



Contents

I. Introduction	19
1. Publications	24
II. Related Work	25
2. Wireless Sensor Network (WSN)	28
2.1. Classification schemes	28
2.1.1. Classification by Iyer et al. [75]	29
2.1.2. Classification by Akkaya and Younis [1]	30
2.1.3. Classification by addressable entity	30
2.2. Approaches	32
2.2.1. Single-Node Addressing (SNA)	32
2.2.2. Data Centric Addressing (DCA)	37
2.2.3. Geographic Addressing (GA)	39
2.2.4. No Addressing	40
2.3. Results	43
3. Topology Control	45
3.1. Preliminaries	45
3.2. Geometrical structures	47
3.3. Weight-based approaches	50
4. Energy Harvesting	53
III. Topology Control	57
5. kTC	60
5.1. Theoretical Analysis	63
5.2. Simulative performance study	65
5.2.1. kTC Parameter k	67



5.2.2. Comparative study	68
5.2.3. Robustness	70
5.3. Measurements	73
6. Asynchronous kTC (a-kTC)	78
6.1. TUD μ Net	80
6.1.1. ContikiMAC	82
6.2. Mapping RSSI to transmission power setting	85
6.3. Evaluation	87
6.3.1. Wireless Mesh Network	88
6.3.2. Wireless Sensor Networks	89
7. Summary	92
IV. Solar-aware distributed flow	93
8. Preliminaries	96
8.1. Routing Graph	96
8.2. Optimal Reference Solution	98
8.3. Energy Model	99
8.4. Solar Radiation Model	100
8.5. Cloud Obstruction Model	101
9. SDF approach	103
9.1. Consumable power	104
9.2. Calculate flow	105
9.3. Control messages	107
10. Evaluation	108
10.1. Simulation setup	108
10.2. Initialization Phase	109
10.3. Control Message Overhead	110
10.4. Performance Evaluation	111
11. Measurements	116
11.1. Implementation	116
11.1.1. Changes to SDF	116
11.1.2. Routing	117
11.1.3. Energy consumption and harvesting	117

11.2.Result	120
12.Summary	122
V. da_sense	123
13.da_sense platform	126
14.Infrastructure sensors	128
15.Participatory sensing	131
15.1.Internal Incentives	133
15.2.External Incentives	133
16.Wireless sensor network	136
16.1.Sensor platform	136
16.2.Deployment and setup	139
16.3.Data delivery protocol	139
17.Summary	141
VI. Conclusion and Future Work	142