Abstract

This thesis considers...

Preface

This study was carried out at Tampere University of Technology (TUT).

I would like to express my sincere gratitude to ...

Contents

Acronyms

DOF	degree of freedom
PID	proportional-integral-derivative
RMSE	root-mean-square error

Alternative automatic method for acronyms. Uses package 'Acronym'

DOF Degrees of Freedom

PID Proportional-Integral-Derivative parameters for controllers

Nomenclature

Notet that for some symbols...

Latin alphabet

${}^{i}a^{x}_{P^{j}_{i}}$	x axis component of ${}^{i}\mathbf{a}_{P^{j}_{i}}$
$\{B\}$	body coordinate frame
$\dot{\mathbf{x}}^{ref}$	end-effector velocity reference
$Y(s)$	position output

Greek alphabet

${}_{G}\boldsymbol{\alpha}_{B}$	angular acceleration of $\{B\}$ with respect to $\{G\}$
${}^{i}\boldsymbol{\alpha}_{i}$	angular velocity of $\{B_i\}$ with respect to $\{I\}$ expressed in $\{B_i\}$
$\boldsymbol{\mu}_{m}$	additive magnetometer measurement noise
${}^{i}_{j}\dot{\boldsymbol{\omega}}_{k}$	angular acceleration of $\{B_k\}$ relative to $\{B_j\}$ expressed in $\{B_i\}$

List of Publications

I Author A, Author B, Author C, "Title of publication 1," *International Journal of..*, vol X, no. Y, pp. YY–ZZ Jan. 2010.

II Author A, Author B, Author C, "Title of publication 2," *IEEE International Conference on...*

1 Introduction

The recent advances in the study of frogs indicate, that...

Figure 1.1: Example figure with caption

Referring to Figure 1.1, we can see...

To create a figure with sub-figures, use

(a) First subfigure

(b) Second subfigure

Figure 1.2: Figure with two sub-figures

You may then refer to Figure 1.2 or to the subfigure as Figure 1.2(a)

An example equation is

$$c = \sqrt{a^2 + b^2}, \tag{1.1}$$

where a, b and c are... For details, please see Eq. (1.1). The values are illustrated in Table 1.1.

Table 1.1: Table caption

Variable	X (m)	Y (deg)	Z (m/s)	Δx (m)
case a	1.0	2.0	3.0	4.0
case b	5.0	6.0	7.0	8.0

1.1 Earlier research on ..

For previous works, please see Zhang et al. (2011) as well as Roberts (1959); Wang et al. (2013) or Simon (2006).

1.2 Objectives of the thesis

The main objective of this thesis is to...

The individual objectives of this thesis are summarized as follows:

- To create a..;
- To show by experimental verification that...; and
- To demonstrate...

1.3 Research methods and restrictions

The research begins by...

1.3.1 Example of Use of Acronyms

Proportional-Integral-Derivative (PID) is very commonly used in controls. Controller calculate outputs via use of PID loops.

First representation. Acronym is opened automaticly: 'Degrees of Freedom (DOF)'. Second representation 'DOF'. Plural form: 'DOFs'. Also full form: 'Degrees of Freedom (DOF)' and long form: 'Degrees of Freedom' are possible. These all are also automaticly linked to acronym list.

1.4 Outline and contributions of the thesis

This thesis is divided into N chapters. The contents of each chapter are summarized below.

Chapter 1 is an introduction into the field of.. The background and motivation for the study are given, followed by the objectives, research methods, restrictions and contributions of the thesis.

The main contributions of this research are as follows:

- First contribution..... ;
- Second contrinution..; and
- Third contribution.

The author has conducted .

2 Discussion

As the results indicate...

3 Conclusion

The results imply...

Bibliography

Roberts, S., "Control charts based on geometric moving averages," *Technometrics*, vol. 1, no. 3, pp. 239 – 250, 1959.

Simon, D., *Optimal State Estimation.* Hoboken, NJ: Wiley, 2006.

Wang, Y., Chen, W., and Tomizuka, M., "Extended kalman filtering for robot joint angle estimation using mems inertial sensors," in *Proceedings of the 6th IFAC Symposium on Mechatronic Systems*, Hangzhou, China, Apr. 2013, pp. 406 – 413.

Zhang, C., Hammad, A., and Rodriguez, S., "Crane pose estimation using UWB real-time location system," *Journal of Computing in Civil Engineering*, vol. 26, no. 5, pp. 625 – 637, 2011.