Smart Parking System for Smart Cities using IOT

Due to the increase in car ownership, it's getting harder to find parking spots in densely populated areas. Searching for an available lot takes up potentially productive time, increases the number of cars circulating the roads, and introduces new challenges to the infrastructure. In this post, you will find out how IoT is used to reduce parking-related road accidents, shorten the search time, and increase the level of drivers' comfort.

Abstract

Internet of Things is the next big thing, as almost everything developed now has an extensive use of data which is then used to get the daily statistics and usage of every individual. The work mainly consists of constructing a screen where the parking space will be shown, and a camera module will be set up, and PIR (Passive Infrared Sensor) will be at the entrance to detect the entrance of a car or any vehicle eligible to park at the lot. The vehicle will be scanned for its registration number in to provide a check whether the vehicle is registered to park or not. This also acts as the security of the parking lot. Moreover, a viable sensor will be placed at each parking slot through which the vacancy of each parking slot will be shown to determine the exact spot available to the user.

Introduction

The project proposal is initiated due to the current issues that are being faced by some regular people every day, i.e., to find a parking spot. The idea is mainly to create a device with a camera module mounted on it which will help to scan only the cars entering and exiting a parking lot and will display the appropriate space remaining in the lot. As it has been known that 20% of the drivers are getting irritated by driving the whole block to look for vacancy spot to park the car. People are getting dependent upon the app which can help them get proper information about the parking lot occupancy, but inevitable due to the improper implication of GPS and other sensors. If applied through IoT devices all the technological limitations can be portrayed as storage, processing and energy and the cloud will be able to deal with all the computation and real applications .

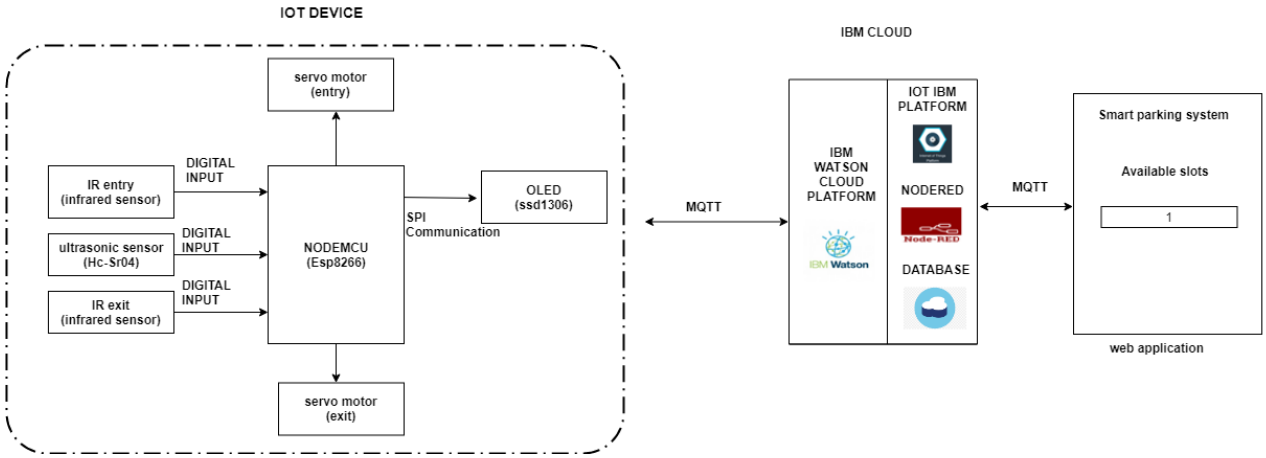
Another feature that can be added is with a viable sensor on each parking space, which will basically feed information to the cloud whether that space is empty in the lot or not and hence, a display of all the available space will be provided through which the vehicle entering can easily track down the space without wasting any time. As, it is known that the range of the sensor, for example, infrared lies from 20 to 4000 mm which will help us deduce the actual vacancy of the parking area. The sensors that can be used to achieve the task and get back with the information on the parking lot area are, ultrasonic, inductive loops, infrared sensors as the sensors tend to be very reliable but for huge parking lots the cost can be huge and hence using convolutional neural network can be an option to get the desired output.

Literature Survey

In today's world parking lots have become redundant and needs lot of manpower to handle and maintain it. These parking lots are not user friendly and do not provide data regarding availability of free spaces. Many researchers have contributed to this issue and formalized with various methods to better optimize the parking lot to serve the needs.

IoT has a multidisciplinary vision to provide its benefit to several domains such as environmental, industrial, public/private, medical, transportation etc. Different researchers have explained the IoT differently with respect to specific interests and aspects. The potential and power of IoT can be seen in several application domains. Illustrates few of the application domains of IoTs potentials.

Block Diagram



Hardware Designing Advantages

Design engineers have many choices when it comes to the design of Internet of Things (IoT) solutions. Hardware is evolving to keep pace with the ever-expanding requirements and potential of IoT applications. As with all components, simplicity, cost-effectiveness, form factor, and reduced time to market are desired qualities. Purpose-built hardware offers an easy way to customize and get up and running with a pre-certified single board computer (SBC).

- ## High flexibility

The flexibility of these SBCs accommodate different designs, giving engineers options they previously didn't have, with limited effort and risk. A valuable head start is pre-certification. Forgoing certifications, for example, offers great cost and time savings in the form of reduced non-recurring engineering (NRE) expenses, or the up-front cost to research, design, develop, and test a new product or product enhancement

- ## Ease-of-use

Purpose-built hardware can be fully developed and operational from the start. This provides engineers an advantage when building their applications. Designers are becoming increasingly specific in terms of their industry and environment, but most of what engineers need is provided. The hardware is production ready and it doesn't require a ground-up development effort.

- ## Reliability and longevity

SBCs are often used in highly specialized and environmentally challenging embedded applications. Specific industry standards related tests for temperature, shock, and vibration will ensure that the platform is able to operate reliably 24/7 without failure.

- **Connectivity options**

The IoT is pervasive throughout applications in virtually all vertical markets. Fully integrated and complete connectivity options must be considered and designed into a product right from the beginning — whether that be Wi-Fi connectivity to allow for product configuration or services, Bluetooth Classic for user device integration, Bluetooth Low Energy for low-power sensors, or Ethernet for use-cases mandating wired network connections.

Disadvantages

- **Problems in ensuring smooth integration of new services**
- **Difficulty in adapting to new environments**
- **Frequent changes in hardware and software facilities**
- **Issues in packaging and integration of small size chip with low weight and lesser power consumption**
- **Carrying out energy awareness operations, etc.**

Conclusion

The IoT has the potential to dramatically increase the availability of information, and is likely to transform companies and organizations in virtually every industry around the world.
As such, finding ways to leverage the power of the IoT is expected to factor into the strategic objectives of most technology companies, regardless of their industry focus.
The number of different technologies required to support and further growth of the IoT places premium on interoperability, and has resulted in widespread efforts to develop standards and

technical specifications that support seamless communication between IoT devices and components. Collaboration between various standards development groups and consolidation of some current efforts will eventually result in greater clarity for IoT technology companies.

Future Scope

The future of the smart parking market is expected to be significantly influenced by the arrival of automated vehicles (AVs). ... Using this system, up to 4 times as many cars can be parked in the same amount of space as a traditional garage (since there is no need for extra space in between cars)