



A SURVEY ON : SMART CAR PARKING SYSTEM

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ABSTRACT

Efficient and smart way to automate the management of the parking system that allocates an efficient parking space using Internet of Things technology. The user can monitor the parking area's availability and access the system wirelessly thanks to the Internet of Things. The number of automobiles in metropolitan areas is growing, and one of the main issues being confronted is traffic congestion. Typically, the user squanders time and energy trying to find a spot in a designated parking lot. The user sees the parking information through an LCD. Creating a smart parking system using RFID that tracks the availability of open spots and directs a car to the closest one by texting a cell number that is linked to the car's RFID. To give users advance notice of parking space availability, the proposed system makes use of pairs of infrared transmitters and receivers to remotely communicate the status of parking occupancy to the Arduino UNO microcontroller. The display of available slots is located at the entrance of the parking area. The user saves a significant amount of time when parking their vehicle thanks to the implementation, which requires little human input and offers a smooth parking experience.

Keywords: Arduino, RFID, GSM Module, LCD

1 INTRODUCTION

These days, parking is a major issue in many public venues, including malls, multiplex systems, hospitals, workplaces, and market areas. The vehicle parking [1-3] area has multiple lanes/slots for car parking. As a way to park an automobile one has to search for all of the lanes. Furthermore, a lot of investment and manual labour are required for this. Therefore, it is necessary to create an automated parking system that, at the entrance, clearly displays the availability of open parking spaces in any lane. It involves a system with a display outside the vehicle parking gate and an infrared transmitter-receiver pair in each lane. so that the person who wants to park their car is aware of the current state of parking space availability. Traditional parking systems rely on security guards to keep an eye on the parking lots; they lack an intelligent monitoring system. Finding a spot to park takes up a lot of time and frequently causes traffic bottlenecks. Multiple parking lanes with multiple parking places in each lane exacerbate the situation. Using a parking management system would provide more comfort while reducing labor-

intensive tasks and time. The display unit in the suggested system helps the user choose where to park their automobile by providing a visual depiction of the parking lot that includes both occupied and empty slots. The technology and software in the system would handle the cars' check-in and check-out procedures in addition to saving time.

2 LITERATURE SURVEY

Additionally, RFID and IoT were integrated to create a car parking system that uses Raspberry Pi-based sensors to identify parking. If a parking spot was available, consumers could reserve one through the online application. However, one drawback of the system that was created was that the standard software was more suited for desktop computers than for mobile devices, especially smartphones, because the design was not supported by different screen sizes. Furthermore, in the event that the sensor identified a parking place that was open, the user would receive a message from the automated SMS and RFID car parking program. Nevertheless, SMS could only be sent in text format and did not include a map or photo of the parking spot, thus users had to know the precise position of each spot in order to park there. According to analysis results, this system's benefit was that it could be utilized anywhere, but its drawback was that transferring data over GSM created a delay in transmission. [1]

As a result, there were gaps in the auditing and fee collection procedures. On the other hand, a noteworthy terminal progression brought about by technical advancement has seen the emergence of smart parking systems. Customers can now autonomously navigate the whole parking experience, from ticketing, parking, and fee settlement to the automation of various parking services. This is made possible by the current smart parking system. In an effort to address the current issues with urban parking, a number of authors have proposed several strategies for gathering data from diverse sources. A large proportion of recent research on smart parking has been devoted to technical aspects, such as system architecture and design, operational algorithms and models, and prototype designs. A large number of them are more concerned with the solution than with the systems, software, algorithms, and the specifics of the sensors' technology. While these studies have evaluated the benefits and drawbacks, they are unable to address the underlying issues because their methodology is rooted in the Internet of Things and not in the design of a new parking system. [2]

Due to the rapid increase in the human population, local transportation, and the number of vehicles on the road, metropolitan regions have become extremely congested. Parking is turning into a big problem in metropolitan regions since more and more people are using cars, making it challenging to manage car parking in certain shopping centers and buildings. Any parking system would find the task problematic. Different systems handle the issue, especially when it comes to managing automobiles in a specific area. Detect and approve the movement of vehicles with accuracy. Get and document data about the movement of vehicles. Boost the level of security in the parking lot. Enhance the quality of your client service. Prevent wasting time on parking This readily resolves the vehicle management issue. Regardless of the issue, security, vehicle verification, and distinguishing between workers and tourists in that area are all problematic. And so, these are major issues that other systems find challenging to handle. [3]

Based on an analysis of the parking management system, Hisamitsu Kuroga suggested a parking system for the benefit of practical traffic management simplification and increased transportation efficiency. In order to prevent traffic jams by giving drivers advance notice, a method to identify areas of current congestion and forecast areas of future congestion was developed. The same interpretation effort is done by Google Maps today. An automated parking system with check-in and check-out was demonstrated. On RFID and RFID readers, this was built. A number of wireless sensor network (WSN) based parking system prototypes were also put forth, with the primary objective being the installation of sensor nodes at parking lots in order to identify and update the status of parking spaces. [4]

Parking space identification is aided by radio waves and is known as RFID, or radio frequency identification. With WSN's assistance, it makes wireless data transfer possible. RFID has several benefits and boosts productivity. When compared to alternative networks, RFID technology offers far more security. Vehicle identification systems use RFID technology, and this process doesn't need any human intervention. Parking lot fees are collected by this technology, which also automatically recognizes cars vehicles may check in and out more quickly and conveniently in a secure environment thanks to the RFID system. Barriers at the gate comprise the majority of the parking lot system. Multiple check-ins or check-outs at once are prohibited by the system, which permits one-by-one parking but takes time. In addition to directing the motorist to the specific location, it offers details about the available slot. The current parking system works with the wired networks already in place, so there's no need to modify it. It is not possible to reserve a spot in advance. The system takes longer to implement node-to-node. [5]

These considerations give rise to the cloud of things. The sensors used in IoT-based smart parking systems store and access data from faraway areas with the help of the cloud. The system we propose gives information regarding the availability of parking slots, and users from remote locations can book parking spaces with the use of a mobile application. The nodes can be monitored and controlled from any place. Network architecture technology and an algorithm are employed to boost the cloud-based parking system's efficiency. The lowest-cost parking place is located using this algorithm. weighing both the quantity of parking spots that are available and the proximity of those spots to the user. [6]

Smart City Barcelona has reaped many benefits from its investments in IoT for urban infrastructure, including intelligent parking systems. According to Sotres et al., the municipal government has made an investment in e-parking spot guidance for drivers through the use of sensor systems. In 2014, 600 wireless parking sensors were placed in Barcelona's les Cortes neighborhood. The sensors were utilized to detect the available parking places and alert drivers when the embedded elements were positioned beneath the asphalt. With real-time directions on the location and availability of open parking spaces, the program aims to reduce traffic and pollution. Through the private application programming interface (API) of many technology suppliers operating in the smart parking space, sensor data was accessed. [7]

Every parking space in the system has infrared sensors installed to determine whether it is open for parking. This can be seen in the working model if the suggested system is represented by blocks. The number of open slots is displayed on a screen at the entry. For the system to function, the automobile must have an RFID card or tag with

the owner's or driver's contact information inside it, for everyone's convenience. To read the vehicle's card, an RFID scanner is installed at the entrance. The reader receives a signal from the vehicle as soon as it pulls into the parking lot and checks the system for contact information. Then, using the GSM module, the system uses the mobile number associated with the RFID card that is now in the car to send information about the closest open slot from the parking gate to that number. At the exit gate, an infrared sensor is installed to detect any vehicles that may be pulling out of the parking space. The gate will stay closed and the user will receive a notification indicating that there are no open slots in the parking lot if all of the spots are taken.[8]

The primary benefits of the gate management model over the lot management model are its affordability and ease of use. Gate management service: Another use of RFID tags is gate management. For instance, an RFID reader and the vehicle tag at the gate can be used to automatically open a gate. The round picture that is created in the parking lot is captured by the system, which then processes it to provide information about the empty parking spots for cars. To capture images that display the occupancy of parking lots, a camera is employed as a sensor. Many cars can be detected at once by a single camera.[9]

The idea of smart cities has gained a lot of popularity recently. The notion of a smart city is becoming more plausible with the rise of the Internet of Things. The Internet of Things industry is constantly working to improve the efficiency and dependability of urban infrastructure. IoT is addressing issues like limited parking, traffic congestion, and road safety. We present an advanced IoT-based parking system for this project. The IoT module site is deployed as part of the proposed smart parking system, and it is used to track each parking lot's availability status. Things with communication devices were the inspiration behind the Internet of Things (IoT) idea. Remote PCs with Internet access can be used to track, manage, or observe devices. IoT broadens the scope of using the Internet to enable network connectivity for physical items, or "Objects," as well as gadgets. IoT allows many items to gather data in remote locations and talk to units that manage, receive, organize, and analyze information about processes and services. These units are typically equipped with a communication system for devices and physical things. [10]

The sensors utilized in Internet of Things (IoT)-based smart parking systems use the cloud to store and retrieve data from distant places; these features combine to create the cloud of things (COT). The system we propose allows users to book parking slots from a remote location using a mobile application, and also gives information about parking slot availability. The nodes may be monitored and operated from any place. The efficiency of the cloud-based parking system is increased by an algorithm and network architecture technologies. The least expensive parking spot is located using this method. Taking into account both the number of parking spots that are available and the separation between the parking spot and the user. [12]

The authors of the study "Android Based Smart Car Parking System" are Prof. Yashomati R. Dhumal, Harshala A. Waghmare, Aishwarya S. Tole, and Swati R. The operating principles of each segment and the implementation of a smart car parking system utilizing an 8051 microcontroller are described in depth by the authors of this study. This article describes the implementation of an electronic invoicing system, number plate identification, parking slot status, and reservation for parking spaces via an Android application. The solution that is being suggested lessens the time and effort required by drivers to find parking. Additionally, the online payment process reduces

the reliance of the system on humans. The paper concludes by noting that a microcontroller may make an excellent processor for this kind of design. Access to the published research may be found in the March 2016 issue of International Journal of Advanced Research in Electrical, Electronics, and Instrumentation Engineering (An ISO 3297: 2007 Certified Organization), volume 5. [13]

This section examines a few research on smart parking systems that use various technologies, including RFID and wireless sensor networks. Parking space management is a problem that is rarely solved by the majority of current parking systems. The majority of parking management companies, especially those that manage indoor parking lots, track the total number of vehicles on their property using a straightforward photocell and barrier system. Drivers are typically informed of this information via signs that are placed on surrounding roadways and entrances. The systems we investigated are summarized below to provide you with a general idea of the many technologies that other people utilize. [14]

Additionally, their system confirms that the individual who parked the car is the one who is leaving the parking lot. SMS notifications are provided via the GSM. There weren't many benefits that we saw. Cost-effectiveness is achieved. It is compact and simple to install. Limited drawbacks were also present. The system's accuracy will be compromised if any RFID tags are broken or if more than one tag is read at the same time. Anything with a communication device was the original object of the Internet of Things concept. By leveraging distant computers with Internet access, devices can be traced, managed, or observed. [15]

5 CONCLUSION

A smart parking system that is economical, intelligent, and efficient has been developed. It offers a workable solution to a number of issues, including excessive fuel usage and traffic congestion. Solutions are offered to address the different challenges and worries, like safety and security, among others. New opportunities in the field of smart cities have been made possible by the development of cloud computing and the internet of things. Constructing smart cities has traditionally revolved around smart parking facilities. The parking system can be installed in practically any metropolitan setting, including malls, police stations, and train stations. By eliminating the requirement for pointless travel during parking periods, the suggested method cuts down on both actual cost and trip time. The needed and accurate information regarding the availability of parking spaces in the parking system is provided by this system. This article aims to enhance the city's parking infrastructure, which will reduce fuel waste, traffic bottlenecks, air and noise pollution, and ultimately improve the quality of life.

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