AUTOMATED QR BASED PARKING SYSTEM

K.R. Jansi, J.Ramaprabha, Vinayak Poddar, Smridhi Sood
Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, India.

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Abstract

Parking is an underestimated problem which needs to be looked upon seriously. In this paper we bring forward the idea of creating an automated parking system to reduce the man force. Every Android compatible device has the ability to read QR codes as well as scanning them to bring forward a lot of information. QR code stands for Quick Response code. QR codes being unique are used to allocate spaces dynamically. The system scans the code of the vehicle about to enter thereby authorizing it. After the scanning he will be allotted a space based on availability and will be emptied once the vehicle leaves the slot. A monthly bill will be generated based on the usage of the parking slot. This way we basically reduce human effort using the simplest of software and hardware available to us. This system will be performing the tasks of authorization, spot selection and billing.

Keywords: QR codes, Android devices, Parking Systems, ZBar Library.
1 INTRODUCTION

Two decades ago, parking was not a problem since each family possessed less number of vehicles and there was more space thereby parking vehicle never caused any inconvenience. It was also the time when parking on roads was not prohibited. Now with the boom in the production of vehicles, diminishing parking spaces and possession of more number of vehicles by an individual, parking has become a huge problem across the world.

Lot of time is wasted in finding a parking slot. Parking in garages is very expensive. All these problems are overcome by appointing a human to look into these problems and assist people find a slot, then calculate the bill for that period. Therefore parking requires an eye 24*7.

As the world is progressing into a more digital age, requirement of automation of tasks without human support is increasing. This paper addresses the problem of parking faced by people. In this paper, we tried to develop a system to minimize human efforts and consumed time by proposing a QR code based parking system which will be fit for offices and residential societies. The proposed system will be performing tasks such as authorization, spot selection and billing.

The system will scan the QR code of the vehicle about to enter. It will provide all required details about the vehicle and the owner. This will provide authorization. QR codes being unique bring in a lot of information. This way we provide the permission to the vehicle owner to park the vehicle in the parking space. The system does not require a person to sit down and manually enter the details of the vehicle thus saving a lot of time by speeding up the manual problem. Not only this, but also human efforts also minimised. After the vehicle is authorised by the system, based on availability of slots, the vehicle is allotted a parking space. Again it does not require for the vehicle to circle around the parking space in search of a slot. Based on the parking costs and policies and the number of hours the slot was used, a monthly bill is generated. Since it is an automated process, there is a less chance of incurring errors. The system gets updated automatically once the slot is emptied.
2 LITERATURE REVIEW

In [1], the author proposes the idea of QR based Attendance system. The student needs to scan the QR code so as to mark their presence in the lecture. The output is displayed for the student at the beginning of each lecture thereby avoiding any discrepancy in the attendance system.

In [2], the paper shows an Android-based system for identification of objects based on reading of QR codes. The system is developed to facilitate identification of various items that exist in already created inventory. The designed system is composed of a database, Web service for intermediary access to the database via Web, and the client Android application, that can be run on mobile phones or tablet computers.

In [3], the system brings forward the idea of smart bus tracking system that any passenger with a smart phone or mobile device with the QR (Quick Response) code reader can scan QR codes placed at bus stops to view estimated bus arrival times, buses’ current locations, and bus routes on a map. Anyone can access these maps and have the option to sign up to receive free alerts about expected bus arrival times for the interested buses and related routes via SMS and e-mails.

3 QR CODES

QR code stands for Quick Response Code. QR code is a machine-readable code consisting of an array of black and white squares arranged in horizontally and vertically componentstypically used for storing information for reading by the camera on a smart-phone or some imagining device. It is formatted algorithmically by underlying software using Reed-Solomon error correction until the image can be appropriately interpreted. Data is then extracted from patterns present in both horizontal and vertical components of the image.

A QR code, as shown in Fig.1 is read by an imaging device, such as a camera, and formatted algorithmically by Underlying software using Reed-Solomon error correction until the image can be appropriately interpreted. Data is then extracted from patterns present in both horizontal and vertical components of the image.
The QR features are listed in table 1 below.

**TABLE 1: CAPACITY, FEATURES, AND STANDARDS FOR QR CODE**

<table>
<thead>
<tr>
<th>QR Code</th>
<th>Developer (country)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>7.089</td>
</tr>
<tr>
<td>Alphanumeric</td>
<td>4.296</td>
</tr>
<tr>
<td>Binary</td>
<td>2.953</td>
</tr>
<tr>
<td>Kanji</td>
<td>1.817</td>
</tr>
<tr>
<td>Major Features</td>
<td>Large capacity</td>
</tr>
<tr>
<td></td>
<td>Small printout size</td>
</tr>
<tr>
<td></td>
<td>High speed scan</td>
</tr>
<tr>
<td>Standards</td>
<td>AIM</td>
</tr>
<tr>
<td></td>
<td>International</td>
</tr>
<tr>
<td></td>
<td>JIS</td>
</tr>
<tr>
<td></td>
<td>ISO</td>
</tr>
</tbody>
</table>

![QR Code Image]

Figure 1: QR Code
4 PROPOSED SYSTEM

The proposed system works entirely based on QR codes.

The idea is to create an automated parking system based on QR code to minimize the problem of parking faced by all of us at some point of time in our lives.

The system proposes the following modules depicted in fig. 2:

1. QR code reader module
2. Admin module
3. Security module
4. Database Module

The vehicle that is about to enter needs to login to the system. For first time users there is a sign-up page. In the sign up page, one
needs to enter his email id, password and several other details and get himself registered. Validation for the same is done to avoid any redundant and fraudulent cases. In the login page, one needs to simply enter his email id and password. These details are validated and verified and to avoid fraudulent cases.

5 DIFFERENT MODULES

5.1 QR code Reader
The QR code Reader module consists of the QR code scanner that scans the code of the vehicle. The QR code scanner present is being developed on the android platform. This module is embedded in the application which will be included in security module. Our QR code scanner works with high efficiency and utilizes ZBar[5] Library to achieve the purpose. Encryption can also be incorporated very easily.

5.2 Admin Module
The admin module is the module that performs the tasks of authorization and generating the monthly bill. As the name suggests, being the admin it can perform various operations in the slot. Fig. 4 and Fig. 5 depict the portal pages.

The various components are:

a) Admin Login page  
b) Add/Update Vehicles  
c) Add/Update parking slots  
d) Update tariff- Cost per unit hours  
e) Report of user details and due amount  
f) Report of slot details and their availability  
g) Parking Log with complete details of previous and current parking
Figure 3: QR Code Scanner UI

Figure 4: Admin portal (Slot report)
6 Security Module

The security module is developed on the android platform as an application and it carries out the task of reading the vehicles coming in and going out. If a vehicle is let into the system, it will ask the user to select parking slot. If a vehicle is let out, show the usage of the slot and update the system accordingly. The app user interface is shown in Fig.6 which is kept very simple realising the user-friendly UI which is easy to use.

7 Database Module

The database module contains database which is made on MySQL. It stores all the data and entries of the system. It is connected through PHP and is accessed by both admin module and security module. Tables are created on a schema suited to support the system and provide various tables for convenient data storage and retrieval.

All these modules are connected to a server via a local area network thus it also works without internet connectivity. The system is stand alone and does not require user to carry any device thus making completely automated for the user.
8 CONCLUSION

These days it is important to make use of technology to ease our lives. Simple day to day problems which are increasingly becoming massive obstacles can be solved by making use of technology. QR being the unique codes brings in a lot of information and solves the problem allocation of spaces in parking slots digitally using existing and basic technologies to achieve a more compatible and user-friendly system.

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