International Journal of Scientific Research & Engineering Trends
Volume 9, Issue 5, Sept-Oct-2023, ISSN (Online): 2395-566X

ParkingManagement System Using Cloud Computing

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Abstract– This application is a special system for smart parking reservation and security maintenance commercial car parking area in an urban environment. Now a day's congestion of traffic increases rapidly with the increasing growth of population. With respect to the number of population's usage of cars also increased. Due to more usage of car the traffic congestion occurred on the road. The parking lot has experienced congestion in addition to the road. Because it takes longer to find a parking spot that is free to part the vehicle. Hence, we loss certain amount of time period and also made more than 80percent of fuel wastage of in the empty parking lot in parking area. To solve this problem, we need especial system in the parking area to measure empty space, which can able to deliver services and show the information to the users who are looking for the empty space for Parking lot with less time spend. Reservations are made solely by the user. Thus, the user discovers a vacant parking lot and makes a reservation using an Android application with the driver's own knowledge of the parking lot. With the removal of the Standalone Parking Lot Application for the Enterprise, information or reports will be available everywhere with an Internet connection with only a single click.

Keywords– Parking, Urban, Congestion, Cloud Computing.

I. INTRODUCTION

Major issues with traffic congestion exist, particularly in large cities. Sometimes the city's traffic gridlocks, which happens more frequently when it's raining and police officers leave the scene to seek shelter, leaving the traffic unattended. When this occurs, it frequently takes some time for the traffic to move smoothly again. On an average day, several things, including the lack of knowledge about parking places that are available, may contribute to the congestion. Drivers waste time searching for parking spots because of driving around the streets.

This indicates that a sizable number of vehicles are on the street looking for a parking place, which adds unnecessarily to the number of automobiles on the road and to the congestion. The noise their engines make and the pollution their exhaust emissions produce. A driver may need to spend some time seeking for a city council parking attendant after finding a spot to park his car and paying the parking costs. Most drivers avoid leaving their vehicles before paying the parking charge since the repercussions, such as having your vehicle locked or being overdue, can result in severe fines. Sometimes, the time spent hunting for the attendant is considerable. In certain instances, cars clash with parking attendants, forfeiting the receipt while paying the attendant less than the whole parking price. Assignment of supervisors to man a region with several attendant sis aimed at reducing fraud, hence increasing revenue.

However, the supervisors themselves have been colluding with the attendants in many cases to let drivers 'park vehicles at a lesser fee but which they pocket and do not deliver to the city council. Since the council must pay both the attendants' and supervisors' salary, the overall impact might be a greater loss.

To eliminate or significantly reduce corruption the project provides an alternative means of payment of the parking fees that do not require cash to exchange hands. This project offers a method of remotely obtaining parking lot information, especially their availability, to cut down on the time needed to find parking spaces. It also shows the possibility of variable message and Application being used for providing such information.

II. LITERATURE SURVEY

Different types of systems can be designed for parking for example: every visitor is given a tag, and it will be authorized before entering the parking space ensuring the security measures. There can be a display for the number of vacant slots at the entry and exit gates. There can be an advanced system where user can beforehand book the slot and payment also be done by some application. In this way many approaches can be used to design Smart Parking system based on our requirements. As IoT is a continuously growing technology, a lot of research has been done in this field.

The sensors used in IoT based smart parking system stores and accesses data from remote locations with the help of the cloud these factors give raise to cloud of things (COT). The nodes could be monitored and controlled from any location the system that we propose provides information regarding the availability of the parking slots with the help of the mobile application the users from the remote location can book the parking slots [1].

The cloud-based parking system's efficiency is improved with the use of an algorithm and network architecture technologies. The methodology used to identify the cheapest parking spot is described below. Considering the quantity of parking spaces available as well as the parking spaces distance from the user. The user may immediately contact the cloud-based server to retrieve the parking spot information. To access this information, the user may also download an application on their mobile devices. This algorithm can reduce the amount of time a person has to wait to get a parking spot. Aspects of security are not covered in this study [2].

To find the parking place, a smart phone application and a wireless sensor node are employed. This system uses wireless technology, which results in excellent precision and efficiency. In this system, onboard components are utilized for vehicle-to-vehicle communication.

The customer parks their car in one of the many available bays, and then a motorized lift raises it out. The user is issued a ticket key and an ID that can only be used by them to collect the car. The user parks his vehicle in any one of the several bays available a mechanical lift lifts the vehicle out. A ticket key and id are given to the user, and it is only known to the user which is used to retrieve the vehicle. The user need not carry any paper ticket since an RFID card is given to the user. The technology used here is economical. Security features must be improved to protect the user's privacy [3].

The author of the report on smart parking systems has classified car sensors and detector systems into two categories: intrusive sensors and non-intrusive sensors. Tunneling beneath the road allows for the installation of intrusive sensors in holes in the road's surface. Nonintrusive sensors are simple to install and maintain, and they have no impact on the road's surface. Smart parking systems cut emissions from cars and assist us in finding solutions to traffic congestion's underlying issues [4].

A paper offers a timesaving, effective method of addressing the issue of parking availability in the actual world. In this, the data is delivered locally while being filtered by several devices. For the procedure as well as for assessment using machine learning algorithms, this signal is sent through the cloud. This study makes use of a mobile phone application that leverages the Google API to give users access to real-time traffic information. Avoiding a traffic jam as a result. The ability to reserve parking is not offered in this publication [5].

IoT technology for smart parking aids in the design and development of a true smart parking system that informs users of available spots and directs them to the closest ones. To increase security, this research use computer vision to recognize vehicle license plates. Before getting inside the automobile, the user can utilize mobile payment to pay for the parking spot. Ensuring the parking reservation in the process. The user is informed of the parking location, the quantity of open spots, and all other pertinent information. The license plate text extraction methods and algorithms used in this study are effective. When a car enters a parking lot using an ultrasonic sensor, an algorithm detects it and determines the minimal cost for the user [6].

The use of a smart parking system based on reservation (SPSR) enables the reserve of an open spot. This entails managing the host parking database, which gathers and saves information on the identity of the motorist and the location of the parking space. A notification will be sent to the user via the web service that has been supplied to them by the admin when the parking reservation time is about to expire. The biggest disadvantage is that another user may take over a spot that has been booked; to prevent this, QR scanners are employed to identify the user [7].

III. PROPOSED SYSTEM

A solution that is easy to use and reliable for the user's needs to be developed. Obstacle detection is used as the principal technology for developing such system. Smart parking is currently one of the promising fields of research because of its demand in everyday life. Leaders in

technology have advanced this sector greatly and accurately. There are many already existing systems for parking as mentioned in literature survey of this paper. The basic flow of the proposed system is shown in figure below.

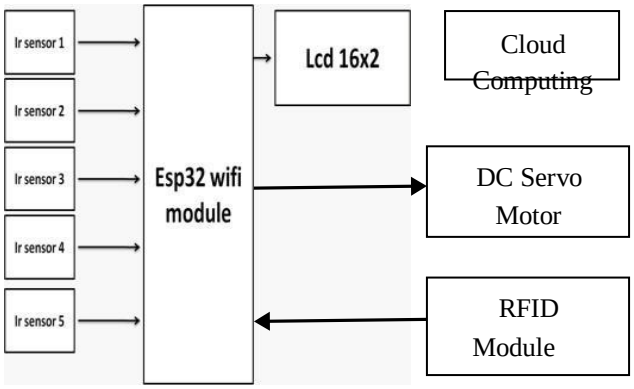

Figure 1 Proposed Block Diagram of Parking System

The system is derived from the idea of IoT or AWS concept. The system employs RFID technology and the WSN to monitor parking lots. The percentage of open parking spaces in each parking lot is calculated using an RFID reader. The use of RFID facilitates implementation of a large-scale system at low cost. The method offers a way to settle disagreements in the parking lot and reduces time spent hunting for a spot. After logging into the system, the user can choose a suitable parking space. The user will receive confirmation about the chosen parking place through notification. The system then changes the parking spaces status to "pending," at which point no other users will be able to reserve it. If after a certain period of pending time the system determines that no car is parked in that space, then it changes the status to ‘‘available.’’ When a new automobile joins the system, the system will update the status from the WSN node (the state of parking spots). As a result, the state of the parking system as a whole is constantly updated in real time. The technology may support the company with hourly parking costs and assist in plotting the parking time for each parking place in real time.

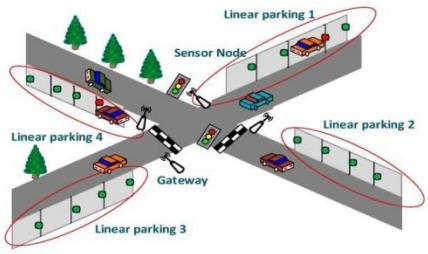

Fig. 2 smart parking system's general architecture

Smart parking systems use several cutting-edge technologies, such as wireless sensor networks (WSNs) and radio frequency identification (RFID), to control the difficulty of parking in urban settings, whether in public or private spaces. These systems use real-time data collection from sensor nodes dispersed throughout the parking area to gather information on the available parking spaces. This information enables users to take advantage of the additional services offered by these systems, such as the automated payment service compatible with mobile phones, allowing them to reserve their parking space in advance. The smart parking system's general architecture is seen in the above figure.

IV. SYSTEM DESIGN

The parking management system using ESP32 with AWS offers a comprehensive solution for efficient management and monitoring of parking spaces.

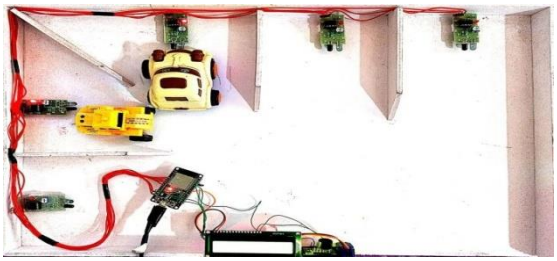

Fig. 4 Experimental Setup

Below are the steps that a driver needs to follow in order to park its car using our parking system.

Step 1: User must be installing the smart parking application or webapp on their mobile device.

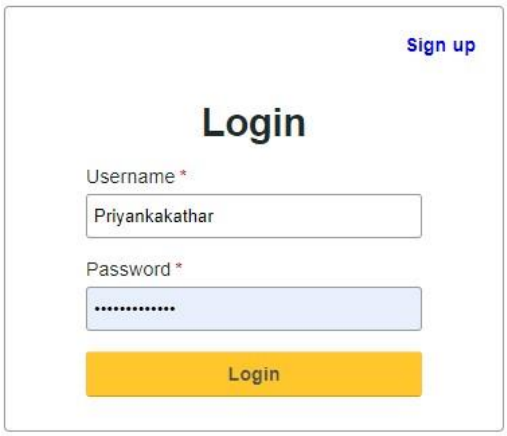

Fig. 5 Webapp Interface

Step 2: On the 16*2 display the number of vacant and filled spots is displayed so that the user can see the status of parking zone.
Step 3: Once the user logs into the app he would see that at which spots and positions which are empty after he or she logged into the app.
Step 4: If there are any open slots, the user will be notified on his Smartphone when he gets close to the parking IR detect sensor of which slot he may park his car.
Step 5: If there is no empty slot for the parking the user will be displayed with an appropriate message on the mobile application through the proposed system.
Step 6: On availability of parking area and user parking into the respective slot he/she would receive a message which states the start time of the parking and the slot in which he/she has parked the car for better understanding.
Step 7: After successfully reversing out of the parking space, the user will get a notification with the start and finish times of his parking time as well as the cost of the parking time.

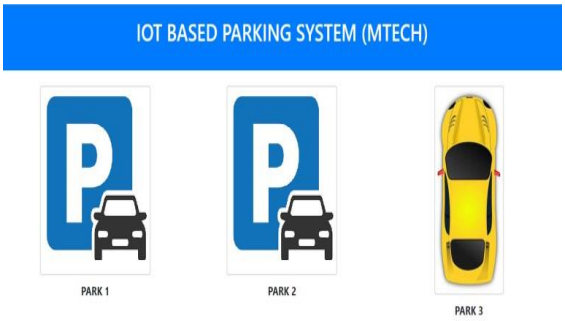

Fig. 6 Webapp Outputs

This model has the capacity of containing two cars. There are two sensors at the entrance to detect the presence of a car before going inside or outside of the parking lot. The other multiple sensors are plotted inside the parking lot to detect the car individually for each parking slot available or not for the user. A DC Servo motor has been used at the entrance to open and close the gate according to the signals sent by the sensors through Esp32.

This is a real time display regarding the status of the parking lot. As this is a web-based representation, anyone will be able to get the status of the parking lot by visiting the website on the URL through their cell phones, laptops, desktops and other internet supporting devices. The model of the parking lot has two parking slots. Thus, we can park a maximum number of cars through the system. We have used two IR sensors which when vehicle parked will show appropriate message to the user and when all the parking slots the dc motor would not open gate for the vehicle to be parked.

V. CONCLUSIONS

The parking strategy suggested in this study reduces the number of users who are unable to find a parking spot while also lowering the expenses associated with relocating to the parking space, improving performance. Our suggested architecture and system have been successfully tested in simulation and put into practice in a real-world setting. The findings indicate that our system greatly decreases the time on average that consumers spend waiting for parking. Our findings closely match those of the mathematical models we suggested. When the majority of cars successfully located a vacant parking place, the simulation of our system had reached its ideal solution. Each parking lot's average wait time for servicing decreases, and the overall time that each vehicle spends there is cut down. In our upcoming research, we'll take security into account and put our suggested approach into practice on a broad scale in the actual world.

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