A Project Report

on

CLOUD BASED CAR PARKING SYSTEM

Submitted in partial fulfillment of the
requirement for the award of the degree of

Bachelor of Technology in Computer Science and Engineering

Under The Supervision of
Mr. G. Nagarajan
Assistant Professor

Submitted By

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CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the project, entitled **"Cloud Based Car Parking System"** in partial fulfillment of the requirements for the award of the **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING** submitted in the **School of Computing Science and Engineering** of Galgotias University, Greater Noida, is an original work carried out during the period of **July, 2021 to December, 2021**, under the supervision of **Mr. G. Nagarajan, Assistant Professor, Department of Computer Science and Engineering** of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the project has not been submitted by me/us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Supervisor

(Mr. G. Nagarajan, Assistant Professor)

CERTIFICATE

The Project Viva-Voce examination of **Utkarsh Gupta – 19SCSE1010761, Vinayak Gupta-19SCSE1010261** has been held on _____ and his/her work is recommended for the award of **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING.**

Signature of Examiner(s)   **Signature of Supervisor(s)**

Signature of Project Coordinator   **Signature of Dean**

Date: December, 2021

Place: Greater Noida

ABSTRACT

The aim of this project is to develop an intelligent parking system to reduce hiring people's costs and maximize the use of car park owners ' resources. The popular method of finding a parking space is currently manual where drivers typically find a place through luck and experience in the street. This method takes time and energy, which if the driver drives in a city with traffic density, can lead to the worst case of failure and to any parking space.

Therefore, through cloud-based slot allocation a smart car parking system is implemented with slot booking operation. The user can book any of the available slot in the webpage. This system takes away the unpredictability of finding a parking slot. This project focuses on reducing time wasted on finding parking space nearby and ongoing through the filled parking slots.

The end user is provided with a webpage to check the available parking slots. Inside a smart city a smart car parking system is a much needed to save time, fuel and even the environment from pollution. This project addresses the most prominent problem of cloud, i.e security using JWT as well as hashing the passwords to increase security. The project would be based on the MERN stack for it's development. React.js would be coupled with bootstrap to provide for the front-end and Node.js paired with Express.js would handle the backend part of the project. The deployment of the project would be handled using cloud services.

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Acronyms

CSP	Cloud Service Provider
ITS	Intelligent Transport Systems
OCR	Optical Code Recognition
LCD	Liquid Crystal Display
JS	Java Script
IOT	Internet of Things

CHAPTER-1

Introduction

The Current Era of Car Parking

The industrialization of the world, increase in population, slow paced city development and mismanagement of the available parking space has resulted in parking related problems. There is a dire need for a secure, intelligent, efficient and reliable system which can be used for searching the unoccupied parking facility, guidance towards the parking facility, negotiation of the parking fee, along with the proper management of the parking facility. Intelligent Parking Service is a part of Intelligent Transportation Systems (ITS). This paper reviews different Intelligent Parking Services used for parking guidance, parking facility management and gives an insight into the economic analysis of such projects. The discussed systems will be able to reduce the problems which are arising due to unavailability of a reliable, efficient, and modern parking system, while the economic analysis technique will help in analyzing the projects' feasibility.

Features

- Easy To use

- No wastage of time

- Simple interface multiple payments options

- Its responsive so it will work on mobile also no need of separate website for mobile

- Fully secure no data leaks

- 24*7 availability

Some Technologies used in this project are

- React JS
It is used for the frontend part

- Node JS
It is used for the backend part

- Express JS
It is a framework for Nodejs

- MongoDB
It is a no SQL database used for storing the data

- AWS or GCP for deployment of website

- JWT (JSON web Tokens)
It is used to increase the security of users, so all the information stored remain saf

CHAPTER-2

Literature Review

Smart Parking System
The main issues pertaining car parking as the control of movement of cars inside the bay, refusal of entry, monitoring of cars at entry/exit points and detection of available parking spots. The researchers used a method of deploying a microcontroller to control the gates using Infrared sensors and stepper motors and monitor the parking spaces available with setting a limitation of refusal to entry by a using a display 16x2 Liquid Crystal Display (LCD). Generated results showed that this method achieved stoppage of unwanted entry if there were no parking spots empty and saving costs.

Smart Parking System with Image Processing
The method implied initially captures the image and then does grayscale conversion and further filters it. The contours of the filtered image are sent to Tesseract OCR to extract the numbers and characters. The idea is based on open sourced OpenCV and Tesseract OCR, which has its own library and trained sets for matching. Raspberry Pi and PS3 camera were used for implementing Python script. The findings were that when the camera is further than 2ft from the number plate, the accuracy goes to 98% from 100%. Camera pixels of less than 640x480 caused issues in the accuracy.

CHAPTER-3

Functionality/Working of Project

Elements in the system:

Cloud-Based Server: This is a Web entity that stores the resource information provided by local units located at each car park. The system allows a driver to search and find information on parking spaces from each car park without the need to directly access the local server node by directly accessing the cloud-based server.

Local Unit: This unit is located in each car park and stores the information of each parking space. The local unit includes the following:

Control Unit: This is an Arduino module, which is connected using an RFID reader. The card reader authenticates the user information and then displays this information on the screen. If the information of the RFID tag or card is correct, the Arduino module will control the opening of the door for the vehicle to enter. The Arduino module connects with the cloud server through an Internet connection to transfer data from the local car park to the cloud server database.

Screen: This displays information on the capacity of the local car park, the total current percentage of free spaces, the status of the RFID tag check, the user card when entering, and a mini map of the local car park.
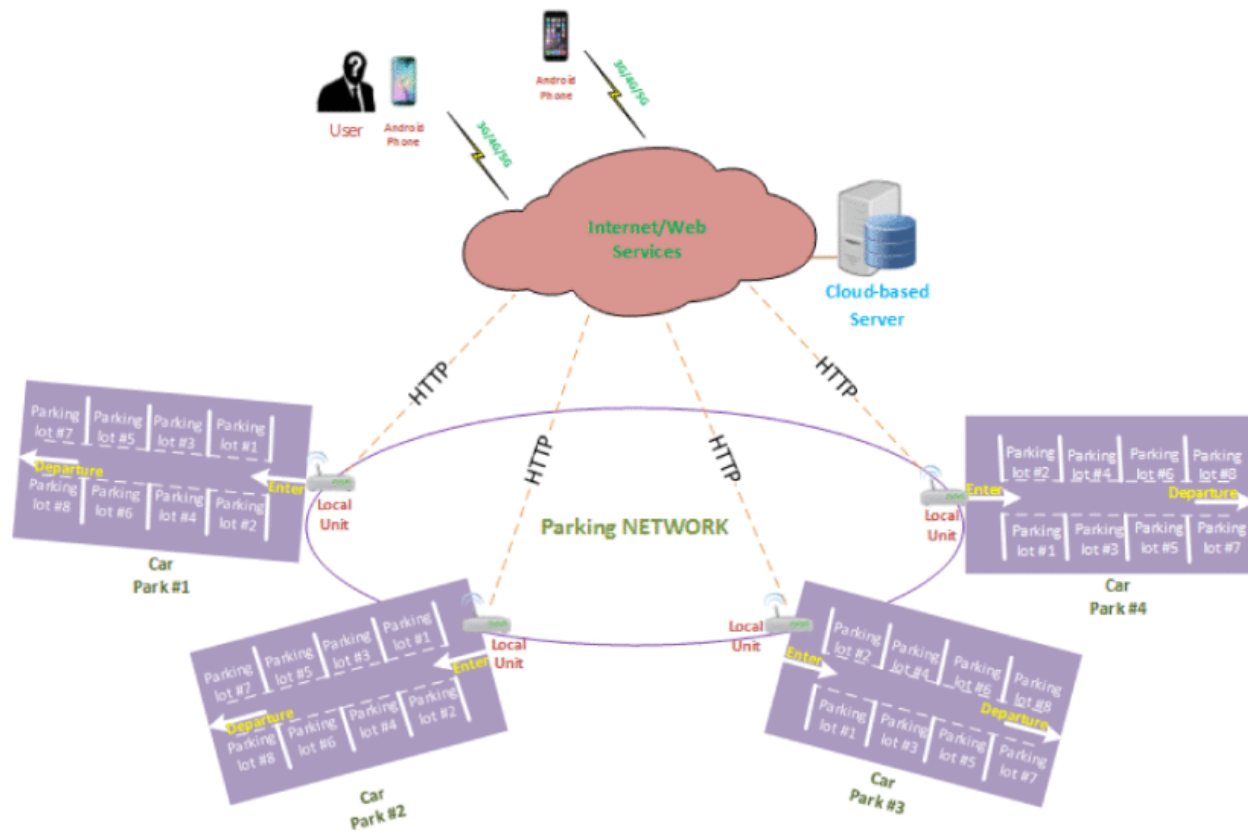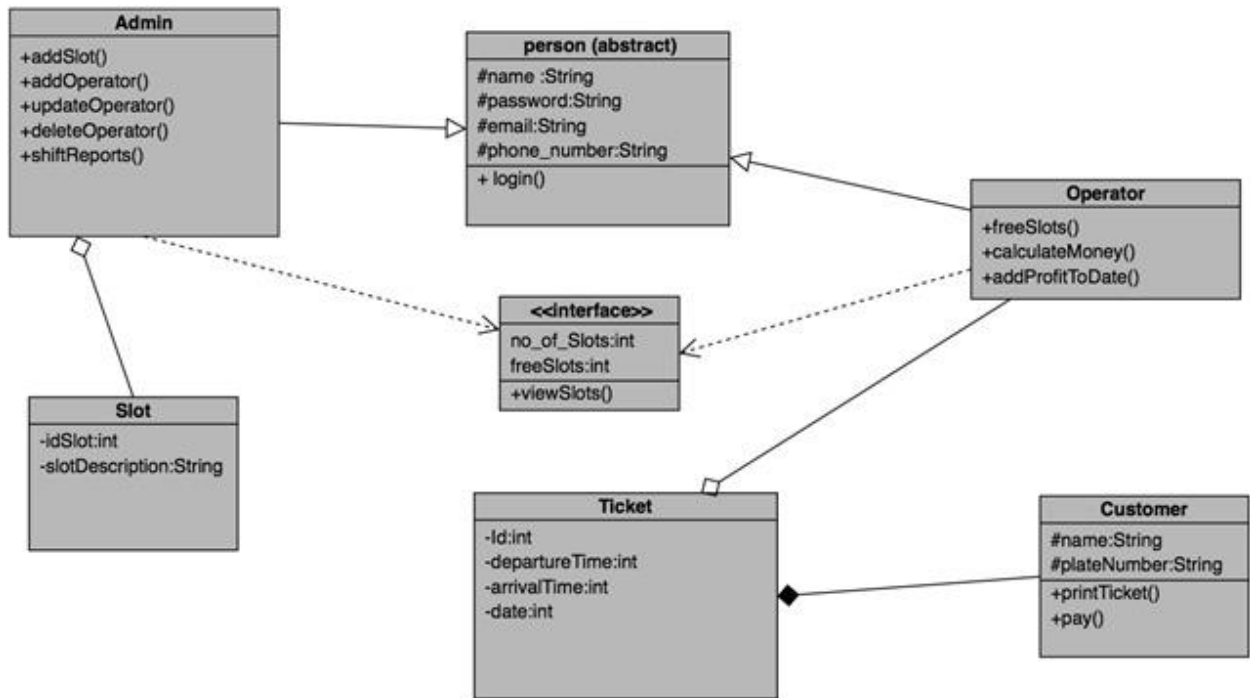
Figure 1

Figure 2

CHAPTER-4

Results and Discussion

To develop a smart parking system that can detect vehicle occupancy and management of parking slots. In order to solve the aforementioned problems, the Smart Parking system proposed in this project can assist users in two aspects. Upon arriving at university's main gate, drivers (staff, students or visitors) will be provided with information on numbers of available parking slots. This information will be displayed at the LCD screen near the main gate. For convenient purposes, this information can also be accessed through their mobile apps (for students and staff only). In addition, once drivers reach the parking compound, there is also an on-spot display at the parking area

BENEFITS OF THIS PROJECT

- **Enhanced Parking**

  This enables drivers to quickly find the best spot available which will save time, resource, and effort. The parking space would be utilized efficiently. Various factors such as size of vehicle, weight, etc. are also considered while allotting the spot.

- **Reduced Congestion**

  Traffic flow around the parking lot will increase as overcrowding of vehicles will decrease.

- **Enhanced User Experience**

  Parking management solution will expand and enhance the experience for a user by giving them a unified procedure. Driver's payment, spot identification, space search and time notification all become convenient.

- **Improved Safety**

  Safety and security can be achieved easily by smart parking. Data can be provided to parking lot employees for better management and lookout for violations and suspicious activities.

CHAPTER-5

Conclusion

We have 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 have been successfully simulated and implemented in a real situation. The results show that our algorithm significantly reduces the average waiting time of users for parking. Our results closely agree with those of our proposed mathematical models. The simulation of our system achieved the optimal solution when most of the vehicles successfully found a free parking space. The average waiting time of each car park for service becomes minimal, and the total time of each vehicle in each car park is reduced. 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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