

Smart Parking System using IoT

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Abstract - Now a days the number of personal vehicles usage is increasing on a large scale. People prefer personal vehicles than public transportation. It is very difficult and frustrating as well to find parking space in most metropolitan areas, especially during the rush hours. It is often costly in almost every major city in the world to find proper and secure parking space. Due to this there is a need to provide sufficient parking places providing plenty of slots to help the user park his vehicle safely. The aim of this paper is to propose a design of IOT based smart Parking System that regulates the number of cars to be parked on designated parking areas.

This is done by automating the Parking and non-parking of the vehicles with the help of IOT and Android Application. Our system will reduce the human work and help user to park their vehicle with ease and more security. It will use the vehicle number plate to authenticate the vehicle and also it will be used to reserve the space for vehicle in parking lot. This system will be robust and can be used for all types of parking lots.

Android application will be used to get the location of nearest parking lots, real time space availability also the user will be able to pay and book their parking slots through the application. The parking lots will be operated by Raspberry pi for data transfer and it will collect data from the sensors and camera for retrieving the vehicles details and allocated parking space for them.

This system is very much secure and it will work fast from other system as KNN(K Nearest Neighbour) algorithm is used with OpenCV, which will help to recognise number plate very accurately and fast. This system contains hardware as Ultrasonic Sensor, USB camera, IR sensor and raspberry pi3. This is done by using Python programming language for codes of Deep learning, Java for Android Application and Google firebase for database.

Keywords: IOT, Raspbeery pi-3, Opencv, Android, KNN.

1. Introduction

Drivers searching for parking are estimated to be responsible for about 30% of traffic congestion in cities. Historically, cities, businesses, and property developers have tried to match parking supply to growing demand for parking spaces. It has become clear, though, that simply creating more parking spaces is not sufficient to address the problem of congestion. New approaches using smart parking systems look to provide a more balanced view of parking that better manages the relationship between supply and demand. With the increase of internet users in our country, everyone have a smartphone and internet connection so they wants that they can do all their work from sitting at one place whether it is shopping or booking any movie tickets or booking a parking space for their vehicles.

Smart Parking is a solution to all these problems we can reduce the human effort and also provide a more secure and fast working parking stations. Now people doesn't have to waste their fuel, time and money in searching for the parking spaces. They can easily find the nearest available parking space through their application they don't have to go and check every parking station for searching empty parking lots. They also have the option to book the parking slots from the application. This will help the owner of Parking Station to check the statistics of their parking station from analysing the previous data.

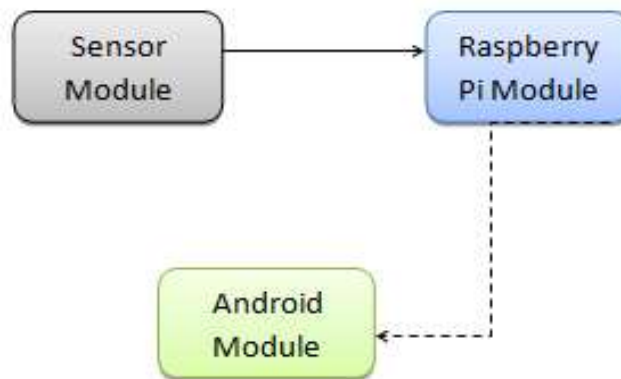
Also the major issues i.e mainly caused due to the illegal parking of vehicles on the road can be solved by this. Smart parking concept is the ability to access, collect, analyse, disseminate, and act on information on parking usage. Increasingly, this information is provided in real-time from intelligent devices that enable both parking managers and drivers to optimize the use of parking capacity.

Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the amount of daily vehicle emissions and ultimately reducing the global environmental footprint.

Parking lot employees and security guards contain real-time lot data that can help prevent parking violations and suspicious activity. License plate recognition cameras can gather pertinent footage. Also, decreased spot-searching traffic on the streets can reduce accidents caused by the distraction of searching for parking.

Over time, a smart parking solution can produce data that uncovers correlations and trends of users and lots. These trends can prove to be invaluable to lot owners as to how to make adjustments and improvements to drivers.

2. Methodology



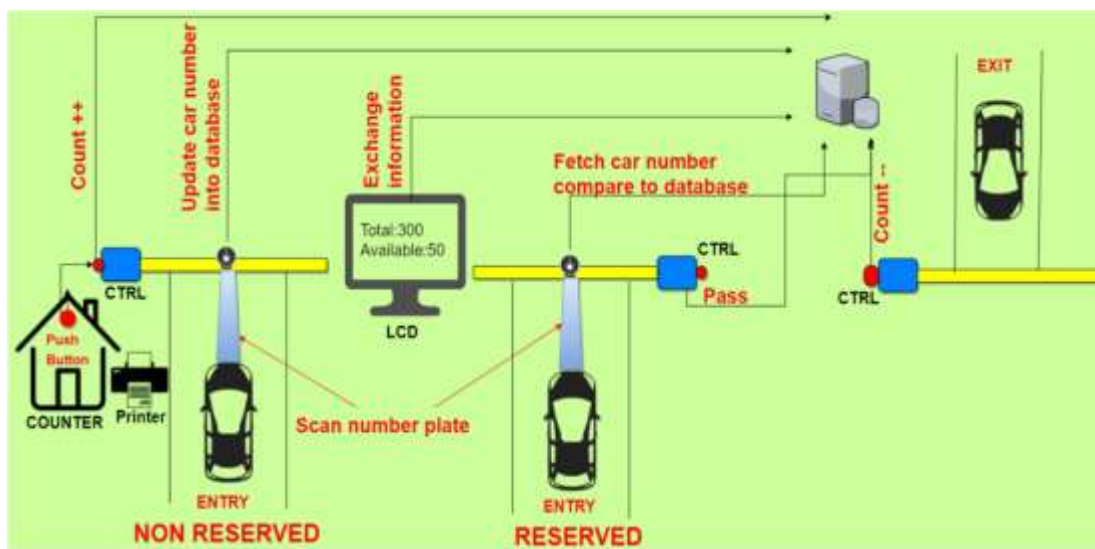
The system will be implemented in three module

2.1 Sensor Module: This module will be installed in the parking space and there will be a sensor used for detecting the distance between the car and the camera fix at the parking station gate to capture the accurate number from the number plate.

2.2 Raspberry Pi Module: This module will help to connect to the internet and will also connected to all the sensors.

2.3 Android Module: This will help the user to connected to the parking station and it will installed as an android app in the mobile phones so that user could easily get the nearest parking station were the space is available.

2.4 System Architecture:



The System Architecture shows the working of the smart parking system, In this there will be different gate for the reserved parking and non reserve parking for reserving the parking space the user should have the app of the smart parking ,form there the user will reserve its place in the parking station for parking by paying the charge through online.

Once the user reserve its parking in the parking station than he/she will get the route to reached to the parking station with the help of google map. And when the user reached to the nearest parking station the number of his car will be fetch by the camera and sensor which is fiton the gate and after fetching the number, the number will be matched through the database of the parking station if the number get matched than the barrier on the gate will be open and the user can access the parking lot. We have use the concept of the balloon, there will be a balloon at every parking space and if the parking space is vacant the balloon will be up in the air and if it is occupied than the balloon will down towards the ground. The balloon can also be used for the adds for the different purpose.

If the user didn't want to reserve its parking space or if they are unable to do the online transaction by any problem than the user could go to the unreserved gate and pay the charge for the parking and get the receipt of the payment and can move inside the parking station and park the car.

3. Conclusions:

In this paper, the implementation of smart car parking system commanded by android application is successfully discussed, The component used for implementing the system provide an efficient output at various stages of implementation this interface established between various components and it provide easiest way to the user for parking the car &

It is recommended for the commercial purpose.

In future, some changes can be done as per the requirement system can be extended to multilevel and multiple parking areas by making potential charges in the hardware setup it can be more effective and most secure parking.

References:

1. Azeem Uddin, Traffic congestion in Indian cities: Challenges of a rising power, 2009.
2. L.Y. Mimbela, L.A. Klein, "A summary of vehicle detection and surveillance technologies used in intelligent transportation systems", New Mexico State University Tech. Report, 2007.
3. J. Yang, J. Portilla, T. Riesgo, "Smart parking service based on wireless sensor networks", IECON 2012-38th Annual Conference on IEEE Industrial Electronics Society, pp. 6029-6034, 2012, October.
4. M. Patil, V. N. Bhonge, "Wireless sensor network and RFID for smart parking system", International Journal of Emerging Technology and Advanced Engineering, vol. 3, no. 4, pp. 188-192, 2013.
5. B. M. K. Gandhi, M. K. Rao, "A Prototype for IoT based Car Parking Management system for Smart cities", Indian Journal of Science and Technology, vol. 9, no. 17, 2016.
6. C. M. Rudin-Brown, "'Intelligent' in-vehicle intelligent transport systems: Limiting behavioural adaptation through adaptive design," Intelligent Transport Systems, IET, vol. 4, pp. 252-261, 2010
7. Kafle, V. P., Fukushima, Y., &Harai, H. (2015, April). ID-based communication for realizing IoT and M2M in future heterogeneous mobile networks. In Recent Advances in Internet of Things (RIoT), 2015 International Conference on (pp. 1-6). IEEE