cheatsheet

José Miguel Alves Pires*

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Contents

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*a50178@alunos.uminho.pt

1   Modular design   IMPORTANT

Modular design is useful to separate logical units inside the LaTeX environment.

- `dissertation.tex`: main document that defines all the formatting and includes all the relevant `.tex` documents

- `./sty`: contains the stylesheets for the document, such as:

  - `dissertation-xelatex.sty`: stylesheet for the main document
  - `listing.sty`: stylesheet for the listings to be formatted and presented

- `./sec`: contains secondary files, like images, PDFs, acronyms and symbols

- `./bib`: contains the bibliography database

- `./listing`: contains the listings (code) to be displayed

- `./font`: contains the fonts to be used

- `./tex`: contains the `.tex` documents to be inputted, subdivided in:

  - `Pre_Chap`: Pre chapters (not used here)
  - `Chap`: chapters
  - `Append`: appendices

Regarding `.tex` documents, they can be included as follows (the extension `.tex` is implicit):

- `\input{path/to/file}`: inputs the file as is ($_{\text{recommended}}$_)

- `\include{path/to/file}`: inputs the file and adds an extra blank page at the end.

2   Styling guides   IMPORTANT

1. Don't use `\newpage`, `\clearpage`, or any other section break command. This is done natively by the TeX engine; it should be done last and only if REALLY required

2. To separate paragraphs use one blank line; any additional blank lines MUST BE AVOIDED anywhere in the document. If you want to separate anything visually, use a comment %.

- Example:

```
%
\section{Product concept}%
\label{sec:product-concept}
\input{./tex/Chap/Analysis/prod-concept}
%
\section{Foreseen specifications}%
\label{sec:fores-spec}
\input{./tex/Chap/Analysis/foreseen-specs}
```

3. If adding a figure, table, listing, acronym/symbol or citation, or any sectioning command, please add a label so it can be referenced later. Check the appropriate section for more info.

4. When adding the reference for the label (see here for more info), use appropriate reference designator before referencing using an non-breaking space in between.

- Example:

```
Fig.~\ref{fig:initial-design}
```

3   Sectioning

Sectioning is used to define the logical structure of the document. The most relevant commands are:

1. \chapter: chapter

2. \section: section

3. \subsection: subsection

4. \subsubsection: subsubsection

5. \paragraph: paragraph

6. \subparagraph: subparagraph

Example:

```
\section{Product concept}%
\label{sec:product-concept}
\input{./tex/Chap/Analysis/prod-concept}
```

4 Floats

4.1 Figures

```latex
\begin{figure}[!ht]
\centering
\includegraphics[width=1.0\textwidth]{./img/initial_design_diagram.
    png}
\caption{\label{fig:initial-design}Initial design: Block diagram
    view}
\end{figure}
```
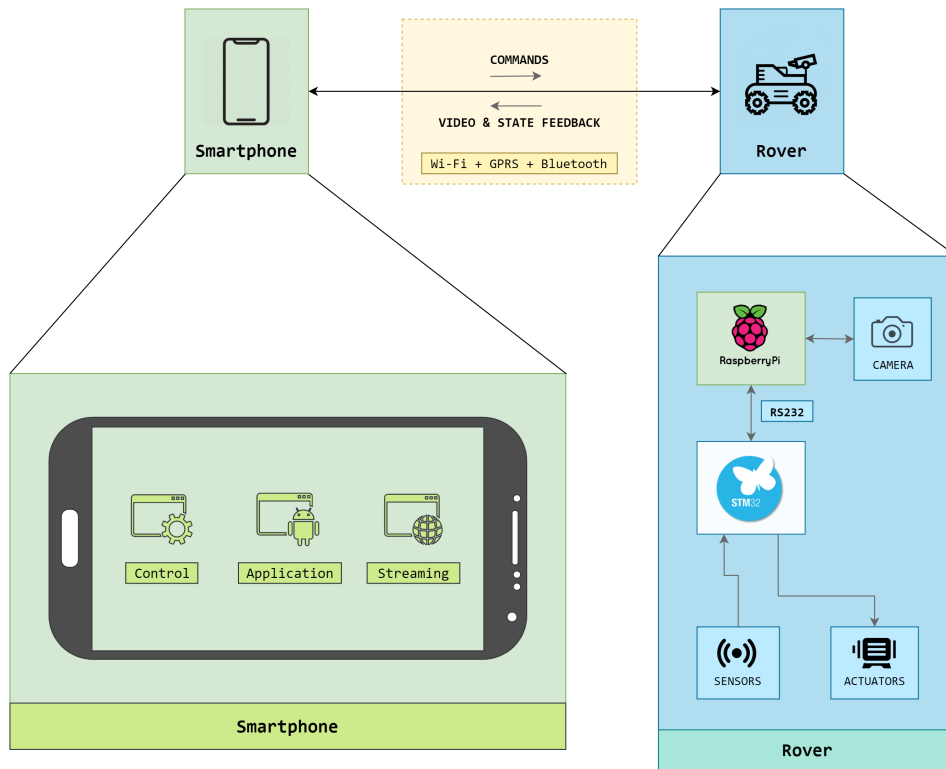
Result (see Fig. 1):

Figure 1: Initial design: Block diagram view

4.2 Tables

1. Construction: Tables can be created using an online tool (`https://www.tablesgenerator.com/`) and then copied, as illustrated in *Def-*

inition

2. Definition:

```
% Please add the following required packages to your document
    preamble:
% \usepackage[table,xcdraw]{xcolor}
\begin{table}[!hbt]
\centering
\caption{Specifications}%
\label{tab:specs-init}
%
\begin{tabular}{
>{\columncolor[HTML]{FFFFFF}}l
>{\columncolor[HTML]{FFFFFF}}l
>{\columncolor[HTML]{FFFFFF}}l }
\hline
                 & Values     & Explanation

                    \\ \hline
Autonomy          & 4 h         & \begin{tabular}[c]{l{}}Time
    interval between battery fully \\ charged and safely
    discharged\end{tabular} \\ \hline
Speed Range  & 0.1 to 1 m/s   & \begin{tabular}[c]{l{}}Speed at
    which the car can operate\end{tabular}           \\ \hline
Frame Rate       & 60 fps      & \begin{tabular}[c]{l{}}Frequency
     at which independent still \\ images appear on the screen\
    end{tabular}   \\ \hline
Camera Range     & 20 m        & \begin{tabular}[c]{l{}}How far
    can the camera capture images\\ without loosing resolution\
    end{tabular}    \\ \hline
Camera resolution & 480p       & Amount of detail that the camera
     can capture


    \\ \hline
Communication Range & 50 m & \begin{tabular}[c]{l{}}Maximum
    distance between the car and the\\ smarphone without losing
    connection\end{tabular} \\ \hline
speed Error       & 5 \%       & \begin{tabular}[c]{l{}}Maximum
    difference between desired \\ and real speed\end{tabular}
                  \\ \hline
Direction Error   & 5\%        & \begin{tabular}[c]{l{}}Maximum
    difference between desired\\  and real direction\end{tabular}
                  \\ \hline
Distance Error     & 5 \% & \begin{tabular}[c]{l{}}Maximum
    difference between desired\\ and real distance to the
    obstacle\end{tabular}        \\ \hline
Dimensions          & 20x12x5 cm & Dimensions of the car


    \\ \hline
Weight            & 0.5 kg      & Weight of the car


    \\ \hline
\end{tabular}
\end{table}
```

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3. **Result**: Table 1 lists the foreseen product specifications.

Table 1: Specifications

	Values	Explanation
Autonomy	4 h	Time interval between battery fully charged and safely discharged
Speed Range	0.1 to 1 m/s	Speed at which the car can operate
Frame Rate	60 fps	Frequency at which independent still images appear on the screen
Camera Range	20 m	How far can the camera capture images without loosing resolution
Camera resolution	480p	Amount of detail that the camera can capture
Communication Range	50 m	Maximum distance between the car and the smarphone without losing connection
speed Error	5 %	Maximum difference between desired and real speed
Direction Error	5%	Maximum difference between desired and real direction
Distance Error	5 %	Maximum difference between desired and real distance to the obstacle
Dimensions	20x12x5 cm	Dimensions of the car
Weight	0.5 kg	Weight of the car

5 Referencing

To reference the relevant items such as figures, tables, sections (chapter, section, subsection), etc., one needs:

1. To label the item, using `\label{<item>:<item-name>}`: e.g. `\label{ch:analysis}`

2. Then, one can reference it using: `\ref{<item>:<item-name>}`: e.g. Chapter~**??**

6 Bibliography

Bibliography management is composed of 2 parts:

1. A Bibliography database, generally a `.bib` file, located at `./bib/dissert.bib` (see here)

- Example of Bibliography entry

```
articleharashima1996mechatronics,title=Mechatronics-" What Is It, Why,
    and How?" An Editorial,author=Harashima, Fumio and Tomizuka,
    Masayoshi and Fukuda, Toshio,journal=IEEE/ASME Transactions on
    Mechatronics,volume=1,number=1,pages=1-4,year=1996,publisher=IEEE
```

- Bibliography entry can be created as:
  - Search the topic at `https://scholar.google.pt/`.
  - Select the Export To Bibtex option
  - Copy to the `.bib` file

2. A citation, using `\cite{<bib-key>}`, where `<bib-key>` is the key defined in the `.bib` file.

  - For example: Mechatronics, was defined by Harashima et. al=~[**?**]=

7 Enviroments

7.1 Itemize

```
\begin{itemize}
\item \textbf{Item 1}: this is an item
\item \textbf{Item 2}: this is another item
\end{itemize}
```

Result:

- **Item 1**: this is an item

- **Item 2**: this is another item

7.2 Enumerate

```
\begin{enumerate}
\item \textbf{Item 1}: this is an enumerated item
\item \textbf{Item 2}: this is another enumerated item
\end{enumerate}
```

Result:

1. **Item 1**: this is an enumerated item

2. **Item 2**: this is another enumerated item

8 Glossary

Glossaries are useful to input <u>acronyms</u> and <u>symbols</u>.

- Acronyms: common use words, often abbreviated.

- Symbols: mathematical/physical symbols that usually require some brief description and the relevant units.

Glossary management is composed of 3 parts:

1. A Glossary database
    - Acronyms: `./sec/acronyms.tex`
    - Symbols: `./sec/symbols.tex`

2. A reference using `\gls{<gls-key>}`, where `<gls-key>` is the key defined in the glossary database file.

3. An external utility that manages the glossary entry items addition and referencing (no need to worry about this, the makefile will handle it).

8.1 Acronyms

- Definition (`./sec/acronyms.tex`):

```
\newacronym{sls}{SLS}{Selective Laser Sintering}
\newacronym{slm}{SLM}{Selective Laser Melting}
```

- Usage: These are two acronyms used together: `\gls{sls}`/`\gls{slm}` technology.

8.2 Symbols

- Definition (`./sec/symbols.tex`):

```
\newglossaryentry{omega}
{
    name={\ensuremath{\omega}},
    description={angular velocity},
    sort=omega,
    symbol={\ensuremath{\omega}},
    unit={\si{rad/s}}
}
```

- Usage: this is `\gls{omega}`.

9   Listings

- Styling: Listings can be formatted using different styles, as presented in ./sty/listing.sty for any programming/markup language required.

  - Example: C

```
\lstdefinestyle{customc}{
belowcaptionskip=1\baselineskip,
breaklines=true,
%frame=L,%lines, whole
xleftmargin=\parindent,
language=C,
showstringspaces=false,
basicstyle=\scriptsize\ttfamily,
keywordstyle=\bfseries\color{green!40!black},
commentstyle=\itshape\color{purple!40!black},
identifierstyle=\color{blue},
stringstyle=\color{orange},
numberstyle={\tiny},
numbers=left,
numberblanklines=false,
stepnumber=5,
backgroundcolor=\color{yellow!10},
frame=tlb
}
```

- Usage: Listings can be inputted using the desired style as below. It includes a caption, a label, a style, and a file path:

```
\lstinputlisting[language=C++, caption={Thread Serial Rx handler
    },label=lst:threadSerialRx,
style=customc]{./listing/threadSerialRx.cpp}%
```

- Result:

```
UINT MMSLSDlg::ThreadSerialRx(LPVOID param)
{
    /* Wait for 1st connection to serial port: OnConnect */
    ::WaitForSingleObject( EvSerial.m_hObject , INFINITE);
    tstring szData;
    CDemoEzdDlg *dlg = (CDemoEzdDlg *)param;

    while(1)
    ;

    return 0;
}
```

10   PDF inclusion

- Include all pages from `anexo3-license`. Be careful of file path. It's relative to the main file.

  ```
  \includepdf[pages=-]{anexo3-license}
  ```

11   Appendices

Appendices can be added in the appropriate section (`./tex/Append/`):

- as text: with figures, tables, etc.

- included as PDF