

PlanItUrban: Shaping future together for better City

Submitted in partial fulfillment of the requirements of the
degree

BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

By

Gayatri Wadhwani (D12B/62)

Nishika Ahuja (D12B/02)

Simran Gurdasani (D12A/28)

Hainy Chughria (D12C/67)

Name of the Mentor

Prof. Indu Dokare



Vivekanand Education Society's Institute of Technology,

An Autonomous Institute affiliated to University of Mumbai

HAMC, Collector's Colony, Chembur,

Mumbai-400074

University of Mumbai (AY 2024-25)

CERTIFICATE

This is to certify that the Mini Project entitled "**PlanItUrban: Shaping future together for better City**" is a bonafide work of **Gayatri Wadhwani (D12B/62)**, **Nishika Ahuja (D12B/02)**, **Simran Gurdasani (D12A/28)**, **Hainy Chughria (D12C/67)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of "**Bachelor of Engineering**" in "**Computer Engineering**".

(Prof. Indu Dokare)

Mentor

(Prof.Dr.(Mrs.) Nupur Giri)

Head of Department

(Prof. Dr.(Mrs.) J.M.Nair)

Principal

Mini Project Approval

This Mini Project entitled “PlanItUrban: Shaping future together for better City” by **Gayatri Wadhwani (D12B/62), Nishika Ahuja (D12B/02), Simran Gurdasani (D12A/28), Hainy Chughria (D12C/67)** is approved for the degree of **Bachelor of Engineering in Computer Engineering.**

Examiners

1.....

(Internal Examiner Name & Sign)

2.....

(External Examiner name & Sign)

Date:

Place:

Contents

Abstract	i
Acknowledgments	ii
List of Abbreviations	iii
List of Figures	iii
List of Tables	v
1 Introduction	1
1.1 Introduction	1
1.2 Motivation	2
1.3 Problem Statement & Objectives	3
1.4 Organization of the Report	3
2 Literature Survey	5
2.1 Survey of Existing System	5
2.2 Limitation Existing system or Research gap	8
2.3 Mini Project Contribution	8
3 Proposed System	10
3.1 Introduction	10
3.2 Architectural Framework / Conceptual Design	11
3.3 Algorithm and Process Design	12
3.4 Methodology Applied	15
3.5 Hardware & Software Specifications	16
3.6 Experiment and Results for Validation and Verification	17
3.7 Result Analysis and Discussion	18
3.8 Conclusion and Future work.	31
References	33

Abstract

Urban governance in India is often hindered by fragmented departmental structures, inefficient resource management, and poor interdepartmental coordination. These challenges frequently lead to project delays, resource misallocation, and overlapping responsibilities among departments such as Water Supply, Public Works, and Sanitation, all of which undermine the efficient execution of urban projects. The lack of communication and cooperation between these departments results in infrastructural inefficiencies that hamper development efforts across Indian cities.

To address these issues, PlanItUrban is proposed as an innovative digital platform designed to streamline governance processes by enhancing interdepartmental collaboration. The platform's key objectives are to improve coordination through real-time data sharing, optimize resource management by leveraging AI-driven decision-making, foster transparency in project execution and enable proactive conflict resolution through data analytics. By integrating these tools, PlanItUrban aims to eliminate the inefficiencies that commonly arise in fragmented governance structures, ensuring that projects are completed on time and within budget.

Additionally, PlanItUrban aligns with global smart city trends by fostering transparency, accountability, and informed decision-making in urban planning. Drawing from successful case studies in cities like Kansas City and Dhaka, the platform incorporates strategies to mitigate delays and inefficiencies while enabling scalability and adaptability across various urban environments. With its potential for expansion, PlanItUrban stands as a promising model for sustainable urban governance in India, capable of transforming the way cities operate and manage their resources.

Acknowledgement

We are immensely grateful to Vivekanand Education Society's Institute of Technology for their unwavering support and encouragement throughout the course of our project. The institute provided us with essential resources, facilities, and a conducive environment that greatly facilitated our research and development efforts. The guidance from the management, faculty, and staff fostered a culture of academic excellence and innovation, motivating us to push our boundaries and strive for success. Their commitment to nurturing students' ideas and projects has been instrumental in shaping our academic journey.

Our heartfelt thanks go to our project guide, Prof. Indu Dokare (Assistant Professor, Computer Engineering), for her invaluable guidance, patience, and unwavering support throughout the project. Her insightful suggestions and constructive feedback were crucial in shaping the direction of our work. We are deeply appreciative of her constant encouragement, which kept us motivated, as well as the time she dedicated to helping us navigate challenges and refine our ideas. Her expertise and mentorship enriched our learning experience, making this project both educational and rewarding.

We would also like to express our sincere gratitude to Dr. (Mrs.) Nupur Giri, Head of the Computer Engineering Department, and our Principal, Dr. (Mrs.) J.M. Nair, for granting us this valuable opportunity to work on the project. Their strong support and visionary leadership created an environment where we could explore our ideas and develop our skills. We are particularly thankful for their belief in the importance of hands-on projects, which provided us with the freedom to innovate and learn. Lastly, we extend our heartfelt thanks to all the teaching and non-teaching staff of the department for their constant encouragement, selfless assistance, and readiness to help us at every stage. Their collective efforts contributed significantly to the successful completion of our project, and we are truly grateful for their support.

List Of Abbreviations

- **PM** - Project Management
- **URM** - User Registration Module
- **RMM** - Resource Management Module
- **PMM** - Project Management Module
- **NCM** - Notification and Communication Module
- **MSM** - Meeting Scheduling Module

List Of Figures

Sr No.	Title	Page No.
1	Fig. 3.2.1 Architectural Framework	11
2	Fig. 3.3.1 Department Flowchart	12
3	Fig. 3.3.2 Administrator Flowchart	13
4	Fig. 3.3.3 Officer Flowchart	14
5	Fig. 3.7.1 Home Page	20

6	Fig. 3.7.2 About Us Page	21
7	Fig. 3.7.3 Department Registration	22
8	Fig. 3.7.4 Login	23
9	Fig. 3.7.5 Department Management	24
10	Fig. 3.7.6 Department Dashboard	24
11	Fig. 3.7.7 Map with Proj	26
12	Fig. 3.7.8 Add New Project	27
13	Fig. 3.7.9 Meeting Page	28
14	Fig. 3.7.10 View All Projects Page	28

15	Fig. 3.7.11 Dashboard	29
16	Fig. 3.7.12 Add New Officer	30
17	Fig. 3.7.13 View All Officers Page	31

List Of Tables

Sr No.	Title	Page No.
1	Table 3.5.1: Hardware Requirements	16
2	Table 3.5.2: Software Requirements	17

1. Introduction

1.1 Introduction

The PlanItUrban project aims to create a digital platform that enhances interdepartmental collaboration and streamlines urban governance in Indian cities. Traditionally, urban governance in India faces challenges due to fragmented departmental structures and inefficient resource management, leading to project delays and ineffective coordination among critical urban departments like Water Supply, Public Works, and Sanitation [3]. PlanItUrban addresses these issues by facilitating seamless coordination, enabling departments to communicate in real-time, assign tasks efficiently, and track the progress of ongoing infrastructure projects. This real-time data-sharing mechanism can mitigate common issues, such as project overlap and delays, by ensuring departments remain informed and aligned with project timelines [2].

The platform provides distinct user roles—Administrators, Departments, and Officers—each responsible for different levels of project management, task assignment, and resource allocation. This role-based structure ensures accountability while minimizing the bureaucratic bottlenecks that often hinder interdepartmental coordination. Additionally, the platform enables easy documentation of progress, allowing departments to maintain up-to-date records, which reduces the risk of miscommunication and enhances project transparency [1].

Research on e-governance and digital platforms highlights the role of such tools in improving transparency, accountability, and efficiency in urban governance [5]. For instance, studies on urban planning in India have demonstrated that digital platforms can help address challenges in governance by fostering citizen engagement and improving the coordination of government projects [14]. Similarly, platforms in cities like Kansas City and Dhaka have shown how digital technology can enhance transparency and reduce project delays by providing a centralized communication system for departments and stakeholders [14].

Furthermore, PlanItUrban incorporates AI-driven decision-making tools, allowing

departments to detect potential conflicts, optimize resource management, and make proactive decisions to prevent project disruptions [8]. AI-based planning and real-time data analytics ensure that the platform can predict issues like overlapping timelines or resource shortages, enabling departments to adjust plans before significant delays occur. The growing global emphasis on smart city development supports the implementation of AI-driven platforms like PlanItUrban, which align with current trends in urban planning [10].

1.2 Motivation

Urban governance is crucial for enhancing public services and infrastructure, which directly contribute to economic growth and stability. In India, fragmented departmental structures often lead to inefficiencies, project delays, and resource wastage. PlanItUrban is designed to address these challenges by creating a digital platform that streamlines interdepartmental collaboration. By enabling real-time data sharing and communication across departments like Water Supply and Public Works, the platform aims to reduce delays, optimize resource management, and improve overall project execution [1].

Integrating operations research (OR) into urban planning can further enhance the effectiveness and social impact of platforms like PlanItUrban. While OR has traditionally focused on urban issues such as transportation and housing, its application in urban governance has been limited compared to public policy [6]. By adopting a more inclusive OR approach that prioritizes community engagement and methodological pluralism, PlanItUrban can address the complex, multi-stakeholder nature of urban environments. This perspective not only recognizes the diverse voices of community members but also aims to develop equitable solutions to urban challenges by incorporating qualitative methods alongside technological innovations [5].

Additionally, efficient governance plays a key role in promoting sustainability and preserving cultural heritage. By streamlining project management and reducing resource wastage, PlanItUrban supports sustainable urban development, ensuring that modern infrastructure projects align with environmental and cultural conservation goals [9]. The platform's scalability makes it a valuable model for future expansions, benefiting current and future generations by fostering transparency and efficient governance [7].

1.3 Problem Definition and Objectives

The rapid urbanization of Indian cities has led to increased demand for efficient infrastructure and public services. However, the existing governance framework often suffers from fragmentation, with multiple departments operating in isolation. This lack of coordination results in overlapping responsibilities, project delays, and mismanagement of resources. For instance, a newly constructed road can be disrupted by the later installation of utility lines, highlighting the inefficiencies inherent in a fragmented governance system that ultimately affects the quality of urban services provided to residents [4].

Research on urban planning in Dhaka, Bangladesh, further emphasizes the importance of coordinated governance structures for effective urban management. Despite the theoretical advantages of decentralization, the lack of alignment among various planning bodies—such as the Dhaka City Corporation and the Capital Development Authority—has led to inefficiencies and poor urban management [14]. Overlapping roles and responsibilities among these organizations hinder effective planning and service delivery, resulting in fragmented efforts that do not align with the city's development goals [6][7].

In response to these challenges, there is a pressing need for a centralized digital platform to facilitate interdepartmental cooperation. The proposed platform, PlanItUrban, aims to enhance communication and resource sharing while establishing clear roles and responsibilities among departments. The objectives of PlanItUrban include improving urban governance, streamlining project execution, and ultimately ensuring that urban projects are completed efficiently and effectively to meet the growing needs of residents.

1.4 Organization of the Report

Chapter 1: Introduction to the project.

This chapter introduces the PlanItUrban platform, outlining its objectives to improve interdepartmental collaboration in urban governance and address challenges in project management, such as communication fragmentation.

Chapter 2: Literature survey.

A review of existing research related to urban governance and current practices is presented, highlighting gaps that PlanItUrban aims to fill. This chapter discusses the challenges in interdepartmental coordination and emphasizes the importance of improved communication and resource management for effective urban project execution.

Chapter 3: Proposed system and conclusion.

The architecture and modules of the PlanItUrban platform are detailed, showcasing how each component improves project execution and resource management while summarizing the system's effectiveness.

Chapter 4: Experiment results

This chapter presents the validation experiments conducted on the platform's modules, demonstrating their effectiveness in user management, resource visibility and project coordination.

Chapter 5: Conclusion and future work.

The final chapter summarizes the project's contributions, discusses its limitations, and suggests directions for future enhancements to optimize the PlanItUrban platform for urban governance.

2. Literature Survey

2.1 Survey of Existing System

We reviewed various scholarly articles and case studies on digital platforms for urban governance, focusing on their strengths and weaknesses in facilitating interdepartmental collaboration. This survey identified gaps in existing systems, particularly in real-time data sharing and community engagement. The insights gained guided the development of PlanItUrban, ensuring it effectively addresses urban governance challenges and improves project execution.

1. Title of Paper: Decisions Institutions, Policy Arenas, and Inter-Departmental Collective Action Around Urban Sustainability

Authors: Christopher V. Hawkins, Rachel M. Krause

Published in: March 2023, Urban Governance, Volume 1

Abstract: This paper analyzes collaboration between government departments for sustainability, focusing on how formal meetings and informal events can enhance cooperative efforts. It emphasizes the critical role of inter-departmental collaboration in achieving urban sustainability goals while addressing the challenges that hinder effective cooperation, such as bureaucratic silos and misaligned objectives. The paper also outlines strategies to foster collaboration, including joint initiatives, shared platforms for resource allocation, and regular workshops to build trust. Ultimately, it advocates for a holistic approach to urban governance that prioritizes collaboration as essential for sustainable development.

Inference: The study identifies key factors influencing successful collaboration among governmental departments involved in sustainability initiatives. These include leadership commitment, shared visions, and effective communication channels. The findings highlight that enhancing inter-departmental collaboration is crucial for the effective implementation of sustainability efforts. Improved coordination can lead to better resource allocation, increased project efficiency, and more resilient urban environments. By working together, departments can leverage their expertise to tackle complex urban challenges, resulting in innovative solutions that benefit communities. In conclusion, fostering inter-departmental

collaboration is essential for advancing sustainability goals in urban settings.

2. Title of Paper: Introduction. The Digitalization of Urban Governance in India

Authors: Khaliq Parkar and Stéphanie Tawa Lama

Published in: South Asia Multidisciplinary Academic Journal (SAMAJ), 2023

Abstract: This paper examines the transformative role of digital technology in urban governance in India, with a particular focus on the Smart City Mission (SCM) and its significant impact on infrastructure development. The SCM aims to enhance urban living standards through smart solutions, which include integrated information systems and advanced communication technologies. The study highlights the critical role of Special Purpose Vehicles (SPVs) in executing urban projects, facilitating project management, and ensuring that initiatives align with the overarching goals of the SCM. Furthermore, the paper delves into the various challenges encountered during the implementation of digital solutions, such as inadequate infrastructure, digital literacy issues, and inter-departmental coordination problems.

Inference: The authors conclude that while digitalization offers great potential for enhancing urban governance in India, its effectiveness hinges on sound implementation strategies and robust stakeholder engagement. By promoting collaboration among government departments, cities can better manage resources and improve service delivery, ultimately leading to more sustainable urban environments and a higher quality of life for residents.

3. Title of Paper: Inter-Departmental Relations and Effective Service Delivery in the Local Government System: A Perspective from Nigeria

Author: Onofere Princewill Okereka

Published in: Public Policy and Administration Research, Vol. 5, No. 1 (2015)

Abstract: This paper examines the critical role of inter-departmental relations in ensuring effective service delivery at the local government level in Nigeria. It employs a qualitative approach combined with systems theory to highlight the importance of interdependence among departments in achieving organizational goals. The findings indicate that a lack of collaboration leads to ineffective service delivery. The paper recommends that local government units view themselves as interdependent and emphasizes the need for training programs to enhance cooperation and compromise among personnel.

Inference: The study highlights that fostering strong inter-departmental relationships significantly enhances service delivery in local governments. By emphasizing training and collaborative strategies, the paper argues that improved communication and coordination can lead to more effective outcomes in public service provision, ultimately benefiting communities.

4. Title of Paper: Coordination of Urban Planning Organizations as a Process of Achieving Effective and Socially Just Planning: A Case of Dhaka City, Bangladesh

Author: Md. Ashiq Ur Rahman

Published in: International Journal of Sustainable Built Environment, Volume 4, 2015

Abstract: This paper discusses the necessity of coordination among urban planning organizations in Dhaka, Bangladesh, to achieve effective and socially just planning outcomes. It argues that while decentralization is intended to promote good governance, effective coordination is essential for realizing these goals. The author emphasizes the need for political will and active community involvement to facilitate planning processes that address the diverse needs of urban residents.

Inference: The study highlights that improving inter-departmental coordination is vital for successful urban planning in Dhaka. It suggests that collaborative approaches, including training and workshops, can foster stronger relationships between organizations, ultimately leading to better service delivery and more equitable urban development. The findings stress that without effective collaboration, the potential benefits of decentralization may remain unrealized, perpetuating inefficiencies in urban governance.

5. Title of Paper: Integrated Infrastructure Transformation: Leveraging Multi-Departmental Goals for Efficient Urban Improvements

Authors: Keith W. Gardner, David VanHoven, Daniel Amelin

Published in: Pipelines 2024

Abstract: This paper discusses the critical importance of collaboration among multiple city departments to achieve efficient urban improvements. It emphasizes the need for integrated approaches to infrastructure projects, specifically focusing on initiatives such as sewer separation, green stormwater management, and urban canopy growth. The authors argue that collaborative efforts among different departments are essential for optimizing urban

infrastructure and ensuring sustainability.

Inference: The study concludes that effective coordination among city departments is vital for transforming urban infrastructure efficiently. By fostering shared goals and collaborative efforts, cities can enhance their infrastructure initiatives, ultimately leading to improved service delivery and sustainability in urban environments.

2.2 Limitation of Existing System or Research Gap

The current urban governance systems in India face significant limitations, primarily stemming from fragmented communication and coordination among multiple authorities and departments. The lack of a centralized platform often results in inefficiencies and project delays, as different agencies may not share critical data or insights. Additionally, the reliance on one-time data collection limits the ability to draw long-term conclusions about project outcomes, hindering continuous improvement in urban governance.

Moreover, existing research highlights challenges related to public participation and transparency, as many digital initiatives, such as the Smart City Mission (SCM), may inadvertently reduce community engagement [15]. This creates a gap in understanding how to balance technological advancements with active citizen involvement. Finally, the absence of training and capacity-building initiatives for urban staff further exacerbates these issues, resulting in poor inter-departmental cooperation and ineffective service delivery. Addressing these gaps is essential for enhancing urban governance in India and ensuring sustainable infrastructure development.

2.3 Mini Project Contribution:

The PlanItUrban platform is designed to enhance interdepartmental collaboration in urban governance by streamlining project management and execution across various urban departments. By providing a centralized digital platform for communication and data sharing, PlanItUrban enables departments such as Water Supply, Public Works, and Sanitation to coordinate more efficiently, minimizing project delays and resource mismanagement [1][3]. The platform significantly reduces the reliance on traditional bureaucratic processes and paperwork, which often slow down decision-making and resource allocation. By integrating AI-driven insights and real-time data analytics,

PlanItUrban ensures more efficient project tracking and resource management, fostering a more transparent and accountable governance structure [8]. The use of digital technologies in urban governance, as discussed in the literature, is crucial for improving service delivery and infrastructure management [4][12].

In leading our team, Gayatri took charge of project planning and backend development coordination. She carefully structured the project into key modules and ensured that each team member was equipped with the necessary resources to complete their tasks. Gayatri's focus on research, especially in the backend architecture, was essential in creating a solid foundation for the platform. She worked closely with Nishika on the backend, guiding the integration of databases and setting up secure communication between the platform and external APIs. This collaboration ensured that the backend was robust enough to handle real-time data updates and support the platform's AI-driven features, fostering efficient project tracking and interdepartmental communication.

Nishika, alongside her responsibilities on the frontend, played a crucial role in developing the backend for PlanItUrban. She was responsible for implementing the Google Maps API and integrating the platform's functionalities with external services. Her backend tasks included establishing the server infrastructure, managing the flow of data between modules, and ensuring data security. With Gayatri's assistance, Nishika optimized server operations and tackled backend issues, enabling smooth interactions between users and the system. Her dual role as a frontend and backend developer ensured that PlanItUrban offered both an intuitive user experience and efficient backend processing.

Simran and Hainy contributed significantly to the design and user experience. Simran led the design process using Figma, ensuring the platform's interface was user-friendly and visually appealing. She also assisted in frontend development, implementing design components into functional code. Hainy supported Simran by working on frontend tasks and helping create paper prototypes for early design testing. This allowed the team to validate user flows and enhance the platform's functionality before moving to digital prototypes. Their combined efforts ensured that the frontend was well-executed, aligning with the project's goals of delivering an accessible and streamlined platform.

3. Proposed System

3.1 Introduction

PlanItUrban is designed to enhance interdepartmental collaboration, addressing key challenges in urban governance by improving communication, resource management, and project coordination. The platform comprises several modules aimed at streamlining various aspects of project execution, thus promoting efficiency and reducing delays in urban infrastructure development [1][3].

- **User Management Module:**

Administrators verify urban departments' registration on the platform. Verified departments can add officers, who receive email prompts to create secure passwords for platform access, ensuring team integration and security.

- **Resource Management Module:**

This module provides a centralized space for departments to manage and share resources effectively. By increasing visibility, departments can optimize resource use, reducing duplication and enhancing project outcomes [7].

- **Project Management Module:**

The platform proactively identifies conflicts by notifying departments of overlapping tasks, enabling them to address issues early, thereby avoiding delays and resource mismanagement [9].

- **Notification and Communication Module:**

Departments receive real-time alerts and updates about project statuses and resource availability, ensuring timely communication and minimizing miscommunication [8].

- **Meeting Scheduling Module:**

This feature allows departments to schedule meetings, track them via a calendar, and receive notifications, ensuring smooth coordination and effective collaboration on

shared projects [12].

Overall, PlanItUrban aims to foster improved interdepartmental cooperation, enhancing the efficiency and effectiveness of urban project execution in Indian cities.

3.2 Architectural Framework / Conceptual Design

Following is the modular diagram for PlanItUrban, illustrating the three core modules: User Management, Project Management, and Resource Management. These modules collectively enable efficient handling of user registrations, project tracking and resource allocation within the platform.

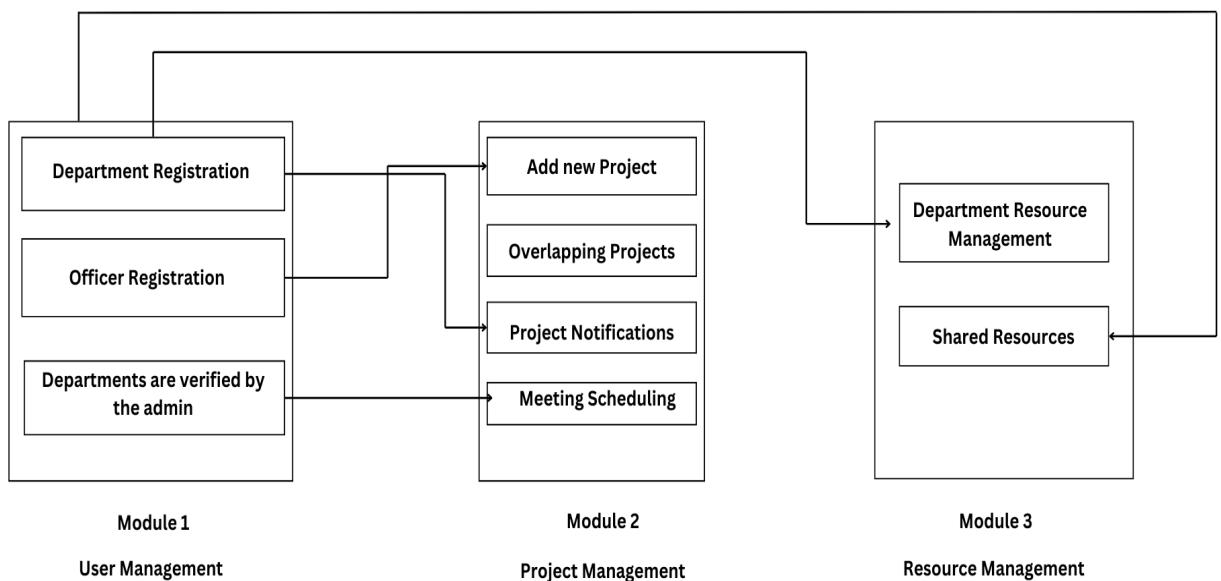


Fig. 3.2.1 Architectural Framework

The above fig. 3.2.1 architectural framework includes three key modules: User Management for handling department and officer registrations, Project Management for adding and tracking project progress, and Resource Management for managing departmental and shared resources.

3.3 Algorithm and Process Design

Department

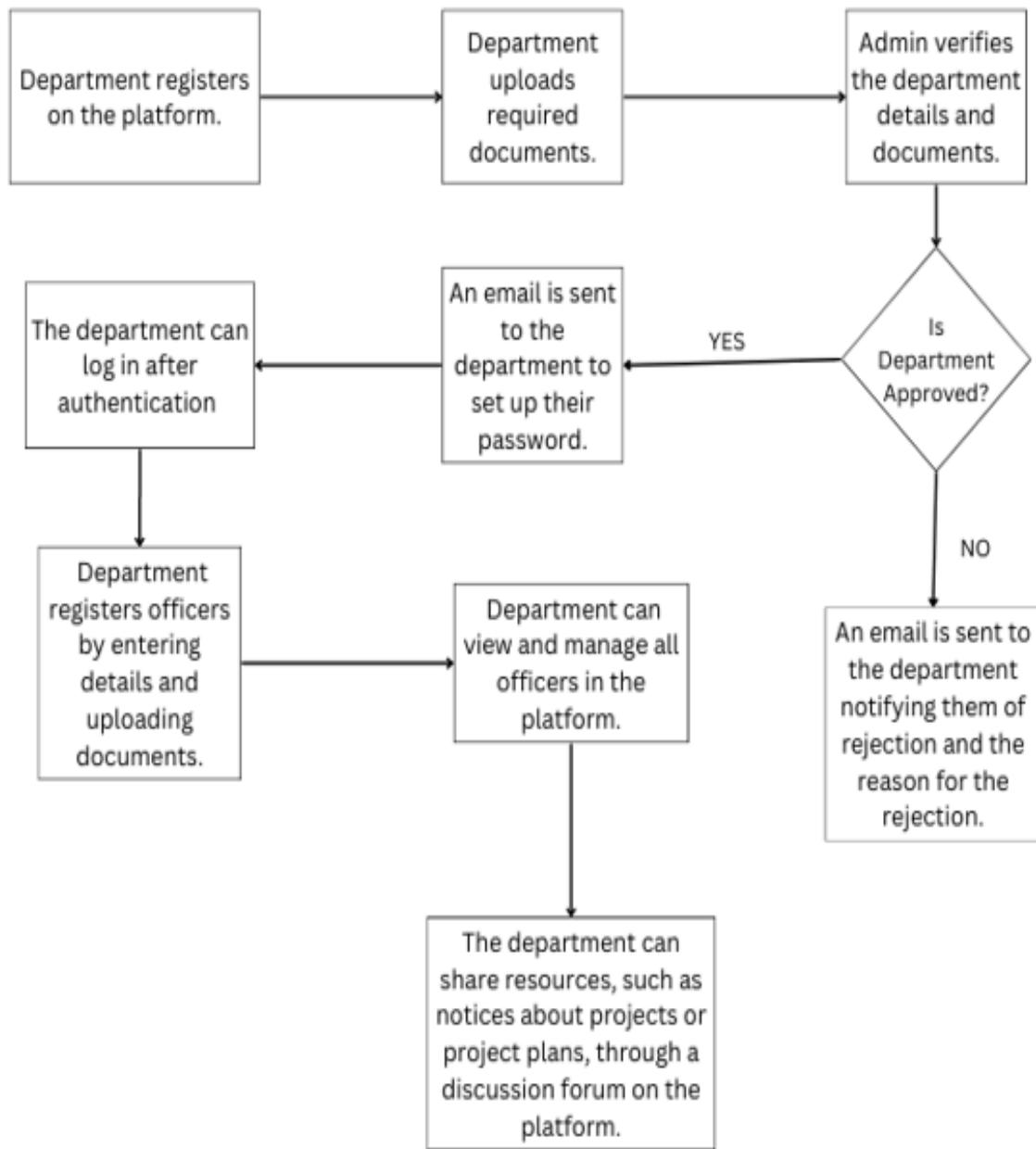


Fig. 3.3.1 Department Flowchart

Fig. 3.3.1 shows algorithm and process design for a department management system that outlines the flow of department registration, the verification process by an admin, and how

approved departments proceed to project allocation. It also includes decision points for approval or rejection based on department validation.

Administrator

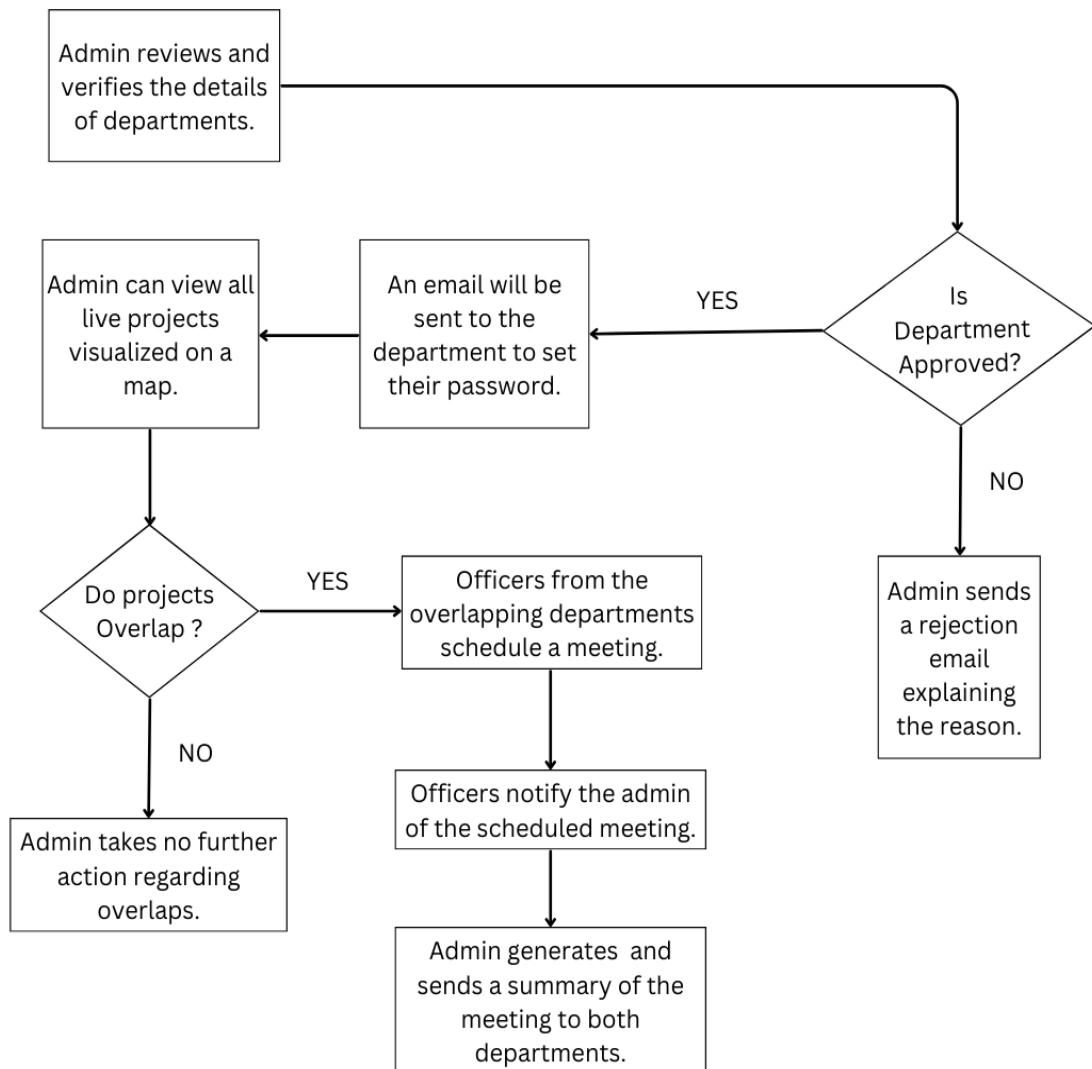


Fig. 3.3.2 Administrator Flowchart

Fig. 3.3.2 shows the Administrator diagram illustrates the process for managing department registrations. Administrators review and approve department registrations, checking if they meet the required criteria. If approved, the department is registered; if not, further information is requested or the registration is rejected.

Officer

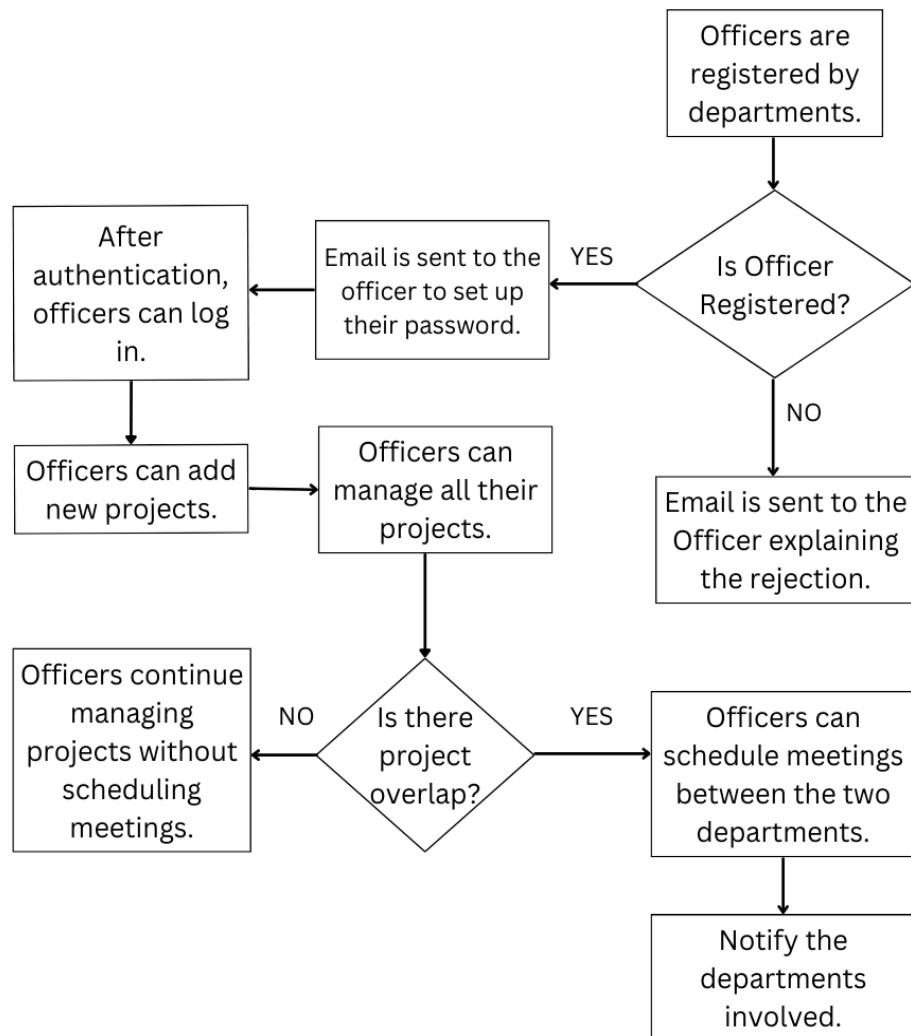


Fig. 3.3.3 Officer Flowchart

Fig 3.3.3 shows an Officer diagram that outlines the workflow for officer registration. Officers submit their information, which is reviewed by the administrator. If verified, they are assigned to a department; if not, corrections are requested, and the officer must re-submit the application. Approved officers are then linked to their respective departments.

3.4 Methodology Applied

The methodology behind PlanItUrban revolves around streamlining collaboration among various urban departments to improve project execution and management. This system is built on three levels of interaction—Department, Administrator and Officer—with each entity playing a distinct role in ensuring smooth communication and project coordination. The following is a flow of how these roles interact within the platform.

Department Registration and Resource Management:

Each department begins by registering on the PlanItUrban platform, uploading necessary documents to verify their legitimacy. The registration is then sent to the Administrator for review. Administrators verify the submitted details, ensuring they meet the required standards. If approved, departments are notified via email and can proceed to add their officers. If not, they are informed about the reasons for rejection. Once registered, departments can manage their resources through a centralized dashboard, streamlining coordination and reducing resource duplication across urban projects.

Officer Integration and User Management:

After a department's registration is approved, it can add officers to its team. Officers receive an email with prompts to set up their passwords for secure access to the platform. They are responsible for managing specific tasks related to the department's projects, such as resource allocation and scheduling, ensuring smooth project execution across the city's departments. Officers can also upload and share important documents that other departments might need, facilitating efficient data sharing and communication between various urban bodies.

Project Conflict Resolution:

During project planning and execution, potential conflicts—such as resource overlaps or scheduling issues—are flagged by the system. Notifications are sent to departments, enabling them to proactively address these issues. The platform includes a meeting scheduling feature, allowing departments to coordinate and resolve conflicts through timely discussions. An integrated calendar system tracks these meetings and sends reminders,

ensuring full participation and timely decision-making.

Real-Time Communication and Updates:

Communication is facilitated through a Notification and Communication system that alerts departments about updates on project status or resource availability. This ensures that all teams stay informed of developments and can adjust their plans accordingly. Departments also have access to discussion forums where they can collaborate with other teams and share critical information related to ongoing projects, ensuring transparency in decision-making and execution.

3.5 Hardware & Software Specifications

Hardware Requirements

The PlanItUrban platform requires specific hardware to ensure optimal performance and user engagement. As outlined in Table 3.5.1 Hardware Requirements, a Pentium or Intel processor is recommended for smooth operations. Additionally, at least 4GB of RAM is necessary for multitasking and efficient data handling. A hard disk with a minimum capacity of 20GB is required for storing project-related data, while a screen resolution of at least 1280x1024 pixels ensures clear visibility of the platform's interface.

Table 3.5.1 Hardware Requirements

Processor	Pentium/Intel
RAM	Minimum 4GB
Hard disk	20GB
Screen resolution	1280*1024 or larger

Software Requirements

The PlanItUrban platform also requires specific software for its optimal functioning. As outlined in Table 3.5.2 Software Requirements, the frontend is developed using Angular,

which enables a responsive and interactive user interface. The platform uses a MySQL database to manage and store data effectively, ensuring that all project information is easily accessible. The backend is built on Spring Boot, a powerful framework that ensures secure data transactions and supports the overall reliability and scalability of the platform. These software specifications work together to streamline interdepartmental collaboration and improve the efficiency of urban project management.

Table 3.5.2 Software Requirements

Frontend	Angular
Database	MySQL
Backend	Spring Boot

3.6 Experiment and Results for Validation and Verification

1. User Management Module Validation:

- **Experiment:** Test the user registration and verification process by enrolling multiple departments and their officers.
- **Result:** Successfully verified department registrations and ensured that officers received email notifications for account setup, confirming the effectiveness of the user management system.

2. Resource Management Module Verification:

- **Experiment:** Conduct trials by registering various resources across departments and tracking their visibility.
- **Result:** Enhanced visibility of resources was observed, leading to efficient sharing among departments, demonstrating improved coordination and utilization.

3. Project Management Module Testing:

- **Experiment:** Simulate overlapping tasks among departments to assess the notification system's effectiveness.
- **Result:** Conflicts were promptly identified through notifications, allowing departments to address issues proactively, thereby validating the conflict

resolution mechanism.

4. Communication and Notification Module Evaluation:

- **Experiment:** Implement alerts and updates regarding project statuses and resource availability.
- **Result:** Improved communication was noted, with departments receiving timely updates, enhancing overall project coordination.

5. Meeting Scheduling Module Assessment:

- **Experiment:** Schedule meetings among departments and track participation through the calendar interface.
- **Result:** Successful coordination of meetings was achieved, with participants receiving notifications, indicating effective management of inter-departmental discussions.

6. Feedback Integration Analysis:

- **Experiment:** Gather feedback from users regarding their experience with the platform's features and functionality.
- **Result:** User suggestions led to the identification of additional features that can be integrated to enhance the platform, validating the importance of user input in development.

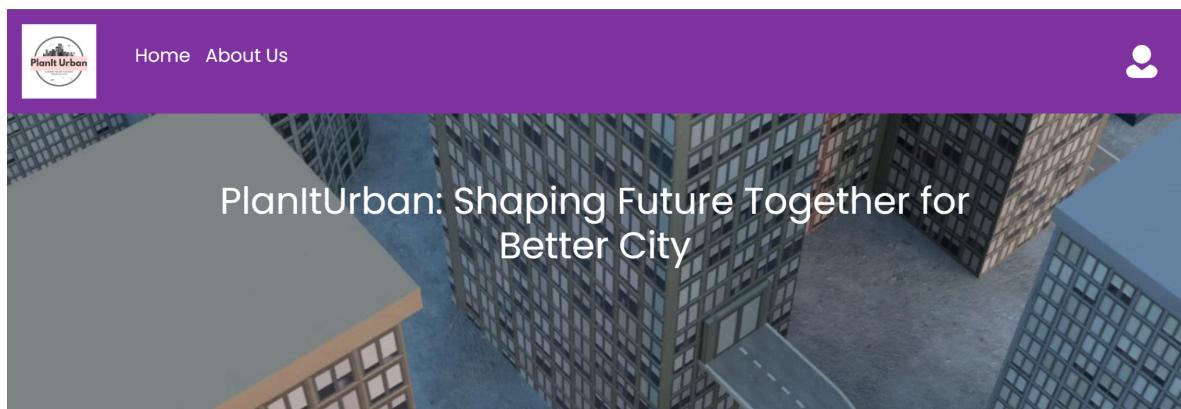
7. Process Automation Testing:

- **Experiment:** Test automated processes to streamline operations and ensure compliance with government regulations.
- **Result:** Initial automation trials showed a reduction in manual intervention, confirming that the platform can enhance operational efficiency while adhering to regulatory requirements.

These experiments and their results confirm the functionality and effectiveness of the PlanItUrban platform, highlighting its potential to improve inter-departmental collaboration and urban governance in Indian cities.

3.7 Result Analysis and Discussion

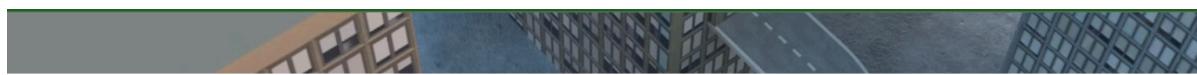
Home Page



Our Departments

Water Supply Department

Urban development



Our Departments

Water Supply Department

Urban development

Housing Department

Department of Public Health

Public Works Department

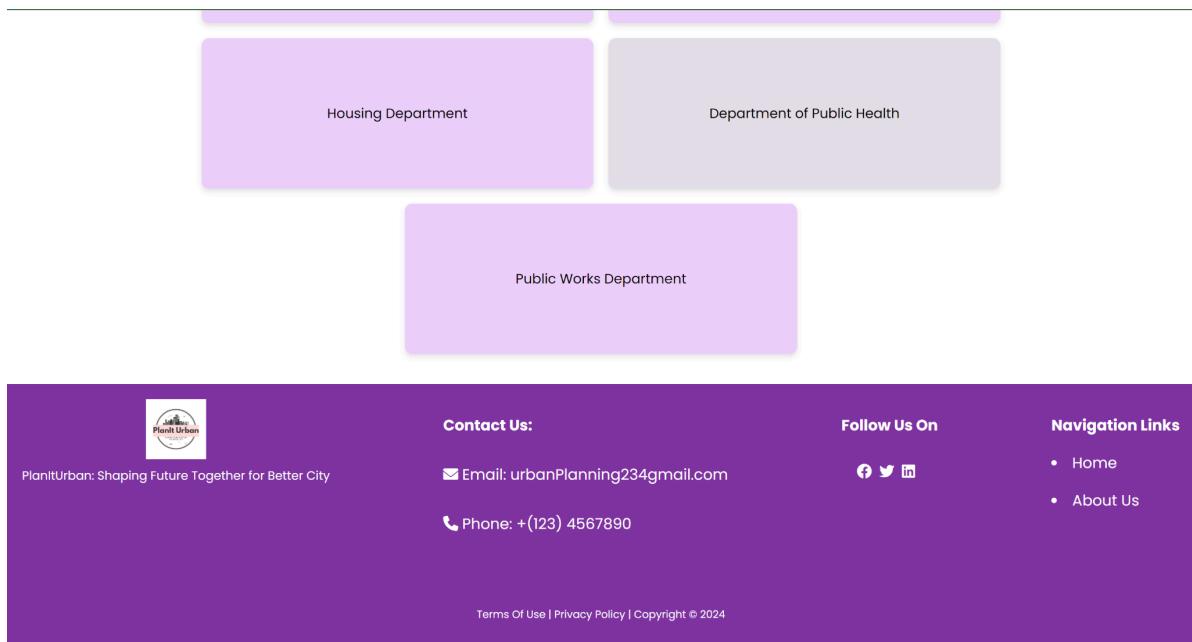


Fig. 3.7.1 Home Page

Fig 3.7.1 shows the home page of the PlanItUrban platform features a simplified navigation bar with two primary options: Home and About Us. The Home section provides users with an overview of all departments, while the About Us section offers insights into the platform's objectives and mission, helping users understand its role in enhancing interdepartmental collaboration in urban governance.

About Us Page

We are dedicated to improving urban governance in Indian cities by developing a digital platform that facilitates seamless inter-departmental cooperation. With multiple authorities and agencies often leading to resource underutilization and project delays, our platform enables departments to share data, technical resources, and project schedules, ensuring better coordination and preventing issues like project site interference. By streamlining task scheduling, work distribution, and reporting for inter-departmental projects, the platform reduces costs through unified project phasing and collaborative planning. Additionally, it provides tools for organizing meetings, fostering collaboration to make urban project execution more efficient and effective.

OUR KEY FEATURES



OUR MISSION

Our mission is to foster sustainable urban development by promoting collaboration between key departments. We aim to integrate ecological considerations into urban planning processes, ensuring that development projects are environmentally responsible while enhancing the quality of life for all citizens.

OUR VISSION

Our vision is to create thriving urban ecosystems where innovative planning harmonizes with nature. We envision a future where cities grow sustainably, with departments working together to minimize environmental impact and build resilient communities that balance human needs with the preservation of natural habitats.

Contact Us:

- Email: urbanPlanning234@gmail.com
- Phone: +(123) 4567890

Follow Us On

- Facebook
- Twitter
- LinkedIn

Navigation Links

- Home
- About Us

Terms Of Use | Privacy Policy | Copyright © 2024

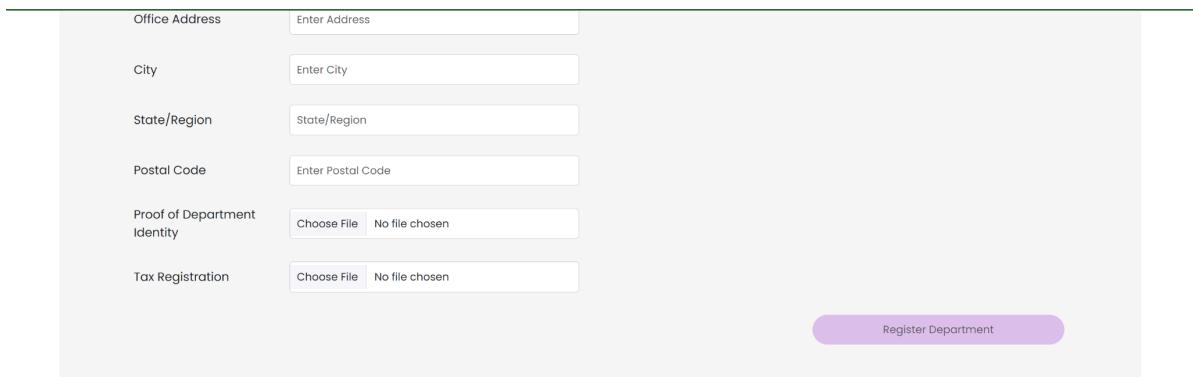
Fig. 3.7.2 About Us Page

Fig 3.7.2 depicts the About Us page which outlines the PlanItUrban platform's vision , mission and key features.

Department Registration

Department Information:

Department Name	Enter Department Name
Department Code	Pre-Assigned by Central Authority
Official Email ID	Enter Email
Mobile No.	Enter Contact No
Office Address	Enter Address
City	Enter City
State/Region	State/Region
Postal Code	Enter Postal Code



Office Address

City

State/Region

Postal Code

Proof of Department Identity No file chosen

Tax Registration No file chosen

Register Department



PlanItUrban: Shaping Future Together for Better City

Contact Us:

Email: urbanPlanning234@gmail.com

Phone: +(123) 4567890

Follow Us On

[Facebook](#) [Twitter](#) [LinkedIn](#)

Navigation Links

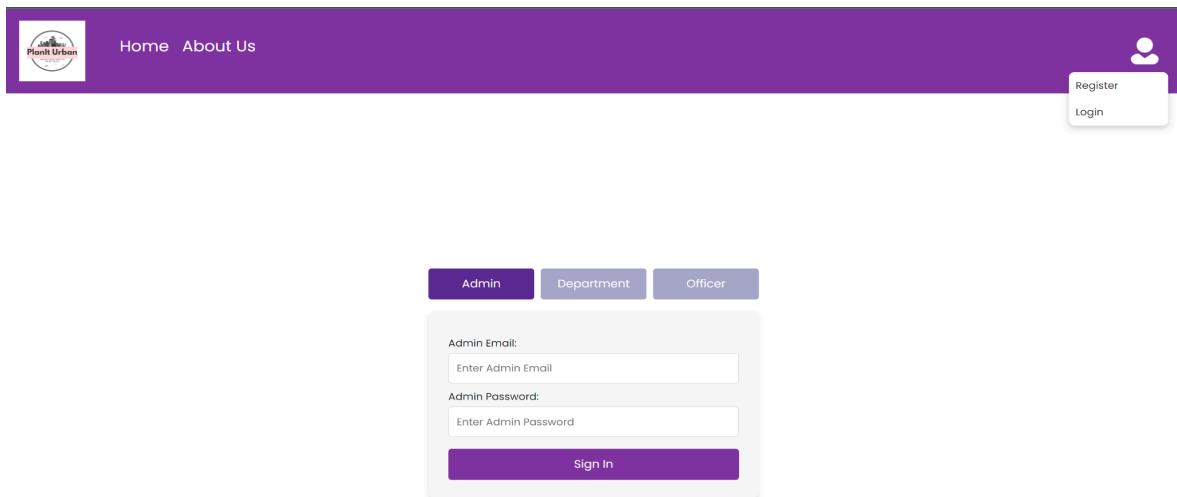
- Home
- About Us

[Terms Of Use](#) | [Privacy Policy](#) | [Copyright © 2024](#)

Fig. 3.7.3 Department Registration

Fig 3.7.3 shows Department Registration which includes a form that allows urban departments to fill out necessary details to register on the PlanItUrban platform. Departments must provide essential information such as department name, contact details etc. This registration process ensures that only authorized departments gain access to the platform, enabling them to collaborate effectively and manage urban projects efficiently.

Login



Home About Us

Register

Login

Admin **Department** **Officer**

Admin Email:

Admin Password:

Sign In

The image displays two screenshots of a web application's login interface. Both screenshots have a purple header bar with a logo on the left, 'Home' and 'About Us' links, and a user icon with 'Register' and 'Login' buttons on the right.

Top Screenshot (Department Tab Selected):

- Header: Home, About Us, User Icon, Register, Login
- Navigation: Admin, Department (highlighted in purple), Officer
- Form Fields:
 - Department Email: Enter Department Email
 - Department Password: Enter Department Password
- Action: Sign In (purple button)

Bottom Screenshot (Officer Tab Selected):

- Header: Home, About Us, User Icon, Register, Login
- Navigation: Admin, Department, Officer (highlighted in purple)
- Form Fields:
 - Officer Email: Enter Officer Email
 - Officer Password: Enter Officer Password
- Action: Sign In (purple button)

Fig. 3.7.4 Login

Fig 3.7.4 shows the Login Page features three distinct tabs for accessing the PlanItUrban platform: Administrator, Department and Officers. Each tab allows users to log in based on their specific roles.

Department Management

The screenshot shows the PlanItUrban platform's Department Management section. At the top, there's a purple header bar with the PlanItUrban logo, navigation links for Dashboard, Notifications, Map, Departments Management, and a user profile icon. Below the header, a sidebar on the left lists categories: Water Supply & Distribution, Public Works Management, and Urban Development Planning. The main content area displays detailed information for the 'Water Supply & Distribution' department, including its name, code, address, and contact details. It also shows uploaded documents like 'TaxProof.pdf' and provides 'Approve' and 'Reject' buttons. A small dropdown arrow is visible at the top right of the sidebar.

Fig. 3.7.5 Department Management

Fig 3.7.5 shows the Department Management page displaying essential information about the registered department, including its name, code, contact details, and uploaded documents. Administrator can also approve or reject submitted documents, facilitating efficient management and oversight of departmental activities within the PlanItUrban platform.

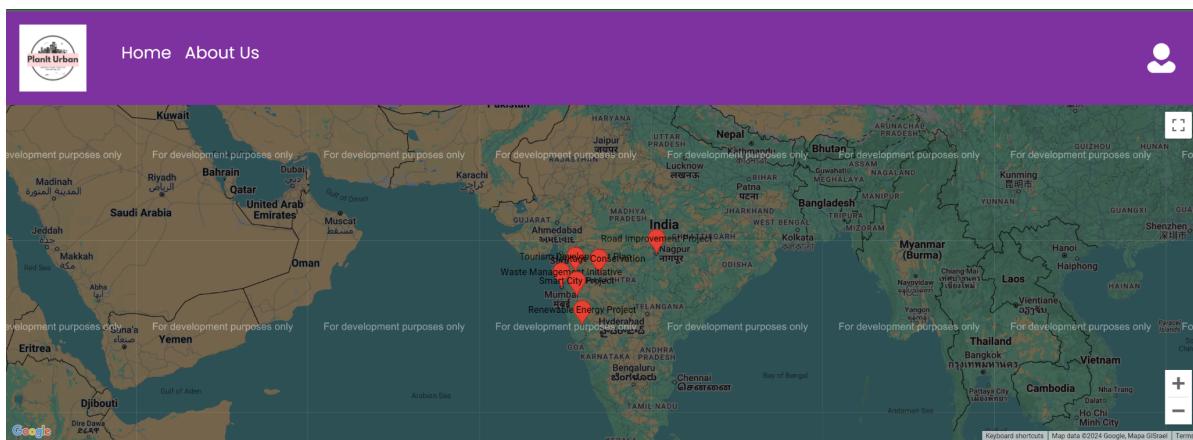
Department Dashboard

The screenshot shows the PlanItUrban platform's Department Dashboard. At the top, there's a purple header bar with the PlanItUrban logo, navigation links for Home and About Us, and a user profile icon. Below the header, a sidebar on the left lists categories: Recent Projects, Project Wise Budget Analysis, and a link to 'Budget Allocation for Various Projects'. The main content area displays a table titled 'Recent Projects' with columns for ID, Project Description, Start Date, End Date, Estimated Budget, Department, Action, and Uploaded Documents. The table lists five projects: PI01 (Construction of New Public Park), PI02 (Smart Traffic Management System), PI03 (Affordable Housing Development), PI04 (River Conservation and Water Management Project), and PI05 (Downtown Road Widening and Beautification). Each project row includes a 'View' and 'Edit' icon under the 'Action' column and a download icon under 'Uploaded Documents'. A small dropdown arrow is visible at the top right of the sidebar. At the bottom, there's a pie chart titled 'Project Wise Budget Analysis' with a legend for Road Construction, Water Pipeline, Bridge Renovation, Urban Development, and Waste Management.

Fig. 3.7.6 Department Dashboard

Fig 3.7.6 shows the Department Dashboard that summarizes recent projects, showing key details like project ID, timeline, budget, and department. It allows quick access to project documents and provides a visual budget analysis, aiding efficient project oversight on the PlanItUrban platform.

Map



Project Details

Smart City Project

Description: Development of smart infrastructure in Pune.

Location: Pune

Latitude: 18.5204

Longitude: 73.8567

Project Details

Smart City Project

Description: Development of smart infrastructure in Pune.

Location: Pune

Latitude: 18.5204

Longitude: 73.8567

Waste Management Initiative

Description: Effective waste management solutions in Mumbai.

Location: Mumbai

Latitude: 19.076

Longitude: 72.8777

Tourism Development Plan

Description: Enhancing tourism facilities in Nashik.

Location: Nashik

Latitude: 19.9975

Longitude: 73.788

Road Improvement Project

Description: Upgrading road infrastructure in Nagpur.

Location: Nagpur

Latitude: 21.1458



Fig. 3.7.7 Map with Project Details

As shown in Fig 3.7.7, the map interface displays project locations across a geographical area, with detailed project information such as the project name, status, and geographic coordinates listed below. This visual representation helps users quickly identify and manage projects based on their geographic distribution, improving the overall navigation and decision-making process on the PlanItUrban platform.

Projects Section

Add New Project

New Project Registration

Project Information:

Project Title	Enter Project Title
Project Description	Enter Project Description
Departments	Enter Departments
Project Location	Enter Project Location
Latitude	Enter Latitude
Longitude	Enter Longitude
Start Date	dd-mm-yyyy

Departments	Enter Departments
Project Location	Enter Project Location
Latitude	Enter Latitude
Longitude	Enter Longitude
Start Date	dd-mm-yyyy
End Date	dd-mm-yyyy
Estimated Budget	Enter Estimated Budget

File Upload Section:

Upload Project Plan	Choose File	No file chosen
Upload Budget PDF	Choose File	No file chosen

Create New Project

Fig. 3.7.8 Add New Project

As shown in Fig 3.7.8, the "Add New Project" interface allows officers to input detailed project information, including project name, description, start and end dates, location coordinates, and budget. This streamlined form ensures efficient project registration and management within the PlanItUrban platform.

Meeting Page

The screenshot shows a monthly calendar interface for the month of August 2024. The top navigation bar includes links for Dashboard, New Project registration, Notifications, Map, Meeting, View all Projects, and a user profile icon. Below the navigation is a header titled "Meetings" with a "Schedule Meeting" button. The main area is a grid-based calendar where each day is represented by a light gray box containing the date. The days of the week are labeled at the top: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday. The dates from 1 to 31 are filled into the grid. A dropdown menu for date selection is visible above the calendar, and a dropdown for the year "2024" is visible to the right.

Fig. 3.7.9 Meeting Page

Fig 3.7.9 shows the "Meeting Page" interface that provides a monthly calendar view for officers to track and manage scheduled meetings. The page includes navigation for date selection, project management links, and an option to create new meetings, facilitating organized meeting planning within the platform.

View All Projects Page

The screenshot shows a list of projects under the heading "View all projects". The top navigation bar includes links for Dashboard, New Project registration, Notifications, Map, Meeting, View all Projects, and a user profile icon. Below the navigation is a header with filter, density, and export options. The main area is a table with columns: ID, Project Description, Start Date, End Date, Estimated Budget, Department, Action, and Uploaded Documents. Each row represents a project with its specific details and download links for documents like project plans and requirements specifications.

ID	Project Description	Start Date	End Date	Estimated Budget	Department	Action	Uploaded Documents
PI01	Construction of New Public Park	2023-01-15	2024-03-30	₹200,000,000.00	Urban Development Department	<input checked="" type="checkbox"/> <input type="button" value="Download"/>	projectPlan.pdf
PI02	Smart Traffic Management System	2022-11-01	2022-12-15	₹250,000,000.00	Public Works Department (PWD)	<input checked="" type="checkbox"/> <input type="button" value="Download"/>	requirement_specifications_project.pdf
PI03	Affordable Housing Development	2023-05-10	2025-02-28	₹800,000,000.00	Housing Department	<input checked="" type="checkbox"/> <input type="button" value="Download"/>	budgetPlan.pdf
PI04	River Conservation and Water Management Project	2023-04-20	2024-09-30	₹1,144,000,000.00	Water Resources Department	<input checked="" type="checkbox"/> <input type="button" value="Download"/>	finalProjectReport.pdf
PI05	Downtown Road Widening and Beautification	2022-08-05	2023-12-01	₹440,000,000.00	Urban Development Department	<input checked="" type="checkbox"/> <input type="button" value="Download"/>	newProjectPlanRelease.pdf

Fig. 3.7.10 View All Projects Page

As shown in Fig 3.7.10, the "View All Projects" page displays a comprehensive list of ongoing projects, providing key details such as project name, status, start and end dates, and associated actions. This page allows users to efficiently access and manage various projects within the platform.

Dashboard Page

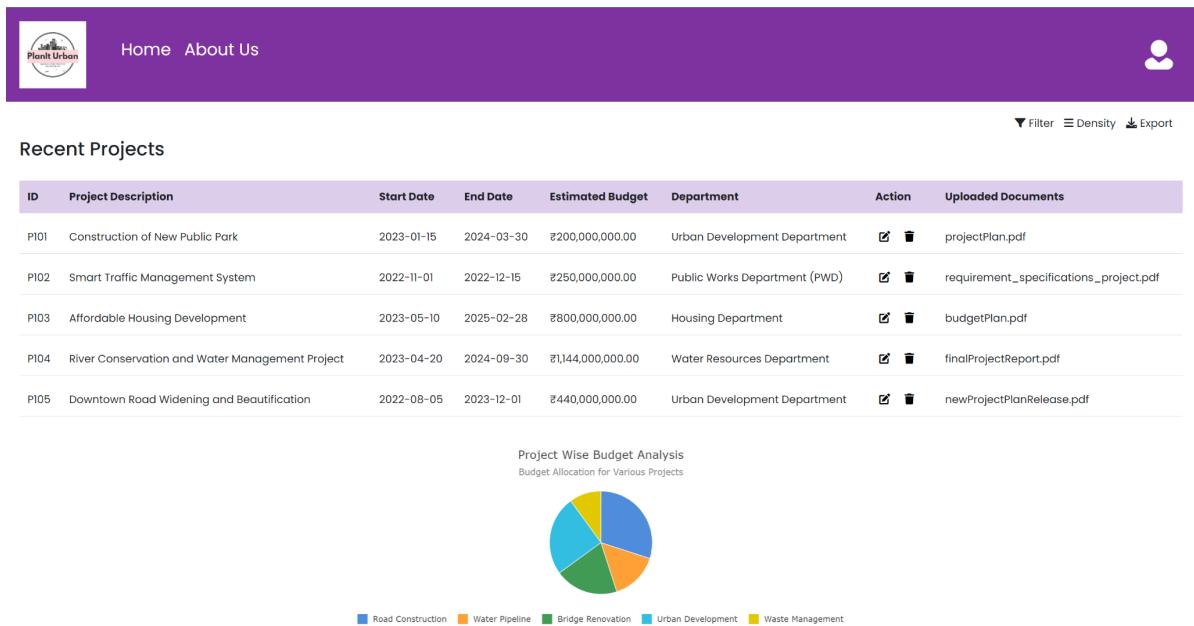
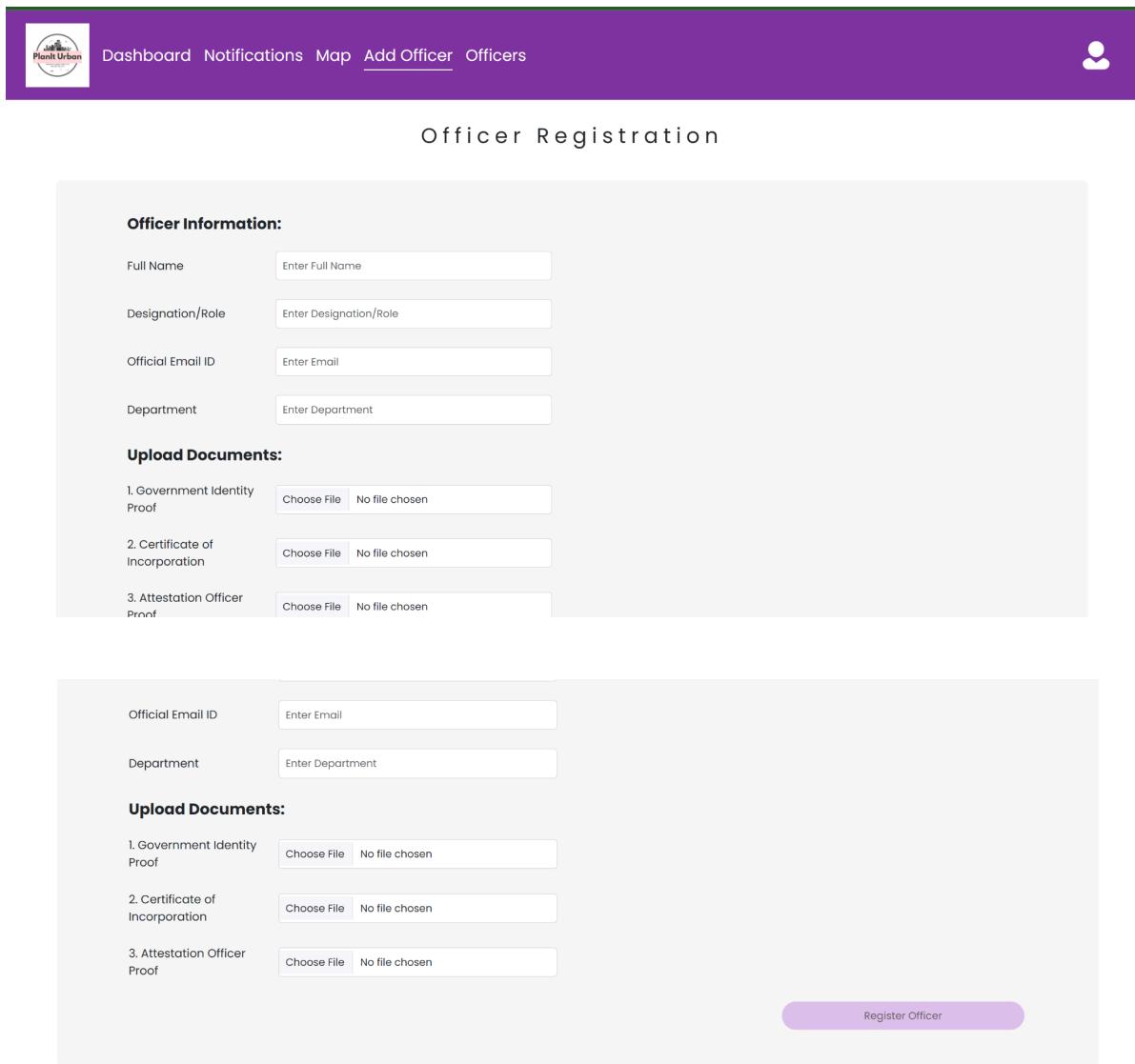


Fig. 3.7.11 Dashboard Page

Fig 3.7.11 shows the "Dashboard Page" that offers a summary of recent projects, including essential information like project status and completion percentage, along with a visual pie chart representation for project progress. This enables users to get a quick overview of overall project activity and performance.

Officers Section

Add New Officer



The screenshot shows the "Officer Registration" page. At the top, there is a purple header bar with the "Planit Urban" logo, navigation links for "Dashboard", "Notifications", "Map", "Add Officer", and "Officers", and a user profile icon. Below the header, the main content area has a light gray background. It contains two sections: "Officer Information:" and "Upload Documents:". The "Officer Information:" section includes input fields for "Full Name", "Designation/Role", "Official Email ID", and "Department". The "Upload Documents:" section includes three file upload fields labeled "1. Government Identity Proof", "2. Certificate of Incorporation", and "3. Attestation Officer Proof". Below these sections, there are additional input fields for "Official Email ID" and "Department". A "Register Officer" button is located at the bottom right of the form.

Fig. 3.7.12 Add New Officer

As shown in Fig 3.7.12, the "Add New Officer" page provides a registration form where departments can input officer details such as name, department, designation, contact information, and login credentials. This page ensures a streamlined process for adding new officers to the system.

View All Officers Page

Sr No	Officer Name	Designation Role	Email Id	Actions
1	Abhijeet Deshmukh	Chief Executive	abhijeet.deshmukh@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
2	Priya Kulkarni	HR Manager	priya.kulkarni@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
3	Swapnil Patil	IT Administrator	swapnil.patil@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
4	Snehal Joshi	Finance Director	snehal.joshi@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
5	Rohan Sawant	Operations Manager	rohan.sawant@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
6	Pooja Shinde	Operations Manager	pooja.shinde@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
7	Ajay Bhosale	Legal Advisor	ajay.bhosale@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
8	Aishwarya Jadhav	Business Analyst	aishwarya.jadhav@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
9	Manasi Pawar	Product Manager	manasi.pawar@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>
10	Anuja Khandekar	R&D Specialist	akshay.bhogle@company.com	<input checked="" type="checkbox"/> <input type="button" value="Delete"/>

Fig. 3.7.13 View All Officers Page

Fig 3.7.13 shows the "View All Officers" page which presents a list of registered officers, displaying their names, departments, designations, contact details, and relevant actions. This page allows users to easily manage officer profiles and perform updates or removals as needed.

3.8 Conclusion and Future work

In conclusion, PlanItUrban effectively addresses the challenges of coordination and resource underutilization in urban governance. By providing secure user access for Administrators, departments, and officers, the platform ensures that all stakeholders can engage seamlessly. Key modules facilitate efficient project management, resource sharing, and communication among urban departments. The notification system for overlapping tasks enables proactive conflict resolution, while centralized resource management enhances the sharing of equipment and expertise. Ultimately, PlanItUrban aims to improve operational efficiency and reduce project delays, significantly benefiting urban infrastructure development in Indian cities.

Future work includes as follows:

- Continue working on the module that generates reports for optimal resource

allocation and solutions to inter-departmental urban project conflicts via meeting recording.

- Address the suggestions to incorporate more features based on feedback and work towards automating more processes in accordance with government regulations.
- Develop a comprehensive and robust backend.

References

- [1] Z.-R. Peng, K.-F. Lu, Y. Liu, and W. Zhai, "*The Pathway of Urban Planning AI: From Planning Support to Plan-Making,*" Journal of Planning Education and Research, Jun. 2023.
- [2] S. Steiniger, M. E. Poorazizi, and A. J. S. Hunter, "*Planning with Citizens: Implementation of an e-Planning Platform and Analysis of Research Needs,*" Urban Planning, vol. 1, no. 2, pp. 49-64, Jun. 2016.
- [3] P. Nevejan, "E-governance and Urban Transformation: The Case of Citizen Participation in Urban Planning in India," South Asia Multidisciplinary Academic Journal (SAMAJ), no. 13, 2016.
- [4] D. Kylasam Iyer and F. Kuriakose, "*Digital Platforms as (Dis)Enablers of Urban Co-Production: Evidence From Bengaluru, India,*" Co-Production in the Urban Setting: Fostering Definitional and Conceptual Clarity Through Comparative Research Mar. 2024.
- [5] A. Anthony, "*The Role of Community Engagement in Urban Innovation Towards the Co-Creation of Smart Sustainable Cities,*" J. Knowl. Econ., vol. 15, pp. 1592–1624, Mar. 2024.
- [6] Fabusuyi, T., & Johnson, M. P. (2022). Enhancing the quality and social impacts of urban planning through community-engaged operations research. Environment and Planning B: Urban Analytics and City Science.
- [7] Afzalan, N., T. W. Sanchez, and J. Evans-Cowley. 2017. “*Creating smarter cities: Considerations for selecting online participatory tools.*” Cities 67: 21–30.
- [8] T. Yigitcanlar, N. Kankanamge, M. Regona, A. R. Maldonado, B. Rowan, A. Ryu, K. C. Desouza, J. M. Corchado, R. Mehmood, and R. Y. M. Li, "Artificial Intelligence Technologies and Related Urban Planning and Development Concepts: How Are They Perceived and Utilized in Australia?," School of Built Environment, Queensland University of Technology, Brisbane, Australia, Nov.

2020.

- [9] M. Schmelzle, S. Wenzel, J. Meurer, T. Ludwig, and V. Pipek, "*Digital Urban Planning Platforms: The Interplay of Digital and Local Embeddedness in Urban Planning,*" Proc. ACM on Hum.-Comput, July 2021.
- [10] P. Chamoso, A. González-Briones, F. De La Prieta, G. K. VenyagamooM. Corchado, "*Smart city as a distributed platform: Toward a system for citizen-oriented management,*" *Comput. Commun.*, vol. 155, pp. 290-300, Jan. 2020.
- [11] A. J. Y. Goh, W. C. R. Goh, and C. H. Goh, "*Smart City 4.0 from the Perspective of Open Innovation,*" Jan. 2020.
- [12] T. H. Son, Z. Weedon, T. Yigitcanlar, T. Sanchez, J. M. Corchado, and R. Mehmood, "*Algorithmic urban planning for smart and sustainable development: Systematic review of the literature,*" *Sustainable Cities and Society*, vol. 94, 104562, Mar. 2023.
- [13] P. Repette, J. Sabatini-Marques, T. Yigitcanlar, D. Sell, and E. Costa, "*The Evolution of City-as-a-Platform: Smart Urban Development Governance with Collective Knowledge-Based Platform Urbanism,*" *Land*, vol. 10, no. 1, p. 33, Jan. 2021.
- [14] M. Hasan, et al., "*Coordination of Urban Planning Organizations as a Process of Achieving Effective and Socially Just Planning: A Case of Dhaka City, Bangladesh,*" *Cities*, vol. 42, pp. 187-197, 2015.
- [15] K. Parkar and S. T. Lama, "*The Digitalization of Urban Governance in India,*" *South Asia Multidisciplinary Academic Journal (SAMAJ)*, 2023.