Group Members:

Ali Imran 70137526

Anum   70137457

Farheen   70131552

Smart Parking System Documentation

1. Introduction
This document provides complete documentation for the Smart Parking System project. The system uses Optical Character Recognition (OCR) and Machine Learning techniques to automatically detect vehicle license plates and verify whether a vehicle is registered to allow or deny parking access.

2. Project Objectives
- Automate parking access control
- Reduce manual verification
- Improve security and efficiency
- Use OCR for real-time number plate recognition

3. Technologies Used
• Python
• Google Colab
• EasyOCR
• OpenCV
• Pandas
• Matplotlib
• Google Drive Dataset

4. Dataset Description
The dataset contains 433 vehicle images stored in multiple folders. Each image includes a vehicle license plate. The dataset is downloaded from Google Drive and extracted automatically using Python scripts.

5. System Architecture
1. Dataset Download
2. Image Processing
3. OCR Text Extraction
4. Plate Number Storage

5. User Image Upload
6. Plate Matching
7. Access Decision

6. OCR Processing

EasyOCR is used to extract text from vehicle images. The extracted plate numbers are converted to uppercase and stored in a Pandas DataFrame for matching.

7. Parking Verification Process

When a user uploads a vehicle image:
- OCR extracts the plate number
- The system compares it with registered plates
- If matched, parking is allowed
- Otherwise, access is denied

8. Results

• Total Registered Plates: 433
• OCR successfully detects most plates
• Some noisy images produce incorrect results
• System works efficiently in real-time scenarios

9. Limitations

- OCR accuracy depends on image quality
- Blurred or angled plates reduce detection accuracy
- GPU is recommended for faster processing

10. Future Enhancements

- Integrate real-time CCTV cameras
- Use deep learning-based plate detection
- Add database & web dashboard
- Improve OCR accuracy using custom models

11. Conclusion

The Smart Parking System successfully demonstrates how OCR and AI can automate vehicle access control. The system improves security, efficiency, and scalability for smart cities.