***Project Phase II Report***

***On***

Parking Space Counter

**Submitted for the requirement of**

**Project course**

BACHELOR OF ENGINEERING

**COMPUTER SCIENCE & ENGINEERING**



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**ABSTRACT**

The parking space counter undertaken as a project is based on relevant technologies. The main aim of this project is to develop software for Parking Space Counter. This project has been developed to carry out the processes easily and quickly, which is not possible with the manuals systems, which are overcome by this software. This project is developed using OpenCv with Python.

The project analyzes the system requirements and then comes up with the requirements specifications. It studies other related systems and then come up with system specifications. The system is then designed in accordance with specifications to satisfy the requirements.

Parking Space Counter find how many total cars are present and how many spaces are vacant to park. In this project, we will be using basic Image Processing techniques to solve this problem.

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**Introduction:**

The analogy is when driver entered certain parking lot, the first thing that the driver do is looking forward of some sign to telling that the parking lot is fully occupied, partly occupied -or vacant. The driver also do not know how many are there and where to find a parking -division for his/her car. Some of parking divisions may -' remain unoccupied even the total occupancy is high. This will causing ineffective use of parking divisions as well as traffics jams around the entrance of parking lot.

Therefore, by offering drivers with relevant information on the parking lot during entering a parking lot becomes an important issue. The proposed system called as Counting Available Parking Space using Image Processing. This system proposes a method of detecting the existence of parked vehicles by processing the image of the parking lot taken by a surveillance camera and then counting the available parking space which is display in front of entrance of parking lot. The system employ images, since all area in the parking lot can be observed with relatively few camera.

Other than that, the system is compact and the cost is not is not expensive. The image of a parking lot is taken by a surveillance camera set at some height in the parking lot

To alleviate the aforementioned problems, the smart parking system has been developed. With the implementation of the smart parking system, patrons can easily locate and secure a vacant parking space at any car park deemed convenient to them.

The current transportation infrastructure and car park facilities are deemed insufficient in sustaining the influx of vehicles on the road. Therefore, problems such as traffic congestion and insufficient parking space inevitably crops up.

With the information provided, drivers are able to avoid car park that are fully occupied and locate vacant parking spaces with ease elsewhere. The number of vehicles parked illegally by the roadside which leads to traffic congestion is also reduced as it is absorbed into the car parks .Most importantly, traffic congestion can be reduced. All this would eventually lead to convenience for the patrons.

**Literature Review:**

**Tobing, Aldo. (2021). EVALUATION OF PARKING SPACES AT THE CLEANERS. CERUCUK.**

Sudimampir market is a complete shopping center in the city of Banjarmasin. Along with its running time, the market sudimampir into a crowded shopping mall visited by people of Banjarmasin and its surroundings for a complete and cost. Most visitors come the shop sudimampir market with a wholesale count.This research[1] was conducted for analyzing the characteristics of the vehicle parked at the location of the study include: accumulation of parking, the average duration of parking, parking volume, the total number of its full vehicle parking ,and right parking corner. Data collection was performed manually during holidays. Based on the survey results, in getting Parking Penatu is often not operating optimally by not using the appropriate SRP SNI and still perform manual calculations in the counter. Performance Laundry Parking can run optimally if SRP SNI and using the angle of 30 °. So it can produce 67 pieces SRP and able to accept 313 units wheeled vehicles 4. With so, parking can operate properly by its function, namely as a parking area in the city center.

**Sig langegger Park Space (2017)**

In Chapter 8, I compare and contrast the design and regulation of four North Denver Parks: Saint Patrick’s Park (a community designed and constructed park), La Raza Park (once the cultural center of North Denver, now a monumental space), a section of Berkeley Park (a soccer field reconfigured as an off-leash dog park), and Sloan’s Lake Park’s internal road system (changed to a pedestrian/bike path)[2]. I suggest that, working at a variety of geographical scales and along parallel temporal arcs, official and unofficial changes to the design and regulation of these parks fossilized ethnic biases into general acceptance, into new modes and means of belonging, and thereby contributed in incremental and cumulative ways to the gentrification of Highland.. Langegger, Sig. (2017). Park Space. 10.1007/978-3-319-41177-4\_8. In Chapter 8, I compare and contrast the design and regulation of four North Denver Parks: Saint Patrick’s Park (a community designed and constructed park), La Raza Park (once the cultural center of North Denver, now a monumental space), a section of Berkeley Park (a soccer field reconfigured as an off-leash dog park), and Sloan’s Lake Park’s internal road system (changed to a pedestrian/bike path). I suggest that, working at a variety of geographical scales and along parallel temporal arcs, official and unofficial changes to the design and regulation of these parks fossilized ethnic biases into general acceptance, into new modes and means of belonging, and thereby contributed in incremental and cumulative ways to the gentrification of Highland.

**Demand forecast for parking spaces and parking areas in Olomouc**

The study[3] focuses on the issue of parking in Olomouc and in two localities of this city: the Foerstrova and Hodolany areas. In the first part of the manuscript, general data, approaches, and methods regarding the process of designing parking areas as well as the demand forecasting for parking spaces, when explaining the principles of regression analysis itself, are presented. The second part of the article, which represents a crucial section of the conducted research study, discusses the very analysis of the parking situation and parking demand forecasting for both areas being investigated. As for major findings, an increasing trend related to the number of cars per 1,000 inhabitants in Olomouc can be observed. Furthermore, following the performed analyses and forecasts, it can be stated that there is a parking deficiency issue, which needs to be addressed in the future.

**Parking Space Recognition Method Based on Parking Space Feature Construction in the Scene of Autonomous Valet Parking by Shidian, ma & Fang, Weifeng & Jiang, Haobin & Han, Mu & Li, Chenxu. (2021).**

At present, the realization of autonomous valet parking (AVP) technology does not achieve information interaction between the parking spaces and vehicles, and accurate parking spaces information perception cannot be obtained when the accuracy of the search is not precise.[4] In addition, when using the camera vision to identify the parking spaces, traditional parking space features such as parking lines and parking angles recognition are susceptible to light and environment. Especially when the vehicle nearby partially occupies the parking space to be parked, it is not easy to determine whether it is a valid empty parking space. This paper proposes a parking space recognition method based on parking space features in the scene of AVP. By constructing the multi-dimensional features containing the parking space information, the cameras are used to extract features’ contour, locate features’ position and recognize features. In this paper, a new similarity calculation formula is proposed to recognize the stained features through template matching algorithm. According to the relative position relationship between the feature and parking space, the identification of effective empty parking spaces and their boundaries is realized. The experimental results show that compared with the recognition of traditional parking lines and parking angles, this method can identify effective empty parking spaces even when the light conditions are complex and the parking spaces are partially occupied by adjacent vehicles, which simplifies the recognition algorithm and improves the reliability of the parking spaces identification.

**Brozova, Helena & Ruzicka, Miroslav. (2020). THE PREDICTION OF PARKING SPACE AVAILABILITY.**

Intelligent Parking Systems (IPS) [5] allow customers to select a car park according to their preferences, rapidly park their vehicle without searching for the available parking space (place) or even book their place in advance avoiding queues. IPS provides the possibility to reduce the wastage of fuel (energy) while finding a parking place and consequently reduce harmful emissions. Some systems interact with in-vehicle navigation systems and provide users with information in real-time such as free places available at a given parking lot (car park), the location and parking fees. Few of these systems, however, provide information on the forecasted utilisation at specific time. This paper describes results of a traffic survey carried out at the parking lot of supermarket and the proposal of the model predicting real-time parking space availability based on these surveyed data. The proposed model is formulated as the non-homogenous Markov chains that are used as a tool for the forecasting of parking space availability. The transition matrices are calculated for different time periods, which allow for and include different drivers’ behaviour and expectations. The proposed forecasting model is adequate for potential use by IPS with the support of different communication means such as the internet, navigation systems (GPS, Galileo etc.) and personal communication services (mobile-phones).

**Problem Definition:**

There are some reasons why Counting Available Parking Space using Image

Processing is developed. The problems that have been identified are

stated below:

i. Driver needs some relevant information before entering the parking lot such

as the current available parking spaces in the parking lot.

ii. There are current system used inparking lot but the method used is based on

the detection by installing a certain sensor on each division; the other is to

detect cars through images of the parking lot taken by surveillance cameras.

In the method with the sensor, the cost rises as the number of parking

divisions because a lot of sensors are required corresponding to each parking

divisions.

iii. Driver might be takes time to find available parking space in parking lot.

Imagine if the parking lot has many number of parking divisions and driver

will through all parking divisions just to find an available parking space.

**Objectives:**

Objectives of our project will be:

1. Monitoring car parking area

2. Provide information about the count of free parking spaces.

3. Reduce traffic in the parking area.

**References:**

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