Automated Parking System (V-PARK)

Amey Borole1, Omkar Vaity2, Rishikesh Chalke3, Prof. Dr. Arun Chavan4

1Student, Dept. of Computer Engineering, Vidyalankar Institute of Technology, Mumbai University, Mumbai, India
2Student, Dept. of Computer Engineering, Vidyalankar Institute of Technology, Mumbai University, Mumbai, India
3Student, Dept. of Computer Engineering, Vidyalankar Institute of Technology, Mumbai University, Mumbai, India
4Professor, Dept. of Computer Engineering, Vidyalankar Institute of Technology, Mumbai University, Mumbai, India

Abstract - In fast times like today, automation is being used in every small operation. Automating a process not only makes it fast but also increases accuracy. We proposed a parking facility with full automation using an RFID tag which allows the student/faculty to enter the campus.

2.EXISTING SYSTEM

Existing parking management at the campus is quite manual and allows the students/faculty to enter the premises after showing the security their respective identity cards. Handling the parking lot manually is difficult as the manual process also allows the students that are not eligible, to park inside the campus. Due to this, there is an increase in the crowd and the campus may face a lack of space availability problem for eligible students.

3.LITERATURE REVIEW

The proposed parking management system with a full automation process for parking vehicles is described in this section expressly. Our system includes a registration unit, a verification unit, an RFID unit, a 2-wheeler unit, a 4-wheeler unit, and a QR code generator unit.
Registration unit: In this, members of the institute who want to use the parking facility will have to register themselves through the mobile application. After successful registration and email verification, log in with your credentials and go further by filling up the form and uploading the documents related to your vehicle (RC book/Driving license/Insurance). Students who belong to final year diploma, SE, TE, BE from VIT and all VISIT students are eligible to use it. The form will automatically validate by checking eligibility criteria assigned to the students. There are no eligibility criteria assigned to faculty members so they can easily use it. After submitting the form, it will go to the verification unit and members will wait for an acknowledgment.

Verification unit: In this, the issuer request comes to admin and whatever documents are uploaded by the members are stored over the cloud. Here, the admin is responsible for the verification of documents which is done with the help of the government portal (www.parivahan.gov.in). It is an extra security measure to ensure validity. After the verification, the admin will know the member’s RC status and license status. So, based on this admin will send an acknowledgment to the issuer and accordingly issue the RFID tag.

RFID unit: This is the authentication and main unit of our system. As from the previous process when a valid member will issue an RFID tag [2], it will be stick on his/her vehicle. Whenever a member tries to enter the campus, an RFID reader placed on the entry gate will scan the RFID tag. If it is a valid tag, then the vehicle will allow parking on the campus.

2-wheeler unit: This unit comprises of the previous unit, LCD, Arduino microcontroller, Pushbutton, Sensor, and Servo motors. Whenever the tag gets verified by the reader, if it is valid entry gate will open and allow the member to park their vehicle. Based on this, updating of values takes place on an LCD. And at the time of the exit gate sensor will sense the movements of vehicles and accordingly update the exit gate and updates the value on the display.

4-wheeler unit: This unit comprises Raspberry pi, webcam, and web page. This authentication process will be the same as mentioned in the RFID unit. After entering the campus, raspberry pi gets a signal and further allows the webcam to capture an image of the parking lot. After that raspberry pi process that image and accordingly display the availability/unavailability of lots on the web page, from where member can refer to it while parking.

QR code generator unit: It is an alternative option for the RFID unit. For the QR code, a secret key is generated after submitting the form by each member. This QR code can be used in case if the member’s RFID tag is damaged or may have a technical issue. If a member’s RFID tag is not detected, then ask for a QR code through a mobile application. QR code is generated using TOTP [6] (time-based one-time password) which updates every 30 seconds. The guard who will scan the QR code will have the same secret key as that of the member. If the QR code is scanned successfully, the member is granted access to the parking lot else access will be denied.

4.PROPOSED SYSTEM

Here, we describe our parking system with fully automated called “V-PARK” that will accommodate the goals and provide a smart solution for the institute. Our proposed system includes both hardware and software components.

The hardware components include cameras or sensors, microcontrollers, and RFID readers which will be mounted on the entrance and exit gate. The software components will include a mobile application, cloud storage/MySQL, and an admin panel. The mobile application is developed using React native because it can be used on android as well as the iOS platform. Admin panel will be developed using HTML/CSS and PHP where it will show the registered user’s feed data. One web page is created where it will show the vacant parking spaces in case of a 4-wheeler. From where admin can verify it from government portal. The cloud service Firebase will act as a mediator for user and admin which will be used to store the documents of users like driving license, RC book and access it from the cloud by admin and provide RFID tags accordingly.

The main hardware components of our system are Arduino Uno, Raspberry pi, Webcam, LCD, Ultrasonic sensor, RFID module, Servo motors, etc. A user can park his/her vehicle only if the user has an RFID tag. As soon as the vehicle enters the parking lot, the RFID reader scans the inscrib user's RFID tag details. That data will be received by Arduino and Raspberry pi. In the case of Arduino, the entry gate will open with help of a servo motor and accordingly update values on the LCD. In the case of Raspberry pi, it allows the webcam to capture an image of the parking lot and process further to display the availability of parking space on the telegram bot [8].

Fig 4.1
4.1 ACTIVITY DIAGRAM

**Flowchart 1** - This represents the entry scenario i.e., the moment a vehicle enters the campus.

**Flowchart 2** - This represents the overall flow of registration of the user in the proposed application and the issue of the RFID tag.
6. ACKNOWLEDGMENT

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REFERENCES


[9] https://github.com/olgarose/ParkingLot