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Review Paper on Digital Parking System

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Abstract: The project entitled "THE DIGITAL PARKING SYSTEM" presents an IOT based smart parking system which provides an optimal solution for the parking problem in metropolitan cities. Due to rapid increase in vehicle density especially during the peak hours of the day it is difficult task for the users to find the parking space to park their vehicles. This study proposes a smart parking system based on Arduino components and mobile application. The proposed smart parking system consists of an onsite deployment of an slot module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. Smart parking can increase the economy by reducing fuel consumption and pollution in urban cities.

Keywords: Digital parking system, Ultrasonic sensors, Parking lot Reservation

I. INTRODUCTION

The Internet of Things (IoT) is the network of physical objects devices, vehicles, buildings and other items—embedded with electronics, software, ultrasonic sensors, and network connectivity that enables these objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit; when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through it Digital parking can be considered as one of the Internet of Things applications, a technology which appeared firstly in 1999.More specifically, IoT can be regarded as concept under which a group of things/objects that can be connected via wireless and wired connections, Things can interact with each other for the creation of new services or even applications. With the growth of population and economic development, the number of vehicles on the road is increasing day by day.

Parking is becoming one of the major problems for cities, and is becoming very costly. For instance, finding parking space during work is challenging. It is more frustrating for the users to search for a parking spot in a parking lot. To overcome this problem many parking guidance systems have been proposed in recent years that try to enhance the basic parking system. All the systems require a mechanism to detect if a vehicle is in the parking spot. The person can register for the parking slot to park his/her car. A unique id is generated for registered user and the time limit is given. The system will calculate the in and out time of the vehicle which is placed in the parking slot and the amount will be detected from their account. I any place in the patch to match with its input impedance (usually 50 ohm).

II. PARKING ISSUE IN INDIA

A. Need for Cleaning System

The biggest issue with owning a car in a metropolitan city in India is finding a suitable parking space due to a lack of parking space. The number of cars in India is more than 40 million, which corporations and personal individuals own. And the number is increasing day by day because of the affordable prices of cars and the improvement of the economic status of a middle-class person. In recent time there has been an increase in the number of vehicles, but the space for parking has not increased according to the requirements. As a result, around 40% of road space is utilized for parking instead of transport activity. Which increases road accidents. [1]

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III. SOLUTION TO PARKING PROBLEMS

The parking problem can be eliminated by using various parking solutions in this paper; the various parking systems and their advantages & limitations are discussed.

A. Modular or Puzzle Type

Puzzle-type automated multilevel parking is inspired by the children's game of '15-sliding puzzle'; a 4*4 grid has one empty slot. For parking or removal of the car, shuffling of cars should be done to bring it to its desired location. Major components of this system are shelves/shuttles, a lift for vertical movement in multilevel, AGVs, I/O points. Here shelves/shuttles can be either movable in X and Y direction or stationery.

The major drawback is the complicated management of the system. There are various proposed retrieval methods in movable shuttles, such as optimal dual load retrieval and multiple load retrieval methods. Some shelf management strategies are autonomous shelf strategy and AGV powered shelf management strategies. [2]

Fig. 1.(a)Type Car Parking System [2]

1) Advantages

i.These systems allow a very high storage efficiency in surface and volume. Then his system is very quick as the time required for accessing a car is low.

2) Limitations

i.The system is complex, and the speed of operation is also slow The effect of change in air gap on radiation parameters such as Return loss is studied. Return loss vs. frequency plot as shown in fig.3. The return loss (R.L) is parameter indicate the amount of power that is lost to load and does not return as a reflection**.** When the air gap thickness is 3 mm, better than -9.5dB return loss is obtained at desired frequency.

Therefore, a 3 mm air gap thickness is decided for this design.

B. Elevated Type or Tower

A tower-based automatic parking system is a system with a cylindrical appearance. A component in the design, i.e., a tower crane, can simultaneously perform two types of movements. Up and down motion in the Y-axis direction and Anti-clockwise rotation and clockwise rotation. The shuttle can move along the diameter of the tower to the opposite parking space. [3]

1) Advantages

i.Optimal utilization of space.
ii.Lower maintenance and operational costs.
iii.Lower construction cost.
iv.Secure and environment-friendly nature (the underground implementation saves open space)
v.Comfortable for the drivers.

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2) Limitations

i.Noise and air pollution to the surrounding environment.
ii.Regular cleanliness is required.

C. Multilevel floor Parking

In this type of car, vehicles are parked on different layers, floors of a building. These floors are accessed with the help of external or internal mediums such as ramps or other similar structures. There is a vertical lift (mechanized) for the movement of vehicles in the y-direction. This arrangement helps in less ground space which directly associates with cost reduction of the building.

This arrangement helps to accommodate more cars and produce a faster parking process. Also, sensor arrangement in this system helps to control and optimize the parking procedure. The system is designed so that the ground level gets filled first and then moves to the next level above it, and once this level is filled, it moves to the next level and so on.

1)Advantages

i.Maximum utilization of ground space.
ii.Designed for driver convenience
iii.Multiple safety guarantees of the drivers and cars.
iv.Quick entry and exit are due to the independent lift operation; hence, partial breakdown does not affect the other parts. The average vehicle retrieves time is less than two minutes.

2)Limitations

i.Expensive because the whole parking retrival operation is multilevel.
ii.Any fault in the multilevel car parking system causes great haphazard and inconvenience.
iii.This system is more complex to build, and the construction cost is very high.

D. Stacker Parking System

This system consists of parking lots with a platform to park the cars.it consists of a stacker mechanism that moves centrally, and it is equipped with a robotic arm to push and pull the car.[5]

Algorithm

1 : Algorithm of System Operations.

Step 1: Start
Step 2: If user not registered
User register into the system
Else Login into the system

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Step 3: user sends the request
Step 4: staff will receive the request
Step 5: if parking space is not available
Staff will sends the message that slot is
not available(try another Park! Unavailable space)

Go to step 3
Else Staff will send the reserve parking slot
number to the user
Step 6: user enters the car parking
Step 7: End

When a user tries to find a parking lot, he should register to find a free parking lot by using the system, then he sends a request through the application. The system will get the request and check the table of available parking to receive the message and to check the park using table. When a car reaches a parking lot, the drivers should be verified by staff. This verification process is achieved via checking the parking website.

If the information is correct, the driver received a receipt and enter the park. Later, the driver checks if the lot is empty. If so, then he will park and the change the state from reserved to park. If the current car parking space is full, the system will send a new message that includes-Try another Park! Unavailable Space, as shown in algorithm

Algorithm 2
update staff table
Step 1: Start
Step 2: detects the vehicle using the ultrasonic sensor
Step 3: update the staff table
Step 4: if the vehicle is leaving Update the staff table
Go to step 2
Else
Go to step 2
Sep 5: End

After parking the car, the ultrasonic sensors detect the change in the signal. The system updates the state of each lot every 2-3 minutes to update the table case, the achieved by the setting of the system as shown in algorithm 2; Update urgent data on a new vehicle park contains the new address. The new message will be selected based on the reserved parking lot of the current vehicle.

D. Working process of parking slot
When the ultrasonic sensor sense the presence of the vehicle it will send the signal to the Arduino. Then Arduino will transmit the signal to the relay. Relay is connected to the led bulbs. When it receives the signal sent by the Arduino, based on that signal it will on or off the bulb.Ultrasonic sensor work by emitting sound waves then wait for the sound to be reflected back.When the car enters the respective slot,the sound waves sent by the ultrasonic sensor hit the car and reflected back and sense the presence of car.

IV. APPLICATIONS

The importance of smart parking is:

1. Accurately sense and predict spot/vehicle occupancy in real-time.
2. Guides residents and visitors to available parking spot.
3. Optimize Parking Space Usage.
4. Simplifies the parking experience and adds value for parking stakeholders, such as merchants and drivers.
5. Helps the free flow of traffic in the city leveraging IoTtechnology.
6. Enables intelligent decisions using data, including real–time status applications and historical analytics reports.
7. Smart Parking plays an important role in creating better urban environment by reducing the emission of CO2 and other pollutants.
8. Smart Parking enables better and real time monitoringand managing of available parking space which results in significant revenue generation.
9. Provides tools to optimize workforce management.

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V. CONCLUSION

The problems which would arise while working with smart parking system as well as the solutions has been described which gives a good platform for all the users. With the implementation of smartparking system, it assures the ease of life for individuals who struggle in daily routines of their day to day life. The system that we propose provides real time information regarding availability of parking slots in a parking area.users Can book a parking slots.

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