IOT Smart parking system*

*Note: Sub-titles are not captured in Xplore and should not be used

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***Abstract*—This document is a model and instructions for LaTeX. This and the IEEEtran.cls file define the components of your paper [title, text, heads, etc.]. *CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract.**

***Index Terms*—component, formatting, style, styling, insert**

I. Introduction

IOT : The Internet of think or IOT is a system of interrelated computing devices, mechanical and digital machines LaTeX. Parking System : A car parking system is a mechanical device that multiplies parking capacity inside a parking lot. Parking systems are generally powered by electric motors or hydraulic pumps that move vehicles into a storage position

II. What is IOT Smart Parking System?

A. IOT smart Parking System parking lot problems and solutions

- Increase parking supply.
- Establish minimum parking requirements.
- Subsidizing off-street parking.
- Increasing on-street parking AND Increase on-street/curbside parking provision.

B. An IOT based smart parking system

An IOT based smart parking system, also known as a connected parking system, is a centralized management system that allows drivers to use a smartphone app to search for and reserve a parking spot.

C. What is problem?

D. How to work this IOT smart Parking System ?

- Here is 3 concept of this system.
- Space Detector.
- Data Transfer.
- Data Receiver from smart device.

Identify applicable funding agency here. If none, delete this.

E. How to work this IOT smart Parking System ?

- FREE Space.
- No Space Free.
- Dirty Space Free.

F. SYSTEM ARCHITECTURE

This section describes the high level architecture for the smart parking system along with a mathematical model. The parking system that we propose comprises of various actors that work in sync with one another. Below is the mathematical model that defines our smart parking system. Table 1: N

G. NEED FOR IOT-CLOUD INTEGRATION

Cloud computing and IoT have witnessed large evolution. Both the technologies have their advantages, however several mutual advantages can be foreseen from their integration. On one hand, IoT can address its technological constraints such as storage, processing and energy by leveraging the unlimited capabilities and resources of Cloud[4]. On the other hand, Cloud can also extend its reach to deal 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. Below are some of the factors that led to the amalgamation of Cloud and IoT

Mi Í X(T,C,P,U,S) // Driver provides input to the input function X()ÍF(S,T) // Input function notifies the computation function X()ÍI(P,C,U) // Input function notifies the identity function Oi= F(S,T)ÍY() // Computation function notifies the output function and the resultant is stored in form of the occupancy rate. TCP/IP protocol. It is designed to establish connections across remote locations where limited amount of data needs to be transferred or in cases of low bandwidth availability

H. 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 collected from various sensors is usually transmitted to more powerful nodes where its aggregation and processing can be done[18]. The computation needs of IoT can be addressed by the use of unlimited processing capabilities and on-demand model of Cloud. With the help of cloud computing, IoT systems could perform 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[16]. By the use of built-in applications IoT systems could monitor and control things on a real-time basis through remote locations

SCALABILITY

Cloud provides a scalable approach towards IoT. It allows increase or decrease in resources in a dynamic fashion. Any number of "things" could be added or subtracted from the system when cloud integration is provided[22]. The cloud allocates resources in accordance with the requirements of things and applications

PARKING SENSORS

For our parking system we have made use of sensors like Infrared, Passive Infrared(PIR) and Ultrasonic Sensors. The work of these sensors is the same i.e. to sense the parking area and determine whether a parking slot is vacant or not. In this case we are using ultrasonic sensors to detect the presence of a car. The ultrasonic sensors are wirelessly connected to raspberry pi using the ESP8266 chip. An ESP8266 WiFi chip comprises of a self contained SOC with integrated TCP/IP protocol stack that allows any microcontroller to access a WiFi network. The sensors are connected to a 5V supply either from raspberry pi or an external source. External source being more preferable.

PROCESSING UNIT

: It comprises of Raspberry pi which is a processor on chip. The processing unit acts like an intermediate between the sensors and cloud. All the sensors are wirelessly connected to the processing unit. A single raspberry pi unit comprises of 26 GPIO pins i.e. 26 different sensors can be connected to it. However we can increase this number by attaching a multiplexer (MUX) to it. It is essential that the ground of raspberry pi and sensors must be connected in order to transfer data using the GPIO pins. There is a python script running on the chip that checks the status of various GPIO pins and updates this information onto the cloud. Data collected from various sensors is sent to the raspberry pi through the esp8266 chip.

FLOW CHART OF THE SYSTEM

We conducted an experiment in order to depict the working of our system at every stage from checking the availability of parking space to actually park a car in a vacant parking slot. This is done by implementing the smart parking system in the parking area of a shopping mall. Below are the steps that a driver needs to follow in order to park its car using our parking system.

FLOW CHART OF THE SYSTEM

Step 1: Insall 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. x 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.