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Smart Parking-Future Towards a Digital India.

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ABSTRACT:

The digital space in India is undergoing a tremendous transformation leading to the Digital India campaign. India has a very strong base in technology and the public industry partnership is bound to bring about a monumental change. Smart cities concept has gained popularity in the recent years. With the of Internet of things, the idea of smart city is emerging. Efforts are being made in this field in order to achieve maximum productivity and reliability of the urban infrastructure. The problem addressed here are road safety, traffic congestion, and limited car parking facility. In this paper, an IoT based cloud integrated smart parking system is done. Here sensors are placed at each of the parking space which is used by the user to check whether space is available for parking. The availability and booking of the parking slot can be done using the mobile application.

I. INTRODUCTION

Parking lots have been ignored when technology is taken into consideration. With the number of cars on the street increasing, and the time taken to park, the parking needs to be addressed effectively. The normal parking is inefficient, frustrating and time consuming. Driving around after arrival to a mall or a multiplex is time consuming.

The Internet of Things (IoT) concept deals with things to identity communication devices. These devices have the capacity of being controlled or monitored using remote computers connected through the Internet. IoT makes use of Internet, thus providing the communication, and thus inter-network of the devices and physical objects, or 'Things'. The two prominent words in IoT are "Internet" and "Things". Internet is a vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems. The sending, receiving, or communicating of information can be done using the internet. Thing in English means many things. It is a term used to refer object, an action or idea, situation or activity. IoT, consists of a number of objects and devices through which we can gather the data at remote locations and communicate to units managing, acquiring, organizing and analyzing the data in the processes and services. It serves as a vision where things (wearable, watch, alarm clock, home devices) become smart and behave alive through sensing, computing and communicating by embedding small devices which interact with remote objects or persons through connectivity.

In simple

Internet of Things =The Physical Object + The Controller, the Sensor and the Actuators + The Internet

II. IOT -INTEGRATION WITH CLOUD

Storage Capacity: The information sources (things) of the IoT produce huge amounts of non-structured or semi structured. So, it requires collecting, accessing, processing, visualizing and sharing large amounts of data which it collects from its objects. So, the Cloud storage system provides unlimited, low-cost, and on-demand storage capacity, thus making it as the best and most cost-effective solution to deal with data generated by IoT. Data which is stored on the Cloud can be accessed and visualized from anywhere through standard APIs.

Computation power: The devices which are being used in designing the IoT have limited processing capabilities. The Data which are being collected from various sensors is usually transmitted to the more powerful nodes where it gets aggregated and processing is done here. The processing speed of the IoT can be addressed by the use of unlimited processing capabilities and on-demand model of Cloud. The technology of cloud computing helps IoT systems to perform real-time processing of data thus facilitating highly responsive applications.

Communication resources. The **core** aim of the IoT is to make the IP enabled devices to communicate with each other through the set of dedicated hardware devices. The most inexpensive and effective way of communicating, connecting, tracking and making devices is through cloud computing. The built-in applications enable IoT systems to control and look in to the working of the systems on a real time basis through the remote locations.

Scalability: The cloud storage systems enable the scalable approach towards the IoT. It allows the resources to be increased or decreased in a dynamic fashion. Using the cloud integration, the number of "things" can be stored or removed in a dynamic fashion. The cloud system assigns the resources in a way that is required by the things and applications

Availability: The Anytime and anywhere availability of the resources becomes very easy with the cloud integration technology. With the cloud technology the systems are always up running and continuous services are being provided to the end users.

III. SYSTEM ARCHITECTURE

The primary attributes that constitute the parking system are:

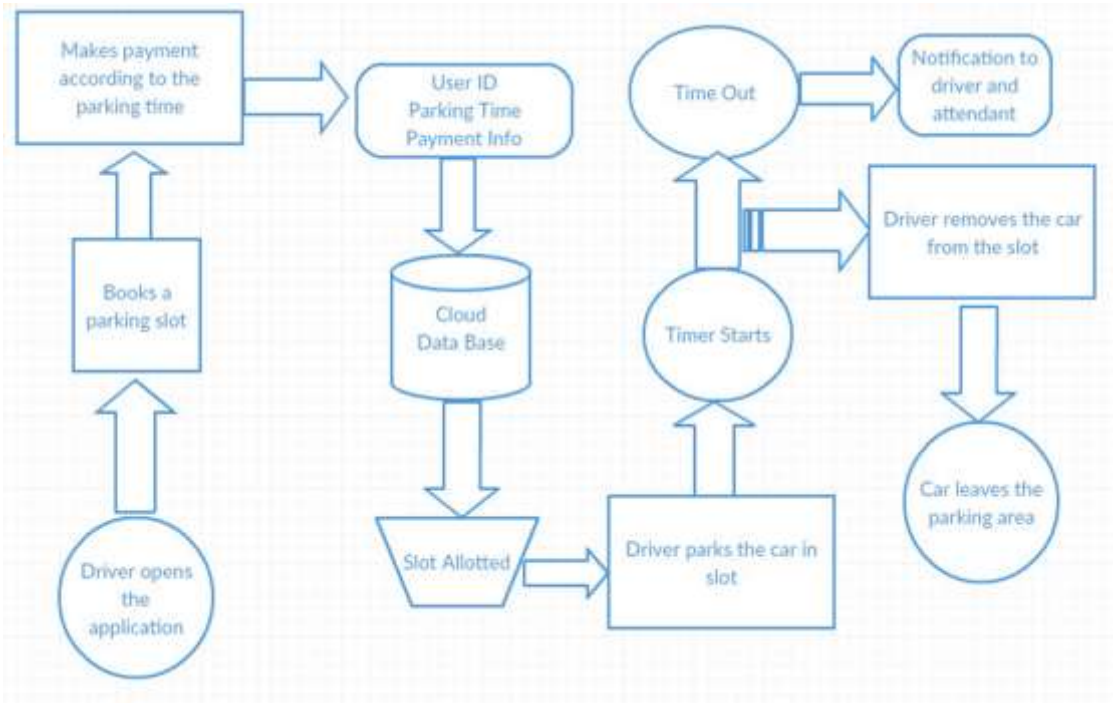
Parking Sensors: For the parking system sensors like Infrared, Passive Infrared (PIR) and Ultrasonic Sensors are being used. The sensors are being used to detect whether the parking slot is vacant or not. An ultrasonic sensor is used to detect the presence of car.

Wi-Fi : Wi-Fi connections are being used to collect data from remote locations or in the cases of low bandwidth.

Mobile application: The interface used over here enables the end user to interact with the system. The Apache Cordova and Angular Js framework using Javascript are the programming language used here. Apache Cordova is used here to create applications that can run on both android and iOS platform. The IBM MQTT server is connected to the application through a secure channel and a 2-factor authorization. The parking slot availability and allowing the ned users to book the slot is the main function of this application. Data transfer takes place in JSON format between IBM MQTT server and the mobile application. Raspberry pi and mobile application is used here to ensure proper communication on a subscribed particular channel on IBM MQTT server.

The Cloud: On the cloud the the IBM MQTT server is hosted. The data store is the Cloud, which is used to store all the data related to the application. The information of every user connected to the application is kept in track by the cloud that is the time at which the car was parked, the duration for which it was parked, the amount paid by the user and also the mode of payment. The flexibility nature of the cloud permits the system to add any number of users at any time of the day. For quick recovery of data in case of system failure continuous backup is made in the Cloud.

IV. PROPOSED WORK FLOW OF THE SYSTEM



The above figure depicts the working of the system at every stage for checking the availability of parking space to actually park a car in a vacant parking slot. The smart parking system can be implemented in the parking area of a shopping mall. The steps that the user needs to follow to use the parking system is given below.

Step 1: The smart parking application needs to be installed in the mobile.

Step 2: Using the mobile application search for the parking area at the destination.

Step 3: The parking area around the destination area needs to be selected.

Step 4: Parking slots available in that parking area can be browsed.

Step 5: A parking slot can be selected.

Step 6: The time required for the car to be parked is selected.

Step 7: Payment charges to be done for the parking through credit card or e-wallet.

Step 8: Confirm the occupancy once the car is successfully parked in the parking slot

V. CONCLUSION

The Smart Cities has been a dream for humanity. For the past couple of years people have been working to make this dream a reality. The Internet of Things and the Cloud Technologies concept have made this dream come true. System that is proposed gives a real time information regarding the availability of the parking slots. The users from remote locations can booking their parking slot using their mobile systems. The idea proposed in this system is useful for improved parking facility to be made easy and see that the time is not wasted in searching for a parking slot at the destination area thus enhancing the quality of life of the people.

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