

Smart Parking System Using IOT

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(Guide)

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Abstract: As we know, now-a-days population has increased; it also caused to increase numbers of Vehicle. So, more spaces are required to park our Vehicle. Since the parking spaces is less and not systematic so parking is a huge problem. So, to overcome the parking problem we are introducing a new parking system called Smart Parking System using IOT. This System gives us efficiency to find vacant slots to park a vehicle in parking area. A user can see the parking slot is available or not using any web application. In short, this system helps us to save our time to find vacant place to park our vehicle. The proposed system is made up of a less human dependent interaction. It helps user to find a parking slot using a short distance algorithm. In our project we use EM 18 module to sense RFID reader, RFID reader to know the status of our parking system. i.e. which car is on which place in parking slot. This system also proposed e-wallet method. We will get to know all these features in brief in our project in detail.

Index Terms: Automated Parking, Web application, Multi-Level Parking, E-Wallet System.

I. INTRODUCTION

The Smart Parking System is a system that replaces the current manual parking management that is time and energy consuming. This manual system does not even guarantee for empty parking slot even after so much amount of time is consumed. The context diagram in figure illustrates the external entities and the system interfaces. The system is expected to evolve over several releases. In today's developed world man is living a comfortable life. As this development is a boon for humans at the same time, sometime it can create problems. The number of vehicles that has been used in daily life has increased drastically as it provides a great comfort to individuals but at the same time the common problem faced by everyone is the parking issues. Parking is a major problem faced which in turn results in the wastage of a big amount of time. Today car parking is present inside the premises i.e. inside buildings. Even after all the development and progress achieved still manual parking management is seen. Vehicle parking facility in various cities has become a huge problem. There is lack of proper free spaces for parking due to increased unplanned housings, buildings in many places. There has been increase in the number of vehicles, but without sufficient spaces for parking. Such growing number of vehicles have created problem of parking in the city including the increase in traffic jam. To improve all these, there is a need to well systemized parking spaces. Hence, we have constructed a Web Application which helps every customer to provide efficient car parking system. By using this application, we can get parking details from anywhere and anytime. Our system also has E-wallet method which helps people to save his time to do payment by standing in a queue

II. RELATED WORK

EXISTING SYSTEM:

(A) Automatic Smart Parking System Using IOT

This system uses raspberry pi 2 for parking slot status. On the street lamp or on the roof top, the raspberry pi camera will be installed, which will click the images. Then it would send those images to the centralized server. Pi-camera is used to capture the picture of parking area continuously to validate the slots which either filled or empty [1].

(B) IOT based Smart Parking System using RFID & IR Sensors

IR sensors are responsible to detect if a particular slot contains bike or not [2]. Vehicle identification is done with the help of RFID tags [2]. RFID readers are present on the parking area which captures the RFID information of each user [2]. Before generating the parking bill, IR sensors and RFID tags work together to know which vehicle is being parked and depending on the time and the amount the corresponding bill is generated [2]

(C) IOT based Smart Parking System

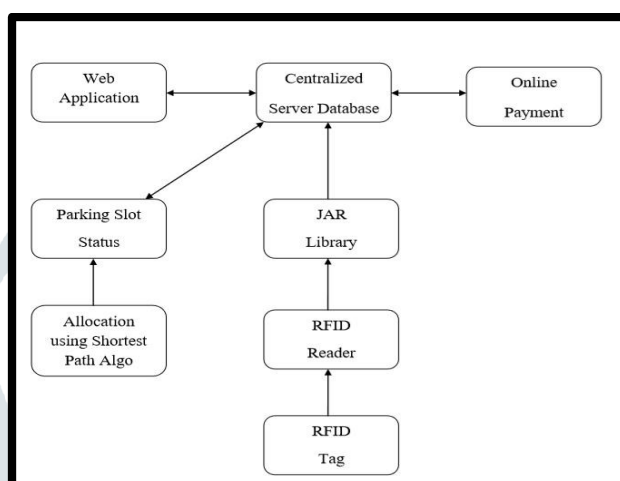
For this system, they have made use of sensors like Infrared, Passive Infrared (PIR) and Ultrasonic Sensors [3]. The work of these sensors is the same i.e. to sense the parking area and determine whether a parking lot is vacant or not [3].

Disadvantages of existing systems:

1. Using of raspberry pi cam can turn out to be costly. And checking, repairing and replacing of cam on a daily basis will be hectic. Cams should be placed at such an angle that the whole parking lot is covered.
2. The use of sensors and checking the working of sensors wouldn't be much efficient as it will increases the work load.

III PROPOSED SYSTEM:

The Block diagram of the proposed system is shown in below figure. We will allot RFID Unique Tag to each employee. Employee will be able to enter in parking slot when RFID Card will be read. RFID Reader will be read the RFID Tag. JAR Library will be use as interface between the RFID Reader & Centralized Server Database.



3.1 Block Diagram:

Web Application: We will provide the web application through which user can register. By using this application, user can get parking details from anywhere and anytime. Visitor user parking slot will be given manually by the admin.

Online Payment: We will provide E-Wallet System which helps our user to save his time to do payment by standing in a queue

Centralized Server Database: It will be store all information about the user.

RFID Tag: We will allot RFID Unique Tag to each employee. Employee will be able to enter in parking slot when RFID Card will be read.

RFID Reader: RFID Reader will be read the RFID Tag. It verify the RFID Tag, if there is insufficient balance in the E-Wallet, it will not allow parking of the vehicle.

JAR Library: It will be use as interface between the RFID Reader & Centralized Server Database.

Parking Slot Status: User will able to see available slots in the parking area.

Allocation Method: In our Project we Use Dijkstra's Algorithm to find shortest path using matrix as shown in fig.3.1(a). Dijkstra's algorithm is very similar to Prim's algorithm for minimum spanning tree. Like Prim's MST, we generate a SPT (shortest path tree) with given source as root. We maintain two sets, one set contains vertices included in shortest path tree, and other set includes vertices not yet included in shortest path tree. At every step of the algorithm, we find a vertex which is in the other set (set of not yet included) and has minimum distance from source. Below are the detailed steps used in Dijkstra's algorithm to find the shortest path from a single source vertex to all other vertices in the given graph.

- Steps :
 1. Set all vertices distances = infinity except for the source vertex, set the source distance = 0.
 2. Push the source vertex in a min-priority queue in the form (distance, vertex), as the comparison in the min-priority queue will be according to vertices distances.
 3. Pop the vertex with the minimum distance from the priority queue (at first the popped vertex = source).
 4. Update the distances of the connected vertices to the popped vertex in case of "current vertex distance + edge weight < next vertex distance", then push the vertex with the new distance to the priority queue.
 5. If the popped vertex is visited before, just continue without using it.
 6. Apply the same algorithm again until the priority queue is empty.

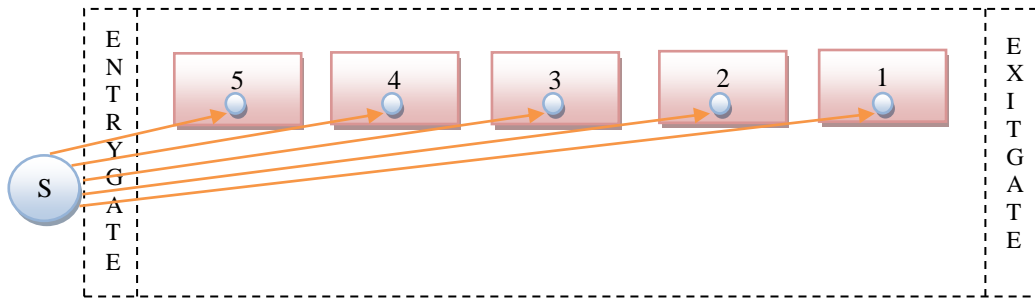


Fig.3.1 (a) Shortest Path Algorithm

3.2 Application Architecture:

The block diagram (Figure 4.1) contains following components:

- 1) Dispatcher Servlet: Dispatcher Servlet takes the user request and forwards it to the Handler Mapping and Handler Adapter.
- 2) Handler Mapping: Handler Mapping decides who will serve the request.
- 3) Handler adapter: Handler Adapter will decide what action should be taken to serve a request.
- 4) Controller: Controller acts as an intermediary between various components.
- 5) View Name: which component to show which search file and loads.
- 6) View Resolver: find the file from directory which we want to load and sends response back to the user
- 7) Service (Business Logic): It contains a Java code. It shows which data to be bring and store where in database
- 8) Repository (Data Access): It contains those classes who have access to database
- 9) Model: Model converts Table into Object transformed manner

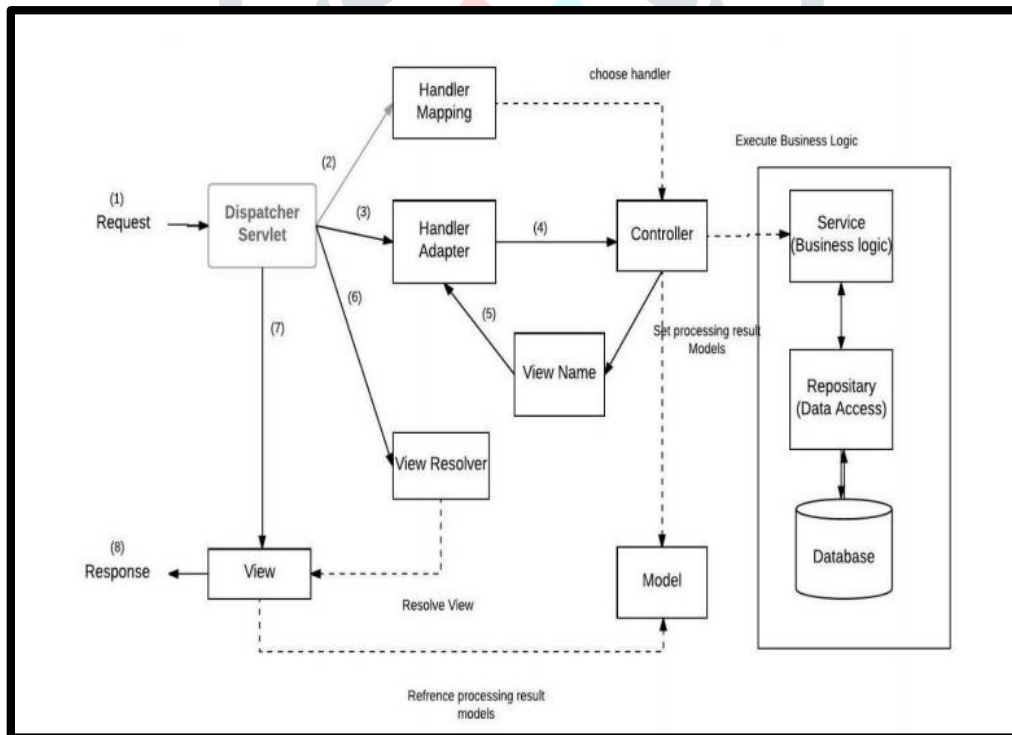


Figure 4.1 System block diagram of SPS

3.3 ADVANTAGES:

- Optimal utilization of space
- Low maintenance cost
- Low operational cost
- Low constructional cost
- Secure
- Environmental friendly
- Comfortable for the drivers

IV. SOFTWARE REQUIREMENTS:

Operating System: Windows 7/8/10

Technology: JAVA & J2EE,

Web-Technologies: HTML, JavaScript, CSS, PHP

IDE:-Eclipse Mars

Webserver-Tomcat 7.0

Database:-MySQL 5.6

RFID Reader EM18

Java Version:-JDK 7

V. RESULTS AND DISCUSSION:

Starting from the Web Application; Figure 5(a) shows the Login Page of the application where only authorized user and admin can access. Following figure shows the pages after logged in by the admin and by the user.

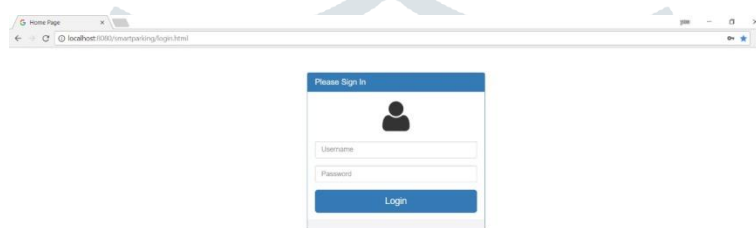


Fig. 5(a) Login Page

Fig. 5(b) shows the Admin side page after logging in an application. It further contains four options. In User, admin can create user name and password for user. Using which a user can get log in access in a web application. Second Tag RFID, in this admin can assign a unique RFID reader to user's every vehicle. Third is Visitor, in this if any visitor enters into the parking area admin can update his data in his records/database. And fourth is Update balance, in this if any user want to update his wallet, admin has authority to do that.

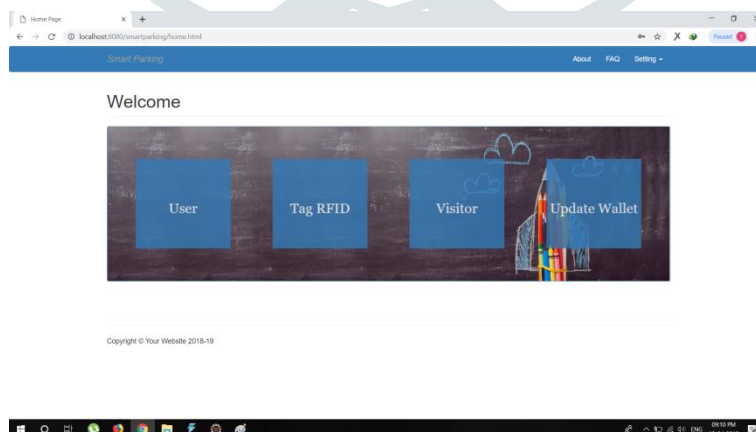


Fig. 5(b) Admin Side Page

Above Figure 5(c), shows the user side page after logged in successfully into the web application. This page further contains four features. First is Add vehicle, here user can add his all vehicle details. Second is View balance, here user can see the amount available in his wallet. Third is Vehicle details, here user can see if parking space is available or not for or his/her vehicle. And Fourth is view parked, here user can see his previous parking history.

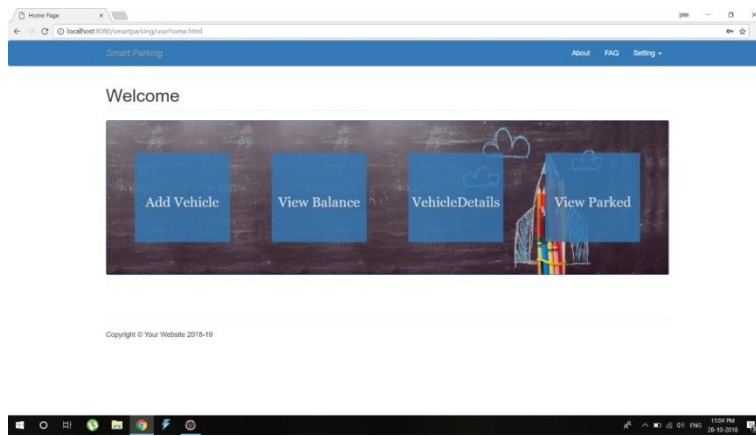


Fig. 5(c) User Side Page

Above Figure 5(d) shows the Display Screen shows the details of last five vehicles with their parking slot. And as a new RFID reader gets read it will show the vehicle number and parking slot assigned for that vehicle. A display screen will get updated in every 4ms.

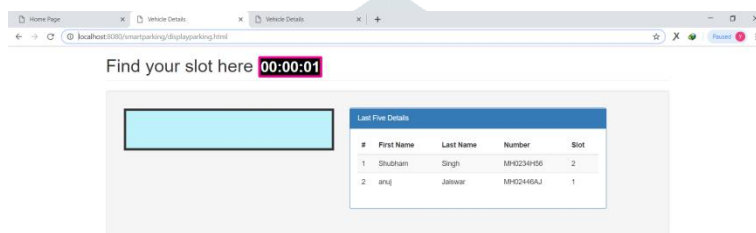


Fig. 5(d) Display Parking

Above Figure 5(e) shows the exit screen i.e. details of vehicles leaving parking area with the calculated money as per the time vehicle available in parking area. And that calculated money will automatically get deducted from user's e-wallet. If user doesn't have sufficient balances in his e-wallet he will get notify on exit screen and have to pay manually. If a visitor's vehicle is leaving a parking area he has to pay bill manually only.

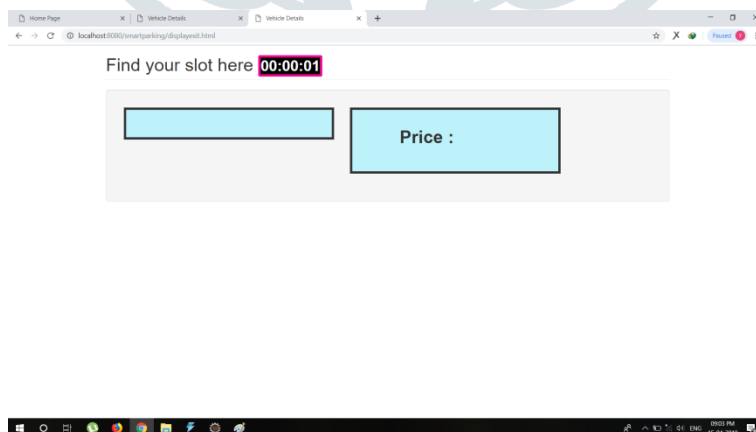


Fig. 5(e) Exit Screen

VI. CONCLUSION & FUTURE SCOPE:

Thus, we propose to develop a web application that would provide a advanced and developed platform to users regarding everything related to parking of vehicles. The proposed parking management system takes into account all possible attributes that is expected from it. The vacant car parking slots are given by as per priority based. The main contribution of study is to introduce the most significant parking problem that is finding vacant space & smallest path to reach that vacant space. It helps to give the proper management of parking. It reduces instances of single car improperly parking across two spaces. Parking detection system would decrease searching time for vacant slots. It is important to have an effective vacant parking slot tracking system to display vacant parking available at each row of parking slot and guide car driver to there. And therefore it reduces the effort of the driver to find vacant slot and also time to reach that vacant parking slot. We ensure that the database updates are carried at regular interval of time.

The web application can further be taken to Android and IOS platforms. Another thing that can be done is the use of IoT, that is using IOT entire parking can be done without a driver. Further big companies can replace the RFID by Sensors to provide a further convenient parking system or to achieve more advancement in the parking system.

VII. REFERENCES:

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