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Neuroarchitecture in Interior Design: Impact of Space on Human Behaviour

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ABSTRACT
Neuroarchitecture is an interdisciplinary field that combines neuroscience, architecture, and interior design to understand how built environments influence human emotions, cognition, health, and behavior. In interior design, neuroarchitecture focuses on creating spaces that positively affect occupants' psychological and physiological well-being through the strategic use of elements such as lighting, color, spatial layout, materials, acoustics, and biophilic design. The impact of interior environments on human behavior has become increasingly significant as people spend a substantial portion of their lives indoors. Research indicates that well-designed spaces can enhance productivity, creativity, concentration, social interaction, and emotional stability, while poorly designed environments may contribute to stress, anxiety, fatigue, and reduced performance. Neuroarchitectural principles utilize evidence-based design approaches to optimize sensory experiences and support cognitive functioning. Natural lighting, ergonomic furniture, appropriate color schemes, and connections to nature have been shown to improve mood and overall well-being. This study explores the relationship between interior design elements and human behavior through the lens of neuroarchitecture, highlighting how scientific understanding of brain responses can inform the creation of healthier, more comfortable, and user-centered environments. The findings emphasize the importance of integrating neuroscience into interior design practices to develop spaces that not only meet functional requirements but also foster psychological comfort, behavioral efficiency, and enhanced quality of life. The growing application of neuroarchitecture offers promising opportunities for designing residential, educational, healthcare, and workplace environments that support human well-being and sustainable living.

Keywords: Neuroarchitecture, Interior Design, Human Behaviour, Built Environment

1. INTRODUCTION

The modern landscape of interior architecture is undergoing a massive shift. It is transitioning from purely aesthetic decoration to a deeply integrated system of space optimization, building psychology, sustainable engineering, and real estate development economics. For a Master of Design student, an internship is not merely an introduction to the corporate workspace; it is a critical crucible where theoretical design philosophies face the unforgiving constraints of real-

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world budgets, client psychologies, structural realities, and supply chain logistics. During this six-month internship, I immersed myself in the dual realms of boutique interior design consultancy and macro-level real estate development. Operating within a fast-paced environment allowed me to study how bespoke spatial design works hand-in-hand with larger real estate frameworks. The integration of high-end aesthetics with practical building codes became the operational norm throughout my tenure. The firm's operational matrix covers three main verticals:

- **Residential Interior Architecture:** High-end, custom residential spaces emphasizing ergonomic efficiency, luxurious material palettes, and smart home automation systems tailored to bespoke user demographics.
- **Turnkey Contracting Services:** Managing projects from a blank canvas to full execution, coordinating civil work, custom carpentry, specialized finishes, and complex MEP (Mechanical, Electrical, Plumbing) structural frameworks.
- **Real Estate Infrastructure Development:** Understanding how site planning, regulatory municipal approvals, commercial viability studies, and spatial branding increase the overall asset market value.

The firm's core philosophy centers around "Functional Luxury." Every design choice must earn its place functionally before it is polished aesthetically. This ethos served as the guiding framework for my daily contributions, research initiatives, and professional development over the six-month academic tenure.

2. PROJECT PORTFOLIO & CASE STUDIES

2.1 Spatial Programming, Adjacency Matrices & Micro-Zoning

The core focus of my field research was a premium multi-generation residential unit at the Sharda Vihar project. The design brief called for a clear balance between spacious, open-concept areas and private, quiet zones. It needed to seamlessly integrate smart automated systems, hidden storage, and a warm, contemporary material palette. I began by creating a comprehensive spatial programming matrix. This mapped daily user routines, identified potential acoustic challenges, and optimized movement pathways across public, semi-private, and private areas: The layout was designed around a central focal point: a large family living room that connects the open dining area and the private bedroom hallways. This approach keeps service traffic separate from family living areas while maintaining an expansive feel throughout the home.

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Figure 1: Raw site status and spatial volume inspection

2.2 Applied Material Science, Aesthetics & Finishes

Material selection requires balancing aesthetic goals with long-term performance and durability. For the Sharda Vihar project, I curated a sophisticated material palette designed to look beautiful while withstanding daily use: Every vertical panel seam was reinforced with hidden expansion gaps, ensuring that the custom woodwork can handle shifting seasonal humidity without cracking.

2.3 Deep Technical Coordination: GFC Blueprints, RCP, HVAC & Plumbing Clashes

A beautiful rendering means very little if it cannot be built accurately on site. At Sharda Vihar, I coordinated the Reflected Ceiling Plan (RCP) with the HVAC and lighting layouts.

Figure 2: Reflected Plan

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A major challenge was running a high-capacity ducted air conditioning system across a 6-meter living area without lowering the overall ceiling height. To solve this, I designed a multi-tiered ceiling drop profile. This approach hid the heavy fan coil units and main duct runs in the perimeter drops, allowing us to keep the main central ceiling higher. This detail allowed us to incorporate sleek, flush-mounted magnetic track lights and hidden linear LED coves directly into the ceiling panels. It perfectly met the client's request for clean, minimalist lines while providing excellent task and ambient lighting.

3. SITE EXECUTION & PROJECT MANAGEMENT

3.1 Operational Chronology of Turnkey Projects

Turnkey site management requires balancing multiple overlapping tasks, coordinating specialized trades, and tracking material lead times. On-site project management requires a deep understanding of construction sequencing, trade dependencies, and structural tolerances. Managing a project successfully from raw concrete to a finished handover depends on following a precise, methodical timeline:

3.2 Financial Engineering: Bills of Quantities (BOQ) Mechanics

An essential skill for any interior design professional is managing project finances. During my time on site, I worked on updating detailed Bills of Quantities (BOQ) to ensure our material costs lined up with our initial estimates. This process taught me how to budget for material waste, account for transport logistics, and plan for unexpected complications on site. Below is a sample from the wood paneling and finishing section of the project's BOQ:

3.3 Subcontractor Dynamics: Specifying Trade-Specific Contracts

A major takeaway from my time in the field was seeing how much impact clear language has in professional contractor agreements. In turnkey operations, general or ambiguous terms can easily lead to project delays, cost overruns, or disputes over work quality. For example, when managing premium interior finishes, it is vital that the contractor agreements are highly specific to the exact trade being employed. A general contractor agreement lacks the nuance required for high-end decorative work. In a painting work contract, substituting general contractor terms with trade-specific terminology like "Specialized Surface Finisher" or "Painter" explicitly holds that subcontractor responsible for critical surface preparation standards:

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Figure 3: Specialized surface finisher

Execution Quality Clause: The Painter shall guarantee that all vertical masonry substrates undergo complete moisture testing (maximum allowable moisture content: 12%) before applying any epoxy primer coat. Sub-surfaces must be sanded down using dustless mechanized sanders down to a level of absolute flatness. The final application of Polyurethane (PU) finishes must be executed in a sealed, pressurized, dust-free spray booth environment to prevent airborne dust particles from settling on the wet surface. Using these specific terms prevents subcontractors from skipping necessary preparation steps, ensuring that high-end finishes look flawless and last over time. Transitioning from the design studio to the construction site highlights the massive difference between an idealized CAD drawing and a live, dynamic working environment. On-site project management requires a deep understanding of construction sequencing, trade dependencies, and structural tolerances. The turnkey workflow followed a strict chronology: Civil Demolition & Core Masonry > Electrical & Plumbing Core Conduits -> Gypsum False Ceiling Framework -> Plastering & Base Levelling -> Custom On-Site Carpentry -> Wall Priming & Specialized PU Painting -> Premium Flooring Laying -> Lighting Fixtures & Automation -> Fine Snagging & Final Handover. A key learning moment during my time on site was discovering how critical precise legal and technical language is in contractor documentation. In turnkey operations, vague terms can quickly lead to project delays, cost overruns, or disputes

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4. DIGITAL TOOLS & DESIGN VISUALIZATION

As a Master of Design student, my role extended beyond standard 2D drafting into creating rich digital narratives. Using industry-standard design tools like AutoCAD, SketchUp, 3ds Max, V-Ray, and Lumion, I developed a high-fidelity visual production system. The goal was to move away from generic, flat representations and instead create renderings that captured authentic material textures, accurate lighting behavior, and real-world shadow depths. In modern interior design practice, a project's digital presence is nearly as important as its physical completion. High-end design firms rely on polished online portfolios to attract premium residential and commercial clients. During my internship, I spearheaded a digital branding initiative to translate our physical site successes into high-impact marketing assets. I quickly learned that traditional landscape formats (16:9) do not translate well to modern, mobile-first design platforms. To maximize digital engagement, I adapted our visual assets into a mobile-optimized 9:16 vertical aspect ratio tailored for Instagram Stories, Reels, and YouTube Shorts. This vertical design strategy allowed us to capture the full scale of our interior spaces—such as a continuous view showing the floor pattern, customized wall paneling, and the reflected ceiling detail all in one frame.

4.1 Photorealistic V-Ray/3ds Max Rendering Standards

As a Master of Design student, my responsibilities went beyond standard drafting into developing compelling digital presentations. Using tools like AutoCAD, SketchUp, 3ds Max, V-Ray, and Lumion, I set up an efficient rendering workflow:

4.2 Mobile-First Marketing Adaptations (9:16 Aspect Ratio Framework)

In today's interior design industry, a firm's digital presence is just as important as the physical spaces they build. High-end studios rely on polished digital portfolios to reach new residential and commercial clients. During my internship, I led an initiative to adapt our project documentation for modern online platforms. Traditional landscape rendering formats (16:9) often lose their impact when viewed on mobile screens. To maximize visual engagement, I reformatted our digital assets into a mobile-optimized 9:16 vertical aspect ratio tailored for Instagram Stories, Reels, and digital lookbooks. This vertical formatting strategy allowed us to capture the full scale of our interior spaces— such as a continuous view showing the floor pattern, customized wall paneling, and the reflected ceiling detail all in one frame. This mobile-

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first presentation style dramatically improved our online engagement and streamlined how we pitched new concepts to clients.

Figure 4:

Figure 5:

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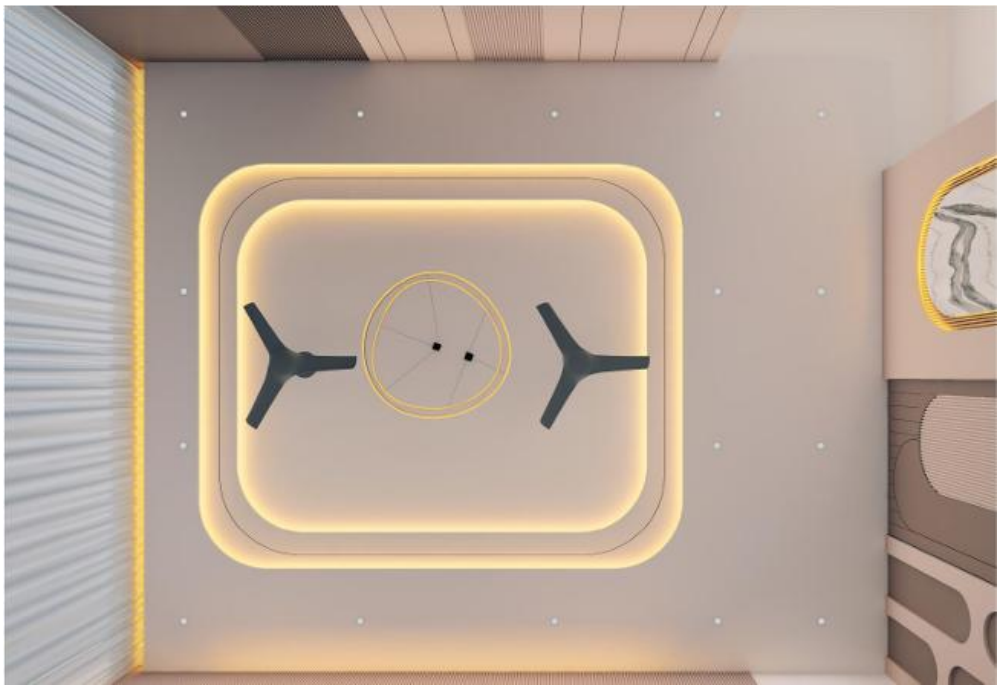

Figure 6:

Figure 7:

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5. CRITICAL REFLECTIONS & CONCLUSION

This six-month internship served as a profound bridge between design theory and realworld practice. In the academic studio, design exists in an ideal environment where budgets are unlimited, materials are always available, and structural tolerances are perfect. The construction site challenges this idealism with real-world constraints. I discovered that true design innovation happens within these constraints. Balancing a client's budget, coordinating complex MEP requirements, and managing site limitations forces you to think creatively and develop more practical, efficient design solutions. Moving forward, I intend to bring this grounded, multi-disciplinary execution mindset into my upcoming Master's thesis project and future professional practice.

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