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SMART CAR PARKING USING QRCODE

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Abstract- In recent times the concept of smart cities has gained great popularity. Thanks to the evolution of the Internet of things the idea of the smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as traffic congestion, limited car parking facilities, and road safety are being addressed by IoT.

Keywords- QRCode, SPS Architecture.

I. INTRODUCTION

According to the traffic management system, an intelligent parking system was created for optimal use of the resources for parking the car. The method of finding space is manual where a driver finds a space in a street through his experience. This process takes time and effort which leads to the worst case of failing to find any parking space. This study aimed to provide accurate information about nearby parking spaces for the driver and to book a slot using smartphone, tablet or Pc's. The Smart Parking System is based on various technologies and can automatically monitor and manage car parks. This can be implemented in system with dynamically generated QR code which is used as a mode of authentication.

II. METHODS AND MATERIAL

A. Related Work

Bonde et al. [1] aimed to automate the car and the car parking. The paper discusses a project which presents miniature model of an automated car parking system that can regulate and manage the number of cars that can be parked in a given area at any given time based on the availability of parking spaces. The automated parking method allows the parking and exiting of cars using sensing devices. Entry to or exit from the car park is commanded by an Android based application. The difference between the Bonde system and the other existing systems is that the authors were aiming to make the system as little human dependent as possible by automating the cars as well as the entire car park; on the other hand, most existing systems require human intervention (the car owner or other) to park the car.

Lambrinos and Dosis [2] described a new SPS architecture based on the Internet of Things technology. The architecture of this system consists of a Zigbee Wireless Sensor Network (WSN), an IoT middleware layer and a front-end layer as the final user interface that provides data reporting to the user. However, there are disadvantage as it does not use a suitable application protocol for the transfer of data from the WSN to the server, such as the constrained application protocol (CoAP), there is no mathematical model for the system operations, and there is no system performance evaluation.

Hsu et al. [3] proposed an innovative system including the parking guidance service. A parking space can be reserved by a smartphone via Internet access. Upon entering the car park, the reserved parking space will be displayed on a small map using wireless transmission for vehicles under the dedicated short-range communication protocol DSRC. An inertial navigation system (INS) is implemented to guide the vehicle to the reserved space. The system will periodically update the status of the parking space in real time to help ensure system accuracy. System performance is measured through the accuracy of the inertial navigation systems run in an indoor environment, and the system implementation is evaluated by considering the accuracy of the GPS. In this paper, the authors have not evaluated the performance of the parking services, they do not provide any mathematical model of the system, and do not consider the waiting time of each vehicle for service.

In few studies [4]-[6], the authors introduce a new algorithm for analysis idea in real time car parking. For the first time, they proposed schedule algorithm to get an online problem of a car parking into an offline problem. Secondly, by describing an offline problem with help of mathematical module they get the linear problem. Third, here they form an algorithm to overcome the linear problem. Finally, they calculate algorithm using a trial simulation of the system. The trial results show timely and useful performance. However, this research does not evaluate average waiting time and average total time for user vehicle. They did not have the mechanism to calculate various other factors too such as finding resources, calculating distance and guiding user vehicle to resources.

B. CONTRIBUTIONS

With the aim of overcoming the disadvantages of the systems mentioned above and inspired by [1]–[3] and some relevant works, we introduce new SPS architecture based on IoT and build a mathematical model of the system operation. First, our algorithm adopt same mechanism to search car parks at the least cost. Second, we adopt a mechanism for forwarding the vehicles to another car park if the current car park is full. We propose a network of car parks such that each park is a node in a network. Each node obtains the information from the neighboring node, thus ensuring smooth movement of vehicles at low cost and increasing the probability of finding a free parking space. Our system achieves better performance compared with other parking systems. We evaluated the performance of our system through simulation and implementation. The results of the simulation are close to our mathematical models and achieve better performance than the other systems. The proposed system reduces the number of vehicles failing to find a parking space and minimizes the costs of moving to the car park. The cost defined here is the time that the user must wait for the service, thus helping users save time and money and reducing environmental pollution. We have also successfully implemented our system in a university parking system.

III. PROPOSED ARHITECTURE

The main aim of this project is to develop a system that helps users automatically find a free parking space at the least cost by considering the distance and total number of free slots available in each parking area. The idea is to create an automated parking system based on QR code to minimize the problem of parking and least cost effective.

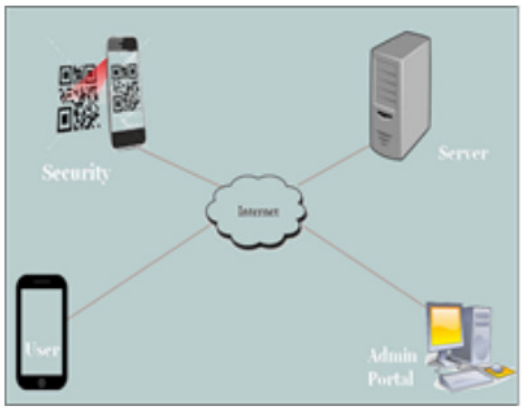

Fig.1: Proposed Architecture

A. QR CODE

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 components typically 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.

Fig.2: QR CODE

IV. CONCLUSIONS

This study has proposed a parking system that improves performance by reducing the number of users that fail to find a parking space and minimizes the costs of moving to the parking space. Our proposed architecture and system has been successfully simulated and implemented. The result will give the bright idea to implement on large scale. This reduces average waiting time and cost of parking system. In our future study, we will consider the security aspects of our system as well as implement our proposed system in large scales in the real world.

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