

LAMPIRAN

A. Dataset Normalisasi

DATA NORMALISASI			
SENSOR 1	SENSOR 2	SENSOR 3	OUTPUT
-0.82547	-0.70755	-0.46292	-0.99546
1.148419	-0.93125	0.727982	-0.99546
-0.19101	-0.83804	0.132529	-0.99546
-0.22626	-0.93125	-0.46292	-0.99546
1.254164	-0.65163	-0.46292	-0.99546
1.571396	-0.89397	-0.76065	-0.99546
-0.43774	-0.80076	-0.61179	-0.99546
0.619698	-0.94989	-0.01633	-0.99546
-0.2615	-0.70755	1.621161	-0.99546
1.606644	-0.74483	0.132529	-0.99546
0.161473	-0.65163	-0.46292	-0.99546
0.055729	-0.68891	0.579119	-0.99546
0.090977	-0.87532	0.430256	-0.99546
-0.22626	-0.87532	1.174572	-0.99546
0.40821	-0.8194	-0.1652	-0.99546
1.571396	-0.76348	1.770025	-0.99546
0.513954	-0.83804	0.281392	-0.99546
0.972179	-0.74483	0.281392	-0.99546
1.007427	-0.83804	1.174572	-0.99546
1.113171	-0.8194	-0.46292	-0.99546
0.267217	-0.78212	1.472298	-0.99546
-0.19101	-0.72619	-0.90951	-0.99546
1.5009	-0.67027	1.025709	-0.99546
1.677141	-0.78212	1.770025	-0.99546
1.712389	-0.93125	-0.1652	-0.99546
0.549202	-0.93125	1.472298	-0.99546
-0.12051	-0.78212	-1.05838	-0.99546
0.126225	-0.70755	1.621161	-0.99546
1.747637	-0.93125	0.579119	-0.99546
1.818133	-0.94989	1.621161	-0.99546
-0.29675	-0.8194	1.621161	-0.99546
0.161473	-0.74483	-1.05838	-0.99546
1.818133	-0.63298	0.727982	-0.99546
0.055729	-0.87532	1.918888	-0.99546
0.866435	-0.76348	-0.46292	-0.99546

-0.57874	-0.5957	0.579119	-0.99546
0.619698	-0.68891	0.876845	-0.99546
1.007427	-0.94989	1.472298	-0.99546
1.923877	-0.91261	-0.90951	-0.99546
1.606644	-0.63298	-0.1652	-0.99546
0.196721	-0.80076	1.770025	-0.99546
0.478706	-0.74483	0.132529	-0.99546
0.972179	-0.72619	1.025709	-0.99546
-0.75498	-0.65163	0.876845	-0.99546
0.831187	-0.87532	-0.76065	-0.99546
1.359908	-0.85668	1.918888	-0.99546
2.029621	-0.74483	-0.1652	-0.99546
0.513954	-0.65163	1.472298	-0.99546
-0.05002	-0.91261	-1.05838	-0.99546
1.641893	-0.72619	0.727982	-0.99546
-0.47299	-0.5957	1.770025	-0.99546
-0.86072	-0.70755	1.472298	-0.99546
0.654946	-0.72619	-0.76065	-0.99546
-0.08526	-0.68891	-1.05838	-0.99546
-0.64923	-0.67027	1.025709	-0.99546
0.901683	-0.72619	-1.05838	-0.99546
1.32466	-0.93125	-0.01633	-0.99546
-0.71973	-0.57706	1.918888	-0.99546
0.654946	-0.87532	-0.90951	-0.99546
2.029621	-0.72619	0.579119	-0.99546
0.020481	-0.5957	-0.61179	-0.99546
1.782885	-0.63298	0.132529	-0.99546
0.866435	-0.80076	1.025709	-0.99546
-0.57874	-0.91261	0.132529	-0.99546
-0.05002	-0.76348	0.132529	-0.99546
-0.82547	-0.67027	1.323435	-0.99546
2.064869	-0.76348	1.323435	-0.99546
0.972179	-0.87532	1.918888	-0.99546
-0.22626	-0.67027	-0.01633	-0.99546
1.148419	-0.5957	-0.76065	-0.99546
1.183667	-0.80076	0.579119	-0.99546
1.818133	-0.94989	1.770025	-0.99546
1.359908	-0.94989	1.472298	-0.99546
-0.75498	-0.57706	-1.05838	-0.99546
0.549202	-0.5957	0.430256	-0.99546
0.055729	-0.68891	0.579119	-0.99546

1.5009	-0.57706	1.323435	-0.99546
0.866435	-0.67027	-0.76065	-0.99546
0.513954	-0.91261	0.132529	-0.99546
0.866435	-0.72619	0.281392	-0.99546
2.029621	-0.70755	1.770025	-0.99546
1.465652	-0.72619	1.323435	-0.99546
0.76069	-0.87532	1.025709	-0.99546
0.725442	-0.61434	-0.31406	-0.99546
1.994373	-0.91261	-0.1652	-0.99546
-0.61398	-0.57706	-0.31406	-0.99546
1.5009	-0.65163	-0.90951	-0.99546
-0.64923	-0.83804	-0.90951	-0.99546
0.302465	-0.74483	0.430256	-0.99546
0.619698	-0.70755	0.281392	-0.99546
-0.22626	-0.89397	-0.90951	-0.99546
1.853381	-0.93125	1.621161	-0.99546
1.183667	-0.78212	-0.31406	-0.99546
1.32466	-0.8194	-0.46292	-0.99546
1.077923	-0.83804	-0.31406	-0.99546
0.196721	-0.72619	1.025709	-0.99546
0.020481	-0.91261	-0.76065	-0.99546
1.923877	-0.89397	-0.76065	-0.99546
-0.15576	-0.83804	1.174572	-0.99546
1.32466	-0.87532	0.579119	-0.99546
0.831187	-0.80076	1.472298	-0.99546
0.58445	-0.72619	1.770025	-0.99546
-0.79023	-0.8194	-0.1652	-0.99546
-0.36725	-0.87532	-0.76065	-0.99546
1.254164	-0.70755	-0.61179	-0.99546
0.972179	-0.5957	0.132529	-0.99546
1.712389	-0.67027	1.918888	-0.99546
-0.2615	-0.8194	-0.46292	-0.99546
-0.12051	-0.74483	0.727982	-0.99546
-0.50824	-0.65163	1.025709	-0.99546
1.571396	-0.78212	0.281392	-0.99546
1.712389	-0.74483	-0.01633	-0.99546
1.853381	-0.61434	1.472298	-0.99546
-0.43774	-0.68891	0.281392	-0.99546
1.113171	-0.68891	-0.90951	-0.99546
1.818133	-0.78212	1.472298	-0.99546
0.090977	-0.70755	-0.01633	-0.99546

-0.332	-0.78212	1.918888	-0.99546
1.32466	-0.70755	-0.01633	-0.99546
1.359908	-0.91261	-0.61179	-0.99546
-0.36725	-0.85668	1.174572	-0.99546
0.795939	-0.91261	0.876845	-0.99546
2.064869	-0.74483	1.770025	-0.99546
0.654946	-0.76348	-0.61179	-0.99546
0.901683	-0.76348	-0.90951	-0.99546
-0.86072	-0.89397	0.579119	-0.99546
1.042675	-0.57706	-0.90951	-0.99546
1.818133	-0.68891	1.918888	-0.99546
1.042675	-0.83804	1.472298	-0.99546
0.337714	-0.87532	-0.1652	-0.99546
1.571396	-0.8194	-1.05838	-0.99546
0.302465	-0.80076	0.727982	-0.99546
-0.01477	-0.63298	0.281392	-0.99546
2.029621	-0.93125	1.918888	-0.99546
0.055729	-0.57706	-0.46292	-0.99546
1.888629	-0.8194	1.770025	-0.99546
-0.54349	-0.78212	-0.90951	-0.99546
0.549202	-0.83804	1.025709	-0.99546
0.302465	-0.72619	0.132529	-0.99546
-0.61398	-0.91261	-0.01633	-0.99546
0.196721	-0.78212	0.281392	-0.99546
1.218916	-0.5957	1.770025	-0.99546
0.40821	-0.70755	0.876845	-0.99546
-0.29675	-0.87532	0.281392	-0.99546
1.571396	-0.65163	0.132529	-0.99546
1.747637	-0.72619	-0.46292	-0.99546
-0.01477	-0.8194	0.579119	-0.99546
1.183667	-0.68891	-0.46292	-0.99546
0.972179	-0.89397	1.323435	-0.99546
0.302465	-0.78212	-0.1652	-0.99546
2.100118	-0.78212	0.876845	-0.99546
1.465652	-0.87532	0.727982	-0.99546
1.430404	-0.94989	1.323435	-0.99546
-0.71973	-0.65163	1.025709	-0.99546
0.090977	-0.67027	-0.01633	-0.99546
-0.36725	-0.89397	-0.1652	-0.99546
0.337714	-0.65163	-0.46292	-0.99546
1.677141	-0.87532	-0.61179	-0.99546

-0.36725	-0.87532	1.025709	-0.99546
-0.50824	-0.93125	0.579119	-0.99546
-0.79023	-0.67027	-0.76065	-0.99546
0.831187	-0.70755	0.727982	-0.99546
1.113171	-0.78212	0.727982	-0.99546
-0.332	-0.87532	1.918888	-0.99546
-0.22626	-0.68891	-0.46292	-0.99546
2.100118	-0.5957	-1.05838	-0.99546
-0.05002	-0.83804	1.770025	-0.99546
-0.4025	-0.61434	1.025709	-0.99546
1.747637	-0.72619	0.727982	-0.99546
-0.332	-0.94989	1.770025	-0.99546
-0.68448	-0.80076	1.621161	-0.99546
-0.15576	-0.72619	1.918888	-0.99546
0.126225	-0.63298	-0.31406	-0.99546
-0.05002	-0.61434	0.430256	-0.99546
0.478706	-0.63298	-0.90951	-0.99546
1.994373	-0.5957	1.174572	-0.99546
1.007427	-0.87532	1.918888	-0.99546
-0.54349	-0.78212	0.876845	-0.99546
-0.50824	-0.67027	-0.90951	-0.99546
1.853381	-0.65163	0.579119	-0.99546
0.161473	-0.85668	1.174572	-0.99546
-0.36725	-0.61434	1.621161	-0.99546
0.901683	-0.93125	-0.90951	-0.99546
1.5009	-0.80076	-0.46292	-0.99546
0.478706	-0.80076	-0.01633	-0.99546
-0.47299	-0.78212	0.430256	-0.99546
2.100118	-0.70755	0.132529	-0.99546
1.853381	-0.83804	-0.1652	-0.99546
1.148419	-0.72619	-0.76065	-0.99546
0.443458	-0.83804	1.025709	-0.99546
1.395156	-0.68891	1.918888	-0.99546
0.549202	-0.78212	-0.01633	-0.99546
0.020481	-0.8194	1.025709	-0.99546
1.782885	-0.8194	0.430256	-0.99546
1.254164	-0.67027	1.472298	-0.99546
0.866435	-0.91261	-0.90951	-0.99546
-0.29675	-0.72619	1.621161	-0.99546
-0.57874	-0.74483	-0.31406	-0.99546
2.100118	-0.70755	1.918888	-0.99546

-0.57874	-0.89397	-0.31406	-0.99546
0.725442	-0.65163	1.918888	-0.99546
-0.68448	-0.83804	0.281392	-0.99546
0.725442	-0.70755	0.132529	-0.99546
0.055729	-0.94989	-0.61179	-0.99546
1.571396	-0.85668	0.579119	-0.99546
-0.61398	-0.61434	0.579119	-0.99546
1.042675	-0.65163	1.025709	-0.99546
0.090977	-0.93125	1.918888	-0.99546
0.231969	-0.83804	0.430256	-0.99546
0.267217	-0.85668	-0.46292	-0.99546
-0.01477	-0.94989	-1.05838	-0.99546
-0.43774	-0.80076	-0.1652	-0.99546
0.337714	-0.87532	0.281392	-0.99546
1.959125	-0.78212	-0.76065	-0.99546
1.747637	-0.65163	1.770025	-0.99546
0.196721	-0.85668	0.430256	-0.99546
-0.64923	-0.91261	1.174572	-0.99546
-0.71973	-0.80076	1.174572	-0.99546
0.055729	-0.67027	-0.76065	-0.99546
1.747637	-0.93125	-0.90951	-0.99546
0.267217	-0.61434	0.430256	-0.99546
0.267217	-0.74483	1.472298	-0.99546
-0.05002	-0.74483	0.430256	-0.99546
1.359908	-0.91261	1.770025	-0.99546
1.395156	-0.61434	1.472298	-0.99546
0.337714	-0.57706	1.025709	-0.99546
-0.68448	-0.93125	1.472298	-0.99546
-0.05002	-0.83804	0.281392	-0.99546
-0.01477	-0.67027	1.025709	-0.99546
1.994373	-0.85668	-0.46292	-0.99546
0.725442	-0.87532	-0.01633	-0.99546
1.32466	-0.94989	1.621161	-0.99546
1.959125	-0.94989	-0.90951	-0.99546
-0.47299	-0.65163	0.876845	-0.99546
0.231969	-0.87532	0.132529	-0.99546
1.465652	-0.89397	1.918888	-0.99546
1.395156	-0.65163	1.918888	-0.99546
0.972179	-0.85668	-0.61179	-0.99546
2.029621	-0.61434	1.174572	-0.99546
-0.57874	-0.72619	-0.31406	-0.99546

-0.47299	-0.65163	0.876845	-0.99546
1.148419	-0.65163	1.621161	-0.99546
1.042675	-0.72619	-0.01633	-0.99546
1.183667	-0.93125	1.621161	-0.99546
1.254164	-0.72619	-0.1652	-0.99546
1.042675	-0.65163	1.918888	-0.99546
-0.15576	-0.61434	-0.90951	-0.99546
0.231969	-0.67027	1.770025	-0.99546
-0.43774	-0.89397	0.579119	-0.99546
-0.54349	-0.8194	1.472298	-0.99546
1.571396	-0.76348	1.472298	-0.99546
1.571396	-0.57706	1.621161	-0.99546
2.064869	-0.76348	1.472298	-0.99546
0.866435	-0.78212	-0.01633	-0.99546
0.196721	-0.94989	1.025709	-0.99546
-0.19101	-0.85668	0.430256	-0.99546
-0.2615	-0.85668	0.727982	-0.99546
1.571396	-0.57706	-0.61179	-0.99546
-0.79023	-0.57706	-0.31406	-0.99546
1.853381	-0.67027	1.918888	-0.99546
1.818133	-0.74483	0.727982	-0.99546
1.077923	-0.72619	-0.31406	-0.99546
1.148419	-0.91261	1.174572	-0.99546
1.923877	-0.70755	1.621161	-0.99546
0.126225	-0.85668	-0.31406	-0.99546
1.113171	-0.61434	-0.31406	-0.99546
0.795939	-0.70755	0.430256	-0.99546
1.148419	-0.68891	-0.01633	-0.99546
-0.22626	-0.74483	-0.90951	-0.99546
1.042675	-0.87532	1.025709	-0.99546
1.782885	-0.70755	1.770025	-0.99546
-0.57874	-0.94989	-0.31406	-0.99546
2.100118	-0.89397	1.918888	-0.99546
0.055729	-0.63298	1.174572	-0.99546
1.923877	-0.93125	-0.61179	-0.99546
0.654946	-0.68891	1.472298	-0.99546
1.818133	-0.91261	1.174572	-0.99546
-0.36725	-0.83804	1.323435	-0.99546
0.725442	-0.70755	1.174572	-0.99546
-0.79023	-0.78212	1.174572	-0.99546
-0.79023	-0.93125	0.876845	-0.99546

1.113171	-0.5957	0.727982	-0.99546
1.395156	-0.76348	1.621161	-0.99546
-0.82547	-0.74483	-0.46292	-0.99546
-0.2615	-0.91261	-1.05838	-0.99546
1.113171	-0.85668	-0.1652	-0.99546
0.090977	-0.63298	0.727982	-0.99546
0.337714	-0.76348	-0.76065	-0.99546
-0.36725	-0.72619	1.174572	-0.99546
-0.2615	-0.93125	-0.76065	-0.99546
1.677141	-0.89397	0.727982	-0.99546
0.372962	-0.74483	-0.01633	-0.99546
-0.50824	-0.76348	0.579119	-0.99546
1.430404	-0.8194	-0.46292	-0.99546
0.513954	-0.89397	-0.61179	-0.99546
0.619698	-0.94989	1.025709	-0.99546
0.936931	-0.85668	0.281392	-0.99546
0.126225	-0.91261	-0.01633	-0.99546
0.40821	-0.74483	-0.31406	-0.99546
0.337714	-0.8194	-0.46292	-0.99546
0.090977	-0.93125	1.770025	-0.99546
2.029621	-0.89397	-0.31406	-0.99546
2.100118	-0.68891	0.132529	-0.99546
1.148419	-0.65163	0.579119	-0.99546
1.923877	-0.70755	-0.61179	-0.99546
1.923877	-0.67027	0.132529	-0.99546
0.725442	-0.85668	0.281392	-0.99546
1.113171	-0.5957	0.579119	-0.99546
0.231969	-0.85668	1.621161	-0.99546
-0.86072	-0.67027	-0.61179	-0.99546
-0.68448	-0.89397	-0.46292	-0.99546
-0.50824	-0.74483	-1.05838	-0.99546
0.267217	-0.80076	0.281392	-0.99546
-0.29675	-0.80076	0.132529	-0.99546
2.100118	-0.94989	1.174572	-0.99546
0.020481	-0.67027	1.323435	-0.99546
-0.2615	-0.91261	0.132529	-0.99546
0.795939	-0.85668	0.579119	-0.99546
0.654946	-0.63298	1.918888	-0.99546
1.218916	-0.76348	-0.76065	-0.99546
0.231969	-0.5957	1.918888	-0.99546
-0.82547	-0.65163	-1.05838	-0.99546

0.372962	-0.61434	0.132529	-0.99546
-0.79023	-0.72619	-0.46292	-0.99546
0.866435	-0.65163	1.323435	-0.99546
0.795939	-0.94989	0.579119	-0.99546
-0.68448	-0.78212	-0.01633	-0.99546
-0.05002	-0.89397	-0.61179	-0.99546
1.359908	-0.68891	0.430256	-0.99546
-0.01477	-0.78212	-0.90951	-0.99546
0.020481	-0.76348	1.174572	-0.99546
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0.443458	-0.70755	0.727982	-0.99546
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0.090977	-0.67027	0.281392	-0.99546
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1.007427	-1.09902	-2.10042	0.064778
1.430404	-1.08038	-2.39815	0.064778
1.183667	-1.00581	-1.95156	0.064778
1.113171	-1.02446	-1.3561	0.064778
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0.549202	-1.00581	-2.10042	0.064778
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1.606644	-1.00581	-1.80269	0.064778
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1.606644	-1.09902	-1.3561	0.064778
1.395156	-1.06174	-1.80269	0.064778
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0.196721	-1.09902	-2.24928	0.064778
2.029621	-1.0431	-1.65383	0.064778
0.126225	-1.11766	-1.65383	0.064778
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0.020481	-1.02446	-1.65383	0.064778
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2.100118	-0.57706	1.770025	-0.99546
0.090977	-0.67027	0.579119	-0.99546

-0.332	-0.80076	0.876845	-0.99546
-0.36725	-0.78212	1.621161	-0.99546
0.725442	-0.5957	0.727982	-0.99546
-0.05002	-0.68891	0.281392	-0.99546
1.148419	-0.8194	-0.61179	-0.99546
1.536148	-0.72619	1.174572	-0.99546
1.395156	-0.93125	-0.90951	-0.99546
-0.47299	-0.91261	-0.90951	-0.99546
-0.05002	-0.83804	-0.46292	-0.99546
1.289412	-0.5957	0.727982	-0.99546
0.795939	-0.80076	0.132529	-0.99546
-0.4025	-0.76348	0.132529	-0.99546
0.725442	-0.67027	-0.01633	-0.99546
-0.57874	-0.65163	0.132529	-0.99546
2.029621	-0.83804	-0.76065	-0.99546
1.536148	-0.80076	1.323435	-0.99546
-0.4025	-0.72619	-0.76065	-0.99546
-0.64923	-0.76348	0.727982	-0.99546
-0.01477	-0.94989	-0.61179	-0.99546
1.113171	-0.87532	1.323435	-0.99546
1.818133	-0.80076	-1.05838	-0.99546
1.818133	-0.57706	-0.31406	-0.99546
-0.2615	-0.85668	0.132529	-0.99546
-0.93122	1.473501	0.727982	1.12502
-0.71973	1.212521	0.579119	1.12502
-0.71973	0.932899	-0.1652	1.12502
-0.89597	1.212521	0.876845	1.12502
-1.03696	1.268445	0.281392	1.12502
-0.71973	1.529426	0.281392	1.12502
-0.96647	0.914257	-0.31406	1.12502
-0.86072	1.566709	-0.01633	1.12502
-0.75498	1.510784	-0.1652	1.12502
-0.93122	1.249804	-0.90951	1.12502
-0.71973	0.783767	0.132529	1.12502
-0.82547	1.156596	-0.76065	1.12502
-1.00171	0.783767	0.727982	1.12502
-1.07221	0.95154	-0.46292	1.12502
-0.79023	1.175238	0.876845	1.12502
-1.07221	1.193879	0.876845	1.12502
-0.79023	0.914257	0.727982	1.12502
-0.71973	0.727842	-0.1652	1.12502

-0.96647	0.653277	-0.61179	1.12502
-0.89597	1.380294	0.727982	1.12502
-0.79023	0.839691	-0.90951	1.12502
-1.07221	0.802408	-0.31406	1.12502
-1.00171	1.45486	0.727982	1.12502
-0.93122	1.529426	0.132529	1.12502
-0.93122	1.622633	-0.46292	1.12502
-0.79023	1.287086	-0.01633	1.12502
-0.71973	1.08203	-0.90951	1.12502
-1.07221	1.08203	-0.61179	1.12502
-0.86072	1.678557	0.876845	1.12502
-0.86072	1.343011	0.430256	1.12502
-0.75498	1.324369	-0.61179	1.12502
-0.82547	0.802408	0.132529	1.12502
-1.03696	0.634635	-0.46292	1.12502
-0.75498	0.634635	-0.1652	1.12502
-0.89597	1.063389	-0.61179	1.12502
-0.75498	0.95154	-0.61179	1.12502
-1.03696	0.802408	0.430256	1.12502
-0.71973	0.895616	-0.46292	1.12502
-0.89597	1.492143	0.579119	1.12502
-1.03696	1.08203	0.579119	1.12502
-1.03696	0.932899	0.579119	1.12502
-1.00171	0.671918	-0.1652	1.12502
-0.96647	1.529426	0.281392	1.12502
-0.93122	0.988823	0.281392	1.12502
-1.07221	0.653277	-0.1652	1.12502
-0.89597	1.659916	0.132529	1.12502
-0.89597	1.361652	-0.61179	1.12502
-0.79023	0.858333	-0.31406	1.12502
-0.71973	0.727842	-0.31406	1.12502
-0.89597	1.324369	0.876845	1.12502
-0.93122	1.193879	0.281392	1.12502
-1.03696	0.783767	-0.76065	1.12502
-0.82547	0.95154	-0.31406	1.12502
-0.71973	1.137955	-0.46292	1.12502
-0.89597	1.436218	0.430256	1.12502
-0.79023	0.690559	-0.1652	1.12502
-0.86072	1.529426	0.132529	1.12502
-0.75498	1.231162	-0.1652	1.12502
-0.75498	0.970182	0.281392	1.12502

-0.71973	0.932899	-0.31406	1.12502
-0.79023	1.212521	-0.31406	1.12502
-0.82547	0.727842	-0.76065	1.12502
-0.82547	1.529426	0.281392	1.12502
-0.71973	1.492143	-0.76065	1.12502
-0.93122	0.988823	0.727982	1.12502
-0.89597	0.634635	-0.1652	1.12502
-0.71973	0.671918	-0.46292	1.12502
-0.75498	0.95154	0.132529	1.12502
-1.03696	0.970182	-0.76065	1.12502
-0.71973	1.529426	-0.01633	1.12502
-0.93122	0.783767	0.727982	1.12502
-0.93122	1.156596	-0.61179	1.12502
-0.93122	1.08203	-0.31406	1.12502
-0.86072	1.603991	-0.46292	1.12502
-0.82547	1.231162	-0.76065	1.12502
-0.71973	1.641274	0.430256	1.12502
-0.82547	1.398935	-0.46292	1.12502
-0.96647	0.839691	0.579119	1.12502
-1.07221	0.82105	0.727982	1.12502
-1.00171	1.100672	-0.1652	1.12502
-0.79023	1.361652	0.281392	1.12502
-0.82547	1.044747	-0.46292	1.12502
-0.86072	1.436218	0.579119	1.12502
-0.82547	0.709201	0.430256	1.12502
-0.93122	1.361652	-0.31406	1.12502
-0.93122	0.95154	-0.61179	1.12502
-0.93122	0.765125	-0.1652	1.12502
-0.86072	1.212521	0.281392	1.12502
-0.86072	0.746484	-0.31406	1.12502
-1.03696	0.95154	-0.61179	1.12502
-0.75498	1.492143	0.876845	1.12502
-1.07221	0.82105	-0.90951	1.12502
-0.86072	1.287086	0.281392	1.12502
-1.03696	1.380294	0.430256	1.12502
-0.75498	0.709201	-0.31406	1.12502
-0.89597	1.398935	0.430256	1.12502
-0.86072	1.603991	-0.76065	1.12502
-0.79023	0.783767	0.876845	1.12502
-0.96647	0.95154	-0.31406	1.12502
-1.00171	0.671918	0.579119	1.12502

-0.93122	1.380294	-0.61179	1.12502
-0.82547	0.765125	0.727982	1.12502
-0.82547	0.765125	0.132529	1.12502
-0.82547	0.895616	0.579119	1.12502
-0.96647	1.007464	-0.76065	1.12502
-0.75498	0.839691	0.876845	1.12502
-0.86072	1.268445	-0.31406	1.12502
-0.89597	1.193879	0.876845	1.12502
-0.82547	0.634635	-0.01633	1.12502
-0.86072	0.690559	0.876845	1.12502
-0.79023	1.529426	-0.90951	1.12502
-0.71973	1.510784	0.430256	1.12502
-0.75498	1.193879	-0.90951	1.12502
-0.82547	0.82105	-0.46292	1.12502
-0.82547	0.802408	0.876845	1.12502
-1.00171	1.007464	-0.01633	1.12502
-1.07221	1.119313	0.727982	1.12502
-0.86072	1.659916	-0.46292	1.12502
-0.93122	0.858333	0.430256	1.12502
-0.93122	1.678557	-0.90951	1.12502
-0.75498	1.007464	0.281392	1.12502
-0.75498	1.380294	0.281392	1.12502
-1.00171	1.492143	-0.1652	1.12502
-0.89597	0.802408	0.876845	1.12502
-0.96647	1.212521	-0.90951	1.12502
-0.96647	0.671918	-0.01633	1.12502
-0.82547	1.641274	0.876845	1.12502
-0.93122	1.287086	0.132529	1.12502
-0.82547	1.231162	-0.01633	1.12502
-1.07221	1.417577	0.132529	1.12502
-0.75498	1.231162	-0.76065	1.12502
-0.75498	1.175238	-0.1652	1.12502
-0.79023	1.249804	-0.76065	1.12502
-0.82547	1.436218	-0.01633	1.12502
-0.96647	1.603991	0.430256	1.12502
-0.75498	1.622633	-0.61179	1.12502
-1.07221	0.671918	0.876845	1.12502
-0.96647	0.970182	0.132529	1.12502
-0.93122	1.137955	0.579119	1.12502
-0.79023	0.727842	0.132529	1.12502
-1.00171	1.380294	0.430256	1.12502

-1.03696	0.858333	0.579119	1.12502
-0.71973	1.398935	-0.01633	1.12502
-0.96647	0.914257	0.579119	1.12502
-1.07221	0.988823	0.876845	1.12502
-0.82547	0.914257	-0.76065	1.12502
-0.93122	0.988823	-0.90951	1.12502
-0.82547	1.548067	-0.1652	1.12502
-0.93122	0.765125	0.579119	1.12502
-0.71973	0.709201	0.281392	1.12502
-0.82547	1.566709	0.579119	1.12502
-0.75498	1.529426	0.727982	1.12502
-0.89597	1.58535	-0.90951	1.12502
-0.89597	1.548067	-0.1652	1.12502
-1.07221	0.970182	-0.90951	1.12502
-1.00171	1.119313	-0.46292	1.12502
-0.93122	0.95154	0.579119	1.12502
-1.07221	1.622633	-0.46292	1.12502
-0.96647	1.380294	0.579119	1.12502
-1.00171	0.709201	0.430256	1.12502
-0.86072	1.137955	0.579119	1.12502
-0.86072	0.895616	-0.61179	1.12502
-0.93122	1.529426	0.132529	1.12502
-0.93122	0.970182	-0.76065	1.12502
-0.86072	1.548067	-0.1652	1.12502
-0.71973	0.746484	-0.76065	1.12502
-0.96647	0.727842	-0.76065	1.12502
-1.07221	1.156596	-0.1652	1.12502
-0.89597	1.659916	-0.46292	1.12502
-1.07221	1.566709	-0.46292	1.12502
-0.71973	1.603991	0.876845	1.12502
-0.71973	1.417577	0.876845	1.12502
-1.03696	1.305728	-0.61179	1.12502
-1.00171	1.641274	0.281392	1.12502
-1.00171	1.287086	-0.31406	1.12502
-0.96647	1.231162	-0.46292	1.12502
-0.82547	1.678557	0.430256	1.12502
-1.00171	0.82105	0.579119	1.12502
-0.89597	1.398935	0.430256	1.12502
-0.96647	0.895616	-0.1652	1.12502
-0.93122	1.343011	-0.90951	1.12502
-0.71973	1.100672	-0.61179	1.12502

-0.93122	1.007464	-0.61179	1.12502
-0.86072	0.970182	0.430256	1.12502
-0.89597	1.156596	-0.46292	1.12502
-0.96647	1.324369	0.727982	1.12502
-0.75498	1.249804	0.727982	1.12502
-0.86072	1.361652	0.876845	1.12502
-0.75498	1.398935	-0.76065	1.12502
-1.07221	1.45486	-0.76065	1.12502
-0.82547	1.063389	0.281392	1.12502
-1.07221	0.690559	-0.1652	1.12502
-1.07221	0.858333	-0.46292	1.12502
-0.89597	1.324369	-0.1652	1.12502
-0.79023	0.970182	-0.90951	1.12502
-0.82547	1.231162	-0.90951	1.12502
-1.07221	0.653277	-0.01633	1.12502
-1.03696	1.380294	-0.1652	1.12502
-0.96647	1.361652	0.727982	1.12502
-0.86072	1.063389	0.132529	1.12502
0.055729	-1.02446	-2.24928	0.064778
1.853381	-1.0431	-1.50497	0.064778
1.183667	-1.09902	-2.10042	0.064778
1.148419	-1.0431	-1.95156	0.064778
-0.57874	-1.06174	-1.50497	0.064778
-0.29675	-1.02446	-1.3561	0.064778
1.430404	-1.0431	-1.95156	0.064778
1.183667	-1.02446	-2.24928	0.064778
-0.68448	-1.06174	-2.10042	0.064778
0.302465	-0.98717	-1.65383	0.064778
2.029621	-1.11766	-1.3561	0.064778
0.126225	-1.00581	-1.65383	0.064778
1.042675	-1.0431	-1.3561	0.064778
1.818133	-0.98717	-1.80269	0.064778
0.901683	-1.11766	-2.24928	0.064778
-0.64923	-1.06174	-2.24928	0.064778
1.641893	-1.09902	-2.10042	0.064778
-0.57874	-1.09902	-2.24928	0.064778
-0.36725	-1.0431	-1.80269	0.064778
-0.68448	-1.06174	-1.80269	0.064778
1.395156	-1.11766	-1.80269	0.064778
1.148419	-1.11766	-1.65383	0.064778
1.994373	-1.11766	-1.3561	0.064778

0.513954	-1.11766	-1.65383	0.064778
1.430404	-1.08038	-2.10042	0.064778
1.923877	-1.0431	-2.24928	0.064778
1.818133	-0.98717	-2.10042	0.064778
1.289412	-1.0431	-1.3561	0.064778
1.395156	-1.00581	-2.39815	0.064778
1.077923	-1.00581	-2.39815	0.064778
0.020481	-1.09902	-1.50497	0.064778
-0.29675	-1.00581	-2.24928	0.064778
1.747637	-1.09902	-2.39815	0.064778
1.853381	-1.11766	-2.39815	0.064778



B. Dataset Jarak Real Pembacaan Sensor

DATA JARAK REAL (cm)			
SENSOR 1	SENSOR 2	SENSOR 3	OUPUT
32	23	16	0
88	11	24	0
50	16	20	0
49	11	16	0
91	26	16	0
100	13	14	0
43	18	15	0
73	10	19	0
48	23	30	0
101	21	20	0
60	26	16	0
57	24	23	0
58	14	22	0
49	14	27	0
67	17	18	0
100	20	31	0
70	16	21	0
83	21	21	0
84	16	27	0
87	17	16	0
63	19	29	0
50	22	13	0
98	25	26	0
103	19	31	0
104	11	18	0
71	11	29	0
52	19	12	0
59	23	30	0
105	11	23	0
107	10	30	0
47	17	30	0
60	21	12	0
107	27	24	0
57	14	32	0
80	20	16	0
39	29	23	0
73	24	25	0
84	10	29	0

110	12	13	0
101	27	18	0
61	18	31	0
69	21	20	0
83	22	26	0
34	26	25	0
79	14	14	0
94	15	32	0
113	21	18	0
70	26	29	0
54	12	12	0
102	22	24	0
42	29	31	0
31	23	29	0
74	22	14	0
53	24	12	0
37	25	26	0
81	22	12	0
93	11	19	0
35	30	32	0
74	14	13	0
113	22	23	0
56	29	15	0
106	27	20	0
80	18	26	0
39	12	20	0
54	20	20	0
32	25	28	0
114	20	28	0
83	14	32	0
49	25	19	0
88	29	14	0
89	18	23	0
107	10	31	0
94	10	29	0
34	30	12	0
71	29	22	0
57	24	23	0
98	30	28	0
80	25	14	0
70	12	20	0

80	22	21	0
113	23	31	0
97	22	28	0
77	14	26	0
76	28	17	0
112	12	18	0
38	30	17	0
98	26	13	0
37	16	13	0
64	21	22	0
73	23	21	0
49	13	13	0
108	11	30	0
89	19	17	0
93	17	16	0
86	16	17	0
61	22	26	0
56	12	14	0
110	13	14	0
51	16	27	0
93	14	23	0
79	18	29	0
72	22	31	0
33	17	18	0
45	14	14	0
91	23	15	0
83	29	20	0
104	25	32	0
48	17	16	0
52	21	24	0
41	26	26	0
100	19	21	0
104	21	19	0
108	28	29	0
43	24	21	0
87	24	13	0
107	19	29	0
58	23	19	0
46	19	32	0
93	23	19	0
94	12	15	0

45	15	27	0
78	12	25	0
114	21	31	0
74	20	15	0
81	20	13	0
31	13	23	0
85	30	13	0
107	24	32	0
85	16	29	0
65	14	18	0
100	17	12	0
64	18	24	0
55	27	21	0
113	11	32	0
57	30	16	0
109	17	31	0
40	19	13	0
71	16	26	0
64	22	20	0
38	12	19	0
61	19	21	0
90	29	31	0
67	23	25	0
47	14	21	0
100	26	20	0
105	22	16	0
55	17	23	0
89	24	16	0
83	13	28	0
64	19	18	0
115	19	25	0
97	14	24	0
96	10	28	0
35	26	26	0
58	25	19	0
45	13	18	0
65	26	16	0
103	14	15	0
45	14	26	0
41	11	23	0
33	25	14	0

79	23	24	0
87	19	24	0
46	14	32	0
49	24	16	0
115	29	12	0
54	16	31	0
44	28	26	0
105	22	24	0
46	10	31	0
36	18	30	0
51	22	32	0
59	27	17	0
54	28	22	0
69	27	13	0
112	29	27	0
84	14	32	0
40	19	25	0
41	25	13	0
108	26	23	0
60	15	27	0
45	28	30	0
81	11	13	0
98	18	16	0
69	18	19	0
42	19	22	0
115	23	20	0
108	16	18	0
88	22	14	0
68	16	26	0
95	24	32	0
71	19	19	0
56	17	26	0
106	17	22	0
91	25	29	0
80	12	13	0
47	22	30	0
39	21	17	0
115	23	32	0
39	13	17	0
76	26	32	0
36	16	21	0

76	23	20	0
57	10	15	0
100	15	23	0
38	28	23	0
85	26	26	0
58	11	32	0
62	16	22	0
63	15	16	0
55	10	12	0
43	18	18	0
65	14	21	0
111	19	14	0
105	26	31	0
61	15	22	0
37	12	27	0
35	18	27	0
57	25	14	0
105	11	13	0
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96	5	7	1
31	8	8	1
53	2	7	1
109	3	8	1
54	1	10	1
39	1	9	1
60	4	3	1
69	7	7	1
34	4	9	1
33	3	7	1
68	3	6	1
47	30	16	0
75	22	24	0
33	27	32	0
64	24	27	0

63	12	27	0
74	21	15	0
89	29	13	0
41	10	23	0
43	11	31	0
65	12	18	0
62	27	22	0
65	30	27	0
56	21	28	0
103	11	20	0
73	24	29	0
77	26	28	0
112	13	22	0
38	22	21	0
100	28	21	0
45	21	23	0
55	13	32	0
97	12	23	0
33	16	12	0
105	25	28	0
58	26	21	0
97	16	24	0
75	11	20	0
39	13	22	0
63	19	18	0
89	30	30	0
54	15	20	0
54	25	31	0
34	30	25	0
54	18	25	0
98	11	18	0
105	22	26	0
89	29	14	0
80	24	14	0
79	22	30	0
103	20	13	0
106	26	18	0
68	15	32	0
81	22	25	0
77	18	32	0
33	19	18	0

41	20	16	0
55	21	13	0
112	13	30	0
37	16	28	0
92	29	13	0
85	16	21	0
91	30	27	0
81	10	24	0
73	23	24	0
57	28	27	0
74	21	25	0
90	22	20	0
87	17	26	0
77	25	29	0
66	17	30	0
62	22	28	0
65	29	18	0
32	11	29	0
72	12	29	0
103	11	16	0
99	19	14	0
98	14	13	0
77	11	15	0
103	12	20	0
109	28	24	0
65	11	22	0
67	18	22	0
111	21	22	0
90	30	18	0
39	11	18	0
103	17	13	0
79	14	25	0
87	15	20	0
113	13	20	0
48	11	17	0
56	16	31	0
101	30	15	0
73	12	26	0
66	30	18	0
94	16	32	0
44	19	24	0

75	18	26	0
52	30	19	0
113	29	20	0
115	11	13	0
114	14	18	0
62	13	24	0
87	15	19	0
102	26	30	0
57	29	22	0
76	17	16	0
60	24	26	0
55	30	12	0
32	22	19	0
65	19	30	0
53	28	18	0
72	10	27	0
87	10	26	0
87	23	29	0
56	28	24	0
108	22	25	0
73	17	19	0
71	19	19	0
40	25	26	0
115	25	29	0
71	23	17	0
85	10	17	0
89	29	28	0
101	19	28	0
58	23	22	0
51	19	14	0
60	21	25	0
74	14	15	0
106	10	13	0
104	14	21	0
57	26	30	0
111	12	19	0
53	29	20	0
51	28	21	0
49	25	30	0
97	26	30	0
71	17	28	0

81	14	20	0
68	20	29	0
39	28	21	0
76	27	22	0
58	14	22	0
61	13	22	0
50	28	13	0
107	28	14	0
103	17	19	0
37	18	25	0
105	22	27	0
51	14	22	0
46	20	21	0
83	25	24	0
41	26	21	0
113	18	23	0
33	21	20	0
97	10	30	0
46	28	21	0
64	13	18	0
114	16	32	0
61	20	27	0
97	16	25	0
31	30	18	0
97	29	26	0
41	17	17	0
68	13	23	0
70	13	18	0
104	13	24	0
96	29	26	0
63	21	21	0
32	23	17	0
85	21	28	0
96	30	23	0
92	17	13	0
69	24	20	0
38	28	25	0
41	22	27	0
46	22	29	0
92	16	27	0
32	29	31	0

41	30	21	0
35	14	13	0
86	19	15	0
61	11	22	0
105	24	15	0
43	30	31	0
44	13	16	0
109	30	12	0
62	18	24	0
33	13	12	0
53	25	30	0
57	11	17	0
72	12	21	0
107	24	21	0
99	26	20	0
48	15	29	0
73	16	17	0
63	22	13	0
96	22	30	0
83	16	25	0
61	18	28	0
79	23	17	0
41	14	22	0
54	13	12	0
74	12	13	0
67	12	18	0
92	18	17	0
46	12	29	0
84	24	18	0
51	22	12	0
89	20	30	0
69	17	20	0
70	24	31	0
54	25	12	0
79	13	32	0
92	27	20	0
115	30	31	0
58	25	23	0
46	18	25	0
45	19	30	0
76	29	24	0

54	24	21	0
88	17	15	0
99	22	27	0
95	11	13	0
42	12	13	0
54	16	16	0
92	29	24	0
78	18	20	0
44	20	20	0
76	25	19	0
39	26	20	0
113	16	14	0
99	18	28	0
44	22	14	0
37	20	24	0
55	10	15	0
87	14	28	0
107	18	12	0
107	30	17	0
48	15	20	0
29	140	24	2
35	126	23	2
35	111	18	2
30	126	25	2
26	129	21	2
35	143	21	2
28	110	17	2
31	145	19	2
34	142	18	2
29	128	13	2
35	103	20	2
32	123	14	2
27	103	24	2
25	112	16	2
33	124	25	2
25	125	25	2
33	110	24	2
35	100	18	2
28	96	15	2
30	135	24	2
33	106	13	2

25	104	17	2
27	139	24	2
29	143	20	2
29	148	16	2
33	130	19	2
35	119	13	2
25	119	15	2
31	151	25	2
31	133	22	2
34	132	15	2
32	104	20	2
26	95	16	2
34	95	18	2
30	118	15	2
34	112	15	2
26	104	22	2
35	109	16	2
30	141	23	2
26	119	23	2
26	111	23	2
27	97	18	2
28	143	21	2
29	114	21	2
25	96	18	2
30	150	20	2
30	134	15	2
33	107	17	2
35	100	17	2
30	132	25	2
29	125	21	2
26	103	14	2
32	112	17	2
35	122	16	2
30	138	22	2
33	98	18	2
31	143	20	2
34	127	18	2
34	113	21	2
35	111	17	2
33	126	17	2
32	100	14	2

32	143	21	2
35	141	14	2
29	114	24	2
30	95	18	2
35	97	16	2
34	112	20	2
26	113	14	2
35	143	19	2
29	103	24	2
29	123	15	2
29	119	17	2
31	147	16	2
32	127	14	2
35	149	22	2
32	136	16	2
28	106	23	2
25	105	24	2
27	120	18	2
33	134	21	2
32	117	16	2
31	138	23	2
32	99	22	2
29	134	17	2
29	112	15	2
29	102	18	2
31	126	21	2
31	101	17	2
26	112	15	2
34	141	25	2
25	105	13	2
31	130	21	2
26	135	22	2
34	99	17	2
30	136	22	2
31	147	14	2
33	103	25	2
28	112	17	2
27	97	23	2
29	135	15	2
32	102	24	2
32	102	20	2

32	109	23	2
28	115	14	2
34	106	25	2
31	129	17	2
30	125	25	2
32	95	19	2
31	98	25	2
33	143	13	2
35	142	22	2
34	125	13	2
32	105	16	2
32	104	25	2
27	115	19	2
25	121	24	2
31	150	16	2
29	107	22	2
29	151	13	2
34	115	21	2
34	135	21	2
27	141	18	2
30	104	25	2
28	126	13	2
28	97	19	2
32	149	25	2
29	130	20	2
32	127	19	2
25	137	20	2
34	127	14	2
34	124	18	2
33	128	14	2
32	138	19	2
28	147	22	2
34	148	15	2
25	97	25	2
28	113	20	2
29	122	23	2
33	100	20	2
27	135	22	2
26	107	23	2
35	136	19	2
28	110	23	2

25	114	25	2
32	110	14	2
29	114	13	2
32	144	18	2
29	102	23	2
35	99	21	2
32	145	23	2
34	143	24	2
30	146	13	2
30	144	18	2
25	113	13	2
27	121	16	2
29	112	23	2
25	148	16	2
28	135	23	2
27	99	22	2
31	122	23	2
31	109	15	2
29	143	20	2
29	113	14	2
31	144	18	2
35	101	14	2
28	100	14	2
25	123	18	2
30	150	16	2
25	145	16	2
35	147	25	2
35	137	25	2
26	131	15	2
27	149	21	2
27	130	17	2
28	127	16	2
32	151	22	2
27	105	23	2
30	136	22	2
28	109	18	2
29	133	13	2
35	120	15	2
29	115	15	2
31	113	22	2
30	123	16	2

28	132	24	2
34	128	24	2
31	134	25	2
34	136	14	2
25	139	14	2
32	118	21	2
25	98	18	2
25	107	16	2
30	132	18	2
33	113	13	2
32	127	13	2
25	96	19	2
26	135	18	2
28	134	24	2
31	118	20	2
57	4	4	1
108	1	9	1
89	4	5	1
88	8	6	1
39	7	9	1
47	7	10	1
96	8	6	1
89	5	4	1
36	6	5	1
64	2	8	1
113	3	10	1
59	4	8	1
85	6	10	1
107	4	7	1
81	6	4	1
37	2	4	1
102	7	5	1
39	6	4	1
45	8	7	1
36	6	7	1
95	2	7	1
88	7	8	1
112	5	10	1
70	8	8	1
96	7	5	1
110	6	4	1

107	8	5	1
92	5	10	1
95	1	3	1
86	3	3	1
56	5	9	1
47	4	4	1
105	8	3	1
108	7	3	1



C. Pemograman Arduino Uno

```
#include "SHCSR04.h"
SHCSR04 hcsr04;

//SKRIPSI : Wall Following Robot//

const int trigPin1 = 11;
const int echoPin1 = 10;
const int trigPin2 = A3; //13;
const int echoPin2 = A4;
const int trigPin3 = A2;
const int echoPin3 = A5;
const int in1 = 9;
const int in2 = 8;
const int in3 = 4;
const int in4 = 3;
const int enA = 5;
const int enB = 6;

#define PWM

/// Nilai STDev, Rata-rata Data Input dan Output
float STDevIn1 = 28.37033921, MeanIn1= 55.41895262;
float STDevIn2 = 53.63126601, MeanIn2= 60.96695761;
float STDevIn3 = 6.717575401, MeanIn3= 19.10972569;
float STDevOut = 0.943180689, MeanOut= 0.938902743;

float Sensor1, Sensor2, Sensor3;
void Sensor () {
    Sensor1 = hcsr04.read(trigPin1, echoPin1);
    Sensor2 = hcsr04.read(trigPin2, echoPin2);
    Sensor3 = hcsr04.read(trigPin3, echoPin3);
}

float Jarak1, Jarak2, Jarak3, Denormalisasi;
void Jarak() {
```

```

Sensor ();
Jarak1  =  (Sensor1  -  MeanIn1)/STDevIn1;  //
Normalisasi Pembacaan Sensor 1
Jarak2  =  (Sensor2  -  MeanIn2)/STDevIn2;  //
Normalisasi Pembacaan Sensor 2
Jarak3  =  (Sensor3  -  MeanIn3)/STDevIn3;  //
Normalisasi Pembacaan Sensor 3
}

void setup()

{
  Serial.begin(9600);
  pinMode(trigPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
  pinMode(trigPin2, OUTPUT);
  pinMode(echoPin2, INPUT);
  pinMode(trigPin3, OUTPUT);
  pinMode(echoPin3, INPUT);
  pinMode (in1, OUTPUT);
  pinMode (in2, OUTPUT);
  pinMode (in3, OUTPUT);
  pinMode (in4, OUTPUT);
  pinMode (enA, OUTPUT);
  pinMode (enB, OUTPUT);
}

// Input Sensor 1
float Dekat1[] = {-2.647, -0.7502, 0.2481};
float Sedang1[] = {-1.339, 0.6092, 2.117};
float Jauh1[] = {0.4348, 2.085, 3.686};

// Input Sensor 2
float Dekat2[] = {-2.196, -0.5735, 0.6346};
float Sedang2[] = {-2.202, 0.4631, 1.994};
float Jauh2[] = {-0.09251, 1.268, 3.071};

```

```

// Input Sensor 3
float Dekat3[] = {-4.023, -1.356, -1.063};
float Sedang3[] = {-4.02, 0.1826, 1.918};
float Jauh3[] = {-0.2777, 1.913, 4.077};

// Neuron Jarak
double L1_1, L1_2, L1_3, L1_4, L1_5, L1_6, L1_7,
L1_8, L1_9; // Layer 1
double L2, L2_1, L2_2, L2_3, L2_4, L2_5, L2_6, L2_7,
L2_8, L2_9, L2_10, L2_11, L2_12, L2_13, L2_14, L2_15,
L2_16, L2_17, L2_18, L2_19, L2_20, L2_21, L2_22,
L2_23, L2_24, L2_25, L2_26, L2_27; // Layer 2
double L3, L3_1, L3_2, L3_3, L3_4, L3_5, L3_6, L3_7,
L3_8, L3_9, L3_10, L3_11, L3_12, L3_13, L3_14, L3_15,
L3_16, L3_17, L3_18, L3_19, L3_20, L3_21, L3_22,
L3_23, L3_24, L3_25, L3_26, L3_27; // Layer 3
double L4, L4_1, L4_2, L4_3, L4_4, L4_5, L4_6, L4_7,
L4_8, L4_9, L4_10, L4_11, L4_12, L4_13, L4_14, L4_15,
L4_16, L4_17, L4_18, L4_19, L4_20, L4_21, L4_22,
L4_23, L4_24, L4_25, L4_26, L4_27; // Layer 4
double L5; // Layer 5

// Parameter Output
double Param1 = 0.8873;
double Param2 = -2.292;
double Param3 = -2.293;
double Param4 = 0.4892;
double Param5 = 1.125;
double Param6 = 1.126;
double Param7 = 0;
double Param8 = 1.125;
double Param9 = 1.125;
double Param10 = 1.125;
double Param11 = -2.292;
double Param12 = -2.29;
double Param13 = 0.422;
double Param14 = 1.125;

```

```

double Param15 = 1.122;
double Param16 = 0;
double Param17 = 1.125;
double Param18 = 1.127;
double Param19 = 0.8693;
double Param20 = -0.7759;
double Param21 = -0.8857;
double Param22 = 0.5205;
double Param23 = -1.355;
double Param24 = -1.175;
double Param25 = 0;
double Param26 = 0;
double Param27 = 0;

/*****
ANFIS Controller
*****/

///Input Rules FIS Properties

void mL1_1 () {
    if (Jarak1 <= Dekat1[1])
    {
        L1_1 = 1;
    }
    else if (Jarak1 >= Dekat1[1] && Jarak1 <= Dekat1[2])
    {
        L1_1 = (Dekat1[2] - Jarak1) / (Dekat1[2] -
Dekat1[1]);
    }
    else if (Jarak1 >= Dekat1[2])
    {
        L1_1 = 0;
    }
}

```

```

void mL1_2 () {
    if (Jarak1 <= Sedang1[0])
    {
        L1_2 = 0;
    }
    else if (Jarak1 >= Sedang1[0]&&Jarak1 <=
Sedang1[1])
    {
        L1_2 = (Jarak1 - Sedang1[0])/(Sedang1[1] -
Sedang1[0]);
    }
    else if (Jarak1 == Sedang1[1])
    {
        L1_2 = 1;
    }
    else if (Jarak1 >= Sedang1[1]&&Jarak1 <=
Sedang1[2])
    {
        L1_2 = (Sedang1[2]-Jarak1)/(Sedang1[2] -
Sedang1[1]);
    }
    else if (Jarak1 >= Sedang1[2])
    {
        L1_2 = 0;
    }
}

void mL1_3 () {
    if (Jarak1 <= Jauh1[0])
    {
        L1_3 = 0;
    }
    else if (Jarak1 >= Jauh1[0] && Jarak1 <= Jauh1[1])
    {
        L1_3 = (Jarak1 - Jauh1[0]) / (Jauh1[1] -
Jauh1[0]);
    }
    else if (Jarak1 >= Jauh1[1])

```

```

    {
        L1_3 = 1;
    }
}

void mL1_4 () {
    if (Jarak2 <= Dekat2[1])
    {
        L1_4 = 1 ;
    }
    else if (Jarak2 >= Dekat2[1] && Jarak2 <=
Dekat2[2])
    {
        L1_4 = (Dekat2[2] - Jarak2) / (Dekat2[2] -
Dekat2[1]);
    }
    else if (Jarak2 >= Dekat2[2])
    {
        L1_4 = 0;
    }
}

void mL1_5() {
    if (Jarak2 <= Sedang2[0])
    {
        L1_5 = 0;
    }
    else if (Jarak2 >= Sedang2[0] && Jarak2 <=
Sedang2[1])
    {
        L1_5 = (Jarak2 - Sedang2[0]) / (Sedang2[1] -
Sedang2[0]);
    }
    else if (Jarak2 == Sedang2[1])
    {
        L1_5 = 1;
    }
}

```

```

else if (Jarak2 >= Sedang2[1] && Jarak2 <=
Sedang2[2])
{
    L1_5 = (Sedang2[2] - Jarak2)/(Sedang2[2] -
Sedang2[1]);
}
else if (Jarak2 >= Sedang2[2])
{
    L1_5 = 0;
}
}

void mL1_6 () {
    if (Jarak2 <= Jauh2[0])
    {
        L1_6 = 0;
    }
    else if (Jarak2 >= Jauh2[0] && Jarak2 <= Jauh2[1])
    {
        L1_6 = (Jarak2 - Jauh2[0]) / (Jauh2[1] -
Jauh2[0]);
    }
    else if (Jarak2 >= Jauh2[1])
    {
        L1_6 = 1;
    }
}

void mL1_7 () {
    if (Jarak3 <= Dekat3[1])
    {
        L1_7 = 1 ;
    }
    else if (Jarak3 >= Dekat3[1] && Jarak3 <=
Dekat3[2])
    {

```

```

        L1_7 = (Dekat3[2] - Jarak3)/(Dekat3[2] -
Dekat3[1]);
    }
    else if (Jarak3 >= Dekat3[2])
    {
        L1_7 = 0;
    }
}

void mL1_8 () {
    if (Jarak3 <= Sedang3[0])
    {
        L1_8 = 0;
    }
    else if (Jarak3 >= Sedang3[0] && Jarak3 <=
Sedang3[1])
    {
        L1_8 = (Jarak3 - Sedang3[0]) / (Sedang3[1] -
Sedang3[0]);
    }
    else if (Jarak3 == Sedang3[1])
    {
        L1_8 = 1;
    }
    else if (Jarak3 >= Sedang3[1] && Jarak3 <=
Sedang3[2])
    {
        L1_8 = (Sedang3[2] - Jarak3)/(Sedang3[2] -
Sedang3[1]);
    }
    else if (Jarak3 >= Sedang3[2])
    {
        L1_8 = 0;
    }
}
}

```



```

void mL1_9 () {
    if (Jarak3 <= Jauh3[0])
    {
        L1_9 = 0;
    }
    else if (Jarak3 >= Jauh3[0] && Jarak3 <= Jauh3[1])
    {
        L1_9 = (Jarak3 - Jauh3[0]) / (Jauh3[1] -
Jauh3[0]);
    }
    else if (Jarak3 >= Jauh3[1])
    {
        L1_9 = 1;
    }
}

/// Perhitungan ANFIS dari Layer 1 - Layer 5

// Layer 1
void Layer1() {
    mL1_1();
    mL1_2();
    mL1_3();
    mL1_4();
    mL1_5();
    mL1_6();
    mL1_7();
    mL1_8();
    mL1_9();
}

// Layer 02
void Layer2() {
    Layer1();
}

```

```

L2_1 = min (L1_1, min (L1_4, L1_7));
L2_2 = min (L1_1, min (L1_4, L1_8));
L2_3 = min (L1_1, min (L1_4, L1_9));
L2_4 = min (L1_1, min (L1_5, L1_7));
L2_5 = min (L1_1, min (L1_5, L1_8));
L2_6 = min (L1_1, min (L1_5, L1_9));
L2_7 = min (L1_1, min (L1_6, L1_7));
L2_8 = min (L1_1, min (L1_6, L1_8));
L2_9 = min (L1_1, min (L1_6, L1_9));
L2_10 = min (L1_2, min (L1_4, L1_7));
L2_11 = min (L1_2, min (L1_4, L1_8));
L2_12 = min (L1_2, min (L1_4, L1_9));
L2_13 = min (L1_2, min (L1_5, L1_7));
L2_14 = min (L1_2, min (L1_5, L1_8));
L2_15 = min (L1_2, min (L1_5, L1_9));
L2_16 = min (L1_2, min (L1_6, L1_7));
L2_17 = min (L1_2, min (L1_6, L1_8));
L2_18 = min (L1_2, min (L1_6, L1_9));
L2_19 = min (L1_3, min (L1_4, L1_7));
L2_20 = min (L1_3, min (L1_4, L1_8));
L2_21 = min (L1_3, min (L1_4, L1_9));
L2_22 = min (L1_3, min (L1_5, L1_7));
L2_23 = min (L1_3, min (L1_5, L1_8));
L2_24 = min (L1_3, min (L1_5, L1_9));
L2_25 = min (L1_3, min (L1_6, L1_7));
L2_26 = min (L1_3, min (L1_6, L1_8));
L2_27 = min (L1_3, min (L1_6, L1_9));

```

```

// L2_1 = (L1_1*L1_4*L1_7);
// L2_2 = (L1_1*L1_4* L1_8);
// L2_3 = (L1_1*L1_4* L1_9);
// L2_4 = (L1_1*L1_5* L1_7);
// L2_5 = (L1_1*L1_5* L1_8);
// L2_6 = (L1_1*L1_5* L1_9);
// L2_7 = (L1_1*L1_6* L1_7);
// L2_8 = (L1_1*L1_6* L1_8);
// L2_9 = (L1_1*L1_6* L1_9);

```

```

// L2_10 = (L1_2*L1_4* L1_7);
// L2_11 = (L1_2*L1_4* L1_8);
// L2_12 = (L1_2*L1_4* L1_9);
// L2_13 = (L1_2*L1_5* L1_7);
// L2_14 = (L1_2*L1_5* L1_8);
// L2_15 = (L1_2*L1_5* L1_9);
// L2_16 = (L1_2*L1_6* L1_7);
// L2_17 = (L1_2*L1_6* L1_8);
// L2_18 = (L1_2*L1_6* L1_9);
// L2_19 = (L1_3*L1_4* L1_7);
// L2_20 = (L1_3*L1_4* L1_8);
// L2_21 = (L1_3*L1_4* L1_9);
// L2_22 = (L1_3*L1_5*L1_7);
// L2_23 = (L1_3*L1_5*L1_8);
// L2_24 = (L1_3, L1_5*L1_9);
// L2_25 = (L1_3*L1_6*L1_7);
// L2_26 = (L1_3 *L1_6*L1_8);
// L2_27 = (L1_3*L1_6*L1_9);
L2 = L2_1 + L2_2 + L2_3 + L2_4 + L2_5 + L2_6 + L2_7
+ L2_8 + L2_9 + L2_10 + L2_11 + L2_12 + L2_13 + L2_14
+ L2_15 + L2_16 + L2_17 + L2_18 + L2_19 + L2_20 +
L2_21 + L2_22 + L2_23 + L2_24 + L2_25 + L2_26 +
L2_27;
}
// Layer 3
void Layer3() {
    Layer2();

    L3_1 = L2_1 / L2;
    L3_2 = L2_2 / L2;
    L3_3 = L2_3 / L2;
    L3_4 = L2_4 / L2;
    L3_5 = L2_5 / L2;
    L3_6 = L2_6 / L2;
    L3_7 = L2_7 / L2;
    L3_8 = L2_8 / L2;

```

```
L3_9 = L2_9 / L2;  
L3_10 = L2_10 / L2;  
L3_11 = L2_11 / L2;  
L3_12 = L2_12 / L2;  
L3_13 = L2_13 / L2;  
L3_14 = L2_14 / L2;  
L3_15 = L2_15 / L2;  
L3_16 = L2_16 / L2;  
L3_17 = L2_17 / L2;  
L3_18 = L2_18 / L2;  
L3_19 = L2_19 / L2;  
L3_20 = L2_20 / L2;  
L3_21 = L2_21 / L2;  
L3_22 = L2_22 / L2;  
L3_23 = L2_23 / L2;  
L3_24 = L2_24 / L2;  
L3_25 = L2_25 / L2;  
L3_26 = L2_26 / L2;  
L3_27 = L2_27 / L2;  
}  
  
// Layer 4  
void Layer4() {  
    Layer3();  
    L4_1 = L3_1 * Param1;  
    L4_2 = L3_2 * Param2;  
    L4_3 = L3_3 * Param3;  
    L4_4 = L3_4 * Param4;  
    L4_5 = L3_5 * Param5;  
    L4_6 = L3_6 * Param6;  
    L4_7 = L3_7 * Param7;  
    L4_8 = L3_8 * Param8;  
    L4_9 = L3_9 * Param9;  
    L4_10 = L3_10 * Param10;  
    L4_11 = L3_11 * Param11;  
    L4_12 = L3_12 * Param12;  
}
```



```

L4_13 = L3_13 * Param13;
L4_14 = L3_14 * Param14;
L4_15 = L3_15 * Param15;
L4_16 = L3_16 * Param16;
L4_17 = L3_17 * Param17;
L4_18 = L3_18 * Param18;
L4_19 = L3_19 * Param19;
L4_20 = L3_20 * Param20;
L4_21 = L3_21 * Param21;
L4_22 = L3_22 * Param22;
L4_23 = L3_23 * Param23;
L4_24 = L3_24 * Param24;
L4_25 = L3_25 * Param25;
L4_26 = L3_26 * Param26;
L4_27 = L3_27 * Param27;
}

// Layer 5
void Layer5() {
    Jarak();
    Layer4();

L5 = L4_1 + L4_2 + L4_3 + L4_4 + L4_5 + L4_6 + L4_7
+ L4_8 + L4_9 + L4_10 + L4_11 + L4_12 + L4_13 + L4_14
+ L4_15 + L4_16 + L4_17 + L4_18 + L4_19 + L4_20 +
L4_21 + L4_22 + L4_23 + L4_24 + L4_25 + L4_26 +
L4_27;
}

void MobilMaju() {
    //Roda Kanan Putaran Maju
    digitalWrite(in1, HIGH);
    digitalWrite(in2, LOW);
    analogWrite(enA, 125); //RODA KIRI

    //Roda Kiri Puataran Maju
    digitalWrite(in3, HIGH);

```

```

    digitalWrite(in4, LOW);
    analogWrite(enB, 150); //RODA KANAN
}

void BelokKiri() {
    //Roda Kanan Putaran Maju
    digitalWrite(in1, HIGH);
    digitalWrite(in2, LOW);
    analogWrite(enA, 110); //RODA KIRI

    //Roda Kiri Puataran Maju
    digitalWrite(in3, HIGH);
    digitalWrite(in4, LOW);
    analogWrite(enB, 130); //RODA KANAN
}

void BelokKanan() {
    //Roda Kanan Putaran Maju
    digitalWrite(in1, LOW);
    digitalWrite(in2, LOW);
    analogWrite(enA, 155); //RODA KIRI

    //Roda Kiri Puataran Maju
    digitalWrite(in3, HIGH);
    digitalWrite(in4, LOW);
    analogWrite(enB, 100); //RODA KANAN
}

int Pembulatan, Kondisi;
void ANFIS() {
    Layer5();
    Jarak ();
    Serial.print("L5 = ");
    Serial.println(L5);
    Denormalisasi = (L5 * STDevOut) + MeanOut ;
//Denormalisasi Hasil L5
    Serial.print("Denormalisasi = ");

```

```

Serial.println(Denormalisasi);
Pembulatan = round(Denormalisasi);
//Pembulatan Hasil Denormalisasi
Serial.print("Pembulatan (Round) = ");
Serial.println(Pembulatan);
Kondisi = constrain(Pembulatan, 0, 2);
//Constrain Pembulatan
Serial.print("Kondisi (Constrain) = ");
Serial.println(Kondisi);
//Kondisi Logika yang Dihasilkan
}

void Keputusan() {
  ANFIS();
  if (Kondisi == 0) {
    MobilMaju();
    Serial.println("Keputusan = 0 Maju");
//Keputusan 0 Maju/Lurus
  }
  else if (Kondisi == 2) {
    BelokKanan();
    Serial.println("Keputusan = 2 Belok Kanan");
//Keputusan 2 Belok Kanan
  }
  else if (Kondisi == 1) {
    BelokKiri();
    Serial.println("Keputusan = 1 Belok Kiri");
//Keputusan 1 Belok Kiri
  }
}

void loop() {
  Serial.print("Sensor 1= ");
  Serial.println(Sensor1);
  Serial.print("Sensor 2 = ");
  Serial.println(Sensor2);
  Serial.print("Sensor 3 = ");
  Serial.println(Sensor3);
}

```

```
    Serial.print("Jarak 1= ");  
    Serial.println(Jarak1);  
    Serial.print("Jarak 2 = ");  
    Serial.println(Jarak2);  
    Serial.print("Jarak 3 = ");  
    Serial.println(Jarak3);  
  
    Keputusan();  
    delay(200);  
}
```

