

one_mobile_attacked Experiment Report

Matthew Swartwout

August 19, 2016

```
## Loading required package: stargazer
```

```
##
```

```
## Please cite as:
```

```
## Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables.
```

```
## R package version 5.2. http://CRAN.R-project.org/package=stargazer
```

This is a summary of the data from the one_mobile_attacked 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.
## -4.049000 -2.686000 -0.931400 -1.458000 -0.378700  0.002957
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -7.608000 -6.306000 -3.554000 -3.620000 -0.61710  0.07425
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
##  -3.060   -2.153   -2.116   -1.770   -1.458    2.694
```

```
summary(continuous$position_error)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 0.000001  0.724000  3.655000  3.926000  6.854000  8.618000
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -4.4090  -2.1020  -0.3096   0.1977   2.8610   4.7650
```

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

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## -8.49300  -4.83600  -2.44400  -2.46500   0.07406   4.64400
```

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

```
##      Min.    1st Qu.      Median        Mean     3rd Qu.        Max.
## -1.7470000 -0.0071270  0.0008007  0.0735100  0.0385500  3.0570000
```

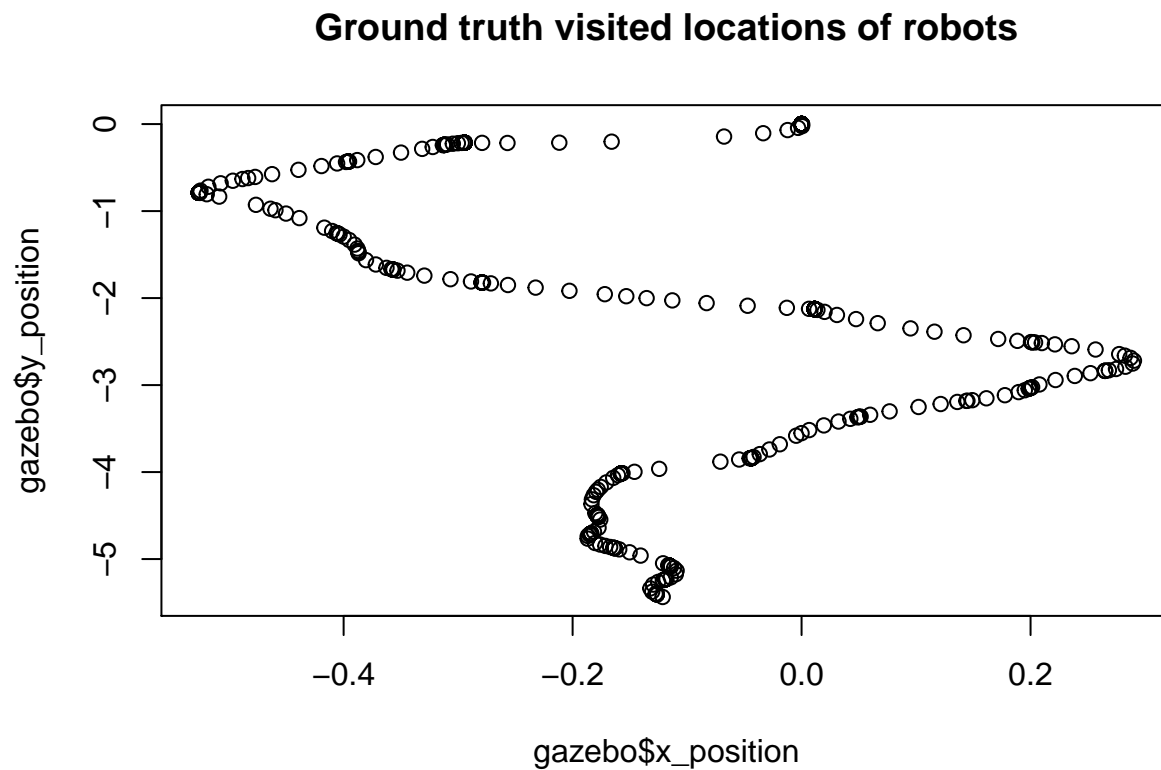
```
summary(discrete$position_error)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
##  0.5201  3.2910  4.4760  4.5590  5.5300  8.9710
```

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

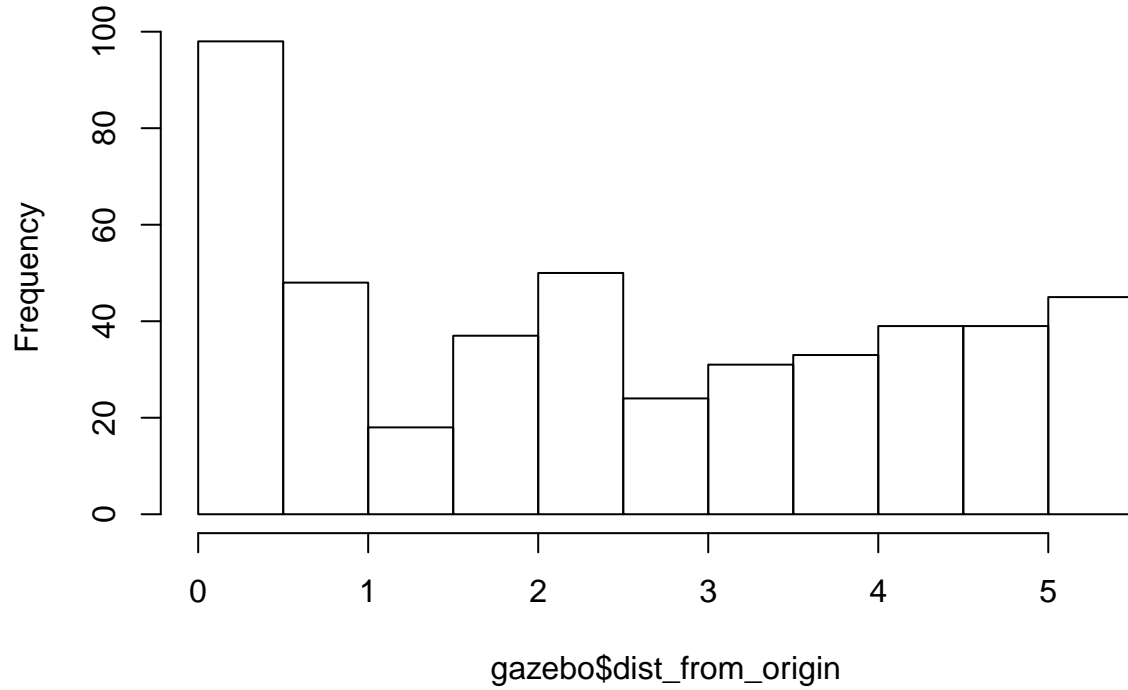
Shown below are plots representing the robot's motion and error over time.

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



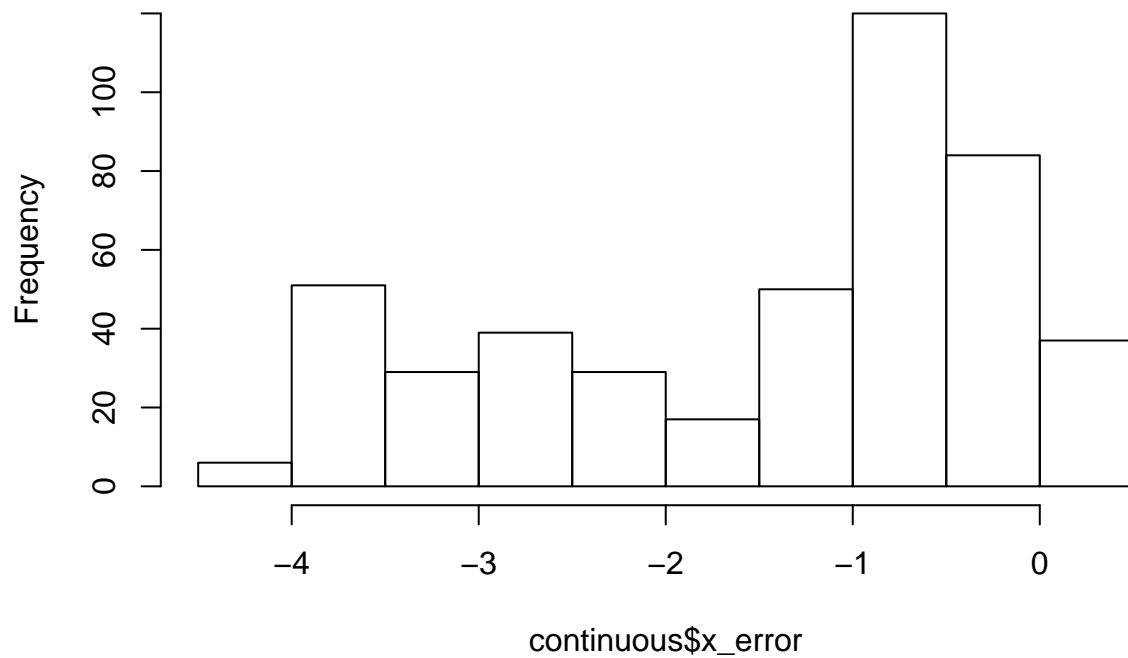
```
hist(gazebo$dist_from_origin,
     main = "Distance from origin vs. time")
```

Distance from origin vs. time

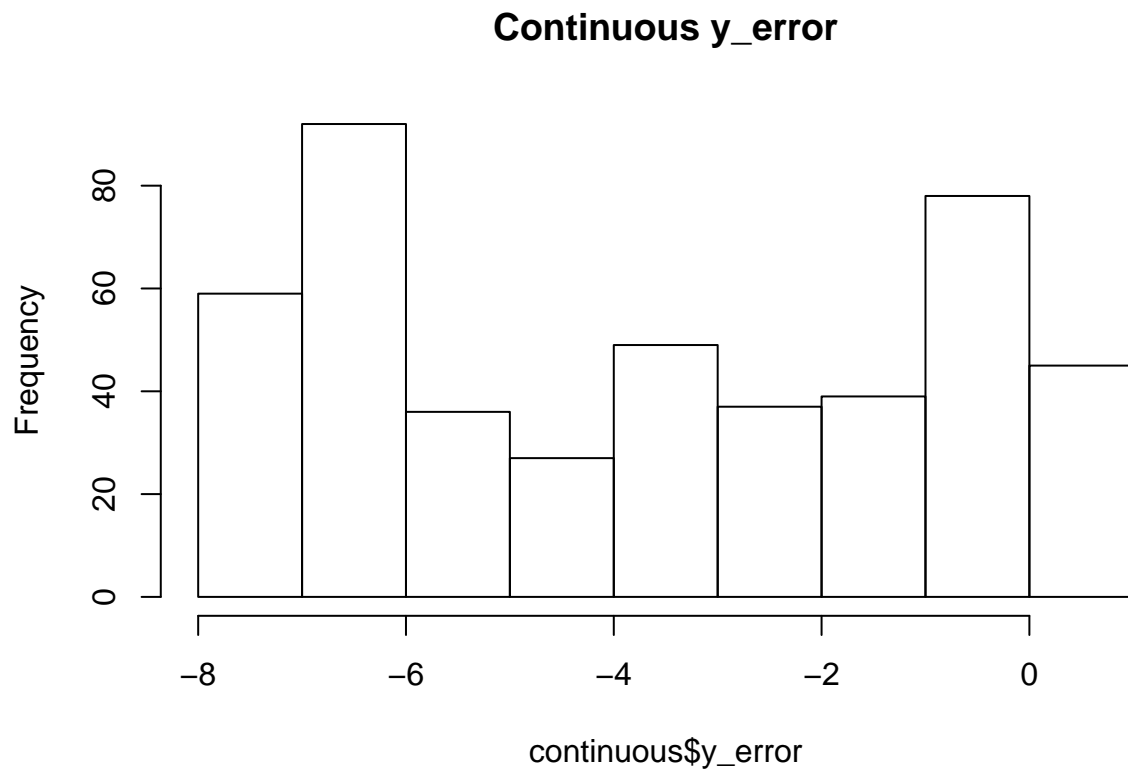


```
hist(continuous$x_error,  
     main = "Continuous x_error")
```

Continuous x_error

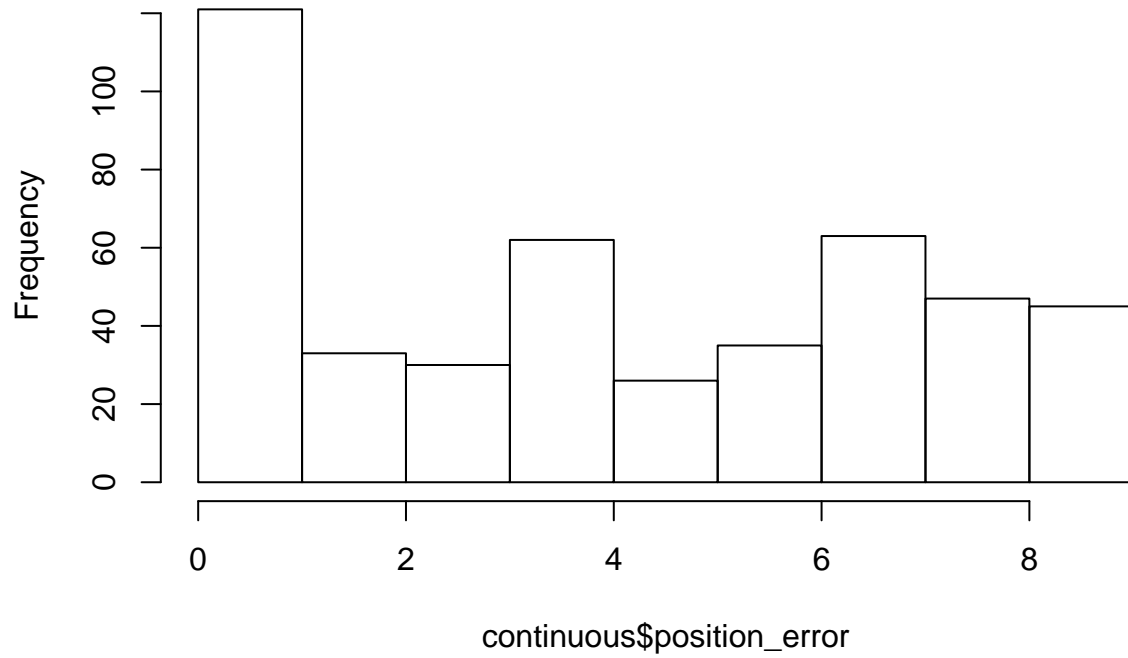


```
hist(continuous$y_error,  
     main = "Continuous y_error")
```



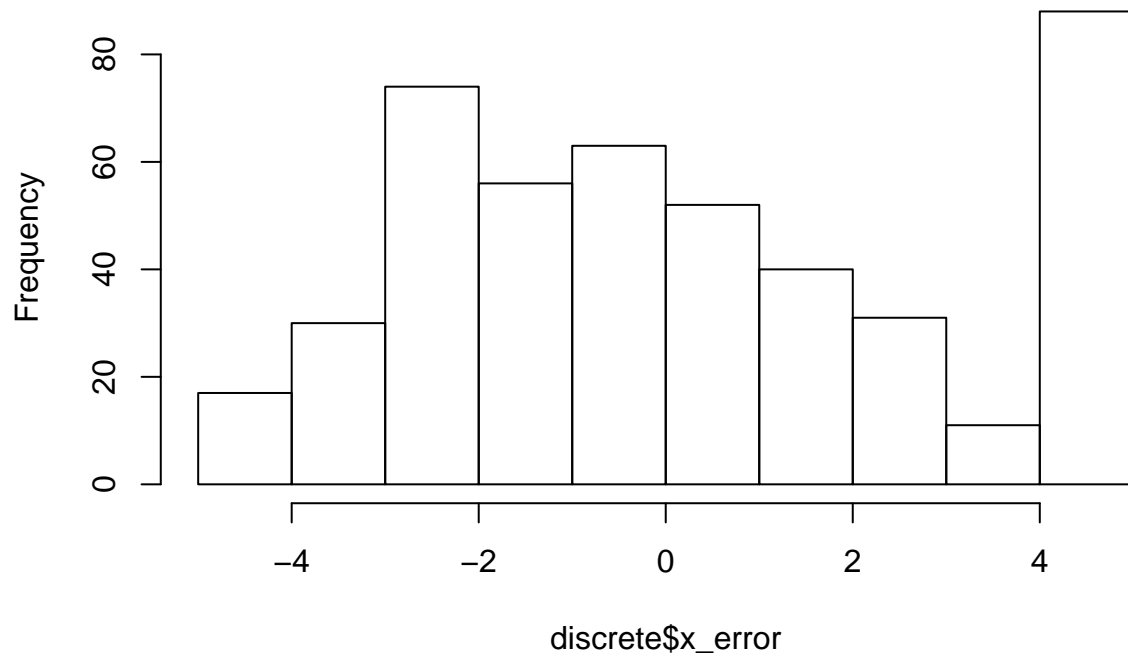
```
hist(continuous$position_error,  
     main = "Continuous total distance error")
```

Continuous total distance error

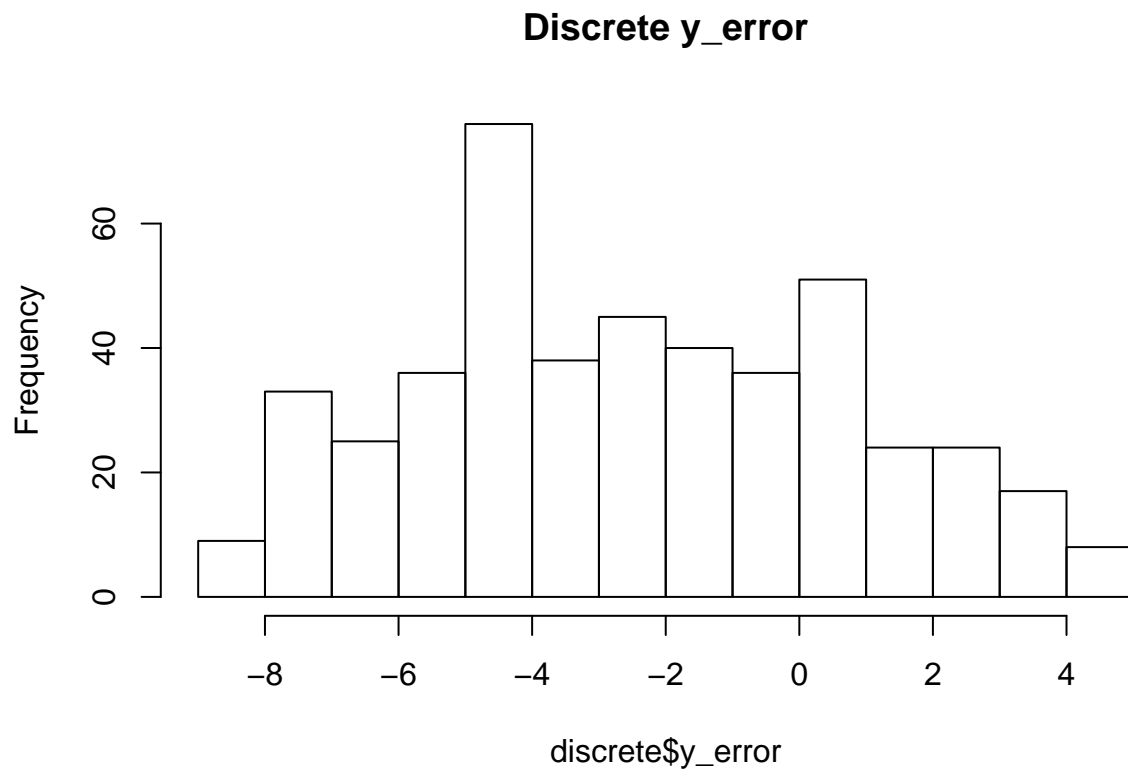


```
hist(discrete$x_error,  
     main = "Discrete x_error")
```

Discrete x_error

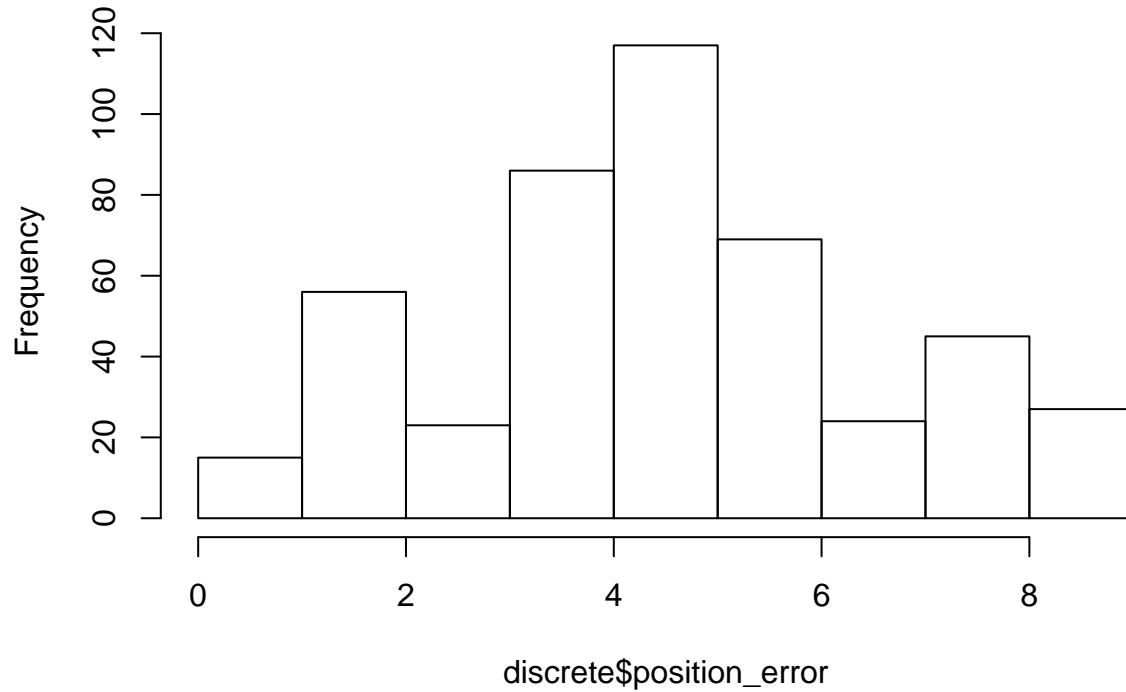


```
hist(discrete$y_error,  
     main = "Discrete y_error")
```



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

Discrete total distance error



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

```
## pdf
## 2
```

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

```
## pdf
## 2
```

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

  plot(gazebo$position_error, main="Gazebo Odometry Drift for Stationary Robot with Noiseless Odometry",
  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="htbp",
  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.harvard.edu
## % Date and time: Fri, Aug 19, 2016 - 02:43:05 PM
## \begin{table}[htbp] \centering
##   \caption{Continuous Filter Estimate for one-mobile-attacked Experiment}
##   \label{tab:one_mobile_attacked_continuous_summary}
##   \begin{tabular}{@{\extracolsep{5pt}}lcccc}
##     \hline
##     \hline \hline
##     Statistic & \multicolumn{1}{c}{N} & \multicolumn{1}{c}{Mean} & \multicolumn{1}{c}{St. Dev.} & \multicolumn{1}{c}{t-stat} \\
##     \hline \hline
##     x\_position & 462 & 1.316 & 1.339 &  $-\$0.251$  & 3.926 \\
##     y\_position & 462 & 1.236 & 0.980 &  $-\$0.288$  & 2.293 \\
##     yaw & 462 & 0.461 & 0.803 &  $-\$3.104$  & 3.072 \\
##     x\_variance & 462 & 1.529 & 0.840 & 0.085 & 2.988 \\
##     y\_variance & 462 & 1.529 & 0.840 & 0.085 & 2.987 \\
##     yaw\_variance & 462 & 1.836 & 1.008 & 0.102 & 3.585 \\
##     x\_error & 462 &  $-\$1.458$  & 1.300 &  $-\$4.049$  & 0.003 \\
##     y\_error & 462 &  $-\$3.620$  & 2.733 &  $-\$7.608$  & 0.074 \\
##     yaw\_error & 462 &  $-\$1.770$  & 0.923 &  $-\$3.060$  & 2.694 \\
##     position\_error & 462 & 3.926 & 2.996 & 0.000001 & 8.618 \\
##     \hline \hline
##   \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="htbp",
  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.edu
## % Date and time: Fri, Aug 19, 2016 - 02:43:05 PM
## \begin{table}[htbp] \centering
##   \caption{Discrete Filter Estimate for one-mobile-attacked Experiment}
##   \label{tab:one_mobile_attacked_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}{Min.} & \multicolumn{1}{c}{Max.} \\
## \hline \[-1.8ex]
## x\_position & 462 & $-0.339 & 2.817 & $-4.992 & 4.372 \\
## y\_position & 462 & 0.081 & 2.703 & $-4.993 & 4.495 \\
## yaw & 462 & $-1.355 & 0.983 & $-3.137 & 3.039 \\
## x\_variance & 462 & 0.024 & 0.014 & 0.0002 & 0.052 \\
## y\_variance & 462 & 0.024 & 0.014 & 0.0002 & 0.052 \\
## yaw\_variance & 462 & 0.092 & 0.018 & 0.059 & 0.125 \\
## x\_error & 462 & 0.198 & 2.774 & $-4.409 & 4.765 \\
## y\_error & 462 & $-2.465 & 3.324 & $-8.493 & 4.644 \\
## yaw\_error & 462 & 0.074 & 0.326 & $-1.747 & 3.057 \\
## position\_error & 462 & 4.559 & 2.010 & 0.520 & 8.971 \\
## \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="htbp",
    label="tab:gazebo_stationary_noiseless_summary",
    title="Ground Truth Noiseless Odometry for Stationary Robot located at Origin",
    digits.extra = 20)
}

```