Review Paper on Smart Parking System

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Abstract-The project entitled "THE SMART 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- Smart 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 is embedded computing system but is able to interoperate within the existing Internet infrastructure.

Smart 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.

II. RELATED WORKS

Robin Grodi et.al [1] has done that how the vehicle will occupy in the particular allocated place. RFID sensors detect the presence of a vehicle or other objects. Once a vehicle is detected, the system needs a way to notify drivers or a parking spot being occupied. The disadvantage is, the parking place will be detected only to the nearby places there is no GPS sensor to search the parking slots from the far place.

Alirezahassani et.al [2] had implemented this system using a mobile application that is connected to the cloud. The user will set the time for when he is going to allocate the place. If he didn't occupy later the alarm will be given to the user. The app will show the number of allocated and the empty spaces in the parking slots. The disadvantage is,

after allocating if another user request for the same place then he is unable to allocate that place so it is the waste of space if the first user cancel later, waste of time and money.

DharminiKanteti et.al [3] have developed a Smart Parking System In the case of pre-registered users IP cameras would capture the vehicle registration number and they can proceed without interruptions. As per their details like parking time estimate, their place of visit etc. For pre-registered users, the amount will be deducted from E-wallet and there by users will be notified. A similar pricing system will be followed for new users but the payment is offline. The disadvantages is, the system could serve all the parking requests but beyond 80 it couldn't accommodate more cars since the parking is full.

Georgios Tsaramirsis et.al [4] make use of the wired sensors systems. There are two categories intrusive and non-intrusive sensors. Intrusive sensors are most commonly installed directly on pavement surfaces or holes in the roads surface. In turn, on-intrusive sensors can also be described as above ground sensors, which are mounted above the traffic lane and are monitoring on either side of the road. The disadvantage is, intrusive sensors type are the decreases of pavement life due to the requirement of pavement cut for installation

Rosario Salpietroet.al [5] implemented automatic detection of parking actions performed by the users, through the analysis of smart-phone embedded sensors' and of the Bluetooth connectivity. Once the parking event has been detected, an adaptive strategy allows the disseminating the information over the target scenario, using the combination of internet connection to a remote server, and device-to-device connection over wifi direct links.

DharminiKanteti et.al [6] implemented a smart parking system in which CMOS sensor which detects the number plate of the car and data is compared with the database and the user will be allocated with his required slot. When the user enters allocated rotary parking slot, the ultrasonic sensors get triggered and the timer starts on. When the user get down, he should be providing the details of smart card which ensures that the user got down as well as it will be helpful when he wants to exist from the parking slot.

Basavaraju S R et.al [7] implemented a smart parking system which uses the cloud based IoT architecture for smart parking system

which contain cloud service provider which provides cloud storage to store the information about the status of parking slot in a parking area. The centralized server which manages to store entire smart parking system information such as number of slot, availability of vehicle etc.

III. PROPOSED SYSTEM

The proposed system is used by the user to reserve the parking slot. Here the user is able to reserve the car parking slot. Once he enter the slot the time period will get started later user leave the slot he need to pay the amount for the period of time is placed his car in the slot area.

A. System Design

The design of the system architecture describes the structure, behavior and more views of the system and analysis. The goal of design is to produce a module of the system which is used to build the system. In the proposed system.
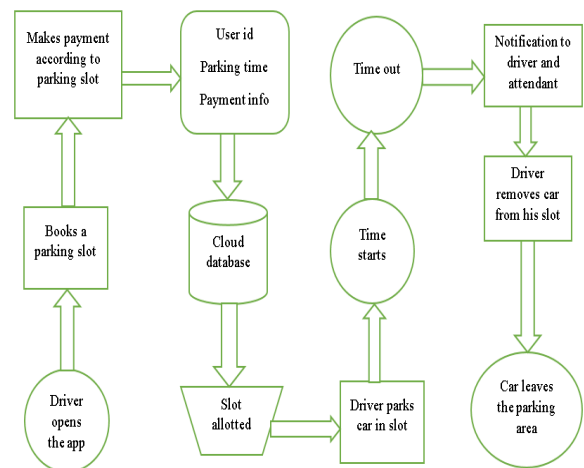
Initially once the user login into the application he can view the real time parking slots that are available to park.

After once he view the slot based on FIFO method the parking will get allocated to the users so once he selects the parking slot by entering all the required information he is able to reserve the parking area.

So once he enters the parking area his parking time will get started, if the person will not take the car with in the selected time the alert message will gets. Then later he leave the area the time in and time out time will get calculated and the amount will be get paid.

B. System Architecture

The goal of design is to produce a module of the system which is used to build the system. Fig 1 shows the proposed system where:

- The user will register to the application,later he get login in to the application by entering the user name and password.
- Intially in the homepage he is able to view the real time slots that are available.
- By viewing the availability of the slots he selects the particular slot area and enters the required information such as vehicle number,parking slot number,intime,outtime.
- The data is sent into the cloud that slot gets allocated to the user.
- Once the selected outtime is getting in to the finish, if the person did not receive back his car the alert message will be sent to the user.
- Later the user leaves the parking slot area he gets in to paid to the respective time period.
- Later the availability of the slots will get updated in the homepage to view.

C. Algorithm

Algorithm can perform calculation, data processing, and automated reasoning tasks. As an effective method, an algorithm can be expressed within a finite amount of space

and time and in a well-defined formal language for calculating a function.

Algorithm 1 describes about the user and the staff relationship about allocating the parking slot.

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

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 1.

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 CO_2 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.

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 slot for them by the use of our mobile application. So the users can save their time from searching for parking slots.

REFERENCES

[1] Robin Grodi, Danda B. Rawat, Fernando Rios-Gutierrez: Smart parking-parking occupancy monitoring and visualization system for smart cities.

[2] Abhirup Khanna, Rishi Anand: IoT based smart parking system.2016 International conference on Internet of Things and application(IOTA).

[3] DharminiKanteti, D V S Srikar and T K Ramesh: smart parking system for commercial stretch in cities.

[4] Georgios Tsaramirsis, IoannisKaramitsos, CharalamposApostolotpoulos: smart parking-an IoT application for smart cities.

[5] Rosario Salpietro, Luca Bedogni, Marco Di Felice, LucianoBononi: Park here! A smart parking based on smart phones' embedded sensors and short range communication technologies.