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CHAPTER 1
INTRODUCTION

1.1 GENERAL

In the current digital landscape, the "Attention Economy" has transformed focus from a natural state into a scarce resource. For the middle-class Indian student demographic, aged 16 to 30, the challenge of maintaining deep focus is compounded by high-density living environments such as hostels and shared studios. Traditional productivity tools often fail because they treat distraction as a purely digital problem, neglecting the physical and environmental "leaks" that disrupt cognitive flow.

1.2 PROBLEM STATEMENT

Existing interventions primarily utilize software-based blocking or gamification to curtail screen time. However, these solutions do not address the physical phenomenon of "Phone Gravity"—the persistent cognitive load exerted by a mobile device simply by being within the user's immediate visual or physical reach. Deep work by its very nature is hard work; it requires one to use their willpower to overcome so many pleasurable activities and hence developing a focus habit and sustaining it is a universal challenge. Research indicates that focus is a visceral, body-engaging state that requires environmental boundaries to be sustainable. There is a lack of low-cost, non-intrusive hardware that establishes these physical boundaries while providing sensory support for sustained deep work.

1.3 MOTIVATION

The motivation for this research stems from the identified gap between high-intensity digital distraction and low-intensity physical focus aids. Users have expressed a strong preference for "feeling" focused through physical stimulation, such as massage or vibration, rather than being surveilled by complex technology like cameras. By leveraging simple haptic feedback and social accountability there is a sensational opportunity to transform the workspace into a "Focus Station," mirroring the immersion found in "Game Stations."

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1.4 RESEARCH OBJECTIVES

The primary objective of this thesis is to develop a physical "Attention Boundary System" specifically designed for shared creative environments. The specific goals include:

- To deconstruct the behavioral triggers of "Focus Leaks" among professionals and students.
- To identify the failure points of current distraction blockers/products through a competitive "Tribe Analysis".
- To design a system that covers both mental and visceral aspects of focus.
- To develop a minimal digital companion app that reduces screen dependency rather than increasing it.

1.5 OUTLINE OF THESIS

This thesis is organized into seven chapters. Following this introduction, Chapter 2 provides a detailed literature review and market analysis of focus-enhancing tools. Chapter 3 describes the methodology of the "Focus Leak Study" through primary research. Chapter 4 is about concept generation and first user testing. Chapter 5 details the design development and technical specifications of the Spine device and its companion application. Chapter 6 evaluates the system through user journey mapping and feedback. Finally, Chapter 7 presents the conclusions, social impact, and future scope of the research.

CHAPTER 2
LITERATURE REVIEW AND MARKET RESEARCH

2.1 OVERVIEW OF CURRENT FOCUS INTERVENTIONS

The landscape of focus-enhancing interventions is predominantly digital, characterized by a reliance on software-driven constraints to manage user attention. These interventions can be systematically categorized into three primary "tribes" based on their core operational philosophy: Distraction Blockers, Gamification and Timers, and Audio-based Focus tools. While these tools offer varying degrees of efficacy, they share a common limitation in their lack of physical environmental engagement.

It is also worth noting that most focus enhancing tools aim at reducing digital distraction as if before the smartphone era, focusing was an easy task. History has shown that focusing has never been an easy task and though it is true that digital distractions have made it harder, focus requires a full lifestyle commitment, a stack of habits and willpower that support focused work sessions. Numerous literature, yogic tools, breathing techniques and even intimidation by instructors as a means to enhance focus of the pupil are some common traditional techniques.

Figure 2.1 Distraction blocking safe

2.2 TRIBE 1: DISTRACTION BLOCKERS

Distraction blockers are designed for "nuclear" intervention, aimed at physically or digitally preventing access to disruptive platforms. Key examples include "Freedom," which provides cross-platform synchronization to block social media across multiple devices simultaneously. Another significant tool is "Opal," which utilizes a "Deep Focus" mode that renders it impossible to cancel blocking sessions once initiated. On desktop platforms, "Cold Turkey Blocker" represents a heavy-duty approach by locking users out of specific sites or entire operating systems to enforce discipline.

These products are the most dominant systems in the commercial market simply because of accessibility. No delivery needed, no physical maintenance. Simple download and run. They are the most hassle free also currently. Their UI is usually very attractive to draw the customer in and keep using it, often using mystical design elements.

Figure 2.2 Opal app

2.3 TRIBE 2: GAMIFICATION AND TIMERS

This category leverages psychological rewards and structured time management techniques, such as the Pomodoro method, to sustain attention. "Forest" is a prominent example where users grow virtual trees during focus sessions; the "death" of the tree upon leaving the app serves as a negative reinforcement against phone usage. Similarly, "Focus Friend" utilizes cozy gamification to keep a virtual

companion happy through sustained work. "Session" combines these timers with notification muting and calendar integration to create structured work windows.

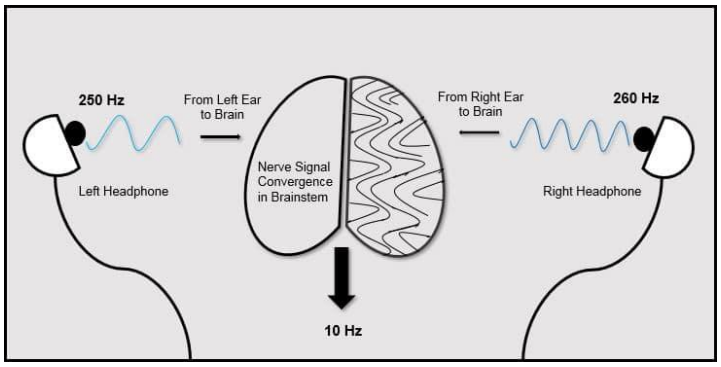


Figure 2.3 Focus Friend app

2.4 TRIBE 3: AUDIO-BASED FOCUS TOOLS

Audio interventions focus on sensory immersion to maintain cognitive flow. These tools frequently utilize binaural beats, white noise, or curated ambient soundscapes to anchor the user's auditory environment. Research suggests that these audio cues can enhance the immersion required for deep work states by masking inconsistent environmental noise, which is a frequent disruptive in shared living or working spaces.

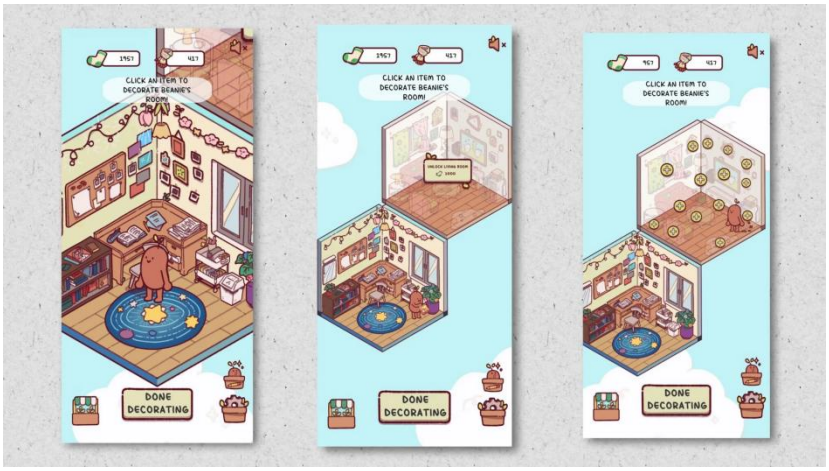


Figure 2.4 Binaural Beat demonstration

2.5 IDENTIFIED MARKET GAPS AND OPPORTUNITIES

A critical analysis of the current market reveals a significant "Focus Leak" at the intersection of digital interventions and the physical environment. Current tools focus on the "Willpower Model," assuming focus is a moral trait rather than a result of environmental architecture. There is a distinct absence of solutions that address "Phone Gravity"—the pull of the device itself. Furthermore, user feedback indicates a growing rejection of "creepy" surveillance-based tech, such as camera-based focus monitors, in favor of simple, body-engaging feedback mechanisms. This presents an opportunity for a visceral, physical focus aid that prioritizes privacy, affordability, and haptic immersion.

CHAPTER 3
RESEARCH METHODOLOGY: THE FOCUS LEAK STUDY

3.1 RESEARCH DESIGN AND APPROACH

The research adopts a user-centered design methodology to deconstruct the mechanics of distraction for students and professionals. The study utilizes a mixed-methods approach combining behavioral surveys and ethnographic observation. The primary goal is to map the "topography of distraction" among students and young professionals to identify triggers that lead to cognitive disengagement, lower focus and desire to not sit for work/study.

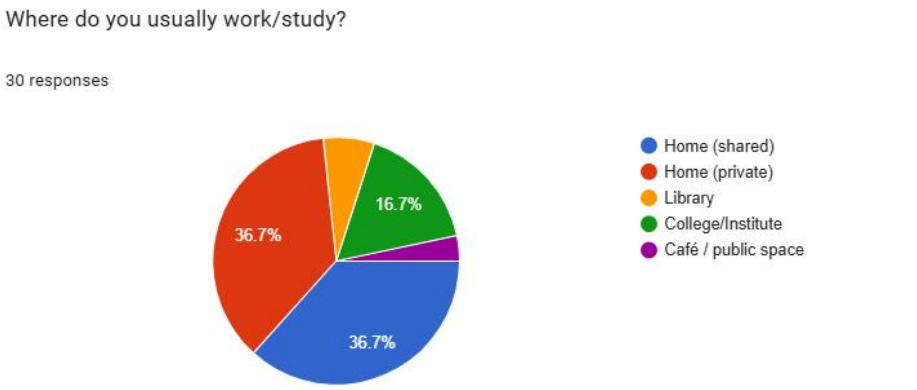
3.2 SHADOWING

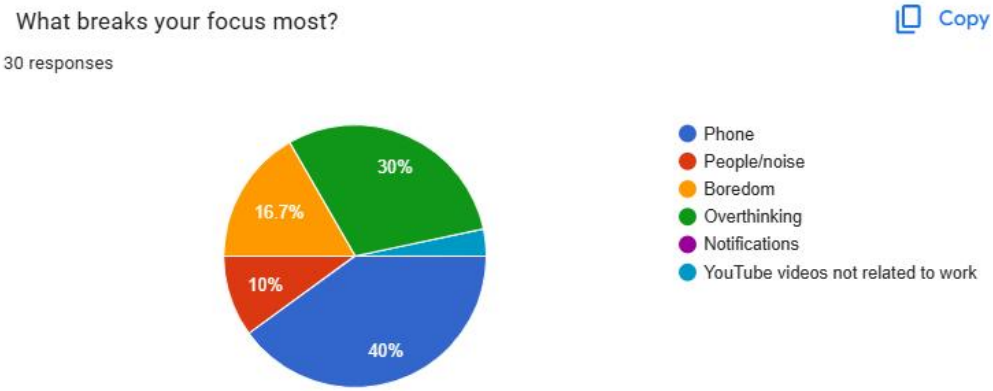
Anuj has been good with marks and is an 18 year old freshman in college living in a hostel. He has a desk but prefers to sit on the floor while keeping the books/notebook on the bed. He looks very bored while studying but still studying because exams are coming up. His phone lies on the bed. Every 5 minutes a notification rings on his device and Anuj quickly checks it, then after 30 seconds of checking he gets back to studying. In his room people come and go and sometimes Anuj breaks his study to talk to them and sometimes ignores them. Like this he studies for 45 minutes until he finally breaks his session for a 15 minute break and talks to his roommate who is playing a video game on his laptop sitting 5 meters away. Then after 15 minutes Anuj gets back to study and resumes.

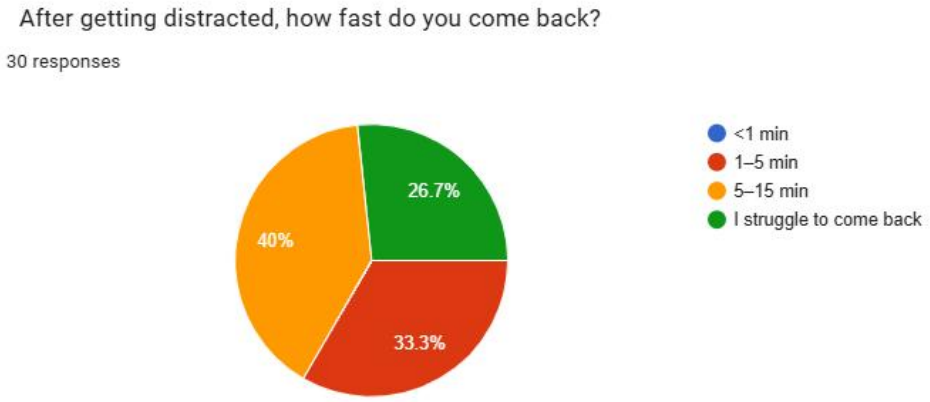
3.3 TARGET DEMOGRAPHIC AND USER PERSONAS

The study focuses on middle-class Indians aged 16 to 30, a demographic highly susceptible to digital "gravity" due to early technology adoption and high-density living conditions. Two primary user archetypes were identified: the "Deep Work Seeker," who possesses the intent for mastery but lacks environmental support, and

the "Micro-Distracted Creative," who struggles with habitual phone checking despite being in a productive setting.

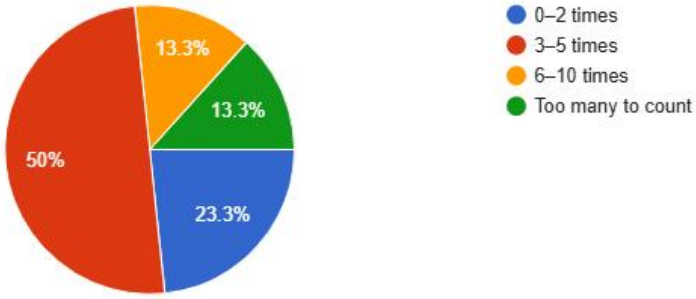






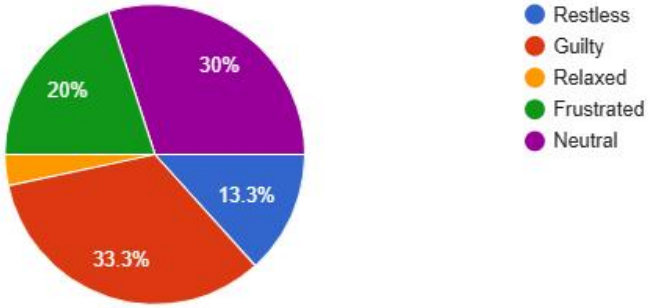
How often do you lose focus in 1 hour?

30 responses



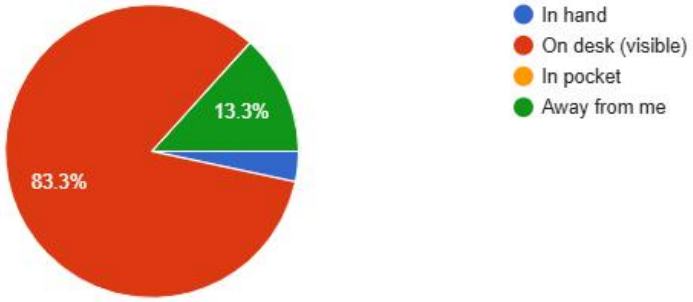
When your focus breaks, you usually feel:

30 responses



Where is your phone while studying/working?

30 responses



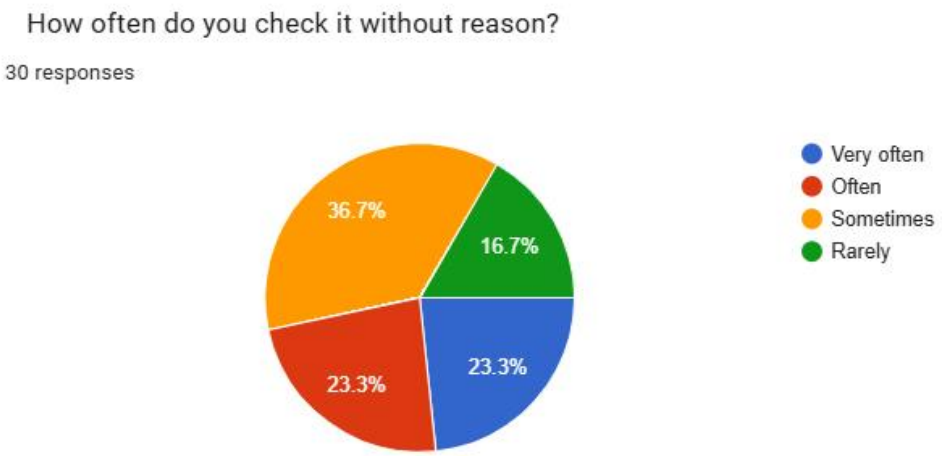


Figure 3.1 Pie charts for primary survey data

3.4 DATA COLLECTION: FEATURE SIGNALS

Data collection was structured around identifying "Feature Signals" to determine which interventions provide the most effective focus support. Based on user feedback, the following signal hierarchy was established:

- Strong Signals: Physical stimulation, including massage and targeted haptic vibration, and integrated audio (binaural beats) were identified as the most effective "anchors" for deep work.
- Moderate Signals: Visual anchors and social accountability mechanisms (Focus Circles) provided secondary reinforcement.
- Weak/Risky Signals: Camera-based surveillance and advanced biometric sensing (pulse detection) were rejected by users due to privacy concerns and perceived "creepiness".

3.5 THE PROXIMITY RULE AND USER JOURNEY MAPPING

A central finding of the research is the "Proximity Rule," which establishes that the cognitive load of a device is inversely proportional to its physical distance. This insight informed the design of a 7-step user journey:

- User initiates the session via the mobile application.

- The system measures relative proximity (signal strength) between the phone and the user.
- The device activates ONLY when the phone is placed outside the user's immediate reach, creating a physical boundary.
- If the phone is moved too close, the device remains inactive, signaling a focus breach.

3.6 STRATEGIC DESIGN TENSIONS

The methodology revealed critical tensions that must be resolved in the design phase. These include the balance between "Experience vs. Cost" (maintaining the visceral feel of a massager within a ₹1000–2000 budget), "Intensity vs. Portability" (deciding between a stationary pillow or a modular wearable), and "Control vs. Comfort" (the use of a physical bar for discipline versus body-based haptic s for pleasure).

CHAPTER 4
CONCEPT GENERATION AND USER DOWN-SELECTION

4.1 HABIT FORMING LOOP

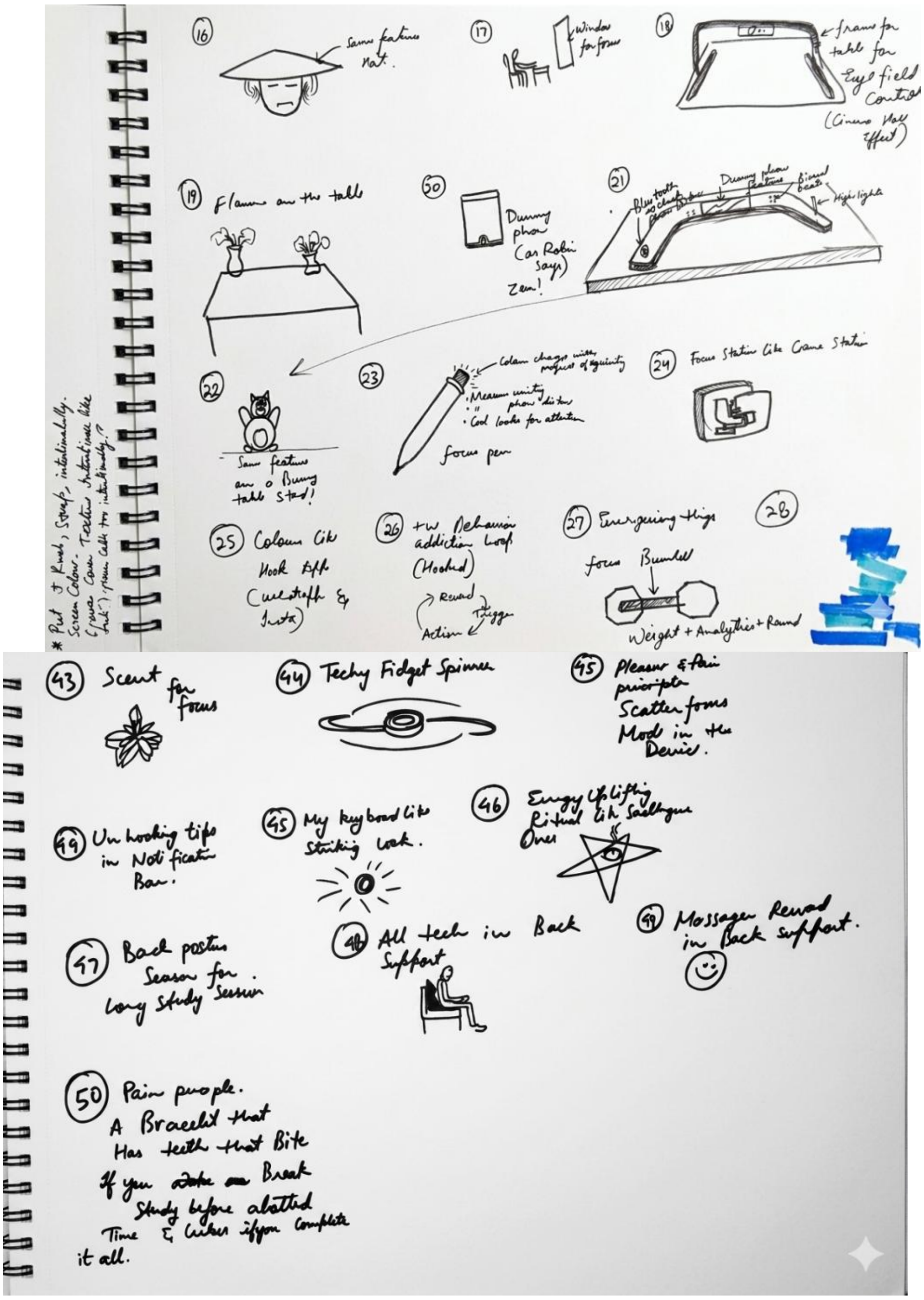
Behavioral psychology research shows us that in order to form any habit, a basic 3 step cycle is needed: Trigger > Action > Reward > Trigger... This loop when done consistently for long enough creates an internalized habit in a human being regardless of culture, age, gender, sex etc. I decided to use this piece of information as one of the core pillars of my solutions. The product must utilize this loop to create a focusing habit in the user. The loop is used in several famous apps like Instagram, Facebook, fitness apps and its worth considering it for a focus enhancing product.

4.2 SOCIAL ACCOUNTABILITY

This is another core idea experimented with here. In several of the ideations this has been used. The idea is quiet popular in the self-help community and was even used by the great inventor Thomas Edison. The idea is that we humans have a deep seated fear of looking like failures in front of a crowd. We can use this trait to do difficult things by announcing publicly what we intend to achieve in a given time period and whether the results are positive or not, we show the results to the group we promised. This forces us to act on our commitment instead of simply procrastinating on the task.

4.3 50 IDEA SPRINT

First a 50 ideas sprint was done in order to generate possible ideas for the problem. This included all kinds of creative variations the designer could think of. Then 5 concrete ideas were developed from this expansive list.


Flame on the table
Dummy phone
Focus pen
Colour Lite
Hook Effect
Scent for Focus
Techy Fidget Spinner
Unhooking tips in Notification Bar.
My keyboard lite Striking Look.
Back posture Season for Long Study Session
All tech in Back Support
Massager Reward in Back Support.
Pain people.
A Bracelet that Has teeth that Bite
Study before allotted
it all.

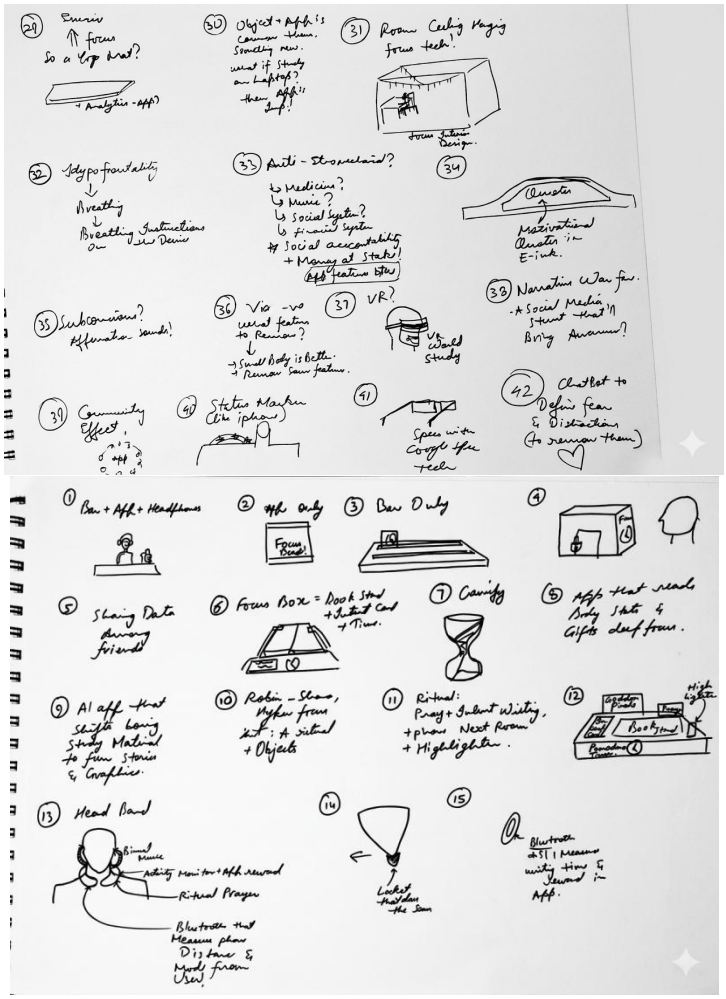
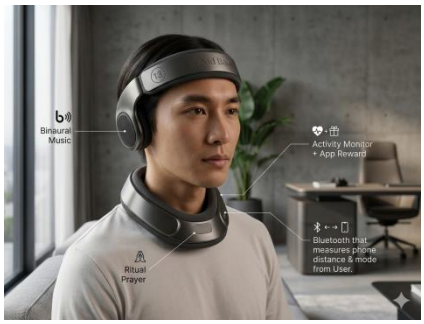


Figure 3.2 50 idea sprint

Below are the AI generated images (for realism during interview) of the 5 ideas that were later shown to participants during the user feedback. In front of each device the respective features are displayed. It is worth noting that in each case the core features are similar apart from the shape and placement of the device.

Table 4.1 Initial test ideas

Idea	Features
	• Visual anchor on table • Attractive due to shape • Display for screen saver and settings • Timer • Phone away feature • App connected
	• Boundary Visual anchor on table • Attractive due to shape • Display for screen saver and settings • Timer • Phone away feature • App connected
	• Tactile anchor for hyperactivity urges • Phone away feature • Portable • Fidget spinner • Timer
	• Audio focus anchor • Phone away feature • App connection • Vibration on neck feature • Timer • Easily adopted design

	• Back massage • Timer • App connected • Visceral feedback loop • Phone away

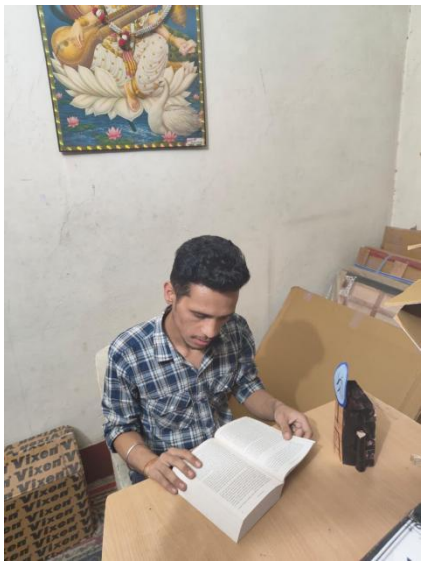
4.4 USER INTERVIEWS

Users were made to test each of the 5 ideas. For the interview the users were placed in an isolated room. A cardboard mock-up was placed in front of them representing the idea of the device so that it's easier to imagine they are actually in the presence of the device. The participants were made to read a simple English book for a fixed amount of time and the simulation was played for each device. After trying all 5 ideas their feedback was taken. In the table below, the user feedback journey is demonstrated. Users were varied — from college students to MBBS doctors to working professionals. The left column shows images of the user while using the device and right column shows the feedback that they gave.

Table 4.2 User testing

Participant interview image	Feedback
	• Top Choice: Back massage device • Reason: Feels best (implied comfort + engagement)

	• Top Choice: Bar device • Second Choice: Massager • Insight: Bar = structured, possibly better control; Open to physical feedback (massager still ranks high)
	• Top Choice: Massager • Concern: Expensive • Insights: Strong belief in effectiveness of physical stimulation; Cost is a major barrier; Open to smarter sensing (pulse detection idea)
	• Top Choice: "Gudda" (tactile/comfort object) • Second Choice: Bar • Would not pay more than ₹1000 • Insight: Values comfort + utility combo; Highly price sensitive

	• Top Choice: Back massage • Second Choice: Bar • Massager makes experience visceral, improves reward system • Bar provides visual anchoring • Liked music/audio component

4.5 PREFERENCE RANKING

1. Back massage / physical feedback → most preferred
2. Bar (visual anchor) → consistent second
3. Audio/music → widely liked (supporting layer)
4. Other concepts (headphone, etc.) → not dominant

4.6 CORE USER NEEDS (DECODED)

- Visceral engagement → "feel something in the body"
- Focus anchoring → visual or physical reference
- Immersion → audio enhances state
- Simplicity → no complex or creepy tech
- Affordability → strong constraint (₹1000–2000 zone)

4.7 CONSTRAINTS AND CONCERNS

- Price sensitivity (especially below ₹1000 for some users)
- Trust issues (camera = potential rejection)
- Over-complexity not requested by users

- Hardware bulk not explicitly discussed but implied risk

CHAPTER 5
DESIGN DEVELOPMENT AND TECHNICAL SPECIFICATIONS

5.1 PRODUCT CONCEPT: SPINE

The design development phase focuses on the realization of "Spine," a modular focus-enhancing system. The conceptual foundation of Spine is to transform the user's workspace into a "Focus Station," analogous to the high-immersion environments of gaming stations. The device is designed to be a visceral anchor, providing physical and sensory feedback to sustain deep work states while enforcing a physical boundary between the user and their mobile device.

5.2 HARDWARE ARCHITECTURE AND COMPONENTS

The Spine device integrates several advanced hardware systems to help the user form a focus habit. The architecture includes:

- A cushioned back support system
- Vibration motors
- Micro-controller with Bluetooth module
- Smartphone app with timer, Bluetooth, and social connection ability

The following images show the second round of ideation done to refine the device and the fabrication process. The fabrication was a multi-step process which involved accessing the lumbar support mould which was then sewed with a cushion and cover. The internals had a haptic motor and Arduino UNO with Bluetooth module. For fabrication, help of a professional fabricator was taken for some parts like sewing and the rest was done by the designer.

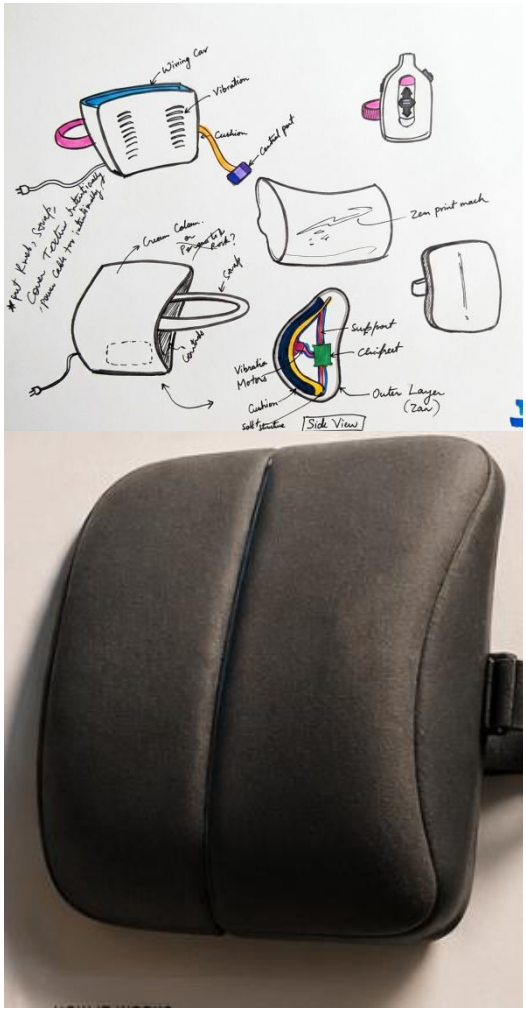


Figure 4.1 Ideation for product's form

Figure 4.2 Fabrication

Figure 4.3 Internals of the prototype

5.3 DESIGN INSPIRATION

The aesthetic and structural language of the device draws from minimal furniture. The device is meant to dissolve in the background rather than be the center of focus during the user's work session. The back massager is shaped like a lumbar support cushion with minimal colour tone and the app too is very minimal so that it doesn't hook the user or consume a lot of cognitive load. The colour palette is mostly white and blacks for least attention grab while seamlessly blending into the users' lifestyle.

Figure 4.4 Spine lumbar vibrator

This device can be kept on any chair with a back rest and is lightweight. The following images show screenshots from a working prototype of the companion app for the system.

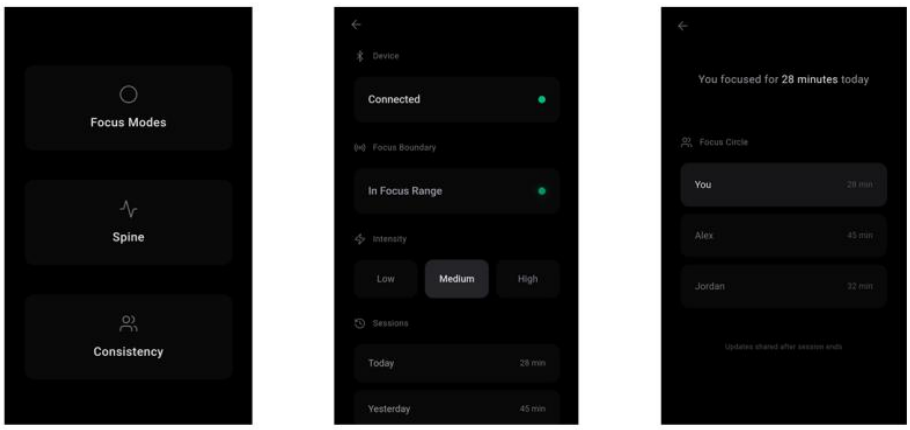


Figure 4.5 Mobile App screen

Figure 4.6 Core features of the system

5.4 COMPANION APPLICATION: THE "ZEN" INTERFACE

The digital interface is designed as a "quiet companion" rather than a primary interaction point. Adhering to the principle that the app should reduce screen dependency, the UI utilizes a dark-mode palette (#0A0A0A) and minimal typography. The structure is limited to three core modules:

1. Focus: Controlling the ritual entry, binaural beats.
2. Smartphone Proximity: The Bluetooth system senses the distance between the user and smartphone and operates only when the smartphone is away (8–10 feet). Vibration: Managing hardware settings, including haptic intensity and temperature controls.

3. Consistency: A social accountability tracker displaying session history and the "Focus Circle" status.

5.5 PROXIMITY LOGIC AND ARDUINO INTEGRATION

The system utilizes a Relative Proximity Sensing (RPS) logic implemented via an Arduino-based micro-controller. The software measures the Bluetooth Received Signal Strength Indicator (RSSI) between the user's phone and the Spine device. The "Activation Threshold" is reached only when the phone is placed outside a predefined radius, ensuring the user physically commits to an "Attention Boundary" before the haptic support and binaural audio are activated.

CHAPTER 6
TESTING, EVALUATION, AND USER JOURNEY ANALYSIS

6.1 USER JOURNEY VALIDATION

The testing phase focuses on validating the 7-step ritualized user journey developed during the ideation phase. This journey is designed to transition the user from a state of distraction to one of deep work through a series of physical and digital checkpoints. The final validated journey consists of:

- Opening the companion application and establishing a connection with the Spine device.
- Selecting a pre-defined focus mode tailored to the specific task complexity.
- The critical step of placing the mobile phone "away" or out of immediate physical reach.
- Commencing work while the system performs a proximity check via signal strength.
- Activation of the device's haptic feedback once the "Attention Boundary" is confirmed and the allotted session is completed by the user.
- Sustained focus support through binaural audio.
- Post-session recording of data and mandatory sharing with the user's Focus Circle.

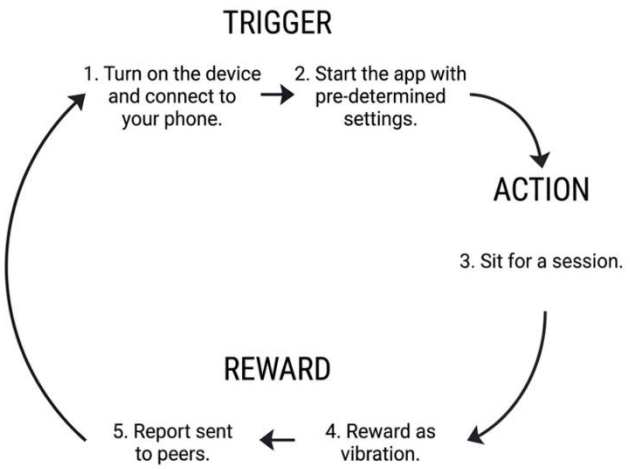


Figure 6.1 Demonstrates how habit forming loop is utilized in this design

6.2 USER FEEDBACK ON VISCERAL SIGNALS

Evaluation sessions confirmed that users strongly preferred body-engaged, visceral focus aids over digital-only solutions. The "Strong Signals" identified in the research—specifically physical stimulation through massage and binaural music—were cited as the primary reasons for successful flow state maintenance. Users noted that the physical sensation of the device provided a "sensational" reminder to stay on task, which was more effective than the passive notifications typical of current productivity applications.

6.3 CRITICAL CONSTRAINTS AND SENSITIVITIES

Testing highlighted a significant price sensitivity among the target demographic, with a strong preference for keeping the device in the ₹1000–₹2000 range. Furthermore, the rejection of "creepy" surveillance tech was re-validated; users expressed relief that the system relied on simple signal strength rather than camera-based monitoring. These findings confirm that the opportunity for this intervention lies in high-intensity physical engagement delivered through a simple, affordable, and portable format. Also the learning curve to adapt to a novel device could be a friction point for some users.

6.4 IDENTIFIED LIMITATIONS

The evaluation phase also identified specific groups for whom the product is not intended. These include individuals who prefer multi-tasking or those who are unable to commit to any form of deep work. The Spine device is strategically positioned as a tool for those willing to work in a deep way but who require environmental and physical support to sustain that state.

It must also be mentioned that the Spine device consciously limits various capabilities, for example being used as an everyday back massager, simply because the aim is to give a controlled experience to the user — the device should only be associated with focus and discipline in the subconscious mind of the user.

CHAPTER 7
CONCLUSION, FUTURE SCOPE AND SOCIAL IMPACT

7.1 CONCLUSION

This research has successfully demonstrated that the challenge of focus in the digital age is not merely a failure of willpower, but a consequence of environmental architecture. Through the development of the "Spine" system, this thesis has introduced a visceral "Attention Boundary" that addresses the physical pull of "Phone Gravity." By integrating relative proximity sensing with haptic feedback and lumbar support, the design successfully transitions the workspace into a "Focus Station." The project proves that users prefer sensory anchors—such as physical stimulation and binaural audio—over surveillance-based interventions.

7.2 FUTURE SCOPE

The current iteration of the Spine system provides a foundational framework for visceral focus aids. Future research and development may explore the integration of more diverse haptic patterns tailored to specific creative tasks (e.g., rhythmic pulses for ideation versus steady pressure for execution). Furthermore, there is an opportunity to expand the "Focus Circle" concept into an "Inter-Library Focus Network," allowing students across different institutional campuses to share quiet presence indicators. Technically, future versions could incorporate more refined thermo-electric elements to explore the impact of variable skin temperature on long-term cognitive endurance.

7.3 SOCIAL IMPACT

The social impact of this research lies in its potential to democratize high-performance work environments for the middle-class Indian student and professional demographic. By maintaining a strict cost constraint of ₹1000–₹2000, the Spine

system provides an accessible alternative to high-end, expensive ergonomic furniture and distractible smart tech. In an era where screen dependency is linked to increased anxiety and reduced cognitive depth, this intervention promotes a "Mastery-first" lifestyle. It empowers users to reclaim their authentic selves and pursue excellence by physically enforcing the boundaries necessary for deep, ecstatic creation. It is also worth mentioning that the system requires a bit of a learning curve as it is a completely novel system; the user might have to adjust to it for the first couple of uses.

7.4 FINAL REFLECTIONS

Design is at its most heroic when it moves beyond superficial polish of mere aesthetics or gimmick features to solve primal human problems. The journey of crafting the Spine system has highlighted that mastery is a continuous journey, not a destination. By aligning the digital companion's purpose with the hardware's visceral intent, we have created a tool that reduces screen dependency and fosters a culture of consistency and focused growth. Focus is not something you do — you can simply remove the distractions and all you are left with is pure focus.