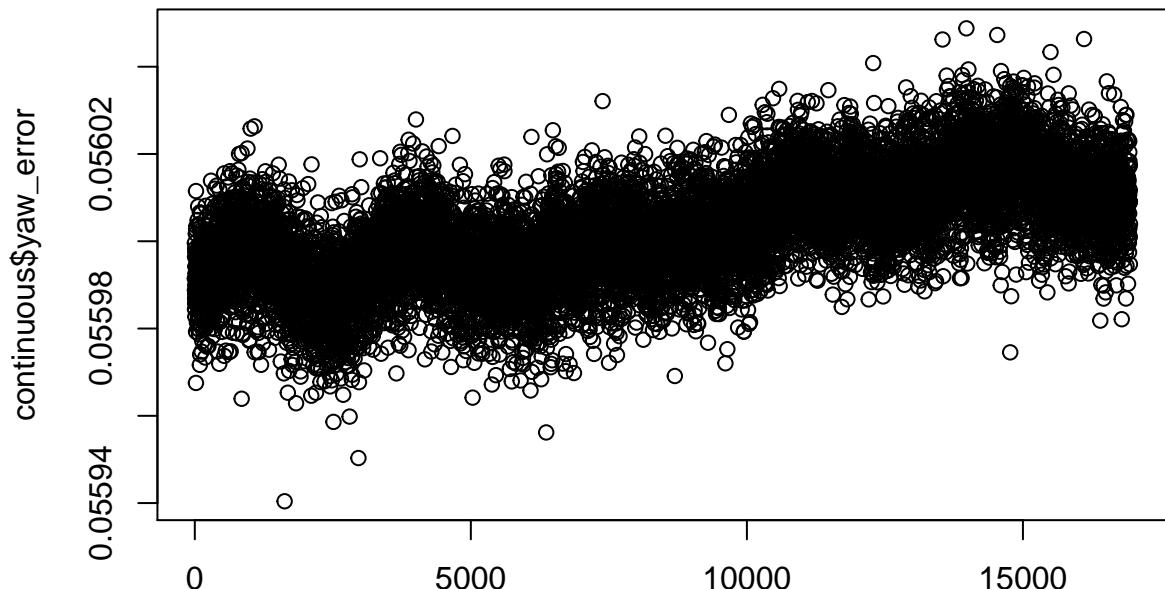
Continuous y_error over time



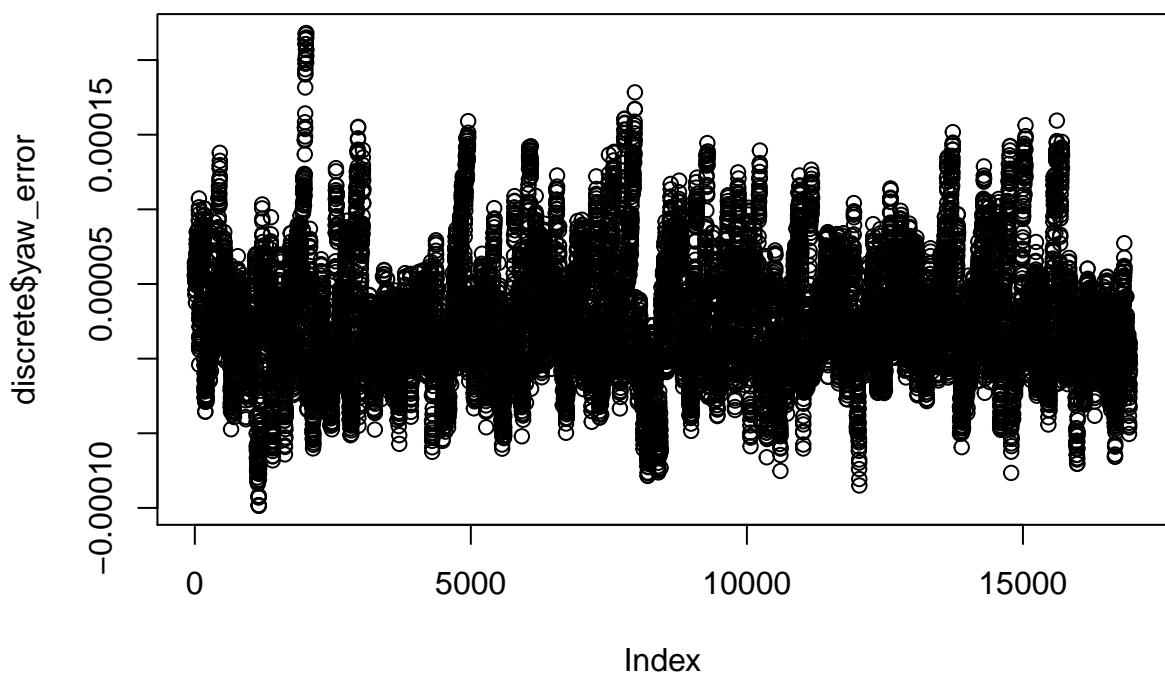
Discrete y_error over time



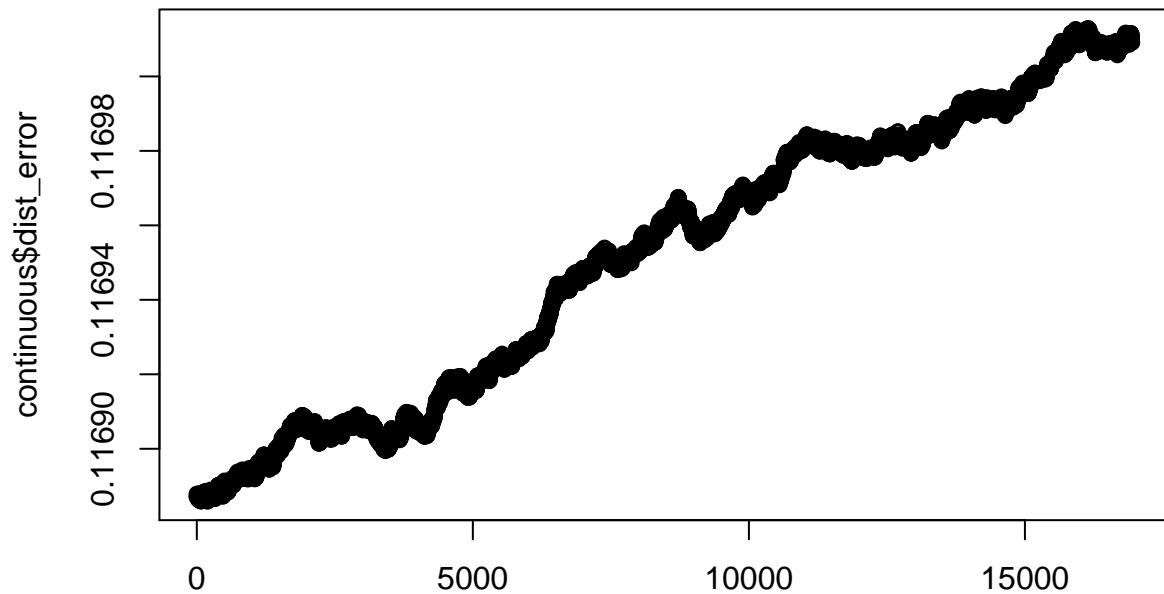
Continuous yaw error over time



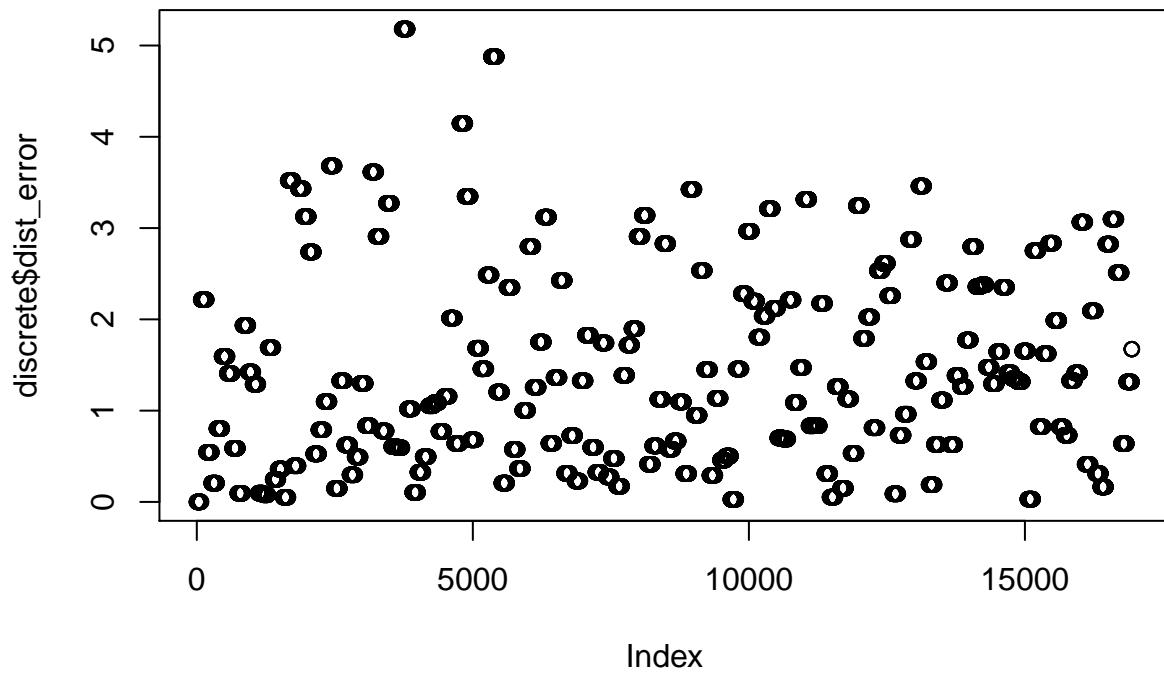
Discrete yaw error over time



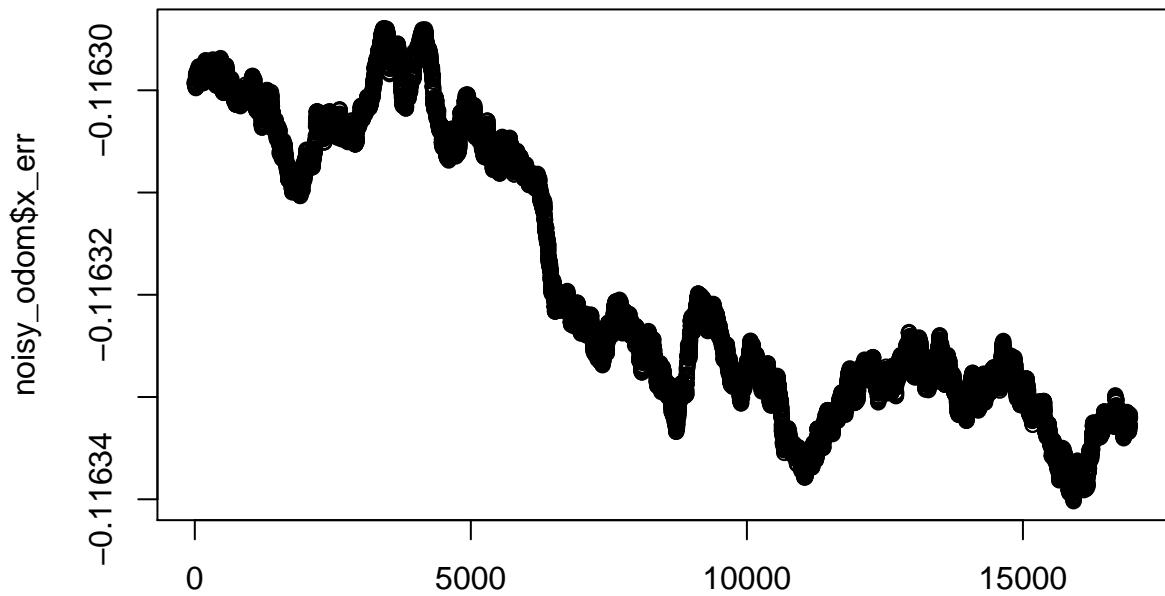
Continuous total distance error over time



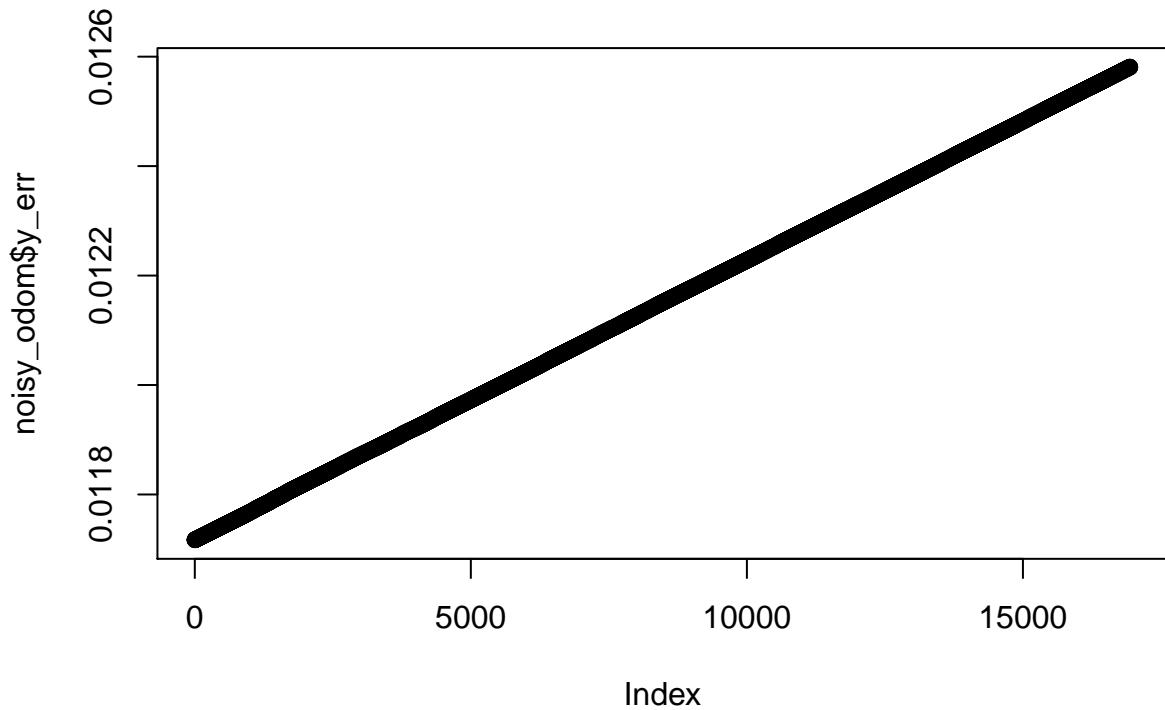
Discrete total distance error over time



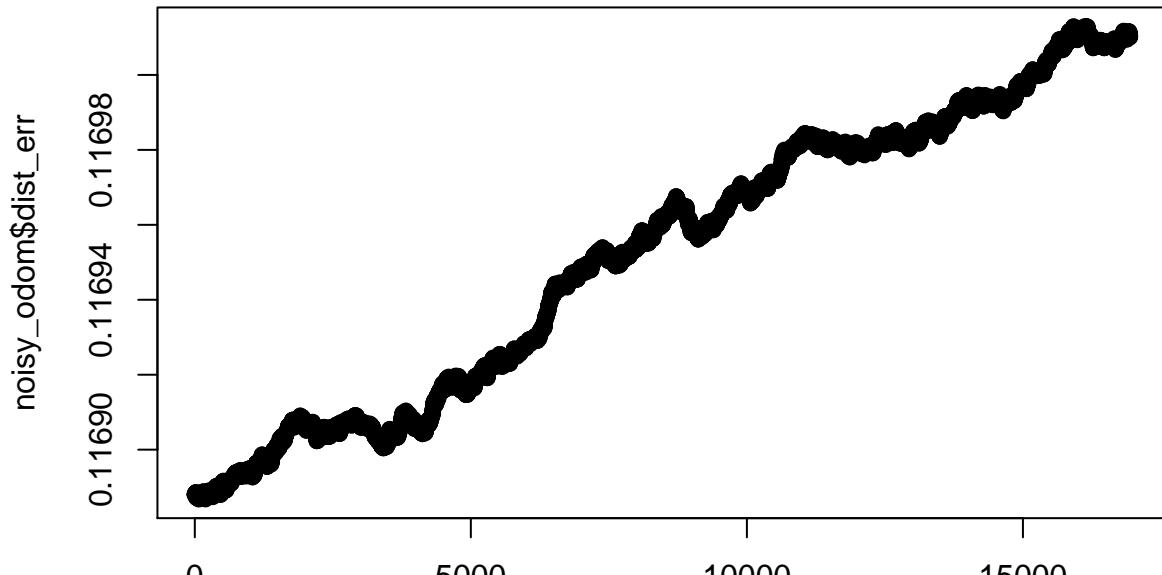
Noisy Odom X Error Over Time



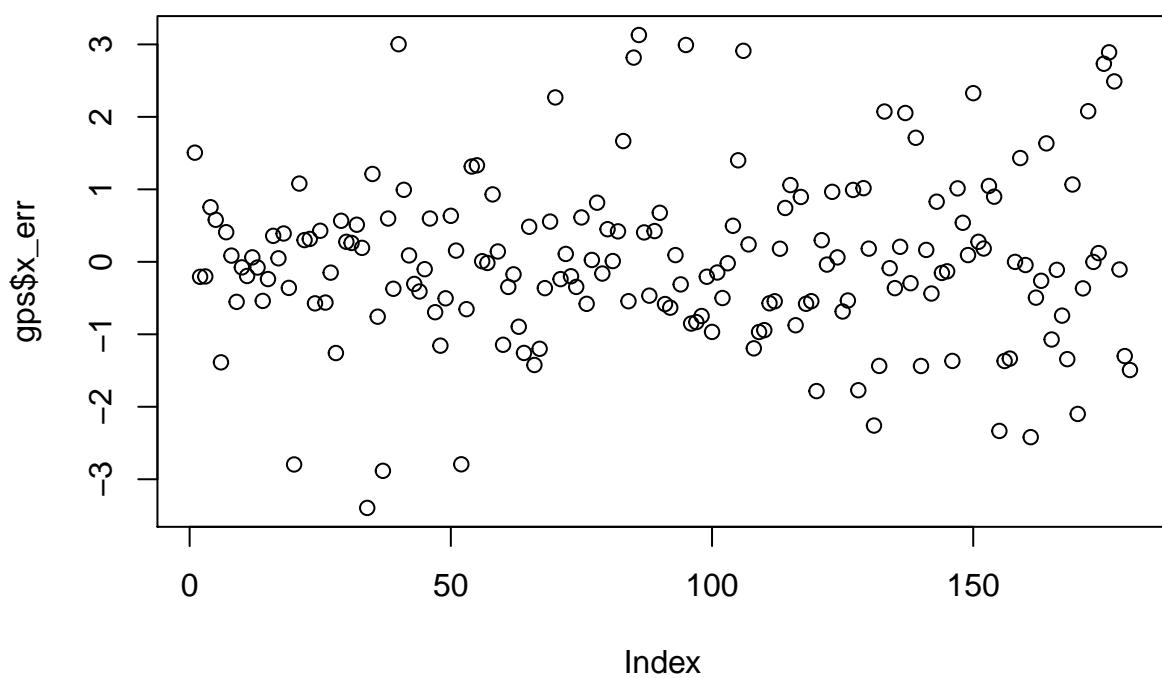
Noisy Odom Y Error Over Time



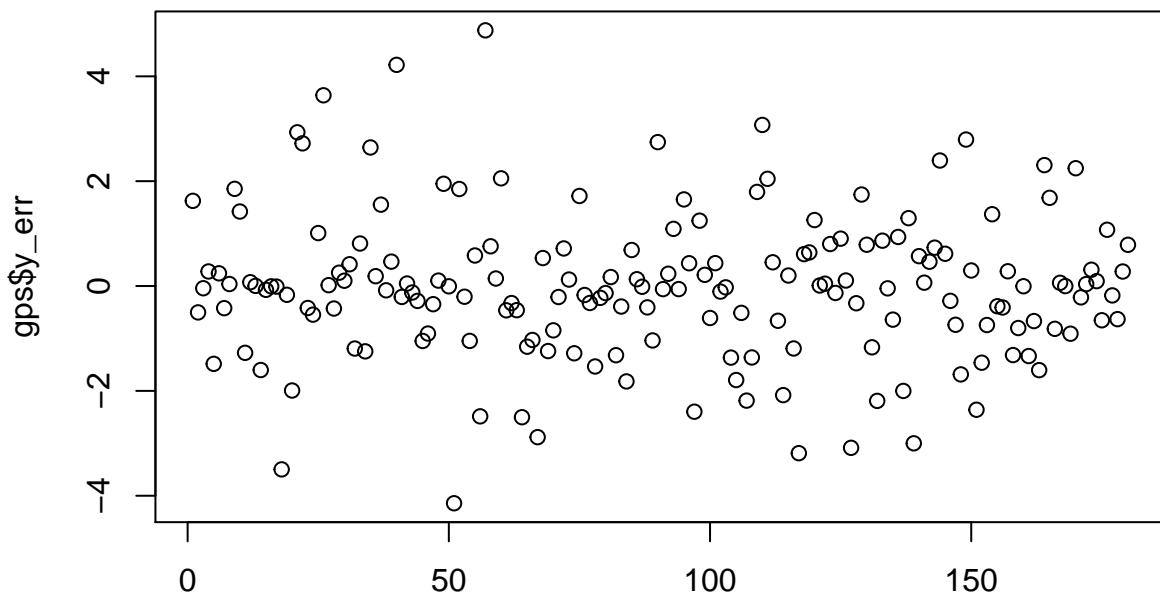
Noisy Odom Horizontal Distance Error Over Time



GPS X Error Over Time



GPS Y Error Over Time



GPS Horizontal Distance Error Over Time

