

Contents

Curriculum Vitae	4
1 Introduction	5
2 Motivation for geometric control	6
2.1 Local control and differential geometry	6
2.2 Further geometric concepts	10
3 Kinematics of robotic snakes	11
3.1 Trident snake robot	12
3.2 3-link snake robot	16
4 Nilpotent Approximation	17
5 Conformal Geometric Algebra	19
5.1 Abstract structures in kinematics	19
5.2 Differential kinematics	21
5.3 CGA and snake robot	22
5.4 CGA and trident snake robot	24
6 Further fields of interest	25
6.1 Jets and jet functors	25
6.2 Higher order connections	26
6.3 Ehresmann prolongation	27
References	28