

**APPENDIX A**  
Experimental Results for Nanorobot Swarm System

**Table A.1** The accuracy results for the case of varying the perception range of nanorobots with random movement

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
1.875	0.7063	0.0860	0.0136	0.7337	0.0170
3.75	0.6809	0.0747	0.0118	0.6995	0.0148
7.5	0.7044	0.0823	0.0130	0.7148	0.0163
15	0.6490	0.1101	0.0174	0.6373	0.0218
30	0.6519	0.0958	0.0152	0.6453	0.0190

**Table A.2** The accuracy results for the case of varying the perception range of nanorobots with PSO1

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
1.875	0.7141	0.0925	0.0146	0.7423	0.0183
3.75	0.7224	0.0838	0.0132	0.7472	0.0166
7.5	0.6996	0.0791	0.0125	0.6937	0.0157
15	0.6908	0.1582	0.0250	0.7427	0.0313
30	0.6387	0.2546	0.0402	0.7287	0.0504

**Table A.3** The accuracy results for the case of varying the perception range of nanorobots with PSO2

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
1.875	0.7156	0.0885	0.0140	0.7428	0.0175
3.75	0.7166	0.0772	0.0122	0.7150	0.0153
7.5	0.7323	0.0748	0.0118	0.7537	0.0148
15	0.7154	0.1787	0.0283	0.7590	0.0354
30	0.5749	0.3225	0.0510	0.7440	0.0639

**Table A.4** The accuracy results for the case of varying the maximum velocity of nanorobots with random movement

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
3.75	0.0855	0.0669	0.0106	0.0760	0.0133
7.5	0.4314	0.1378	0.0218	0.4615	0.0273
15	0.7044	0.0823	0.0130	0.7148	0.0163
30	0.6961	0.0886	0.0140	0.7228	0.0175
60	0.6872	0.1033	0.0163	0.7153	0.0205

**Table A.5** The accuracy results for the case of varying the maximum velocity of nanorobots with PSO1

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
3.75	0.2684	0.3261	0.0516	0.0000	0.0646
7.5	0.6779	0.1675	0.0265	0.7473	0.0332
15	0.6996	0.0791	0.0125	0.6937	0.0157
30	0.7235	0.0865	0.0137	0.7437	0.0171
60	0.7233	0.0719	0.0114	0.7477	0.0143

**Table A.6** The accuracy results for the case of varying the maximum velocity of nanorobots with PSO2

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
3.75	0.2596	0.3165	0.0500	0.0000	0.0627
7.5	0.6631	0.1852	0.0293	0.7403	0.0367
15	0.7323	0.0748	0.0118	0.7537	0.0148
30	0.7008	0.0839	0.0133	0.7240	0.0166
60	0.7388	0.0915	0.0145	0.8003	0.0181

**Table A.7** The accuracy results for the case of varying the nanorobot execution time of nanorobots with random movement

<b>NRTIME</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
0.001	0.7142	0.0847	0.0134	0.7173	0.0168
0.002	0.7070	0.0950	0.0150	0.7383	0.0188
0.01	0.7044	0.0823	0.0130	0.7148	0.0163

**Table A.8** The accuracy results for the case of varying the nanorobot execution time of nanorobots with PSO1

<b>NRTime</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
0.001	0.7281	0.0627	0.0099	0.7478	0.0124
0.002	0.7249	0.0856	0.0135	0.7393	0.0170
0.01	0.6996	0.0791	0.0125	0.6937	0.0157

**Table A.9** The accuracy results for the case of varying the nanorobot execution time of nanorobots with PSO2

<b>NRTime</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>	<b>Standard Error of Median</b>
0.001	0.7179	0.0800	0.0127	0.7345	0.0159
0.002	0.7447	0.0615	0.0097	0.7673	0.0122
0.01	0.7323	0.0748	0.0118	0.7537	0.0148

**Table A.10** The speed results for the case of varying the perception range of nanorobots with random movement

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
1.875	9565.53	1077.46	170.36	10000.00
3.75	9914.78	312.36	49.39	10000.00
7.5	9709.15	663.75	104.95	10000.00
15	9665.23	1096.05	173.30	10000.00
30	9659.23	1062.15	167.94	10000.00

**Table A.11** The speed results for the case of varying the perception range of nanorobots with PSO1

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
1.875	7785.70	3887.97	614.74	10000.00
3.75	7084.83	3787.85	598.91	10000.00
7.5	8365.63	3123.18	493.82	10000.00
15	7382.30	4126.13	652.40	10000.00
30	7570.30	4051.49	640.60	10000.00

**Table A.12** The speed results for the case of varying the perception range of nanorobots with PSO2

<b>Prange (<math>\mu\text{m}</math>)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
1.875	7287.18	3987.53	630.48	10000.00
3.75	8115.83	3278.14	518.32	10000.00
7.5	7494.90	3773.90	596.71	10000.00
15	5776.45	4517.06	714.21	10000.00
30	7168.35	4121.16	651.61	10000.00

**Table A.13** The speed results for the case of varying the maximum velocity of nanorobots with random movement

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
3.75	10000.00	0.00	0.00	10000.00
7.5	10000.00	0.00	0.00	10000.00
15	9709.15	663.75	104.95	10000.00
30	8911.15	2422.66	383.06	10000.00
60	7948.48	3214.27	508.22	10000.00

**Table A.14** The speed results for the case of varying the maximum velocity of nanorobots with PSO1

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
3.75	9583.05	1452.24	229.62	10000.00
7.5	8300.33	2663.37	421.12	10000.00
15	8365.63	3123.18	493.82	10000.00
30	7385.30	3884.17	614.14	10000.00
60	8275.23	3249.03	513.72	10000.00

**Table A.15** The speed results for the case of varying the maximum velocity of nanorobots with PSO2

<b>VMax (mm/s)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
3.75	9844.83	733.84	116.03	10000.00
7.5	7399.28	3543.10	560.21	10000.00
15	7494.90	3773.90	596.71	10000.00
30	8626.75	3135.42	495.75	10000.00
60	5509.85	4206.30	665.07	3975.00

**Table A.16** The speed results for the case of varying the nanorobot execution time of nanorobots with random movement

<b>NRTime</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
0.001	7336.63	4066.34	642.94	10000.00
0.002	8219.38	3402.51	537.98	10000.00
0.01	9709.15	663.75	104.95	10000.00

**Table A.17** The speed results for the case of varying the nanorobot execution time of nanorobots with PSO1

<b>NRTime</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
0.001	8233.20	3700.12	585.04	10000.00
0.002	6290.25	4658.45	736.56	10000.00
0.01	8365.63	3123.18	493.82	10000.00

**Table A.18** The speed results for the case of varying the nanorobot execution time of nanorobots with PSO2

<b>NRTime</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Standard Error of Mean</b>	<b>Median</b>
0.001	7565.68	4271.58	675.40	10000.00
0.002	6787.05	4450.68	703.71	10000.00
0.01	7494.90	3773.90	596.71	10000.00