Smart Parking System In Multi-Storey Buildings

Rahul Shekhar[1], Kunal Kedia[2], imanshu Zade[3]

1,2,3Department of Electronics and Telecommunication, MIT College of Enginerring, Pune, India

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Abstract — The looking of parking burns heaps of barrels of the world's oil each day. Car parking drawback could be a major contributor in congestion of traffic and has been, still a significant drawback with increasing vehicle size within the luxurious phase and additionally compass parking spaces in urban cities. The rapid growth in the number of vehicles worldwide is intensifying the problem of the lack of parking space. As the international population continues to urbanize, without a well-planned, convenience-driven retreat from the car, these problems will worsen in many countries. The current unmanaged automotive parks and transportation facilities build it troublesome to accommodate the increasing variety of vehicles in an exceedingly correct, convenient manner so it is necessary to have an efficient and smart parking system. Smart parking management systems area unit capable of providing extreme level of convenience to the drivers. In this project, a proposed web App system is based on the usage of smart phones, sensors monitoring techniques. By implementing this technique, the utilization of parking spaces will increase. It allocates on the market automobile parking space to a given driver to park their vehicle, renew the availability of the parking space when the car leaves and compute the charges due.

Keywords — Smart Parking System; Sensors; Microcontroller; Cloud Storage; Android Application

I. INTRODUCTION

Smart Parking systems usually obtains data concerning on the market parking areas in an exceedingly specific geographic region and method is period of time to position vehicles at on the market positions .In the development of traffic management systems, an intelligent parking system is created for optimal use of resources for car-park owners. Currently, the common method of finding a parking space is manual where the driver usually finds a space through luck and experience. However, this is not an optimal solution. This study aimed to supply data concerning close parking areas for the motive force and to create a reservation minutes earlier victimisation supported devices like smart-phones or pill PCs. A significant development in technology, the Internet-of-Things technology (IOT) has created a revolution in many fields in life as well as in smart-parking system (SPS) technology. The present

study proposes and develops a good cloud-based SPS answer supported the net of Things. The SPS can automatically monitor and manage car parks. This paper aimed toward developing associate intelligent automotive parking system that's a lot of value effective and user friendly than the already existing systems. The project aims at designing a prototype for allotting parking slots to vehicles in various malls and offices. It provides allotment via an application and by using various sensors. An application is run on android device. The system will be utilized in big selection of areas. The ideal of creating a Smart City is now becoming possible with the emergence of the Internet of Things. One of the key issues that smart cities relate to are car parking facilities and traffic management systems.

II.METHODOLOGY

The Raspberry Pi polls the IR Sensor to check for a stable status of the parking space. On positive detection of a free parking space, the Raspberry Pi sends the information to the Firebase Cloud via the Flask server. This data provides the details of the IR sensor and the corresponding location associated with the free parking space. Further, an Android Application will be used in order to retrieve the information of the allocated free space from the Cloud. This will help navigate the user to the allotted free parking space.

1. In the first phase, we ensure the communication between the Raspberry Pi and the IR Sensor is stable. For instance, we should make sure there is no false detection from the IR Sensor. Only on a continuous stable status of free parking space for certain duration of time is detected, the Raspberry Pi should pick the signal as a positive detect. This can be verified by manual interference with the IR Sensor. 2. The second phase involves in testing the path of the data from the Raspberry Pi to the Firebase Cloud. In order to test this, we send known data from the Raspberry Pi and can verify if the same data is saved in the cloud database. If successfully saved, we integrate the IR Sensor module to send the data detected by it and store the same in the cloud database. 3.The last phase consists of developing an Android App to retrieve the location of the IR Sensor. Firstly, we initially push known data from cloud to the Android App. If path is successfully established, then we include (1) and (2) with the App to verify the location of the free parking space and guide user to the same.

III. NEED for IOT-CLOUD INTEGRATION

Cloud computing and IoT have witnessed large evolution. Both the technologies have their blessings, however several mutual advantages can be foreseen from their integration. On one hand, IoT can address its technological constraints such as storage, processing and energy by leveraging the unlimited capabilities and resources of Cloud. On the opposite hand, Cloud can even extend its reach to subsume globe entities in an exceedingly a lot of distributed and dynamic fashion by the employment of IoT. Basically, the Cloud acts as an intermediate between things and applications, in order to hide all the complexities and functionalities necessary for running the application. Below are some of the factors that led to the amalgamation of Cloud and IoT.

IV. SYSTEM ARCHITECTURE

This section describes the high level architecture for the smart parking system. The parking system that we propose comprises of various factors that work in sync with one another. The following figure gives an outlined view of the complete system.
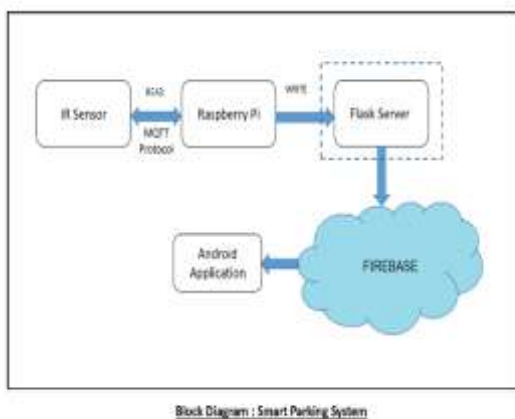

Figure 1: Smart Parking System

Talking of the on top of mentioned figure, it depicts a parking area where our parking system is implementation along with the way in which communication happens between various factors.

•*Parking Sensors:* For our parking system we have made use of sensors like Infrared, Passive Infrared (PIR) and Ultrasonic Sensors. The work of these sensors is the same i.e.to sense the park and confirm whether or not a parking spot is vacant or not.In this case we are using IR sensors to detect the presence of a car. The IR sensors are connected to raspberry pi.

• Processing *Unit*: It comprises of Raspberry pi which is a processor on chip. The process unit acts like Associate in nursing intermediate between the sensors and cloud.

All the sensors are connected to the processing unit. A single raspberry pi unit comprises of 26 GPIO pins i.e. 26 different sensors can be connected to it. It is essential that the ground of raspberry pi and sensors must be connected in order to transfer data using the GPIO pins. There is a python script running on the chip thatchecks the status of various GPIO pins and updates this information onto the cloud. Data collected from various sensors is sent to the raspberry pi.

• *Mobile application:* The mobile application acts like an interface for the end users to interact with the system. The application is developed in Android Studio and Flask framework is used as a server using Python as a programming language. The purpose of this mobile application is to produce data concerning convenience of parking areas and permitting the tip user to book a slot consequently. Transfer of data takes place in JSON format between Python Flask server and the mobile application. In order to ensure proper communication both the Raspberry pi and mobile application must be subscribed to a particular channel on Python Flask server.

• The *Cloud:* Cloud acts as a data base to store all the records related to parking areas and end users that have access to the system. It keeps a track of each user connected to the system and maintains data like time at that the automobile was position, time duration for parking a car, amount paid by the user and mode of payment. It is due to the flexible nature of cloud which permits the system to add any number of users at any time of the day. Continuous backup is formed of the information keep on cloud so as to make sure simple and fast recovery of information just in case of any quite system failure.

V.IMPLEMENTATION & WORKING

In the previous section we discussed about the architecture and technical parameters related to the smart parking system. In this section we talk about the implementation and working of the system in a real world scenario. The complete process of booking a parking slot, parking a car in that slot and leaving the parking area is explained with the help of the flowchart.
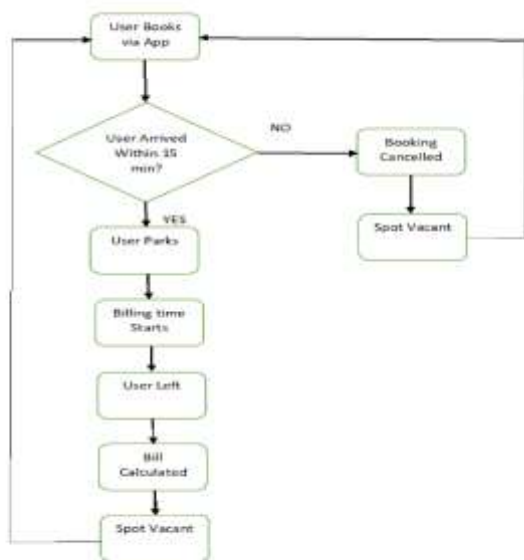
Figure 2: Flow chart of the system

We conducted an experiment in order to depict the working of our system at every stage from checking the availability of parking space to actually park a car in a vacant parking slot. This is done by implementing the smart parking system in the parking area of a multi-storey building. Below are the steps that a driver needs to follow in order to park its car using our parking system:

Step 1: Install the good parking application on your mobile device.

Step 2: With the assistance of the mobile app search for vacant parking spot.

Step 3: Select a particular parking slot.

Step 4: User parks.

Step 5: User then leaves.

Step 6: Pay the parking charges according to the time duration.

The higher than mentioned procedure for booking a slot and parking a automobile therein terribly slot is explained with the assistance of the subsequent screenshots.

V. CONCLUSION

The construct of good Cities have forever been a dream for humanity. Since the past few years massive advancements are created in creating good cities a reality. The growth of net of Things and Cloud technologies have produce to new prospects in terms of good cities. Smart parking facilities and traffic management systems have forever been at the core of constructing good cities. In this paper, we have a tendency to address the problem of parking and gift an IoT based mostly Cloud integrated good parking system. The system that we propose provides real time information regarding availability of parking slots in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this paper are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

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