

Smart Grippers :

A Design Methodology for Novel Integrated Actuators Powered by Shape Memory Alloys

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Integrated Actuators Laboratory
Programme Doctoral en Robotics, Control, and Intelligent Systems
École polytechnique fédérale de Lausanne
pour l'obtention du grade de Docteur ès Sciences
par

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acceptée sur proposition du jury :

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Prof Name Surname, rapporteur
Prof Name Surname, rapporteur
Prof Name Surname, rapporteur

Lausanne, EPFL, 2021



Wings are a constraint that makes
it possible to fly.
— Robert Bringhurst

To my parents...

Acknowledgements

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Lausanne, May 17, 2021

D. K.

Preface

A preface is not mandatory. It would typically be written by some other person (eg your thesis director).

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Lausanne, 12 Mars 2011

T. D.

Abstract

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Zusammenfassung

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Résumé

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Introduction

A non-numbered chapter...

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1 Overview of SMA Actuator Design

In this chapter, a basic simplified control strategy is investigated for characterization of SMAs. Furthermore, a basic analysis of sensorless SMA control is presented.

1.1 Introduction

1.2 An Overview of Traditional SMA Actuator Design

1.3 Summary and Conclusion

2 Predicting the Shape Memory Effect

In this chapter, different modelling strategies, such as finite element modelling and analytical modelling, are presented. Furthermore, the bias spring actuator model and a simplified model are presented.

2.1 Introduction

2.2 Analytical Modelling of the SME

2.3 Finite Element Modelling

2.4 Stroke Estimation of SMA Actuators

2.4.1 Mechanical Modelling

2.4.2 Thermal Model

2.5 Simplified SMA Actuator Model

2.6 Summary and Conclusion

3 Design methodology for Integrated SMA Actuators

In this chapter, different modelling strategies, such as finite element modelling and analytical modelling, are presented. Furthermore, the bias spring actuator model and a simplified model are presented.

3.1 Introduction

3.2 Building blocks of SMA Actuator Design

3.3 Integrated Biasing Elements

3.3.1 Passive Biasing Compliant Mechanisms

3.4 Integrated Active Elements

3.4.1 Compliant SMA Actuators

3.4.2 Kirigami inspired SMA Actuators

3.5 Integrated Control Systems

3.6 Summary and Conclusion

4 Novel SMA Robotic Systems

In this chapter, different modelling strategies, such as finite element modelling and analytical modelling, are presented. Furthermore, the bias spring actuator model and a simplified model are presented.

4.1 Introduction

4.2 Case Study: A Multi-Output SMA Mandrel

4.3 Case Study: A Bistable SMA Gripper

4.4 Case Study: An SMA powered Inchworm Robot

4.5 Conclusion



Conclusion

A An appendix

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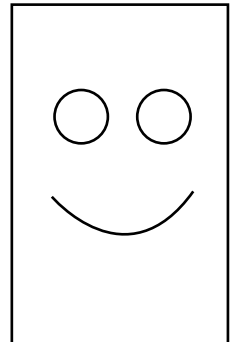
Bibliography

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Legally work : legally work in EU
Marital status : with partner
Children : none

Languages : Chinese/Mandarin, English, French, German
Education level : Bachelors degree
Hospitality work experience : 3-5 years
Special experience : Europe work experience

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Current location : Africa
Travelling Status : will be travelling single status
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Position(s) sought : Permanent position for graduates
Department(s) sought : Food & Beverage Bar/Sommelier



Personal profile:

As a Bachelor of Business Administration and after obtaining first relevant international work experience within the hospitality industry, I am now ready to take on new responsibilities to further my professional career. My key strengths include strong analytical and logical skills, an eye for detail, communication and interpersonal skills.
I enjoy working in a team and help others progress. At the same time I work well independently.
As a highly motivated and driven individual I strive on taking up challenges.

Interests:

Travelling
Foreign Cultures
Photography
Sports

Educational qualifications:

Oct 99 - Feb 02 Higher Diploma (Hotel Management)
Swiss Hotelmanagement School, SHL

Employment history:

Mar 04 - Ongoing	<p>Assistant Manager (Rooms Division/Food & Beverage)</p> <p>Hotel Atlantic Kempinski Hamburg www.kempinski.com 5 star business hotel, part of Leading Hotels of the World 412 guest rooms, large function facilities, 3 food & beverage outlets</p> <p>Optimization of bar procedures, reinforcing SOPs</p> <p>Developing & implementing promotions</p> <p>Responsible for day-to-day operations</p> <p>Optimization and streamlining of housekeeping and laundry procedures</p> <p>Implementation of new SOPs</p> <p>Analyzing monthly reports for rooms division performance and sub departments</p>
Mar 03 - Mar 04	<p>Management Trainee</p> <p>Hospitality Graduate Recruitment www.h-g-r.com Leading company for placements within the Hospitality industry.</p> <p>Traineeship covering all aspects of an online recruitment agency.</p>
Mar 02 - Mar 03	<p>Management Trainee (Rooms Division)</p> <p>Hyatt Regency Xian, China www.hyatt.com 5 star business hotel 404 guest rooms, 4 food & beverage outlets</p> <p>Traineeship covering all rooms division departments on operational as well as supervisory level.</p>

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References:

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