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A SPATIAL ANALYSIS THROUGH ISOVISTS: A COMPARATIVE STUDY OF DIFFERENT ARCHITECTURAL TYPOLOGIES

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Abstract: This research paper explores the application of isovist analysis in understanding spatial perception and visibility within different architectural typologies. The study examines four typologies—modern residences, traditional Chettinad houses, campus environments, and forts—to evaluate how spatial organization influences visibility, movement, and user experience. Spatial analyses were conducted by second- and third-year architecture students using the concept of isovists as a tool for interpreting built environments. The study compares openness, enclosure, connectivity, and visual accessibility across the selected typologies. The findings demonstrate how isovist analysis can reveal the relationship between architectural form and human spatial behavior, thereby contributing to architectural research and design methodologies.

Index Terms - Isovist Analysis, Spatial Visibility, Spatial Perception, Architectural Typologies, Space Syntax, Visual Connectivity, Spatial Organization, Movement Patterns, Built Environment, Architectural Research, Modern Residence, Chettinad House, Campus Planning, Fort Architecture

I. INTRODUCTION

Architecture is not only concerned with physical form but also with the way people visually perceive and experience spaces. Visibility and spatial perception significantly influence movement, interaction, orientation, and emotional response within built environments. One of the important analytical tools used to study these spatial relationships is the concept of the isovist.

An isovist is defined as the area visible from a particular point in space. It helps in understanding how people visually interact with architectural environments and how spatial configurations affect perception and movement. Isovist analysis has become an important method in spatial studies and Space Syntax research because it allows designers to quantitatively and qualitatively evaluate visibility patterns within buildings and urban spaces.

This research investigates four different architectural typologies: modern residences, traditional Chettinad houses, campuses, and forts. Each typology possesses unique spatial characteristics shaped by cultural, functional, and historical factors. By comparing these typologies through isovist analysis, the study aims to understand how visibility and spatial organization vary across different architectural contexts.

The spatial analyses were conducted by second- and third-year architecture students as part of an academic exploration into spatial perception and visibility studies. The research highlights the educational and analytical value of isovist techniques in architectural learning and design interpretation.

1.1. Why architects use isovists

Architects and urban designers use isovists to analyze visibility and understand how people experience and navigate spaces. Through isovist analysis, designers can evaluate what is visible from a particular location, whether entrances and important destinations are easily seen, and whether wayfinding within a building or urban environment is intuitive. Isovists also help assess the spatial experience of a place by indicating whether a space feels open, enclosed, dramatic, or confusing to users. In terms of safety and surveillance, isovist analysis allows architects to determine whether areas can be visually monitored effectively and to identify potential blind spots. Additionally, isovists are used to study movement and behavior, as people generally tend to move toward spaces with broader visibility; this principle is often applied in the design of retail stores, museums, and public buildings. In urban design, isovists help analyze visibility along streets, public squares, and pedestrian pathways, contributing to a better understanding of how people perceive and interact with city environments.

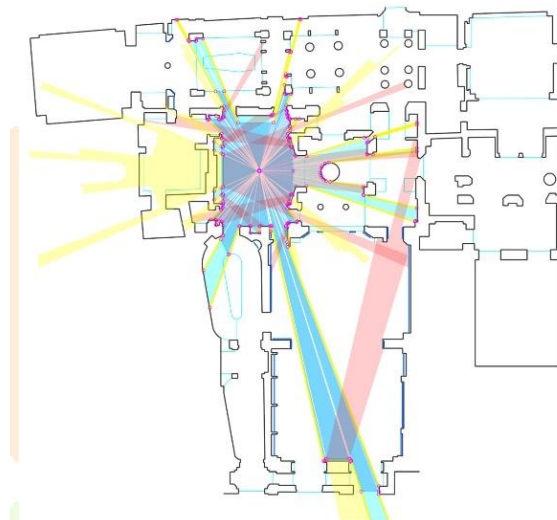


fig.1.1.1. The plan illustrating the isovist view

II. OBJECTIVE

The objectives of this study are to understand the concept and application of isovists in architecture and to analyze visibility patterns within different spatial typologies. The study also aims to compare the qualities of openness, enclosure, and connectivity across the selected case studies in order to identify spatial variations and relationships. Furthermore, it seeks to examine how spatial organization influences movement patterns and user perception within built environments. Finally, the research evaluates the effectiveness of isovist analysis as a methodological tool for architectural research and education, highlighting its potential in understanding spatial experience and design interpretation.

III. SCOPE OF STUDY

The study focuses on four architectural typologies: Modern Residence, Traditional Chettinad House, Campus Environment, Fort Architecture. The research primarily examines spatial visibility, visual connectivity, and movement patterns through isovist analysis. The study is limited to selected case studies analyzed by architecture students and does not include behavioral surveys or advanced computational simulations.

IV. REASON FOR CHOOSING THE FOUR TYPOLOGIES

The four typologies—modern residence, traditional Chettinad house, campus, and fort—were selected for this study because each represents a distinct spatial organization, functional purpose, and architectural character. These typologies provide a broad comparative framework for understanding how visibility, movement, and spatial perception vary across different built environments through isovist analysis.

4.1. Modern Residence

The modern residence was chosen to study contemporary spatial planning, which often emphasizes openness, visual continuity, and flexible movement. Modern residential architecture typically features open-plan layouts and minimal spatial barriers, making it suitable for analyzing large and continuous isovists.

4.1.1. Chandroth is a contemporary residence located on the outskirts of Thrissur, Kerala, designed as a reflection of the architect's childhood memories and cultural roots. Surrounded by lush farmlands, the house seamlessly blends modern living with the traditional architectural essence of Kerala. Built using rustic raw materials, the residence creates a warm and timeless character while maintaining a strong connection with its rural context and heritage.



fig.4.1.1. Chandroth Residence view



fig. 4.1.2. Entrance view of Chandroth residence

4.2. Traditional Chettinad House

The traditional Chettinad house was selected because of its unique cultural and climatic response through layered spatial arrangements, courtyards, transitional spaces, and hierarchical organization. This typology provides an opportunity to study controlled visibility, privacy, and sequential spatial experiences.

4.2.1. The Muthu Chettiyar Veedu - These houses are known for their grand scale, elegant courtyards, spacious halls, intricately carved wooden elements, and the use of high-quality materials sourced from different parts of the world. The design reflects a harmonious blend of functionality, climate-responsive planning, and artistic craftsmanship. Features such as internal courtyards for natural light and ventilation, decorative facades, Athangudi tiles, and ornamental columns showcase the cultural identity and prosperity of the community. These houses stand as valuable heritage structures that preserve the history, traditions, and architectural excellence of Chettinad.

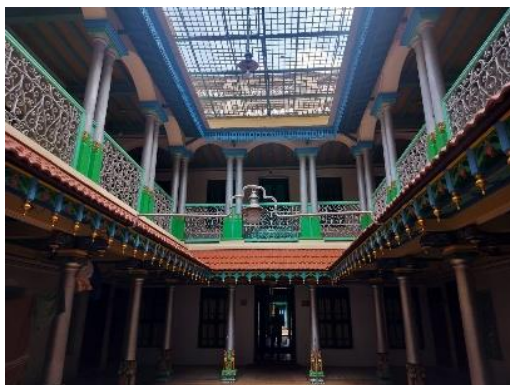


fig.4.2.1. Interior View – The Muthu Chettiyar Veedu



fig.4.2.2. Entrance view of the Muthu Chettiyar Veedu

4.3. Campus Environment

The campus typology was included to understand spatial interaction within large institutional environments. Campuses consist of interconnected buildings, pathways, open spaces, and social gathering areas, making them ideal for studying navigation, accessibility, and movement patterns through visibility analysis.

4.3.1. State University of Performing and Visual Arts - The State University of Performing and Visual Arts (SUPVA) campus is conceived as a dynamic educational environment that reflects creativity, innovation, and artistic expression through its architectural design. The campus planning emphasizes functional zoning, interconnected academic spaces, and open courtyards that encourage interaction, collaboration, and cultural exchange among students. Contemporary architectural forms, spacious studios, naturally lit workspaces, and thoughtfully designed landscape elements create a vibrant learning atmosphere. The integration of built and open spaces enhances visual connectivity, environmental comfort, and user experience, while the campus architecture symbolizes the university's commitment to nurturing excellence in the performing, visual, and creative arts.



fig.4.3.1. SUPVA Campus View



fig.4.3.2.SUPVA Campus overall View

4.4. Fort Architecture

The fort typology was chosen due to its defensive spatial planning and strategic organization. Forts are designed with controlled access, surveillance points, narrow pathways, and layered movement systems, allowing the study of restricted visibility and spatial complexity.

4.4.1. Nagaur Fort – Nagaur Fort is an outstanding example of Rajput military architecture, strategically planned on the plains of Nagaur in Rajasthan. The fort complex is enclosed by massive defensive walls, bastions, and multiple gateways, demonstrating a well-organized layout that effectively integrates defense, administration, residential quarters, palaces, temples, gardens, and water management systems. Its architectural character reflects a harmonious blend of Rajput and Mughal influences, evident in its richly decorated palaces, intricately painted interiors, ornamental jharokhas, courtyards, and landscaped gardens. The fort's hierarchical spatial organization, efficient circulation, and sustainable planning through stepwells, tanks, and rainwater harvesting systems highlight its functional and climatic responsiveness. The seamless combination of military strength, royal grandeur, and environmental adaptation makes Nagaur Fort a significant precedent in architectural planning and design.



fig.4.3.1. Nagaur Fort View

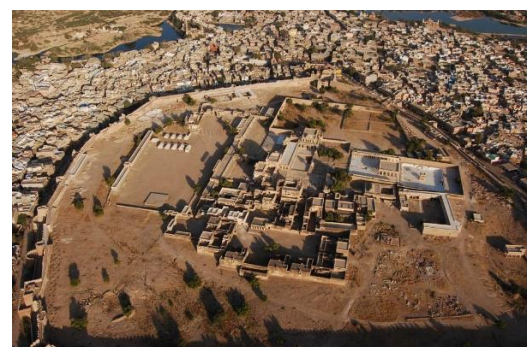


fig.4.3.2.Nagaur Fort overall View

Together, these four typologies represent residential, traditional, institutional, and defensive architectural environments. Their contrasting spatial characteristics make them highly suitable for comparative isovist analysis and help in understanding how architecture influences human perception, movement, and spatial experience across different contexts.

V. METHODOLOGY

The study adopts a comparative spatial analysis approach using isovist mapping techniques. The study involved a systematic process comprising six key steps. First, case studies were selected from four different typologies to ensure a diverse comparative framework. Following the selection, the plans and spatial layouts of each case study were documented in detail to establish the basis for spatial analysis. Observation points were then identified within the selected environments to represent significant user viewpoints. From these viewpoints, isovists were generated to examine the visible spatial fields and patterns of perception. The generated isovists were subsequently analyzed in terms of visibility fields, openness, enclosure, and spatial connectivity to understand the experiential and configurational qualities of the spaces. Finally, the findings from all case studies were comparatively interpreted to identify similarities, differences, and broader spatial insights.

The analyses were carried out manually and digitally by second- and third-year architecture students as part of academic spatial studies, with observational write-ups prepared by the students for each observation point to document their findings and spatial interpretations.

VI. RESULTS AND DISCUSSIONS

Students observed and analyzed four different architectural typologies in using isovist analysis to understand spatial visibility, movement patterns, and visual connectivity.

6.1. STUDENTS OBSERVATIONS

6.1.1. Chandroth Residence Observations

The user feels a sense of comfort and warmth upon entering the house due to the lush greenery and earthy color palette. While seated in the living room, the user enjoys a complete view of the courtyard, staircase, and dining area, allowing for visual connectivity and interaction among the spaces. The user is welcomed by a chronological movie memory wall, where each movie represents a significant milestone in the occupant's life. The courtyard view evokes childhood memories of bathing in the lakes near the user's old home, creating a strong emotional connection to the space. On the return journey, the pause space before the staircase offers one of the most architecturally striking and aesthetically pleasing views of the house, enhanced by the calming presence of nature.

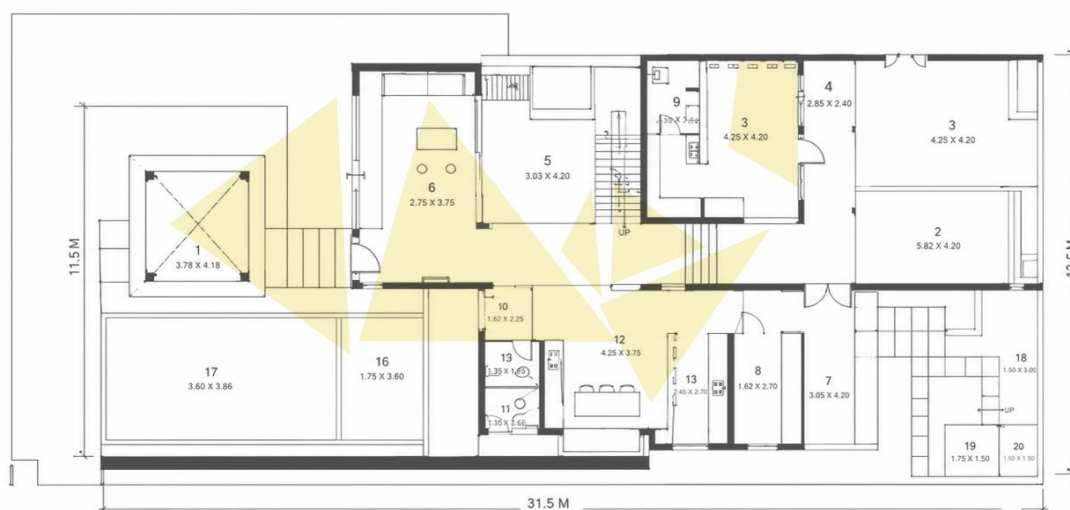


fig.6.1.1. Chandroth Residence – Ground Floor Plan Showing the Isovist View

6.1.2. The Muthu Chettiyar Veedu Observations

The observations are based on both positive and negative views identified through isovist analysis. While entering through the main entrance, the positive views are framed through the windows, allowing visual connections to the surrounding spaces. The negative views are created by walls that obstruct the line of sight. As the user moves from one staircase to the opposite staircase, the courtyard forms the primary positive view, acting as the visual focal point. The negative views are caused by the structural columns, which partially interrupt visibility. While standing in the courtyard, the positive views extend through the surrounding corridors and doorways, creating strong visual connectivity. The negative views occur where walls block or limit the field of vision.

Overall, the house demonstrates a well-sequenced spatial organization, where the central courtyard acts as the visual and spatial core, connecting the surrounding spaces while carefully balancing openness and enclosure.

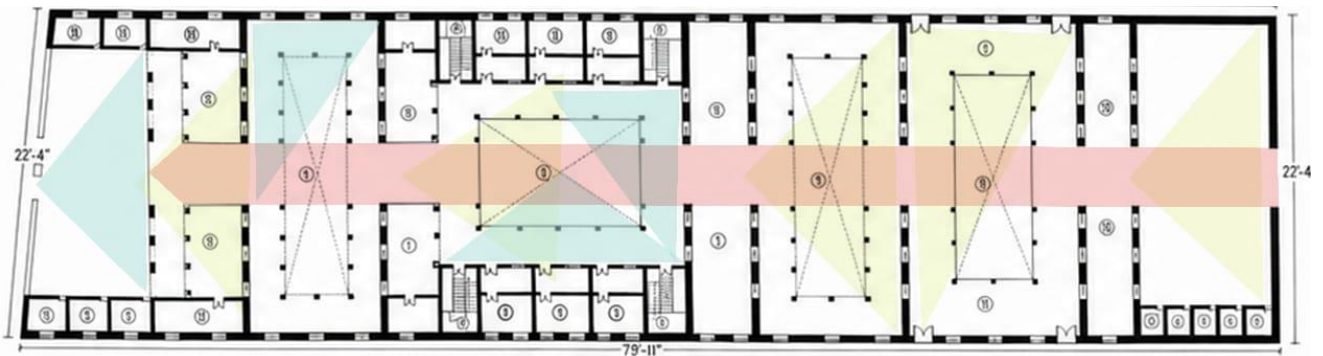


fig.6.1.2. The Muthu Chettiyar Veedu – Ground Floor Plan Showing the Isovist View

6.1.3. SUPVA Campus Observations

The view from the institution provides a clear view of the interior space of the block, featuring a small gathering area. The semi-open amphitheatre is visible from this point, with its half-circular form and roof fitted with solar panels. This viewpoint also offers a view of both the ground and the Institution of Fine Arts, with the Administration Block creating a vanishing perspective. The elevation highlights the gathering spaces, including a rectangular stepwell that traditionally brings people together. The view from the entrance towards the common activity area creates a sense of movement and visual continuity. Finally, the view from the balcony offers an attractive perspective of the gathering space, connecting the Administration Block, the amphitheatre, and the common activity area.

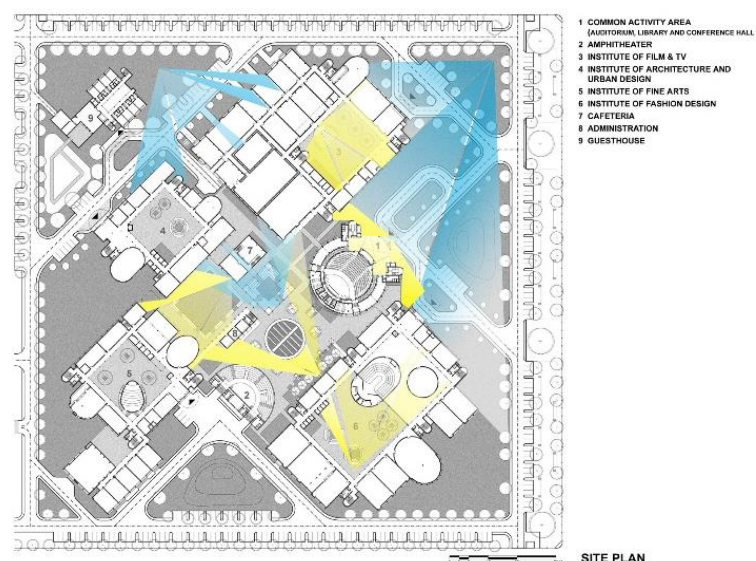


fig.6.1.3. SUPVA Campus - Floor Plan Showing the Isovist View

6.1.4. Nagaur Fort Observations

The Queen's Court should be fully visible from the Mandapa. As the cooking area is located behind the court and the residential area is positioned further beyond, the view extends towards the residential complex. from the Mandapa, a person can enjoy the entire beauty of the central water bodies as well as the front entrance of the King's residence. from the central water body, the view unfolds more gradually compared to the other perspectives due to the site's slope. from the open space, a linear view can be experienced through the opening, leading to the next area. from the guard room, the view extends straight ahead, providing clear visibility of both the interior and exterior of the fort.



fig.6.1.4. Nagaur Fort - Floor Plan Showing the Isovist View

6.2. COMPARATIVE ANALYSIS

Parameters	Modern Residence	Traditional Chettinad	Campus	Fort
Name of the Typology	Chandroth Residence	The Muthu Chettiyar Veedu	State University of Performing and Visual Arts	Nagaur Fort
Description of the space	The spaces are connected through a courtyard. Public and semi-public spaces are arranged around the courtyard, while the private spaces are located beyond them.	The spaces are arranged in a sequential manner. Four courtyards are placed adjacent to one another to provide better natural lighting.	Each block is provided with adequate green buffers and circulation spaces, and every block has a central courtyard.	The spaces are arranged in a clustered form to ensure privacy and are enclosed by a fortification wall.
Spatial Visibility	High visibility with open visual connections	Controlled and layered visibility	Mixed visibility across open and built spaces	Restricted and strategic visibility
Spatial Character	Open, flexible, and continuous	Hierarchical and private	Interactive and interconnected	Defensive and enclosed

Movement Pattern	Free and flexible movement	Sequential movement through transitional spaces	Dynamic movement through pathways and open spaces	Controlled and guided movement
User Experience	Spacious and transparent	Gradual and intimate spatial experience	Easy navigation and social interaction	Complex and secure spatial experience
Nature of Isovist	Large and continuous isovists  6.2.1.Chandroth Residence – Corridor View	Fragmented and sequential isovists  6.2.2.The Muthu Chettiyar Veedu – Porch View	Varied and interconnected isovists  6.2.3. SUPVA Campus – Outdoor View	Narrow and controlled isovists  6.2.4.NagaurFort – passage View
Observations	• Large and continuous visibility fields • Strong visual connectivity between spaces • Minimal spatial hierarchy • Increased perception of openness	• Fragmented and sequential isovists • Hierarchical spatial arrangement • Controlled visibility and privacy • Courtyard-centered visual connections	• Dynamic visibility across open and built spaces • Strong pedestrian connectivity • Visual guidance through pathways • Varied scales of openness and enclosure	• Controlled and strategic visibility • Strong surveillance-oriented spaces • Sequential movement patterns • High spatial complexity

Table 6.2.1. Table showing synthesis of student's observations

VII. LEARNING OUTCOMES

7.1. Understanding Sequences of Spaces

Isovist analysis helps reveal how spaces are experienced in sequence as a person moves through an environment. By examining changes in visibility from one location to another, it becomes possible to understand the progression of spaces, the hierarchy between them, and the manner in which spatial experiences unfold. This is particularly evident in traditional houses and forts, where movement occurs through a series of interconnected spaces rather than within a single open environment.

7.2. Understanding Physical Composition and Spatial Possibilities

The study enables the identification of open, semi-open, and closed spaces and their relationship within a built environment. Isovists illustrate how architectural elements such as walls, courtyards, verandahs, and corridors influence visibility and spatial enclosure. Through this analysis, students gain an understanding of how different spatial compositions affect user perception and functionality.

7.3. Analysis of Inner Views and Visual Connectivity

Isovists help determine the extent of visual connections between spaces. The analysis reveals how interior spaces relate to one another through sightlines and visibility networks. Understanding inner views assists in evaluating openness, orientation, and the overall visual experience of users within a building.

7.4. Understanding Privacy and Spatial Control

One of the key outcomes of isovist analysis is the ability to assess levels of privacy. Spaces with restricted visibility tend to offer greater privacy, while highly visible areas encourage interaction and accessibility. The study demonstrates how different architectural typologies use spatial configuration to balance privacy and openness according to functional requirements.

7.5. Evaluating Wayfinding and Navigation

Isovist analysis contributes to understanding how people orient themselves and move through spaces. Areas with greater visibility often serve as navigational anchors, making circulation easier and more intuitive. The analysis highlights how spatial layouts influence wayfinding and user movement within residential, institutional, and historic environments.

7.6. Assessing Aesthetic Experience

Visibility plays a significant role in shaping the aesthetic quality of architectural spaces. Isovists reveal how framed views, visual corridors, and spatial openness contribute to the perception of beauty and spatial richness. The study helps identify how architectural compositions create memorable visual experiences.

7.7. Identification of Focal Areas

The analysis enables the identification of focal points that naturally attract visual attention. Courtyards, entrances, monuments, gathering spaces, and significant architectural elements often emerge as dominant focal areas within isovist fields. Understanding these focal points helps explain how architecture directs user attention and organizes spatial experiences.

7.8. Understanding Transition and Semi-Open Spaces

Transition spaces such as verandahs, corridors, courtyards, and thresholds play a crucial role in connecting different spatial zones. Isovist analysis highlights how these spaces mediate between open and enclosed environments while supporting various functional and social activities. The study demonstrates the importance of transitional spaces in creating gradual spatial experiences.

7.9. Evaluating Social Security and Natural Surveillance

Visibility is closely related to safety and social security. Spaces with wider visual access support natural surveillance by allowing users to observe activities within their surroundings. Isovist analysis helps identify areas that are visually accessible as well as locations that may become isolated or vulnerable due to limited visibility.

7.10. Identifying Grey Zones

Grey zones are transitional spaces that lie between public and private areas. It refers to spaces that are neither fully public nor fully private, often serving as transitional or buffer areas. Through isovist analysis, these zones can be identified based on their intermediate levels of visibility and accessibility. Understanding grey zones provides insights into social interactions, territorial boundaries, and the gradual transition between different functional areas.

The isovist-based analysis enabled students to understand the relationship between visibility, spatial organization, movement, privacy, and user experience across different architectural typologies. The study demonstrated that architectural form significantly influences how spaces are perceived, navigated, and utilized, making isovist analysis a valuable tool for spatial research, design evaluation, and architectural education.

VIII. CONCLUSION

This study demonstrates the effectiveness of isovist analysis as a tool for understanding the relationship between visibility, spatial organization, and human experience within different architectural environments. Through the comparative analysis of four distinct typologies—Chandroth Residence, The Muthu Chettiyar Veedu, State University of Performing and Visual Arts (SUPVA), and Nagaur Fort—the research highlights how spatial configurations influence perception, movement, privacy, wayfinding, and social interaction.

The findings reveal that each typology generates unique visibility patterns based on its functional requirements, cultural context, and architectural intent. Modern residential architecture promotes openness, flexibility, and continuous visual connectivity through large and uninterrupted isovist fields. Traditional Chettinad houses demonstrate layered visibility and hierarchical spatial arrangements that support privacy, climatic responsiveness, and gradual spatial transitions. The campus environment exhibits a balance between openness and enclosure, facilitating navigation, interaction, and visual accessibility across interconnected spaces. In contrast, the fort typology employs controlled visibility and strategic spatial organization to enhance surveillance, security, and defense.

The study further demonstrates that isovist analysis is valuable in identifying spatial sequences, focal points, visual connections, transition spaces, grey zones, and areas of natural surveillance. These observations provide deeper insights into how architectural spaces are perceived and experienced by users. Beyond visibility assessment, isovists serve as a means of understanding the experiential qualities of architecture and the relationship between built form and human behavior.

An important outcome of this research is its educational contribution. By engaging second- and third-year architecture students in the process of spatial analysis, the study encouraged critical observation, analytical thinking, and a deeper understanding of architectural space. The exercise enabled students to interpret spatial qualities beyond physical dimensions and recognize the role of visibility in shaping user experience.

Overall, the research confirms that isovist analysis is a powerful and accessible method for evaluating architectural environments across varying typologies. The comparative approach adopted in this study demonstrates that visibility is not merely a visual phenomenon but a fundamental factor influencing movement, perception, social interaction, and spatial identity. The findings reinforce the potential of isovist analysis as a valuable tool for architectural research, design evaluation, heritage studies, and future spatial planning practices.

IX. ACKNOWLEDGMENT

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