

Intelligent Parking System-PARCARE

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Abstract- Many metropolitan cities face common issue of parking management which is a root cause of up growing pollution. Parking issue has always been major problem faced by every zone. In populated areas, numbers of vehicles are more than number of parking space. In such situation, finding a unoccupied space for parking is time consuming which leads to congestion. To overcome such issues, various researches are done and implemented using various sensor techniques. Various techniques and methods have been proposed using various kind of sensors, wireless and wired techniques. The literature survey gives glance on smart parking systems. Various studies evolved using machine vision, ultrasonic sensors, and deep-learning. The proposed system targets to develop a system which contributes in solving major problem of finding vacant space for parking. The proposed system is a purely a software-based system which will allow end users to book their parking slots prior. Real-time analysis and booking of slot is the main goal of the system. The system targets to save manual time, paper work, congestion control and leads to more automation. The system aims to make effective platform for user's real-time application.

Keywords- Smart Parking System, Parking management, Data mining techniques, software-based system, Cloud Computing, machine learning.

I. INTRODUCTION

There is a major problem of lack of parking management system. With increasing number of vehicles and population, the availability of parking spots is decreasing day by day. Various issues of finding vacant space, parking amount, quick service for new individual in area, improper guidance of parking area are causing poor impact on management of the traditional system. With rapid increase in technologies, various studies and system have been developed for overcoming the issue. Advance sensors such as ultrasonic sensor, RFID, magnetometer techniques are used for minimizing the management sector of parking issue. Smart systems have been developed using machine learning, deep learning and data analytics techniques. The combination of sensors, intelligent learning techniques, and wireless technologies provides accuracy in their system

According to literature survey, analysis of all proposed system concludes that every system uses some kind of sensors or wireless technologies to detect vacant space for vehicles. The overview of the proposed system highlights to maintain automation process and help in providing intelligent system using advanced technologies and real-time application.

II. RELATED WORK

Many research and techniques have come over solution to this problem. Innovation has become a crucial part of life style. According to study, this issue needs more real-time and efficient system. As per literature survey, analyses of various researches are done and their future scope or work is considered as a main point in the proposed system. In [1] study, combination of wireless technologies, IOT, deep learning allows system to track the car parking availability of all shape and size of cars. The small sensor known as magnetometer sensor is mounted in each parking space with less power consumption. This sensor detects the strength of magnetic field produced by the metallic body of the vehicle. The network of sensors is arranged in star topology where all nodes are connected to central hub. The device is enabled on interruption generated by the sensor. The continuous signal generated and trained artificial neural network can detect a unique pattern that indicates motion of vehicle. The motion of vehicle can be "vehicle moving into space" or "vehicle leaving the space". As sensor identifies the motion, it identifies and saves all the Bluetooth devices with the strength of their signals. Closest Bluetooth device data and unique identification as well as type of motion is verified and transferred to wireless transceiver that send information to central. Central hub then transfers the information to cloud server by using long range wireless communication protocol. Server stores list of Bluetooth devices with data and time for further data processing. List of Bluetooth devices is compared to list of subscribers to the automated payment services. The central hubs keep track of the occupancy status of group of sensors using wireless protocols. After filtering and identification, server sends information to the mobile phone application for that user. User is given option to select amount of time they want to use parking space and arrange the payment. The IOT vision inspection device is also designed in such a way that it performs all the vision and related data processing tasks on actual device. The Optical character

recognition, object detector, tracker are based on deep learning algorithms. It consists of high resolution camera processed with the use of trained deep learning algorithms. The annotated data is sent to main processing unit which is further processed to cloud server. The information is stored in database for automated payment services.

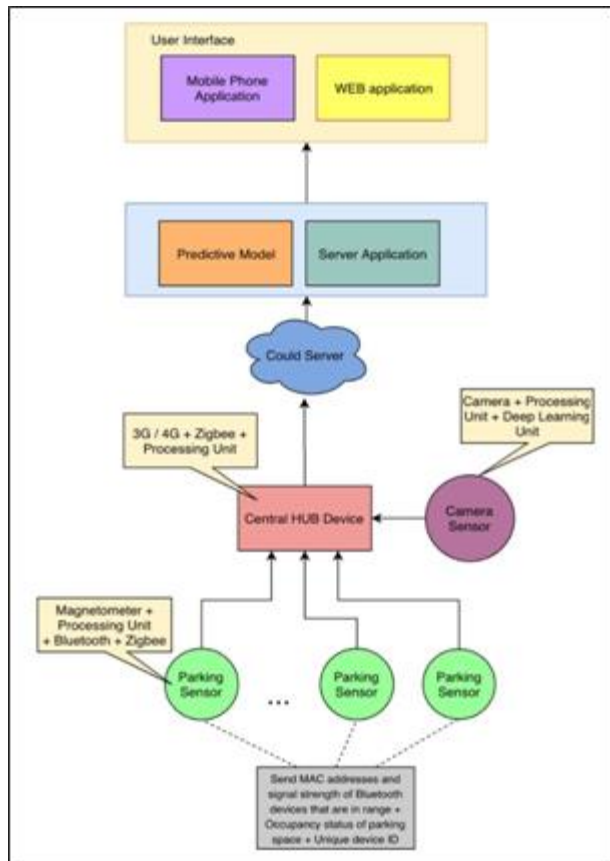


Figure1. Smart Parking System architecture.

In [3] study landed on with proposal of solving common current problem of parking by providing IOT based cloud integrated smart parking system. The system consists of an on-site deployment of an IOT module that is used to monitor and sent signal of the state of availability of each signal parking space. A user interface that is mobile application is also provided that allows an end user to check availability of parking space ad book a park slot. It is mobile application connected to the cloud. In this system they have made use of Infrared sensor, Passive sensor and ultrasonic sensor. These sensor senses the parking area and determine whether parking space is vacant or not. Ultrasonic sensor is use of the detecting presence of car and is connected to Raspberry pi using ESP8266 chip. TCP/IP protocol is used that allows any microcontroller to access a Wi-Fi network. Data collected from various sensors is sent to the raspberry pi through chip. The raspberry pi then transmits this data to the IBM MQTT Server through MQTT protocol over a channel.

IBM MQTT server is hosted on cloud. It keeps track of connected users and maintains information such as parking duration, mode of payment, amount paid. The mobile application is an interface for the end users to interact with the system. The application is developed in Apache Cordova and Angular Js framework using JavaScript as programming language. The application is connected with the same IBM MQTT server through secure channel and authorization. Transfer of data takes place in JSON format between IBM MQTT server and mobile application. In order to ensure proper communication both Raspberry pi and mobile application must be subscribed to particular channel on IBM MQTT server. The system provides real time information regarding availability of parking slots in a parking area. User could book parking slots from remote locations.

In [4] designing of Smart Parking System which provides availability of parking slots in that respective parking area for vehicle using some IOT and Data mining techniques. These system makes use of some IOT supportable sensors and arduino board. IR sensors are placed in parking slots. The data collected from sensor is sent o server for generation of report which is useful for end users. K-means algorithm focuses on vector quantisation.

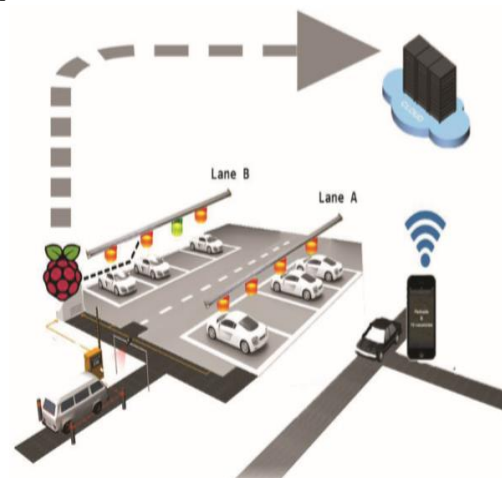


Figure2: Smart Parking System using IOT

This algorithm is used for clustering data, which is gathered in the server. Initially when vehicle arrives, the parking slots status would be displayed on screen. The availability of the slots can help vehicle to use the slot. If the slots are empty barrier opens else it remains closed. The sensor senses the car that are parked. Each time LCD screen is updated simultaneously as car is parked. Hence report is generated using data collected. The paper concluded with solution towards making parking easier and reducing pollution and time saver.

III. PROPOSED SYSTEM

After literature survey, analysis of existing system was done. The result of literature survey came up with many innovative and effective methodologies that can be implemented and reduce the serious issue of parking. According to our survey, most of the systems are based on sensor data. Data generated from sensor are carried out further for data processing and various techniques are used to process sensor generated data. In proposed system, software based system would be developed consisting of various sections by which end user can interact with availability and pre-book their parking space. Parking space data would fetch using database of the parking area and various API's. The local database will then transfer the data to cloud server. The user can add their parking zone for rental service. The online payment process would be carried out further for confirm booking slot. Data mining technique is used to check vacant space is occupied or unoccupied. The duration of utilisation of space can be decided by user during booking process and if time exceeds alert notification would be prompted so as to vacant the space or increase the duration and pay extra charges. Various programming languages are to be used for front-end, back-end interfaces. Local database is used which would further proceed to cloud based server.

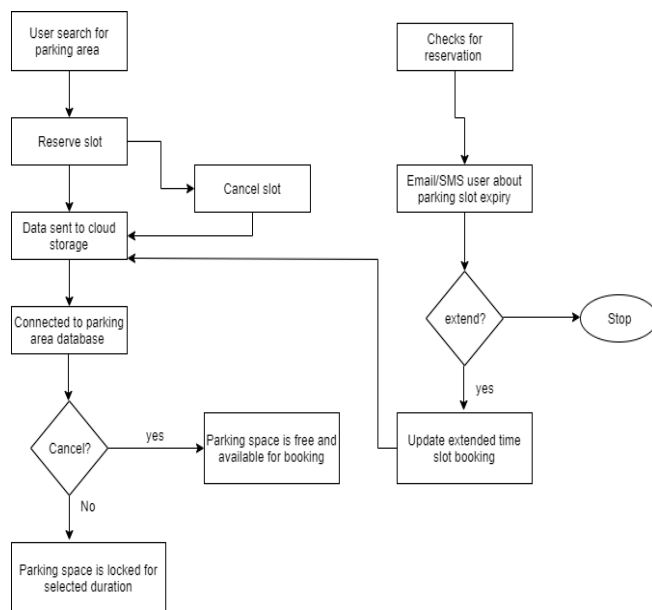


Figure3: Flow Chart of Proposed System

The proposed system aims real-time solution of the problem and can easily and efficiently used in public areas, commercial areas, and corporate places for management of the parking issue. The main aim of the proposed system is to make effective and real-time applicable system so that real problems of individuals can be solved. Nowadays everyone is reliable on mobile techniques. The motivation of the system

came from various e-service platforms such as Bookmyshow, various commercial ticketing platforms such as IRCTC. The platforms are in real-time application and users willingly take proper advantage for such systems. The system will become an intelligent solution of the issue. Intelligent parking system platform will be using data mining techniques to make analysis of occupied and unoccupied vacant slot. There are no sensors, object detector, or any kind of hardware associated with system. It is purely a software-based system, where user interface is connected to local database. Later this would be connected to cloud for real-time database connectivity. Machine learning algorithms would be used to analyze the space and occupancy of the slots. Pre-booking can be done by payment process by selecting duration of utilization. Additional feature in proposed system would be user can add their parking zone for parking facility and can make outcome out of it leading to contribution in providing space for parking.

IV. CONCLUSION

The proposed system wants to contribute in congestion control. The system is a real-time in which user can actively accept in daily routine. The individuals, college campus, corporate sectors, commercial area, public places can implement this system. The additional advantage of the system there is no cost of hardware or sensors, so every sector can implement to manage their space. During festivals, holidays, peak hours, after spending half of the time in traffic adapting a intelligent approach towards parking activity is an effective way. Manual workload of making receipt and maintaining records of those receipts reduces. It leads to more automation. Authority can scan or can check booking id for confirmation of booking. Just as online ticketing system, most adaptive e-services accepted by citizens. The main aim of the proposed system is to make effective and real-time applicable system so that real problems of individuals can be solved.

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