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Automatic Vehicle Entry System

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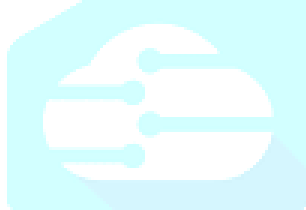
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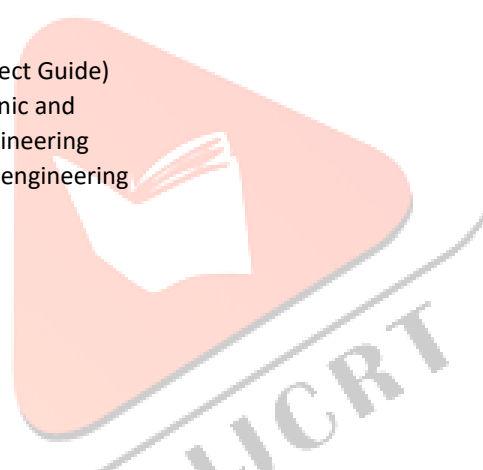
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Abstract



Wireless Entry System for gate attendees in IT parks, malls, societies, offices, etc. With the system, it becomes easy for the gate attendee to easily capture the image of the car and add the entry to the database with a single click. It is a portable device with a camera. It is Internet enabled. Due to internet availability to the device, the car details and timestamps captured can easily be stored in the cloud database wirelessly. The database that has stored all the data from the device can be accessed using the Android application and website. Our proposed design incorporates features that have been proven advantageous in the past. Image-based authentication has several benefits over speech-based authentication. The use of email through smartphones has increased in the recent past which makes sure that the user can get alerts about the guests even on the go.

Keywords: AVES, API, Number Plate Recognition.

1. INTRODUCTION

Wireless Entry System for gate attendees in IT parks, malls, societies, offices, etc. With the system, it becomes easy for the gate attendee to easily capture the image of the car and add the entry to the database with a single click. It is a portable device with a camera. It is Internet enabled. Due to internet availability to the device, the car details and timestamps captured can easily be stored in the cloud database wirelessly. The database that has stored all the data from the device can be accessed using the Android application and website. Our proposed design incorporates features that have been proven advantageous in the past. Image-based authentication has several benefits over speech-based authentication. The use of email through smartphones has increased in the recent past which makes sure that the user can get alerts about the guests even on the go. The project is entitled AUTOMATIC VEHICLE ENTRY using IoT, the major motivation of this project is to reduce the traffic congestion in roads, multi-storeyed buildings and malls due to manual entry systems. The project captures the number plate of the vehicle and extracts the number from the number plate. Our project aims to make automatic entry of the vehicle. We track vacant slots in the parking space and assign that to the user. In recent times the concept of smart cities has gained great popularity. Thanks to the evolution of the Internet of things the idea of a smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as traffic congestion, limited car parking facilities and road safety are being addressed by IoT MOTIVATION.

The current method of entry requires individuals to sign a sheet manually, which is both time-consuming and frustrating. Other technologies like voice, iris, and fingerprint recognition through RFID can perform the same task, but they share the same downsides. Although RFID technology could serve as an alternative, it poses a risk of misuse or loss. A completely automated, reliable, contactless, and unobtrusive system is necessary to save time and avoid unnecessary inconvenience.

OBJECTIVE

It has always been a problem for gate attendees to manually enter the details of the vehicles visiting.

- At societies, malls, IT parks, and commercial premises it is mandatory to collect data for the visiting vehicles for security and other purposes.
- The data collected can be used for different real-time applications such as smart parking systems.
- The data collected in the manual registers are very hectic to search and sort. It becomes difficult to find a specific entry in the whole data set. Whereas data available in the database are easily accessible, searchable, and sortable. It becomes easy to search for a specific entry in the whole data set.
- This is only one application out of all the applications. There could be many other applications of the data set available.

2. LITERATURE SURVEY

The literature survey includes four different systems for monitoring and access control.

The first system is based on fingerprints, which is considered the most accurate system but has privacy invasion concerns and issues with recognizing damaged fingerprints.

The second system is based on RFID technology, which is easy to use and scalable but less reliable and susceptible to misuse.

The third system utilizes an iris scanner for biometric identification, which offers real-time face detection and efficiency.

Finally, the fourth system is based on smart cards, which are easy to use and efficient, but the cards can be stolen and misused. The survey covers systems developed between 2009 and 2017, highlighting the pros and cons of each technology

3. PROBLEM STATEMENT

It becomes tedious for a gate attendant at big infrastructures to manage the incoming and outgoing vehicle data for security.

- The wait time eventually increases which increases the chaos.
- Managing the manual registers for the same is a hectic task. Also, the data stored for the vehicles is unsorted and unusable.
- The work of manually adding the car details for every visitor becomes a lengthy process. ➤ Data set available in the manual registers is not open to different applications as it is not searchable or sortable.
- Chaotic traffic flow on the premises.
- Non-portable system..

4. REQUIREMENT SPECIFICATION

ANDROID STUDIO

Android Studio is an integrated development environment (IDE) specifically designed for developing Android applications. It provides a comprehensive set of tools and features that enable developers to create, test, and debug Android apps efficiently. Here is some key information about Android Studio:

Purpose: Android Studio is primarily used for Android app development. It allows developers to write code, design user interfaces, test applications on virtual or physical devices, and package the apps for distribution on the Google Play Store or other platforms.

Features: Android Studio offers a wide range of features to aid in the development process. Some notable features include:

Code editing: It includes intelligent code completion, code analysis, and refactoring capabilities.

Layout editor: It provides a visual editor for designing app interfaces with drag-and-drop functionality.

Virtual devices: Android Studio includes an emulator that allows developers to test their apps on virtual devices with different configurations.



Figure 4.1: Android Studio

Arduino ide

The Arduino IDE is an open-source environment for creating and uploading software to microcontroller boards that are compatible with the Arduino platform. The IDE was created to make the process of coding and prototyping electrical devices easier. It is based on the Processing programming language. A code editor, a compiler, and a serial monitor are all included in the package, which has an intuitive user interface. Robots, sensors, and interactive displays may all be programmed using the Arduino IDE, which is compatible with a variety of microcontroller boards. On a variety of operating systems, including Windows, macOS, and Linux, the IDE can be downloaded.



Figure 4.2: Arduino ide

ESP32 cam

A small and inexpensive development board called the ESP32-Cam is built around the ESP32 microcontroller and the OV2640 camera module. It is intended for use in wireless communication and image processing-intensive applications like remote monitoring, security systems, and Internet of Things (IoT) initiatives. Wi-Fi and Bluetooth connectivity on the ESP32-Cam module. It supports up to 128GB SD cards for additional storage and includes a built-in 4MB flash memory for storing pictures and other types of

data. The ESP32-Cam board's OV2640 camera module, which has a 2 megapixel resolution, can record photos and video in a variety of formats. JPEG, BMP, and GIF picture formats are supported, and it can record video at resolutions of up to 15 frames per second @ 160x120 pixels. The ESP32-Cam module is an all-around strong and adaptable development board for creating Internet of Things (IoT) applications with wireless connectivity and image processing capabilities.

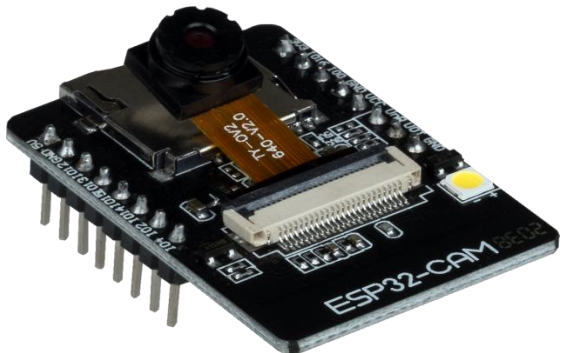


Figure 4.3: ESP -32 Cam Module

5. SYSTEM ARCHITECTURE

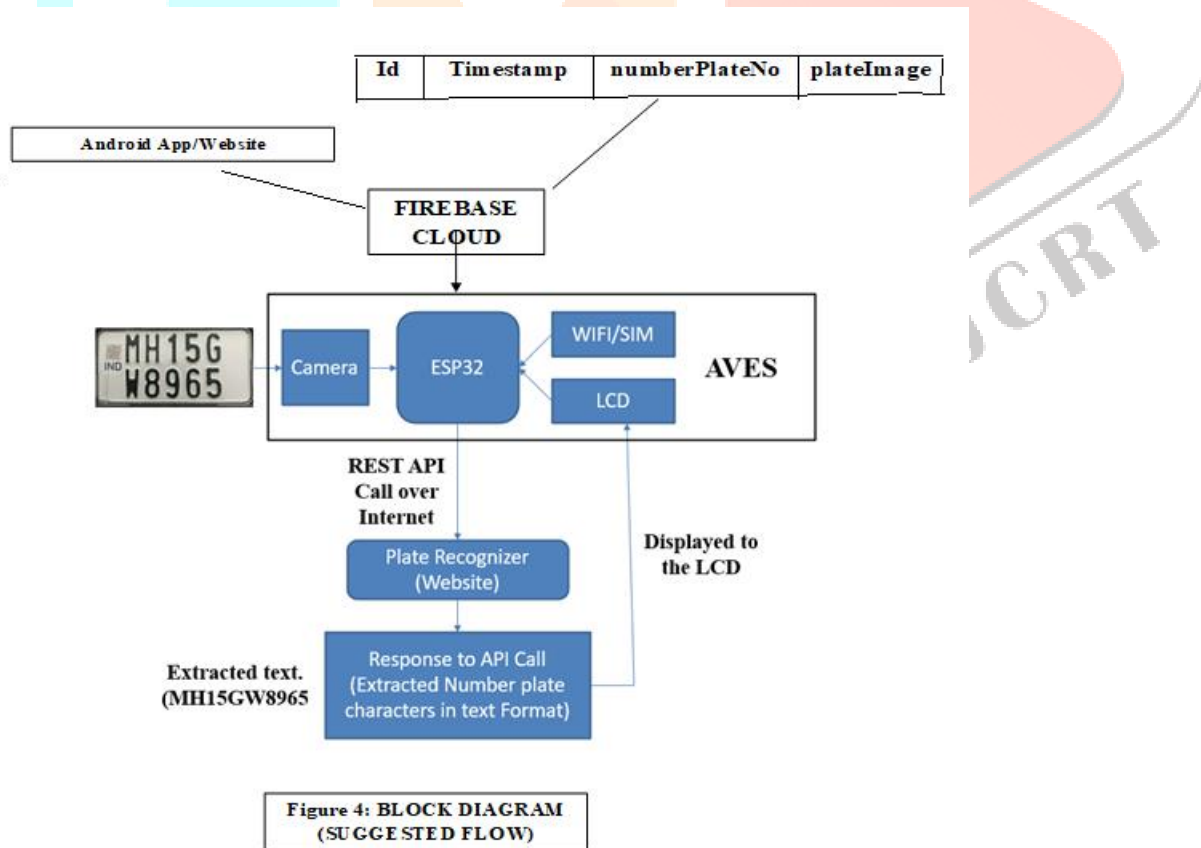


Figure 5.1: System Architecture

6. RELATED WORK

Automatic Vehicle entry system is used to make the entry of vehicles at malls, IT organizations and chaotic places. This AVES system helps to make the entry of vehicle automatically by just capturing the vehicle number plate.

The image is captured by ESP32 cam module and this image then sent to API, and that API extract the number from number plate. This extracted number is stored in database with time stamp and all data.

7. ALGORITHM:

- 1] Install all Arduino IDE
- 2] Install following librarires
 - a. Firebase ESP32 Client libraries
 - b. HttpClient libraries
 - c. ESP32 camera module specific utility libraries
- 3] Connect Arduino and ESP32 module and connect it with the computer with Arduino IDE.
- 4] ESP32 camera clicks image, the image then is uploaded to Firebase Database.
- 5] The image URL is fetched, this image is sent as a payload to the website via a HTTP API call.
- 6] This image is then processed at the servers, the number plate from image is detected, the image trimmed undergoes OCR (Optical Character Recognition) and the characters on the number are extracted and sent back as a response back to the ESP32.
- 7] The extracted details are then uploaded to the Firebase Realtime database as IN/OUT entries.
- 8] This entries are then shown to the user using Android app and Website.

8. RESULT:

The result of the project is a portable device with a camera that has a LCD screen, switches and buttons that can be used to take pictures. The clicked image of the vehicle is automatically checked and the characters on the license plate are recognized, entries are made in a remote database. Another part of the system is a user interface that displays the entries from the remote database, i.e. Firebase. The whole system is based on IOT.

9. CONCLUSION:

In this work, existing methodologies and algorithms proposed in literature for Vehicle and Number Plate recognition were reviewed. Due to the unavailability of such an ANPR system off the shelf in tune with our requirements, it is our endeavor to customize an ANPR system for educational institution. Template matching was implemented on number plates obtained from static images and an average accuracy of 80.8% was obtained. This accuracy can be improved greatly by positioning the camera suitably to capture the best frame and using two layers of neural networks. The implementation of the proposed system can be extended for the recognition of the number plates of multiple vehicles in a single image frame by using multi-level genetic algorithms. Also, a more sophisticated version of this system can be implemented by taking inputs from the live video feed and selecting the best vehicle frame for the classification of vehicle types and recognizing the number plates using neural networks.

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