Campus Entrance Vehicle Control System

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Abstract: **We made the Campus Entrance Vehicle Control System to improve the safety at the main gate of our college. Sometimes vehicles enter the campus without permission, and that can be a security problem. So, we developed a mobile app that uses OCR (Optical Character Recognition) to scan the number plates of vehicles. When a vehicle arrives at the gate, the security person can scan its number plate using the app. If the number is already saved in the college's database, it means the vehicle is authorized and is allowed to enter. But if the number is not found, then it is treated as a guest vehicle, and its details are saved in the system as a guest entry. Our app also includes a login page for admin, a dashboard to manage and view reports, and sections to see:**

- **Authorized users**
- **Vehicle entry/exit records**
- **Guest visit records**

This system helps avoid manual writing, saves time, and makes the process faster and more secure. It also keeps proper records of all vehicles, which helps the college maintain safety and manage entries more transparently.

Keywords: **Campus Entrance Vehicle Control System, OCR (Optical Character Recognition), number plates, security problem.**

1. INTRODUCTION

In many colleges and educational institutes, the process of checking vehicles at the campus gate is done manually. Security guards usually note down the vehicle number in a register or sometimes even allow vehicles inside without checking properly. This can be risky because unauthorized or unknown vehicles might enter the campus, and that can create security issues for students, staff, and campus property. To solve this problem, we decided to develop a smart solution called the Campus Entrance Vehicle Control System. This project is based on Android technology and uses a mobile phone to scan vehicle number plates at the gate. We have used OCR (Optical Character Recognition) technology, which helps the camera read the vehicle's number plate. If the scanned number is already saved in the college database, it means the vehicle is authorized, and the system allows it to enter. But if the number is not found, then it is marked as a guest or unauthorized vehicle, and its entry is saved in a guest visit report. This way, even unregistered vehicles are tracked and managed properly.

Our system includes many helpful features such as:

- Admin login page – Only the authorized user can access the system.
- Dashboard – To view different types of reports and monitor vehicle activity in one place.
- Allowed users list – This stores details of vehicles and people who are regularly allowed inside.
- Guest visit report – Keeps track of unknown or new vehicles that visit the campus.
- Entry and exit time records – The system automatically saves the date and time when a vehicle enters or exits.

The main purpose of this system is to make the vehicle entry process automatic, fast, and secure. It reduces the need for manual writing and improves the overall safety and management of the campus. Also, using this digital method keeps all the data organized and makes it easier for the administration to track and monitor every entry.

2. RELATED WORK

Before starting our project, we first looked at how other places manage vehicle entry and security. We observed different vehicle monitoring systems used in housing societies, companies, and public areas like malls or toll booths. We saw that many of these places use methods like RFID cards, QR codes, or manual registers. In the manual system, security guards write down the vehicle number, time, and name of the visitor. But this method is not very accurate and can have human mistakes like writing wrong numbers or forgetting to enter data. Also, it's very time-consuming and hard to check previous entries quickly. Then we studied systems using RFID cards or QR codes. These are better than manual methods, but they also have problems. For example, users must carry their card or QR code every time. If they lose it or forget it, they can't enter. Also, these systems may need extra hardware and setup, which increases the cost and maintenance. After that, we looked at advanced systems that use number plate recognition technology. These systems scan vehicle number plates using high-resolution cameras and then compare the number with a database. This method is used in toll plazas, smart cities, and gated communities. These systems are very accurate and fully automatic, but they are very expensive, need high-end hardware, and are not suitable for small institutions like a college campus. So, after understanding the pros and cons of all these systems, we decided to create our own solution that is simple, affordable, and perfect for colleges. We made an Android-based app that uses OCR (Optical Character Recognition) to scan the vehicle's number plate using a normal mobile camera. It then checks the number in the college database. This system is easy to use, doesn't need any costly equipment like RFID scanners or special cameras, and still keeps all records safely in a database. It gives better accuracy than manual systems, is cheaper than advanced systems, and is perfect for college-level security needs.

3. OBJECTIVE

The main purpose of our project is to make the vehicle entry system at the college gate safer, faster, and smarter. Below are the main goals we focused on while developing this project:

1. To improve college gate security

The main aim is to stop unknown or unauthorized vehicles from entering the campus. We do this by scanning the vehicle number plate and checking if it's already registered in the system. If it's authorized, the gate entry is allowed; otherwise, it is blocked or marked as a guest.

2. To reduce manual work

In many places, vehicle details are written down in a notebook by security guards. This process takes time and can have mistakes. Our system replaces that manual process with a simple mobile app, which saves time and is more accurate.

3. To keep proper records

Every time a vehicle enters or exits, the system automatically saves its number along with the date and time. So, there's no need to write anything by hand, and records can be checked anytime later if needed.

4. To make a simple and easy-to-use app

We wanted to make sure that even non-technical staff can use the app easily. So, we designed the app to be user-friendly, with clear buttons and a simple layout, so that any security guard can operate it without training.

5. To track guest or unauthorized vehicles

If a vehicle's number is not in the database, the system doesn't reject it completely—it marks it as a guest and saves the details in a separate report. This helps in tracking who visited the campus and when, even if the person was not already registered.

6. To use simple and cost-effective technology

We didn't want the system to be too expensive or hard to set up. That's why we used a mobile phone camera for scanning and MySQL database for storing data. This keeps the system simple, affordable, and perfect for college or school use.

4. LITERATURE REVIEW

Before working on our project, we studied different systems that are already used to manage vehicle entry in places like societies, offices, toll booths, and smart cities. From this research, we found that there are mainly three types of systems used:

1. RFID-based systems

These systems use RFID cards or tags. When a vehicle comes near the gate, the RFID reader scans the tag and checks if the vehicle is allowed. This method is fast and automatic, but it requires special hardware like RFID scanners and tags, which can be expensive for small institutions like colleges.

2. QR Code-based systems

In this method, each vehicle is given a QR code that is scanned at the entrance using a scanner or mobile app. This system is also useful, but it depends on internet access and needs regular maintenance. If the QR code is not clear or the network is slow, it can cause problems.

3. License Plate Recognition (LPR)

This is an advanced method that uses cameras and image processing to read the number plate of the vehicle. It's mostly used in toll booths, metro cities, and big societies. It is very accurate and automatic, but it also requires high-quality cameras and powerful software, which makes it costly and difficult to set up in smaller places.

After learning about these systems, we wanted to build something that is simple, low-cost, and easy to use for a college campus. So, we decided to use OCR (Optical Character Recognition) technology, where the mobile camera scans the vehicle number plate and checks it in the college database. We used a mobile app to scan and a MySQL database to store the data. This way, we avoided the need for expensive equipment like RFID scanners or high-end cameras.

We also read from different research papers that a good vehicle control system should include:

- Real-time tracking and monitoring

- Saving data automatically in a database

- Easy-to-use interface for security staff

So, we made sure to include these features in our system. Our project is a perfect balance between simple manual systems and expensive smart systems. It's affordable, efficient, and user-friendly, especially for college use.
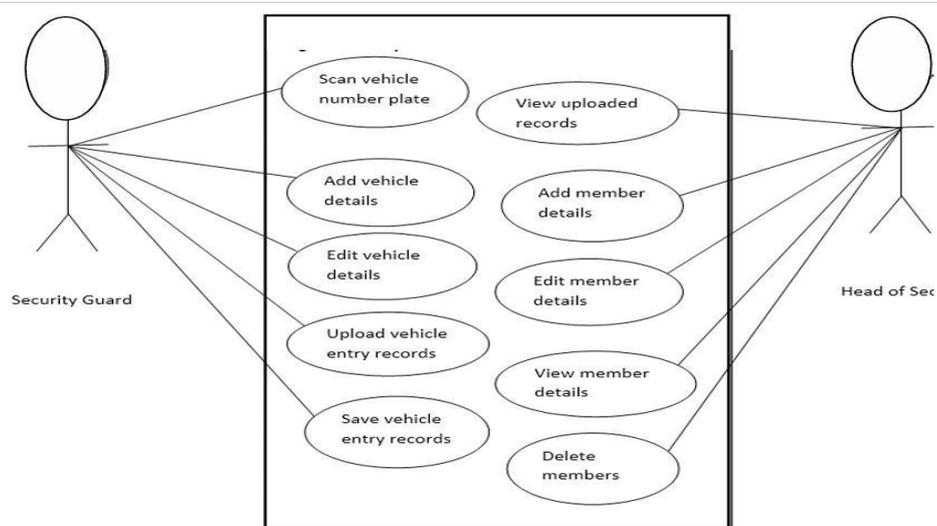

Fig.1 Use Case Diagram

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 12, Issue 1, pp: (57-66), Month: April 2025 – September 2025, Available at: **www.paperpublications.org**

5. OVERALL READINESS

Our project, Campus Entrance Vehicle Control System, is now completely ready to use. We have finished all the steps like planning, coding, testing, and final setup. The Android app is working smoothly, and all the main features such as number plate scanning, guest entry saving, and storing data in the database are working properly. We have tested the system with both authorized and unauthorized vehicle numbers, and it is giving the correct results every time. The app is very simple, so even a security guard or anyone with basic knowledge can use it easily. All vehicle records, entry time, and guest details are saved in the database and can be viewed whenever needed. The best part is that the system does not need expensive hardware. Just a mobile phone with a camera is enough to run it. This makes it easy to use and budget-friendly, especially for colleges and small campuses. We have also taken care to write clean code and design the app in a way that is stable and user-friendly.

So overall, our project is completely ready for real use. It can help make college entrances more secure, reduce manual work, and keep proper records of every vehicle that enters the campus.
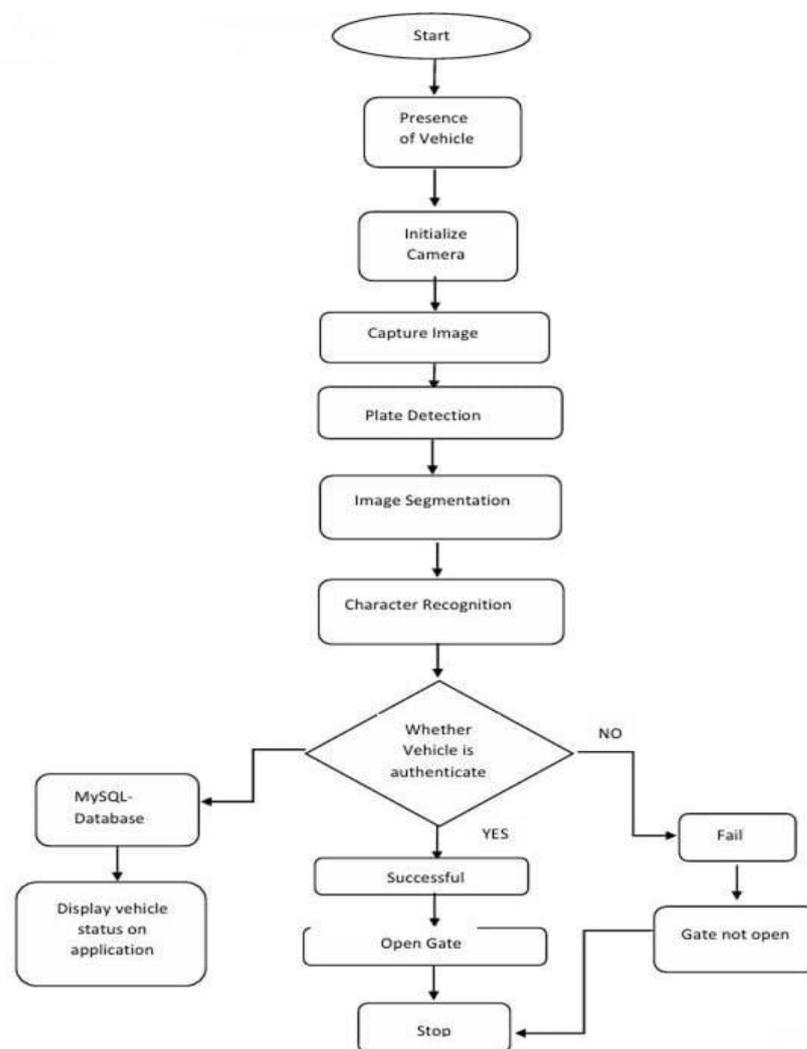

Fig .2 flow diagram.

6. RESULT AND ANALYSIS

o After completing the project, we tested all the features of our Campus Entrance Vehicle Control System, and the final results were successful. The app is working as expected. It scans vehicle number plates using a mobile phone camera and checks whether the vehicle is authorized or not. If the vehicle is registered in the system, it is allowed to enter, and its entry is saved. If it is not registered, it is marked as a guest, and the data is stored separately.

o   We tested the system with different vehicle numbers, and it gave accurate and quick results. The data was correctly saved in the database along with the date and time, and all reports like allowed users, guest visits, and vehicle logs were generated properly.

o   The mobile app is also very easy to use, even for people who are not from a technical background, like security guards. There is no need for any special training to use the system. Also, since we are using only a mobile phone for scanning and storing the data on MySQL, the setup is very simple and low-cost.

o   From our analysis, we can say that the system is very helpful for improving security, reducing manual work, and maintaining proper entry records at any college or school gate. The system can also be used in small offices, societies, or other places where entry control is important.

o   So overall, the outcome of our project is positive, and it meets all the goals we had planned at the beginning.

7. ADVANTAGES AND DISADVANTAGES

Advantages:

1. Improves Security

Our system helps to stop unauthorized vehicles from entering the campus, which increases the overall safety of students and staff.

2. Saves Time and Effort

There is no need to manually write down vehicle details in a register. The app scans and saves everything automatically.

3. Easy to Use

The mobile app is simple, so even security guards or non-technical users can use it without any training.

4. Low Cost

The system only needs a mobile phone with a camera. No expensive hardware is required, which makes it affordable for colleges and small campuses.

5. Proper Record Keeping

All entries and exits are saved in the database with date and time, so we can check the data anytime if needed.

6. Guest Tracking

Even if a vehicle is not registered, the system still saves its entry under the guest list for better tracking.

Disadvantages:

1. Depends on Mobile Camera Quality

If the mobile camera is not clear or the number plate is dirty or damaged, the system may not read it properly.

2. Needs Internet or Network Access

The app may need a stable internet or local network connection to sync with the database, especially for live updates.

3. Limited to Number Plate Recognition

If someone uses a fake or duplicate number plate, the system might not be able to detect it, unless extra features like face recognition are added.
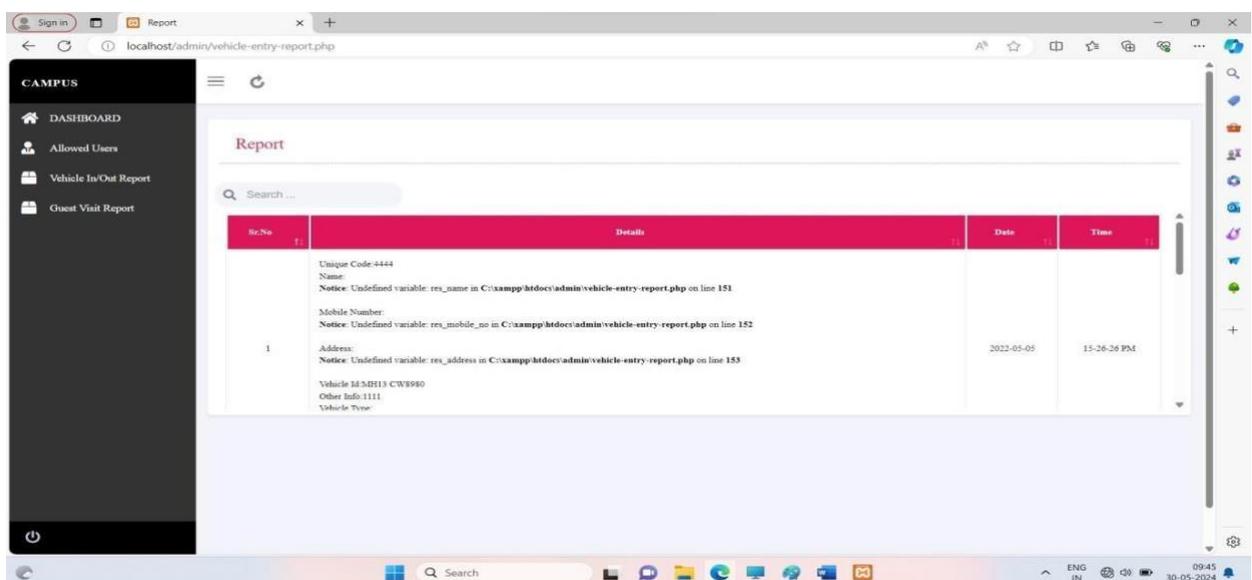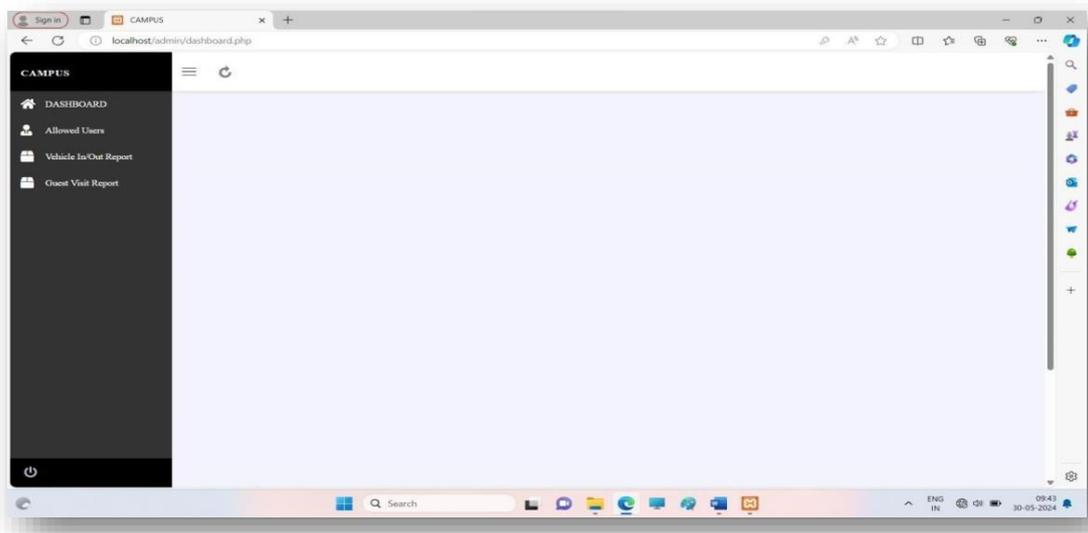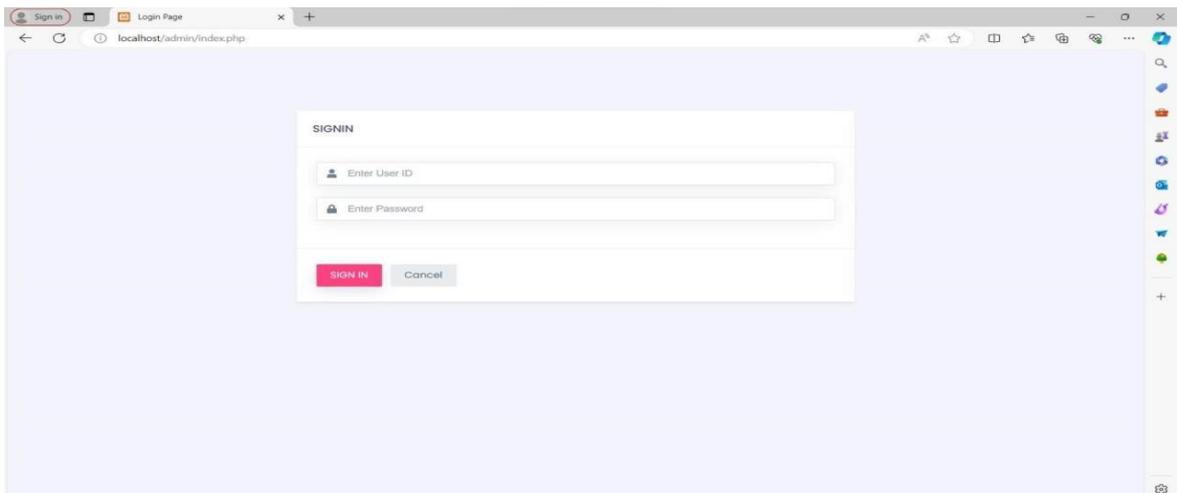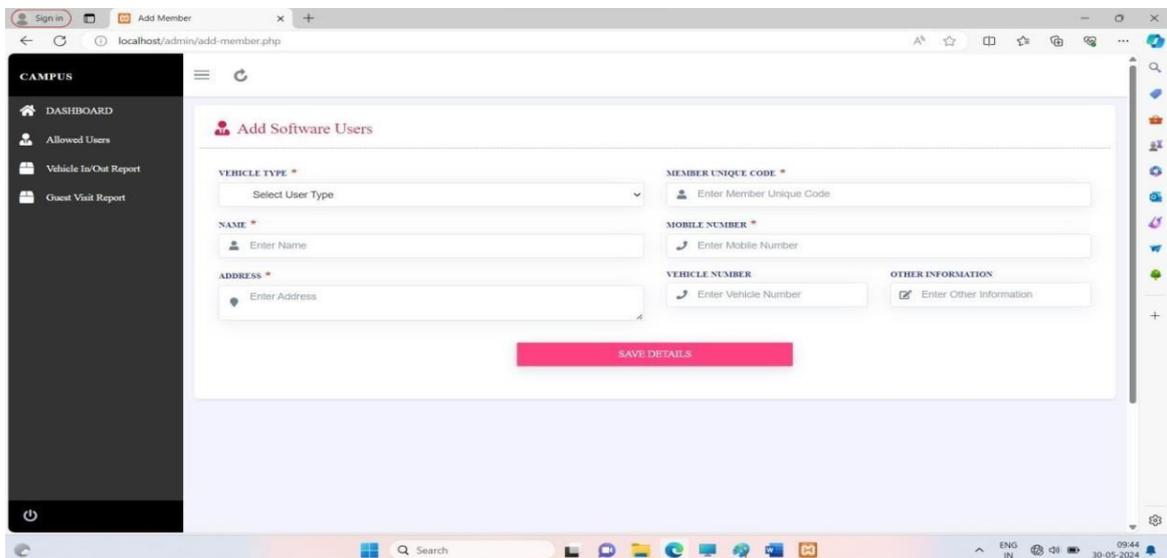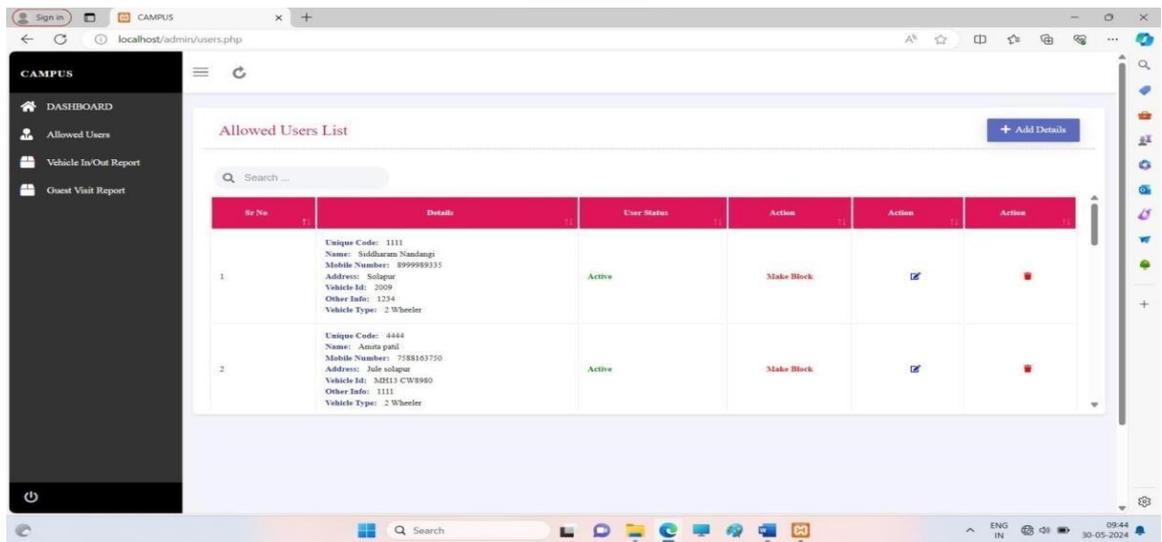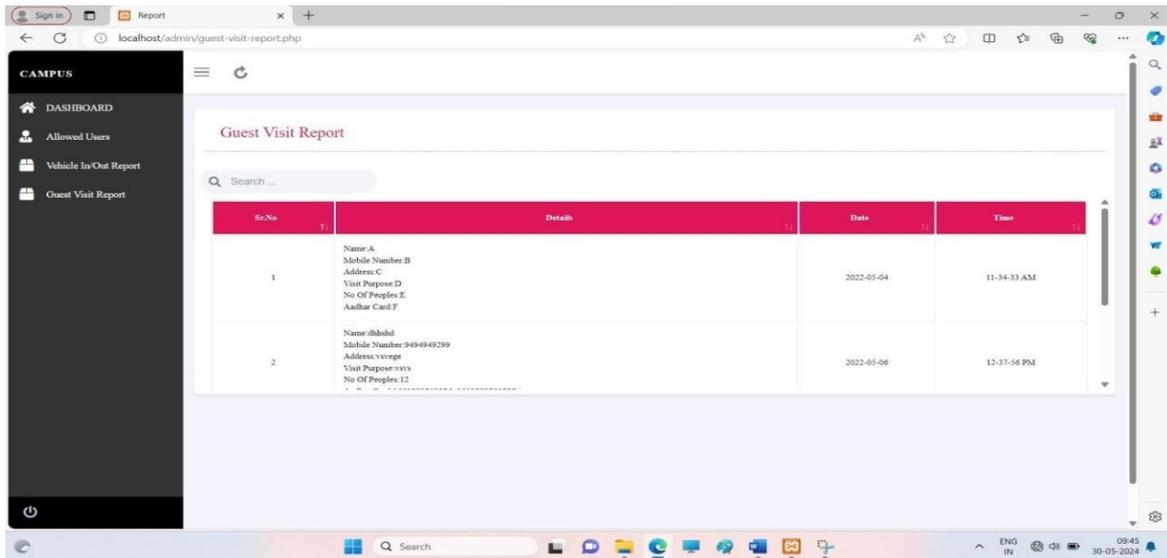
4. No Gate Automation

Our current system only shows if the vehicle is authorized or not — it does not automatically open or close the gate (that would need hardware integration).

8. FINAL OUTCOME
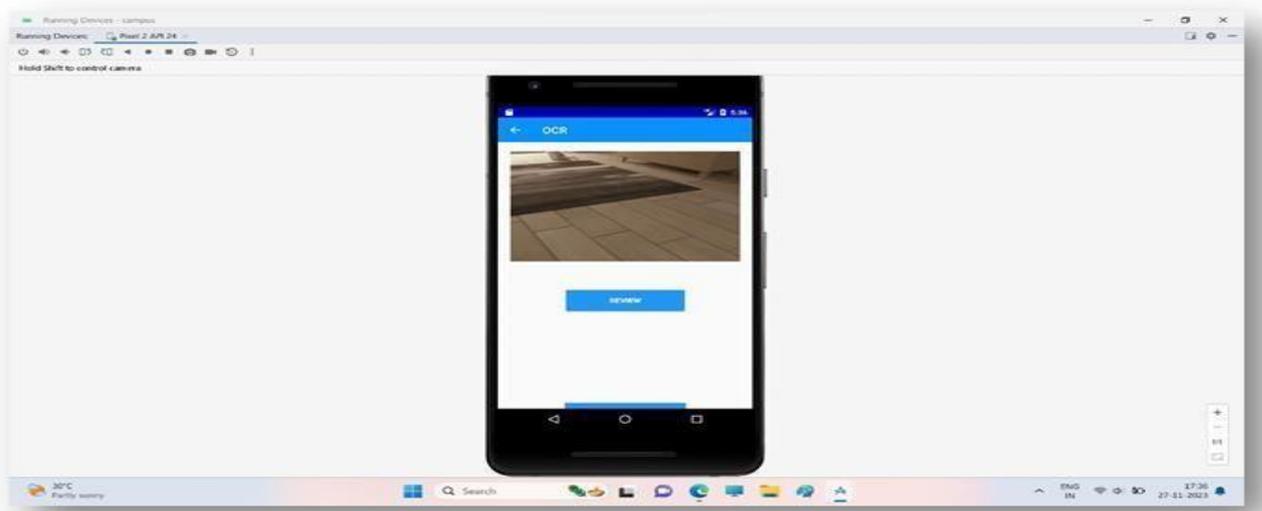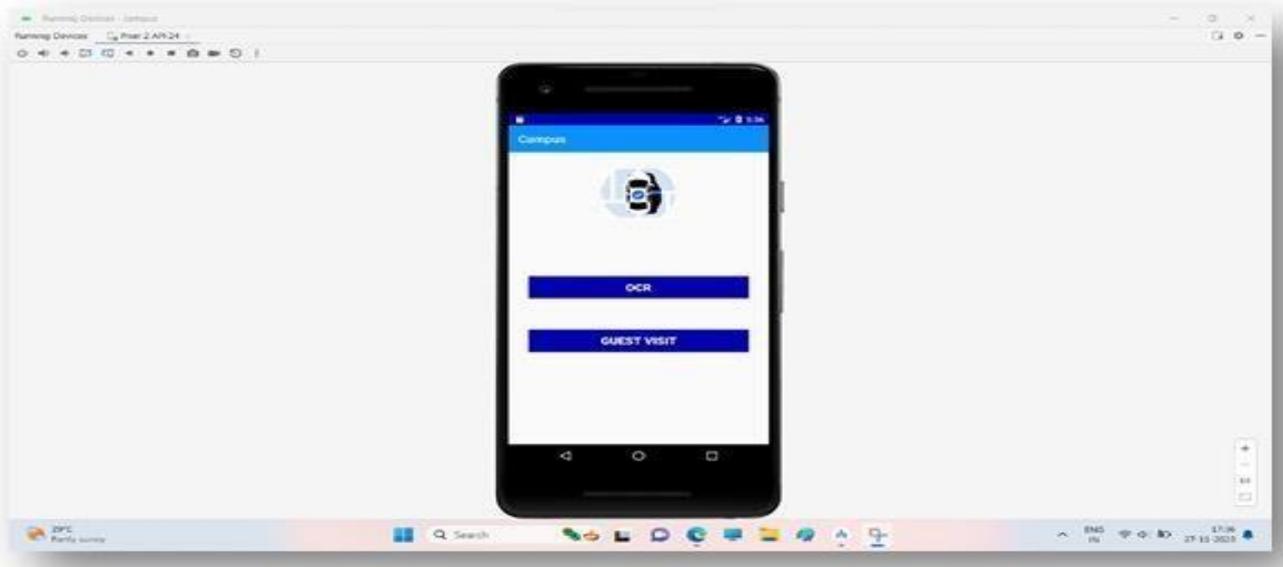
9. APPLICATION

1. **College and School Campuses**

This system is very useful for colleges or schools to manage and control the entry of vehicles. It helps keep the campus secure by allowing only authorized vehicles.

2. **Hostel or Student Housing Gates**

It can be used at hostel gates to track which students or guests are coming in and going out, improving safety in the hostel area.

3. **Offices and Companies**

The system can be used at company gates to check employee vehicles and maintain proper entry/exit records automatically.

4. **Residential Societies**

It is helpful in housing societies to allow entry to members and to keep track of visitors or delivery vehicles.

5. **Small Parking Areas**

The system can be used to manage parking entries and to know which vehicle is inside the premises at any time.

6. **Event or Function Entrances**

For private events or functions, this system can help organizers allow only registered vehicles and maintain guest vehicle records.

10. CONCLUSION

In this project, we successfully developed the **Campus Entrance Vehicle Control System** to make vehicle entry more secure and manageable at college gates. The system scans vehicle number plates using a mobile camera and checks whether the vehicle is authorized or not. This helps in stopping unknown vehicles from entering without permission.

Our app is simple to use, saves time, and keeps proper records of all vehicles that enter or leave the campus. It reduces manual work, improves safety, and is cost-effective because it only needs a mobile phone and internet connection. We have tested the system and found it works accurately with both authorized and guest vehicles.

Overall, this project helped us learn how to solve real-life problems using technology. It is a complete, working solution that can be used not only in colleges but also in hostels, offices, and housing societies.

REFERENCES

While working on this project, we took help from the following sources:

[1]   Nevon Projects – To understand similar project ideas and features https://nevonprojects.com

[2]   ResearchGate – For studying how vehicle number plate recognition works https://www.researchgate.net

[3]   EduProjectTopics – For reading about vehicle monitoring systems in campuses https://eduprojecttopics.com

[4]   YouTube Tutorials – To learn how OCR works in Android apps

[5]   Android Studio Documentation – For app development guidance and features