

# List of Figures

2.1	Illustration of the working of active and passive sensor nodes in WSNs. . . . .	12
2.2	Components of a sensor node in WSNs. . . . .	13
2.3	Sponsored coverage for redundancy check Tian and Georganas (2002). . . . .	28
2.4	Perimeter coverage for redundancy check. . . . .	37
3.1	Illustration of a Target Tracking System (TTS). . . . .	47
3.2	Regular directional sensor node placement patterns in the FoI. . . . .	52
3.3	Illustration of a directional sensor node. . . . .	53
3.4	Regular sensor node placement patterns. . . . .	57
3.5	Illustration of Scenarios of 1-target tracking and 2-target tracking. . . . .	58
3.6	Tracking regions and sensor nodes in a square pattern. . . . .	59
3.7	Regular patterns with the FoI. . . . .	65
3.8	Impact of $k$ -target tracking on number of sensor nodes, where $k=\{1,2,3,4\}$ . . . . .	70
3.9	Relationship between $k$ -target tracking and tracking range. . . . .	70
3.10	Impact of area of the FoI on number of directional sensor nodes for different values of $k$ -target tracking. . . . .	71
3.11	Impact of area of the FoI on number of directional sensor nodes for different values of tracking range. . . . .	72
3.12	Experiment setup at IIT (BHU) Varanasi. . . . .	73
3.13	Placement of sensor nodes in Computer lab. . . . .	74
3.14	Placement of sensor nodes in corridor. . . . .	75

3.15	Placement of sensor nodes along the road. . . . .	75
4.1	Illustration of a fuzzy logic with features. . . . .	83
4.2	Illustration of the components of a Fuzzy Logic System (FLS). . . . .	84
4.3	A directional sensor node with its characteristics. . . . .	86
4.4	Regular directional node placement patterns in the FoI. . . . .	88
4.5	An example of the route selection technique. . . . .	92
4.6	Illustration of three inputs <i>i.e.</i> , hop count, neighbor energy consumption, and transmission energy to fuzzy system and its corresponding output. . .	93
4.7	Illustration of three inputs <i>i.e.</i> , power consumption, quality of tracking, and stability of path to fuzzy system and its corresponding output. . . . .	95
4.8	Devices used in MTS. . . . .	100
4.9	Illustration of MTS. . . . .	101
4.10	Experiment setup at IIT (BHU) Varanasi. . . . .	103
4.11	Relationship between network lifetime and traffic load. . . . .	107
4.12	Comparison of network lifetime by proposed work with existing works. . .	107
4.13	Relationship between time instances and energy consumption. . . . .	109
4.14	Comparison of energy consumption of the proposed work with existing work.	110
4.15	Relationship between time instances and standard deviation of the residual energy. . . . .	111
4.16	Comparison of standard deviation of the residual energy of the proposed work with existing works. . . . .	112
5.1	Illustration of random way point starting from coordinate (133,180). . . .	119
5.2	Relationship between the pause time (in percentage) and ratio of energy consumption (residual energy/initial energy). . . . .	122