

# Contents

<i>Contributors</i>	vii
<i>Preface</i>	ix
<b>1. Mechanism design for legged locomotion systems</b>	<b>1</b>
Giuseppe Carbone, Marco Ceccarelli	
1 Introduction	1
2 Characteristics of legged locomotion	2
3 Existing legged locomotion systems	7
4 Design considerations for legged locomotion systems	16
5 Illustrative examples	19
6 Conclusions	30
References	30
Further reading	31
<b>2. Gait analysis and regeneration by means of principal component analysis and its application to kinematic design of wearable walking assist device for hemiplegics</b>	<b>33</b>
Daisuke Matsuura, Yuta Chounan, Masaki Omata, Yusuke Sugahara, Yukio Takeda	
1 Introduction	33
2 Gait analysis and generation based on principal component analysis	34
3 Kinematic synthesis of a wearable walking assist device for hemiplegics	39
4 Conclusions	49
References	49
<b>3. Multibody dynamics for human-like locomotion</b>	<b>51</b>
Mario Acevedo, Hiram Ponce	
1 Introduction	51
2 Stability in human-like locomotion	52
3 One-leg mechanism model	53
4 Control of and learning the balancing task	61
5 Experimental results	67
6 Conclusions	77
Acknowledgments	79
References	79

<b>4. Human lower limb operation tracking via motion capture systems</b>	<b>83</b>
Med Amine Laribi, Said Zegloul	
1 Introduction	83
2 Analysis of human walking	85
3 Quantitative gait analysis	86
4 Human walking analysis	89
5 Analysis of obstacle overcoming	95
6 Conclusion	104
Acknowledgments	106
References	106
<b>5. Design and operation of exoskeletons for limb replacement or performance enhancement</b>	<b>109</b>
Aleksandar Rodić, Svemir Popić, Miloš Jovanović	
1 Introduction	109
2 Biomechanical aspects of biped locomotion	110
3 Mechanical design and operation of exoskeletons	122
4 Control of exoskeletons	147
5 Conclusion	153
References	154
<i>Index</i>	<i>159</i>