**A Major Project Report**

**On**

# ANALYZING MACHINE LEARNING ALGORITHMS FOR INTRUSION DETECTION IN IOT NETWORKS

*Submitted in partial fulfilment of the requirements for the award of degree of*

**BACHELOR OF TECHNOLOGY**

**IN**

## COMPUTER SCIENCE AND ENGINEERING


**Under the Guidance of**

**Dr. C. ANJANAMMA**

**Associate Professor**

**BY**

**MANKALA MANASA DEVI (21D21A05A5)**

**PATLOLLA NISHITHA (21D21A05B6)**

**SANIA MASROOR (21D21A05C4)**




**Department of Computer Science and Engineering**

**SRIDEVI WOMEN'S ENGINEERING COLLEGE**

(An UGC Autonomous Institution)

(Estd. 2001 |Approved by AICTE& Govt. of TS |Affiliated to JNTUH

Accredited by NBA and NAAC (A++) |Certified with ISO 9001:2015)

**V.N. Pally, Gandipet, Hyderabad-75**


**2024-25**

**Department of Computer Science and Engineering**

# SRIDEVI WOMEN'S ENGINEERING COLLEGE

(An UGC Autonomous Institution)

(Estd. 2001 |Approved by AICTE & Govt. of TS |Affiliated to JNTUH

Accredited by NBA and NAAC(A++) |Certified with ISO 9001:2015)

**V.N. Pally, Gandipet, Hyderabad-75**

**2024-25**

## CERTIFICATE

This is to certify that the MAJOR PROJECT report entitled **"ANALYZING MACHINE LEARNING ALGORITHMS FOR INTRUSION DETECTION IN IOT NETWORKS"** is being submitted by **Mankala Manasa Devi (21D21A05A5), Patlolla Nishitha (21D21A05B6), Sania Masroor (21D21A05C4)** in partial fulfillment for the award of degree of **Bachelor of Technology** in **Computer Science and Engineering** is a record of Bonafide work carried out by them.

| INTERNAL GUIDE | COORDINATOR | HEAD OF THE DEPARTMENT |
|---|---|---|
| **Dr. C. ANJANAMMA** | **Dr. D. NAZIMODDIN** | **Dr. U. SRI LAKSHMI** |
| **Associate Professor** | **Associate Professor** | **Professor** |

**EXTERNAL EXAMINER**

TruProjects
Find Your Dream Projects

**DATE : 27-05- 2025**

## CERTIFICATE OF COMPLETION

This is to certify that the following students **MANKALA MANASA DEVI, PATLOLLA NISHITHA and SANIA MASROOR** bearing **with REG NO.: 21D21A05A5, 21D21A05B6 and 21D21A05C4** who are pursuing B.TECH (Computer Science & Engineering) at **SRIDEVI WOMEN'S ENGINEERING COLLEGE, HYDERABAD**, has successfully Completed their Mini Project Work at **TRUPROJECTS EDUCATIONAL SERVICES PRIVATE LIMITED** from **17th January, 2024 to 10th May, 2025** during the Major Project Work they worked on the Mini Project entitled **ANALYZING MACHINE LEARNING ALGORITHMS FOR INTRUSION DETECTION IN IoT NETWORKS.**

They were found punctual, hardworking and interested to learn the technologies during the Mini Project Work. They demonstrated good skills with self-motivate attitude towards learning.

Their association with the team was fruitful. We wish them all the best for future!

**Tru Projects**

J. Manoj Kumar

**J MANOJ KUMAR**

**Managing Director**

Tru Projects Educational Services Pvt. Ltd. HYDERABAD

RS BROTHERS BUILDING
The Pavani Prestige 407, 4th floor,
Ameerpet, Hyderabad, Telangana

info@truprojects.in
www.truprojects.in

+91 96761 90678

# DECLARATION

We, hereby declare that Major Project entitled **"Analyzing Machine Learning Algorithms for Intrusion Detection in IoT Networks"** is the work done during the period from **17th January, 2025** to **10th May, 2025** and is submitted in partial fulfillment of the requirements for the award of degree of Bachelor of Technology in Computer Science and Engineering from Jawaharlal Nehru Technological University, Hyderabad.

**MANKALA MANASA DEVI (21D21A05A5)**

**PATLOLLA NISHITHA (21D21A05B6)**

**SANIA MASROOR (21D21A05C4)**

# ACKNOWLEDGEMENT

We would like to express our sincere gratitude and indebtedness to our **Internal guide, Dr. C. ANJANAMMA, Associate Professor, Department of Computer Science and Engineering** for her valuable guidance, suggestions, and keen personal interest throughout the course of Major project and for her tireless patience in hearing all our seminars, minutely seeing all the reports and giving appropriate guidance and suggestions.

We are grateful for the support we received throughout the project and would like to express our sincere gratitude to our **Project Coordinator Dr. D. NAZIMODDIN, Associate Professor, Department of Computer Science and Engineering**, for his invaluable and timely coordination's throughout the Major Project work.

Our sincere gratitude goes out to **Dr. U. SRI LAKSHMI, Professor and Head of the Department, Department of Computer Science and Engineering**, for her insightful counsel and recommendations.

We also like to express our gratitude to **Dean Academics, Dr. K. SIVA NAGI REDDY, Professor, Sridevi Women's Engineering College**, for his valuable advice and insightful comments.

We are also extremely thankful to our **Principal Dr. A. NARMADA, Sridevi Women's Engineering College,** for her precious guidance and invaluable suggestions.

Finally, we would like to take this opportunity to thank all our faculty, family and friends for their support throughout this work. We also sincerely acknowledge and thank all those who gave directly or indirectly their support in completion of Major Project work.

**MANKALA MANASA DEVI** **(21D21A05A5)**

**PATLOLLA NISHITHA** **(21D21A05B6)**

**SANIA MASROOR** **(21D21A05C4)**

# LIST OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# ABSTRACT

This study presents a comprehensive analysis of machine learning algorithms in IoT Intrusion Detection Systems (IDS), focusing on critical aspects like accuracy, precision, recall, and F1 score. We examine the effect of data preparation methods—including normalization, outlier removal, standardization, and regularization—on model performance. The influence of dataset balancing, both balanced and unbalanced, is also assessed across four key IoT-focused datasets: CIC-IDS 2017, CIC-IoT-2023, IoT-ID20, and UNSW-NB15. To improve feature quality, ANOVA-based feature selection is applied. Eight algorithms, including Naive Bayes, K-Nearest Neighbors (KNN), AdaBoost, XGBoost, Support Vector Classifier (SVC), Logistic Regression, Decision Tree, and a Voting Classifier (comprising Boosted Decision Tree, Random Forest, and Bagging Extra Trees), are evaluated. Among these, the Voting Classifier ensemble demonstrated the highest performance in accuracy and overall classification metrics. This research highlights the potential of ensemble learning to optimize detection capabilities in IoT IDS, providing a robust framework for future developments in IoT security.