

SMART PARKING USING INTERNET OF THINGS

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Abstract: Internet of Things (IoT) plays the crucial role in Smart parking system. Smart parking is a emerging concept. As its sensors can provide information about status of parking slots. This paper aims at smart car parking system based on Iot.

As the number of vehicles on Indian roads are expected to increase by 10882262 by 2020, reducing average speed from an already miserly 6.4 kph to 4.7 kph walking speed for most people. While major infrastructural improvements are scheduled to take place to reduce the number of cars on the road, this paper proposed a solution directed at traffic space management to accelerate the process.

Studies have shown illegal encroachments by motor vehicles parking on roads have a massive effect of the flow in traffic. The purpose of this paper is to remove the all too familiar sight of cars parked on the roads by introducing smart parking technique using IOT.

Keywords: IoT, Sensors, Smart Parking.

1. INTRODUCTION TO PROBLEM:

In the recent, the concept of smart city has gained appreciation. One of the important considerations of being a smart city is the Smart Parking facility. Finding a particular space to park our vehicle becomes an annoying issue. Besides, number of vehicles in like manner rapidly grows once every day. It has been seen that the drivers struggle to find a halting extent without thinking about where parking space is open.

Initially, our system gives a brief overview of the concept of smart parking system and the need for IoT devices to be integrated with cloud.

Finding a parking slot to park their vehicle has ended up being a disappointing issue to the drivers all the time. It has paved the way for traffic congestion which has turned out to be an alarming problem on a global scale. In order to alleviate this condition, many smart parking facilities evolved but failed to bring relief to all. They could only give the parking information but didn't prove to "smart" enough.

With increase in the population, number of vehicles increases and due to unmanaged parking it leads to many problems. Figure 1 shows the view of unmanaged parking.



Figure 1: Unmanaged parking

If one can publish the vacant parking slots many drivers rush to fill the limited spaces. So, we have tried to address these issues. Here, we propose an idea to realize Smart Parking structure in perspective of reservation using Internet of Things (IoT). The wonder of Internet of Things is inter-communication using the Internet where server ranches could assemble the data and look at and control anything. The two magnificent words in IoT are "Internet" and "Things". The Internet is the vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems. Things could be commonly said as any possession or object. The machine-to-machine (M2M) data that is generated has a wide range of uses, but it is specifically seen for Smart Parking here.

1.2 Problem Statement:

The parking management problem can be viewed from several angles. Limited number of parking lots, drivers

not knowing where parking lots are, drivers also not sure about if the parking slot is vacant or occupied.

Main problem in this system is that before going to parking area one cannot know the status of parking slots if vacant or occupied.



Figure 2: Existing System

1.3 Solution:

To achieve this goal, each parking lot has to be equipped with a control system that enables monitoring of the number of free and occupied parking places and informing potential parking lot users about the parking lot status (open with/without free available parking spaces or closed) locally and in a wider area. Additionally, it is preferable that the systems contains driver navigation to a parking lot with free parking spaces in an urban area and driver navigation to a free parking space in a parking lot, tracking of parking lot occupancy during parking lot working hours for further analysis and security monitoring of the parking lot.

2. OBJECTIVE:

- The goal of this project is to develop a smart parking place that gives the user complete information about vacant or occupied parking slots.
- The automation system will have the ability to be controlled from the Internet, and also remotely accessed via a Pocket PC with a Windows Mobile based application.
- Developing this system within city solves its pollution level to much extent.
- It eliminates unnecessary travelling of vehicles across the filled parking slots in a city.

3. REVIEW OF RELATED LITERATURE:

When people think about smart parking, most of them may imagine that they are getting information of vacant parking slots in their mobile phones. One mobile application for every information & every vacant slot. No need to go here and there in parking area to search for parking place.

Nowadays everyone using a mobile application so the drivers could get their parking information and reserve the vacant spaces of their wish as per their vehicle's width via Wi-Fi or Internet because today almost everyone can possess a smart phone with them.

To some extent smart parking equals to smart city. They both bring out smart living condition and make our life more convenient and fast.

4. PROPOSED SYSTEM:

To find parking space one can use mobile application from anywhere in this proposed system. One can request parking slot using login id & password. As one can see from their mobile if there is vacant parking slot available or not. If available then location of vacant parking slot is also known by this system.

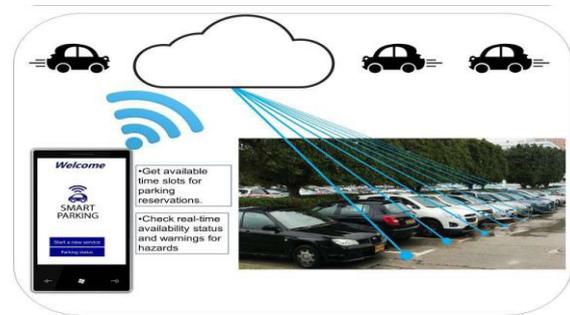


Figure 3: Proposed System of Smart Parking

5. BLOCK DIAGRAM:

Block diagram of this project consists of Arduino UNO, Node MCU, IR sensors, & a webpage on which one end user can see real time parking status information on his mobile or desktop. Here Arduino UNO is used. Here one can write Arduino code in IDE & then uploads it to microcontroller which executes the code & interacts the code with outputs such as sensors, LEDs, & on webpage. User can see output through NodeMCU which is open source WiFi module.

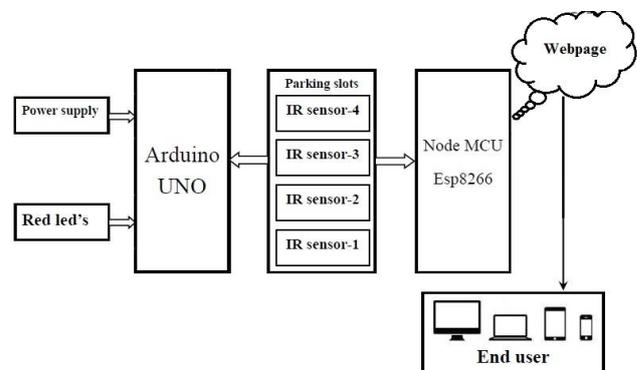


Figure 4: Block diagram of proposed system

6. HARDWARE OF PROPOSED SYSTEM:

Smart parking system is a concept which allows the user to check availability of parking system before setting up of journey. Once the circuit is in ON condition, then this system will work as smart parking system. Let's see the picture of proposed system.

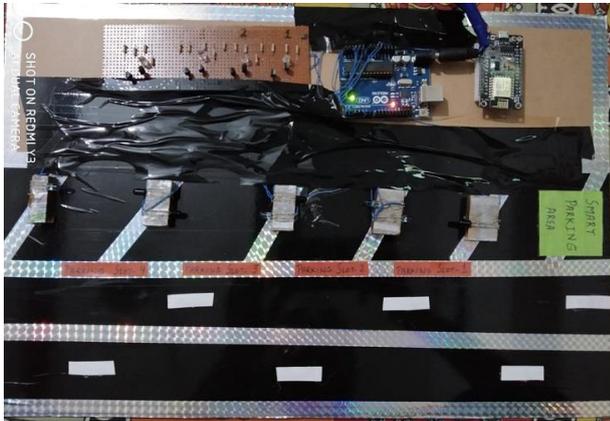


Figure 5: Smart parking system

Case 1: All parking slots are empty

When all parking slots are empty or no any car been shown in any of the parking slots; then webpage showing empty in all slots. This has been shown in above section. This is clearly seen in webpage showing car1 Empty, car2 Empty, car3 Empty, and car4 Empty. One can easily see the results on showing webpage on mobile or desktop very easily.

Here in above figure parking slot no. is defined with corresponding LEDs. Here a webpage is created showing status of parking slots whether empty or full. Webpage when all parking slots are empty has been shown below.

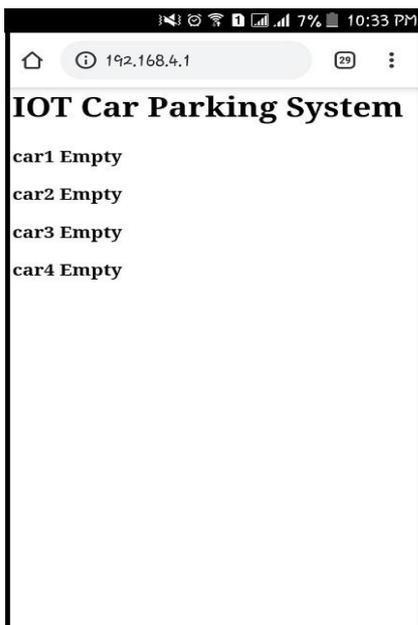


Figure 6: Webpage when all parking slots are empty.

Case 2: When car is parked in parking slot-1 and all other parking slots are empty or vacant.

In this case when car is parked in 1st parking slot then corresponding LED glows which 1st parking slot is full, user can see the result in their mobile phones using following webpage. In this way this proposed system will work in each case.



Figure 7: Parking Slot-1 full

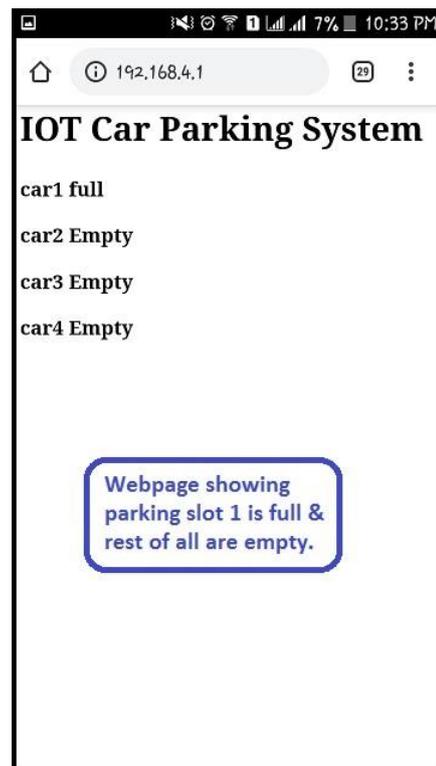


Figure 8: Webpage for Case 2

7. IMPROVEMENTS:

- *Application platform:* Our project is currently an webpage based mobile system. This should be android based mobile application system.

- *VIN number and IPv6*: As the implementation of IPv6 becomes more prominent, we will map a vehicle's 132 bit alphanumeric VIN number (unique for each car worldwide) to a 128 bit IP, which allow us to identify and communicate with vehicles directly, without the need for human intervention.
- *Car Application*: In the near future we can build an application system suitable for each car available on the earth if implemented with IPv6.

8. CONCLUSION:

The rapid urbanization of the world has made concept of "smart cities" gain momentum in main agenda. The transformation of cities into smart cities brings welfare and fast economic progress. The vision of smart city has always been a thought. Since a couple of years, projects were taken and ideas were employed to make it practically possible. Internet of Things stands out to be the indispensable technology implemented along with Cloud Computing. To be a smart city, Smart Parking facility is an essential service. Previous technologies were proved to be either not so efficient or too much expensive. The sensors used to detect the vehicle are main components. Here, we have employed Arduino which seemed to be cost efficient with easy installation and maintenance. In future we would develop application for iOS and also with virtual reality and test its workability in a real time environment. We infer that our future work would facilitate parking issues and decrease traffic congestion issues and pollution created by the search time for parking.

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