IoT based Smart Parking System

Research Paper Summary using Latex

Shruthi Mohan
21011101125
AI-DS B

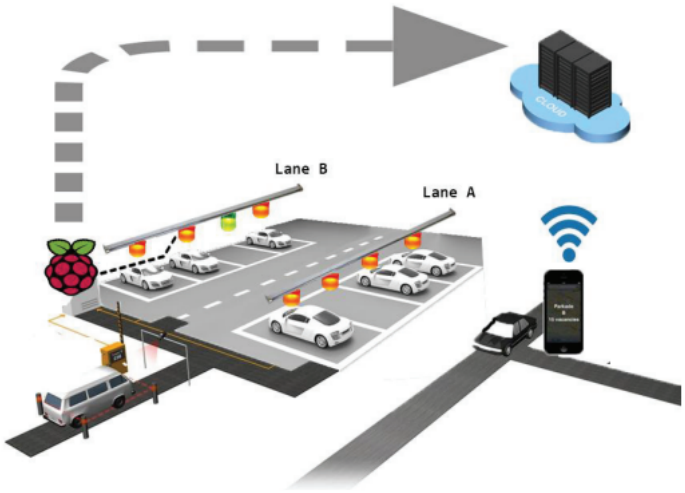

Figure 1: Smart Parking System

Computer Science and Engineering
Shiv Nadar University, Chennai
22 January 2023

IoT based Smart Parking System

0.1 Summary

The smart parking system that we propose is implemented using a mobile application that is connected to the cloud. The system helps a user know the availability of parking spaces on a real time basis. The paper talks about the factors responsible of Cloud-IoT integration, state-of-the-art in smart parking system and its architecture, implementation and working of the same. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. The system that is proposed provides real time information regarding availability of parking slots in a parking area. Users from remote locations can book a parking slot for them by the use of the mobile application.

Key contribution/ideas from the author

The author explains the need for Cloud-IoT integration. Following are the factors that led to this integration:

1. **Storage capacity** - 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.

2. **Computation power** - With the help of cloud computing, IoT systems could perform real-time processing of data thus facilitating highly responsive applications.

3. **Communication resources** - . By the use of built-in applications IoT systems could monitor and control things on a real-time basis through remote locations.

4. **Scalability** - The cloud allocates resources in accordance with the requirements of things and applications.

5. **Availability** - With cloud, the applications are always up and running and continuous services are being provided to the end users.

6. **Interoperability** - Cloud helps in addressing this problem as it provides a common platform where various devices can connect and interact.

The author also explains the Architecture of the system.The primary actors that constitute the parking system are:

1. **Parking Sensors** - For the 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

2. **Processing Unit** - It comprises of Raspberry pi which is a processor on chip. A single raspberry pi unit comprises of 26 GPIO pins i.e. 26 different sensors can be connected to it. MQTT[15] (Message Queue Telemetry Transport) Protocol is a publish-subscribe based "light weight" messaging protocol that is used on top of the TCP/IP protocol.

3. **Mobile application** - The mobile application acts like an interface for the end users to interact with the system. In order to ensure proper communication both the Raspberry pi and mobile application must be subscribed to a particular channel on IBM MQTT server.

4. **The Cloud** - Continuous backup is made of the data stored on cloud in order to ensure easy and quick recovery of data in case of any kind of system failure.

   One gets to see that empty parking spaces are indicated by red light in Lane A whereas green light in Lane B. This is due to the fact that in case of Lane A although there is no car currently parked but there still is a red light because the slot has al-

ready been booked by some user. On the other hand, the parking slot in Lane B shows green light because it neither has a booking nor a car parked in it.

My views about this paper

In my opinion this system on practice is not just going to make parking easy but it will also take care of traffic control, easy calculation of parking fee and payment, safer cities can be created, and energy efficiency can be improved. The development of the Internet of Things and cloud technology also opens up new opportunities for smart cities. IoT-based smart parking system also offers real-time slots, parking procedures, information and improves users' ability to save time on proper parking. License plate scanners can be included in the future.

Agreement, Pitfalls and Fallacies

Though I was able to get the gist behind the concept what the author is trying to convey, I don't feel it to be generalised for the following reasons:

- The deployment of smart parking systems could increase thanks to the rising issue of parking and reducing costs of implementing a smart parking system.
- Licence plate checking must be involved along with some verfification document.
- If suppose a person does not use the parking space after they booked it the application must free this space for others to use.

This paper describes a basic mobile application and if this can be put to practice it will be the basis to a big part of IoT.