

# Advanced Techniques for Mobile Robotics

## First Steps with Gnuplot

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# Motivation

- Introduction to the most relevant tools commonly used in scientific writing
  - LaTeX - a general typesetting system
  - **Gnuplot** - a plotting utility to visualize data

# Why not Using Excel?

- “I am happy with Excel, why not use it?”
- Excel plots are ugly
- No automatic processing of data files, ...
- Excel is clearly suboptimal for scientific working  
(reformatting takes ages, limited scripting, limited functionality ...)
- By default, Excel outputs raster images

# Gnuplot

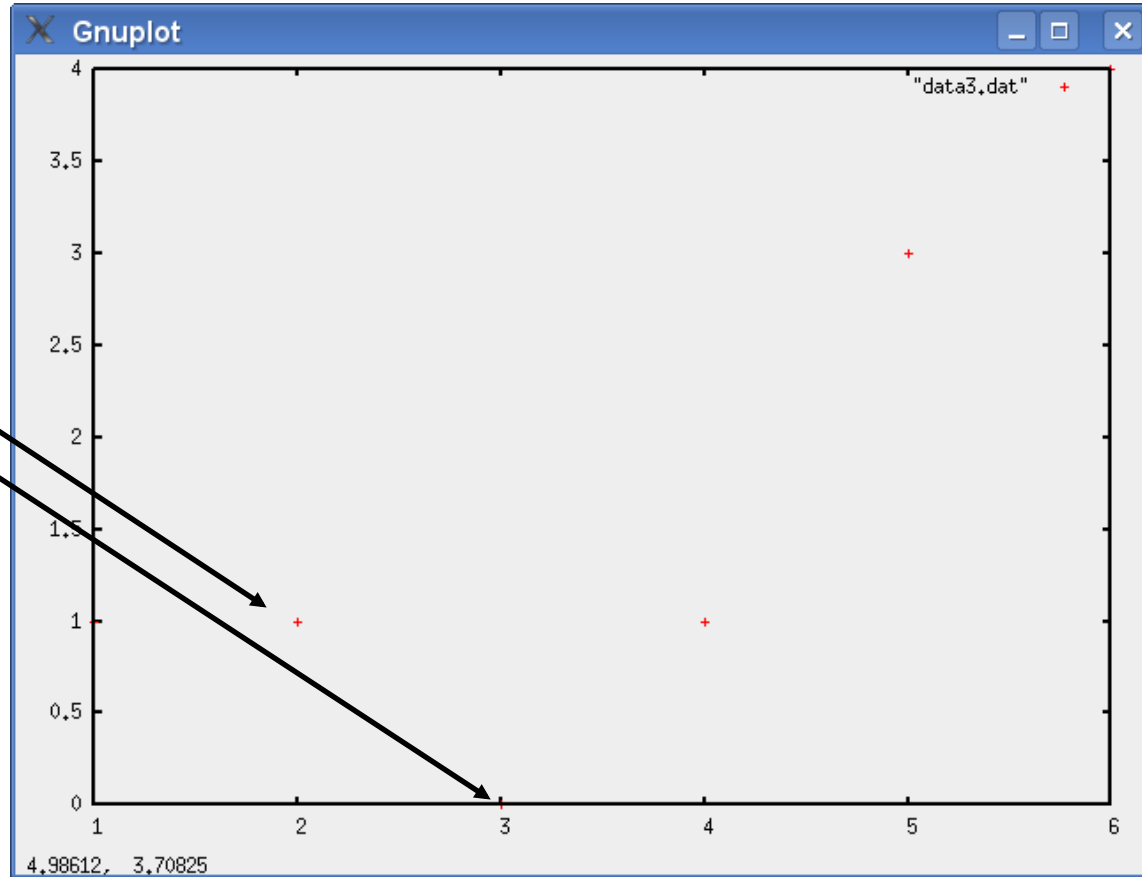
- Powerful 2D and 3D plotting utility
- Plotting is possible with very few lines of code
- Batch processing (plotting multiple plots in one run)
- Various output formats (eps, pdf, png, X11, latex, xfig, ...)
- Data can be plotting via stdin/stdout
- Free and available for basically all platforms
- One of the standard tools for plotting

# An Gnuplot Example

```
plot "data3.dat" using 1:2
```

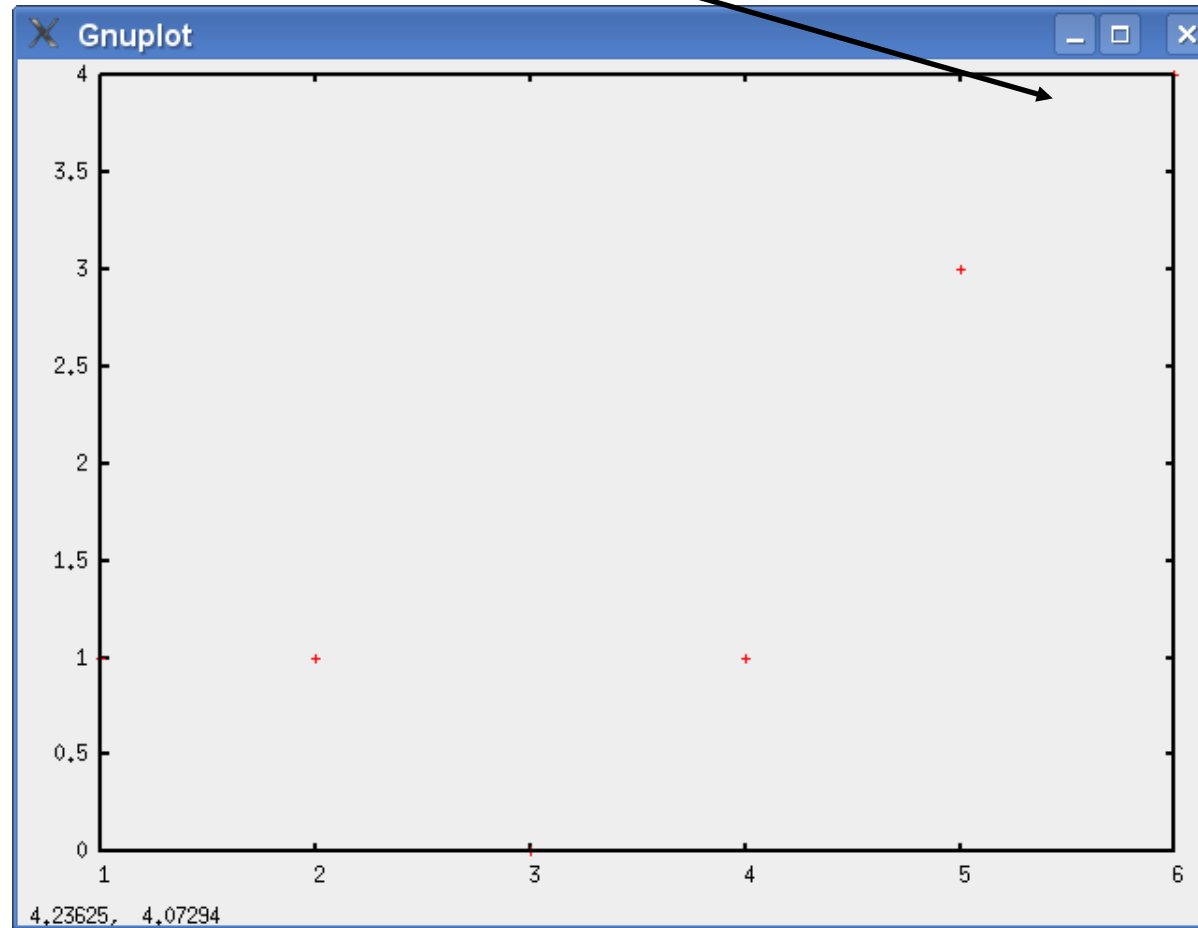
data3.dat

1	1	0.5	1.5
2	1	0.4	1.4
3	0	0	0
4	1	0	2
5	3	1	4
6	4	2	6



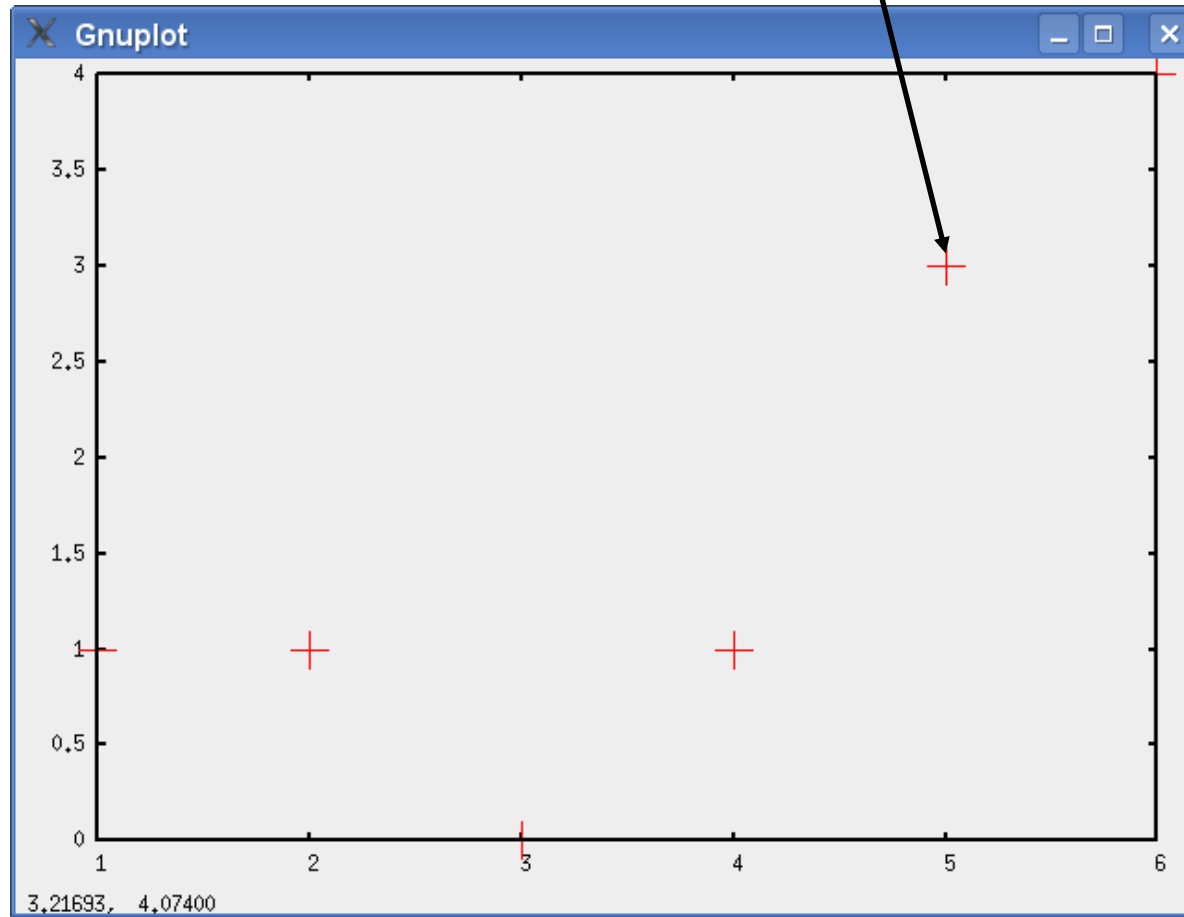
# An Gnuplot Example

```
plot "data3.dat" using 1:2 notitle
```



# An Gnuplot Example

```
plot "data3.dat" using 1:2 notitle w points ps 5
```



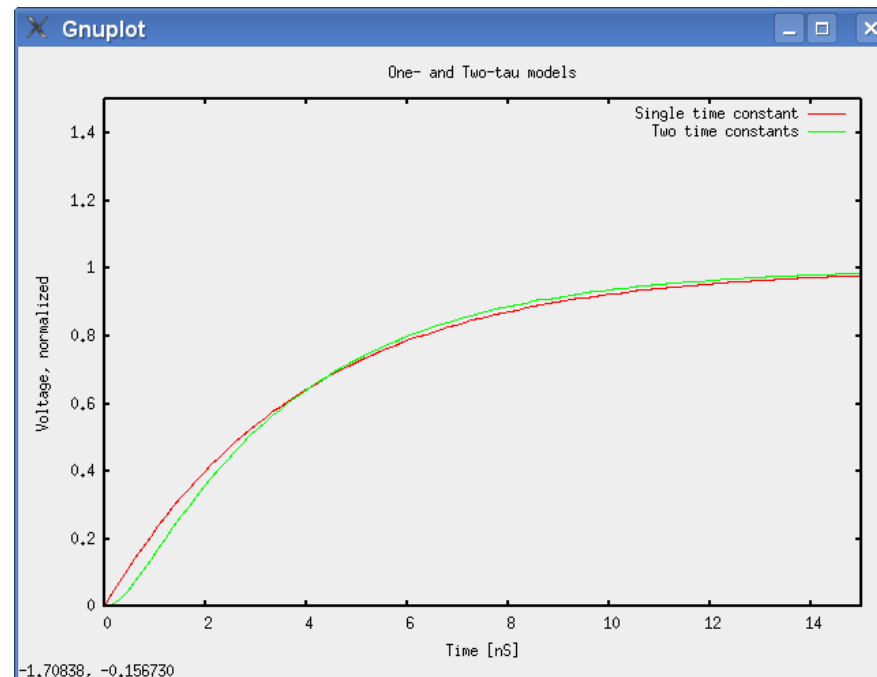
# Running Gnuplot

- Run: `gnuplot mygnuplotfile.gnuplot`
- It either produces an image or shows the result on the screen (terminal X11)
- Gnuplot can also read commands from `stdin`
- This is excellent for debugging code



# Gnuplot Example

```
reset
set terminal X11
set title "One- and Two-tau models"
set xrange [0:15]
set yrange [0:1.5]
set xlabel "Time [nS]"
set ylabel "Voltage, normalized"
plot 1-exp(-x/3.8825) title "Single time constant", \
     1-(3.44*exp(-x/3.44)-0.44*exp(-x/0.44))/3.0 title "Two time constants"
```



# Hands on Gnuplot Examples

**see examples on the web**

- gnuplot points.gnuplot
- gnuplot lines1.gnuplot
- gnuplot lines2.gnuplot
- gnuplot filledcurve.gnuplot
- gnuplot function.gnuplot
- gnuplot errorbars.gnuplot
- gnuplot histogram.gnuplot
- gnuplot boxes.gnuplot
- gnuplot box-error.gnuplot
- gnuplot surface.gnuplot
- gnuplot world.gnuplot
- gnuplot labeling.gnuplot
- perl example.pl | gnuplot
- ...

# Gnuplot Summary

- Gnuplot is much more powerful than what is shown here
- One needs to get used to the syntax but it pays off very quickly
- There are a lot of tutorials available online
- See gnuplot demo page:  
<http://gnuplot.sourceforge.net/demo/>
- As well as the “Impossible Gnuplot Plots”:  
<http://www.phyast.pitt.edu/~zov1/gnuplot/gnuplot.html>