

Intelligent traffic management in smart cities

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ABSTRACT

With the development of smart cities, and due to the increase in population and rise in number of vehicles mismanagement of parking is a common cause of concern among users as well as government. The current parking infrastructure is unable to provide sufficient and efficient parking to users, leading to users parking vehicles carelessly on roads. Therefore, there is a need to provide a parking facility to overcome the issue. Thanks to recent development in technology and the emergence of smart parking solutions, which will help to reduce parking problems. In this paper, we propose a G+4 parking facility at an existing bus depot, which will help to reduce parking problems in the nearby region. This parking facility will be integrated with the VersionX parking system, which will provide seamless parking service to users, resulting in a reduction in parking on roads. This Intelligent traffic management system

Keyword : - Intelligent Traffic Management , Intelligent parking System, Thane, Smart city

1.INTRODUCTION

Today, Governments of India are looking forward to developing efficient traffic management systems. Regardless of the extensive efforts devoted to developing and improving smart systems, traffic management is still a major problem in our smart cities. With the high percentage of vehicle ownership in the smart cities, problems with parking are an everyday occurrence. Inadequate information on parking availability and price will likely frustrate people, who are searching for parking spots, which they at times spend excessive time searching for a parking space. In this research paper, we are considering Parking Issue caused at Manpada and surrounding area. Manpada is a junction in Ghodbunder Road located in the northern region of Thane, Maharashtra.

2. LITERATURE REVIEW

As public and private sectors invest in city development, particularly in the high density and mixed- use central business districts, forecasting parking volumes for multiple facilities throughout urban transformation are critical to parking supply decision-making. Most previous studies have limitations that may yield inaccurate predictions and cannot precisely analyse the impact to area parking facilities, due to model simplicity and limited data accessibility. To provide accurate estimation with detailed information and account for technological improvements in data availability, this study provides an alternative method by utilizing an assignment model with a generalized cost approach. Smart parking system obtains information about available parking spaces process it and then places the car at a certain position. Parking demand prediction is an important

part of urban parking planning, and it is an important foundation for the development of parking facilities with future scenarios have great changes, traditional prediction methods will no longer apply. A multi-storey car parks have several unique features can be integrated with smart systems. For the design aspect, there are numerous configurations of multi-storey car parks featuring different arrangements

3. SURVEYING

We conducted a survey around Manpada Junction, to find out the number of 19 parking to be provided in the parking facility. This data will be then used to design the parking facility. The data we collected is tabulated the data

Table -1: vehicle density data

Types of vehicles	Number of vehicles
4 wheeler	65
3 wheeler	8
2 wheeler	60

The above tabulated data is the total number of vehicles parked on the main highway (Ghodbunder Road), Service Road and Tikuji ni wadi Road in the Manpada Region. While designing the parking facility we have considered the present requirement for parking and taking the future requirement into consideration. The number of vehicles is going to rise in the future and designing the structure for current need will again result in roadside parking. Therefore, we must provide more than current need to tackle the problem. We have used AutoCAD to design and STAADPRO to analyze the structure. The process followed while analyzing in STAADPRO are as follows 1. Graphical model generation utilities as well as text editor-based commands for creating the mathematical model. 2. Analysis engines for analyzing the structure 3. Design engines for code checking and optimization of steel and concrete members. Reinforcement calculations for concrete beams, columns, walls, and slabs. 4. Result viewing, result verification and report generation tools for examining displacement diagrams, bending moment and shear force diagrams, beam.

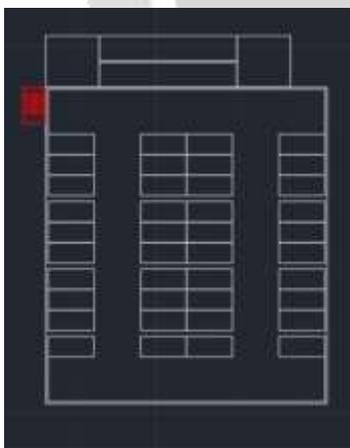


Fig -1 Plan of parking system

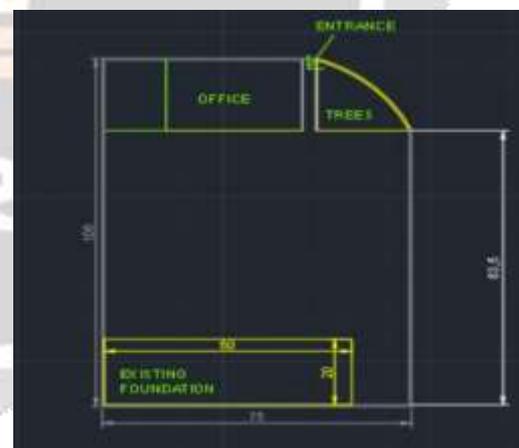


Fig -2 Site plan and its dimension

4. INTELLIGENT PARKING

Intelligent Parking is a parking strategy that combines technology and human innovation to use as few resources as possible—such as fuel, time, and space—to achieve faster, easier, and denser parking of vehicles for most of the time they remain idle. Intelligent parking is an important aspect of Intelligent Traffic Management, as providing parking will reduce roadside parking and intelligent parking system will provide an effortless process of parking. Together this will benefit the users as well as the society.

5. VersionX

The proposed Intelligent parking system is based on smart gate at the entrance and exit for the vehicles, auto identifying appropriate parking slots. This system digitizes the end-to-end management of parking spaces and all parking processes related to visitors, vehicles, & payments. This system is vided by VersionX. VersionX innovation pvt ltd is a company in Bangalore that provides software that are integrated smartly in various sectors. VersionX parking management system is an integrated smart parking system that automates end to end parking process.

Parts of VersionX

1. Access Control System
2. Boom Barriers
3. Turnstile- an automated gate
4. Speed Gate / Flap Barrier
5. Security Cameras

5.1 How does versionX technology works?

When a vehicle leaves the parking space, the sensors detect it and the number of available parking spaces and their location. Sensors also detect the time the vehicle enters and leaves the parking lot. By leveraging this technology, a parking management system tracks all information beforehand and presents it wherever needed such as in applications and LED screens.

5.2 Features of VersionX

1. Customize spaces: Customize & reserve parking space as per company, staff, pay-&-park, etc.
2. Slots per vehicle type: Allocate slots as per two-wheeler and four-wheeler vehicles to utilise all available space.
3. Views live reports: No more manual checking of empty space. View it on your phone. Also view live reports.
4. Auto generated passes: QR code-based passes are instantly auto-generated for a visitor.
5. On-spot or monthly pay: Parking passes generated can be on pay-&-park or a monthly pay basis. It is FASTag enabled.
6. Access control system: integrate parking passes with access control system - boom barriers, biometrics, etc.
7. Slots on led display: Display empty slot info such as floor and bay on LED screens in the parking bay.
8. Ensure periodic patrolling: Monitor security guards on duty and shift changes in the parking bay area.
9. Levy penalty for violation: Levy instant penalty tickets, if any person or vehicle is found guilty of any time or rule violation

5.3 Advantages of VersionX

1. Easy to Use: Manage the entire parking area using your handheld device. No training required.
2. Foolproof: It is based on cloud and mobile technology, and therefore reduces manual errors.
3. Accountability: Guards are made more accountable since the system cannot be tampered with.
4. No Clunky Hardware: The system requires minimal hardware for efficient functioning.
5. Customizable: Features can be quickly and easily added or tailored to specific needs.
6. Live Trends & Reports: Built-in statistical tools help you use the data captured for further decision making

5.4 . Cost of implementation of VersionX smart parking system.

The cost valuation for this proposed smart parking system is estimated as 15 lakhs for installation and 30 thousand for the annual maintenance. There are two types of car parking systems: traditional and smart parking system. In the long term, smart parking systems are likely to be more cost effective when compared to traditional parking garages

7. OUTCOMES

In previous chapters, we got to know about the parking facility and the smart parking system implemented. In this chapter we will find out about the outcomes of the system

1. Optimized parking – Users find the best spot available, saving time, resources, and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.
2. Reduced traffic – Traffic flow increases as fewer cars are required to drive around in search of an open parking space.
3. Reduced pollution – Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the amount of daily vehicle emissions, and ultimately reducing the global environmental footprint.

4. Enhanced User Experience – A smart parking solution will integrate the entire user experience into a unified action. Driver's payment, spot identification, location search and time notifications all seamlessly become part of the destination arrival process.
5. New Revenue Streams – Many new revenue streams are possible with smart parking technology. For example, lot owners can enable tiered payment options dependent on parking space location. Also, reward programs can be integrated into existing models to encourage repeat users.
6. Integrated Payments and POS – Returning users can replace daily, manual cash payments with account invoicing and application payments from their phone. This could also enable customer loyalty programs and valuable user feedback.
7. Increased Safety – Parking lot employees and security guards contain real-time lot data that can help prevent parking violations and suspicious activity. License plate recognition cameras can gather pertinent footage. Also, decreased spot- searching traffic on the streets can reduce accidents caused by the distraction of searching for parking.
8. Real-Time Data and Trend Insight – Over time, a smart parking solution can produce data that uncovers correlations and trends of users and lots. These trends can prove to be invaluable to lot owners as to how to adjust and improvements to drivers.
9. Decreased Management Costs – More automation and less manual activity saves on labor cost and resource exhaustion.

8. FUTURE SCOPE

The existing parking services are unique to a given locality. Parking is marked by the perimeters of the confined facilities, and there are no possibilities or mechanisms of allowing clients to park in any other collocated garages or via any consolidated mechanism. Whereas the model provides simplicity in the operations, there is a missed opportunity for individuals to have good parking experiences. Parking operators need to expand their revenue outlets by capitalizing on the possibilities of adopting the consolidated services that smart parking systems are making possible. The future of the smart parking system is projected to be promising, as these are tied to technologies such as the artificial intelligence, machine learning, and other advanced modern technologies. These are the same technologies that are driving digital transformation for businesses in this era of the fourth industrial revolution. The leverages of innovation and future smart parking systems will improve parking system efficiency by solving the issues that occur because of urbanization. For instance, there is some interest in the ideology of using parking lifts in the management of parking. This is a mechanical process, where a car is stacked on the available overhead space, thereby ensuring that more than one car can occupy the same parking space by being stacked above or below each other in two, three, or more layers. As such, the future parking system may be a smart parking system that integrates different players in different industries as well as the provision of diverse services. This way, existing parking practices can be accommodated for, and the transition to modern, smart parking systems can be realized.

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