

Contents

1	Introduction	1
	References.	5
2	Human Hand Motor Control Studies	7
2.1	Hand Control in Pre-grasp Phase	7
2.2	Grasp Force Distribution	9
2.3	Muscle Activity	10
2.4	Impedance Control	11
2.5	Outstanding Aspects in Grasping Task	12
	References.	15
 Part I Devices for Human Grasp Studies		
3	Sensorized Object Approach	21
3.1	Three-Digit Grasp Haptic Device with Variable Contact Stiffness for Rehabilitation and Human Grasping Studies.	21
3.1.1	Materials and Methods	23
3.1.2	Validation and Results	26
3.2	An Instrumented Manipulandum for Human Grasping Studies	29
3.2.1	Materials and Methods	30
3.2.2	Contact Point Estimation.	33
3.2.3	F/T Compensation.	34
3.2.4	Experiments on Contact Position.	35
3.2.5	Validation on Grasping and Results	36
3.3	Neuroscientific Studies and Applications	39
3.4	Conclusions	40
	References.	40

4	Wearable Approach: ThimbleSense, a Fingertip-Wearable Tactile Sensor for Grasp Analysis	43
4.1	Concept and Implementation	44
4.2	Weight Bias Compensation	46
4.3	Validation and Results	48
4.3.1	Experiments 1	48
4.3.2	Experiments 2	53
4.4	Conclusion	55
	References	55
 Part II Studies and Experiments on Three Digit Grasp		
5	Electromyographic Mapping of Finger Stiffness in Tripod Grasp	59
5.1	Study Design	59
5.1.1	Sensorized Object and Experimental Setup	60
5.1.2	Protocol	62
5.2	Data Analysis	62
5.3	Results	63
5.4	Discussion	68
5.5	Conclusion	69
	References	69
6	Effect of Homogenous Object Stiffness on Tri-Digit Proprieties	71
6.1	Materials and Methods	72
6.1.1	Study Design	72
6.1.2	Sensorized Object and Experimental Setup	73
6.1.3	Protocol	73
6.2	Data Analysis	74
6.3	Results	75
6.4	Discussion and Conclusions	78
	References	79
	Conclusions	81

Haptic Devices for Studies on Human Grasp and
Rehabilitation

Altobelli, A.

2016, XVI, 82 p. 64 illus., 60 illus. in color., Hardcover

ISBN: 978-3-319-47086-3