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People-Centric Planning Approach for The Lingaraj Temple Influence Zone: Enhancing Pilgrim Experience and Urban Livability

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Abstract: ***Sacred spaces have historically played a significant role in shaping the spatial structure, cultural identity, and economic activities of Indian cities. In Bhubaneswar, the Lingaraj Temple functions as a major urban anchor, influencing surrounding land use patterns, mobility systems, and community interactions. Over time, however, rapid urbanization, increasing pilgrimage activity, and growing commercialization have placed considerable pressure on the temple precinct and its surrounding areas. These changes have resulted in challenges such as congestion, encroachment, inadequate public amenities, and conflicts between pedestrian and vehicular movement, which collectively affect both the quality of the pilgrim experience and overall urban livability.This study examines the influence of the Lingaraj Temple on spatial organization and pedestrian movement within its influence zone and explores the potential of a people-centric planning approach to address these challenges. A mixed-method methodology is adopted, integrating primary surveys—including pedestrian movement observation, land use mapping, and stakeholder perception analysis—with secondary data sources and policy review. Analytical tools such as GIS mapping, time-space analysis, and crowd density assessment are used to understand spatial patterns, activity distribution, and movement dynamics around the temple.The findings indicate that pedestrian movement forms the dominant mode of mobility in the area but is significantly constrained by limited street capacity, encroachments, and insufficient infrastructure. The absence of adequate public amenities, inefficient space utilization, and lack of organized management systems further intensify congestion and reduce accessibility and safety, particularly during periods of festivals. Based on these observations, the study proposes a set of people-centric planning interventions focused on improving walkability, enhancing public amenities, organizing informal activities, and strengthening crowd management strategies. The research emphasizes the importance of integrating cultural context with urban planning practices to create inclusive, efficient, and sustainable environments in temple precincts, thereby enhancing both the pilgrimage experience and the overall quality of urban life.***

Keywords: Sacred Spaces, People-Centric Planning, Pedestrian Movement, Spatial Organization, Urban Livability, Cultural Landscape.

I. INTRODUCTION

Sacred spaces have historically played a significant role in shaping the spatial organization, cultural identity, and socio-economic structure of Indian cities. In contemporary urban conditions, rapid urbanization, increasing tourism activities, commercialization, and rising pilgrim inflow are creating immense pressure on these heritage precincts. Temple cities such as Bhubaneswar demonstrate how sacred institutions continue to influence surrounding urban growth, movement patterns, and community interactions.

The Lingaraj Temple precinct represents one of the most significant sacred urban landscapes in Bhubaneswar, where religious activities strongly influence land use, circulation systems, public spaces, and local economic activities. However, the increasing concentration of pilgrims and mixed urban activities has resulted in congestion, pedestrian-vehicle conflicts, encroachments, inadequate public infrastructure, and environmental stress within the Old Town area.

A. Aim

To analyse the influence of the Lingaraj Temple on spatial organization, pedestrian movement, and surrounding urban activities within the Old Town area of Bhubaneswar, and to propose people-centric planning strategies for enhancing pilgrim experience, accessibility, and urban livability.

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B. Objective

Theprimaryobjectives are:

1) To study the spatial organization and land use pattern surrounding the Lingaraj Temple.
2) To examine the interaction between sacred spaces and the surrounding urban.
3) To analyze pilgrim movement, pedestrian circulation, and activity patterns within the study area.
4) To develop people-centric planning interventions for improving accessibility, safety, public amenities, and overall pilgrim experience within the sacred precinct.

C. ContributionsandPaperOrganization

The study emphasizes the importance of integrating sacred heritage with contemporary urban planning principles. By adopting a people-centric planning approach, the research aims to improve accessibility, safety, public space quality, and the overall pilgrimage environment while preserving the cultural and spiritual identity of the Lingaraj Temple precinct.

II. LITERATURE STUDY

Sacred space refers to a spiritually and culturally significant place distinguished from ordinary urban space through religious beliefs, rituals, and symbolic meanings. Such spaces influence surrounding land use, urban form, movement systems, and community identity. Sacred spaces often develop around temples, pilgrimage routes, sacred water bodies, and ritual corridors, creating a strong relationship between religion and urban structure.Sacred spaces play an important role in shaping urban transformation by influencing settlement growth, circulation systems, economic activities, and public spaces. Temple precincts often act as urban growth centers where commercial activities, residential areas, and social interactions develop around the sacred core. Festivals and rituals also transform streets and open spaces into ceremonial and social gathering areas.People-centric planning is an approach that prioritizes human comfort, accessibility, safety, and social interaction over vehicle-oriented development. It focuses on improving pedestrian infrastructure, public spaces, inclusiveness, and overall user experience within urban environments. Tools such as behavior mapping, crowd analysis, and accessibility assessment are commonly used in people-centric planning studies.Pilgrim-centric planning focuses on improving movement, safety, convenience, and spiritual experience for pilgrims within sacred precincts. It emphasizes crowd management, processional routes, pedestrian accessibility, public amenities, and infrastructure improvements during both normal and festival periods.

A. Case study – 1 (Tirumala Temple Complex)

The study on the Tirumala Temple Complex examines temporal pilgrim movement and activity patterns within the temple precinct. It highlights how rituals, festivals, and time-based activities influence crowd distribution, circulation, and space utilization. The study demonstrates the importance of understanding pilgrim dynamics for improving crowd management and spatial planning in temple cities.

B. Case study – 2 (Kashi Viswanath temple corridor)

The Kashi Vishwanath Temple Corridor project demonstrates how heritage conservation and modern infrastructure can be integrated to improve pilgrimage management. The project enhanced accessibility, pedestrian movement, public amenities, and tourism infrastructure while preserving cultural heritage. The study highlights the role of corridor development in improving urban livability within sacred cities.

C. Case study – 3 (Jagannatha Temple Puri)

The study on Jagannath Puri explains how temples, ritual routes, festivals, and sacred spaces collectively shape the spatial structure of the city. The Jagannath Temple acts as the central sacred core influencing pilgrimage movement, cultural activities, and urban development. The research highlights the relationship between sacred landscapes and urban identity within pilgrimage cities.

III. METHODOLOGY

The study follows a mixed-method approach combining both primary and secondary data collection methods to analyse the influence of the Lingaraj Temple on spatial organization, pedestrian movement, and surrounding urban activities within the Old Town area of Bhubaneswar. The research begins with identifying major issues such as congestion, traffic conflicts, encroachment, inadequate infrastructure, and poor accessibility within the temple precinct.

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Conceptual and empirical literature studies were conducted to understand sacred spaces, pilgrim movement, people-centric planning, and urban transformation in temple cities through case studies like Tirumala Temple, Kashi Vishwanath Corridor, and Jagannath Puri.

Primary data were collected through field observation, questionnaire surveys, pedestrian and pilgrim movement surveys, and crowd behaviour studies, while secondary data were collected from planning reports, government documents, GIS maps, satellite imagery, census data, and tourism records.

The collected data were analysed using land use analysis, connectivity and road network analysis, pedestrian movement analysis, and crowd density assessment. Based on the findings, key issues, potentials, and people-centric planning proposals were identified to improve accessibility, public spaces, pilgrim facilities, and urban livability within the Lingaraj Temple precinct.

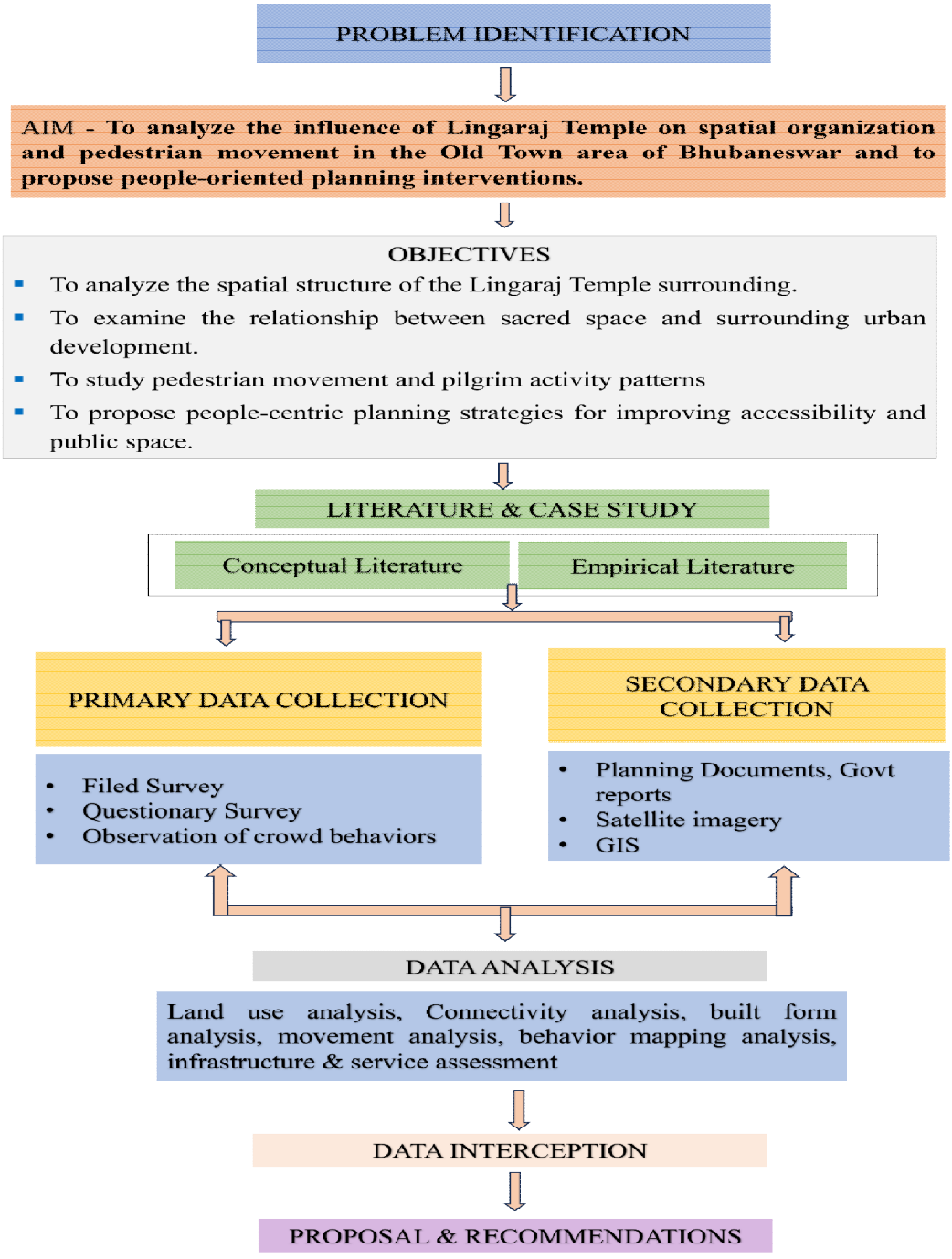


Fig01:Methodology

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IV. DATA COLLECTION & ANALYSIS

A. Land Use Analysis

The land use analysis shows that the study area is predominantly residential, occupying nearly 51% of the total area. Water bodies account for approximately 12%, while commercial, public/semi-public, open spaces, green spaces, and temple areas form the remaining land use categories. Commercial activities are mainly concentrated near major movement corridors and temple access routes due to pilgrim activities.

Table 2: Land use analysis

Land Use	Area (sqm)
Waterbody	122,793
Residential	524,293
Commercial	94,999
Public/Semi-public	114,482
Open Space	76,293
Green Space	47,696
Temple	47,683
Total	1,028,239

B. Connectivity

The road network is dominated by local roads, forming nearly 61% of the circulation system, while collector roads function as major movement corridors connecting important activity zones. Mixed traffic conditions and high pedestrian movement create congestion near key junctions and temple entry areas.

C. Growth Pattern Analysis

The study area exhibits an organic and temple-oriented growth pattern centered around the Lingaraj Temple. Residential neighborhoods and commercial activities gradually developed around the sacred core, resulting in dense built form, narrow streets, and mixed land-use development. Increasing pilgrimage activities have intensified pressure on roads, infrastructure, and public spaces.

D. Pilgrim movement & activity analysis

Pilgrim movement analysis indicates that walking is the dominant mode of movement within the precinct. Major ritual routes and processional streets connect important sacred nodes and public spaces. During festivals, streets transform into ceremonial corridors with heavy crowd movement and temporary commercial activities.

Table 3: Festival data

Festival data						
Event	Avg Footfall	Toilets Needed	Toilets Provided	Tankers Needed	Tankers Provided	Barricade
Maha Shivaratri	225,000	225	60–80	90	15–20	1.5–2 km
Ashokastami	115,000	115	30–55	46	-	1 km
Shravan Monday	32,500	33	-	13	-	100–200 m

E. Vendor density analysis

The study reveals strong seasonal variation in visitor density. Peak seasons record daily footfall ranging from 9,000 to 15,000 visitors, while off-season periods experience comparatively lower pilgrim inflow. High crowd density during festivals creates pressure on pedestrian infrastructure, traffic management, sanitation, and public amenities.

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Table 4: Vendor distribution analysis

Vendor distribution analysis	
Vendor Type	Estimated Number
Flower Vendors	40–60
Prasad Shops	35–50
Puja Material Shops	30–40
Temporary Festival Vendors	100+ during festivals
Food Stalls	25–35
Souvenir Shops	10–20

F. Public space and infrastructure analysis

The analysis highlights inadequate pedestrian facilities, discontinuous footpaths, traffic conflicts, encroachment, insufficient parking, and poor sanitation infrastructure within the study area. Existing public spaces are heavily utilized during festivals and social gatherings but lack proper organization and pedestrian-friendly infrastructure.

V. RESEARCH GAP

Most existing studies on temple cities and pilgrimage precincts primarily focus on heritage conservation, religious tourism, ritual activities, or crowd management within temple complexes. Limited research has been conducted on the integrated relationship between sacred spaces, surrounding urban spatial organization, pedestrian movement, and every day public life in the Old Town area of Bhubaneswar.

Previous studies such as Tirumala, Kashi Vishwanath, and Jagannath Puri mainly emphasize pilgrimage management, ritual landscapes, and heritage development, but provide limited focus on people-centric urban planning interventions, pedestrian accessibility, public space quality, and mobility infrastructure around sacred precincts.

There is also a lack of detailed spatial analysis related to pedestrian behaviour, circulation conflicts, public space usage, and the impact of pilgrimage activities on surrounding urban livability within the Lingaraj Temple influence zone. Therefore, the present study attempts to bridge this gap by integrating sacred space analysis with people-centric planning approaches to improve accessibility, pedestrian movement, public infrastructure, and overall pilgrim experience while preserving the cultural identity of the precinct.

Table 5: Gap analysis

Gap Analysis				
Parameter	Existing Condition	Standard / Required Condition	Quantitative Gap	Inference
Pedestrian Infrastructure	Only ~1084 m footpath available out of 3117 m road length	Continuous pedestrian network along all major roads	~2033 m footpath deficit (65%)	Major pedestrian deficiency
Footpath Width	Existing width: 1.8 m – 2.75 m	Required: 3–4 m in pilgrim corridors	Deficit of 1–1.5 m on major stretches	Inadequate for peak crowd movement
Vendor Concentration	100+ temporary vendors during festivals	Dedicated vending zones absent	High encroachment pressure	Public space occupation

Road Width Variation	Carriageway width varies from 3.75 m to 7.5 m	Minimum 6–9 m desirable for mixed pilgrimage movement	Several links below required width	Bottlenecks and mobility conflict
Public Amenities	Toilets & resting areas temporary during festivals	Permanent public amenities required year-round	Insufficient service coverage	Pilgrim discomfort
Green/Open Space	Open space + green space only ~12% combined	Higher public open space needed in heritage precincts	Insufficient shaded gathering areas	Heat stress and crowd pressure
Walking Dependency	65–70% pilgrims move on foot	Pedestrian-first environment required	Existing roads remain vehicle-oriented	Poor walkability

VI. PROPOSAL

The proposal focuses on improving pilgrim experience, pedestrian accessibility, public spaces, and urban livability within the Lingaraj Temple influence zone while preserving its sacred and cultural identity. The proposed interventions aim to reduce congestion, improve mobility, strengthen heritage character, and create a safer and more inclusive environment for pilgrims, local residents, and visitors. A pedestrian-oriented sacred corridor is proposed around the temple core to reduce vehicular conflict and improve walkability. Selected streets near the temple precinct will function as pedestrian-priority zones during peak hours and festival periods.he proposal for the Lingaraj Temple precinct focuses on developing a people-centric and pilgrim-friendly environment while preserving the sacred and cultural identity of the area. The proposed interventions aim to improve pedestrian accessibility, public spaces, mobility systems, crowd management, and urban livability within the Old Town precinct of Bhubaneswar. A pedestrian-priority zone is proposed around the temple core to reduce vehicular conflicts and improve walkability. The proposal includes wider and continuous footpaths, barrier-free access, shaded walkways, resting spaces, improved signage, and better street lighting to ensure safe and comfortable movement for pilgrims and visitors. Vehicular movement near the temple core will be restricted during peak hours and major festivals to create a safer pedestrian environment.

The proposal also includes the development of a heritage corridor connecting important sacred nodes, ritual routes, temples, and Bindusagar Lake. Streetscape improvements, heritage-themed street furniture, cultural signage, façade enhancement, and visual improvement of sacred streets are proposed to strengthen the cultural identity and visual character of the precinct.

Bindusagar Lake and its surrounding areas are proposed to be developed as active public and cultural spaces through ghat improvement, landscaping, seating areas, green buffers, public plazas, and enhanced lighting. These interventions aim to improve environmental quality and create vibrant social and cultural gathering spaces.

To reduce encroachment and improve circulation, organized vending zones are proposed within the temple precinct. Dedicated spaces for flower vendors, prasad shops, and temporary festival markets will help support local livelihoods while maintaining organized public spaces and pedestrian movement.

Traffic and parking management strategies are also proposed to reduce congestion within the sacred core. Peripheral parking zones, shuttle services, one-way circulation systems, festival diversion routes, and improved last-mile connectivity through e-rickshaws and public transport are suggested to manage traffic efficiently.

The proposal further emphasizes the improvement of public amenities such as toilets, drinking water facilities, resting shelters, information kiosks, waste management systems, and sanitation infrastructure to enhance pilgrim comfort and overall urban livability.

Special crowd management strategies are proposed during major festivals such as Mahashivaratri and Ashokastami.

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These include barricaded queue systems, temporary pedestrian routes, emergency medical facilities, crowd surveillance systems, and temporary public amenities to ensure safe and efficient management of large gatherings.

VII. DISCUSSION

A. Limitation & constrains

The study is limited by time constraints and the availability of primary data within the study area. Pilgrim movement and crowd behavior were observed during selected periods and may vary across different seasons and festival events. The analysis mainly focuses on the Lingaraj Temple influence zone and does not cover the wider city-level impacts of pilgrimage activities. Limited availability of detailed traffic, tourism, and socio-economic data also restricted deeper quantitative analysis. In addition, rapid urban changes and temporary festival-based activities may alter the existing spatial and movement patterns over time.

B. Alignment with literature findings

The study aligns with existing literature on sacred spaces, pilgrimage-based urban development, and people-centric planning approaches. Similar to the case studies of Tirumala, Kashi Vishwanath, and Jagannath Puri, the research demonstrates that sacred spaces strongly influence spatial organization, pedestrian movement, economic activities, and cultural identity within temple cities. The findings also support literature emphasizing the importance of pedestrian-friendly infrastructure, crowd management, heritage conservation, and public space improvement in pilgrimage environments. The study further reinforces the need to integrate heritage preservation with sustainable and people-oriented urban planning strategies for improving pilgrim experience and urban livability.

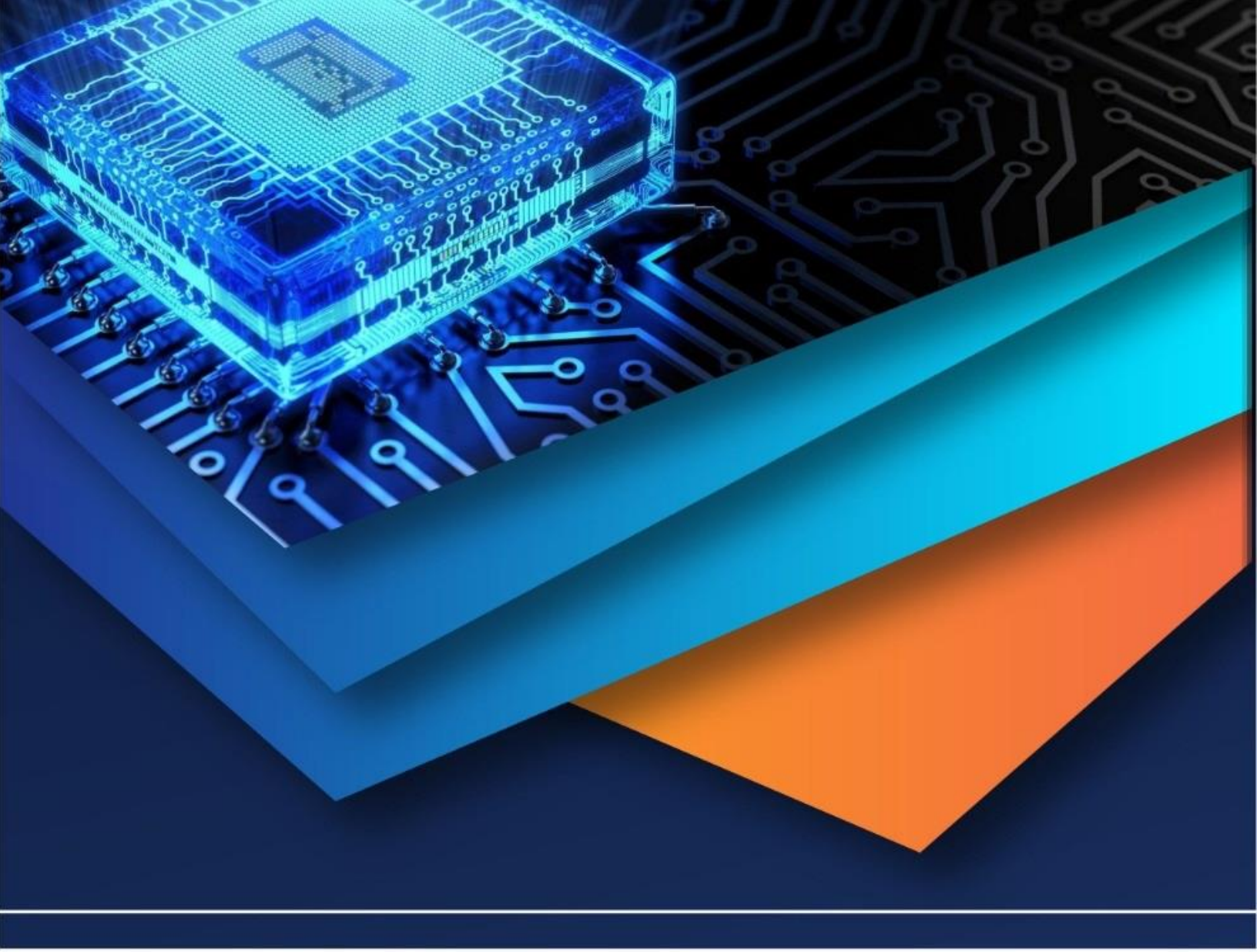
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