Semi-Automated Vehicle Parking System based on Web Application

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Abstract - *The Semi-automated car/bike parking system has been designed in such a way that it could reduce/minimize the work of a human being. Many things which a human being does, is now done by a machine which is semi-automated, as most of the burden is reduced from the people, who are being employed at the parking area. Only few things are taken care of by the people employed at the parking area (Jian Yu Chen, 2018). They keep a record of the vehicles which takes entry and exit in the parking area. But these records are being recorded in the GUI based standalone system. Therefore only few works is done by the person employed at the parking area. The person only collects revenue which is given at the exit of the vehicle from the parking system. There is less confusion created by this semi-automated standalone system. The data provided by the client is kept private with the entire authentication required. Therefore, this semi-automated vehicle parking software makes things easier for the human being working and a person parking their vehicle in the parking system.*

Key Words: **semi-automated; authentication**

1. INTRODUCTION

A Semi-automated parking system is made to reduce the workload of a person being employed at the parking area and to use the parking area in a very intelligent way, in order to reduce any accident, if people themselves will park their vehicles. A Semi-automated car/bike parking system makes available parking for cars/bikes on different positions packed vertically to intelligently use the parking areas, in place of the driver so that w could try to reduce the area which is wasted in a large building parking garage.

1. Fully-automated car parking system: A car/bike parking system in which, the vehicle is parked at the entry of the parking system. Then the vehicle is said to be empty i.e., all the passengers and the driver come out of the vehicle (Shidan Ma, 2017). As soon as the vehicle is empty, the hydraulic system takes the dimensions of the vehicle. While all this happening, the driver goes to the automated machine, in which the driver enters the vehicle number, and after this, he receives a coupon card. After all the dimensions are taken of the vehicle, the vehicle is carried above to the desired parking space, according to the dimensions taken by the hydraulic system. The main advantage of this fully automated vehicle parking system is that, there is no need of the attendant or any employee at the software, from which the coupon code is generated.

All of the work is done automatically without any other help of the Attendant (Jian Yu Chen, 2018). Now when the driver would need the vehicle back, he would use the coupon code which he got at the entry time and would insert the same coupon inside the automated machine. As soon as the coupon is inserted, all the details are displayed of the vehicle on the machine, which includes the vehicle number, the entry time of the vehicle number, and the total revenue at the time of the exit. When the driver will insert the cost inside the machine, the hydraulic system would automatically place the vehicle from the parking lot at the exit of the parking area.

2. Semi-automated car parking system: In this type of vehicle parking software, the owner of the vehicle leaves the vehicle at the entry of the parking lot, and the vehicle is taken in exactly the same way as in the fully automated parking system to the parking area, according to the dimensions taken. But the main difference here arises when, the driver go to take the coupon code. Because the coupon code is given by an attendant who is employed in the parking lot. (en wikipedia.org) The attendant will enter all the details of the driver in the standalone application and will provide the coupon code to the driver. When the driver comes back to retrieve the vehicle, he will give back the coupon code to the attendant, the all the details are visible on the screen of the monitor, with the total revenue calculated. Then the driver receives the vehicle after payment of the parking time of the vehicle in the parking lot.

1.1 Purpose:

The purpose of this paper is to figure out what is going on in the industry, in terms of automated vehicle parking system and what are the challenges that are or could be faced in the development or working phase of the standalone application**.** For the process of automated vehicle parking system, many techniques were practiced. As in the current scenario, urban population has increased; we also have increased number of vehicles which every family of the population emerges with. With the increased number of vehicles in the country, there emerges a problem where we need to park the vehicles, without any hassles created or any accident. For this purpose, intelligent automated vehicle parking systems came into picture.

With the help of these intelligent automated systems, all the vehicles are parked in the desired area, without any

accident. (Jian Yu Chen, 2018)With these systems, the vehicles are parked safely and quickly. Intelligent Parking areas are main innovative trend of the research institutions.

The main research challenges of automated vehicle parking model are as follows:

(1) *Target Area*: Minimize the cost of the revenue for the valid time consumed by the client.

(2) *Computational cost*: The heavy computational cost associated with mobile networks.

(3) *Development*: The problem may include decomposing and distributing the processing elements, and then assembling solutions.

2. PROPOSED METHODOLOGIES

The general approach to automate a manual system is to make the system flexible enough to accommodate future changes in the environment. The methodology should also be incremental progress in this case. Starting with whatever maximum understanding can be gained over a fixed period of time, we start developing the system. The very essence of the process is splitting the system at hand into manageable, fairly understandable and sufficiently complete modules.

Bearing this fact in mind, the system was divided into fairly comprehensive and distinct modules, as follows:
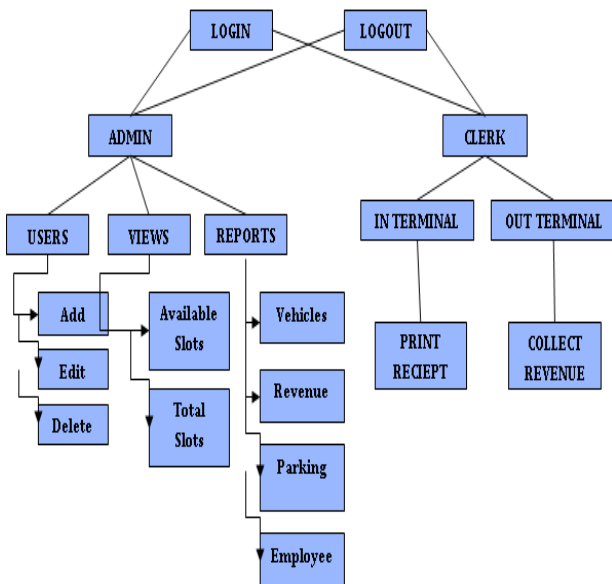

Fig 1: System Architecture

While carrying out the development of this project, we implemented the WATERFALL MODEL for software development life cycle.(W3 Schools) It was chosen because of the following reasons:

- ✓ It is optimal for use in small projects with pre-defined requirements.

- ✓ It has a streamlined and linear approach to development which can help in the project being carried out effectively in the time available.

- ✓ It is simple and easy to follow.

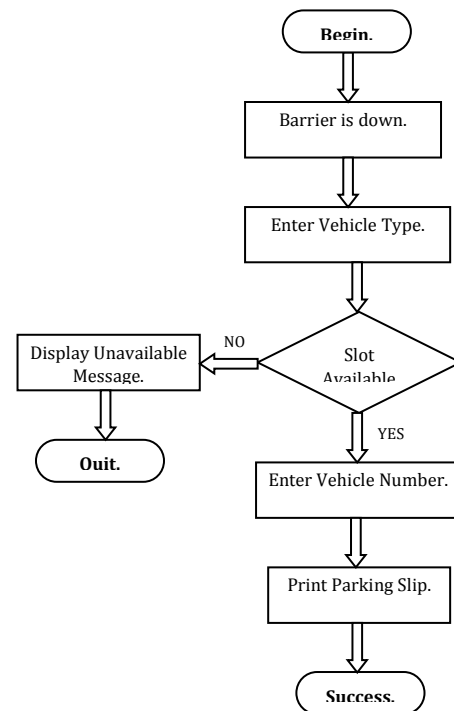- ✓ It is relatively cost-saving on inexpensive as compared to other SDLC models.

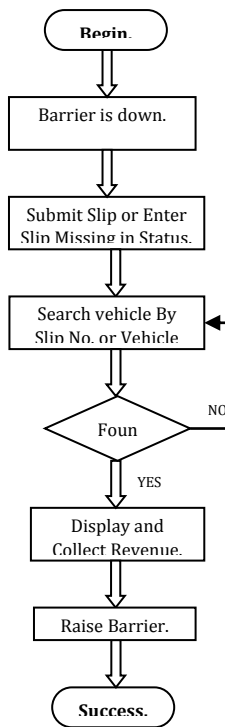

Fig 2: In Terminal-New Vehicle Entry

Fig 3: Out Terminal-Vehicle Exit
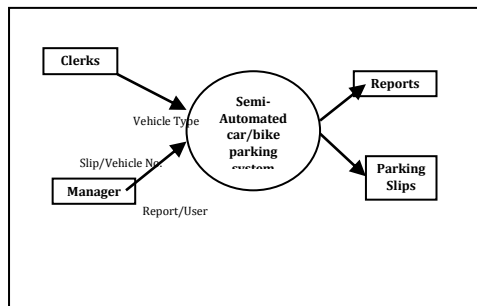
3. DATA FLOW DIAGRAMS
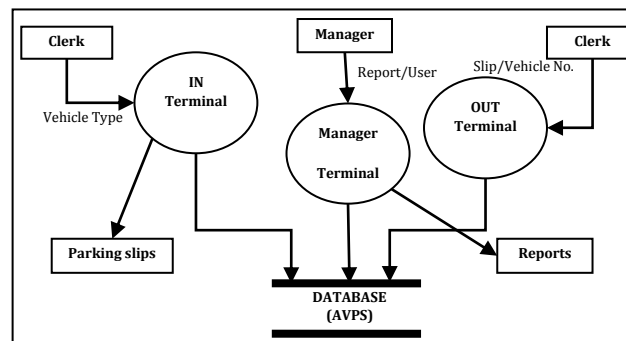

Fig 1: 0-Level DFD Diagram

Fig 2: 1-Level DFD Diagram

4. PROPOSED SYSTEM

[1] According to the earlier survey, it has been concluded that, for the purpose of the development of the Semi-automated vehicle parking systems,

In our Current available automotive system, in which the employee is working in the semi-automated parking system, the employee gives the receipt generated from the system to the client at the end of the whole process.

(DATA MINING APPROACH AND DDOS ATTACKS, M ARVINDHAN)

[2] Suppose the Parking Lot has only 50 parking slots for the vehicle to be parked.

[3] Therefore, if a new client enters the parking lot (which is the 51st vehicle), then there would be no space available for the vehicle to be parked.

[4] In our proposed model, the employed attendant working in the semi-automated parking system will enable the software to send a message to the client owning the 1st vehicle which has been parked in the parking lot. If the client owning the 1st vehicle removes the vehicle from the parking lot, then there will be space for the new client to park their vehicles.

5. SYSTEM OVERVIEW

We can see in Fig [1], that this model has different stages of working. These stages are in the form of steps as follows:

[1] Login Page: in this stage, the clerk or admin could login into the system for the further processing.

[2] Entry Terminal: in this stage, the clerk would enter the details of the vehicle into the software and a receipt is generated from the software, which is given to client.

[3] Exit Terminal: in this step, the client would receive the vehicle when the receipt generated is given back to the clerk, then the client has to pay the revenue for the time consumed by the vehicle the parking slot.

[4] Admin: This could handle all the operations, i.e., could add or remove the client password setting for the client, etc.

6. LITERATURE OVERVIEW

The following contains the name, author names, merits and demerits of the all the recent published papers in the field of pose estimation.

(a) A Research Paper on Automotive parking systems based on parking Scene recognition (2017) By- Shidian Ma, Haobin Jiang, Mu Han, Ju Xie, and Chenxu L. Provides following merits and demerits:

Merits: Research on automatic parking systems based on ultrasonic sensors was developed.

Demerits: Only the sensors with less power technology were found.

(b) A research paper on Visual methods so that we can detect available parking slots in (2018) By- Jian-Yu Chen, Chih-Ming Hsu*. Provides following merits and demerits:

Merits: Automatic parking systems designate target positions using a free space-based approach that involves the use of ultrasonic sensors.

Demerits: Ultrasonic sensors are not flexible to implement.

7. EXPERIMENTAL VALUE

Process of Vehicle at the Entry of the Parking Lot.

[1] The hydraulic system takes the vehicle to the Parking area, according to dimensions of the Vehicle taken.

[2] The hydraulic system or crane puts the vehicle in Place safely.

[3]This process is finished and the hydraulic crane Returns to the initial position and waits for the next Command given by the employed attendant.

Process of Vehicle being removed from the parking area, which has being parked earlier.

[1] The hydraulic crane moves to the parking area in order to reach the vehicle and lifts the vehicle.

[2] The vehicle is taken out of the parking lot and is taken to the ground floor.

[3] After the crane reaches the exit position, it will wait till the vehicle is driven out of the exit position by the driver.

[4] The hydraulic system or crane returns to its initial position and the process is completed.
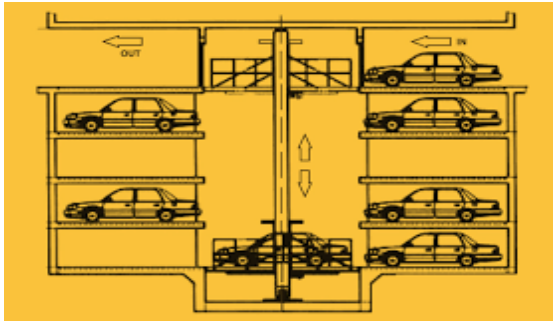
Fig 4: Hydraulic System Working

8. CONCLUSION

The Semi-automated vehicle parking system was built on the idea of minimizing the area or space of vehicles in the parking lots. The overall goal has been achieved by studying mechanical design, system integration, (Shidian Ma, 2017) and sensors. In accordance with the mechanical parts, more floor level and slots could be added in the Semi-automated parking system.

9. FUTURE WORK

This standalone application created based on GUI could be implemented and can be used in various situations where needed and can reduce the workload of a human being.

[1] Extensibility

The standalone application created is extensible in many ways, which we have not realized at the time of creating this software. The principles which can increase the extensibility such as analysis of data structure, distinguish public and private operations, and further additions like including more terminals, enhancing vehicle types, linkage with other software applications like CRM, Payroll etc.

[2] Reusability

We can update the software when required. Software's which are reusable are easier to understand as they could reduce further coding and designing of new software. Only we are eligible to add new features if we want to add in our different-different new softwares.

[3] Effective-on-Cost Reduction

This standalone application is created so that on minimum requirements, we can manage intelligent parking areas and could give maximum output (M Arvindhan, 2019). This software is built on minimum cost and utilizes fewer resources as compared to other software created.

[4] Understandability

Software is best understandable, if it could be understood by other people also. If a code is understandable and design could be decoded by other people, then that software is easier to carry forward with.

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