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IOT Based Smart Car Parking System for Smart Cities

Nazish Fatima
<u>nazish.fatima83@gmail.com</u>
Keystone School of Engineering, Pune, Maharashtra

Akshaya Natkar <u>natkarakshaya@gmail.com</u> Keystone School of Engineering, Pune, Maharashtra

Pratiksha Jagtap
<u>pratikshajagtap26@gmail.com</u>
Keystone School of Engineering, Pune, Maharashtra

Snehal Tukaram Choudhari
<u>snehal310.choudhari@gmail.com</u>
Keystone School of Engineering, Pune, Maharashtra

ABSTRACT

In recent times the concept of smart cities have become very popular. Thanks to the Internet of things the idea of smart city now seems to be completed. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. In this paper, we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly.

Keywords: *Internet of Things, Smart Parking, Smart City.*



1. INTRODUCTION

The concept of Internet of Things (IoT) started with things with identity communication devices. The devices could be tracked, controlled or monitored using remote computers connected through Internet. IoT extends the use of Internet providing the communication, and thus inter-network of the devices and physical objects, or 'Things'.

Internet means a vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems. Internet enables sending, receiving, or communicating of information. Thing in English has number of uses and meanings. Dictionary meaning of 'Thing' is a term used to reference to a physical object, an action or idea, situation or activity, in case when we do not wish to be precise. IoT, in general consists of inter-network of the devices and physical objects, number of objects can gather the data at remote locations and communicate to units managing, acquiring, organizing and analyzing the data in the processes and services. It provides a vision where things (wearable, watch, alarm clock,

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home devices, surrounding objects with) become smart and behave alive through sensing, computing and communicating by embedded small devices which interact with remote objects or persons through connectivity.

The scalable and robust nature of Cloud computing is allowing developers to create and host their applications on it. Cloud acts as a perfect partner for IoT as it acts as a platform where all the sensor data can be stored and accessed from remote locations. These factors gave rise to the amalgamation of both technologies thus leading to the formation of a new technology called Cloud of Things (CoT). In CoT the things (nodes) could be accessed, monitored and controlled from any remote location through the cloud. Due to high scalability in cloud any number of node could be added or Removed from the IoT system on a real time basis.

In simple terms IoT can be explained in form of an equation stating:

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



The idea 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 is car parking facilities and traffic management systems. In present day cities finding an available parking spot is always difficult for drivers, and it tends to become harder with ever increasing number of private car users. This situation can be seen as an opportunity for smart cities to undertake actions in order enhance the efficiency their parking resources thus leading to reduction in searching times, traffic congestion and road accidents. Problems pertaining to parking and 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. Recent advances in creating low-cost, low-power embedded systems are helping developers to build new applications for Internet of Things. Followed by the developments in sensor technology, many modern cities have opted for deploying various IoT based systems in and around the cities for the purpose of monitoring. A recent survey performed by the International Parking Institute reflects an increase in number of innovative ideas related to parking systems. At present there are certain parking systems that claim to citizens of delivering real time information about, available parking spaces. Such systems require efficient sensors to be deployed in the parking areas for monitoring the occupancy as well as quick data processing units in order to gain practical insights from data collected over various sources.

2. PROBLEM STATEMENT & OBJECTIVE

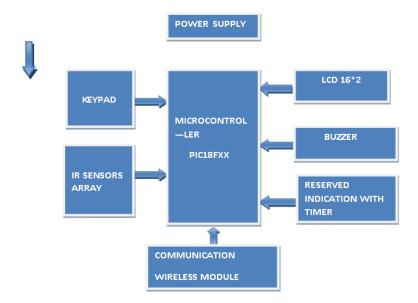
Problem Statement

- Parking management influences drivers search time and cost for parking spaces.
- It may also causes traffic congestion.
- Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers.
- Difficulty arises from not knowing where the available spaces may be at that time traffic congestion may occur.

Objective

- Parking space reservation can help drivers to reduce the search time dramatically.
- With the real-time reservation service, the drivers can find and reserve their desired vacant parking spaces quickly. Therefore, the gasoline and time in search of vacant parking space is reduced.
- It reduces time in search of vacant parking spaces is reduced so it reduces traffic congestion caused due that.

3. BLOCK DIAGRAM

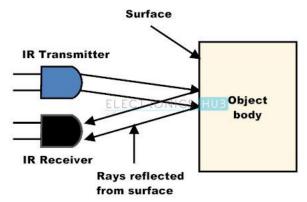


• Power Supply

Power supply gives 5v supply to the PIC microcontroller and other block also work on 5v DC.

IR Sensor

The IR sensor used to detect the car in parking. If car is present then it shows on cloud as that parking slot is allowed if not allowed then it will shows that parking slot empty.



Reservation

If you booked parking then from booking time then it will booked for next 5 minutes and countdown start at timer.

• Buzzer

If any other person parked their car in booked slot then alarm will get buzzed periodically for some time as per set.

• LED

On LED we will show the indication of booked slot.

• LCD

LCD part is used in security area for check out the parking is allotted or free.

4. WORKING PRINCIPLE

Algorithm

- Start.
- Turn on the power supply.
- IR sensor will get activated.
- Search online for empty parking slot from android application.
- Space detection will start.
- If space is detected data sends and stored on cloud by sending system status by GSM.
- LED will start showing the number of parking slots.
- Display on front LCD that the slot is booked.
- Else go to step 5.
- Shows space on cloud.
- We can now book empty parking slot online.
- LED indication will get off.
- IR sensor will open a gate.
- End.

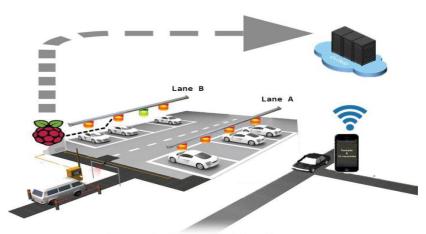
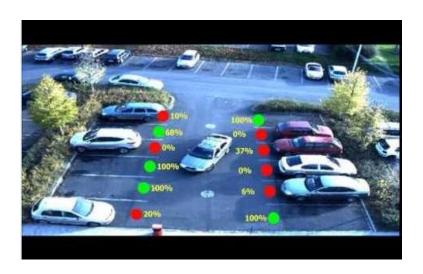
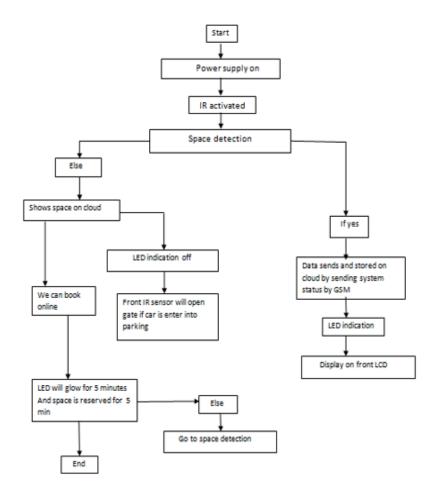


Figure 1: Smart Parking System



5. FLOW CHART



6. CONCLUSION

The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have given rise to new possibilities in terms of smart cities. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this paper, we address the issue of parking and present an IoT based Cloud integrated smart 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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