EFFICIENT VEHICLE PARKING SYSTEM USING CLOUD BASED IOT

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Abstract-The aim of this paper is to develop an intelligent parking system to reduce hiring people's costs and maximize the use of car park owners ' resources.The popular method of finding a parking space is currently manual where drivers typically find a place through luck and experience in the street.This method takes time and energy, which if the driver drives in a city with traffic density, can lead to the worst case of failure and to any parking space.Therefore, through cloud-based IOT and slot allocation through open source computer vision librarybased recognition tool, a smart car parking system is implemented with slot booking operation.The user can book any of the available slot in the webpage. This system takes away the unpredictability of finding a parking slot. This paper focuses on reducing time wasted on finding parking space nearby and ongoing through the filled parking slots. The end user is provided with a webpage to check the available parking slots. Inside a smart city a smart car parking system is a much needed to save time, fuel and even the environment from pollution.

Keywords- Raspberry Pi, IR Sensor, Camera, Cloud, Buzzer.

I. INTRODUCTION

One of the weakest applications in smart cities is the intelligent car parking program. With cities rising increasingly in population and traffic volume, conventional parking management approaches are facing several challenges such as inadequate resource management, high human capital requirements and data noise[1]. The Internet of Things has the opportunity to tackle these problems. The Internet of Things is a system of interrelated computing devices, mechanical and digital machines, objects or people provided with unique identifiers(UIDs). It has the ability to transfer data over network without requiring human to human or human to computer interaction. The IOT can be configured to collect sensor data to track areas of interest in small towns[8]. In addition, the number of vehicles in cities is increasing every day while the amount of on-street parking bays can hardly be increased.Restricting the maximum amount of time a vehicle can occupy a parking spot is required to facilitate frequent parking bay turnover

and give drivers a fair chance to find parking spaces. Precise monitoring can only be done by installing in ground sensors that alert a parking officer when a car reaches the parking limit[7].The proposed system module is used to monitor and signalize the state of availability of each single parking space. Every parking slot has an IR sensor and camera which is connected to the raspberry pi control unit.This system uses IR sensors and each sensors act as a slot in the parking space.At the time of exit the parking fee is calculated and is sent to the particular user mail id.A webpage is also provided to the end user to check the availability of the parking slot and book a parking slot accordingly.

II. LITERATURE SURVEY: Over the last few years, several applications permitting to pay through the mobile phone have appeared. Such applications manage detailed information about parking operations so that accurate profiles of parking habits of car owners can be created. In this paper we propose a system to pay for parking by phone which preserves the privacy of drivers in the sense that the information managed by the system is proven not to help an attacker with full access to it to do better that she would do by patrolling the city for collecting information about parked cars[9]. In the wake of the recent trend to build convenient, green, and energy-efficient smart cities, common techniques adopted by high-profile smart parking systems are reviewed, and the performance of the various approaches are compared. A mobile sensing unit has been developed as an alternative to the fixed sensing approach. It is mounted on the passenger side of a car to measure the distance from the vehicle to the nearest roadside obstacle. By extracting parked vehicles' features from the collected trace, a supervised learning algorithm has been
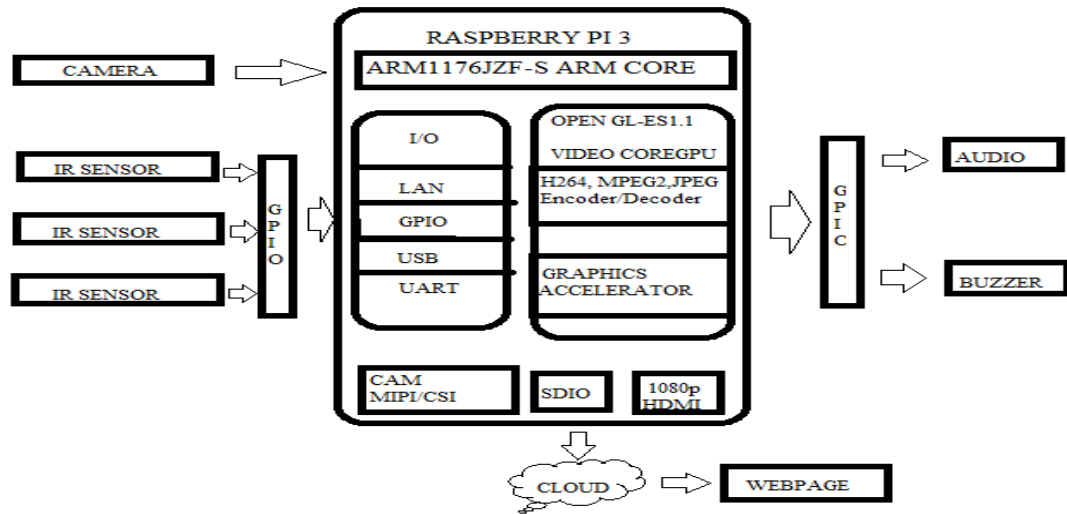

Fig 1. Proposed system model

developed to estimate roadside parking occupancy[10]. Furtherly, many motor vehicle parking systems are designed and modeled by using RFID and wireless sensor networks [2]. The detection of Radio frequency signal propagation is the main factor to be considered while using wireless sensor network in the parking area. There are only few models available to predict radio frequency signal accurately. RF propagation models are created to support cellular system that differs form indoor and outdoor[1].Non-intrusive sensors are used in wireless sensor network

because it is easy to install and it is cost effective. These sensors are robust when compared with others in the concept of video image processing process. Here the sensors are used within the boundary of the particular parking slot which is used to detect the presence of vehicle [7]. In [11] the authors have constructed a traffic Net enabling the transfer of network to traffic applications. The network can be retrained using self-established data set. Deep learning approach (Convolutional Neural Network) was utilized for traffic monitoring and control.

III. HISTORY

A variety of automatic motor vehicle parking systems are proposed and modelled by considering the vehicle parking time period, using RFID and wireless sensor networks. According to the constraints, sensor systems or sensors consist mainly of intrusive andnon-intrusive system. In non intrusive system the sensors will be placed in such a way that there is no contact between the sensor and the object.The non-intrusive sensors are used in various wireless sensor networks because it is easy-to-install and it is cost effective. They are more effective when compared to others in video image processing process. These sensors are placedwithin the boundary of the parking slot to detect the presence of vehicle.

IV. PROPOSED IDEA

Every parking slot in our system has an IR sensor and camera with control unit Raspberry Pi. Then we can assign the slots from detection of IR sensor car presence or absence. The user can register any free slots available at the location where the parking is located. A QR code is provided immediately to the user. When the user reaches the destination, the camera recognizes the QR code and the user can park the vehicle in the respective registered slots

A. Components required for the Proposed Idea

1) Raspberry Pi
2) IR Sensor
3) Camera
4) Buzzer
5) Cloud
6) Webpage

V. PROPOSED SYSTEM MODEL

The Microcontroller that is used to implement our parking system is the Raspberry Pi 3 and it is attached with the IR sensor and Camera as shown in Figure 1. The Raspberry Pi 3 is a powerful

credit card sized single board computer that can be used for many applications. It has a powerful processor which is ten times faster than the first time generation Raspberry Pi. The basic use of an infrared sensor is to detect obstacles. It transmits infrared signal, this signal bounces from the surface of an object and the bounced signal is received at the infrared signal. Here the IR sensor is used to detect whether any car is parked in the parking slot or not. The IR sensor is used to detect the presence or absence of car in the particular parking slot. The main advantage of IR sensor is they do not require contact with the object for detection. IR sensor is capable of detecting motion in presence or absence of light.A camera can record and store photographic image in digital form. Capturing of the image is accomplished by use of a photo sensor, using a charged coupled device. Here camera is used to recognize the QR code, which is generated to the user mail id while booking of that particular slot. When the user parks the car in someother slot instead of that booked slot the buzzer goes to the active mode and indicated the user. Here a Piezo electric buzzer is used to produce sound. It works based on the inverse principle of piezo electricity. The Piezo electric buzzer has a very simple construction, light weight and low price which makes it used for various applications.A Webpage is a specific collection of information provided by a website and it is displayed to the user. A Webpage is a document that is commonly written in HTML, which can be viewed in an Internet browser. The user uses the Webpage to book the parking slot. The information that must be provided by the user in the webpage is User mail id, vehicle number and slot number. The Webpage also displays the pre-booked slots and shows the available slots to the current user. A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. Here the DC motor is used to open the gate for entry and exit of the vehicle.
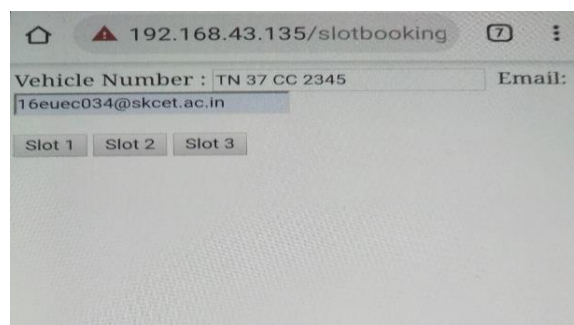

Fig 2. Webpage for the user to book slot

VI. WORKING OF THE PROPOSED SYSTEM

Every Parking slot has IR sensor and Camera with Raspberry Pi control unit. When the user registersany particular slot a QR code is send to the usermail id. The User must provide

information's like vehicle number and email id in the webpage as shown in the Figure 2. They can also select the preferred parking slot available in the webpage.

When the user reaches the destination, the camera available in the parking slot recognizes the QR code. If the users QR code isunrecognized the system will not allow the vehicle to enter the parking slot. When the user parks the car in some other parking slot instead of the booked slot the buzzer goes to the active state and indicates the user. When the user exits the parking slot, again the QR code is scanned. Thetotal parking time of the vehicle and the amount for that particular time period is calculated and sent to the particular user mail id as shown in Figure 3.
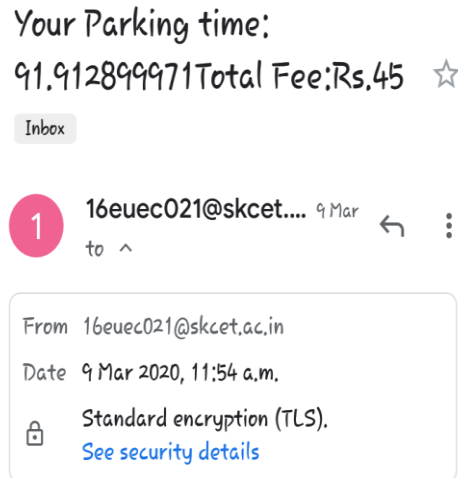

Fig 3. Payment details at the time of departure

VII. MERITS

1. Reduces stress while searching for aparking space.
2. It takes away the unpredictability offinding a parking spot.
3. Smart Parking will reduce search of traffic in streets.
4.There is a minimal staff requirement if it is used by known parkers.
5. Greater sense of security.
6. User is directed to the booked parking slot so that less fuel is consumed and time is saved.

VIII. DEMERITS

1. There may be a fear of breakdown of the network.
2. It may be a bit confusing for unfamiliar users.
3. All the users must have a Smart Mobile device with a internet connection.

IX. RESULTS AND DISCUSSION

After booking slot in the webpage confirmation text will be shown in the python ide as shown in Figure 4and then booked slot will be updated in the webpage. The booked parking slot will not be displayed in the webpage and only the available parking slots at that particular time period will be

Fig 4.Mail sent from raspberry pi when booked

Fig 5.Mail sent from raspberry pi when leaving

displayed to the user and the user can book any of the available slots from that list. When the user enters into an unregistered parking slot, the user is indicated by a buzzer sound. While leaving the parking slot the QR code will be scanned again, the total time and parking feefor that particular time period will be calculated and will be displayed along with the vehicle number and the slot number in the python ide as shown in Figure 5. The User's parking time period and the amount for that particular time period will also be sent to the user's mail id.

.X. CONCLUSION AND FUTURE SCOPE

The system benefits of smart parking go well beyond avoiding time wasting.This design providesoptimal use of resources for car park owners Parking allotment is done through Cloud basedservice and sensor nodes. Slot booking verification is done through QR based image recognition for ensuring vehicle is registered are not while parking.Developing a smart parking system within a city solves the pollution problems.In future this system will be the one which will be used in every industry and even in household apartments.This project can be enhanced for tracking the vehicle speed on the road.Smart Parking system is expected to be significantly influenced by the arrival of automated vehicles. Specialized parking slot must be upgraded for automated
vehicles.

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