TEX Summary & Best Practice

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Contents

1 *listings* package

2020-05-01: first update

1.1 Package settings

```
\lstset{
  basicstyle=\ttfamily,
  columns=fullflexible,
  frame=single,
  breaklines=true,
  postbreak=\mbox{\textcolor{red}{$\hookrightarrow$}\space},
}
```

1.2 Examples

```
\begin{enumerate}
    \item \href{https://mirror.foobar.to/CTAN/macros/latex/contrib/listings/listings.pdf}{
        ↪ The Listings Package mamual}
\end{enumerate}
```

1.3 Useful links

1. The Listings Package

   2020/03/24 Version 1.8d

2. LaTeX/Source Code Listings - Wikibooks

3. lstlisting line wrapping - stackexchange

   adding line break for *listings* package

2 Ti*k*Z package

2020-05-01: first update

2.1 Package settings

1. TikZ library

```
\usepackage{tikz}
\usetikzlibrary{shapes.geometric, arrows}
```

For more details, please refer to List of available TikZ libraries with a short introduction - stackexchange.

2. `tikzstyle`

Theis command could be used to define the basic components of a flowchart, which is discussed in detail in Section 2.2.2.

2.2 Examples

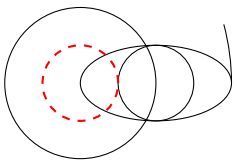
2.2.1 Basic shapes

1. drawing a square

```
\begin{tikzpicture}
    %% line
    \draw (0,0) -- (0,2) -- (2,2) -- (2,0) -- (0,0);
    % end in the start to form a cycle
    \draw (0,0) -- (0,2) -- (2,2) -- (2,0) -- cycle;
    % use the rectangle keyword to simplify
    \draw (0,0) rectangle (1,1);
    %% parabola
    \draw (0,0) parabola (1,1);
    % add control points
    \draw (0,0) .. controls (0,1) and (1,0) .. (1,1);
\end{tikzpicture}
```

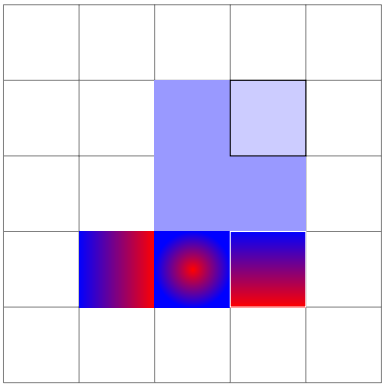
2. draw a circle/ellipse/arc with line style

```
\begin{tikzpicture}
     % center and radius
    \draw (1,1) circle (1cm);
    \draw (2,1) circle (0.5cm);
    % center and semi-axis in x/y
    \draw (2,1) ellipse (1cm and 0.5cm);
    % start point and (start:end:radius)
    \draw (2,1) arc (0:30:2cm)
    % line style
    \draw[red,thick,dashed] (1,1) circle (0.5cm);
\end{tikzpicture}
```

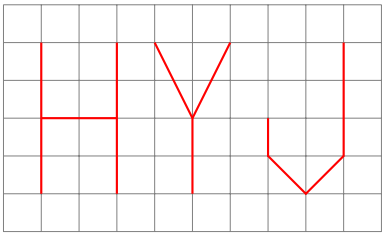


3. Grids with filling

```
\begin{tikzpicture}
    %% grid
    % bottom-left -> top-right
    \draw[step=1cm,gray,very thin] (-2,-2) grid (3,3);
    %% color filling
    \fill[blue!40!white] (0,0) rectangle (2,2); % 40% blue mixed with 60% white
    %% fill with border
    \filldraw[blue!20!white, draw=black] (1,1) rectangle (2,2);
    %% fill with color gradient
    % left/right/top/bottom/inner/outer color
    \shade[left color=blue, right color=red] (-1,-1) rectangle (0,0);
    \shade[outer color=blue, inner color=red] (0,-1) rectangle (1,0);
    %% fill with color gradient and border
    \shadedraw[top color=blue,bottom color=red, draw=white] (1,-1) rectangle (2,0);
\end{tikzpicture}
```



4. combining line and grid



5. Axes with text

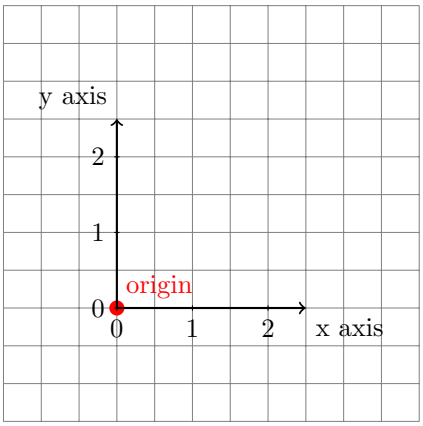
```
\begin{tikzpicture}
    %% grid
    \draw[step=0.5cm,gray,very thin] (-1.5,-1.5) grid (4,4);
    \fill[red] (0,0) circle (0.1cm);

    %% Axes
    \draw[thick,->] (0,0) -- (0,2.5);
    \draw[thick,->] (0,0) -- (2.5,0);

    % label our axes using nodes
    \draw[thick,->] (0,0) -- (2.5,0) node[anchor=north west] {x axis};
    \draw[thick,->] (0,0) -- (0,2.5) node[anchor=south east] {y axis};

    % add in ticks and numbering
```

```
    \foreach \x in {0,1,2}
        \draw (\x cm,1pt) -- (\x cm,-1pt) node[anchor=north] {$\x$};
    \foreach \y in {0,1,2}
        \draw (1pt,\y cm) -- (-1pt,\y cm) node[anchor=east] {$\y$};
\end{tikzpicture}
```



2.2.2 Creating flowchart

1. include TikZ library & define block style

```
\usepackage{pgf,tikz}
\usetikzlibrary{shapes.geometric, arrows}

\tikzstyle{startstop} = [rectangle, rounded corners, minimum width=3cm, minimum height
    ↪ =1cm,text centered, draw=black, fill=red!30]
\tikzstyle{io} = [trapezium, trapezium left angle=70, trapezium right angle=110,
    ↪ minimum width=3cm, minimum height=1cm, text centered, draw=black, fill=blue!30]
\tikzstyle{process} = [rectangle, minimum width=3cm, minimum height=1cm, text centered,
    ↪  draw=black, fill=orange!30]
\tikzstyle{decision} = [diamond, minimum width=3cm, minimum height=1cm, text centered,
    ↪ draw=black, fill=green!30]
\tikzstyle{arrow} = [thick,->,>=stealth]
```

2. add nodes

```
\begin{tikzpicture}[node distance=2.5cm]
    \node (start) [startstop] {Takeoff};
    \node (pro1) [process, right of=start, xshift=1.8cm] {FlyToDestGPS};
    \node (pro2) [process, right of=pro1, xshift=1.8cm] {OffboardMode};
    \node (pro3) [process, right of=pro2, xshift=1.8cm] {SearchTag};
    \node (dec1) [decision, below of=pro3] {Tag found?};
    \node (pro4) [process, left of=dec1, xshift=-1.8cm] {MinAltiErr};
    \node (pro5) [process, left of=pro4, xshift=-1.8cm] {CenterTag};
    \node (pro6) [process, left of=pro5, xshift=-1.8cm] {RotateToTag};
    \node (pro7) [process, below of=pro6] {ApproachTag};
    \node (end) [startstop, right of=pro7, xshift=1.8cm] {Land \& Disarm};

    \draw [arrow] (start) -- (pro1);
    \draw [arrow] (pro1) -- (pro2);
    \draw [arrow] (pro2) -- (pro3);
    \draw [arrow] (pro3) -- (dec1);
    \draw [arrow] (dec1) -- (pro3);
```

```
    \draw [arrow] (dec1) -- (pro4);
    \draw [arrow] (pro4) -- (pro5);
    \draw [arrow] (pro5) -- (pro6);
    \draw [arrow] (pro6) -- (pro7);
    \draw [arrow] (pro7) -- (end);
\end{tikzpicture}
```

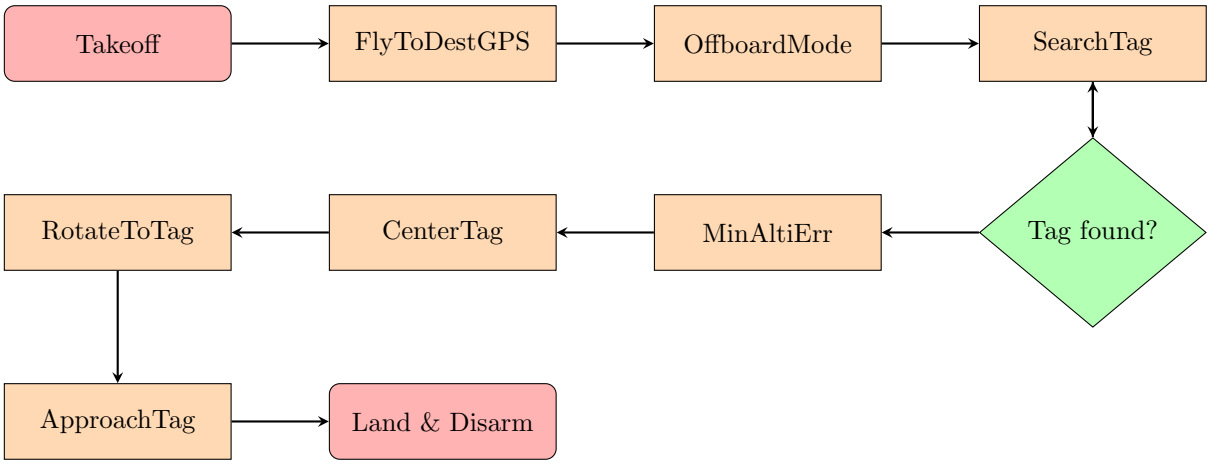


Figure 1: Flowchart of drone delivery using Ti*k*Z

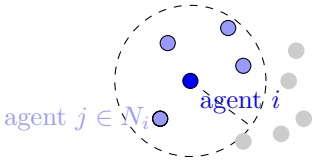
3. connect with arrows

   to be updated

2.2.3 Creating TikZ from GeoGebra

1. radius of communication/neighborhood from Reynolds flocking algorithm

```
\begin{tikzpicture}
    % circle and radius
    \draw[dashed] (0,0) circle (1cm);
    \draw[dashed] (0,0) -- (0.8,-0.6);
    % center point
    \filldraw[blue, draw=black] (0,0) circle (0.1cm) node[anchor=north west] {agent $i
        ↪ $};
    % points within the neighbor
    \filldraw[blue!40!white, draw=black] (0.5,0.7) circle (0.1cm);
    \filldraw[blue!40!white, draw=black] (0.7,0.2) circle (0.1cm);
    \filldraw[blue!40!white, draw=black] (-0.3,0.5) circle (0.1cm);
    \filldraw[blue!40!white, draw=black] (-0.4,-0.5) circle (0.1cm) circle (0.1cm) node
        ↪ [anchor=east] {agent $j \in N_i$};
    \filldraw[blue!40!white, draw=black] (0.4,-0.8);
    % points outside the radius neighbor
    \fill[black!20!white] (0.7,-0.8) circle (0.11cm);
    \fill[black!20!white] (1.3,0.0) circle (0.11cm);
    \fill[black!20!white] (1.2,-0.7) circle (0.11cm);
    \fill[black!20!white] (1.5,-0.5) circle (0.11cm);
    \fill[black!20!white] (1.4,0.4) circle (0.11cm);
\end{tikzpicture}
```



2. to be updated

2.3 Useful links

1. The TikZ and PGF Packages
   Manual for version 3.1.8b, December 27, 2020
2. LaTeX Graphics using TikZ: A Tutorial for Beginners - Overleaf
   Part 1-Basic Drawing; Part 2-Generating TikZ Code from GeoGebra; Part 3-Creating Flowcharts
3. List of available TikZ libraries with a short introduction - stackexchange
4. TikZ Tutorial by Nick Horelik from MIT

3 *graphicx* package

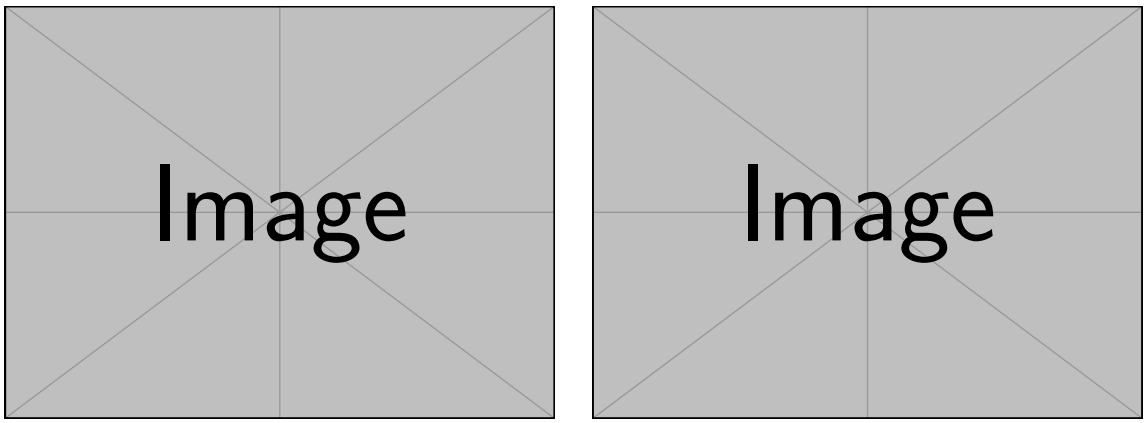
2020-05-01: first update

3.1 Examples

3.2 Specical case

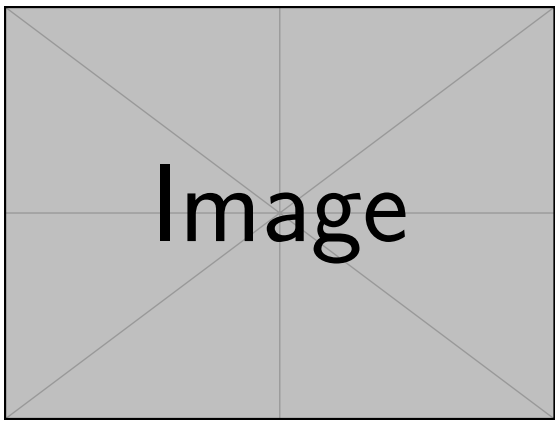
1. Splitting subfigure across multiple pages

```
\begin{figure}[b]
    \begin{subfigure}[t]{0.45\hsize}
        \includegraphics[width=0.95\linewidth]{example-image}
        \caption{}
    \end{subfigure}
    \begin{subfigure}[t]{0.45\hsize}
        \includegraphics[width=0.95\linewidth]{example-image}
        \caption{}
    \end{subfigure}
    \caption{first part of my figure}
\end{figure}
\clearpage
\begin{figure}[tb]\ContinuedFloat
    \begin{subfigure}[t]{0.45\hsize}
        \includegraphics[width=0.95\linewidth]{example-image}
        \caption{}
    \end{subfigure}
    \begin{subfigure}[t]{0.45\hsize}
        \includegraphics[width=0.95\linewidth]{example-image}
        \caption{}
    \end{subfigure}
    \caption{second part of my figure}
\end{figure}
```

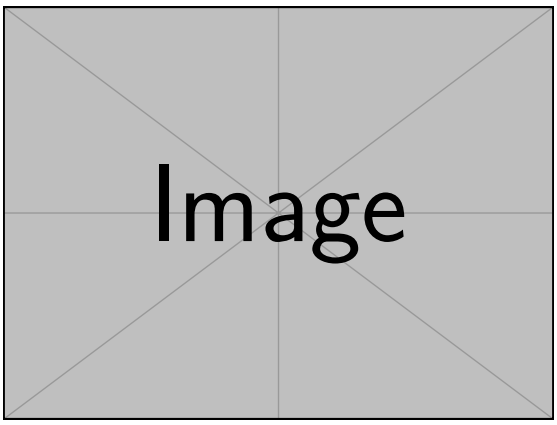


(a) (b)

Figure 2: first part of my figure



(c)



(d)

Figure 2: second part of my figure

3.3 Useful links

1. The graphicx package mamual
   Version: 2020/09/09
2. Splitting Subfigure across multiple pages - stackexchange

4 Misc.

1. version control with `.gitignore`
   - https://github.com/github/gitignore/blob/master/TeX.gitignore
   - Yujie's customization: https://github.com/hibetterheyj/yujiehe-gitignore/blob/master/TeX.gitignore
2. Yujie's EPFL report template

   to be updated!

   Example1: ROS_Basics_Report_21Spring.pdf

   Example1: MPC_Report.pdf
3. Yujie's CV

   to be updated!

   Example: my personal CV

5 To-do lists

1. adding useful `newcommand`
2. difference between *xcolor* and *color* package
3. difference between *subfig* and *subfigure* package and best practice to use sub-figures
4. best practice for href and url package
5. adding bibiligrahy in the LaTeX
6. adding emoji in LaTeX
7. propose a `.sty` for personal use
8. add reference section
9. highlight with *soul* using different colors
10. adding beamer template