School of Engineering, Discipline of Mechanical Engineering and Mechatronics, pp. 1–9

Insert the Title Here

Final Year Project Report - MECH4841 Part A [B]

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Student Name [1]

[1] *Student of Mechatronics Engineering,*
The University of Newcastle, Callaghan, NSW 2308, AUSTRALIA
Student Number: 3.....
E-mail: First.Last@uon.edu.au

Executive summary or Abstract

Remember that executive summary may include the following information:

- Defines the intention of the report.
- Places the report in context so the reader knows why it is important to read it.
- Why is it important?
- What problem is addressed?
- Briefly states the results
- Briefly presents the implications and recommendations

Executive summaries can take from a couple of paragraphs to a couple of pages.

Acknowledgements

You may like to say thank you to someone that helped you with your project.

Contents

1. Introduction

To organise your introduction section you can use the following structure:

- **Position**: Show there is a problem and that it is important to solve it.
- **Problem**: Describe the specifics of the problem you are trying to address
- **Proposal**: Discuss how you are going to address this problem. Use the literature to back-up your approach to the problem, or to highlight that what you are doing has not been done before

Here you need to sell why what you are doing is important, and what benefits will it bring if you are successful and solve the problem?

1.1. Subsection title

You can use subsections within any section of the report.

1.2. Subsection title

Recall that you need at least two subsections per section.

1.2.1. Subsubsection 1

Do not use more than 2 levels of sub-sectioning.

1.2.2. Subsubsection 2

Do not use more than 2 levels of sub-sectioning.

The rest of the report is organised as follows. Section 2 describes items related to the core content. Section 4 concludes the report. Appendix A shows an example of how to make a Table.

2. Core Section

2.1. Mathematics

LaTeX is very good for writing Mathematics. You can write mathematics in the middle of a sentence, like for example $y = mx + h$. Or you can use the `equation` environment as indicated in (2.1) below.

$$y = mx + h. \tag{2.1}$$

You can also use equations and tell LaTeX not to number an equation:

$$z = m_z x^2 + h_z.$$

You can use the split command as in (2.2) below (split gives you only one equation number):

$$\begin{aligned} \dot{\mathbf{x}} &= \mathbf{A}\mathbf{x} + \mathbf{B}\mathbf{u}, \\ \mathbf{y} &= \mathbf{C}\mathbf{x} + \mathbf{D}\mathbf{u}, \end{aligned} \tag{2.2}$$

and you also use numbers for each equation and refer to them separately like in (2.3) and (2.4) below:

$$\dot{\mathbf{x}} = \mathbf{A}\mathbf{x} + \mathbf{B}\mathbf{u}, \tag{2.3}$$
$$\mathbf{y} = \mathbf{C}\mathbf{x} + \mathbf{D}\mathbf{u}. \tag{2.4}$$

You can write a matrix like

$$\mathbf{A} = \begin{bmatrix} A_{11} & A_{12} & \dots & A_{1n} \\ A_{21} & A_{22} & \dots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ A_{m1} & A_{m2} & \dots & A_{mn} \end{bmatrix}.$$

If you want to distinguish vectors from scalars you can use **bold** for vectors and matrices:

$$\dot{\mathbf{x}} = \mathbf{A}\mathbf{x} + \mathbf{B}u,$$
$$y = \mathbf{C}\mathbf{x} + \mathbf{D}u,$$

where u and y are scalar variables and $\mathbf{x}$ is a vector variable. You can also write Greek letters in bold: $\boldsymbol{\alpha}$.

2.2. Figures

To import the figures from Matlab, follow the following procedure:

1. Add labels and legends (don't forget to include units in the labels of each axis.)
2. From the file menu tag on the figure select export set up
3. Change the font size to 14 and click apply to figure
4. Export the figure as eps
5. Import it in LaTeX using the include graphics within a `figure` environment.

Figure 1 shows a shows a plot of the function $\sin(x)/x$.

If I need to make a simple diagram, I use powerpoint and select the drawing and save it as a pdf. For example, look at Figure 2.

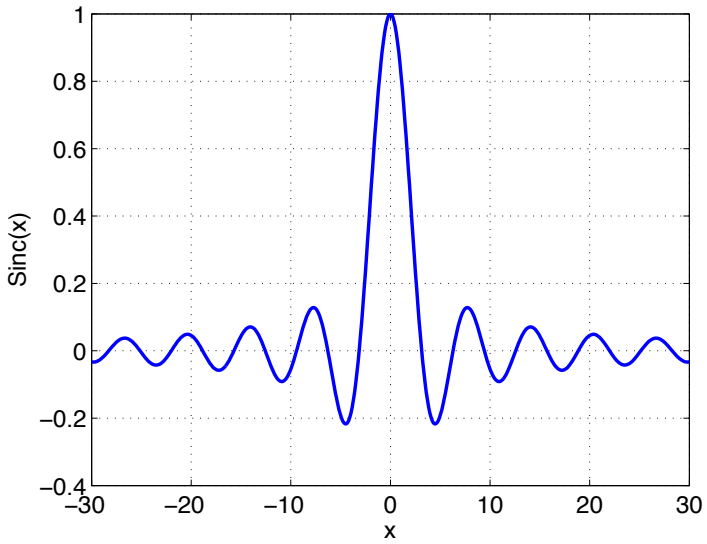

Figure 1: Here goes the caption.

2.3. Lists

To create lists use the environments `itemize`, `enumerate`, or `description`

The following is generated using *itemize*

- This is item 1
- This is item 2

The following is generated using *enumerate*

1) This is item 1
   a) Subitem a
   b) Subitem b
      i) Subsubitem i
      ii) Subsubitem ii
2) This is item 2

The following is generated using *description*

foo) This is item 1

bar) This is item 2

2.4. Code listings

To include a syntax-highlighted code listing, you can use the *listings* package. The default options are specified by the `\lstset` command. There are 3 main commands, all of which can include options to override the defaults:

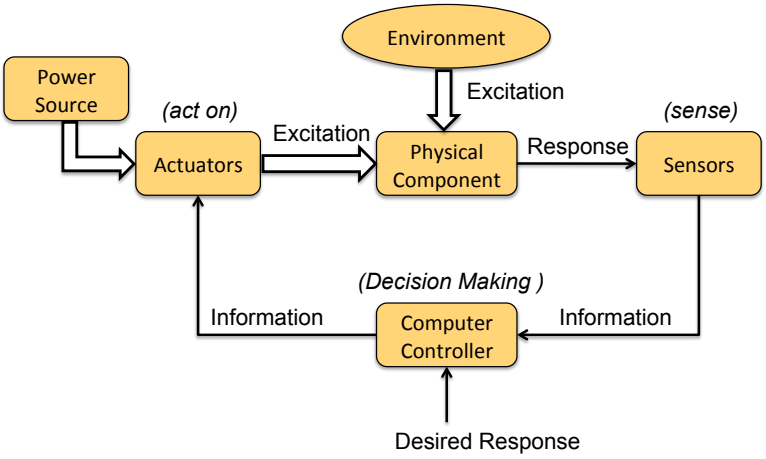

Figure 2: Here goes the caption.

1. `\lstinline`: Command for including code fragments inline with the text, as an alternative to `\verb`. For example, we might describe function prototypes such as `int main(int argc, char *argv[])`.
2. `\begin{lstlisting}`,...,`\end{lstlisting}`: Environment for including a source code listing—embedded in the LaTeX source—in a box or floating environment. An example is shown in Listing 1.
3. `\lstinputlisting`: Command for including a source code listing—loaded from an external file—in a box or floating environment. This method is preferred over including the code source within the LaTeX file, since the code and its documentation can always be kept in sync. An example is shown in Listing 2.

Listing 1: A winning entry from the 16th International Obfuscated C Code Contest, that computes the square root of its input.

```
#include <stdio.h>
int l;int main(int o,char **O,
int I){char c,*D=O[1];if(o>0){
for(l=0;D[l              ];D[l
++]-=10){D   [l++]-=120;D[l]-=
110;while   (!main(0,O,1))D[l]
+=   20;   putchar((D[l]+1032)
/20   )   ;}putchar(10);}else{
c=o+     (D[I]+82)%10-(I>l/2)*
(D[I-l+I]+72)/10-9;D[I]+=I<0?0
:!(o=main(c/10,O,I-1))*((c+999
)%10-(D[I]+92)%10);}return o;}
```

3. References and Citations

To generate the bibliography look at the end of this document in .tex file. To make reference to the bibliography use the commands `\citet{}` and `\citep{}` (Strunk, 2007). You can combine more than

Listing 2: Matlab serial communication example.

```
% Setup and open the serial connection
s = serial('COM1','BaudRate',115200);   % TODO: Modify port and rate as needed
fopen(s);
try
    % Set a variable
    fprintf(s,'x=123.456\n');

    % Retrieve a variable
    x = query(s,'x?','%s\n','x␣is␣%f\n')
    % Note: If you need to troubleshoot the query command, it is equivalent to:
%       fprintf(s,'x?');        % serial fprintf already includes newline
%       x = fscanf(s,'x is %f\n')
catch me
    fclose(s); delete(s); clear s   % Close serial connection and clean up
    rethrow me;                     % Pass to higher level error handler
end
fclose(s); delete(s); clear s       % Close serial connection and clean up

% Note: If the serial object is not cleaned up before opening another connection,
%       Matlab will lose its handle to the previous serial object and lock the
%       port, requiring a session restart to release the resource.
```

one reference in a single citation (Troyka et al., 1999; Jay, 1995).

4. Conclusion

This is one of the most important parts of the report. In the conclusion section, you should

- briefly summarise the results,
- reflect on the work presented,
- make recommendations,
- suggest future work or improvements.

References

Jay, R., 1995. How to write proposals and reports that get results. Pitman.

Strunk, W., 2007. The elements of style. Penguin.

Troyka, L. Q., Hesse, D. D., Strom, C., 1999. Simon & Schuster handbook for writers. Prentice Hall.

A. Example of a Table

Table 1: Proposed Bachelor of Engineering Mechatronics Program

1st Year		
Semester	Course Code	Course Name
1	GENG1000	Computer Aided Engineering
1	GENG1803	Introduction to Engineering Practice
1	MATH1110	Mathematics I
1	PHYS1205	Integrated Physics
2	ELEC1300	Electrical Engineering I
2	**GENG1003**	**Procedural Programming**
2	GENG1001	Introduction to Engineering Mechanics
2	MATH1120	Mathematics II
2nd Year		
Semester	Course Code	Course Name
1	ELEC1700	Computer Engineering I
1	ELEC2700	Computer Engineering II
1	MECH2420	Engineering Mechanics
1	**MCHA2440**	**Computational Engineering Modelling**
2	**MCHA2000**	**Mechatronic Systems**
2	**MECH2450**	**Engineering Computations II**
2	MECH2350	Dynamics II
2	ELEC2320	Electrical Circuits
3rd Year		
Semester	Course Code	Course Name
1	MECH2110	Mechanical Engineering Design I
1	ELEC4400	Automatic Control
1	ELEC3240	Electronics
1	ELEC3730	Embedded Systems
2	**MECH4400**	**Computational Mechanics**
2	MECH2700	Thermofluids
2	**MCHA3000**	**Mechatronic System Design I**
2	**ELEC4410**	**Control System Design and Management**
4th Year		
Semester	Course Code	Course Name
1	**MCHA3900**	**Mechatronic System Design II**
1	PHIL3910	Technology and Human Values
1	GENG3830	Engineering Project Management
1	FYP A	Final Year Project part A
2	GE	General Elective
2	GE	General Elective
2	FYP B	Final Year Project part B

Courses in **bold** are new to the program.