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A Real Time IoT Interfaced Application for Autonomous Vehicle Parking

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Abstract: ***Smart Car-Parking System usually acquire info concerning accessible parking areas during an explicit geographical area and avail it in real time to provide vehicle parking at accessible points. IoT allows connection between environmental things through internet and build a way straightforward to connect to those things from any locations. The planned work is that the application of combo of Internet of Things and Cloud Computing. The target is to style, evaluate and carry out "IoT established sensor empowered car parking system", this permits the user to pre book the parking slot from any place with the assistance of mobile application.***

Keywords: Internet of Things, Cloud Computing, Parking, Sensors.

I. INTRODUCTION

Fishing for an automobile parking space, may be a conventional activity and it's calculable that just about 30%of traffic jam is formed by drivers, who hunt for a parking slots. Additionally leading to oil wastage, virtually 1,000,000 barrels of the worlds oil a day. This ever-thriving tie up and ambiguity within the parking accessibility and payment have so implemented the requirement for good Parking systems. Smart Parking System usually obtains info concerning accessible parking areas during an explicit geographic area. It processes in time period to provide car parking at accessible points. IoT allows connection between environmental things through internet and build a way straight forward to avail those things from any location. The planned work is that the application of combo of Internet of Things and Cloud Computing. The target is to style, evaluate and carry out "IoT established sensor empowered car parking system", this permits the user to pre book parking slot from any place with the assistance of mobile application. In this, the ultrasonic sensors transmit the information to Raspberry Pi that successively stores the information within the database. The principle idea is to provide an application that makes the user easier to check for slot accessibility and pre reserve the slot for parking. The vision of this project is to reduce the wastage of time, finding free parking slot and avoid the unnecessary roaming through filled slots. It additionally reduces the traffic and fuel consumption. Currently, the IoT applications in our lifestyle are unit blooming, and there is also a growing trend with in the applications of smart cities which may provide in rising to reduce smart city problems. In a smart town we tend to face many issues. To resolve one of the smart town problems we have got to develop such system that is combo of the new technology also of low cost. The most important problem in a developing town is that the parking. A parking zone obligation is to give customers enough space to park their automotives since automotive plays an enormous role of transport, It would be difficult to check out for parking slot to slot.

A. Block Diagram

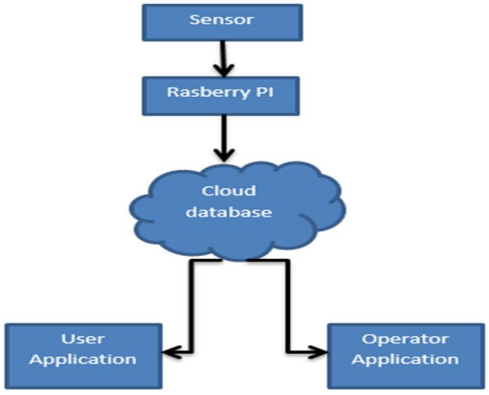


Fig 1: Block diagram for Smart car parking system.

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II. LITERATURE SURVEY

A. This project helps the user to pre book the parking lot using an application. It uses RFID tags to sense the slot.

B. In this project User can view the empty slots through a website and choose the one he likes. It provides the information about the free slots but there is no pre booking process found in this parking system.

C. In this project the parking system gives the information about the number of slots that are available but does not give any information about every individual slot.

D. This project discuss about the combination of IoT with cloud technology. And also discuss the issues that occur during the integration.[5] This work is to make the parking system intelligent using cloud technologies. Here the main concept is cloud. That means the smartness of the system based on the cloud technology.

E. This work discuss about the different technologies that can be introduced to make the parking system smart.

F. This work discuss about the smart technologies like cloud computing and deployment of the mobile applications.

G. This paper discuss about he fast parking facility by installing better sensors and mobile applications to save fuel and time.

H. This review paper discuss about the technologies that make the cities smart and also advantages of that technologies.

I. This survey paper says that the application scenario is the backbone for the sensor network and cloud computing.

J. This paper discuss about the technologies in Internet of things and their advantages.[12] This paper talks about the zigbee technology for the site of parking using electronics.[13] This project provides the user to select an empty slot and also can select the time period of the slot usage.

K. In this project the slots are sensed using IR sensor. Here the user can pre book the parking lot through a mobile application.

CRITERIA	CITATION 1	CITATION 2	CITATION 3	CITATION 4
Name	"IoT Based Smart Parking System"	"An Approach for smart parking system based on cloud using IoT"	"IoT sensor enabled smart car parking for Advanced Driver Assistance System"	"IoT based smart parking system"
Year	2019	2017	2017	2016
Authors	Saidur Rahman, Poly Bhoumik	Swapna S.Deshpande, Prof.Renuka S.Gound	Mahendra BM, Dr Savita Sonoli, Nagaraj bhat, Raju, Raghu T	Abhirup Khanna, Rishi Anand
Sensors Used	Ultrasonic Sensor	RFID Sensor	IR Sensor	Ultrasonic Sensor
Processor/Controller	Arduino Microcontroller	Rassberry PI Microprocessor	Rassberry PI Microprocessor	Rassberry PI Microprocessor
Storage	Local Storage	Cloud Storage	Cloud Storage	Cloud Storage
Result	In this project User can view the empty slots through a website and choose the one he likes.	This project helps the user to pre book the parking lot using an application.It uses RFID tags to sense the slot.	In this project the slots are sensed using IR sensor.Here the user can pre book the parking lot through a mobile application.	This project provides the user to select an empty slot and also can select the time period of the slot usage.

Table 1: Comparision table between proposed system and existing systems.

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III. PROPOSED SYSTEM

The proposed system composed of the subsequent tasks:

1) Firstly, the sensor senses the parking slot and send the provision data to the raspberry pi that is then sent to the cloud database.
2) The user opens the Mobile application and checks the offered slots. Free slots area unit shown in green color and stuffed slots area unit shown in Red color.
3) The user shows the QR code at the entrance and also the exit. The time difference is used to calculate the fare.
4) The static navigation path is shown for the User to one of the closest offered slots.

The proposed system consists of 3 main phases:

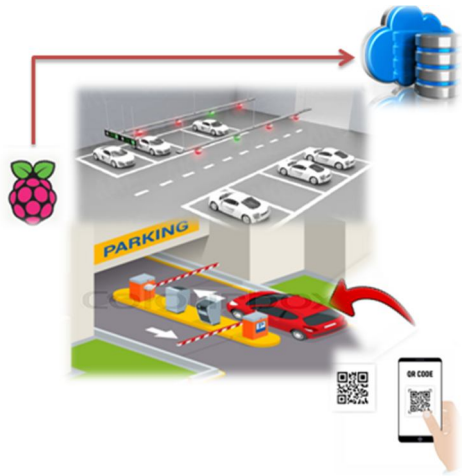


Fig2: projected smart Parking System

A. *On-Field System*

In On-Field System section there will be an ultrasonic sensor fixed in every slot. They are used in getting the availability information of the slots in that parking area. Raspberry Pi is used to collect the information from the ultrasonic sensors and post it to cloud database.

1) *Ultrasonic Sensor:* An ultrasonic sensor measures distance by using ultrasonic sound waves. It comprises a trigger, an echo, and an impression circuit. The trigger give outa high frequency ultrasonic wave, that reflects on any nearest solid object. The sound that is given out will hit the obstacle and bounces the signal to the sensing element. Speed of sound, and the time difference between the emitted and receipted wave is used to calculate the distance. Ultrasonic sensors are designed to sense various ultrasound bounce, just like the measuring device, that computes the distance between the sensing element and a solid object by emitting ultrasonic sound pulse. Ultrasonic sound is basically used since it is ultrasonic to the human ear, and it provides nearly correct outcomes among the objects at shorter distance with harder surface.
2) *Raspberry Pi:* Raspberry Pi is a single board computer which is of MasterCard size. The system on chip has many versions and models zero, A, A+, B, B+. It is supplied with a set of GPIO pins that can be used to control electronic components for physical computing. The board has two 5V pins, two 3.3V pins,8 grounds and remaining are all general purpose 3.3V pins which can be used as Input or Output pins. The raspberry pi can be powered up using +5.1V micro USB supply. The built in wifi in the raspberry makes it easy to connect to the internet. System can be used to make the service start when the Pi boots.

B. *Cloud Platform*

Firebase is a web and mobile development platform acquired by Google, an API that adjusts the application information across the iOS, Android, and net devices, and store it on firebase cloud. The merchandise take care of software package developers in developing period, cooperative applications. Firebase provides a real-time database and back end as a service. The service facilitates with the application developers AN API that permits application information to be synchronic across purchasers and keep on the firebase's cloud. Firebase Auth service can authenticate users, supports social logins such as GitHub, Twitter, Facebook and also includes user management system that can enable user authentication with email and password. The remainder API utilizes the Server Sent events protocol that is AN API for making hypertext transfer protocol connections for collecting push notifications from a server. Firebase provides tool for persisting data locally, that makes application work even it loses its network connection.

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C. Mobile Application

Two mobile applications one for user and other for operator is developed.

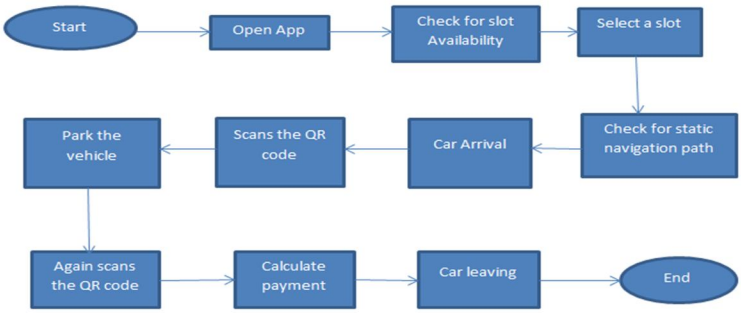


Fig 3: work flow diagram of Mobile Application

As shown in fig3. In the user side application the user will access the information about parking area using his android mobile application. The user can check for the parking slots availability and also can pre book the slots that are not filled. The QR code is generated such that it is unique for each account. For the easiness of the user a static navigation path is shown.
In the operator side application, there will be an entry scan which post the QR code info along with the time in the firebase database. At the time of exit scan fare is calculated based on the time difference between the two scans.

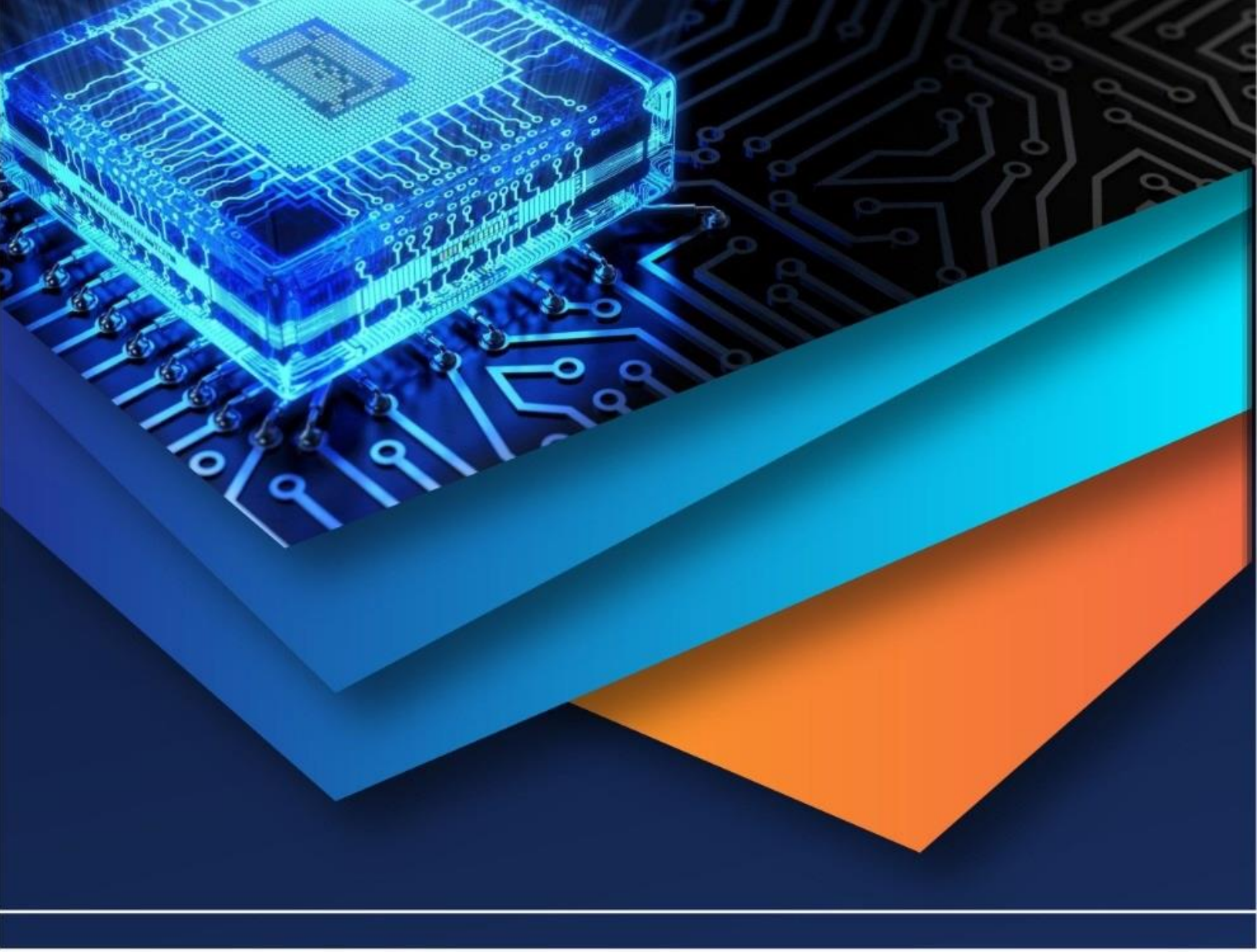
IV. CONCLUSION

The idea of getting smart cities continuously has been a dream for humans. Since the past few years massive advancements that are created in smart cities may be a reality. The expansion of Internet of things and cloud technologies has brought new potentialities within the variety of smart cities. Smart parking system and control systems have continuously been at the idea of building smart cities. This paper has an inclination to handle the problem of parking in associate to Internet of Things and Cloud based smart parking system. The system has an inclination to produce real time information concerning convenience of parking slots in an exceedingly automobile parking space. Users from any location might reserve a parking slot by using the mobile application. The efforts made during this paper are sectioned to realize the parking facilities of a town, and there by aiming to extend the quality of lifetime of individuals.

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