Role of IT in Parking Management

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Abstract:

Automobiles are synonyms for mobility and freedom. A continuous increase in the growth of population in this world leads to the rapid increase in the number of vehicle being used. With the growing number of vehicles and the consequent shortage of parking space, there is haphazard and totally unregulated parking of vehicles all over. Also with the growth of vehicles, a major problem is increasing in vehicle size in the luxurious segment in urban cities. As the global population continues to urbanize, without a well-plannedthese problems will worsen in many countries. Sometimes, the spaces are left in the parking lot, but it is congested due to the unmanaged parking of the cars, for which it going to waste

In densely populated areas, providing convenient parking is real challenge for city planners, architects and developers. The need to offer sufficient parking spaces is a task for specialists. This situation calls for the need for an efficient and IntelligentParking System that not only regulates parking in a given area but also keeps the manual control to a minimum congestion. Intelligent parking system is the solution to park a car as many cars as possible in as little space as possible. Intelligent parking system is based on the most modern technology of storage systems. The entry of parking'sis facilitated to the image sensing process to detect the car size and allot the parking space according to the size of the cars.This paper aims to provide an intelligent system of using sensors camera on entry for searchingparking space before to enter in the parking zone withhelpfulin manage the size of parking cars.The proposed system captures and processes the image produces the information of the empty car parking spaces. This paper reviews the Intelligent Parking System used for parking guidance, parking facility management. A proposesystem ofmonitoring technique with a camera which is used as a sensor to take photos to show all the occupancy of cars parks. By implementing this system, the utilization and management of parking spaces will increase. It also allow to show parking spaces availability in the nearby of search area.

Keywords:

Parking system, monitoring sensors, Image process sensors.

I. INTRODUCTION

The industrialization of the world, increase in population, slow paced city development and mismanagement of the available parking space has resulted in parking related problems [15]. Most of the car parks are full at the time of need, but it cannot be knowledge before reaching at the parking. And also the unmanaged arrangements of cars are also taking more space in the parking lots. There is a dire need for a secure, intelligent, efficient and reliable system which can be used for searching the unoccupied parking facility, guidance towards the parking facility. Implementing Intelligent Parking system will help to resolve the growing problem of traffic congestion, wasted time, wasting money, and help provide better public service, reduce car emissions and pollution, improve city visitor experience, increase parking utilization, and prevent unnecessary capital investments [2].The proposed system based on image processing sensors at the entrance of the parking which captures and processes theimage and produces the information of the empty car parking spaces through computer system that manages the whole process and displayon the screens, at the entry of the parking. Therefore, parking improves the utilization of existing parking places and manages the parking cars, leading to greater revenue for parking owners. It also benefitted for the environment and plays a major role in creating eco-friendly environment.There are numerous methods of detecting cars in a car park such as Magnetic sensors, Microwave Radar, Ultrasonic sensors and image processing, as summary is given of different techniques for Intelligent Parking System in table 1.Image processing image system has cheap and easiest method. One or more cameras are used for video image processing. Software is needed to process the images taken by the cameras. This processing is usually done by examining the difference between consecutive video frames [10].

Table 1:*Summary of relevant techniques for intelligent parking systems* [15]:

S.No.	Different Technologies	Features	Services Provided
1.	Agent Based	Dynamic Distribution and Complex Traffic Environments	Bargaining, parking guidance and route negotiation etc.
2.	Fuzzy Based	Human-like intelligence and expertise	Intelligent parking methods e.g. parallel parking and perpendicular parking etc.
3.	Wireless Sensor Based	Low cost implementation with lower power consumption	Detection and monitoring of the parking facility etc
4.	GPS Based	Real time location based information and guidance towards destination	Provides information about the locality and availability of parking facility
5.	Vehicular Communication	Provision of parking information distribution service for mobile vehicles	Antitheft protection, real time parking navigation service etc.
6.	Vision Based	Good for car searching in large parking lots	Lot occupancy detection, parking space recognition, parking charges collection etc

The area that a camera scans can be easily changed. Here, the size of the cars detection is done by identifying, and matches with the zone's size to allot the space, and display the space on the screen.

A. Need and benefits analysis of smart parking:
• Optimize Parking Space Usage.
• Help traffic in the city flow more freely.
• Accurately predict and sense spot in real-time.
• Reduction of negative impacts of parking services.
• Increasing the social, economic and environmental benefits of the parking facility.
• Intelligent Parking plays a major role in creating better urban environment.

B. Methodology:
Nowadays, car is very important to everyone especially for who are works. People are willing to make instalment to get own car. When talking about metropolitan, then traffic jam always occur because of numbers of vehicles are so high. Thus we cannot deny the existing of the cars in -our daily life. Whenever we go out by car, we are facing problem to find an available parking space due to the tremendous increase of occupancy of cars. The analogy is when driver entera certain parking lot, the first thing that the driver do is looking forward of some sign to telling that the parking lot is fully occupied, partly occupied -or vacant. The driver also do not know how many are there and where to find a parking -division for his/her car. Some of parking divisions may remain unoccupied even the total occupancy is high. This will causing ineffective use of parking divisions as well as traffics jams around the entrance of parking lot [14]. For this purpose, this proposed system is very useful. It will detect the vacant or occupied spaces of the cars and show with the help of image processing. Image Processing defines as analysis of a picture using techniques that can identify shades, colours and relationships that cannot be perceived by the human eye.

Image Processing is two-dimensional function, i(x, y), where x and y are spatial (plane) coordinates, and the amplitude of f at any pair of coordinate (x, y) is called intensity or gray level of the image at that point. When x, y and the intensity values of f are all finite, discrete quantities, the image called a digital image. The field of digital image processing refers to processing digital images by means of a digital computer.

A digital image is composed of a finite number of elements, each of which has a particular location and value. The elements are called picture elements, image elements, pels, and pixels. Pixel is the term used mode widely to denote the elements of a digital image.

This system proposes a technique of detecting the existence of park vehicles by processing the image of the parking lot taken by a surveillance camera and manage the parking intodivide zones and display in on the screen at entry of parking lot by using Parking Space Image Processing technique [14].

In this system, a camera is used with a sensor to take images to show the occupancy of parking spaces. The camera can detect the presence of many cars at once. Also, the camera can be easily moved to detect different zones of the parking lot. The camera detect the vacant space of parking and shown on the screen with **Green** circles are placed on the vacant car parks. **Green Circle** helps users so that users can easily know whether a car is parked or notin a spot, as shown in the fig 1. It

provides the easy parking spaces by using this technique that allow people to easily and exit.

The image of a parking lot is taken by a surveillance camera in the parking lot .After that, system will shows how many available parking spaces in each zone and display it at entrance of parking lot.The capturing images are involves in image acquisition. Acquisition could be as simple as being given an image that is already in digital form. In Parking Space Monitoring, image are taken using camera digital and periodically performing raster scans of the lot at a specified zoom level for sufficient image resolution. Necessary considerations for scanning include image overlap, scan frequency, and scan time [14], as shown in fig 2.

It permits cities to carefully manage their parking supply. It involves using sensors, real-time data collection, payment systems that allow people to park a car where they will likely find a spot. With the advent of smart parking and more mobility alternatives to personal vehicles, better use of existing parking will decreased demand for the country's parking space surplus and for surface parking. It also helpful in making the environment greener, cleaner, more compact. Also making more inherently walk-able, bike-able and serviceable by a multimodal transportation system [2].

The pictorial procedure flow of the entire system is given fig 3, 4, when the user enters in the parking lot, the cameras records the model of the car, and send the message to the service provider, who checks the availability of the parking space. If the parking is available, it gives feedback to the user.
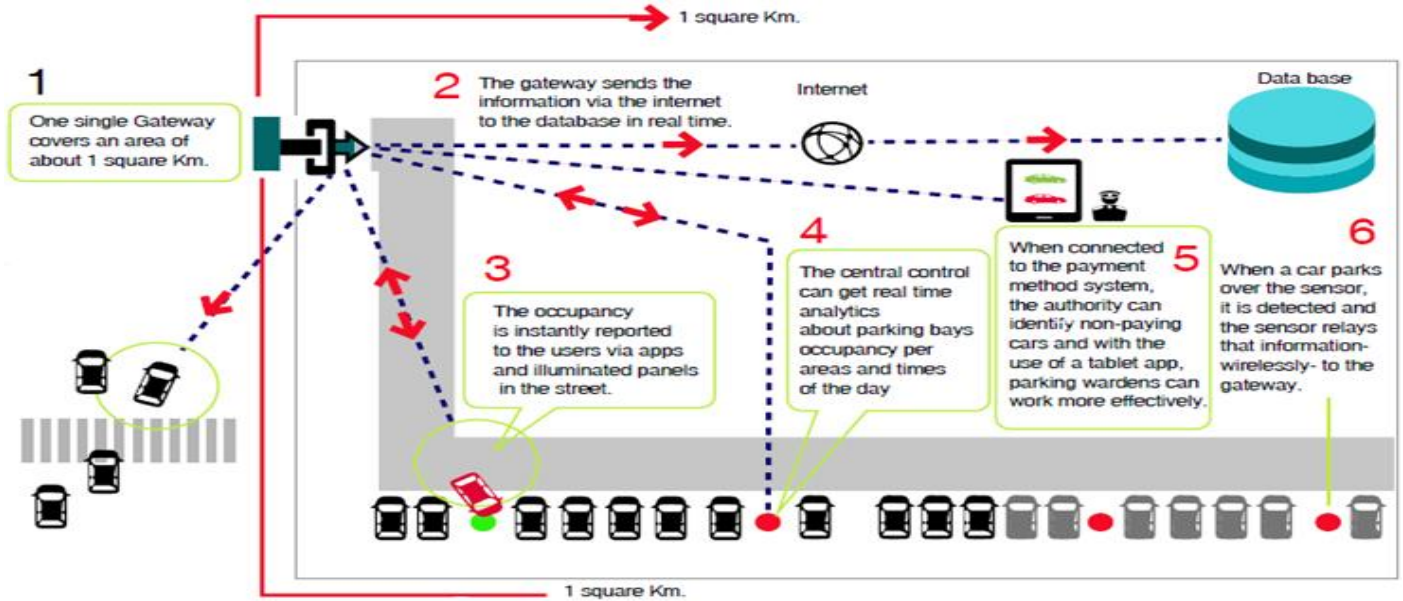

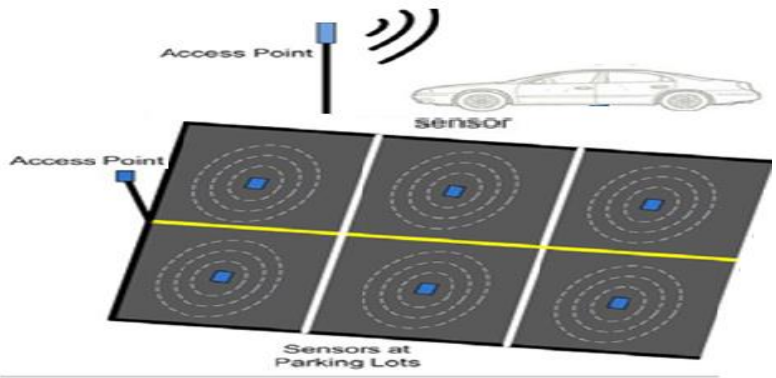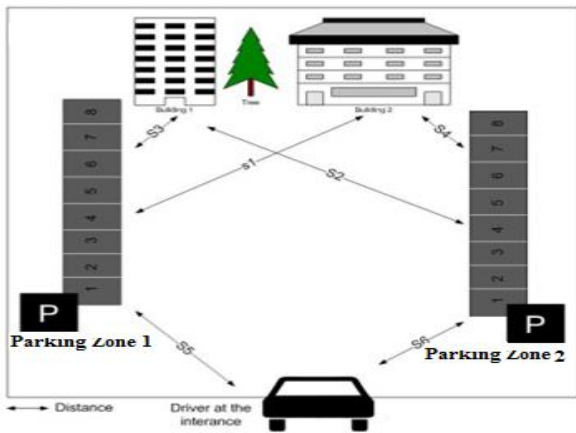*Fig 1: Working process of Parking System.*
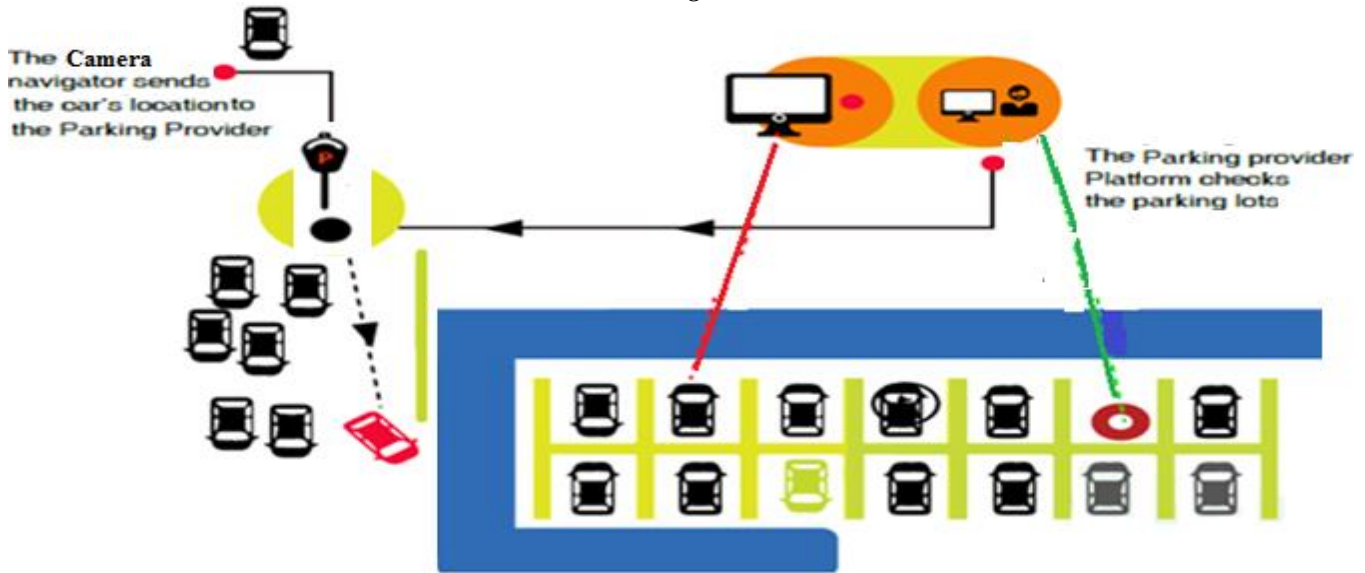
Fig 2: *Using Procedure*

Fig 3: Detecting of Parking spaces

Finally, when the User placed the car in the parking, with the selected time limit, the meter measure the time of the parking, for a selected time period, On-Street parking meter intimate to the service provider and sendsa message to the User to remind about the park car.This shows the using procedure of the entire system with the help of smart phones.
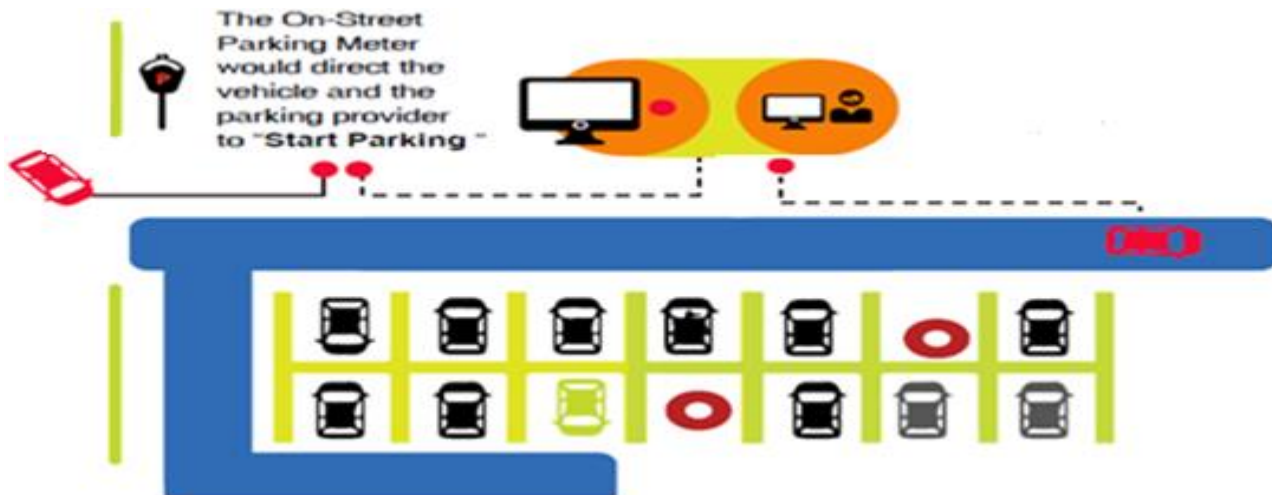
Fig 4: Allotting Parking Zone.

To promote the small cars usage, the parking should be cleared vision, including the relaxation of time for the extension of parking need. This relaxation should depend on the situation and site of the parking lots. This relaxation of time should be classified according to the size of the cars, as-blue zone, yellow zone and green zones. According to the sequences:

A. *Blue Zone:* Those zones which are most saturated of small cars below three meters. This zone can only the relaxation of the time is only for the **two hours**.

B. *Yellow Zone:* Those zones which are saturated at peak hours. In this zone, the cars are from the range of **three meters to five meters**. The relaxation of the time period is in the saturated time is three hours. Rest of the day, the relaxation time will increases at certain limit with paying extra amount on extension.

C. *Green Zone:* Those zones which are slightly saturated or the areas of college, institutes, parks etc. In this zone, the cars above the **five meters** are allowed.

II. CONCLUSION

Due to the worldwide spread of urbanization raises new issues for city-developers. One of the key concerns of urban traffic is the growing size of the space occupied by parking cars which affects the traffic highly. In this paper, an I.T based car parking system and its management with the help of image processing technique is proposed. It helps inreduces parking problems that arise due to the unavailability of a reliable and modern Parking system.As intelligent parking service is a part of I.T.S, it can decrease the impact of uneven distribution of parking in different parking facilities.

The use of modern technique can reduce the parking related issues, such as:

- It can also helpthe economic and also helps in preserving the environment, fuel and time.

- It makespossible to manage large area by just using several cameras.
- It is consistent in detectingincoming cars because it uses real time data.
- It is cheap and easy-installed.
- Drivers can get useful real-time parking lot information from this system by the guidanceinformation display.
- It helps in providing the unique zone for the parking, according to the size of the car. Therefore, it reduces the wastage of space in parking.
- It also gives the route of the particular allotted zone on the payment slip and on the screen at the entry, so, the time for searching the availability of parking lots has been eliminated by using proposed technique.

The integration of image processing and the use of IT have made it a smart system. The simulated results are obtained in the MATLAB and the number of vehicles is displayed in the LCD[13].

Primarily Smart Parking technology is about enhancing the productivity levels and the service levels in operations. Some of the underlying benefits could be lowering operating costs, while building value for customer to drive occupancy, revenues and facility value.Finally, smart parking can actually integrate many technologies to make a unique way for the modernization in the field of parking.

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