

ARAFL-BAD Adversarial Resilient Asynchronous Federated Learning Framework for Zero-Day IoT Botnet Attack Detection

January 2025

1 results

Table 1: results

Attack	Performance						Metric (%)												F1 Score (%)						
	Accuracy (%)						Precision (%)						Sensitivity (%)						F1 Score (%)						
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	
benign	99.84	100	99.98	99.98	99.79	98.65	99.99	99.81	100	99.96	99.98	99.92	99.84	100	99.98	99.98	99.79	98.65	99.91	99.90	99.99	99.97	99.88	99.28	
g.combo	99.97	41.31	99.99	99.93	99.97	99.94	99.93	99.95	99.90	99.49	99.80	99.91	99.97	41.31	99.99	99.93	99.97	99.94	99.95	58.46	99.94	99.99	99.71	99.89	99.93
g.junk	99.78	99.92	99.77	98.96	99.81	99.81	100	49.33	100	99.82	99.95	99.96	99.78	99.92	99.77	98.96	99.81	99.81	99.89	66.05	99.89	99.39	99.88	99.89	
g.scan	99.97	99.98	99.78	99.93	99.75	99.96	99.60	99.91	99.89	99.91	99.96	99.77	99.97	99.98	99.78	99.93	99.75	99.96	99.78	99.95	99.84	99.92	99.86	99.87	
g.fcnp	99.99	94.03	99.98	99.96	99.19	99.68	99.64	99.99	65.18	83.95	99.98	99.98	99.99	94.03	99.98	99.96	99.19	99.68	99.82	96.92	78.92	91.26	99.58	99.83	
g.udp	99.67	100	53.30	80.78	99.99	99.98	100	94.88	99.98	99.99	99.32	99.75	99.67	100	53.30	80.78	99.99	99.98	99.83	97.37	69.54	89.36	99.65	99.86	
m.ack	100	100	100	99.98	99.93	100	100	100	99.97	46.13	99.97	99.99	100	100	100	99.98	99.93	100	100	100	99.99	63.13	99.95	100	
m.scan	100	99.97	100	100	72.14	99.99	100	99.99	100	100	99.69	99.97	100	99.97	100	100	72.14	99.99	100	99.98	100	100	83.71	99.98	
m.syn	100	100	100	99.99	99.90	100	100	100	100	99.98	69.51	100	100	100	100	99.99	99.90	100	100	100	99.99	81.98	100	100	
m.udp	100	100	100	44.69	99.98	99.99	99.99	100	100	100	99.99	100	100	100	100	44.69	99.98	99.99	100	100	100	61.77	99.99	100	
m.udpplain	100	100	100	99.99	99.99	100	100	99.99	100	78.25	99.97	99.26	100	100	100	99.99	99.99	100	100	100	100	87.79	99.98	99.63	
Overall	99.95	95.59	95.49	87.10	96.62	99.88	99.92	94.90	96.81	91.59	97.10	99.86	99.93	94.11	95.71	93.11	97.31	99.82	99.93	92.60	95.28	90.21	96.76	99.84	

Table 2: ad result 1

Adversarial Attacks \ ASR (%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	1.80	8.18	7.88	23.57	13.29	7.05	10.30
BIM	1.80	8.18	8.06	23.94	14.41	8.25	10.78
PGD	1.58	7.98	7.62	22.69	12.48	6.06	9.73
Deep Fool	1.69	7.55	5.36	17.43	5.58	2.02	6.61

Table 3: result 2

Performance	Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	99.73	100	99.25	99.83	99.77	95.70	100	99.89	100	99.90	99.97	99.89	99.73	100	99.25	99.83	99.77	95.70	99.86	99.94	99.62	99.86	99.87	97.75
benign	99.90	99.87	96.17	99.93	99.98	99.80	99.93	99.99	99.17	99.10	99.69	99.95	99.90	99.87	96.17	99.93	99.98	99.80	99.92	99.93	97.65	99.51	99.84	99.88
g_combo	99.91	99.95	98.01	97.59	99.78	99.65	99.86	99.80	92.63	99.41	99.83	99.67	99.91	99.95	98.01	97.59	99.78	99.65	99.89	99.88	95.24	98.49	99.80	99.66
g_junk	99.92	99.96	98.89	98.94	99.42	98.60	99.55	99.93	99.83	99.93	99.98	99.60	99.92	99.96	98.89	98.94	99.42	98.60	99.73	99.95	99.37	99.43	99.70	99.10
g_scan	99.99	99.99	99.95	99.98	99.07	99.63	99.06	94.06	98.88	99.04	99.98	99.80	99.99	99.99	99.95	99.98	99.07	99.63	99.52	96.94	99.41	99.51	99.52	99.71
g_tcp	99.16	94.28	99.57	99.04	99.99	99.98	100	99.99	99.58	99.71	99.21	99.28	99.16	94.28	99.57	99.04	99.99	99.98	99.58	97.06	99.57	99.38	99.60	99.63
g_udp	100	100	99.79	99.27	99.80	100	100	100	99.99	99.78	99.97	99.99	100	100	99.79	99.27	99.80	100	100	100	99.89	99.53	99.89	100
m_ack	100	99.99	100	99.15	76.58	99.96	99.99	99.97	99.99	97.27	99.68	99.82	100	99.99	100	99.15	76.58	99.96	99.99	99.98	99.99	98.20	86.62	99.89
m_scan	100	100	100	95.99	99.89	99.95	100	100	99.99	98.65	73.04	100	100	100	100	95.99	99.89	99.95	100	100	99.99	97.30	84.38	99.97
m_syn	100	99.98	99.11	99.91	99.98	99.83	99.99	99.99	99.62	99.47	99.95	100	100	99.98	99.11	99.91	99.98	99.83	99.99	99.99	99.37	99.69	99.97	99.92
m_udp	100	99.98	99.99	99.28	99.99	100	100	99.99	97.60	99.94	99.96	97.52	100	99.98	99.99	99.28	99.99	100	100	99.99	98.78	99.61	99.98	98.74
m_udpplain	99.89	99.27	99.36	99.19	97.10	99.62	99.85	99.42	98.85	99.29	97.39	99.59	99.87	99.46	99.16	98.99	97.66	99.37	99.86	99.42	98.99	99.14	97.20	99.48
Overall																								

Table 4: ad result 2

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	1.93	4.96	18.25	18.35	12.64	14.26	11.73
BIM	2.05	5.02	19.90	20.39	13.52	16.35	12.87
PGD	1.68	4.17	16.89	17.94	11.67	13.46	10.97
Deep Fool	1.69	1.84	3.32	3.37	5.10	2.47	2.96

Table 5: result 3

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.56	100	99.22	99.86	99.63	95.74	99.84	98.31	100	99.91	99.98	99.88	99.56	100	99.22	99.86	99.63	95.74	99.70	99.15	99.61	99.89	99.81	97.76						
g-combo	99.42	99.97	96.86	99.92	99.68	99.68	99.92	99.87	93.88	99.69	98.71	99.95	99.42	99.97	96.86	99.92	99.97	99.68	99.67	99.92	97.99	99.80	99.34	99.82						
g-junk	96.87	99.22	97.90	98.88	98.14	99.21	99.82	99.97	93.88	98.66	99.03	99.44	96.87	99.22	97.90	98.88	98.14	99.21	98.32	99.59	95.85	98.77	98.58	99.33						
g-scan	99.60	99.85	99.71	98.16	98.29	98.56	99.85	99.91	99.86	99.95	99.98	99.60	99.60	99.85	99.71	98.16	98.29	98.56	99.72	99.88	99.78	99.04	99.13	99.08						
g-fcp	99.56	99.34	99.95	99.90	100	99.97	99.66	99.96	93.76	99.98	97.08	99.49	99.56	99.34	99.95	99.90	100	99.97	99.61	99.65	96.76	99.94	98.52	99.73						
g-udp	99.97	99.99	94.79	99.99	97.43	99.69	98.82	99.25	99.78	99.66	99.99	99.44	99.97	99.99	94.79	99.99	97.43	99.69	99.39	99.61	97.22	99.82	98.70	99.57						
m-ack	100	100	98.79	98.57	99.91	99.99	99.79	100	99.98	99.95	99.50	99.99	100	100	98.79	98.57	99.91	99.99	99.89	100	99.38	99.26	99.71	99.99						
m-scan	100	99.99	100	98.55	92.84	99.95	99.97	100	99.98	97.64	99.17	99.80	100	99.99	100	98.55	92.84	99.95	99.99	99.99	99.99	98.09	95.90	99.87						
m-syn	99.99	100	100	96.57	99.27	99.95	99.99	100	99.99	97.80	89.74	100	99.99	100	100	96.57	99.27	99.95	99.99	100	100	97.18	94.27	99.97						
m-udp	99.96	99.84	99.77	99.97	99.81	99.72	100	100	99.20	99.35	99.98	100	99.96	99.84	99.77	99.97	99.81	99.72	99.98	99.92	99.49	99.66	99.90	99.86						
m-udpplain	100	100	99.99	99.71	99.99	100	99.90	99.99	99.34	99.93	99.97	97.31	100	100	99.99	99.71	99.99	100	99.95	100	99.66	99.82	99.98	98.64						
Overall	99.79	99.86	99.00	99.29	98.58	99.58	99.78	99.75	98.63	99.32	98.47	99.54	99.54	99.84	98.82	99.10	98.66	99.31	99.66	99.79	98.70	99.21	98.53	99.42						

Table 6: ad result 3

ASR Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	8.81	10.51	21.13	17.84	16.29	15.24	14.97
BIM	11.41	11.32	22.56	19.85	17.11	17.28	16.59
PGD	8.69	10.00	19.18	17.38	14.01	13.93	13.87
DeepFool	2.03	2.42	3.26	4.01	3.68	2.81	3.03

Table 7: result 4

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	98.96	100	99.99	99.98	99.80	96.52	99.97	99.89	100	99.97	99.93	99.86	98.96	100	99.99	99.98	99.80	96.52	99.46	99.94	100	99.97	99.87	98.16						
g-combo	99.87	99.81	99.83	99.91	99.70	99.98	99.92	100	99.87	99.99	99.57	99.83	99.87	99.81	99.83	99.91	99.70	99.98	99.90	99.91	99.85	99.95	99.64	99.90						
g-junk	99.02	99.97	99.82	99.98	99.24	99.21	99.79	99.74	99.67	99.84	99.06	99.98	99.02	99.97	99.82	99.98	99.24	99.21	99.40	99.85	99.74	99.91	99.15	99.60						
g_scan	95.01	99.98	96.63	99.93	99.21	99.80	99.28	99.89	99.80	99.93	99.91	99.61	95.01	99.98	96.63	99.93	99.21	99.89	97.10	99.94	98.19	99.93	99.56	99.75						
g_tcp	99.98	99.98	99.97	82.10	99.49	97.30	97.75	99.09	46.46	99.98	99.96	99.84	99.98	99.98	99.97	82.10	99.49	97.30	98.85	99.54	63.43	90.16	99.72	98.55						
g_udp	99.40	99.16	0.00	99.99	99.97	99.95	99.76	100	0.00	84.77	99.57	89.26	99.40	99.16	0.00	99.99	99.97	99.95	99.58	99.58	0.00	91.76	99.77	94.30						
m_ack	100	100	100	99.41	99.84	100	99.88	100	99.99	83.63	99.83	99.99	100	100	100	99.41	99.84	100	99.94	100	100	90.84	99.84	100						
m_scan	100	99.99	100	99.99	40.66	99.97	99.84	100	100	100	99.58	99.97	100	99.99	100	99.99	40.66	99.97	99.92	99.99	100	100	57.74	99.97						
m_syn	100	100	100	99.99	99.94	100	99.99	99.99	100	99.99	51.69	99.99	100	100	100	99.99	99.94	100	99.99	99.99	100	99.99	68.14	99.99						
m_udp	100	100	100	92.45	99.93	99.98	100	100	100	99.76	99.99	100	100	100	100	92.45	99.93	99.98	100	100	100	95.97	99.96	99.99						
m_udpplain	100	100	99.99	99.99	99.99	87.69	99.99	100	100	99.90	99.97	98.44	100	100	99.99	99.99	99.99	87.69	100	100	100	99.95	99.98	92.75						
Overall	99.70	99.88	90.27	96.26	92.93	98.38	99.65	99.87	85.98	97.07	95.37	98.80	99.29	99.90	90.57	97.61	94.34	98.23	99.47	99.88	87.38	97.13	93.03	98.45						

Table 8: ad result 4

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	11.80	6.80	12.42	14.37	18.62	13.42	12.91
BIM	12.12	7.53	12.53	15.72	18.95	14.25	13.52
PGD	11.00	5.50	11.97	13.21	16.92	11.37	11.66
Deep Fool	2.07	1.86	9.80	6.16	9.28	3.38	5.43

Table 9: result 5

Attack	Performance						Accuracy						Precision						Sensitivity						F1 Score						
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	
benign	99.33	99.96	99.56	99.85	99.81	95.82	99.96	99.89	100	99.91	99.95	99.87	99.33	99.96	99.56	99.85	99.81	95.82	99.65	99.92	99.78	99.88	99.88	97.80							
g-combo	99.87	99.77	72.64	98.32	99.71	99.60	99.89	100	99.58	96.10	99.62	99.81	99.87	99.77	72.64	98.32	99.71	99.60	99.88	99.89	84.00	97.20	99.67	99.70							
g-junk	99.02	99.97	96.68	91.63	99.35	97.64	99.83	99.75	63.86	93.85	99.24	99.27	99.02	99.97	96.68	91.63	99.35	97.64	99.42	99.86	76.92	92.73	99.30	98.45							
g-scan	94.74	99.98	76.35	96.67	99.37	98.62	99.38	99.87	99.79	99.95	99.89	99.78	94.74	99.98	76.35	96.67	99.37	98.62	97.01	99.93	86.51	98.28	99.63	99.20							
g-tcp	99.97	99.87	99.98	99.98	99.33	78.50	96.62	99.98	58.19	99.60	99.96	99.74	99.97	99.87	99.98	39.80	99.33	78.50	98.27	99.93	73.57	56.87	99.64	87.85							
g-udp	98.37	99.99	39.61	99.95	99.97	99.97	99.76	99.90	88.44	62.27	99.44	83.58	98.37	99.99	39.61	99.95	99.97	99.97	99.06	99.94	54.72	76.73	99.70	91.04							
m-ack	100	100	98.75	94.90	99.90	99.96	99.91	100	99.98	99.99	99.59	99.99	100	100	98.75	94.90	99.90	99.96	100	99.96	100	99.36	97.38	99.74	99.97						
m-scan	100	99.99	100	98.92	49.04	99.92	99.88	99.98	100	96.74	99.61	99.95	100	99.99	100	98.92	49.04	99.92	99.94	99.98	100	97.82	65.72	99.93							
m-syn	99.99	100	99.92	95.15	99.90	99.97	99.98	99.97	100	98.24	55.46	99.99	99.99	100	99.92	95.15	99.90	99.97	99.99	99.99	99.96	96.67	71.33	99.98							
m-udp	100	99.99	98.67	98.78	99.84	99.76	100	100	99.26	98.04	100	99.97	100	99.99	98.67	98.78	99.84	99.76	100	99.99	98.96	98.41	99.92	99.86							
m-udpplain	100	100	100	99.98	99.99	99.99	99.99	99.99	96.56	96.71	99.97	97.80	100	100	100	99.98	99.99	99.99	100	100	98.25	98.32	99.98	98.88							
Overall	99.60	99.96	91.61	90.72	93.88	97.35	99.56	99.94	91.42	94.67	95.70	98.16	99.21	99.96	89.29	92.18	95.11	97.25	99.38	99.95	88.37	91.84	94.05	97.52							

Table 10: ad result 5

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	11.67	9.29	21.51	20.04	17.37	13.38	15.54
BIM	12.16	9.82	21.55	20.26	17.74	14.81	16.06
PGD	10.67	6.63	20.03	18.53	15.98	12.16	14.00
DeepFool	2.05	1.86	11.09	11.79	8.35	4.87	6.67

Table 11: result 6

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.58	100	99.49	99.89	99.71	95.85	99.83	98.17	100	99.90	99.95	99.82	99.58	100	99.49	99.89	99.71	95.85	99.70	99.07	99.74	99.90	99.83	97.79						
g-combo	96.89	99.97	76.23	98.26	99.78	99.32	99.77	99.87	99.42	96.65	96.63	99.66	96.89	99.97	76.23	98.26	99.78	99.32	98.31	99.92	86.29	97.45	98.18	99.49						
g-junk	91.52	98.99	95.73	92.69	93.33	95.89	97.76	99.97	66.95	93.55	96.04	98.69	91.52	98.99	95.73	92.69	93.33	95.89	94.54	99.48	78.80	93.12	94.66	97.27						
g-scan	74.46	97.47	75.77	96.38	96.09	98.51	99.78	99.91	99.79	99.95	99.95	99.85	74.46	97.47	75.77	96.38	96.09	98.51	85.28	98.67	86.14	98.13	97.98	99.18						
g-ftp	83.80	93.63	99.98	38.57	66.63	76.48	91.16	99.22	67.57	99.64	99.96	99.66	83.80	93.63	99.98	38.57	66.63	76.48	87.33	96.35	80.64	55.61	79.96	86.55						
g-udp	99.93	99.99	60.06	99.95	99.98	99.97	85.06	94.34	90.94	61.77	77.83	81.89	99.93	99.99	60.06	99.95	99.98	99.97	91.90	97.08	72.34	76.35	87.52	90.03						
m-ack	100	100	98.82	97.43	99.86	99.80	99.79	100	99.98	99.98	99.52	99.99	100	100	98.82	97.43	99.86	99.80	99.89	100	99.40	98.69	99.69	99.89						
m-scan	99.96	100	99.98	100	97.06	99.91	99.99	100	100	97.06	99.35	99.97	100	99.98	100	96.64	87.13	99.91	99.99	99.99	100	96.85	92.84	99.94						
m-syn	100	100	99.96	95.71	99.47	99.92	99.99	100	100	94.97	83.00	99.99	99.96	100	99.96	95.71	99.47	99.92	99.98	100	99.98	95.34	90.49	99.96						
m-udp	100	99.83	98.92	97.96	99.82	99.88	100	100	99.27	99.00	99.99	99.85	100	99.83	98.92	97.96	99.82	99.88	100	99.92	99.10	98.48	99.90	99.87						
m-udpplain	100	100	100	99.98	99.99	99.99	99.99	99.99	97.18	94.68	99.97	98.40	100	100	100	99.98	99.99	99.99	100	100	98.57	97.26	99.98	99.19						
Overall	97.33	99.12	93.77	90.40	94.44	97.06	97.55	99.22	92.83	94.29	95.65	97.98	95.10	99.08	91.36	92.13	94.71	96.87	96.08	99.13	91.00	91.56	94.64	97.20						

Table 12: ad result 6

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	9.91	10.06	22.44	23.40	15.84	13.11	15.79
BIM	10.94	10.92	22.46	23.55	16.23	14.68	16.46
PGD	9.62	9.38	21.04	21.40	14.52	11.89	14.64
DeepFool	4.79	2.36	8.72	12.20	7.54	5.17	6.80

Table 13: result 7

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6						
benign	99.87	100	99.97	99.95	99.82	99.07	99.96	99.89	100	99.99	99.97	99.92	99.87	100	99.97	99.95	99.82	99.07	99.91	99.94	99.99	99.97	99.90	99.49						
g_combo	99.97	99.63	99.97	99.90	99.99	99.94	99.92	100	99.91	99.99	99.81	99.93	99.97	99.63	99.97	99.90	99.99	99.94	99.94	99.82	99.94	99.95	99.90	99.94						
g_junk	99.85	99.97	99.77	99.95	99.76	99.79	99.91	99.39	99.96	99.90	99.98	99.95	99.85	99.97	99.77	99.95	99.76	99.79	99.88	99.68	99.87	99.93	99.87	99.87						
g_scan	99.88	99.98	99.98	99.97	99.82	99.91	99.78	99.93	99.91	99.86	99.98	99.71	99.88	99.98	99.98	99.97	99.82	99.91	99.83	99.95	99.95	99.91	99.90	99.81						
g_tcp	99.99	99.99	99.98	99.97	99.16	99.49	98.51	99.94	65.76	96.58	99.97	99.97	99.99	99.99	99.98	99.98	99.16	99.49	99.25	99.96	79.34	98.25	99.56	99.73						
g_udp	98.67	99.95	54.45	96.46	99.99	99.97	100	100	99.98	99.99	99.29	99.58	98.67	99.95	54.45	96.46	99.99	99.97	99.33	99.97	70.50	98.19	99.64	99.77						
m_ack	100	100	100	99.98	99.94	100	100	100	99.97	99.76	99.96	99.95	100	100	100	99.98	99.94	100	100	100	99.99	99.87	99.95	100						
m_scan	100	99.99	100	100	57.39	99.98	100	100	100	99.70	99.95	100	99.99	100	100	100	57.39	99.98	100	99.99	100	100	72.85	99.96						
m_syn	100	100	100	100	99.93	99.99	100	100	100	99.94	59.86	99.99	100	100	100	100	99.93	99.99	100	100	99.97	74.87	99.99	99.99						
m_udp	100	100	99.99	99.90	99.98	99.99	99.99	99.99	100	100	100	100	100	100	99.99	99.90	99.98	99.99	100	100	99.95	99.99	99.99	99.99						
m_udpplain	100	100	100	100	99.99	100	100	100	99.98	99.93	99.96	99.50	100	100	100	100	99.99	100	100	100	99.99	99.96	99.98	99.75						
Overall	99.85	99.97	95.60	99.52	94.91	99.88	99.82	99.92	96.86	99.63	96.23	99.86	99.84	99.95	95.83	99.64	95.98	99.83	99.83	99.94	95.41	99.63	95.13	99.85						

Table 14: ad result 7

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	1.72	4.74	8.72	4.60	13.31	5.47	6.43
BIM	1.73	4.78	8.83	4.71	14.16	6.10	6.72
PGD	1.54	4.17	7.62	3.72	12.88	5.19	5.85
Deep Fool	1.67	1.98	5.24	1.93	7.36	2.00	3.36

Table 15: result 8

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.79	100	99.22	99.84	99.82	97.01	99.94	99.89	100	99.90	99.97	99.90	99.90	99.79	100	99.22	99.84	99.82	97.01	99.86	99.94	99.61	99.87	99.90	98.43					
g-combo	99.95	79.20	94.45	99.93	99.97	99.80	99.92	99.95	99.42	99.59	99.65	99.94	99.95	79.20	94.45	99.93	99.97	99.80	99.93	98.38	96.87	99.76	99.81	99.87						
g-junk	99.88	99.90	98.54	98.75	99.81	99.86	99.86	73.33	89.68	99.46	99.45	99.67	99.88	99.90	98.54	98.75	99.81	99.86	99.87	84.58	93.90	99.11	99.63	99.76						
g-scan	99.88	99.98	98.26	98.96	98.86	98.83	99.70	99.93	99.85	99.91	99.96	99.58	99.88	99.98	98.26	98.96	98.86	98.83	99.79	99.95	99.05	99.43	99.41	99.21						
g-tcp	99.18	99.99	99.95	98.83	100	99.61	99.98	95.75	98.42	99.98	97.59	99.95	99.18	99.99	99.95	98.83	100	99.61	99.58	97.82	99.18	99.40	98.78	99.78						
g-udp	99.96	95.98	99.20	99.99	97.90	99.98	99.29	100	99.42	98.63	99.98	99.39	99.96	95.98	99.20	99.99	97.90	99.98	99.62	97.95	99.31	99.30	98.93	99.69						
m-ack	100	100	99.85	98.93	99.93	100	100	100	99.99	99.97	99.91	99.99	100	100	99.85	98.93	99.93	100	100	100	99.92	99.45	99.92	100						
m-scan	100	99.99	100	97.32	85.12	99.97	100	100	99.99	97.75	99.58	99.83	100	99.99	100	97.32	85.12	99.97	100	99.99	99.99	97.54	91.78	99.90						
m-syn	99.99	100	100	96.78	99.73	99.95	100	100	99.99	96.03	81.01	100	99.99	100	100	96.78	99.73	99.95	100	100	100	96.41	89.40	99.97						
m-udp	100	99.99	99.38	99.98	99.96	99.88	99.98	99.99	99.65	99.46	100	100	100	99.99	99.38	99.98	99.96	99.88	99.99	99.99	99.51	99.72	99.98	99.94						
m-udpplain	100	99.99	100	99.60	99.99	100	100	99.99	98.28	99.94	99.97	98.20	100	99.99	100	99.60	99.99	100	100	99.99	99.13	99.77	99.98	99.09						
Overall	99.90	98.17	99.28	99.07	97.91	99.71	99.88	97.17	98.61	99.15	97.92	99.68	99.87	97.73	98.99	98.99	98.28	99.54	99.88	97.15	98.77	99.07	97.96	99.60						

Table 16: ad result 8

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	2.07	8.05	17.55	18.89	11.31	13.99	11.98
BIM	2.09	8.08	18.68	20.72	12.32	15.60	12.91
PGD	1.84	6.85	15.35	18.19	10.24	13.09	10.93
Deep Fool	1.69	4.53	3.25	3.57	4.05	2.31	3.23

Table 17: result 9

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.57	100	99.21	99.83	99.20	96.57	99.81	98.31	100	99.89	99.98	99.89	99.57	100	99.21	99.83	99.20	96.57	99.69	99.15	99.60	99.86	99.59	98.20						
g-combo	99.77	99.97	94.97	99.93	99.97	99.77	99.92	99.87	99.51	99.80	99.14	99.95	99.77	99.97	94.97	99.93	99.97	99.77	99.85	99.92	97.19	99.86	99.55	99.86						
g-junk	98.28	99.42	98.69	98.85	99.12	99.65	99.83	99.97	90.56	99.33	98.82	99.62	98.28	99.42	98.69	98.85	99.12	99.65	99.05	99.69	94.46	99.09	98.97	99.63						
g-scan	99.56	99.96	97.70	98.84	97.92	98.60	99.88	99.91	99.85	99.93	99.98	99.51	99.56	99.96	97.70	98.84	97.92	98.60	99.72	99.94	98.77	99.38	98.94	99.05						
g-icmp	99.98	98.87	99.95	99.50	100	99.97	99.27	99.99	94.49	99.98	98.61	99.15	99.98	98.87	99.95	99.50	100	99.97	99.62	99.43	97.14	99.74	99.30	99.56						
g-udp	99.42	99.99	95.50	99.99	98.80	99.32	99.56	98.88	99.23	99.19	99.99	99.57	99.42	99.99	95.50	99.99	98.80	99.32	99.49	99.43	97.33	99.59	99.39	99.44						
m-ack	100	100	97.02	99.17	99.76	100	99.79	100	99.98	99.93	99.74	99.99	100	100	97.02	99.17	99.76	100	99.89	100	98.48	99.55	99.75	100						
m-scan	100	99.99	100	99.23	93.91	99.96	99.93	100	99.99	97.35	98.71	99.84	100	99.99	100	99.23	93.91	99.96	99.97	99.99	99.99	98.28	96.25	99.90						
m-syn	99.95	100	100	96.11	99.25	99.95	99.99	100	99.99	98.77	91.13	99.98	99.95	100	100	96.11	99.25	99.95	99.97	100	99.99	97.42	95.02	99.97						
m-udp	100	99.84	99.54	99.96	99.90	99.90	100	100	98.47	99.58	99.93	100	100	99.84	99.54	99.96	99.90	99.90	100	99.92	99.00	99.77	99.91	99.95						
m-udpplain	100	100	99.99	99.69	99.99	100	99.99	99.99	98.71	99.93	99.97	98.05	100	100	99.99	99.69	99.99	100	100	100	99.35	99.81	99.98	99.01						
Overall	99.84	99.82	98.74	99.34	98.85	99.63	99.82	99.72	98.25	99.42	98.73	99.60	99.68	99.82	98.42	99.19	98.89	99.42	99.75	99.77	98.30	99.30	98.79	99.51						

Table 18: ad result 9

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	8.66	10.53	20.67	17.39	16.15	15.24	14.77
BIM	11.07	11.29	21.99	19.43	16.94	17.07	16.30
PGD	8.14	10.11	18.23	17.05	14.51	14.45	13.75
Deep Fool	1.94	2.59	4.02	3.26	3.37	2.38	2.93

Table 19: result 10

Performance	Attack						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)						
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	
benign	99.06	100	100	99.98	99.80	96.81	99.98	99.81	100	99.97	99.97	99.51	99.06	100	100	99.98	99.80	96.81	99.52	99.90	100	99.97	99.89	98.14	99.91	99.90	99.92	99.93	99.67	99.91	
g_combo	99.91	99.79	99.97	99.86	99.71	99.98	99.92	100	99.88	100	99.62	99.84	99.91	99.79	99.97	99.86	99.71	99.98	99.91	99.90	99.92	99.93	99.67	99.91	99.90	99.92	99.93	99.67	99.91		
g_junk	99.78	99.97	99.82	100	99.33	99.11	99.90	99.74	99.95	99.74	99.07	99.98	99.78	99.97	99.82	100	99.33	99.11	99.84	99.85	99.80	99.87	99.20	99.54	99.91	99.90	99.92	99.93	99.20	99.54	
g_scan	98.16	99.98	96.66	99.93	99.23	99.93	98.87	99.89	99.80	99.93	99.91	99.64	98.16	99.98	96.66	99.93	99.23	99.93	98.51	99.94	98.20	99.93	99.57	99.78	99.91	99.94	98.20	99.93	99.57	99.78	
g_tcp	97.62	99.98	99.97	74.97	98.97	99.05	99.37	99.46	46.46	99.98	99.96	99.79	97.62	99.98	99.97	74.97	98.97	99.05	98.49	99.72	63.43	85.69	99.46	99.42	99.94	99.50	99.94	85.69	99.46	99.42	
g_udp	99.94	99.50	0.00	100	99.97	99.94	97.93	100	0.00	79.92	99.13	76.84	99.94	99.50	0.00	100	99.97	99.94	98.93	99.75	0.00	88.84	99.55	86.88	99.91	100	100	100	99.91	100	
m_ack	100	100	100	97.71	99.90	100	99.99	100	100	99.98	99.93	99.99	100	100	100	97.71	99.90	100	100	100	100	98.83	99.91	100	100	100	100	100	99.91	100	
m_scan	100	99.99	100	99.95	48.44	99.93	99.87	100	100	100	99.60	99.97	100	99.99	100	99.95	48.44	99.93	99.94	99.99	100	99.97	65.18	99.95	99.99	100	99.99	100	99.96	71.09	100
m_syn	99.99	100	100	99.99	99.90	100	99.98	99.98	100	99.92	55.17	100	99.99	100	100	99.99	99.90	100	99.99	99.99	100	99.96	71.09	100	99.99	100	99.99	100	99.96	71.09	100
m_udp	100	99.99	100	99.98	99.97	99.92	100	100	100	99.13	99.99	100	100	99.99	100	99.98	99.97	99.92	100	99.99	100	99.56	99.98	99.96	99.99	100	99.99	100	99.56	99.98	99.96
m_udpplain	100	100	99.99	99.99	99.99	61.56	99.99	99.99	100	99.89	99.97	97.87	100	100	99.99	99.99	99.99	61.56	100	100	100	99.94	99.98	75.58	99.99	100	100	99.94	99.98	75.58	
Overall	99.67	99.92	90.28	96.65	93.79	96.19	99.62	99.90	86.01	98.04	95.67	97.59	99.50	99.93	90.58	97.49	95.02	96.02	99.56	99.91	87.40	97.50	93.95	96.29	99.67	99.92	90.28	96.65	93.79	96.19	

Table 20: ad result 10

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	5.73	6.61	11.67	10.96	17.56	15.47	11.34
BIM	6.28	7.55	12.17	11.82	17.91	16.38	12.02
PGD	5.27	5.37	11.36	9.74	16.05	13.59	10.23
Deep Fool	1.87	1.87	9.76	4.58	8.40	5.72	5.36

Table 21: result 11

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	97.55	100	99.46	99.90	99.80	95.84	99.99	99.89	100	99.90	99.97	99.83	97.55	100	99.46	99.90	99.80	95.84	98.75	99.94	99.73	99.90	99.89	97.79	99.90	99.94	99.73	99.90	99.89	97.79
g_combo	99.87	99.75	75.19	99.16	99.71	99.80	99.92	100	99.39	96.27	99.62	99.79	99.87	99.75	99.75	99.16	99.71	99.80	99.87	99.86	99.90	99.87	99.67	99.79	99.90	99.87	99.86	99.90	99.87	99.67
g_junk	99.76	99.97	95.84	91.93	99.38	97.34	99.83	99.75	66.02	96.22	99.02	99.64	99.76	99.97	95.84	91.93	99.38	97.34	99.79	99.86	78.18	94.03	99.20	98.48	99.90	99.86	78.18	94.03	99.20	98.48
g_scan	97.62	99.98	74.21	97.44	99.14	98.65	98.96	99.89	99.78	99.95	99.93	99.78	97.62	99.98	74.21	97.44	99.14	98.65	98.29	99.94	85.12	98.68	99.53	99.21	99.94	99.94	85.12	98.68	99.53	99.21
g_tcp	98.84	99.81	99.98	43.35	98.91	79.40	98.66	99.99	97.27	99.69	99.96	99.74	98.84	99.81	99.98	43.35	98.91	79.40	98.75	99.90	98.61	60.43	99.43	88.41	99.90	99.90	98.61	60.43	99.43	88.41
g_udp	99.95	99.99	98.97	99.95	99.97	99.97	98.97	99.84	93.39	63.67	99.09	84.03	99.95	99.99	98.97	99.95	99.97	99.97	99.46	99.91	96.10	77.79	99.53	91.31	99.91	99.91	96.10	77.79	99.53	91.31
m_ack	100	100	98.60	97.13	99.93	99.91	99.91	100	99.98	99.99	99.66	99.99	100	100	98.60	97.13	99.93	99.91	99.96	100	99.28	98.54	99.80	99.95	100	99.96	99.28	98.54	99.80	99.95
m_scan	100	99.99	100	94.93	43.65	99.91	99.69	100	100	97.13	99.60	99.97	100	99.99	100	94.93	43.65	99.91	99.85	99.99	100	96.02	60.70	99.94	99.99	99.99	100	96.02	60.70	99.94
m_syn	99.99	100	99.92	95.86	99.94	99.98	99.98	99.96	100	92.68	52.98	99.99	99.99	100	99.92	95.86	99.94	99.98	99.99	99.98	99.96	94.24	69.25	99.99	99.99	99.98	99.96	94.24	69.25	99.99
m_udp	100	100	98.74	99.36	99.87	99.95	100	100	99.14	98.90	100	99.94	100	100	98.74	99.36	99.87	99.95	100	100	98.94	99.13	99.94	99.94	100	100	98.94	99.13	99.94	99.94
m_udpplain	100	100	100	99.98	99.99	99.99	99.99	100	96.71	98.24	99.97	98.25	100	100	100	99.98	99.99	99.99	100	100	98.33	99.10	99.98	99.12	100	100	98.33	99.10	99.98	99.12
Overall	99.69	99.96	97.37	91.13	93.21	97.48	99.63	99.94	95.61	94.79	95.44	98.27	99.42	99.95	94.63	92.64	94.57	97.34	99.52	99.94	94.53	92.32	93.36	97.63	99.94	99.52	94.53	92.32	93.36	97.63

Table 22: ad result 11

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	10.88	10.65	22.65	22.31	18.00	12.92	16.24
BIM	11.46	11.25	22.73	22.57	18.31	14.53	16.81
PGD	8.74	9.05	20.64	20.26	16.58	11.80	14.51
Deep Fool	2.03	1.87	6.24	11.56	8.97	4.62	5.88

Table 23: result 12

Performance	Attack						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)						
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	
benign	99.57	100	99.51	99.90	99.71	95.93	99.82	99.88	100	99.89	99.94	99.81	99.57	100	99.51	99.90	99.71	95.93	99.69	98.98	99.76	99.90	99.83	99.69	98.98	99.76	99.90	99.83	97.83		
	88.99	99.97	72.79	99.48	99.78	99.86	99.70	99.87	99.52	95.23	96.02	99.76	88.99	99.97	72.79	99.48	99.78	99.86	94.04	99.92	84.08	97.31	97.86	99.81	94.04	99.92	84.08	97.31	97.86	99.81	
	91.76	99.14	96.24	89.63	92.05	96.97	83.24	99.97	63.93	95.86	96.24	99.75	91.76	99.14	96.24	89.63	92.05	96.97	87.29	99.55	76.83	92.64	94.10	98.34	87.29	99.55	76.83	92.64	94.10	98.34	
	74.36	97.47	75.04	96.47	96.34	98.63	99.80	99.91	99.79	99.95	99.95	99.84	74.36	97.47	75.04	96.47	96.34	98.63	85.22	98.67	85.66	98.18	98.11	99.23	85.22	98.67	85.66	98.18	98.11	99.23	
	82.71	94.54	99.98	39.08	67.49	77.93	91.06	99.23	96.96	99.56	99.95	99.76	82.71	94.54	99.98	39.08	67.49	77.93	86.68	96.83	98.45	56.13	80.57	87.51	86.68	96.83	98.45	56.13	80.57	87.51	
g-udp	99.94	99.98	98.73	99.95	99.98	99.96	84.43	95.12	93.65	61.99	78.27	83.05	99.94	99.98	98.73	99.95	99.98	99.96	91.54	97.49	96.12	76.52	87.80	90.72	91.54	97.49	96.12	76.52	87.80	90.72	
	100	100	99.16	94.89	99.87	100	99.79	100	99.98	99.99	99.37	99.99	100	100	99.16	94.89	99.87	100	99.89	100	99.56	97.37	99.62	100	99.89	100	99.56	97.37	99.62	100	
	100	99.98	100	96.75	85.06	99.90	99.99	100	100	97.09	99.37	99.91	100	99.98	100	96.75	85.06	99.90	99.99	99.99	100	96.92	91.66	99.91	99.99	99.99	100	96.92	91.66	99.91	
	99.95	100	99.92	95.73	99.52	99.95	100	100	100	95.12	80.81	99.99	99.95	100	99.92	95.73	99.52	99.95	99.97	100	99.96	95.43	89.20	99.97	99.97	100	99.96	95.43	89.20	99.97	
	100	99.82	97.97	99.39	99.76	99.80	100	100	99.42	98.05	99.99	100	100	99.82	97.97	99.39	99.76	99.80	100	99.91	98.69	98.72	99.88	99.90	99.91	98.69	98.72	99.88	99.90	99.90	
m-udpplain	100	100	100	99.98	99.99	99.99	99.99	99.99	94.81	98.33	99.97	98.04	100	100	100	99.98	99.99	99.99	100	100	99.34	99.15	99.98	99.01	100	100	99.34	99.15	99.98	99.01	
	96.77	99.23	97.15	90.54	94.25	97.30	96.16	99.28	95.28	94.64	95.44	98.17	94.30	99.17	94.49	91.93	94.50	97.18	94.94	99.21	94.22	91.66	94.42	97.47	94.94	99.21	94.22	91.66	94.42	97.47	
Overall																															

Table 24: ad result 12

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	10.09	9.81	23.33	21.07	16.30	12.61	15.53
BIM	11.21	10.60	23.41	21.26	16.77	14.16	16.23
PGD	9.97	9.17	21.25	19.31	14.94	11.40	14.34
Deep Fool	5.14	2.16	6.28	12.14	7.86	4.72	6.38

Table 25: result 13

Performance		Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
		ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	benign	99.81	99.96	99.88	99.94	99.79	99.92	99.95	99.89	100	99.96	99.97	99.92	99.81	99.96	99.88	99.94	99.79	99.92	99.88	99.92	99.94	99.95	99.88	99.92
	g_combo	99.91	99.87	98.70	99.93	99.98	99.94	99.94	99.99	99.90	99.99	99.54	99.91	99.91	99.87	98.70	99.93	99.98	99.94	99.92	99.93	99.96	99.96	99.76	99.92
	g_junk	99.90	99.95	99.79	99.95	99.81	99.81	99.85	99.79	97.42	99.85	99.57	99.96	99.90	99.95	99.79	99.95	99.81	99.81	99.87	99.87	98.59	99.90	99.69	99.89
	g_scan	99.73	99.98	99.41	99.97	98.87	99.93	99.75	99.91	99.93	99.90	99.98	99.78	99.73	99.98	99.41	99.97	98.87	99.93	99.74	99.95	99.93	99.42	99.86	
	g_tcp	99.99	99.99	99.98	99.93	100	99.98	99.53	98.44	72.92	92.34	99.19	99.16	99.99	99.99	99.98	99.93	100	99.98	99.76	99.21	84.33	95.99	99.59	99.57
	g_udp	99.62	98.56	67.67	91.67	99.31	99.28	100	100	99.97	99.92	100	100	99.62	98.56	67.67	91.67	99.31	99.28	99.81	99.27	80.71	95.62	99.65	99.64
Defense	m_ack	100	100	100	99.98	99.93	100	99.96	100	99.97	97.62	99.62	100	100	100	100	99.98	99.93	100	99.98	100	99.99	98.78	99.78	100
	m_scan	100	99.99	100	100	70.26	99.99	100	100	100	100	99.72	99.96	100	99.99	100	100	70.26	99.99	100	99.99	100	100	82.44	99.97
	m_syn	100	100	100	99.99	99.92	99.99	100	100	99.99	99.97	68.11	100	100	100	100	99.99	99.92	99.99	100	100	99.99	99.98	81.00	99.99
	m_udp	100	100	100	99.00	99.85	99.99	100	99.99	99.93	100	100	100	100	100	100	99.00	99.85	99.99	100	100	99.96	99.50	99.93	100
	m_udpplain	100	100	100	100	99.99	100	100	100	99.99	99.84	99.97	99.99	100	100	100	100	99.99	100	100	100	99.99	99.92	99.98	100
	Overall	99.93	99.80	96.78	98.74	96.35	99.89	99.91	99.82	97.27	99.04	96.88	99.88	99.91	99.84	96.86	99.12	97.07	99.89	99.91	99.83	96.59	99.05	96.47	99.89

Table 26: ad result 13

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	2.28	6.44	10.61	5.37	14.11	5.15	7.33
BIM	2.29	6.50	10.86	5.39	14.96	5.70	7.62
PGD	2.05	5.66	10.04	4.59	12.95	4.42	6.62
Deep Fool	1.71	1.84	5.96	2.82	5.88	1.93	3.36

Table 27: result 14

Performance	Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	99.84	99.92	99.22	99.87	99.79	95.65	99.94	99.89	100	99.90	99.96	99.88	99.84	99.92	99.22	99.87	99.79	95.65	99.89	99.90	99.61	99.89	99.88	97.72
benign	99.92	99.69	95.69	99.92	99.97	99.24	99.93	100	99.59	99.80	99.72	99.96	99.92	99.69	95.69	99.92	99.97	99.24	99.92	99.84	97.60	99.86	99.85	99.60
g-combo	99.90	99.98	98.94	99.00	99.81	98.83	99.85	99.47	91.85	99.16	99.66	98.62	99.90	99.98	98.94	99.00	99.81	98.83	99.87	99.73	95.26	99.08	99.73	98.72
g-junk	99.77	99.98	98.46	98.75	99.35	98.54	99.87	99.93	99.87	99.95	99.98	99.67	99.77	99.98	98.46	98.75	99.35	98.54	99.82	99.95	99.16	99.35	99.66	99.11
g-scan	99.64	99.98	99.95	99.22	100	99.97	99.90	93.56	97.54	99.98	97.41	99.59	99.64	99.98	99.95	99.22	100	99.97	99.77	96.66	98.73	99.60	99.78	99.11
g-ftp	99.95	93.76	98.40	99.99	97.74	99.83	99.69	99.99	99.49	98.98	100	99.32	99.95	93.76	98.40	99.99	97.74	99.83	99.82	96.78	98.94	99.48	99.57	99.11
g-udp	100	100	99.41	97.83	99.92	100	99.99	99.99	99.97	99.97	99.92	99.99	100	100	99.41	97.83	99.92	100	100	99.99	99.69	98.89	99.92	99.99
m-ack	100	99.99	100	98.25	71.43	99.95	99.98	100	99.99	97.34	99.71	99.84	100	99.99	100	98.25	71.43	99.95	99.99	99.99	100	97.79	83.23	99.89
m-scan	100	100	100	96.10	99.89	99.95	100	100	99.98	97.33	68.96	99.99	100	100	100	96.10	99.89	99.95	100	100	99.99	96.71	81.60	99.97
m-syn	100	100	99.12	99.98	99.97	99.96	99.99	99.99	99.45	99.10	100	100	100	100	99.12	99.98	99.97	99.96	100	99.99	99.29	99.53	99.99	99.98
m-udp	100	99.98	99.99	99.77	99.99	100	100	99.99	97.67	99.93	99.99	97.77	100	99.98	99.99	99.77	99.99	100	100	99.99	98.82	99.85	99.99	98.87
m-udpplain	99.94	99.19	99.20	99.11	96.33	99.59	99.92	99.35	98.67	99.22	96.85	99.51	99.91	99.39	99.02	98.97	97.08	99.27	99.92	99.35	98.83	99.09	96.49	99.38
Overall																								

Table 28: ad result 14

Adversarial Attacks \ ASR(%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	3.73	7.75	16.95	17.72	12.67	17.46	12.71
BIM	3.90	7.94	18.73	19.48	13.55	19.12	13.78
PGD	2.65	6.81	15.90	17.03	11.70	16.21	11.72
Deep Fool	1.70	3.36	3.64	3.68	5.69	3.62	3.62

Table 29: result 15

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.56	100	99.26	99.84	99.39	95.82	99.81	98.28	100	99.90	99.98	99.89	99.56	100	99.26	99.84	99.39	95.82	99.68	99.13	99.63	99.87	99.69	97.81						
g-combo	98.95	99.97	95.73	99.92	99.97	99.77	99.91	99.87	99.49	99.80	99.15	99.95	98.95	99.97	95.73	99.92	99.97	99.77	99.42	99.92	97.57	99.86	99.56	99.86						
g-junk	94.62	99.14	98.61	98.80	99.07	99.53	99.46	99.97	91.88	99.27	99.52	99.61	94.62	99.14	98.61	98.80	99.07	99.53	96.98	99.55	95.13	99.03	99.29	99.57						
g-scan	99.56	99.96	98.37	98.82	98.73	98.60	99.87	99.91	99.85	99.93	99.96	99.49	99.56	99.96	98.37	98.82	98.73	98.60	99.71	99.94	99.10	99.37	99.34	99.04						
g-icp	98.44	99.99	99.95	97.91	99.99	98.98	99.46	98.66	98.70	99.98	96.03	99.78	98.44	99.99	99.95	97.91	99.99	98.98	98.94	99.32	99.32	98.93	97.97	99.38						
g-udp	99.97	98.76	99.39	99.99	96.47	99.98	97.29	99.80	99.44	97.64	99.99	98.70	99.97	98.76	99.39	99.99	96.47	99.98	98.61	99.28	99.41	98.80	99.34							
m-ack	100	100	99.44	98.80	99.96	100	99.79	100	99.98	99.95	98.74	99.99	100	100	99.44	98.80	99.96	100	99.90	100	99.71	99.37	99.34	100						
m-scan	100	99.99	100	99.02	91.06	99.96	99.98	100	99.99	97.01	99.00	99.84	100	99.99	100	99.02	91.06	99.96	99.99	99.99	99.99	98.01	94.87	99.90						
m-syn	99.99	100	100	95.59	99.43	99.95	99.99	100	99.99	98.46	87.55	99.98	99.99	100	100	95.59	99.43	99.95	99.99	100	99.99	97.00	93.11	99.97						
m-udp	99.96	99.84	99.72	99.97	99.53	99.81	100	100	99.47	99.31	100	100	99.96	99.84	99.72	99.97	99.53	99.81	99.98	99.92	99.60	99.64	99.76	99.91						
m-udpplain	100	100	99.99	99.34	99.99	100	99.89	99.99	99.21	99.93	99.97	97.62	100	100	99.99	99.34	99.99	100	99.95	100	99.60	99.63	99.98	98.80						
Overall	99.59	99.78	99.41	99.03	98.24	99.55	99.59	99.68	98.91	99.20	98.17	99.53	99.19	99.79	99.13	98.91	98.51	99.31	99.38	99.73	99.01	99.05	98.28	99.41						

Table 30: ad result 15

<div>ASR(%)</div> <div>Adversarial Attacks</div>	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	11.08	8.43	18.12	18.67	21.16	15.98	15.57
BIM	12.53	9.54	20.20	20.50	22.23	18.01	17.17
PGD	10.75	7.92	17.40	18.13	18.31	15.29	14.63
Deep Fool	2.84	1.97	3.28	3.93	3.76	2.45	3.04

Table 31: result 16

Performance		Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
		ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	benign	98.40	100	99.99	99.98	99.81	96.42	100	99.89	100	99.96	99.94	99.81	98.40	100	99.99	99.98	99.81	96.42	99.19	99.94	99.99	99.97	99.87	98.08
	g_combo	99.91	99.77	99.93	99.85	99.72	99.98	99.90	100	99.87	99.98	99.51	99.85	99.91	99.77	99.93	99.85	99.72	99.98	99.90	99.89	99.90	99.92	99.61	99.92
	g_junk	99.74	99.97	99.81	99.94	99.12	99.49	99.88	99.74	99.88	99.73	99.12	99.08	99.74	99.97	99.81	99.94	99.12	99.49	99.81	99.85	99.84	99.83	99.12	99.74
	g_scan	98.19	99.98	96.95	99.91	99.26	99.84	98.47	99.89	99.80	99.90	99.91	99.27	98.19	99.98	96.95	99.91	99.26	99.84	98.33	99.94	98.35	99.91	99.58	99.55
	g_tcp	98.70	99.98	99.97	72.98	99.06	97.34	99.29	99.87	46.47	99.97	99.96	99.90	98.70	99.98	99.97	72.98	99.06	97.34	99.00	99.93	63.45	84.37	99.51	98.61
m_udpplain	g_udp	99.94	99.88	0.00	100	99.97	99.96	98.86	100	0.00	78.65	99.21	97.43	99.94	99.88	0.00	100	99.97	99.96	99.40	99.94	0.00	88.05	99.59	98.68
	m_ack	100	100	100	99.10	99.86	100	99.93	100	99.99	80.23	99.77	99.99	100	100	100	99.10	99.86	100	99.96	100	99.99	88.67	99.81	100
	m_scan	100	99.99	100	97.07	48.92	99.96	99.80	99.99	100	100	99.61	99.97	100	99.99	100	97.07	48.92	99.96	99.90	99.99	100	98.51	65.61	99.96
	m_syn	99.99	100	100	99.99	99.90	100	99.98	99.97	100	95.86	55.40	99.99	99.99	100	100	99.99	99.90	100	99.99	99.99	100	97.88	71.28	99.99
	m_udp	100	99.99	100	88.71	99.91	99.98	100	100	100	99.62	99.99	100	100	99.99	100	88.71	99.91	99.98	100	99.99	100	93.85	99.95	99.99
Overall	m_udpplain	100	100	99.99	99.99	99.99	99.99	99.99	99.99	100	95.18	99.97	98.60	100	100	99.99	99.99	99.99	99.99	100	99.99	100	97.53	99.98	99.29
	Overall	99.73	99.96	90.28	94.03	93.84	99.50	99.65	99.94	86.00	95.37	95.67	99.53	99.53	99.96	90.60	96.14	95.05	99.36	99.59	99.95	87.41	95.32	93.99	99.44

Table 32: ad result 16

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	5.92	7.14	11.84	20.17	17.82	12.52	12.57
BIM	6.57	7.73	12.33	20.58	18.13	13.47	13.14
PGD	5.41	5.61	11.45	17.95	16.03	10.76	11.20
DeepFool	1.90	1.86	9.76	8.97	8.36	2.19	5.51

Table 33: result 17

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	98.36	99.96	99.53	99.81	99.76	95.85	100	99.89	100	99.98	99.95	99.87	98.36	99.96	99.53	99.81	99.76	95.85	99.17	99.92	99.77	99.89	99.86	97.81						
g-combo	99.89	99.82	71.89	99.74	99.77	99.85	99.90	100	99.61	97.29	98.69	99.80	99.89	99.82	71.89	99.74	99.77	99.85	99.90	99.91	83.51	98.50	99.23	99.83						
g-junk	99.76	99.97	96.42	94.29	97.54	97.73	99.86	99.75	63.20	96.19	99.20	99.75	99.76	99.97	96.42	94.29	97.54	97.73	99.81	99.86	76.35	95.23	98.36	98.73						
g-scan	97.91	99.98	73.47	96.18	99.26	98.71	98.62	99.89	99.78	99.89	99.93	99.78	97.91	99.98	73.47	96.18	99.26	98.71	98.26	99.94	84.63	98.00	99.59	99.24						
g-ftp	99.37	99.68	73.35	44.41	95.74	78.84	99.12	99.98	98.12	99.65	99.97	99.52	99.37	99.68	73.35	44.41	95.74	78.84	99.24	99.83	83.94	61.44	97.81	87.98						
g-udp	99.94	99.99	99.91	99.95	99.98	99.97	99.44	99.73	76.50	64.16	96.50	83.84	99.94	99.99	99.91	99.95	99.98	99.97	99.69	99.86	86.65	78.15	98.21	91.19						
m-ack	100	100	98.09	97.47	99.83	100	99.98	100	99.98	99.99	99.88	99.99	100	100	98.09	97.47	99.83	100	99.99	100	99.02	98.72	99.85	100						
m-scan	100	99.99	100	92.55	53.47	99.92	99.76	100	100	97.34	99.54	99.97	100	99.99	100	92.55	53.47	99.92	99.88	99.99	100	94.89	69.57	99.95						
m-syn	99.99	100	99.92	96.37	99.89	99.98	99.98	99.99	100	89.66	57.69	99.99	99.99	100	99.92	96.37	99.89	99.98	99.99	100	99.96	92.90	73.14	99.99						
m-udp	100	100	98.81	99.43	99.95	99.88	100	100	98.96	99.03	99.97	100	100	100	98.81	99.43	99.95	99.88	100	100	98.89	99.23	99.96	99.94						
m-udpplain	100	100	100	99.99	99.99	99.99	99.99	99.99	96.91	98.41	99.96	98.21	100	100	100	99.99	99.99	99.99	100	100	98.43	99.19	99.98	99.09						
Overall	99.78	99.95	95.02	91.15	93.96	97.44	99.70	99.93	93.91	94.69	95.57	98.25	99.56	99.94	91.95	92.74	95.02	97.34	99.63	99.94	91.92	92.38	94.14	97.61						

Table 34: ad result 17

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	7.24	9.27	21.25	21.89	17.86	12.79	15.05
BIM	7.74	10.05	21.39	21.99	18.08	14.36	15.60
PGD	5.84	6.12	19.49	19.98	16.42	11.67	13.25
Deep Fool	1.91	1.86	7.81	11.29	8.48	4.56	5.99

Table 35: result 18

Performance		Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
		ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	benign	99.59	100	99.48	99.90	99.67	95.82	99.81	97.87	100	99.90	99.97	99.85	99.59	100	99.48	99.90	99.67	95.82	99.70	98.93	99.74	99.90	99.82	97.80
	g_combo	97.15	99.97	51.24	99.14	99.78	99.86	99.78	99.87	99.65	96.36	96.58	99.76	97.15	99.97	51.24	99.14	99.78	99.86	98.44	99.92	67.68	97.73	98.15	99.81
	g_junk	92.10	99.14	95.80	92.10	93.22	97.15	98.18	99.97	49.31	96.16	96.22	99.77	92.10	99.14	95.80	92.10	93.22	97.15	95.05	99.55	65.11	94.09	94.70	98.44
	g_scan	74.59	97.40	73.51	97.37	96.28	98.74	99.75	99.91	99.81	99.95	99.95	99.78	74.59	97.40	73.51	97.37	96.28	98.74	85.36	98.64	84.66	98.08	99.26	
	g_tcp	85.29	95.02	65.41	42.65	66.67	78.95	91.21	99.20	97.99	99.46	99.95	99.69	85.29	95.02	65.41	42.65	66.67	78.95	88.15	97.07	78.46	59.70	79.99	88.12
	g_udp	99.93	99.97	99.91	99.95	99.98	99.96	86.23	95.51	72.47	63.42	77.84	83.71	99.93	99.97	99.91	99.95	99.98	99.96	92.58	97.69	84.01	77.60	87.53	91.12
m_attack	m_ack	100	100	97.69	98.33	99.91	100	99.79	100	99.98	97.18	99.37	99.99	100	100	97.69	98.33	99.91	100	99.89	100	98.82	97.75	99.63	100
	m_scan	100	99.97	100	97.17	86.31	99.91	99.99	100	100	97.03	99.32	99.91	100	99.97	100	97.17	86.31	99.91	100	99.98	100	97.10	92.36	99.91
	m_syn	99.96	100	99.96	95.63	99.50	99.95	99.99	100	100	95.70	82.11	99.99	99.96	100	99.96	95.63	99.50	99.95	99.98	100	99.98	99.97	99.97	
	m_udp	100	99.81	97.96	97.85	99.76	99.86	100	100	98.78	99.35	99.99	100	100	99.81	97.96	97.85	99.76	99.86	100	99.90	98.37	98.60	99.88	99.93
	m_udpplain	100	100	100	99.98	99.99	99.99	99.99	99.99	94.80	97.18	99.97	98.16	100	100	100	99.98	99.99	99.99	100	100	97.33	98.56	99.98	99.07
	Overall	97.50	99.28	93.03	91.09	94.34	97.42	97.70	99.30	92.07	94.70	95.57	98.24	95.33	99.21	89.18	92.73	94.64	97.29	96.28	99.24	88.56	92.30	94.55	97.58

Table 36: ad result 18

ASR(%) Adversarial Attacks	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	9.90	9.87	22.36	23.86	16.93	12.34	15.88
BIM	10.74	10.65	22.47	24.11	17.32	13.96	16.54
PGD	9.48	9.21	20.78	21.85	15.52	11.10	14.66
DeepFool	4.57	2.15	10.35	12.89	7.68	4.40	7.01

Table 37: Result of all experimental setup

S No.	Trust Score Decay (γ)	Parameters		Accuracy (%)						Precision(%)						Sensitivity (%)						F1 Score(%)					
		Optional Layer Freeze	Device Train on Adversarial Data	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
1	0.99	FALSE	ALL (ED1-ED6)	99.95	95.59	95.49	87.10	96.62	99.88	99.92	94.90	96.81	91.59	97.10	99.86	99.93	94.11	95.71	93.11	97.31	99.82	99.93	92.60	95.28	90.21	96.76	99.84
2	0.99	FALSE	ED1,ED2,ED5	99.89	99.27	99.36	99.19	97.10	99.62	99.85	99.42	98.85	99.29	97.39	99.59	99.87	99.46	99.16	98.99	97.66	99.37	99.86	99.42	98.99	99.14	97.20	99.48
3	0.99	FALSE	None	99.79	99.86	99.00	99.29	98.58	99.58	99.78	99.75	98.63	99.32	98.47	99.54	99.54	99.84	98.82	99.10	98.66	99.31	99.66	99.79	98.70	99.21	98.53	99.42
4	0.99	TRUE	ALL (ED1-ED6)	99.70	99.88	90.27	96.26	92.93	98.38	99.65	99.87	85.98	97.07	95.37	98.80	99.29	99.90	90.57	97.61	94.34	98.23	99.47	99.88	87.38	97.13	93.03	98.45
5	0.99	TRUE	ED1,ED2,ED5	99.60	99.96	91.61	90.72	93.88	97.35	99.56	99.94	91.42	94.67	95.70	98.16	99.21	99.96	89.29	92.18	95.11	97.25	99.38	99.95	88.37	91.84	94.05	97.52
6	0.99	TRUE	None	97.33	99.12	93.77	90.44	94.44	97.06	97.55	99.22	92.83	94.29	95.65	97.98	95.10	99.08	91.36	92.13	94.71	96.87	96.08	99.13	91.00	91.56	94.64	97.20
7	0.95	FALSE	ALL (ED1-ED6)	99.85	99.97	95.60	99.52	94.91	99.88	99.82	99.92	96.86	99.63	96.23	99.86	99.84	99.95	95.83	99.64	95.98	99.83	99.83	99.94	95.41	99.63	95.13	99.85
8	0.95	FALSE	ED1,ED2,ED5	99.90	98.17	99.28	99.07	97.91	99.71	99.88	97.17	98.61	99.15	97.92	99.68	99.87	97.73	98.99	98.99	98.28	99.54	99.88	97.15	98.77	99.07	97.96	99.60
9	0.95	FALSE	None	99.84	99.82	98.74	99.34	98.85	99.63	99.82	99.72	98.25	99.42	98.73	99.60	99.68	99.82	98.42	99.19	98.89	99.42	99.75	99.77	98.30	99.30	98.79	99.51
10	0.95	TRUE	ALL (ED1-ED6)	99.67	99.92	90.28	96.65	93.79	96.19	99.62	99.90	86.01	96.04	95.67	97.59	99.50	99.93	90.58	97.49	95.02	96.02	99.56	99.91	87.40	97.50	93.95	96.29
11	0.95	TRUE	ED1,ED2,ED5	99.69	99.96	97.37	91.13	93.21	97.48	99.63	99.94	95.61	94.79	95.44	98.27	99.42	99.95	94.63	92.64	94.57	97.34	99.52	99.94	94.53	92.32	93.36	97.63
12	0.95	TRUE	None	96.77	99.23	97.15	90.54	94.25	97.30	96.16	99.28	95.28	96.64	95.44	98.17	94.30	99.17	94.49	91.93	94.50	97.18	99.21	94.22	91.66	94.42	97.47	
13	0.90	FALSE	ALL (ED1-ED6)	99.93	99.80	96.78	98.74	96.35	99.89	99.91	99.82	97.27	99.04	96.88	99.88	99.91	99.84	96.86	99.12	97.07	99.89	99.91	99.83	96.59	99.05	96.47	99.89
14	0.90	FALSE	ED1,ED2,ED5	99.94	99.19	99.20	99.11	96.33	99.59	99.92	99.35	98.67	99.22	96.85	99.51	99.91	99.39	99.02	98.97	97.08	99.27	99.92	99.35	98.83	99.09	96.49	99.38
15	0.90	FALSE	None	99.59	99.78	99.41	99.03	98.24	99.55	99.59	99.68	98.91	99.20	98.17	99.53	99.19	99.79	99.13	98.91	98.51	99.31	99.38	99.73	99.01	99.05	98.28	99.41
16	0.90	TRUE	ALL (ED1-ED6)	99.73	99.96	90.28	94.03	93.84	99.50	99.65	99.94	86.00	95.37	95.67	99.53	99.53	99.96	90.60	96.14	95.05	99.36	99.59	99.95	87.41	95.32	93.99	99.44
17	0.90	TRUE	ED1,ED2,ED5	99.78	99.95	95.02	91.15	93.96	97.44	99.70	99.93	93.91	94.69	95.57	98.25	99.56	99.94	91.95	92.74	95.02	97.34	99.63	99.94	91.92	92.38	94.14	97.61
18	0.90	TRUE	None	97.50	99.28	93.03	91.09	94.34	97.42	97.70	99.30	92.07	94.70	95.57	98.24	95.33	99.21	89.18	92.73	94.64	97.29	96.28	99.24	88.56	92.30	94.55	97.58

Table 38: Overall ASR Results of All ED Obtained by Varying Three Key Parameters

S No.	Parameters			ASR(%)			
	Trust Score Decay(γ)	Optional Layer Freeze	Device Train on Adversarial Data	FGSM	BIM	PGD	Deep Fool
1	0.99	FALSE	ALL (ED1-ED6)	10.30	10.78	9.73	6.61
2	0.99	FALSE	ED1,ED2,ED5	11.73	12.87	10.97	2.96
3	0.99	FALSE	None	14.97	16.59	13.87	3.03
4	0.99	TRUE	ALL (ED1-ED6)	12.91	13.52	11.66	5.43
5	0.99	TRUE	ED1,ED2,ED5	15.54	16.06	14.00	6.67
6	0.99	TRUE	None	15.79	16.46	14.64	6.80
7	0.95	FALSE	ALL (ED1-ED6)	6.43	6.72	5.85	3.36
8	0.95	FALSE	ED1,ED2,ED5	11.98	12.91	10.93	3.23
9	0.95	FALSE	None	14.77	16.30	13.75	2.93
10	0.95	TRUE	ALL (ED1-ED6)	11.34	12.02	10.23	5.36
11	0.95	TRUE	ED1,ED2,ED5	16.24	16.81	14.51	5.88
12	0.95	TRUE	None	15.53	16.23	14.34	6.38
13	0.90	FALSE	ALL (ED1-ED6)	7.33	7.62	6.62	3.36
14	0.90	FALSE	ED1,ED2,ED5	12.71	13.78	11.72	3.62
15	0.90	FALSE	None	15.57	17.17	14.63	3.04
16	0.90	TRUE	ALL (ED1-ED6)	12.57	13.14	11.20	5.51
17	0.90	TRUE	ED1,ED2,ED5	15.05	15.60	13.25	5.99
18	0.90	TRUE	None	15.88	16.54	14.66	7.01

Table 39: Results of Setup 7 when only malicious devices is ED1(Data Poisoning)

Performance	Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
Attack	99.64	100.00	99.99	99.98	99.86	98.73	99.79	99.89	100.00	99.95	99.94	99.92	99.64	100.00	99.99	99.98	99.86	98.73	99.71	99.94	99.99	99.97	99.90	99.33
benign	99.46	99.77	99.98	99.92	99.97	99.84	90.82	99.99	99.88	99.98	99.86	99.94	99.46	99.77	99.98	99.92	99.97	99.84	94.95	99.88	99.93	99.95	99.92	99.89
g_combo	75.16	99.95	99.74	99.97	99.83	99.83	99.89	99.64	99.98	99.79	99.97	99.76	75.16	99.95	99.74	99.97	99.83	99.83	85.78	99.79	99.86	99.88	99.90	99.79
g_junk	98.73	99.98	99.95	99.83	99.86	99.93	99.75	99.89	99.91	99.93	99.95	99.71	98.73	99.98	99.95	99.83	99.86	99.93	99.23	99.94	99.93	99.88	99.90	99.82
g_scan	99.97	98.06	99.98	93.95	100.00	98.87	61.75	99.98	68.14	99.96	96.09	99.97	99.97	98.06	99.98	93.95	100.00	98.87	76.34	99.01	81.04	96.86	98.01	99.42
g_tcp	47.73	99.99	59.08	99.97	96.53	99.97	100.00	98.28	99.98	94.26	100.00	99.05	47.73	99.99	59.08	99.97	96.53	99.97	64.62	99.12	74.27	97.03	98.24	99.51
g_udp	100.00	100.00	100.00	99.98	99.89	100.00	46.57	100.00	99.97	49.11	99.93	99.99	100.00	100.00	100.00	99.98	99.89	100.00	63.54	100.00	99.99	65.87	99.91	100.00
m_ack	100.00	99.99	100.00	100.00	100.00	99.98	99.94	100.00	100.00	100.00	99.69	99.83	100.00	99.99	100.00	100.00	87.41	99.98	99.97	99.99	100.00	100.00	93.15	99.90
m_scan	99.93	100.00	100.00	99.99	99.80	99.95	99.99	100.00	100.00	100.00	83.47	100.00	99.93	100.00	100.00	99.99	99.80	99.95	99.96	100.00	100.00	100.00	90.91	99.97
m_syn	50.63	99.99	99.99	40.25	99.97	99.99	99.99	100.00	100.00	100.00	100.00	100.00	50.63	99.99	99.99	40.25	99.97	99.99	67.22	100.00	100.00	57.40	99.98	99.99
m_udp	99.99	100.00	100.00	99.99	99.99	100.00	99.66	99.99	99.98	64.92	99.97	99.31	99.99	100.00	100.00	99.99	99.99	100.00	99.82	100.00	99.99	78.73	99.98	99.66
m_udpplaint	82.24	99.76	96.05	87.94	98.05	99.78	90.74	99.79	97.08	91.63	98.08	99.77	88.29	99.79	96.25	93.98	98.47	99.74	86.47	99.79	95.91	90.51	98.16	99.75
Overall																								

Table 40: ASR Results of Setup 7 when malicious devices are ED1(Data Poisoning)

Adversarial Attack \ ASR (%)	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	24.78	6.54	9.49	17.33	9.82	5.72	12.28
BIM	25.07	6.58	9.61	17.40	10.28	6.52	12.58
PGD	24.00	5.92	8.33	16.85	8.95	5.59	11.61
Deep Fool	20.22	2.46	4.79	15.20	3.68	2.00	8.06

Table 41: Results of Setup 7 when malicious devices are ED1(Data Poisoning), ED2 (Model Poisoning)

Attack	Performance						Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.63	100	99.98	99.99	99.79	99.21	99.81	99.89	100	99.98	99.97	99.91	99.63	100	99.98	99.99	99.79	99.21	99.72	99.94	99.99	99.99	99.88	99.56						
g-combo	0.08	99.75	99.96	99.94	99.98	99.97	62.50	99.97	99.91	99.98	99.77	99.86	0.08	99.75	99.96	99.94	99.98	99.97	0.17	99.86	99.93	99.96	99.87	99.92						
g-junk	89.30	99.93	99.77	99.97	99.79	99.76	31.14	99.52	99.95	99.94	99.97	99.98	89.30	99.93	99.77	99.97	99.79	99.76	46.18	99.73	99.86	99.95	99.88	99.87						
g-scan	93.12	99.91	99.84	99.97	99.72	99.93	99.77	99.93	99.87	99.91	99.98	99.82	93.12	99.91	99.84	99.97	99.72	99.93	96.33	99.92	99.86	99.94	99.85	99.87						
g-tcp	99.98	99.18	99.98	99.88	96.97	99.98	94.69	99.99	98.00	99.97	99.99	99.82	99.98	99.18	99.98	99.88	96.97	99.98	97.26	99.58	80.94	99.93	98.46	99.90						
g-udp	96.93	100	58.87	99.97	100	99.85	95.05	99.28	99.98	99.89	97.48	100	96.93	100	58.87	99.97	100	99.85	95.98	99.64	74.10	99.93	98.72	99.92						
m-ack	100	99.98	99.99	99.98	99.85	100	94.77	100	99.97	41.80	99.98	99.99	100	99.98	99.99	99.98	99.85	100	97.31	99.99	99.98	58.95	99.92	100						
m-scan	100	99.99	100	100	66.40	99.99	99.99	100	100	100	99.66	99.97	100	99.99	100	100	66.40	99.99	99.99	99.99	100	100	79.70	99.98						
m-syn	99.99	100	100	100	99.89	99.99	99.99	100	100	99.98	65.40	100	99.99	100	100	100	99.89	99.99	99.99	100	100	99.99	79.05	99.99						
m-udp	97.68	99.99	100	46.04	99.99	99.99	100	99.99	100	100	99.97	100	97.68	99.99	100	46.04	99.99	99.99	98.83	99.99	100	63.05	99.98	100						
m-udpplain	99.99	100	100	100	99.99	100	99.90	99.98	99.98	99.94	99.96	99.59	99.99	100	100	100	99.99	100	99.94	99.99	99.99	99.97	99.98	99.79						
Overall	92.75	99.88	96.02	89.79	95.71	99.92	88.87	99.87	97.06	94.67	96.56	99.90	88.79	99.88	96.22	95.07	96.58	99.88	84.70	99.88	95.88	92.88	95.94	99.89						

Table 43: Results of Setup 7 when malicious devices are ED1(Data Poisoning), ED2 (Model Poisoning), ED3(Backdoor Attack))

Attack	Performance						Accuracy						Precision						Sensitivity						F1 Score					
	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
benign	99.57	99.96	99.97	99.95	99.79	97.42	99.85	99.73	100	99.94	99.94	99.96	99.57	99.96	99.97	99.95	99.79	97.42	99.71	99.85	99.98	99.94	99.87	98.67						
g_combo	14.84	99.83	0.08	99.93	99.99	99.82	98.99	99.96	56.25	99.97	99.77	99.94	14.84	99.83	0.08	99.93	99.99	99.82	25.80	99.90	0.15	99.95	99.88	99.88						
g_junk	97.45	99.87	99.59	99.97	99.72	99.83	36.38	99.74	32.70	99.87	99.97	99.72	97.45	99.87	99.59	99.97	99.72	99.83	52.98	99.80	49.24	99.92	99.85	99.77						
g_scan	91.54	99.98	99.66	99.83	99.79	99.93	99.80	99.87	99.96	99.95	99.98	99.61	91.54	99.98	99.66	99.99	99.61	99.64	96.79	94.63	99.81	99.89	99.77							
g_tcp	98.18	99.99	99.99	94.61	100	96.64	95.43	89.81	89.06	99.99	98.28	99.97	98.18	99.99	99.99	94.61	100	96.64	96.79	94.63	94.21	97.23	99.13	98.28						
g_udp	99.95	89.72	89.34	99.99	98.51	99.98	98.46	100	99.92	94.88	100	97.22	99.95	89.72	89.34	99.99	98.51	99.98	99.20	94.58	94.33	97.37	99.25	98.58						
m_ack	100	99.99	100	99.98	99.88	100	70.09	100	99.96	82.84	99.93	99.99	100	99.99	100	99.98	99.88	100	82.42	100	99.98	90.60	99.91	100						
m_scan	100	99.98	100	99.99	73.27	100	99.94	100	100	100	99.75	99.92	100	99.98	100	99.99	73.27	100	99.97	99.99	100	100	84.48	99.96						
m_syn	99.98	100	100	99.99	99.94	99.99	100	100	99.98	99.96	70.37	99.99	99.98	100	100	99.99	99.94	99.99	99.99	100	99.99	99.98	82.59	99.99						
m_udp	81.75	99.97	100	91.80	99.97	99.99	100	100	100	100	100	100	81.75	99.97	100	91.80	99.97	99.99	89.96	99.99	100	95.72	99.98	99.99						
m_udpplain	100	100	100	99.99	99.99	100	99.95	100	99.95	99.46	99.97	98.61	100	100	100	99.99	99.99	100	99.98	99.98	100	99.72	99.98	99.30						
Overall	90.23	98.69	93.66	97.75	96.65	99.49	90.81	99.01	88.89	97.89	97.09	99.54	89.39	99.03	89.88	98.73	97.35	99.42	85.66	98.97	85.25	98.21	96.80	99.47						

Table 44: ASR Results of Setup 7 when malicious devices are ED1(Data Poisoning), ED2 (Model Poisoning), ED3(Backdoor Attack))

ASR (%) Adversarial Attack	ED1	ED2	ED3	ED4	ED5	ED6	Average
FGSM	21.77	5.90	10.98	12.55	11.64	7.46	11.71
BIM	22.22	5.92	11.04	12.79	12.01	11.58	12.59
PGD	20.82	5.32	10.37	10.22	10.64	7.87	10.87
Deep Fool	14.65	2.55	7.18	4.96	5.41	2.08	6.14

Table 45: Overall Performance of Setup 7 when Every ED when ED(s) is/are malicious (Data Poisoning, Model Poisoning , Backdoor Attack)

S No.	Malicious Device(s) - Attack(s) Type	Accuracy(%)						Precision(%)						Sensitivity(%)						F1 Score(%)					
		ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6	ED1	ED2	ED3	ED4	ED5	ED6
1	NONE	99.85	99.97	95.60	99.52	94.91	99.88	99.82	99.92	96.86	99.63	96.23	99.86	99.84	99.95	95.83	99.64	95.98	99.83	99.83	99.94	95.41	99.63	95.13	99.85
2	ED1-Data Poisoning	82.24	99.76	96.05	87.94	98.05	99.78	90.74	99.79	97.08	91.63	98.08	99.77	88.29	99.79	96.25	93.98	98.47	99.74	86.47	99.79	95.91	90.51	98.16	99.75
3	ED1-Data Poisoning ED2-Model Poisoning	92.75	99.88	96.02	89.79	95.71	99.92	88.87	99.87	97.06	94.67	96.56	99.90	88.79	99.88	96.22	95.07	96.58	99.88	84.70	99.88	95.88	92.88	95.94	99.89
4	ED1-Data Poisoning ED2-Model Poisoning ED3- Backdoor Attack	90.23	98.69	93.66	97.75	96.65	99.49	90.81	99.01	88.89	97.89	97.09	99.54	89.39	99.03	89.88	98.73	97.35	99.42	85.66	98.97	85.25	98.21	96.80	99.47

Table 46: Overall ASR of Setup 7 when Every ED when ED(s) is/are malicious (Data Poisoning, Model Poisoning , Backdoor Attack)

S No.	Malicious Device(s) -Attack(s) Type	ASR(%)			
		FGSM	BIM	PGD	Deep Fool
1	NONE	6.43	6.72	5.85	3.36
2	ED1-Data Poisoning	12.28	12.58	11.61	8.06
3	ED1-Data Poisoning ED2-Model Poisoning	11.69	12.01	10.84	6.53
4	ED1-Data Poisoning ED2-Model Poisoning ED3- Backdoor Attack	11.71	12.59	10.87	6.14