

LIST OF FIGURES

2.1	Autonomous Navigation System	7
2.2	Types of machine learning	8
2.3	Diagram Interaksi antara Learner dan Environment	9
3.1	Behavior Based Kontrol pada Autonomous Trash Collector Robot	12
3.2	ROS Navigation stack block	14
3.3	Sub-space state of variables x_1 and x_2	16
3.4	Sub-space state of variables x_3 and x_4	17
3.5	Tampilan layar saat proses pelatihan (Gazebo simulator)	21
3.6	grafik rqt proses pelatihan agen	21
3.7	Flow diagram of the learning process by the Q - learning algorithm	23
4.1	Parameters of epoch search strategies	24
4.2	Accumulated agent reward through epochs for different search strategies . .	25
4.3	The average number of agent steps through epochs for different search strate- gies	25
4.4	Average number of agent steps through epochs for a parameter	26
4.5	Accumulated agent reward through epochs for a parameter	27
4.6	Accumulated agent reward through epochs for a parameter	28
4.7	Average number of agent steps through epochs for a parameter	28
4.8	Average number of agent steps through epochs, final training	29
4.9	Accumulated agent reward through epochs, final training	30
4.10	Q-table at the end of the training algorithm	30
4.11	algorithm testing in simulation environment, experiment 1	31
4.12	algorithm testing in simulation environment, experiment 2	32
4.13	rqt graph of the hybrid algorithm testing process in a simulation environment	32