

SMART PARKING SYSTEM USING IMAGE PROCESSING

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Abstract— Vehicle parking is a significant issue today, and its demand is growing daily. Due to the manual vehicle parking method still in use in India, we frequently waste time and fuel looking for open spaces around the parking lot when we need to park our car, which calls for enough lighting. Another problem is the pandemonium that results from parking because there is no set method and anyone can park wherever, which occasionally results in damage to the cars while they are being moved out of or in the parking lot. There is also a security issue.

We are implementing a new parking system for cars to address these issues. How does the system function? The number of parking spaces available will be shown on a monitor viewable when the motorist parks the car in front of the garage door. A car parking tray will arrive and park the user's vehicle in the garage when the operator receives a request from the user with his mobile phone number and vehicle's registration number. A code will be included in an SMS sent to the subscriber. A time counter will start counting the money to be taken off after the car is parked and continue until the car is parked out. The driver must give the code to the gate operator at the exit when parking outside. The amount that must be paid will be stated in an SMS sent to the subscriber. The car parking tray will park out the vehicle using the same procedure as before after receiving payment.

I. INTRODUCTION

Our nation has dramatically evolved over the years, and as a result, there are now many well-maintained highways, business buildings, and an increasing number of cars. We employ a manual parking process when putting these cars in a parking spot. People can park their cars anywhere they like because of this lack of planning and discipline, which leads to a mess because most of the time people do not adhere to the specific cue. This leads to a significant traffic bottleneck in that area. Due to poor management, cars can collide with each other while being parked and being retrieved, causing dents. This causes individuals to argue and fight, which occasionally causes major traffic jams. There is also a financial loss because we have to fix our damaged automobile and because autos use more fuel while parked in or outside. Traffic congestion is a problem since it wastes our valuable time. Our time is squandered as a result of the parking lot turmoil. It causes significant harm to students, employees who work in offices, and emergency room patients.



Fig 1: Existing Parking System

Due to the increased likelihood that customers won't visit these locations owing to the parking danger, it also results in revenue loss for commercial spaces like retail malls and theme parks. The manual parking method in commercial spaces is becoming a barrier as time goes on, wasting time and resulting in some financial losses. Thus, we require a solution that can solve these issues. Here, we're offering automated parking systems as a solution to these issues as well as the fact that commercial parking systems provide a challenge that wastes time and results in some financial losses. Thus, we require a solution that can solve these issues. As a solution to these issues and a replacement for manual car parking systems in commercial locations, we are introducing automated car parking systems in this article. This method can generate income by charging for parking spaces in addition to saving time and money.

In our nation, traditional or manual parking systems are widely used, yet they are rife with issues.

As follows:

1. Huge traffic jams in front of parking can be seen in numerous hospitals and shopping malls. The parking attendant causes a traffic bottleneck by stopping every car in the area and handing out payment slips.
2. Finding a parking spot takes some effort and time, both of which add to fuel use.
3. Security issues are yet another issue with manual parking; anyone can enter the space and commit theft or robbery.
4. A guard must be hired for the duration of a manual parking system, which is an expensive enough expense.

II. LITERATURE REVIEW

Problem with Traditional car parking system S M Saifullah Arman, Sajal Chandra Banik and Sourav Raxit said RFID technology is used to create an automated car parking system that saves space while also increasing security. To accommodate cars, the system employs a single entrance and exit point as well as parking spaces that rotate horizontally. Each slot has an RFID tag and an infrared sensor, as well as green and red LEDs that indicate whether the slot is empty or occupied. The system is designed to manage and regulate cars quickly without the need for human intervention, making it more efficient than traditional parking systems.

An Automated Vehicle Parking System Mohammed Abu Tawhid Rian, Md. Saidul Islam, Apon Dey said The goal is to develop a fully automated and secure car parking system that requires little human intervention. The current parking situation is extremely inconvenient and wastes valuable time. The proposed system allows users to reserve parking spaces ahead of time and allows cars to self-park. The system is intended to prevent accidents caused by fast cars or frustrated drivers who are unable to find parking. The goal is to develop a dependable and deployable system that could one day become an industry standard for parking systems.

Haobin Jiang, Shidian Ma, Shaokang Jiang and Yue Li said This paper proposes an automatic parking method that addresses low automation, poor path planning conformity, and low success rates. The method uses preview correction for path planning, detects curvature outliers, and optimises using advance correction. Path tracking control employs dual sliding mode variable structure control to improve effectiveness and automation. An automatic parking system with solutions for parking path planning and path tracking control was developed and tested.

R.Roopa Chandrika; N.S.Gowri Ganesh; A. Mummoorthy; K.M.Karthick Raghunath said The paper proposes using image processing techniques to detect, count, and classify vehicles on busy streets in order to collect traffic flow statistics and analyse patterns. The task is broken down into six steps, which include object detection and classification. Vehicle detection and counting algorithms, as well as road marking detection algorithms, will be used. This system can also be used to monitor highways, detect accidents, and identify violators of traffic laws. Vehicles will be classified into five categories, and this information will aid in the design of efficient traffic patterns.

Automatic Parking Space Detection System Nazia Bibi 1, Muhammad Nadeem Majid2, Hassan Dawood3, and Ping guo said The development of a vision-based smart parking system can assist drivers in finding suitable parking spaces in metropolitan areas more efficiently, reducing traffic congestion caused by parking space insecurity. The proposed framework involves calibrating the parking area and then classifying each block to determine whether or not a car is parked there. This information is then relayed to the driver, informing them of the parking status, whether reserved or available. The proposed system has a potentially higher performance accuracy when compared to other hardware solutions, demonstrating the effectiveness of the proposed framework. Overall, this vision-based smart parking system has the potential to significantly improve the parking experience for drivers in densely populated urban areas.

D. Azshwanth, M. T. Koshy, and M. T. Balachander said The proposed automated car parking system aims to solve the problem of illegal parking and the frustration of finding a parking spot by offering a safe and automated experience that can be reserved ahead of time. It aims to be more efficient, reduce accidents caused by frustrated drivers, and possibly become the future standard for parking systems.

Ishraq Haider Chowdhury, Afsana Abida, Md. Mehedi Hasan Muaz said The proposed system is intended to manage vehicle traffic and prevent illegal parking in public places. It consists of detecting permitted and non-permitted vehicles, detecting unauthorised parking in restricted zones, and sending SMS alerts to authorities so that they can take appropriate action. Parking metres are used to collect fees from parked vehicles, and parking lights are used to indicate availability.

III. ADVANTAGES OF AUTOMATED VEHICEL PARKING SYSTEM:

The advantages of automated car parking systems are:

1. Minimizing traffic jams:

Automated vehicle systems reduce traffic jams because we use a card system to pay for goods and services. By punching the card in the payment booth, the vehicle is moved to the proper location.

2. Time-saving:

It is a system that saves time. Finding an empty parking space in a manual parking system is very time-consuming and difficult. It occasionally results in being late for meetings or other critical tasks.

3. Safety in the parking:

As no one is allowed inside, there is no possibility of theft, robbery, or snatching. But, occasionally people are harassed in quiet parking spaces. These issues are avoided by this system.

4. Fuel savings:

This technology makes use of an automatic tray that moves the car into the designated parking spot and into the appropriate slot. Fuel costs will go down as a result. We don't need to illuminate the parking lot here. When it moves, it will turn on the light to show where the path is, and it also saves a great deal of electricity.

5. Operational cost savings:

Over time, the cost of collecting parking fees is decreased. As the system does not require any human interaction for the money transaction, there is a reduction in the man-hour needed.

IV. PROPOSED SYSTEM

AUTOMATED PARKING SYSTEM

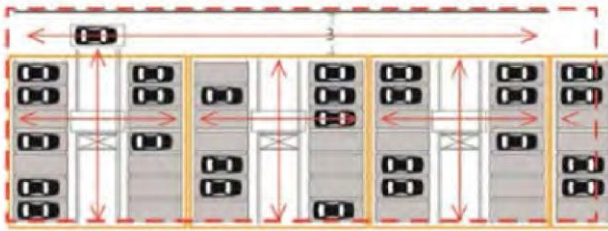


Fig 2: Automated Parking System

V. SMART CAR RECOGNITION

With the use of image processing in the ACP system, we are able to identify vehicles by their licence plates. Users of this technology can pay for their parking spot up front using the prepaid balance on their cell phone or the amount on their parking account.

VI. USER ABOUT AVAILABE PARTKING LOT

- The user can receive updates on available parking space slots.
- **Parking logic**
- A sensor specified above the area which has a LED that emits a 3 range colour radiation red, green, yellow.
- It emits red colour when it is parked correctly.
- It emits yellow colour when it is parked incorrectly in the specified area.
- It emits green colour when the area is empty.
- The sensor which has been fixed in the speed breaker near to the machine read the number plate of the car using image processing and saved in the data .
- If any problems occurs while parking the car there will be a worker where you can clear your doubts .
- After your entry registration the time gets started till your exit point.

Security

- The saved data of the number plate of the respective car is checked :
 - For how long they have been in the respective area.
 - How many times they have visited.
 - They also used to calculate the time period of their stay.
- The camera which is been located in the entry machine and the sensor capture the face of the driver using image processing and store it.

- This image processing is used in the exit check post whether the stored face in the data matches with any of the members in the car for the security reason .
- If not then action is to be taken , if the car is theft in such cases.
- If the car is parked for an extended period of time, it should be checked to see if the owner is in the area, and then the car should be checked for security reasons.

There are several other drawbacks to manual parking systems.

- Manual car parking systems are not environmentally friendly because they generate noise, GHG emissions, and sometimes make the parking lot dirty due to people's litter disposal.
- Manual parking systems are not environmentally friendly.

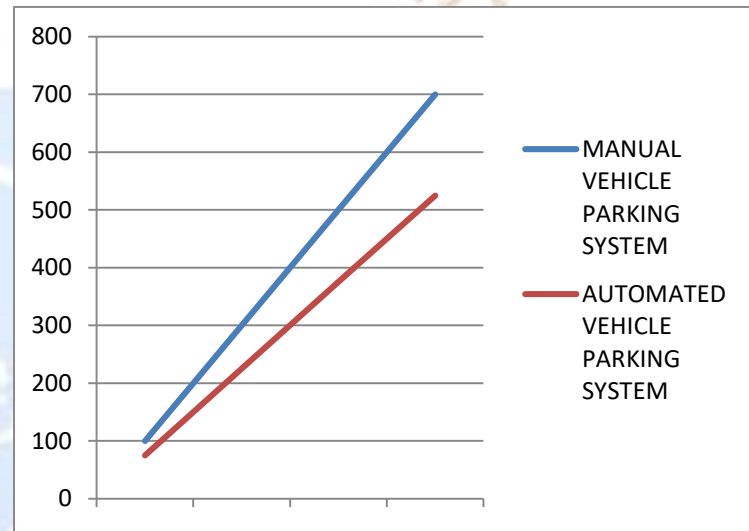


Fig 3: Graph depicting the pollution due to both manual and automated parking system

Item	Manual car parking	Automated car parking
Space needed for paring	15/8	15/8
Maintenance Cost in INR	80000	35000
Parking Staff Needs	8	2
Consumption of fuel for parking in Litres	267	4
Time needed for parking the car in min	8	1.5
Time saved in min	0	5

Table-1: Comparison on both manual and automated parking system

VII. CONCLUSION

In comparison to a manual car parking system, this automated system for vehicles has a number of benefits. This creative approach might significantly reduce the amount of time you spend on tasks because in today's fast-paced world everything is digitalized and we use technology in everyday life. By lowering air pollution and noise pollution and making the greatest possible contribution to maintaining a sustainable environment, this helps to achieve environmental sustainability. Any organisation and those who park will appreciate this system's positive effects on daily life and will support its implementation.

VIII. REFERANCE

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