

cheatsheet

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1 Modular design

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

2 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

3 Floats

3.1 Figures

```
\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):

3.2 Tables

1. Construction: Tables can be created using an online tool (<https://www.tablesgenerator.com/>) and then copied, as illustrated in *Definition*
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}}1
>\columncolor[HTML]{FFFFFF}}1
>\columncolor[HTML]{FFFFFF}}1 }
\hline
& Values & Explanation
\\ \hline
```

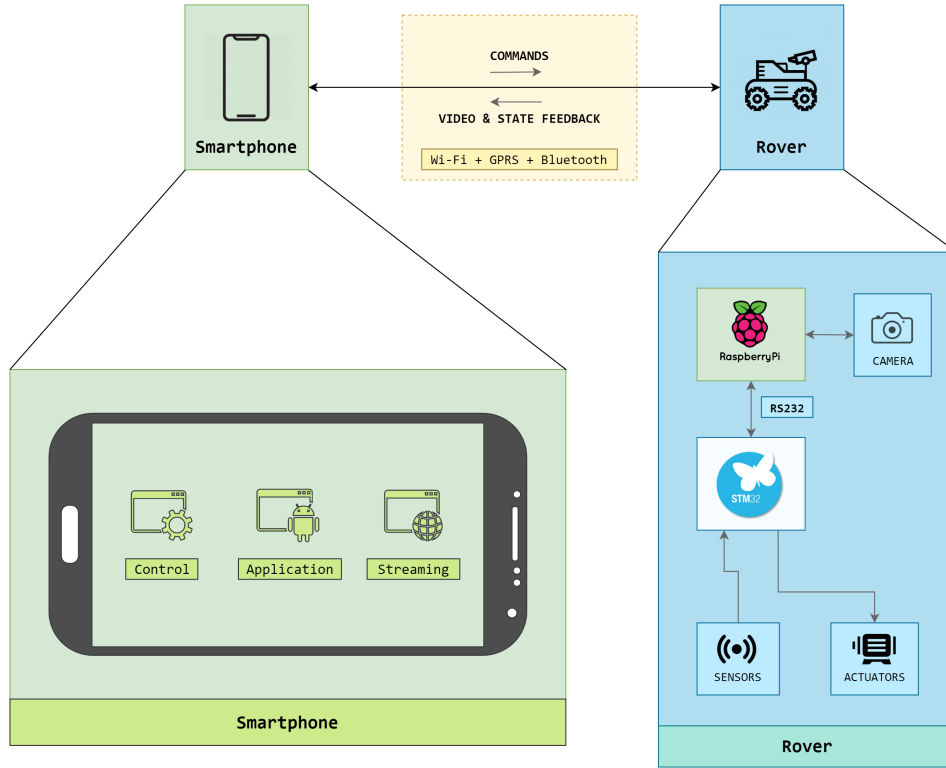


Figure 1: Initial design: Block diagram view

```

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}

```

3. **Result:** Table~1 lists the foreseen product specifications. `\# +endsrc`

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 losing resolution
Camera resolution	480p	Amount of detail that the camera can capture
Communication Range	50 m	Maximum distance between the car and the smartphone 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

4 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~??

5 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=`~[?]=`

6 Enviroments

6.1 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

6.2 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

7 Glossary

Glossaries are useful to input acronyms and symbols.

- 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).

7.1 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.

7.2 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}`.

8 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:


```

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

8      while(1)
        ;

        return 0;
    }

```

9 PDF inclusion

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

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

10 Appendices

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

- as text: with figures, tables, etc.
- included as PDF