**Project Title:** ANPR and ATCC for Smart Traffic Management

**Project Statement:**

This project aims to develop an intelligent traffic management system using Automatic Number Plate Recognition (ANPR) and Automatic Traffic Classification and Control (ATCC). By leveraging Deep Learning and Object Detection techniques, the system will automate traffic monitoring and control in smart city environments. ANPR will detect and recognize vehicle license plates, while ATCC will classify different types of traffic and automate traffic signals accordingly. The system will improve traffic flow, reduce congestion, and enhance road safety.

**Outcomes:**

* Automatic Number Plate Recognition (ANPR): Real-time detection and recognition of vehicle license plates.
* Automatic Traffic Classification and Control (ATCC): Automated classification of vehicles (e.g., cars, trucks, motorcycles) and dynamic control of traffic signals based on traffic volume.
* Efficient Traffic Management: Reduce congestion and optimize traffic flow by automating traffic control processes.
* Smart City Integration: Seamless integration into smart city infrastructures for enhanced urban mobility and road safety.

**Modules to be Implemented:**

1. ANPR (Automatic Number Plate Recognition)
2. ATCC (Automatic Traffic Classification and Control)
3. System Integration and Optimization
4. Testing and Validation

**Milestone 1: Weeks 1-3**

**Module 1:** ANPR (Automatic Number Plate Recognition) **Objective:** Implement the ANPR system to detect and recognize vehicle license plates in real-time.

**Tasks:**

* Develop a Deep Learning-based model to detect and extract vehicle license plates from video or image feeds.
* Implement Optical Character Recognition (OCR) to read the alphanumeric characters on the license plates.
* Integrate the ANPR system with traffic cameras to monitor vehicle movements and store recognized plate numbers in a database.

**Milestone 2: Weeks 4-6**

**Module 2:** ATCC (Automatic Traffic Classification and Control) **Objective:** Implement the ATCC system to classify different types of traffic and automate traffic control mechanisms.

**Tasks:**

* Develop a vehicle classification model using Deep Learning to identify different types of vehicles (e.g., cars, trucks, buses, motorcycles).
* Implement dynamic traffic signal control based on real-time traffic classification and volume.
* Integrate the ATCC system with existing traffic signal control infrastructure for automated traffic management.

**Milestone 3: Weeks 7-8**

**Module 3:** System Integration and Optimization **Objective:** Integrate the ANPR and ATCC systems into a unified traffic management platform and optimize performance.

**Tasks:**

* Combine the ANPR and ATCC systems to form a comprehensive traffic management solution.
* Optimize the system for real-time performance and accuracy in recognizing plates and classifying traffic.
* Ensure smooth data exchange between the ANPR, ATCC, and traffic control systems for efficient decision-making.

**Milestone 4: Weeks 9-10**

**Module 4:** Testing and Validation **Objective:** Test the system in real-world traffic conditions and validate its accuracy, reliability, and performance.

**Tasks:**

* Conduct testing on live traffic data to evaluate the ANPR system’s accuracy in detecting and recognizing license plates.
* Test the ATCC system’s ability to classify vehicles correctly and adjust traffic signals dynamically based on traffic conditions.
* Validate the system’s overall performance, focusing on accuracy, real-time responsiveness, and integration with smart city traffic systems.

**Evaluation Criteria:**

**Milestone 1 Evaluation (Week 3):**Successful implementation of the ANPR system with accurate recognition of vehicle license plates from video feeds.

**Milestone 2 Evaluation (Week 6):**Completion of the ATCC system with accurate vehicle classification and dynamic traffic signal control based on real-time traffic data.

**Milestone 3 Evaluation (Week 8):**Successful integration of ANPR and ATCC systems into a unified platform with optimized real-time performance for traffic management.

**Milestone 4 Evaluation (Week 10):**Validation of the system’s performance in real-world conditions, ensuring accuracy in vehicle recognition and classification, and effective control of traffic signals.