CERTIFICATE

This is to certify that the thesis entitled **"Performance Efficient Methods To Handle Zero-Day Attacks In Cloud Environment"** submitted to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, in partial fulfilment of the requirements for the award of the **Degree of Doctor of Philosophy in Computer Science,** is a record of original research work done by **Ms. Swathy Akshaya M (17PHCSF003)** during the period of her study in the Department of Computer Science at Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, under my Supervision and Guidance and the thesis has not formed the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or other similar title to any candidate of any University.

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DECLARATION

I, Swathy Akshaya, hereby declare that the thesis entitled **"Performance Efficient Methods To Handle Zero-Day Attacks In Cloud Environment"** submitted to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, in partial fulfilment of the requirements for the award of the **Degree of Doctor of Philosophy in Computer Science,** is a record of original research work done by me during the period of my study under the Supervision and Guidance of **Dr. G. Padmavathi, M.Sc.,M.Phil.,Ph.D.,** Former Professor, Department of Computer Science at Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, and it has not formed the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or other similar title to any candidate of any University.

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Swathy Akshaya .M

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ABBREVIATIONS

S.No.	Abbreviation	Description
1	AI	Artificial Intelligence
2	ANN	Artificial Neural Network
3	APT	Advanced Persistent Threat
4	BPNN	Back Propagation Neural Network
5	Bi-LSTM	Bidirectional Long Short-Term Memory
6	CIA	Confidentiality, Integrity, Availability
7	CNN	Convolutional Neural Network
8	CSOC	Cyber Security Operations Center
9	DCNN	Deep Convolutional Neural Network
10	DL	Deep Learning
11	DoS	Denial of Service
12	DDoS	Distributed Denial of Service
13	HMM	Hidden Markov Model
14	IDS	Intrusion Detection System
15	IG	Information Gain
16	IoT	Internet of Things
17	IPS	Intrusion Prevention System
18	IaaS	Infrastructure as a Service
19	ML	Machine Learning
20	NB	Naïve Bayes
21	NN	Neural Network
22	NVD	National Vulnerability Database
23	OS	Operating System
24	PZDA	Pseudo Zero-Day Attack
25	PPZDA	Potential for Pseudo Zero-Day Attack
26	POA	Potential for Attack
27	PRC	People's Republic of China
28	ResNet	Residual Network
29	SaaS	Software as a Service
30	SIEM	Security Information and Event Management

S.No.	Abbreviation	Description
31	SVM	Support Vector Machine
32	TL	Transfer Learning
33	USB	Universal Serial Bus
34	ZDA	Zero-Day Attack
35	DC-nZDA	Deep Convolutional Network for Zero-Day Attack Detection
36	OLFFOA	Optimized Lévy Flight Fruit Fly Optimization Algorithm
37	HPC	High-Performance Computing
38	CIDD	Cyber Intrusion Detection Dataset
39	CSOCs	Cyber Security Operations Centers
40	VisualPhishNet	Visual Phishing Detection Network
41	AI	Artificial Intelligence
42	ANN	Artificial Neural Network
43	BPNN	Back Propagation Neural Network
44	EBPNN	Enhanced Back Propagation Neural Network
45	BN	Bayesian Network
46	DL	Deep Learning
47	ML	Machine Learning
48	IDS	Intrusion Detection System
49	ZDA	Zero-Day Attack
50	OLFFOA	Optimized Lévy Flight Fruit Fly Optimization Algorithm
51	Bi-LSTM	Bidirectional Long Short-Term Memory
52	CNN	Convolutional Neural Network
53	ResNet50	Residual Network-50
54	OS	Operating System
55	CV	Correlation / Coefficient of Variation (used in NN context)
56	AUC	Area Under the Curve
57	SQL	Structured Query Language
58	VM	Virtual Machine
59	VMM	Virtual Machine Monitor
60	DFS	Depth First Search
61	PATH	Simulated Attack Path Dataset
62	GraphML	Graph Markup Language

S.No.	Abbreviation	Description
63	LOM	Local Observation Model
64	FP	False Positive
65	FN	False Negative
66	TP	True Positive
67	TN	True Negative
68	KDD	Knowledge Discovery in Databases
69	NSL-KDD	NSL Knowledge Discovery Dataset
70	CICIDS	Canadian Institute for Cybersecurity Intrusion Detection System
71	TTPs	Tactics, Techniques and Procedures
72	SODG	System Object Dependency Graph
73	ZePro	Zero-day Exploit Provenance
74	PATROL	Path-based Attack Tracking using Rule-based Object Linking
75	EDCNN	Enhanced Deep Convolutional Neural Network
76	AI	Artificial Intelligence
77	ML	Machine Learning
78	DL	Deep Learning
79	ANN	Artificial Neural Network
80	BPNN	Back Propagation Neural Network
81	EBPNN	Enhanced Back Propagation Neural Network
82	BN	Bayesian Network
83	CNN	Convolutional Neural Network
84	EDCNN	Enhanced Deep Convolutional Neural Network
85	Bi-LSTM	Bidirectional Long Short-Term Memory
86	ResNet50	Residual Network-50
87	IDS	Intrusion Detection System
88	ZDA	Zero-Day Attack
89	PZDA	Pseudo Zero-Day Attack
90	DC-nZDA	Deep Convolutional Network for Zero-Day Attack Detection
91	OLFFOA	Optimized Lévy Flight Fruit Fly Optimization Algorithm
92	SODG	System Object Dependency Graph
93	ZePro	Zero-day Exploit Provenance

S.No.	Abbreviation	Description
94	PATROL	Path-based Attack Tracking using Rule-based Object Linking
95	CSOC	Cyber Security Operations Center
96	CSOCs	Cyber Security Operations Centers
97	VM	Virtual Machine
98	VMM	Virtual Machine Monitor
99	OS	Operating System
100	SQL	Structured Query Language
101	DFS	Depth First Search
102	PATH	Simulated Attack Path Dataset
103	GraphML	Graph Markup Language
104	LOM	Local Observation Model
105	TP	True Positive
106	TN	True Negative
107	FP	False Positive
108	FN	False Negative
109	AUC	Area Under the Curve
110	CV	Coefficient of Variation
111	KDD	Knowledge Discovery in Databases
112	NSL-KDD	NSL Knowledge Discovery Dataset
113	CICIDS	Canadian Institute for Cybersecurity Intrusion Detection System
114	TTPs	Tactics, Techniques, and Procedures
115	HPC	High-Performance Computing
116	CIDD	Cyber Intrusion Detection Dataset
117	VisualPhishNet	Visual Phishing Detection Network
118	ScaleMalNet	Scalable Malware Detection Network