

IOT BASED INTELLIGENT PARKING SYSTEM FOR SMART CITIES

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ABSTRACT

Present day's car parking has become a major issue in urban areas with lack of parking facilities and increased amount of vehicles, due to this drivers who are searching for parking space they were roaming around the city in peak hours. This causes traffic, waste of time and money. To solve those problems, the system is developed using sensor circuit, Cloud storage and IoT. Proximity IR sensor is used to find the presence of the car and all details are accessed from remotely through IoT. This system helps user to find parking space availability with the help of Internet of Things (IoT) technology by providing parking free space information. The IoT maintains the database of the parked vehicles through a shared server. So drivers can book the slots in advance and the parking information updated in server. This prototype developed for the parking system with less human interaction, increases flexibility and security. This system is employable in airports and multiplexes parking.

Keyword : - IOT, Smart Parking, Cloud, Sensor Network, Web Application, Raspberry Pi3, MQTT

1. INTRODUCTION

The smart parking system that we propose is implemented using a Web application that is connected to the cloud. The system helps a user know the availability of parking spaces on a real time basis. Wireless Sensor Networks (WSN) is an enabling technology, which is based on autonomous sensors, deployed in an area to sense different physical parameters, such as parking slot vacancy, vehicle detection and etc . These sensors communicate wireless amongst themselves and with central base station, where entire information from the sensors is collected and post processed. Thus, with the help of wireless operating autonomous sensors, a WSN based smart parking system can be developed [1]. A smart city according to Forrester, is one that uses information and communications technologies (ICT) to make the critical infrastructure and services of a city, such as public safety, transportation and utilities, more aware, interactive and efficient [2].

In parallel, the emergence of the Internet of Things (IoT) that involves sensors embedded to every day devices promotes monitoring data produced by humans or by the environment in an automatic way [2]. The correlation of cloud computing and IoT arises some new opportunities for wide usage of such data, since new applications could be developed and impact peoples' everyday life [4]. Cloud computing is an extended form of the distributed computing. Cloud computing combines large number of distributed computed resources. Cloud computing is a model to store the data and is also used for resource sharing. Cloud computing is a universal model suitable for on-demand network access to shared resources. The IoT standard is based on intelligent and self configuring things. The IoT things are connected in a dynamic and universal network infrastructure. With the restricted storage and processing capacity, and major issues regarding reliability, performance, security, and privacy IoT is characterized by real world and small things [5].

2. LITERATURE SURVEY

Table -1: Literature Survey

Sr.No	Paper Name	Author name	year	Advantages	Disadvantages
1.	Smart parking reservation system using short message Services.	1.Noor Hazrin Hany Mohamad Hanif 2.Mohd Hafiz Badiozaman 3.Hanita Daud	2009	System can be used and applied anywhere due to ease of usage.	1.Cost of implementation is high. 2.The microcontroller will have to take a lot of load which can crash the system.
2.	ZigBee and GSM based secure vehicle parking management and reservation system.	1.Ashwin Sayeeraman 2.P.S.Ramesh	2012	1. Parking lot vacancy module uses ZigBee. 2. Barrier gate will not get open until correct exit password is entered.	The SMS contains entry/exit password to the parking lot may not be received due to network congestion.
3	An Intelligent Parking Guidance and Information System by using image processing technique.	1.P.DharmaReddy 2.A.Rajeshwar Rao 3.Dr. Syed Musthak Ahmed	2013	1.It identifies car only but if any object other than car is at parking slot it doesn't considered. 2. Shows real time information.	1.High cost of implementation 2. User will have to inquire for every slot available.
4.	Intelligent Parking Management System Based on Image Processing.	1.Hilal Al-Kharusi 2. Ibrahim AlBahadly	2014	1.A camera is used as a sensor to take photos to show the occupancy of car parks. 2.Single camera can detect the presence of many cars at once.	1.No guidance is provided to the parking lot. 2. The weather conditions affect the System i.e. in terms of visibility.
5.	Automatic Parking Management System and Parking Fee Collection Based on Number Plate Recognition.	1.M. M. Rashid 2.A. Musa 3.M. AtaurRahman 4.N. Farahana	2015	1.Less interaction of humans and use magnetic card and its devices. 2. identify vehicles by automatically reading the license and its used.	1.Different algorithm has to be applied for different type of number plates. 2. No way a user can reserve a parking lot.

3. FUNCTIONAL DISCRIPTION

The functions of the various working components are given below:

3.1 Raspberry Pi3

Raspberry pi 3 is small credit card sized computer uses Advanced Reduced Instruction Set Computing Machine technology which reduces power consumption, heat and cost. Raspberry pi uses only 5v and 700mA power rating. Raspberry pi available in many variants named Raspberry pi A, Raspberry pi B, Raspberry pi B+, and Raspberry pi 3 B. Raspberry pi 3 B is the latest version and it runs on A 1.2GHz 64-bit quad-core ARMv8 CPU with 1 GB RAM. It comes with on board Bluetooth and Wireless LAN. It has memory card slot which is used for booting the operating system. It has four USB ports, one HDMI port to connect Monitor, 40 GPIO pins to connect different sensors and Actuator, on board Camera interface (CSI) and Display interface (DSI) to connect Camera module and display module. Raspberry pi also has VideoCore IV 3D graphics core to render high quality graphics.



Fig -1: Raspberry Pi3

3.2 MQTT Protocol

MQTT is a machine-to-machine (M2M)/"Internet of Things" connectivity protocol. It was designed as an extremely lightweight publish/subscribe messaging transport. It is useful for connections with remote locations where a small code footprint is required and/or network bandwidth is at a premium. For example, it has been used in sensors communicating to a broker via satellite link, over occasional dial-up connections with healthcare providers, and in a range of home automation and small device scenarios. It is also ideal for mobile applications because of its small size, low power usage, minimized data packets, and efficient distribution of information to one or many receivers.

3.3 Proximity Sensor

A **proximity sensor** is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

4. DETAIL WORKING

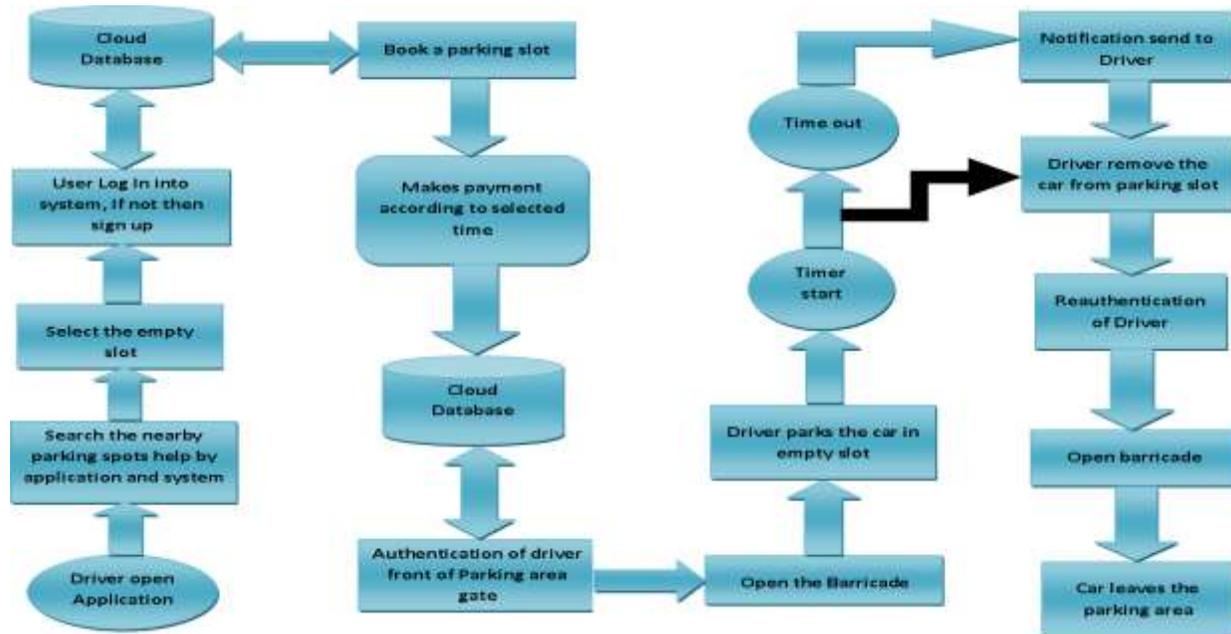


Fig -1: Detailed Working of System

Step 1: Go to the Web app or 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 24 hours) for which you would like to park your car

Step 7: Pay the parking charges either with your e-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 or Web Application.

Step 9: When driver want remove vehicle he should complete reauthentication process and leave the parking area.

5. SOFTWARE DESIGNING

5.1 Python Programming

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages. We are use the python for controlling the hardware and sensors to update real time information

5.2 PHP

PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. PHP are used for the backend programming to make the web app responsive.

5.3 HTML

Hyper Text Markup Language are use to development the web app and CSS (Cascade Style Sheet) are used with the HTML to design Front end which is user friendly and attractive.

5.4 SQL

Structured Query Language is used to communicate with a database. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems. SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database.

6. RESULT

This System are very helpful to user as well as Business purpose for Private and Government Sectors. Using the System user / Driver can book parking slot in advance as per requirement and find route from own location to selected parking area. The proposed system is practically used to find select and book nearby parking slot to park vehicle.

Fig.2 shows the web Application show the map and parking area and related information.

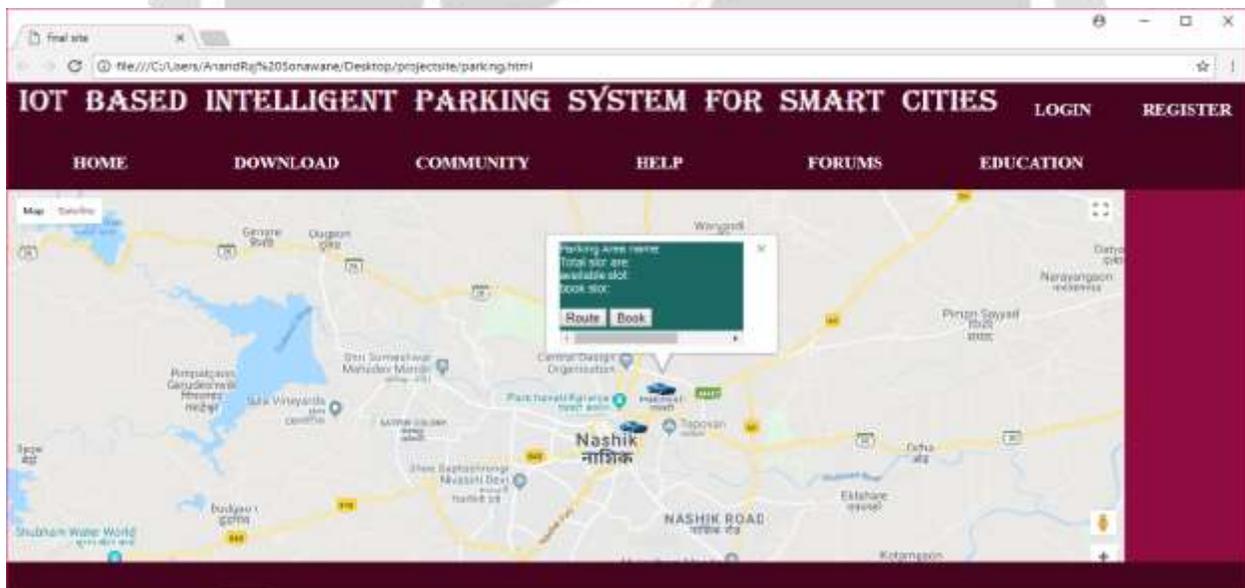


Fig -2: Parking area and it's Information

Fig3 shows the Model in which show the Parking area contain Controller and sensors.



Fig -3: Model of Parking Area

7. CONCLUSIONS

In this system smart parking using Internet of Things is discussed. This system includes Cloud technology with Android application which provides user interface for control system of vehicles. The average waiting time of users for parking their vehicles is effectively reduced in this system. This smart parking system provides better performance, low cost and efficient large scale parking system.

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