International Journal of Advance Research in Science and Engineering
Vol. No. 8, Issue No. 02 , February 2019
www.ijarse.com
IJARSE
ISSN 2319 - 8354

HIGH RESPONSIVE SMART PARKING SYSTEM USING IOT AND CLOUD COMPUTING

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Abstract -*In recent times the concept of smart cities have gained major popularity. The evolution of Internet of things had been explored the idea of smart city that seems to be achievable. A lot of efforts are 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 smart parking system. The proposed Smart Parking system consists of a on-site development of an IoT module that is used to 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 booking a parking slot accordingly. In this paper,we 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 had been created.The parking related problems 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 place the vehicle in a suitable parking space so that fuel consumption can be decreased and time complexity can be increased. It has been found that a driver search for a suitable parking space takes almost 10 minutes which in turn increases the fuel consumption of the vehicle, traffic congestion and air pollution. Most of the smart parking system, that exists over

the years provides information about the parking availability information system design, parking reservation system, and management of the available parking lots, real-time navigation of parking facility etc.

Thus, this paper presents an internet-of-thing (IoT) based on E-parking system that employs an integrated component called parking meter (PM) to address the following issues.

• Real-time detection of improper parking area

• Estimation of the time for each vehicle that is been parked

• Automatic collection of parking charges for placing an vehicle.

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, etc.

Out of these techniques , a prototype of RFID-based smart parking application implements an automatic check-in and check-out process using RFID reader of the vehicle in parking slot area. There a lots of technologies that has been existing in the present parking systems such as Smart Parking System Using Ultrasonic sensors.

3. PROPOSED SYSTEM

The newly used technique in the System is IOT 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 way. The user can easily view through their mobile phones whether the parking slot is free or not.

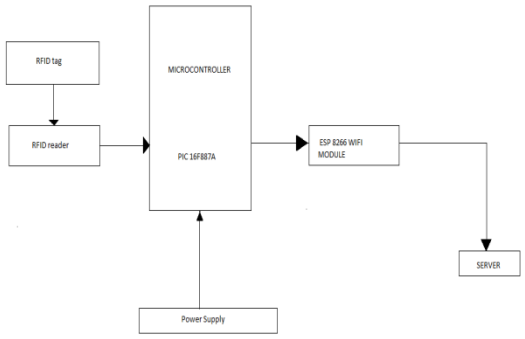

Fig.1 Block diagram of Smart Parking System Using IOT

3.1 PURPOSE OF USING IOT MODULE

Internet of Things have witnessed large evolution. The technologies have some advantages, however several mutual advantages can be foreseen from their integration. Initially, IOT can address only its technological factors including storage, processing by leveraging the unlimited capabilities and resources of Cloud. On the other side, Cloud are capable of dealing withn the real world entities in a more distributed and dynamic fashion by the use of IoT. Basically, the Cloud acts as a intermediate between things and applications, in order to hide all the complexities and

functionalities necessary for running the applications. Some of the factors that led to the amalgamation of Cloud and IoT are explained below.

1)Storage capacity:

IoT comprises of a large number of information sources, which produce huge amounts of non-structured and semi-structured data. As a result IoT requires collecting, accessing, processing, visualizing and sharing large amount of data.

Cloud provides unlimited, low-cost, on-demand storage capacity, thus making it is the best and most cost effective solution to deal with IoT.

2) Computation power:

The devices have been used under IoT are limited processing capabilities. Data that are collected from various sensors and it is transmitted,where its 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 easily. With the help of cloud computing, IoT systems are capable of performing real-time processing of data thus facilitating the highly responsive applications.

3)Communication resource:

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

4)Availability:

The meaning of availability defines an any time and any where of resources which becomes very easy with cloud integration.

Most of the cloud providers assure 6 nine availability. The applications with cloud are always running and continuous services are being provided to the end users.

4. RADIO FREQUENCY IDENTIFICATION

The RFID section describe about the parts that comprises .The RFID tags defines about the how they work in principle, and what types of tags do exist. Its mainly focuses on how tags are powered and with what frequency ranges they are being operated. This section states about the covering a few important standards.The real power of RFID is defined as, 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 which are similar to a depicted system.

RFID readers are mainly used to scan tags, and they forward the information to the backend . The backend of a RFID 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 in some case it performs some of the computation on related fields. This application retrieves and store the data from the backend.

5. PIC MICROCONTROLLER

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

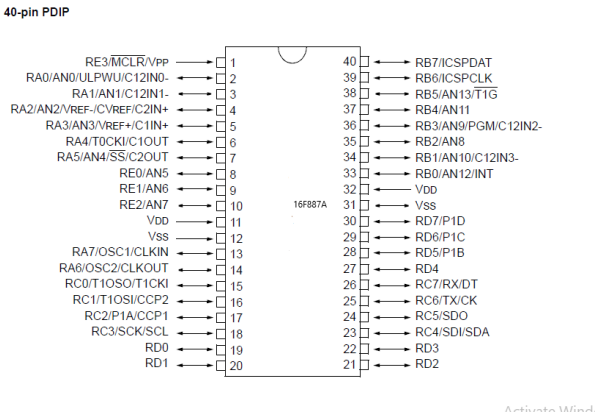

Fig 2.Pin diagram of PIC 16F887A

6. IMPLEMENTATION & WORKING

The architecture and technical stack are related to the smart parking system. In this section the description is given about the implementation and working of the system in a day to day scenario. The complete process is booking a parking slot, parking a car in that slot and leaving the parking area. The working of this system describes in a step format that 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, hospitals ,industrial areas and various other places. The steps that a driver should follow in order to park its car using this system are listed below.

Step 1: Install the smart parking application on your mobile device.(windows, apple, android devices)

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

Step 3: Select the particular parking area.

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

Step 5: Select the particular parking slot.

Step 6: Select the amount of time (in hours eg:1hrs or 2 hrs) for which you would like to park your car.

Step 7: Pay the parking charges by online payment.

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

7. CONCLUSION

The concept and the implementation of Smart Cities have always been a dream for humanity. There are some 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 inventors in terms of smart cities. Smart parking facilities and traffic management systems are also a important constrains that plays a important role in the construction of smart cities. In this paper, we discussed about the issue of parking and introduce a IoT based Cloud integrated smart parking system.

The system that we have proposed are provided a real time information regarding the availability of parking slots in a parking area. Users can be able to know whether the parking slot is free by authorizing a mobile application from remote locations in order to book a parking. This 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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