



## **BMS College of Engineering**

### **Department of Information Science and Engineering**

**Project – AY- 2024-2025**

**Course : Project Phase 1**

**Semester :6**

**Course code: 23IS6PWPW1**

**Batch No: 46**

**Project Title: Simulation Based Evaluation of Cryptographic techniques,Traffic Optimisation,Disaster Management using VANETs**

#### **Team Members**

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## 1. ABSTRACT

Vehicular Ad-Hoc Networks (VANETs) are a backbone of modern Intelligent Transportation Systems (ITS), that provide seamless communication between vehicles and infrastructure. However it is critical to ensure secure communication despite various attacks. This project aims to develop a unique and secure VANET framework leveraging either Machine Learning for intrusion detection or using Post Quantum Cryptographic methods for long term security while also simultaneously optimizing traffic light signals in smart cities using Road Side Units (RSU). The project delivers simulations using tools like SUMO, NS3 and evaluates both RSU based traffic optimization and security models to provide a comprehensive VANET framework that nurtures the development of smart cities. The work also aligns with the SDG 9 and 11 which is to build resilient infrastructure, promote sustainable urban mobility, and improve road safety, ultimately enabling the transition towards future-ready smart cities.

## 2. Project Overview:

### a. Objectives

- I. Intelligent Traffic Signal Optimization Using RSUs as an alternative to the existing VAC system that reduces congestion and delays.
- II. Reduce the secondary disasters in rough terrain by establishing V2V communication.
- III. Secure Communication in VANETs using either of the 2 approaches of ML based intrusion detection or Post Quantum Cryptography for real time and efficient approach.
- IV. Use simulation tools SUMO, NS3 for analyzing network performance and evaluate accuracy and efficiency in different scenarios.

### b. Scope

- I. **Traffic Management & Optimization:** To improve traffic flow and lessen congestion in smart cities, AI-driven traffic light control and RSU-based vehicle density estimation are used.
- II. **Simulation & Evaluation:** Uses Grafana/Kibana dashboards to visualize real-time traffic and security alerts, compares security models, and analyzes network performance using NS-3.
- III. **Secure Communication in VANETs** – Implements ML-based intrusion detection or Post-Quantum Cryptography (PQC) to enhance cybersecurity and ensure secure V2V and V2I communication.

### 3. Tech Stack

STEP	COMPONENT	TOOL/ TECHNOLOGY	PURPOSE
Vehicle Simulation	Traffic & Vehicle Movement	SUMO (Simulation of Urban Mobility)	Simulates roads, vehicle behaviors, and congestion patterns
Network Communication	VANET Protocols & Data Exchange	NS-3	Simulates V2V (Vehicle-to-Vehicle) and V2I (Vehicle-to-Infrastructure) communication
Radar Signal Transmission	RSU-Based Data Gathering	Python Sockets / MATLAB	Simulates radar-based vehicle density estimation
Traffic Light Processing & Control	AI-Based Signal Optimization	Python + AI (TensorFlow/PyTorch)	
Intrusion Detection System (IDS) [Option 1]	ML-Based Security	Scikit-Learn, TensorFlow, PyTorch	Detects cyber threats like Sybil attacks and DoS using ML models
Post-Quantum Cryptography (PQC) [Option 2]	Future-Proof Security	Kyber, Dilithium, NTRU (From Open Quantum Safe)	Implements quantum-resistant encryption for VANET communication
Cryptography Implementation	Secure Data Exchange	OpenSSL / Libsodium / PyCryptodome	Handles encryption, authentication, and key management
Cloud Data Upload & Storage	Data Processing & Backup	Firebase, AWS, Google Cloud	Stores security logs and traffic analytics for further analysis
Real-Time Data Visualization	System Monitoring	Grafana, Kibana, Flask/Django Dashboards	Displays network security alerts and traffic flow patterns

#### 4. Project outcomes (Research papers, patent, product)

**Research paper:** We aim to publish the simulation results showcasing the effectiveness of proposed methods in VANET for traffic, disaster management and cryptographic techniques in communication in reputed journals

**Product:** We aim to deliver simulations for the above said approaches in VANET and security aligning with smart city projects .

Synopsis : Accepted

Yes	No
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Name of the Guide: Dr. Sowmya K S	Signature of Team Members
Signature of the Guide:	