**Objective/Agenda:**

* Why vector graphics? (pretty standard, think everyone knows)
* TikZ -> a medium of getting well integrated vector graphics within LaTeX
* Why TikZ over other vector graphical softwares (Inkscape etc.) <- what this presentation doesn’t try to answer
  + Reason: never used anything other than TikZ
* Some examples of TikZ figures I am quite proud of from my career till now
* Important packages everyone should know about
* Special cases -> block diagrams, matlab plots
* Small illustration?
* Discussion (what do others use, workflow, suggestions with using TikZ)

**Presumptions/Pre-requisites/Target-Audience**

* Latex is used as a standard tool in your workflow for documentation
* Looking to switch from Word to Latex
* Basic idea about Latex syntax
* Generation of vector graphics is a standard part of your workflow
* Looking to switch to vector graphics for your presentations
* Bonus: frustrated with current solution for vector graphics generation

**1). Why Vector Graphics**

* Raster vs Vector Graphics (.jpeg,.png v/s .svg)
  + Raster: collection of colored pixels (resolution dependent)
  + Vector: geometric shapes
* Example figure (mekf)
  + .png vs .svg
  + Normal view: 134%
  + Zoomed View: 400%

**2). TikZ:**

* Concept: implementing vector graphics with the help of code
* Code syntax: Latex
* Code file: figSource.tex -> integrated directly into the Latex document with \input{figSource.tex} -> Code Modularity
* \usepackage{tikz}-> accessing the TikZ package
* \begin{tikzpicture} <Code Body> \end{tikzpicture}
* TikZ official documentation link
* **Not a lot of focus into syntax:** 
  + Millions of packages, no standard syntax across all packages
  + Best way to deal with TikZ: Learn by doing

**3). Other Vectoral Graphical Softwares**

* Inkscape
* Illustrator
* Some advantages of TikZ
  + Biggest advantage of TikZ: is much more deeply integrated than any other tools -> because it is essentially LaTeX
    - Example: Maintaining consistent fonts and format between figures and document text (eg. during creating exam questions) -> provide a pictorial example?
  + Trivial usage in Version Control systems (human readable diffs vs XML/Binary file diffs for other softwares/SVG files) -> GitHub allows visual diffs for .svg files (not as reliable: example provided)

**4). Some favorite examples and related important packages**

* Reference frames for drone navigation
  + tdplotsetmaincoords -> {rot. About x-axis}{rot. About z-axis}
  + Code modularity -> Drone graphic made separately and simply imported using \input
  + The importance of the package tikz-3dplot -> allows three-dimensional rotation and translation of graphical elements
    - The various reference frames (having a particular orientation wrt one another -> the same orientation pattern followed while making the graphics)
    - The drone, created separately in another .tex file, can be imported and rotated with respect to the main coordinate system
* Allan-Variance plots (matlab2tikz)
  + Generating pgfplots from matlab plots/figures automatically
  + Introduce repository for matlab2tikz
  + Emphasize the use of cleanfigure;
  + Similar tools for other programming languages

**Suggestions:**

* Learn by doing
* Enormous online resources for TikZ
* Make use of GenAI -> as a starting point -> build on that starting point

**Important Links**

* TikZ official documentation: <https://tikz.dev/>
* TikZ based Website: <https://tikz.net/>
* Overleaf TikZ: <https://www.overleaf.com/learn/latex/TikZ_package>
* Repository consisting of numerous TikZ examples: <https://github.com/f0nzie/tikz_favorites>
* Matlab2tikz: <https://de.mathworks.com/matlabcentral/fileexchange/22022-matlab2tikz-matlab2tikz>