

two_mobile_noiseless_no_gps Experiment Report

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This is a summary of the data from the two_mobile_noiseless_no_gps experiment.

Shown below is the summary of the error of all robots combined 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.
## -1.2390000 -0.8877000 -0.0042240 -0.2572000  0.0000248  0.6862000
```

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

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -0.101600 -0.037440 -0.000009  2.184000  6.679000  7.974000
```

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

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -3.1410 -1.5490 -0.3738 -0.1290  1.4810  3.1400
```

```
summary(continuous$horizontal_error)
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
##  0.000002  0.000064  0.037740  2.235000  6.734000  8.045000
```

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

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -1.10800 -0.39620 -0.28540 -0.24160 -0.03806  0.70380
```

```
summary(discrete$y_error)
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -2.7610 -1.9300  0.1676 -0.3249  0.7700  1.1860
```

```
summary(discrete$yaw_error)
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
## -3.1420 -1.5320 -0.3611 -0.1159  1.4860  3.1400
```

```
summary(discrete$horizontal_error)
```

```
##      Min.      1st Qu.      Median      Mean      3rd Qu.      Max.
##  0.0000159  0.7228000  0.9499000  1.1690000  1.9350000  2.7760000
```

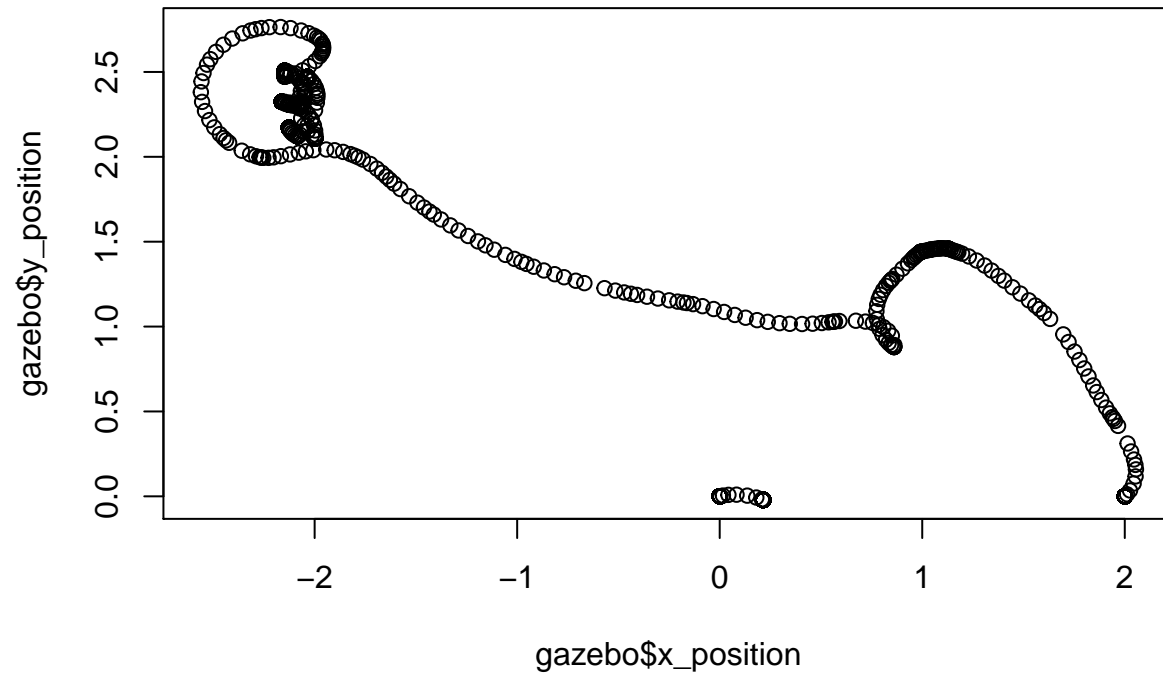
```
if (params$robot >= 2) {
  summary(external_data_averages)
}
```

```
##      Length Class  Mode
## [1,] 1      -none- numeric
## [2,] 1      -none- numeric
```

Shown below are plots representing the robot's motion and error over time.

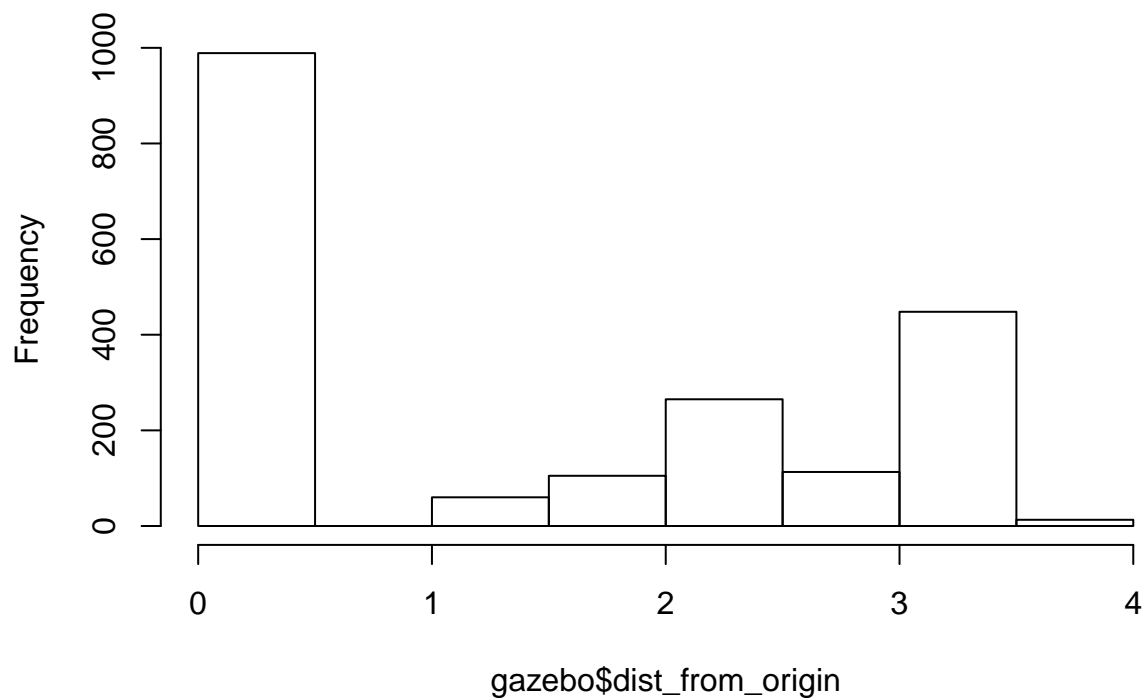
```
plot(gazebo$x_position, gazebo$y_position,
     main = "Ground truth visited locations of robots")
```

Ground truth visited locations of robots

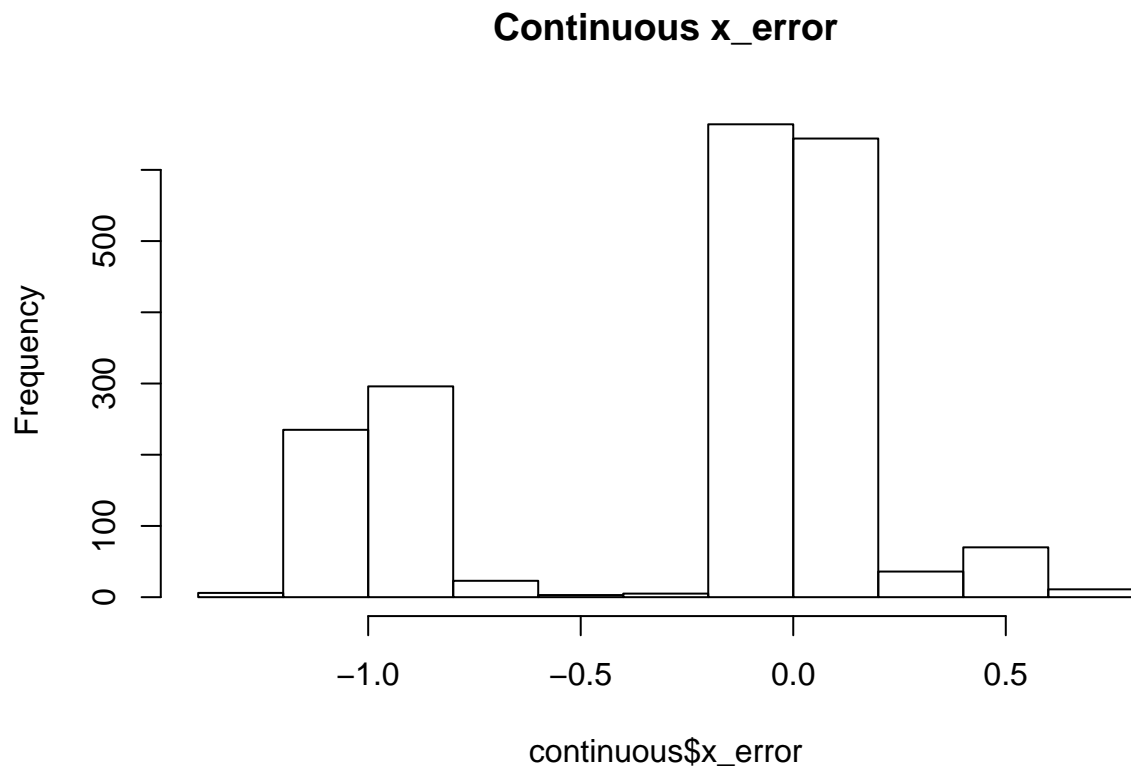


```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```

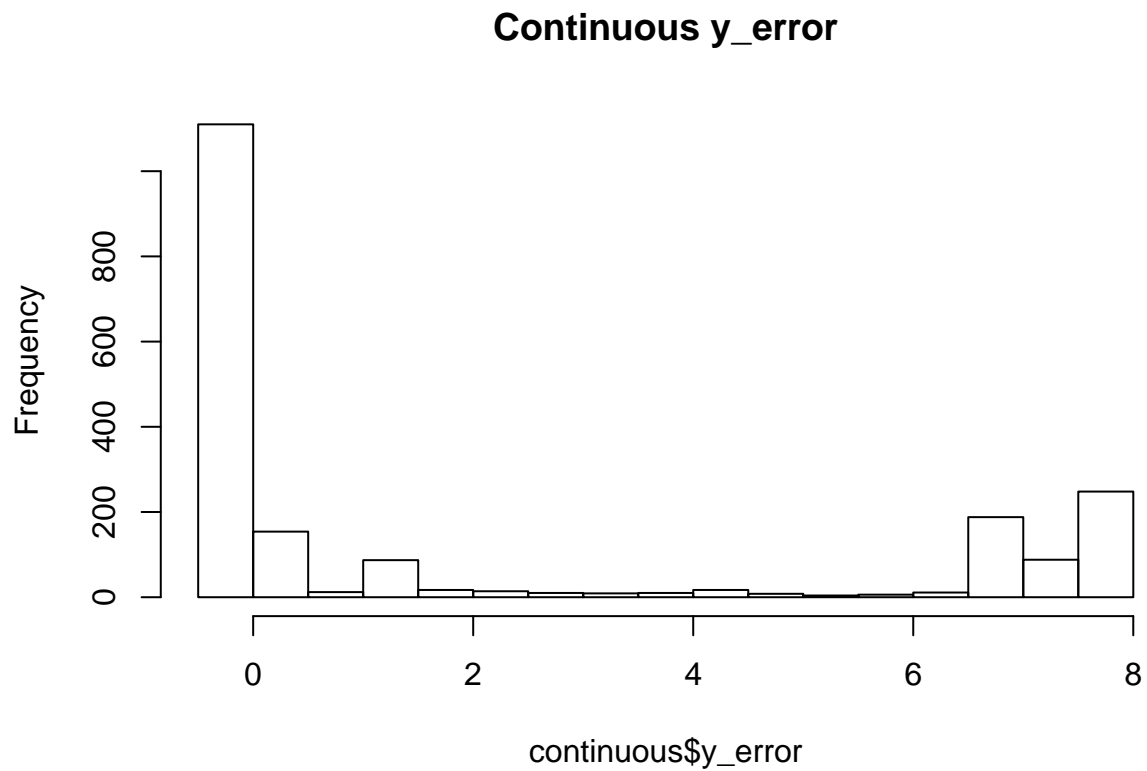
Distance from origin vs. time



```
hist(continuous$x_error,  
     main = "Continuous x_error")
```

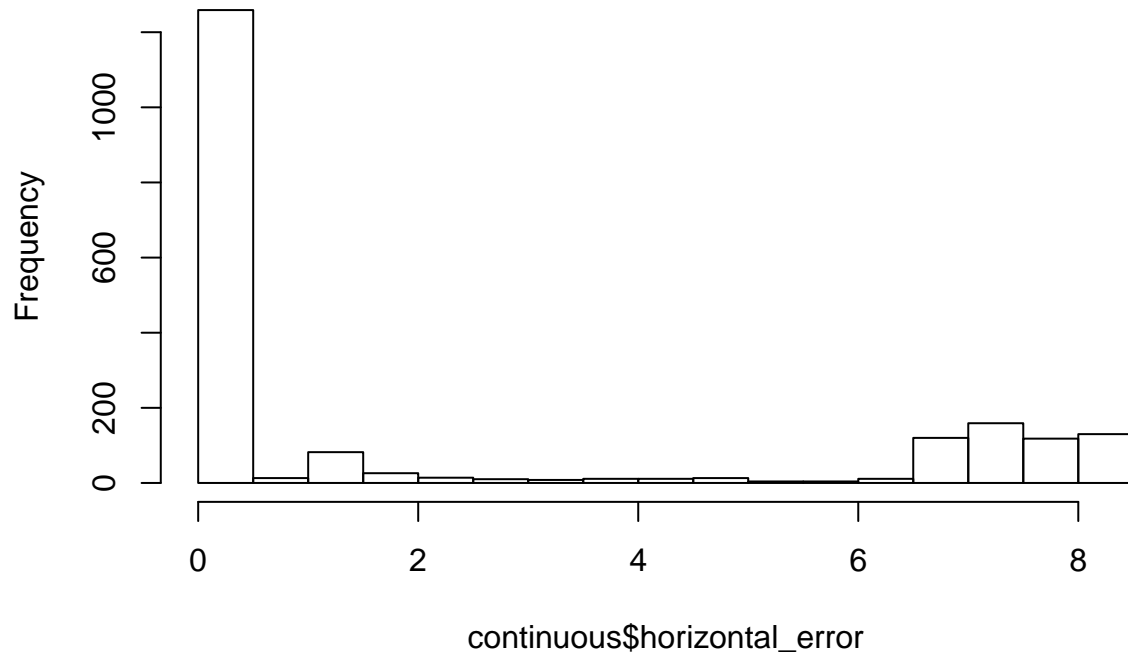


```
hist(continuous$y_error,  
     main = "Continuous y_error")
```



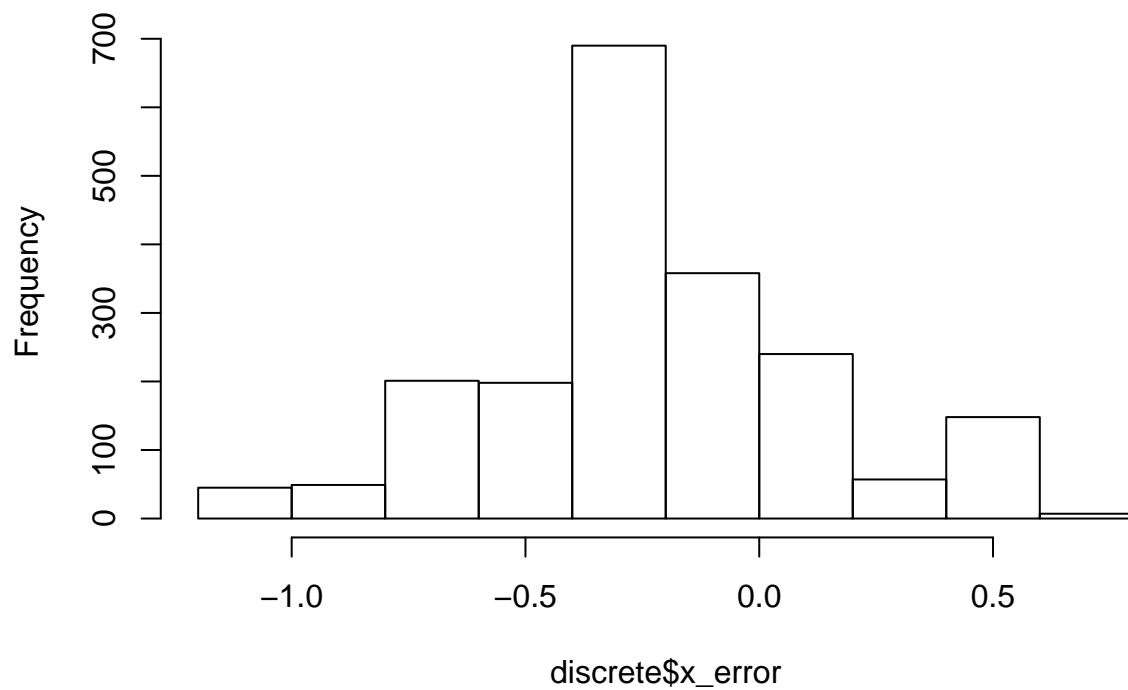
```
hist(continuous$horizontal_error,  
     main = "Continuous total distance error")
```

Continuous total distance error

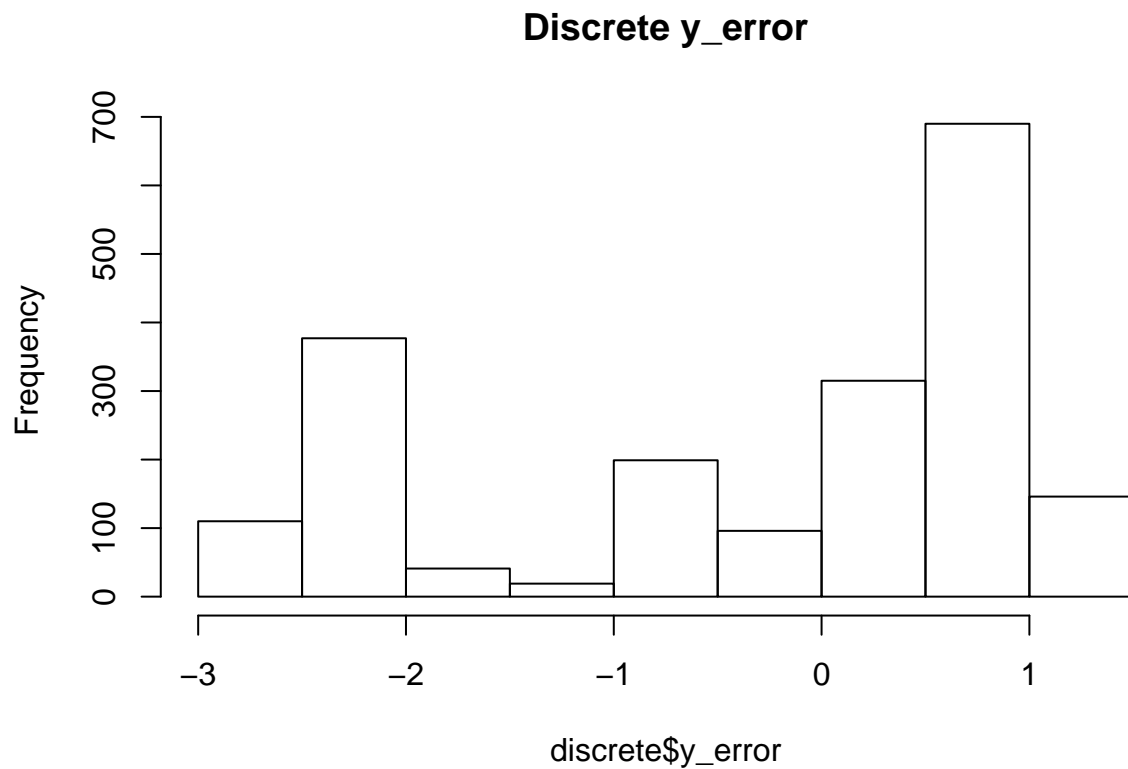


```
hist(discrete$x_error,  
     main = "Discrete x_error")
```

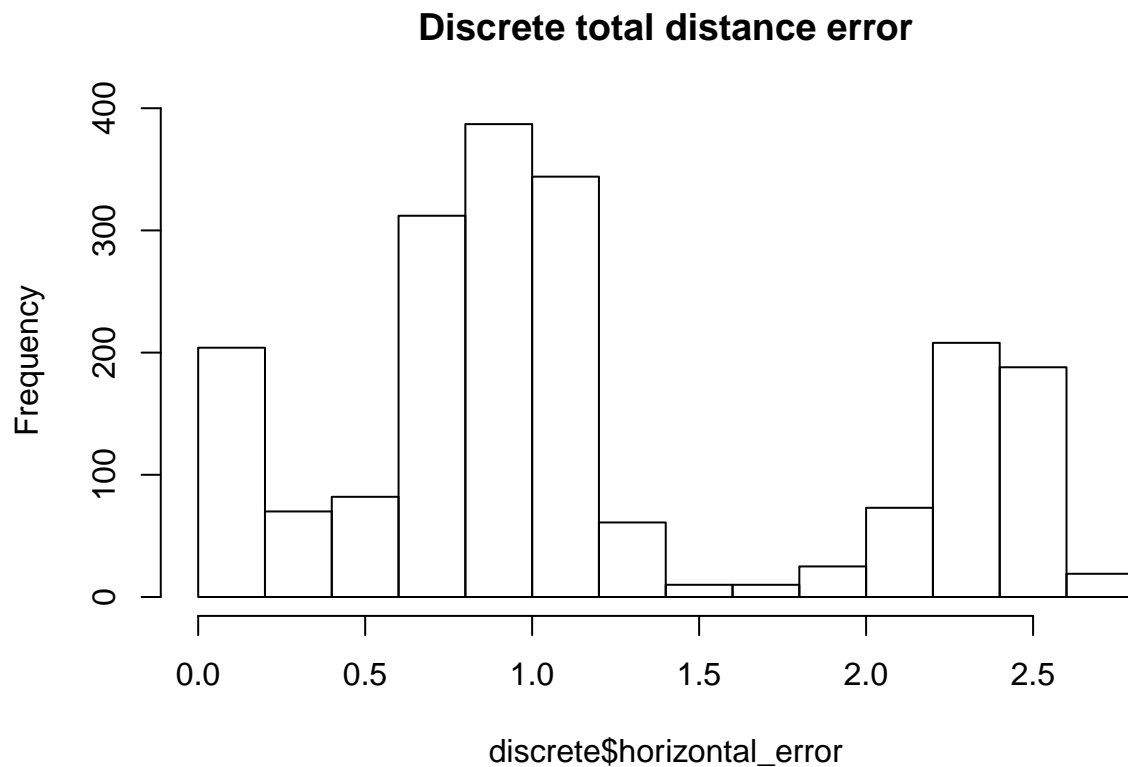
Discrete x_error



```
hist(discrete$y_error,
     main = "Discrete y_error")
```



```
hist (discrete$horizontal_error,
     main = "Discrete total distance error")
```



```

figure_dir <- "/home/matt/thesis/writing/r_figures/"
filename = paste0(figure_dir, params$experiment, "_continuous_error.pdf")
pdf(filename)
plot(continuous$horizontal_error, main="Continuous Filter Error", sub=paste0("For ", params$experiment,
dev.off()

## pdf
## 2

filename = paste0(figure_dir, params$experiment, "_discrete_error.pdf")
pdf(filename)
plot(discrete$horizontal_error, main="Discrete Filter Error", sub=paste0("For ", params$experiment, " E
dev.off()

## pdf
## 2

if (params$experiment == "one_stationary_noiseless") {
  gazebo$horizontal_error <- sqrt(gazebo$x_position ^ 2 + gazebo$y_position ^ 2)
  pdf(paste0(figure_dir, "gazebo_odom_drift.pdf"))

  plot(gazebo$horizontal_error, main="Gazebo Odometry Drift for Stationary Robot with Noiseless Odome
  dev.off()
}

table_dir <- "/home/matt/thesis/writing/autogenerated_tables/"

out_file <- paste0(table_dir, params$experiment, "_continuous_summary.tex")
tex_label <- paste0("tab:", params$experiment, "_continuous_summary")
stargazer(continuous,
  out=out_file,
  table.placement="h",
  label=tex_label,
  title=gsub("_", "-", paste0("Continuous Filter Estimate for ", params$experiment, " Experiment
  digits.extra = 20)

##
## % Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvar
## % Date and time: Mon, Aug 15, 2016 - 04:27:45 PM
## \begin{table}[h] \centering
## \caption{Continuous Filter Estimate for two-mobile-noiseless-no-gps Experiment}
## \label{tab:two_mobile_noiseless_no_gps_continuous_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lcccc}
## \ll[-1.8ex]\hline
## \hline \ll[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multi
## \hline \ll[-1.8ex]
## x\_position & 1,993 & 0.037 & 0.975 & $-1.607 & 2.001 \ll
## y\_position & 1,993 & $-1.429 & 2.252 & $-5.815 & 0.400 \ll
## yaw & 1,993 & $-0.447 & 0.958 & $-3.128 & 3.129 \ll
## x\_variance & 1,993 & 5.556 & 3.128 & 0.123 & 11.148 \ll
## y\_variance & 1,993 & 5.556 & 3.128 & 0.123 & 11.148 \ll
## yaw\_variance & 1,993 & 5.080 & 2.863 & 0.112 & 10.068 \ll
## yaw\_error & 1,993 & $-0.129 & 1.783 & $-3.141 & 3.140 \ll
## x\_error & 1,993 & $-0.257 & 0.483 & $-1.239 & 0.686 \ll

```

```

## y\_error & 1,993 & 2.184 & 3.240 & $-$0.102 & 7.974 \\
## horizontal\_error & 1,993 & 2.235 & 3.251 & 0.000002 & 8.045 \\
## \hline \\[-1.8ex]
## \end{tabular}
## \end{table}

out_file <- paste0(table_dir, params$experiment, "_discrete_summary.tex")
tex_label <- paste0("tab:", params$experiment, "_discrete_summary")
stargazer(discrete,
  out=out_file,
  table.placement="h",
  label=tex_label,
  title=gsub("_", "-", paste0("Discrete Filter Estimate for ", params$experiment, " Experiment")),
  digits.extra = 20)

##
## % Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard
## % Date and time: Mon, Aug 15, 2016 - 04:27:46 PM
## \begin{table}[h] \centering
## \caption{Discrete Filter Estimate for two-mobile-noiseless-no-gps Experiment}
## \label{tab:two_mobile_noiseless_no_gps_discrete_summary}
## \begin{tabular}{@{\extracolsep{5pt}}lcccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
## Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multicolumn{1}{c}{St. Error} \\
## \hline \\[-1.8ex]
## x\_position & 1,993 & 0.021 & 1.345 & $-$2.345 & 2.475 \\
## y\_position & 1,993 & 1.080 & 1.378 & $-$0.944 & 4.387 \\
## yaw & 1,993 & $-$0.463 & 0.983 & $-$3.139 & 3.119 \\
## x\_variance & 1,993 & 0.281 & 0.288 & 0.001 & 1.370 \\
## y\_variance & 1,993 & 0.281 & 0.288 & 0.001 & 1.370 \\
## yaw\_variance & 1,993 & 5.088 & 2.863 & 0.120 & 10.068 \\
## x\_error & 1,993 & $-$0.242 & 0.347 & $-$1.108 & 0.704 \\
## y\_error & 1,993 & $-$0.325 & 1.295 & $-$2.761 & 1.186 \\
## horizontal\_error & 1,993 & 1.169 & 0.771 & 0.00002 & 2.776 \\
## yaw\_error & 1,993 & $-$0.116 & 1.782 & $-$3.142 & 3.140 \\
## \hline \\[-1.8ex]
## \end{tabular}
## \end{table}

if (params$experiment == "one_stationary_noiseless") {
  stargazer(gazebo,
    out=paste0(table_dir, "gazebo_stationary_noiseless_summary.tex"),
    table.placement="h",
    label="tab:gazebo_stationary_noiseless_summary",
    title="Ground Truth Noiseless Odometry for Stationary Robot located at Origin",
    digits.extra = 20)
}

```