Project Synopsis

Title: AI-Powered Network Intrusion Detection System

Subtitle: Real-time Network Traffic Analysis Using Machine Learning

Student Name: Shaik Abdul Sameer

Enrollment No.: C24CA0572

Course: MCA Final Project

College: Andhra University, Visakhapatnam, Andhra Pradesh

1. Introduction

With the rapid growth of internet-based applications and online services, network security has become a critical concern. Intrusion Detection Systems (IDS) are essential for identifying unauthorized access, malicious activity, and potential security breaches in real-time. Traditional IDS methods rely on signature-based detection, which may fail to detect new or evolving attacks.

This project proposes an **AI-powered Network Intrusion Detection System** that leverages **machine learning algorithms** to detect suspicious patterns in network traffic. The system aims to improve detection accuracy and reduce false positives, providing a more robust network security solution.

2. Objectives

- Analyze network traffic to differentiate normal and abnormal behavior.
- Implement machine learning algorithms for real-time intrusion detection.
- Reduce false positives compared to traditional IDS methods.
- Provide a scalable solution for enterprise network environments.

3. Scope of the Project

- Monitoring live network traffic for anomalies.
- Classifying network events as normal or malicious using ML models.
- Generating alerts for detected intrusions.
- Potential integration with Security Information and Event Management (SIEM) systems.

4. Methodology

1. **Data Collection:** Capturing network packets from simulated or real network traffic.

2. **Preprocessing:** Cleaning and selecting relevant features from the network data.

3. **Machine Learning Model:**

    - Using supervised learning algorithms such as Random Forest, Decision Tree, or Support Vector Machine.

    - Training the model on labeled datasets of normal and malicious traffic.

4. **Real-time Detection:** Deploying the trained model to monitor incoming network traffic and classify intrusions.

5. **Evaluation:** Measuring performance using accuracy, precision, recall, and F1-score.

5. Tools and Technologies

- **Programming Language:** Python
- **Libraries/Frameworks:** Scikit-learn, Pandas, NumPy
- **Platform:** Virtual Kali Linux / Windows environment
- **Data Sources:** Public intrusion detection datasets (e.g., KDD Cup 1999, NSL-KDD)

- **Additional Tools:** Wireshark for packet capturing, Jupyter Notebook for analysis

6. Expected Outcomes

- A working AI-based IDS capable of detecting intrusions with high accuracy.
- Reduced false positives compared to traditional IDS.
- A prototype that can be extended for real-world enterprise network security monitoring.

7. References

1. Liao, H.-J., et al. “Intrusion Detection System: A Comprehensive Review.” *Journal of Network and Computer Applications*, 2013.

2. Kotsiantis, S. B., et al. “Supervised Machine Learning: A Review of Classification Techniques.” *Emerging Artificial Intelligence Applications in Computer Engineering*, 2007.

3. Tavallaee, M., et al. “A Detailed Analysis of the KDD Cup 1999 Data Set.” *IEEE Symposium on Computational Intelligence for Security and Defense Applications*, 2009.

ANDHRA UNIVERSITY
CENTRE FOR DISTANCE AND ONLINE EDUCATION
4th Semester Online MCA Program

PROFORMA FOR PROJECT PROPOSAL

Enrollment No C24CA0572 : C24CA0572

Name and Address of the Learner : Shaik Abdul Sameer
Anjaiya Nagar, Gachibowli, Hyd.

Mobile No : 8919346159

Title of the Project : AI-powered Network Intrusion Detection System [NIDS]

Name, Designation and Official Address of the Project guide : TUSHAR BADEKAR
AMAZON - AWS SPECIALIST
Mobile No: 7972171853
MADHAVAREDDY COLONY, GACHIBOWLI - HYD

Experience (in years) : Teaching _____ Executive ✓ 5-years

Sameer.
Signature of the Learner
Date:

Signature of the Project guide
Date:

Note: Enclose the Synopsis of the Proposed Project and Bio-data of the Project guide

Director
Centre for Distance and Online Education
Andhra University
Visakhapatnam-530003

Programme Coordinator
Centre for Distance and Online Education
Andhra University
Visakhapatnam

Annexure A

CERTIFICATE FROM GUIDE

This is to certify that this project entitled "AI-powered NIDS" submitted in partial fulfillment of the degree of MASTER IN COMPUTER APPLICATION (MCA) to the Andhra University done by Mr./Ms. SHAIK ABDUL SAMEER, Roll No. C24CA0572 is authentic work carried out by him/her under my guidance. The matter embodied in this project's work has not been submitted earlier for the award of any degree or diploma to the best of my knowledge and belief.

Sameer.
Signature of the student

Signature of the Guide

ANDHRA UNIVERSITY

CENTRE FOR DISTANCE AND ONLINE EDUCATION
ONLINE MCA PROGRAMME
4th SEMESTER

PROFORMA FOR PROJECT PROPOSAL APPROVAL

Enrollment No.: C24CA0572

Name and Address of the Learner: Shaik Abdul Sameer

Address: Anjaiya Nagar, Gachibowli, Hyderabad

Mobile No: 8919346159

Title of the Project: AI-powered Network Intrusion Detection System (NIDS)

Subject Area: Computer Science / Network Security / Machine Learning

---

Name, Designation, and Official Address of the Project Guide:

Name: Tushar Badekar

Designation: Amazon-AWS Specialist (ML/AI, Networking)

Address: Madhavareddy Colony, Gachibowli, Hyderabad

Qualification : MCA

University : JNTU hyderabad

Mobile No: 7972171853

Experience (in years):

- **Executive**: 5 years

Signature of the Learner: Sameer

Signature of the Project Guide

Date: 05/11/2025

Date: 05/11/2025

Note: Enclose the Synopsis of the Proposed Project and Bio-data of the Project guide.

Annexure – I: Guide Biodata

Guide Biodata

Name: Mr. Tushar Badekar
Designation: Amazon – AWS Specialist (ML/AI, Networking)
Qualification: MCA
University: JNTU Hyderabad

Professional Summary:
Mr. Tushar Badekar is an experienced IT professional specializing in cloud technologies, machine learning, and computer networking. He has extensive hands on experience with AWS infrastructure, AI-driven solutions, and secure network deployment practices.

Technical Expertise:

- Amazon Web Services (AWS)
- Machine Learning & Artificial Intelligence
- Networking and Cloud Security
- Data Analytics and Python Programming

Experience:

- AWS Specialist at Amazon (ML/AI & Networking domains)

Contact:

- Address: Madhavareddy Colony, Gachibowli, Hyderabad
- Mobile: 7972171853
- Email: gtusbade@amazon.com

Signature of the Guide: