IoT Based Vehicle Parking Smart Slot Availability Detection (VPSSAD)

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Abstract - *In this latest virtual generation, we guarantee that almost everyone has a smartphone and no additional hardware is required for the consumer interface. As a rule, big cities have at least one car that you can easily pay for. Therefore, the city parking problem is over. This causes parking problems, heavy traffic and high pollution. This is a problem faced in many cities today. Vehicle drivers waste most of their time finding available parking spaces. We will look at a demonstration of how to mitigate these parking problems and perform efficient IoT-based valley services. Traffic management systems have been introduced in many urban areas, and new parking guidance systems have been introduced, which are parking guidance information technologies (PGIs) for good parking. With the IoT, you can build the world's largest city groups at incredible speeds and build integrated parking systems. This scheme aims to increase the number of in-vehicle devices that detect the number of automatic slots by extending the parking app for free parking using a reputation detection approach. This document uses an Android application. Due to the rapid population growth in urban areas, almost all citizens use cars. This technology sends transaction data about parking in smart cities. The manual parking guidance system has several drawbacks. Very expensive maintenance of parking system, time required to generate results, double data entry.*

*Key Words***: Smart Parking, ESP8266, Arduino, VPSSAD, IR.**

1. INTRODUCTION

Now a days in metropolitan cities it is very difficult to find free parking slot due to the high growth of vehicles. It is especially difficult to park a car in a metro city. in this project we aim at solving the problem of the driver by knowing available parking space for the car to be parked. is there are any free parking spaces are available or not can be found by using their smart phone without having to deal with the hassle of driving around for finding parking space.

The Arduino based device that is used in this project along with sensors and telnet app can help in finding the car parking space. The Arduino is an open-source electronic device based on an easy-to-use hardware and programmed for interfacing with any sensors or modules. The Arduino program will be written to control all of the components used to solve the problem. The main objective is to build a car parking demonstration unit that contains five parking spaces. The idea of the project is to make sure, that the driver who aims to park their car in the parking will know if there are any parking spaces available to him an important contributing factor will be an android application. The intention of this project is to indicate the number of free spaces.

2. Background

The motivation behind selecting the proposed system was got from Dundrum Shopping Centre underground car parking system. This car parking is very large space to park large number of vehicles. in such places identifying the parking slot free or not is very difficult in such cases android app-based information on the tip of smart phone can help the time-consuming process of identifying parking slot.

The LED's that display in front of parking place comes in handy to know the parking slot is available or not, if LED Blink with RED is identified as not available, The LED will be GREEN then it is identified as space is available. It helps in finding parking place with ease and faster way Moreover, the LED's displaying all over the parking area will reveal how many (if any) parking slot are available at that time. these factors inspired to develop car parking prototype module [4].

3. Literature Review

There are various methods for the development of car parking automation, study of many papers shows that human involvement [1] in car parking is more. This should be reduced considerably and that will be the main objective of designing an automatic car parking allocation system. There is no automation in practice when it comes to car parking allocation in our country.

Countries like Europe, the United States, and Japan have implemented advanced mechanism in making automated car parking allocation systems [1]. Therefore, we made this project using simple sensors and a microcontroller [2]. Since human interference is seen in allocating spaces, unnecessary congestions of vehicles happen [3], especially during peak hours. Thus, optimal results are obtained at a low cost when basic sensors are used instead of using

conventional methods as seen in shopping malls [4]. In this system, we have inserted an IR sensor at the entrance of the gate on both sides and it is placed in every car parking slot available individually. In parking slots two sensors are fixed underground, the distance between two sensors is small enough to detect all the hatchback cars in India. This will help place sensors effectively in the parking system [5].

Therefore, no cars will be left undetected by the IR sensor. Here we use Arduino as the microcontroller [6] to transfer the information received by the sensors to the servomotor, LCD, LEDs, etc. LEDs, LCDs, and servomotor are connected to Arduino as output devices. Thus, it reacts based on the inputs obtained from the sensors i.e., detection of vehicles and allocation of place [8]. This will be an optimal car parking allocation mechanism and it will have a cost-effective approach in designing. Servomotor was used for gates open and close operations, and LCD is used to display the details of a parking slot available with is a content addition from the references. In some cases, RFIDs were used. The usage of RFID mechanism will provide more accurate results with high efficiency. But this mechanism cannot be applied everywhere since people visiting the spots cannot be predicted before their arrival.

The input information that we receive are very anonymous. There is no place for anonymity when RFIDs are used. It is impossible pragmatically to provide RFID receiver tags to all cars to be parked [8]. Initially, when the car enters through the gate, the IR sensor in the gate detects the car and sends the signal to the microcontroller [9], which resends the signal to the servomotor after checking the number of slots available for parking. The servomotor is turned 90 degrees up to open the gate when there is a place available to park [9]. The IR sensor at the other side of the gate is used to count the number of cars entering the parking area and it decrements the counts and displays them on an LCD.

The display shows the remaining number of empty car parking slots and the total number of slots occupied already. LED indication is used to show specifically which slot is filled and which slot is empty. In the parking slots, the IR sensor inserted underground detects the car and sends the signal to the microcontroller [11]. This signal makes the LED activate and the specific slot's LED is turned off. If a slot is filled, the LCD will show that the slot is occupied. Thus, providing information about the occupied slots to the driver and they can go for another floor. Thus, we aim to propose a car parking allocation system that represents a fully automated model with minimal human intervention and overcome the limitations of existing systems.

4. Existing System

There are various parking systems have been done in the past years. However, the advancement technology of hardware towards Industrial Revolution 4.0 requires us as a researcher to propose a smart parking system that suits with the revolution. This section reviews various works conducted on smart car parking systems from the literature.

Firstly, Elsie et al., [12] suggested an automation of Realtime car parking system (RTCPS). RTCPS is the integration of mobile cloud computing (MCC) and vehicular networking (VN) system which apply the idea of integrated communication-computing platforms (ICCP). The ICCP's goals are to develop a productive way to address issues such as inappropriate parking management scheme, traffic congestion in parking lots, unsecured of vehicles, and other Infrastructure-to-Vehicle (I2V) services to deliver data distribution and service content to connected Vehicular Clients (VCs).

In contrast, Mutiara et al. [13] proposed a module that uses both, an ultrasonic PING sensor and a microcontroller NodeMCU. The module provides a low-cost wireless parking module with a parking sensor to detect a vehicle and an unoccupied parking space LED display. The module connected to the main server wirelessly via a router. The module would cost less than the average marketable retail prices of equivalent module. By taking advantage of cutting-edge technologies such as IoT, Cloud Computing and Deep Learning, Park Smart [14] aims to solve the difficulty of finding a free car park in public and private areas such as towns, malls, and etc. The key component for this system is camera that uses specialized embedded systems to collect the stream that will send the data to the main server. It uses wide angle cameras to optimize the number of monitored car parking spaces. The data from the cameras are send to cloud by implementing the Edge Computing paradigm. A computer vision algorithm is design to classify the parking spaces, given their spatial configuration. The mobile application or browsers are the ending point for people looking a free spot to park their vehicle.

With the IoT, Alsafery et al. [15] proposed a smart car parking system solution for smart cities internet of things. Aside from providing information about the number of parking spaces and nearest parking spaces, their system included with roads traffic congestion status. They applied the machine learning algorithm based on data analysis and data processing from the specific data collected by their own. They use cloud web service to collect data from fog microcontroller distributed devices around the users, analyze and process the data, before passing the information of the road congestion and nearest parking space to the users. To collect the data, the system requires lots of efforts which are expensive and costly, while the machine learning algorithm shouldn't be too complex to analyze lots of data in a real time. Both, deep learning, and machine learning features are still new and developing. Hence, the implementations require extra cost of infrastructure in term or software and hardware.

Differently, Chandran et al. [16] recommended a parking reservation system using Android application. They propose to use Infrared sensor which allocated in the parking lot to detect the presence of parked vehicles. User can reserve the lot in advance before reach to the location.

Meanwhile, Fikri & Hwang [17] dedicated their application for disabled people. They propose to secure the disabled parking space by using Near-field communication (NFC) tag reader and alarm system.

Recently, Al-Turjman & Malekloo [18] conduct a survey review about IoT smart parking system. They discussed the software and hardware design implementations that commonly used in the literature.

5. Proposed System

The main problem is to find a parking niche, whether in the shopping boardwalk or companies or at the field or in hospitals. An average, people spent much time to find a suitable parking. Most of the people situate their vehicles in places not designated for parking, and parking in places not reserved for parking places. Generally, there are reasons to situate people in places not reserved for parking similar as the area designated for parking isn't enough to feed the requirements.

This is due to the weak planning and not allowing of results to keep pace with the large increase in the number of vehicles, and utmost people situate the vehicles for long times without allowing. Drives looking for parking space is a major cause of business traffic and accounts for 30.

Traditional parking System In recent times, number of vehicles possessors are adding day by day, when someone tries to find a position to stop his auto after a long day of work surprised by the lack of parking to stop his vehicles and see the motorist passes positions further than formerly to find him a position.

Traditional parking consists of only two passages to enter and exit harborage. In some parking only one entrance to enter and out of space, while parking spaces are small for a small vehicle, while the big vehicle takes further than one position, which makes effects worse, occasionally the vehicles stands but when it isn't possible to open the.

The vehicles are scratched with the coming auto because the parking is too small and cannot take up enough space between vehicles for the parking, but when you exit take a lot of time to get out of the vehicles for fear of hitting any vehicles near- in.

Smart parking system the traditional parking has been developed to a parking system that helps the motorist to know the enthralled and available positions through a display that contains the number of available parking spaces and where they are.

This system is used in numerous places and break the problem of arbitrary parking and not to stand in places not available to stand up. Smart parking consists of two networks, an external network and an internal network, the external network is that the stoner connects to the Internet and enter the operation of smart parking to reserve a position and be reserving anywhere available in a data network, and the stoner enters the garçon of smart parking to be suitable to reserve the asked position without the need to pierce parking through the operation the stoner can know any vacant positions and available and places parking.

The internal network of parking is the process of connecting all bias smart parking When the garçon is transferring a signal to the pall and the part of the pall shoot this signal to the display screen and from the display screen to the detector and the detector to the top of the position and vice versa and this communication is done internally without the intervention of any hand or stoner.

* Our paper aims at regulating parking allocation system with delicacy without any mortal hindrance to avoid the business traffic before parking places with introductory electronic factors.

* It's designed in such a way to be enforced in shopping complexes, promenades, multi-store structures, apartments to regulate parking allocation especially during peak hours.

* It displays the number of empty parking places available at the entrance itself thereby reducing the time loss that happens in searching for empty parking places. It also displays the specific space available for parking in the entrance.

* It restricts the entry of vehicles when the parking area is full and regulate the entry of vehicles entering inside the parking garage systematically. However, the gateway will be closed, if all the places were enthralled formerly. No farther entries will be allowed outside.

Therefore, the motorist will search for a space in another bottom of the parking garage.
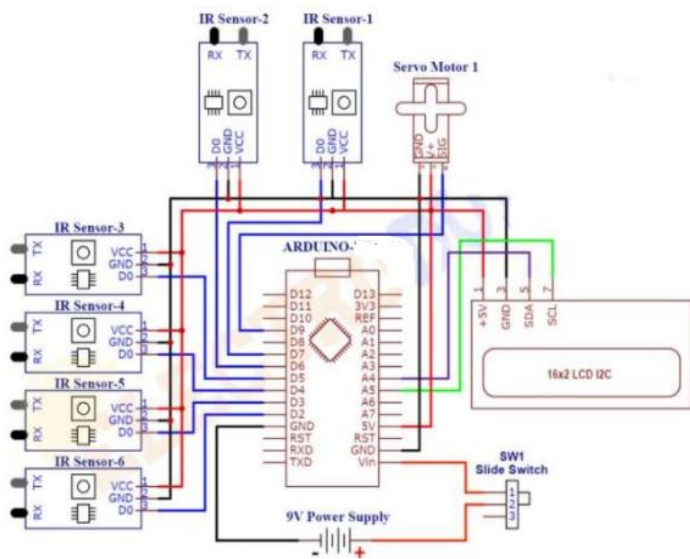
Fig-1: Proposed Diagram

Fig-2: Expected Working of Car Parking System

In this project, we are going to implement smart car parking system, we are using IR sensors which will detect the car is parked in the slot or not. If car parked then it will show space is occupied or empty. By using ESP8266 NodeMCU kit we can achieve the concept of IoT. Which will display on Android mobile phone.

6. Future Enhancement

In forthcoming, audio enabled directing technique are to be merged in this system. Therefore, this will give information to the driver if he fails to see the LCD display. Collection of parking charges through digitalized platforms with NPCI's BHIM, UPI, FASTAG etc. will reduce further time lag in collection of charges. Pre booking of slots using mobile applications of the specific malls, offices will be helpful in parking and it will be helpful to persons with EVs since they require charging spots. Applications of IoTs in this field will open more channels and address many short comes. Different ways for incoming and outgoing are to be added to reduce further congestion.

3. CONCLUSIONS

This projected system, we can find-out the free niche in the parking zone and it can also be used for time saving purpose. This can be executed in a real- time terrain and the agreeing data can be reckoned and displayed on the web runner or mobile operation. This system can reduce the force radiates an effective result for the real- time problem. Therefore, this design finds its operations in numerous cases. The system has nicely satisfied the introductory effects similar as chancing a free parking niche in the parking area inside the boardwalk. But still, the power force for the processor and detectors has been powered ON for the fulltime. In forthcoming improvement payment for parking time corresponding to the specific auto can be intended and payment through online by connecting banking account to the mobile operation. Another result for calculating the parking time is by using the camera.

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