

SMART CAR PARKING SYSTEM WITH ANDROID APPLICATION

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Abstract

Car parking facilities and traffic management systems are one of the key aspects that smart cities. Now a days finding a parking space in crowded area is always difficult. It is becoming harder and harder with increasing number of private car users. For smart cities to undertake actions in order to improve the efficiency, to minimize the searching times for parking, traffic congestion can be solved if the drivers can be informed in advance about the availability of parking spaces at and around their intended destination, it can be a golden opportunity.

To creating new application for internet of things, recent advances in creating low cost, low power embedded systems are helping developers. For the purpose of monitoring followed by development of sensor technology many modern cities have decided for deploying various IoT based system in and around cities. A gain in number of inventive ideas related to smart parking systems are reflected from a survey performed by international parking institute. For delivering real time information about available parking spaces there are certain parking systems at present.

Keywords— Internet of Things; Cloud Computing; Smart Parking; Smart City; Cloud of Things

Introduction

To gain practical insights from data collected over various sources, such systems require efficient sensors to be deployed in parking areas for monitoring the occupancy as well as quick data processing units. For many drivers during peak hours in areas like Hospitals, Hotels, Shopping Malls, Airport, Universities and Exhibitions and Convention center, seeking a vacant place has always been frustrating. Unavailability of parking space can cause traffic congestion and it is a serious issue to look after, and the best solution is Smart parking system. For information about occupancy status of spaces in parking lot, sensors can be used to detect the presence of vehicle.

Today's parking problems can be solved using smart parking system. Smart parking system can be extended at higher level also. To deal with the security issues, a central management system can make sure that

only authenticated information is sent to the client. User can get recommendation or suggestions on parking spaces and their availability by analyzing the parking history data. While reserving or renting the parking space, that analysis can be used by user. A mobile application can be designed, which driver can get occupancy status of the parking space. With the help of theft detection a secured car parking slot can be designed.

Literature Survey

Smart city concept has gained great popularity in recent times. Due to evolution of Internet of Things it seems to be achievable the idea of smart city. In order to increase the productivity and reliability of urban infrastructure, continuous efforts are being made in the field of IOT. IOT address problems such as, traffic congestion, limited car parking facilities and road safety.

By locating the empty place in parking lots as well as conveying such information to the car owners, many researchers in their various works elaborated significantly the problem of implementing reliable parking guidance and information systems.

Using a mobile application they proposed the smart parking system is implemented that is connected to the cloud. On a real time basis the system they proposed helps a user to know the availability of parking spaces. In this system they use IR sensors. The IR sensor detect the action after all send the information to the unit controller for the information update on the car status, when the car parks or leaves the parking slot.[1]

This paper is aimed at automating the car and parking. . The research presents a miniature model of an automated car parking system. It can regulate and manage the number of cars which can be parked in a given area at any specific time based-on the availability of parking spaces. Using sensing devices the automated parking is a method which facilitates in existing and parking cars.[2]

With the aim of providing public parking management solution they proposed intelligent parking assistant (IPA) architecture. Information regarding on street parking stall availability and allows drivers is provided by

this architecture to reserve the most convenient parking stall at their just before their departure.[3]

Objectives:

This application is a compelling answer for the todays stopping issues. This task can be stretched out from multiple points of view:

- 1) To give a focal administration system that ensures that lone validated data is sent to the customer, i.e. managing the security issues.
- 2) More investigation should be possible utilizing the stopping history information by which client can get proposals or recommendations on parking spots and their accessibility patterns.
- 3) . What's more, this investigation can be utilized while saving a parking spot by client or while leasing a space
- 4) To outline a versatile application through which driver can get the inhabitation statuses of the stopping places.

Methodology:

This below block diagram represents the operation of our smart car parking system.

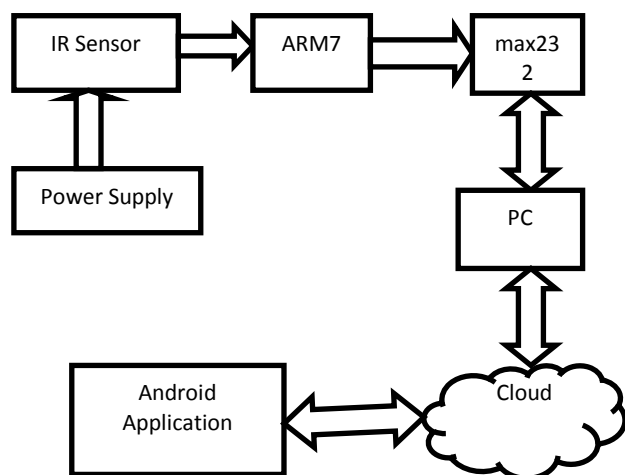


Fig1: Block Diagram of Smart Car Parking System

To power whole hardware platform ARM 7 is used in our system. For detection of vehicle in parking slot IR sensors are used. By connecting ARM 7 to PC, it is programmed using Virtual Basics(VB) for proper operation. Mobile equipment (ME) is used by user to interact with system. By ARM 7 all the data is updated in cloud via internet application in mobile device user can access the

data to book a parking slot. For reservation and allocation of optimal parking space to drivers by simply guiding them to parking place which may not be available before reaching at the destination. Using “Smart Car Parking System ” specific slot reservation will be done for the user.

Components used:

1)Parking sensor:

Infrared sensors, passive infrared sensors (PIR) are used in our smart car parking system. For sensing the parking area and for determination of parking slot if it is vacant or not, these sensors are used. To detect the presence of the car we can use infrared sensors. Using the ESP 8266 chip wirelessly connectable infrared sensors are connected to ARM 7 micro-controller.

2)Processing Unit:

A micro-controller on chip is ARM 7 which processing unit comprises. The intermediate between sensors and cloud is the processing unit. Processing unit is connected with all the sensors wirelessly. 47 different sensors can be connected to processing unit because ARM 7 micro-controller comprises of 47 GPIO pins. By attaching a multiplexer (MUX) we can increase these number of GPIO pins. To transfer data with the help of GPIO pins, the ground of ARM 7 and sensor must be connected, which is essential. To check the status of different GPIO pins and to update collected data on the cloud, ‘PYTHON SCRIPT’ is running. Using the ESP 8266 chip, data collected from number of sensors is sent to ARM 7 micro-controller.

Mobile Application:

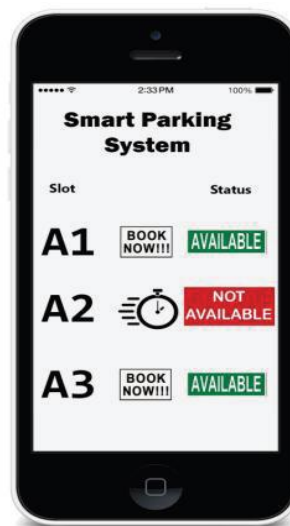


Fig 2: Conceptual View of the Android Application

To collaborate with the system an android application work like a compound for the end users. Apache Cordova and Angular Js framework are developed by the application using JavaScript as a programming language. To create applications Apache Cordova is being used which can be used on both android as well as iOS platform using the same source code. The IBM MQTT server is connected with the android application through a secure channel and a 2 factor authorization. To provide information about availability of parking slots and allowing the end user to book a slot simultaneously is the purpose of this mobile application. JSON format between IBM MQTT server and the mobile application transfer of data takes place. Both the ARM 7 and mobile application must be subscribed to ensure proper communication to an appropriate channel on an IBM MQTT server.

Cloud:

Server of IBM MQTT is hosted on cloud. Cloud acts as a data base to collect all the data related to parking areas as well as end users that have access to the system. Our system maintains all the information such as time at which the car was parked, time duration for parking a car and it keeps a record of every user connected to the system. Because of flexible nature of cloud any number of users can be added at any time of the day. In case of any kind of system failure, to ensure easy and quick recovery of data, continuous backup of the system data is stored on cloud.

Software Used:

1) Precise JS was initially created in 2009 by Misko Hevery at Brat Tech LLC as the product behind an online JSON stockpiling administration that would have been estimated by the megabyte, for the undertaking. This wander was situated at the web area "GetAngular.com", and had a couple of endorsers, before the two chose to surrender the business thought and discharge Angular as an open-source library.

2) Rakish JS (commonly alluded to as "Angular.js" or "Precise JS 1.X") is a Java-content based open-source front-end web application system mostly kept up by Google and by a group of people and partnerships to address a considerable lot of the difficulties experienced creating single-page application. The Java-content segments supplement Apache Cordova, the structure utilized for creating cross-stage portable applications.

Future Scope:

In future by implementing this system, the security of the parking space can also improve. As the parking of vehicle is one of the most important aspects, it can be simpler and easier in future. By processing the real-time

data, one can take action immediately and in less time as compared to now-a-days action.

Result:

Our project provides complete safety to a parked vehicle as parking area is not accessible to anyone else. By using our application user can save his time and fuel.

Conclusion:

For humanity the concept of smart cities and smart facilities has always been a dream. In making smart cities in reality the past couple of year's large improvements have been made. To new possibilities in term of smart cities raise of internet of things and cloud technologies has given upsurge. At the core of constructing smart cities, smart parking facilities and traffic management system are always considered. We are addressing and presenting complications of parking and IOT based cloud integrated smart parking system respectively. The real time information about the availability of parking slot in parking area is introduced by our system. By using our mobile application, user can book a particular parking slot for them from any remote location.

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