IDENTIFICATION, ANALYSIS & PROVIDING REMEDIAL FOR PARKING ISSUE AT DYPEC AKURDI

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ABSTRACT—

This study focuses on the identification and analysis of parking issues within DYP college campus and proposes remedial measures to address the challenges associated with parking management. DYP College campus often face parking-related problems due to an increasing number of vehicles and limited parking space. The research employs a comprehensive approach, including surveys, data analysis, and case studies, to identify the root causes of parking issues. Through a thorough analysis of parking patterns, user behaviours, and campus infrastructure, the study aims to pinpoint specific challenges such as congestion, Inadequate signage, and inefficient space utilization. Additionally, it explores the Impact of technological advancements, such as smart parking solutions and mobile applications, on improving parking management efficiency. The proposed remedial measures encompass both short-term interventions and long- term strategies. Short-term solutions include optimizing existing parking spaces, implementing improved signage, and introducing temporary measures to alleviate immediate congestion. Long term strategies involve the integration of technology- driven solutions, expansion of parking facilities, and the implementation of sustainable transportation alternatives. This leads to many serious problems like delays parking congestion, unclear orientation of parking lots, more carbon emission from vehicles in campus, academic loss of students due to time wasted in search of parking, disturbing the peace of the campus, increase in temperature and pollution, etc. In this Project parking survey was conducted 1) Initially we had created Google form and this Google form is shared on official groups of DYP campus. But this online collected data is not valid, so also, we had conducted offline survey at campus gate. And also, we had counted vehicles for 30 days regularly in parking area of campus. And take a photograph of roughly parked vehicles. By using these 30 days data we had analyzed the fluctuations in number of parked vehicles systematically. 2) At next stage we will measure the parking area in campus. And also find out the parking space in campus. Current situation and problems of parking are analyzed systematically & thoroughly. Then the reasons of these problems are found out. Finally suitable suggestions are put forward

Keywords: Parking, Remedies, System Development, Infrastructure, Transportation

INTRODUCTION

Parking issues on college campuses are a common concern affecting both students and faculty alike. These issues often arise due to limited space, increased enrolment, and inadequate infrastructure planning. Analysing these problems requires understanding the various factors contributing to the parking crunch and their impact on campus life.

Firstly, limited parking space is a primary issue. Many colleges have seen a surge in student enrolment without corresponding expansions in parking facilities. As a result, finding a parking spot during peak hours can be challenging, leading to frustration and tardiness among students and staff.

Secondly, the allocation of parking permits may not be equitable. Some students or faculty members may receive preferential treatment or priority access to parking, leaving others to scramble for available spots. This can create resentment and a sense of unfairness within the campus community.

Thirdly, the design and layout of parking lots may not be optimized for maximum capacity. Poorly designed parking structures or inefficient use of space can exacerbate the problem, leading to wasted resources and exacerbating congestion.

Additionally, the lack of alternative transportation options exacerbates parking issues. Many college campuses may not have robust public transportation systems or adequate bike lanes, forcing students and staff to rely solely on personal vehicles.

Moreover, parking enforcement policies and fines may be inconsistently applied, leading to confusion and frustration among individuals trying to adhere to the rules.

Lastly, the environmental impact of increased car usage on campus cannot be ignored. The congestion caused by parking issues contributes to air pollution and carbon emissions, negatively impacting the campus's sustainability goals.

In summary, parking issues on college campuses are multifaceted problems that require careful analysis and strategic solutions. By addressing factors such as limited space, equitable allocation of permits, infrastructure design, alternative transportation options, enforcement policies, and environmental concerns, colleges can work towards creating a more efficient

A parking facility is generally defined as "Any building, Structure, land, right of way, equipment's or facility used or Useful in connection with the construction, enlargement, Development, maintenance or operation of any area or Building for off-street parking of motor vehicles". Nowadays two wheeler or car parking steals the most Valuable asset every individual has i.e. time. A lot of time is Wasted in finding for an available parking space. Lack of Parking spaces is an additional source of traffic congestion And pollution. More traffic means more pollution. Vehicle's CO2 emission is higher while you are circling around looking For available parking spot than you could just drive to your Spot and park the vehicle. In urban cities like Pune, the land space available for parking Is so much less as compare to the population available and it Is very difficult to search parking space which leads to Various serious problems. Nowadays due to scarcity of Parking facilities vertical parking is preferred instead of Horizontal parking which accommodates more number of Vehicles in less space available. Due to large number of infrastructure buildings in the Campus and lack of parking spaces, people start parking on Roadside which creates so much congestion leading to Improper traffic flow. DY Patil college consist of around 500 Teaching staff and 480 non-teaching staff and the total Number of undergraduate students are around 3600.

Analysis of Underlying Cause

Campus Growth and Urbanization: Many college campuses are located in urban areas where space is limited and expensive. As campuses grow, the availability of nearby land for parking decreases, leading to more acute shortages. Increased

Vehicle Ownership: There is a growing trend of students and staff preferring personal vehicles over public transportation, contributing to higher demand for parking spaces

Planning and Policy Gaps: Lack of long-term planning and investment in parking infrastructure, as well as inadequate policies addressing alternative transportation modes, often aggravate parking issues.

Inadequate Public Transport Options: Poor public transportation connectivity and reliability compel more individuals to drive to campus, thus increasing parking demand.

Cultural Preferences: In many regions, cultural preferences for driving over other modes of transportation, such as biking or carpooling, further exacerbate the parking dilemma.

Parking issues

- Parking issues on college campuses are a common and multifaceted challenge that impacts students, faculty, staff, and visitors. As colleges and universities expand and enrollments grow, the demand for parking spaces often exceeds the available supply, leading to several significant problems

- One primary issue is the scarcity of parking spaces. Many campuses were not originally designed to accommodate the large number of vehicles they now host, resulting in insufficient parking facilities. This scarcity forces drivers to spend considerable time searching for parking spots, which can lead to frustration, increased lateness for classes or meetings, and congestion around campus roads.

- The cost of parking is another significant concern. Many institutions charge for parking permits and visitor parking, which can be a financial burden on students and staff. These fees can be particularly challenging for students already managing tuition and other educational expenses. Additionally, the high cost of parking permits does not always guarantee a convenient or available spot, adding to the dissatisfaction.

- Parking issues also affect the campus environment and community dynamics. Overflow parking can lead to the unauthorized use of nearby residential streets, causing tension between the college and local residents. Furthermore, the need to accommodate parking lots and structures often results in the loss of green spaces and potential sites for new academic buildings or recreational areas, impacting the campus's aesthetic and functional landscape.

- The environmental Impact of extensive parking facilities is another important consideration. Large parking areas contribute to urban heat islands, increase stormwater runoff, and reduce the amount of natural, permeable ground. These environmental effects are particularly concerning in the context of a campus setting, where sustainability and environmental stewardship are often institutional priorities

Objectives

- To Identify parking issues
- To analysis parking issues
- To provide remedial actions for parking issues.

Problem Statement:

• Investigate and address the prevalent parking issues within the college campus to enhance Traffic flow, alleviate congestion, and ensure equitable access to parking spaces for Students, faculty, and staff.

• Identifying and analysing parking issues on a college campus involves examining various Factors such as insufficient parking space, improper allocation of parking spots, Congestion, unauthorized parking, and lack of efficient traffic flow.

• Develop comprehensive remedial strategies and solutions to optimize the parking Infrastructure and mitigate ongoing challenges faced by the college community.

• Remedies could include implementing a parking management system, optimizing parking Space, introducing designated parking areas, encouraging alternative transportation Methods, educating the community about parking rules, and considering technological Solutions like parking apps or sensors to monitor and manage parking availability

Methodology

1. Parking Location:

We identity the all-parking locations in DYPEC and divided the parking spaces according to college.

1.1. Parking space near main college gate :

Fig.1 Parking space near college gate

1.2 parking space near applied arts college :

Fig .2 parking space near applied arts college.

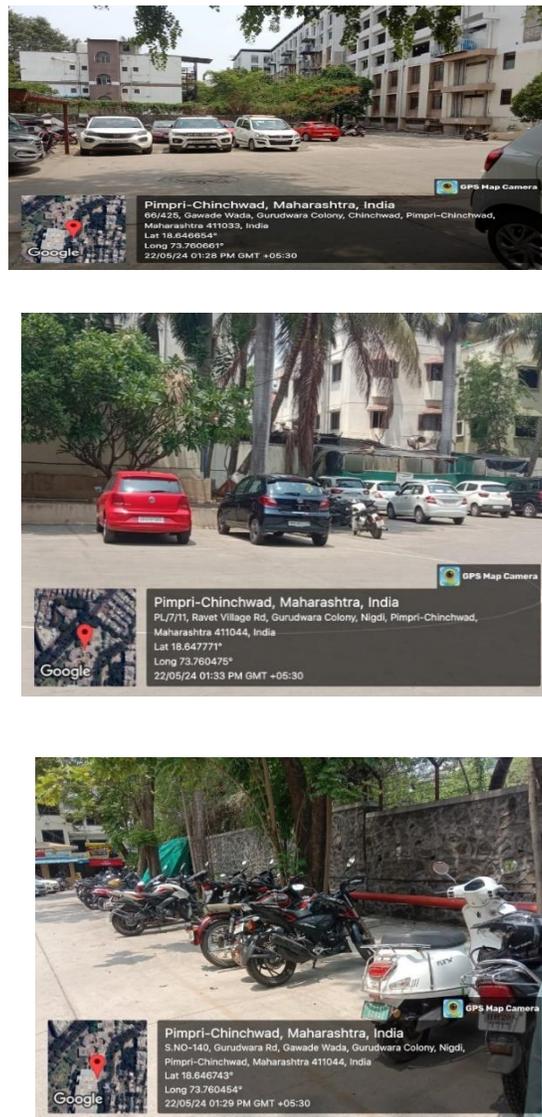**1.3 parking location near architecture college.**

Fig 3 parking location near architecture college.

2. Ways of collecting vehicular data :

 2.1Google Form: we use google form for collecting the vehicular count. It consists of several questions like which type of vehicle you use to come to college? what is your timing college? From which location you come? and so on. By analyzing google form and answer received from students we get vehicular data.

Several samples of google form:

2.2 In and out survey: This is also another way collecting vehicular data. In this method we carried out the survey at main gate of college and ask some questions regarding vehicle data.

We ask questions like from where they come to college, college name and timing of college?

On basis of all this we concluded peak hours of congestion of vehicle. we carried out this twice in day on slot for counting the vehicle is from 10 to 12 and another slot was 2 to 3. On this we compared the number of vehicles in morning and vehicle in afternoon and clearly understood that in morning there are huge of flow of vehicle rather than the morning.

Fig .2 In and out survey at main gate of campuss

2.3 Counting number of vehicle:

In this method we simply counted the number vehicle in whole dypec. we carried this survey of counting vehicle for 30 days. In day we take the count of the vehicle twice in a day after 2 hours interval. we divided vehicle in two categories that is student and faculty.


2.4 Data collection :

Date	Faculty		Students		
	Car	bike	Car	bike	bicycle
2/10/2023	82	101	61	1950	44
3/10/2023	82	101	59	1930	45
4/10/2023	79	98	54	1810	43
5/10/2023	72	94	47	1710	50
6/10/2023	69	99	45	1700	41
9/10/2023	81	102	58	1900	47
10/10/2023	77	99	55	1935	42
11/10/2023	82	95	52	1890	49
12/10/2023	80	90	43	1800	30
13/10/2023	71	94	39	1700	39
16/10/2023	83	100	60	1960	48
17/10/2023	76	97	57	1925	43
18/10/2023	71	92	59	1915	46
19/10/2023	75	96	50	1810	40
20/10/2023	70	91	42	1730	35
23/10/2023	80	95	61	1990	47
24/10/2023	80	93	60	1950	45
25/10/2023	76	100	58	1897	40

| 26/10/2023 | 73 | 93 | 45 | 1790 | 32 |
27/10/2023	77	89	40	1750	38
30/10/2023	81	98	55	1950	50
31/10/2023	78	93	59	1899	45
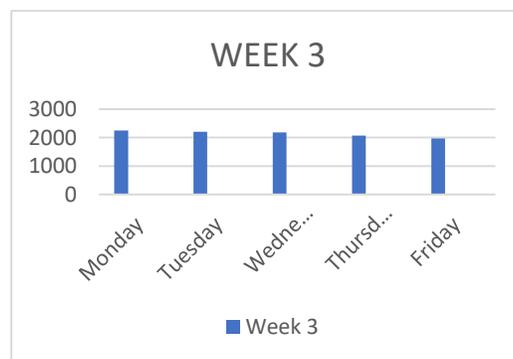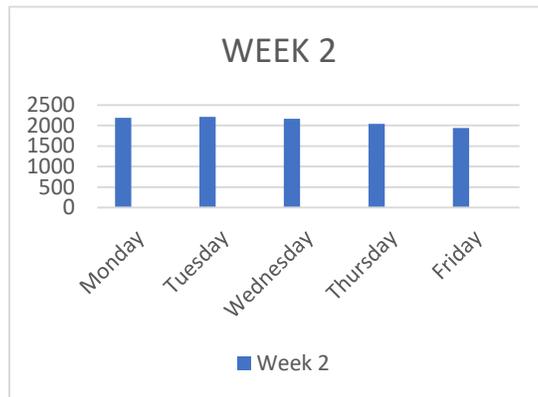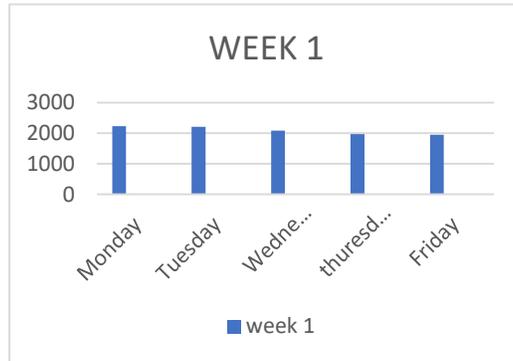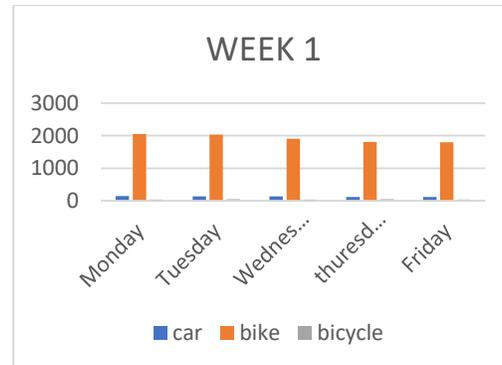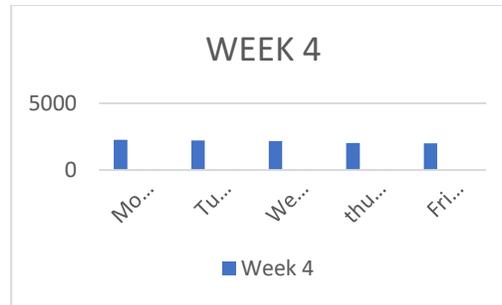
3. Evaluating the parking area of DYPEC:

In this method we calculated parking area of entire campus. We calculated parking area with help of two method one is GPS and another one is manual measurement with help of meter tape.

1. GPS: GPS is nothing but global positioning system. It is satellite navigation system used to identify of ground position of an object. With help of GPS, we identify the ground position of DYPEC which include parking spaces, open space, canteen, educational buildings, Landscape.
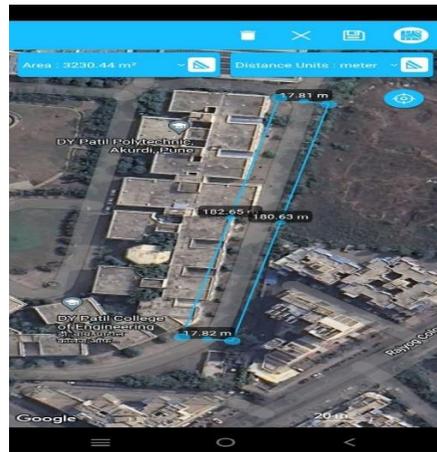
2. Meter tape: By using meter tape we measure the length and width of parking space. With the help of dimentions we calculated parking area.

4.Analysis of DYPEC parking area :

Parking space	Parking area
Architecture college	3897.93 sq.m
DYPIEMR college	4430 sq.m
Pharmacy college	3709 sq.m
workshop	1518.9 sq.m
DYPCOE college	3331 .3 sq.m
Y.B. Patil. college	2100 sq.m
Junior college of science, arts and commerce	1851 sq.m

5. DYPEC PLAN

1. With the help of data extracted from GPS and dimension measured by meter tape we drawn the plan of DYPEC.
2. In this plan we shown the areas of buildings, parking areas, open spaces, landscapes, roads .
3. Parking area is denoted by hatching.
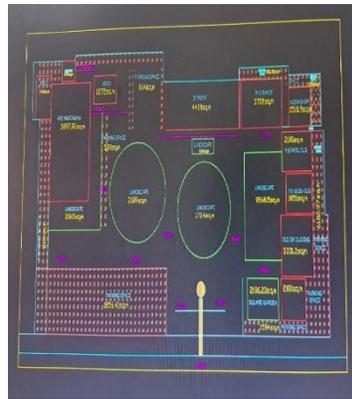
6. Allocation of vehicle according to the proposed plan

As per IRC maximum vehicle width should be 2.44 meter.

Parking space	Parking area	Limitation of bikes	Limitation of cars
Architecture college	3897.93	450	41
DYPIEMR college	4430	186	17
Pharmacy college	3709	192	18
Cafeteria		240	23
DYPCOE college	3331.3	1300	126

| Square garden | 2186.23 | 336 | 30 |
| Front of applied arts college | | 472 | 42 |

7. System development

1) IoT in smart parking management

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IoT-Based Smart Parking System: A Comprehensive Development Guide

If you've ever had trouble finding a parking space, you'll appreciate how an IoT smart parking system can ease customer parking woes. Fortunately, IoT-based smart parking technology makes for a quick and easy solution to parking-related challenges from the ground up! These systems use smart sensors and controllers for swift and seamless parking management in every parking spot. No wonder the market for IoT parking systems predicts a 22% annual market surge. At this rate, it's expected to hit $30 billion by 2030![1] Now's the time to get involved in developing a smart parking system using IoT technology. Explore the step-by-step development process behind this transformative system that is shaping the future of urban living.

2) What Problems Does an IoT-based Smart Parking System Solve?

Traditional parking systems can often lead to a lack of transparency with respect to availability and pricing, which creates consumer frustration. IoT-based parking management has changed the game for all stakeholders involved. Drivers can now navigate their journeys with parking occupancy insights. Enforcement agencies can swiftly assess violations. Similarly, parking operators can optimize resources with real-time access to parking data. Let's explore some key issues that IoT-enabled parking systems can efficiently solve:

3) Problems Addressed by IoT-Based Smart Parking Systems

Enhanced Payment Convenience: Smart meters accept credit card or smartphone payments, thus offering ease of payment. Moreover, IoT sensors constantly detect vehicle presence in the parking facility, updating the app about real-time space availability in the parking facility so the drivers only pay for the time they use.

Congestion Reduction and Traffic Flow Improvement: IoT sensors precisely determine the number and position of vacant parking spaces. They monitor space availability and guide drivers to open spots, thus reducing congestion.

Cloud-Based Dashboard: Parking management technology system utilizes a cloud-based IoT dashboard to deliver real-time insights for a clear facility overview.

Optimized Operations and Enhanced Security: Embedded sensors track vehicle movements for improved parking operations and heightened security. Mobile apps display real-time parking data, sending alerts in case of security breaches.

Environmental Monitoring in Parking Garages: Sensors monitor air quality and temperature to ensure safe conditions for occupants.

Access Control and Management: User authorization on mobile apps or license plate scanning controls entry in parking lots.

Parking Monitoring: Video surveillance integration improves the administration of parking facilities. It makes it easier to address issues like traffic accidents and theft.

Parking Reservation: Drivers can reserve parking spaces through mobile apps or web interfaces aided by innovative solutions like parking locks.

Efficient Parking Management: IoT-based parking system supervises processes, monitors space availability, and also streamlines the billing process for effective parking administration.

Thus, a smart IoT-driven parking system enables drivers to access real-time information while also allowing parking operators to efficiently manage and supervise parking spaces remotely

Market Research and Validation: Identify your target market and do thorough research. This will help you validate the concept. Finally gather feedback to ensure that the solution aligns with the primary needs of your target users.

Ideation: Conceptualize your smart parking solution. Decide on appropriate sensors, microcontrollers, cloud services, and network protocols. Determine whether you need to create a mobile app, a web app, or a hybrid solution depending on your business needs. Define Core Features: Define essential features for the MVP. These can include real-time monitoring, user registration, payment functionality, and an admin dashboard.

Hardware Selection: Choose appropriate IoT hardware components, such as sensors, gateways, and display panels, tailored for parking lots.

Cost Considerations: Plan the budget, covering hardware, software development, operational costs, and equipment expenses.

Prototyping: Construct a workable prototype emphasizing essential features, showcasing the core functionality of the smart parking system. Engage an experienced IoT software development company to build an initial prototype.

Designing: Create a user interface and narrow down on your basic features for the IoT-based PoC (Proof of Concept). Your goal should be to develop a user-friendly app that supports major operating systems.

Development: Mobilize a multi-disciplinary team of mobile, front-end, and back-end developers, along with IoT experts. They'll implement the technical aspects of your IoT-based smart parking system and integrate it with compatible devices and systems.

Testing: Once all components are interconnected, rigorous testing is required. Conduct comprehensive testing to identify and rectify technical issues, bugs, or usability concerns

Benefits of an IoT-based Smart Parking Management System

Cost Reduction: Automating payments and ticketing processes, as well as tasks such as detecting vacant spaces minimize operational costs.

Enhanced Security: Sensors and integrated surveillance enhance the security and safety of both vehicles by automatically alarming unauthorized access in the parking area.

Increased Efficiency: Drivers benefit from redirected routes to the nearest available spot, which saves their time and fuel cost.

Improved Customer Experience: Real-time information on parking availability and automated payment options ensure superior customer experience. Real-Time Data and Insights: IoT parking systems provide valuable insights into peak times and parking patterns for effective forecasting and reporting.

Reduced Traffic: Smart parking systems using IoT streamline the parking process and help optimize traffic flow by directing drivers to available spaces. It also helps reduce traffic congestion and time spent searching for parking space.

Reduced Costs and Overhead: Minimizes traditional overheads associated with parking meters and inspectors.

Enforcement Effectiveness: Makes targeted enforcement more effective, directing staff towards vehicles that have overstayed.

Integrated Payments: Incorporates real-time and electronic payment methods, simplifying the parking experience.

Smart City Integration: Essential for Smart City initiatives, aligning with emerging standards like ISO 37122. IoT parking systems assist in ensuring compliance with local regulations. Benefits of an IoT-based Smart Parking Management System

8. Remedies for Parking Issues

Parking Management Technology

Mobile Apps: Real-time updates on available parking spaces. License Plate Recognition (LPR): Streamlined enforcement and reduced need for physical permits.

Alternative Transportation Incentives

Public Transit Partnerships: Discounted or free transit passes for students and staff. Shuttle Services: Campus shuttles connecting remote parking lots, residential areas, and academic buildings. Bike-Sharing Programs: Easily accessible bikes for short-distance travel around campus.

Infrastructure Improvements

Parking Garages: Multi-level parking structures to increase capacity without expanding the campus footprint.

Parking Management Systems**:** Implementing smart parking systems that use sensors and apps to guide drivers to available spots can improve the efficiency of existing parking spaces.

Parking Fees and Permits: Adjusting parking fees and permit allocations can control the number of vehicles on campus. Differential pricing based on time of day or location can help manage demand.

Parking Structures**:** Building multi-level parking garages can increase capacity without requiring additional land. Though costly, they provide a long-term solution to space constraints.

Flexible Scheduling**:** Encouraging flexible class schedules and staggered work hours can distribute parking demand more evenly throughout the day.

Remote Parking with Shuttle Services: Establishing remote parking lots with shuttle services to the main campus can alleviate congestion in central areas.

Technology Integration: Apps and online platforms can allow users to reserve parking spaces in advance, reducing the time spent searching for spots.

Awareness Campaigns: Educating the campus community about the benefits of using alternative transportation and the availability of different options can lead to a cultural shift away from reliance on personal vehicle

CONCLUSION

Analysing the situation, implementing a comprehensive parking management plan, including proper signage, designated zones, and possibly a multi-level parking structure, could alleviate the congestion. Moreover, educating the campus community about responsible parking practices would contribute to a more organized systems The current campus space to campus population is approximately 0.51.The ratio is significantly more than the 0.3 . This means that most parking space is full in the peak time , hence the parking Management or demand strategies are necessary. So there are great need of parking management in dy.patil educational complex .The identification and analysis of parking issues in DY Patil Educational Complex reveal several challenges, including inadequate parking space, poor organization, and increased vehicular traffic. These issues contribute to congestion, inconvenience for students and staff, and potential safety hazards. Addressing these concerns requires a comprehensive approach,

involving campus planning, infrastructure improvements, and sustainable transportation alternatives. In conclusion, implementing effective solutions will not only alleviate parking problems but also enhance the overall functionality and safety of the educational complex

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