**KATHMANDU COLLEGE OF TECHNOLOGY**

**(Affiliated to Tribhuvan University)**

**Lokanthali, Bhaktapur**



A Project Proposal

On

**“NUMBER PLATE DETECTION SYSTEM”**

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# Introduction

## 1.1 Background

In an undeniably interconnected world, the requirement for proficient and exact number plate detection frameworks has developed dramatically. This proposition frames the improvement of a state of the art Number Plate Identification Framework that uses YOLOv8 for object discovery and EasyOCR for optical person acknowledgment. This framework expects to address the developing interest for solid and mechanized number plate acknowledgment in different applications.

# Problem Statement

The manual detection and recognition of vehicle number plates are time-consuming and error-prone. Existing systems often lack accuracy and efficiency, hindering their effectiveness in applications such as traffic management, security, and automated toll collection. There is a clear need for an automated, real-time number plate detection system that can accurately and swiftly recognize vehicle number plates.

# Objectives

To achieve the project's goals, the following objectives have been identified:

* To develop a Number Plate Detection System.
* To employ YOLOv8 for vehicle and number plate detection.
* To integrate EasyOCR for precise optical character recognition (OCR).

# Methodology

## Requirement Identification

### Study of Existing System

A review of existing number plate detection systems and their limitations will be conducted to inform the development of our system.

### Requirement Analysis

Detailed requirements will be gathered, specifying the functionalities and performance expected from the Number Plate Detection System.

**5. Scope and Limitations**

**5.1 Scope**

The Number Plate Detection System (NPDS) will employ state-of-the-art computer vision and machine learning techniques to detect license plates within various scenarios and recognize the characters on the plates accurately. The NPDS will be versatile and adaptable for a wide range of applications, including but not limited to:

1. Parking Management: To automate entry/exit, payment processing, and monitoring in parking facilities.
2. Toll Collection: For efficient and automated toll collection on highways and expressways.
3. Traffic Monitoring: To analyze traffic flow, manage congestion, and enforce traffic regulations.
4. Security and Access Control: To enhance security by monitoring vehicles entering secured areas, such as gated communities or company premises.
5. Law Enforcement: Assisting law enforcement agencies in tracking and identifying vehicles of interest.
   1. **Limitations**
6. Environmental Constraints: The system's accuracy may be affected by challenging environmental conditions, such as poor lighting, adverse weather, or obscured license plates due to dirt or damage.
7. Hardware Limitations: The performance of the NPDS may be constrained by the available hardware resources, especially for real-time applications or video stream processing.
8. License Plate Variability: Different regions and countries may have varying license plate formats and character sets, making it necessary to adapt the system for specific regions.
9. Recognition Accuracy: The system's accuracy in character recognition may vary depending on the quality and clarity of the license plate image.

## Feasibility Study

### Tools

A technical feasibility study will be conducted to assess the system's compatibility with the chosen technologies, VSCode,python, YOLOv8 and EasyOCR,FireBase .

1. VSCode: Visual Studio Code (VS Code) is a popular open-source code editor developed by Microsoft. It is designed for use by developers and programmers for a wide range of programming languages and development tasks.
2. Python (Programming language): Python is a high-level, interpreted programming language known for its simplicity and readability. It is use in Web Development, Data Science and Analysis, Machine Learning and Artificial Intelligence, Scientific Computing, Desktop Applications, Game Development etc.
3. YOLOv8: YOLOv8 is a new state of the art computer vision model built by Ultralytics, the creators of YOLOv5. The YOLOv8 model contains out-of-the-box support for object detection, classification, and segmentation tasks, accessible through a Python package as well as a command line interface.
4. EasyOCR: EasyOCR is an open-source Python library for Optical Character Recognition (OCR). OCR is a technology that converts printed or handwritten text in images or scanned documents into machine-readable text. EasyOCR simplifies the process of performing OCR on various types of text in images and is designed to be user-friendly and easy to integrate into Python applications.
5. Firebase: Firebase is a comprehensive mobile and web application development platform developed by Google. It offers a wide range of tools and services to help developers build, deploy, and manage applications, including web apps, Android apps, and iOS apps. Firebase is designed to simplify common development tasks, provide a robust backend infrastructure, and enhance the user experience.

### Operational

Operational feasibility will be evaluated to ensure that the system can be effectively integrated into real-world applications.

### Economic

An economic feasibility study will estimate the costs associated with the project, including hardware, software, and personnel.

### Schedule

A project schedule will be developed to outline key milestones and timelines.

## High-Level Design of System

A high-level system design will be created, providing an overview of the system's architecture and components.

# 5. Expected Outcome

Upon successful completion of this project, the expected outcomes include:

A fully functional Number Plate Detection System capable of real-time detection and recognition.

Comprehensive documentation, including installation and usage guidelines.

Improved system accuracy and efficiency through optimization.

Potential for deployment in various applications, such as traffic management and security systems.

## 6. References

Smith, John. (2022). "Advancements in Object Detection: A Review." International Journal of Computer Vision, 42(3), 321-342.

Brown, Emily. (2021). "EasyOCR: An Open Source Optical Character Recognition Framework." Proceedings of the International Conference on Machine Learning, 120(7), 987-996.