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HIGH RESPONSIVE SMART PARKING SYSTEM USING IOT

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Abstract - *In recent times the concept of smart cities have gained major popularity. The evolution of Internet of things has explored the idea of smart city that seems to be achievable. A lot of efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems based as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. In this paper, we represent an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site development of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is provided in order to check the availability of parking space and book a parking slot accordingly. The paper describes a high-level view of the system architecture and discusses the working of the system in form of a use case that proves the exactness of the proposed method.*

Key Words: **PIC *Microcontroller, RFID Sensor, Wi Fi module, Cloud management.***

1. INTRODUCTION

The huge increase in the number of vehicles on the road along with insufficient number of parking space has created parking related problems including increased traffic congestion in urban areas. Hence, we are in a need to develop an automated smart parking management system that will help a driver to locate the vehicle in a suitable parking space so that fuel consumption and air pollution can be decreased. It has been found that a driver s search for a suitable parking space takes almost 15 minutes which in turn increases the fuel consumption of the vehicle, traffic congestion and air pollution.

Most of the smart parking systems (SPS) that exists over the years provides information about the parking availability information system design, parking reservation system, occupancy detection and management of the available parking lots, real-time navigation of the parking facility etc. Thus, this paper presents an internet-of-thing (IoT) based E-parking system that employs an integrated component called parking meter (PM) to address the following issues.

- Real-time detection of improper parking
- Estimating the time of each vehicle that is been parked
- Automatic collection of parking charges.

2. RELATED WORK

There are a significant number of smart parking systems depending on various technologies that includes radio frequency identification (RFID), wireless sensor network (WSN), Bluetooth, Wi-Fi, ZigBee etc.

Out of these techniques , a prototype of RFID-based smart parking application implements automatic check-in and check-out process using RFID reader of the vehicle in parking lot area. There a lots of technologies that are been existing in the present parking systems such as Smart Parking System Using Ultrasonic sensors, E-Parking system. The main drawback is wastage of fuel, waste of time.

3. PROPOSED SYSTEM

The newly used technique in the System is IOT or Cloud computing is very time consuming and the most versatile in the developing smart cities.

Here IOT is employed in order to make the process quick and easy. The user can easily view through their mobile phones whether the parking lot is free or not.

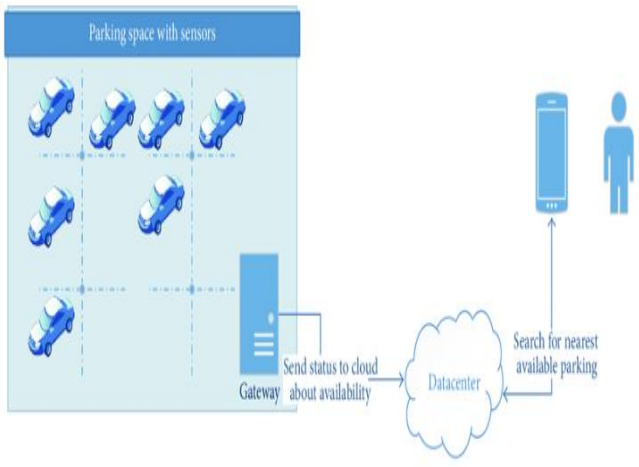

Fig.1 Proposed system Using IOT

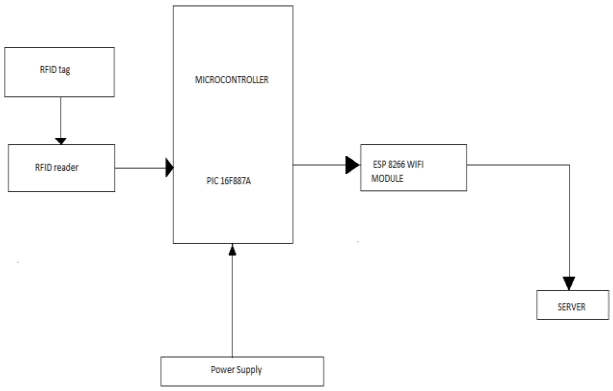

Fig.2 Block diagram of Smart Parking System Using IOT

3.1 PURPOSE OF USING IoT MODULE

Cloud computing and IoT have witnessed large evolution. Both the technologies have advantages, however several mutual advantages can be foreseen from their integration. Initially, IOT can address only its technological factors including storage, processing and energy by leveraging the unlimited capabilities and resources of Cloud.

On the other side, Cloud are also capable of dealing with real world entities in a more distributed and dynamic fashion by the use 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. Some of the factors that led to the amalgamation of Cloud and IoT are listed and explained below.

Storage capacity: IoT comprises of a large number of information sources (things), which produce huge amounts of non-structured or semi-structured data. As a result IoT requires collecting, accessing, processing, visualizing and sharing large amounts of data[14].Cloud provides unlimited, low-cost, and on-demand storage capacity, thus making it the best and most cost effective solution to deal with data generated by IoT.

Computation power: The devices being used under IoT have limited processing capabilities. Data that are collected from various sensors is transmitted, where it's aggregated and Processed to more powerful nodes .By the use of unlimited processing capabilities and on-demand model of cloud, the computation needs of IoT can be addressed. With the help of cloud computing, IoT systems are capable of performing real-time processing of data thus facilitating highly responsive applications.

Communication resources: The basic functionality of IoT is to make IP-enabled devices communicate with one another through dedicated set of hardware. Cloud computing offers cheap and effective ways of connecting, tracking, and managing devices from anywhere over the internet.

Availability: The meaning of availability defines any time anywhere of resources which becomes very easy with cloud integration.

Most of the cloud providers assure 5 nine availability. The applications with cloud are always up and running and continuous services are being provided to the end users.

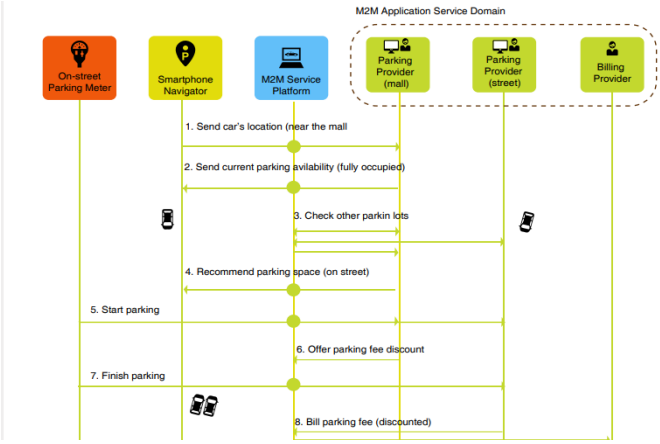

Fig.3 Flow Diagram of Smart Parking System

4. RADIO FREQUENCY IDENTIFICATION

The RFID section describes about the parts that comprises. The RFID tags define about, how they work in principle, and what types of tags do exist. It mainly focuses on how tags are powered and with what frequency ranges they are being operated. This section states by covering a few important standards. The real power of RFID is defined within the combination of backend which stores additional information that includes descriptions for products and also signifies where and when a certain tag was scanned. In general a RFID system structure is similar to a depicted system. RFID readers are mainly used to scan tags, and then they forward the information to the backend. The backend of a RFID in general is nothing but a database and also a well-defined application interface.

When the backend receives any of the information, it adds it to the database and if in case it performs some of the computation on related fields. This application retrieves data from the backend. In many situations, the application is combined with the reader itself.

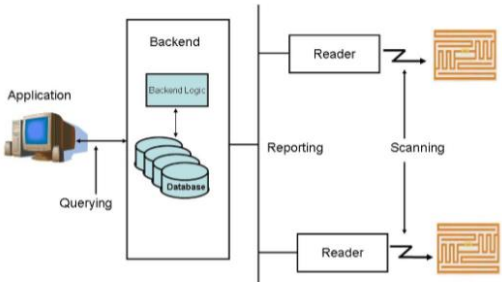

Fig4. RFID System

5. PIC MICROCONTROLLER

The term PIC is termed as Peripheral Interface Microcontroller.in this system we use PIC 16F886.The PIC16F886 is also available in 28-pin PDIP, SOIC, SSOP and QFN packages. The PIC16F887 is available in a 40-pin PDIP and 44-pin QFN and TQFP packages the block diagram of PIC16F887. There are a many range of thirty-five general purpose I/O pins available. Depending on the type of peripherals are enabled, some or all of the pins may not be available as general purpose I/O ports. Generally, the associated pin may not be used as a general purpose I/O pin, when a peripheral is enabled.

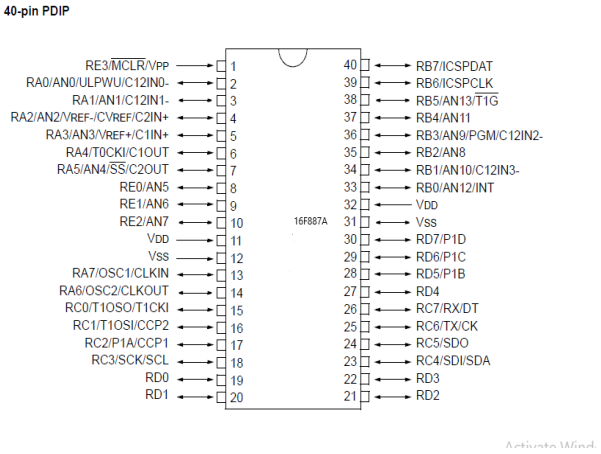

Fig 5.Pin diagram of PIC 16F887A

6. IMPLEMENTATION & WORKING

The architecture and technical stack is related to the smart parking system. In this section the description is given 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. The working of this system details in a step format that includes checking the availability of parking space, to actually park a car in a vacant parking slot and so on.

This can be done by implementing the smart parking system in the parking area of a shopping mall and various other places. The steps that a driver should follow in order to park its car using Smart parking system are listed below.

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

Step 2: With the help of the mobile app search for a parking area on and around your destination.

Step 3: Select a particular parking area.

Step 4: Browse through the various parking slots available in that parking area.

Step 5: Select a particular parking slot.

Step 6: Select the amount of time (in hours) for which you would like to park your car for.

Step 7: Pay the parking charges either with your wallet or your credit card.

Step 8: Once you have successfully parked your car in the selected parking slot, confirm your occupancy using the mobile application.

7. CONCLUSION

The concept and implementation of Smart Cities have always been a dream for humanity. Though there are major advancements made in the implementation of smart cities over the past couple of years. The growth of Internet of Things and Cloud Computing technologies have given rise to new inventories in terms of smart cities. Smart parking facilities and traffic management systems are also a important constrains that plays a major role in the construction of smart cities. In this paper, we discuss about the issue of parking and introduce an IoT based Cloud integrated smart parking system. The system that we have proposed have provided a real time information regarding the availability of parking slots in a parking area. Users can be able to know whether the parking lot is free for authorizing a mobile application from remote locations in order to book a parking. The efforts have been made to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

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