

CORE KIT: A SYSTEM FOR CORDLESS AND MODULAR KITCHEN APPLIANCES

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SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
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**MASTER OF DESIGN
IN
PRODUCT DESIGN**

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CERTIFICATE

I hereby certify that the Project Dissertation titled “**CoreKit: A system for cordless and modular kitchen appliances**” which is submitted by **Anurag Jatin Darolia**, Roll No.- **2K23/MDPD/02**, Department of Design, Delhi Technological, University, Delhi in partial fulfillment of the requirement for the award of the degree of Master of Design, is a record for the project work carried out by the student under my supervision. To the best of my knowledge this work has not been submitted in part or full for any Degree or Diploma to this University or elsewhere.

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Date:

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ABSTRACT

This report presents the design and development of a modular, cordless handheld kitchen appliance system aimed at addressing the evolving needs of modern households. The project responds to the challenges of limited kitchen space, appliance clutter, and the desire for versatile, user-friendly cooking tools. Through comprehensive user research and competitive analysis, the project identifies significant gaps in existing kitchen appliance offerings—particularly the lack of true modularity and unified cordless ecosystems.

The proposed solution features a single, ergonomic power base compatible with a range of snap-on attachments tailored to diverse cooking tasks, including those specific to Indian cuisine. Powered by a shared, rechargeable battery, the system emphasizes portability, space efficiency, and ease of maintenance. Technical calculations and prototyping validate the feasibility of the design, ensuring optimal performance and user safety.

By integrating modularity, cordless convenience, and context-specific functionality, this project offers a forward-thinking alternative to traditional kitchen appliances. The result is a cohesive ecosystem that enhances the cooking experience for urban dwellers, minimalist cooks, and anyone seeking efficiency and flexibility in the modern kitchen.

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PREFACE

In an age where kitchens are evolving into hubs of efficiency and innovation, this project, **CoreKit**, was born out of a desire to reimagine how we interact with everyday kitchen appliances. The inspiration came from simple but persistent issues observed at home—wire clutter, redundant attachments, incompatible devices, and fragmented appliance ecosystems. These observations were not just personal frustrations but common pain points for many users, validated through in-depth research and user engagement.

This report documents the journey of identifying those challenges, understanding user behavior, exploring the current market landscape, and eventually designing a solution that is modular, cordless, and intuitive. From early ideation sketches to functional prototypes, each phase reflects a thoughtful balance between technical feasibility, user experience, and visual clarity.

The project reflects my learnings as a product design student and a designer-in-the-making—sharpening my ability to observe, synthesize insights, and convert them into tangible, purposeful design. It is also an attempt to push the boundaries of how appliances are perceived—not as isolated tools, but as part of an adaptable and user-centered system.

CoreKit is more than just a product; it is a design approach that aims to improve not just utility but the overall relationship people have with their kitchen environment.

CHAPTER 1 INTRODUCTION

1.1 PROJECT BACKGROUND

The kitchen, often considered the heart of the home, has undergone significant transformation in recent years. With the rise of urban living, shrinking apartment sizes, and increasingly busy lifestyles, the expectations from kitchen appliances have shifted dramatically. No longer are users content with a collection of single-purpose, bulky, and corded devices that clutter counter tops and restrict movement. Instead, there is a growing demand for solutions that are not only compact and efficient but also adaptable to a variety of cooking needs.

Despite advancements in technology and design, many kitchens remain plagued by common issues: tangled wires from multiple appliances (Fig. 1.1), disorganized storage due to a lack of integrated systems, and the inconvenience of being tethered to a power outlet. These challenges are especially pronounced in smaller homes and apartments, where every inch of space is valuable and efficiency is paramount. The traditional approach to kitchen appliances—owning a separate device for every function—no longer aligns with the needs of modern households.



Figure 1.1. Appliances present in a household kitchen

1.2 MOTIVATION AND CONTEXT

The motivation for this project stems from real-life observations within the home kitchen environment. Everyday inconveniences such as clutter caused by excessive wiring, difficulty in organizing and storing appliances, and the frustration of dealing with unnecessary or redundant attachments highlighted a clear gap in the market. The absence of a unified ecosystem for kitchen appliances not only leads to inefficient use of space but also complicates the user experience, making cooking and cleaning more cumbersome than necessary. (Fig. 1.2)



Figure 1.2. Picture of a kitchen showing different areas and appliances in use

To validate and deepen these initial observations, a comprehensive research process was undertaken. Secondary research provided insights into current market trends, user preferences, and existing solutions, while primary research-including surveys and interviews-captured firsthand accounts of user pain points and aspirations. The findings consistently pointed to a need for a kitchen appliance system that offers modularity, cordless convenience, and seamless integration-a system that could adapt to the diverse and evolving needs of contemporary users.

1.3 OBJECTIVES

This project sets out to design and develop a modular, cordless handheld kitchen appliance system that directly addresses the pain points identified through research. The primary objectives of the project are to [1]:

The primary objectives of this project are to:

- **Minimize Kitchen Clutter:** Develop a solution that reduces the mess and inconvenience caused by tangled wires and the proliferation of single-purpose appliances, creating a more organized and accessible kitchen environment.
- **Enhance Space Efficiency:** Address storage challenges by designing for compactness and modularity, ensuring that appliances and their attachments can be neatly stored and easily accessed, even in small kitchens.
- **Increase User Flexibility and Freedom:** Enable cordless operation to liberate users from being tethered to power outlets, allowing greater mobility and convenience during meal preparation.
- **Create a Cohesive Appliance Ecosystem:** Design an integrated system where multiple functions and attachments work seamlessly together, reducing redundancy and improving the overall user experience.
- **Prioritize Ergonomics and Usability:** Ensure that the solution is comfortable to use, with thoughtful attention to grip, weight distribution, and intuitive controls, accommodating a wide range of users and cooking styles.
- **Support Diverse Culinary Needs:** Provide versatility through modular attachments or features that cater to a broad spectrum of cooking tasks, including those specific to various cuisines and food preparation traditions.

These objectives guide the project toward delivering a kitchen appliance system that is efficient, user-friendly, adaptable, and well-suited to the demands of modern living [2][3][4].

CHAPTER 2 PROBLEM IDENTIFICATION

2.1 OBSERVATIONS FROM HOME KITCHEN

The genesis of this project lies in firsthand observations of daily life in a typical home kitchen. While preparing meals and managing kitchen tasks, several recurring issues became apparent. The kitchen space, though functional, was frequently disrupted by a tangle of wires from various appliances, making both movement and cleaning cumbersome. Storage posed another significant challenge: appliances and their numerous attachments often lacked designated spaces, resulting in a cluttered, disorganized environment. This not only made it difficult to locate specific tools when needed but also contributed to a sense of visual and practical chaos.

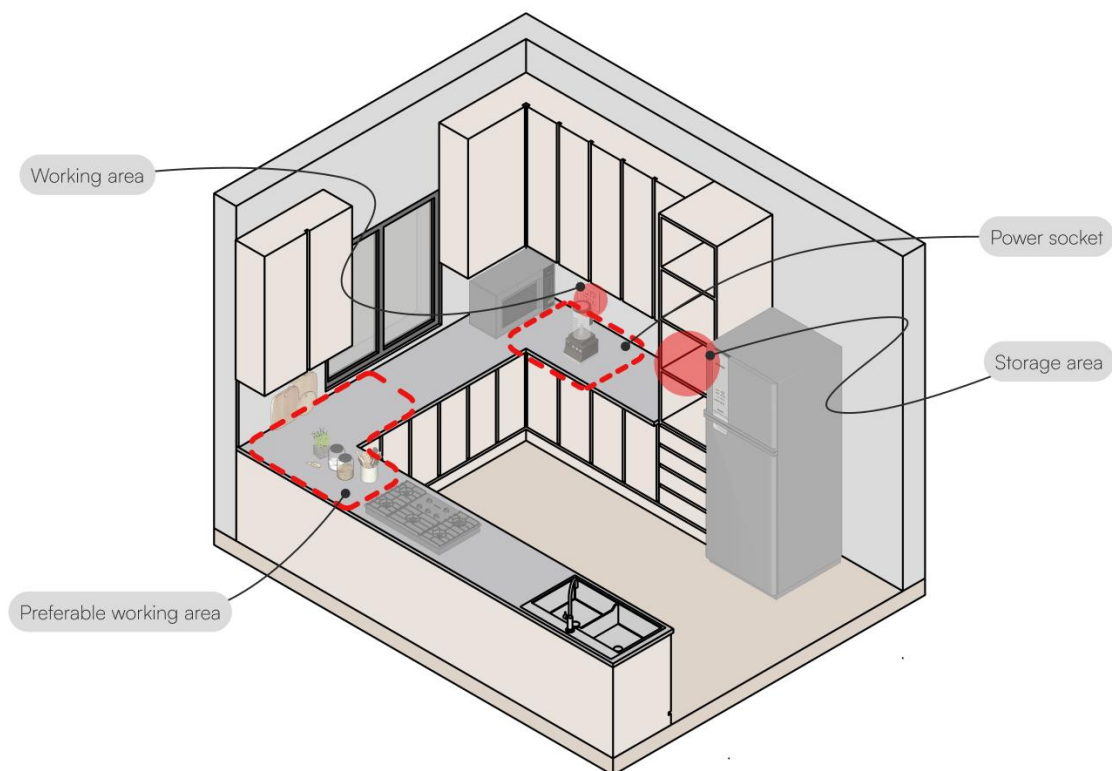


Figure 2.1. Illustrated isometric view of the kitchen shown in above Image, showcasing concerned areas

Additionally, many appliances came bundled with attachments that were rarely, if ever, used. These unnecessary components occupied valuable storage space and added to the confusion. The reliance on corded appliances further compounded the problem, as users were forced to

work within the limited reach of power outlets, often leading to inconvenient kitchen layouts and workflow interruptions (As illustrated in Fig. 2.1). Collectively, these observations highlighted a broader issue: the absence of a cohesive, integrated approach to kitchen appliance design.

2.2 KEY PAIN POINTS

From these observations, several core pain points were identified (Shown in Figure 2.2):

- **Clutter from Wires:** Multiple corded appliances create a web of wires, leading to safety hazards, difficulty in cleaning, and restricted movement.
- **Disorganized Storage:** Limited kitchen space and a lack of integrated storage solutions result in appliances and attachments being scattered or crammed into cabinets and drawers.
- **Unnecessary Attachments:** Appliances are often sold with numerous attachments, many of which are redundant or rarely used, adding to storage woes and decision fatigue.
- **Tethered Operation:** Conventional appliances require constant connection to power outlets, limiting flexibility and forcing users to work within a constrained area.
- **Lack of Ecosystem:** There is no unified system or ecosystem among kitchen appliances, resulting in fragmented workflows and a lack of synergy between tools.



Figure 2.2. Series of images showing concerned points in the kitchen

2.3 NEED FOR AN INTEGRATED ECOSYSTEM

The evolving nature of Indian urban lifestyles—characterized by smaller living spaces, busy schedules, and growing interest in home cooking—has placed new demands on kitchen functionality. Despite the presence of multiple appliances intended to ease cooking tasks, the current setup often results in more friction than convenience. Each appliance typically comes

with its own attachments, storage needs, and power requirements, contributing to a disconnected and chaotic kitchen environment.

The modern kitchen requires more than just functional appliances; it calls for coherence, portability, and intuitive organization. There is a pressing need for appliances that are not only compact and efficient but also designed to work in harmony with one another. A unified ecosystem of appliances could streamline the cooking workflow, minimize redundancy, and free up valuable countertop and storage space.

Additionally, an integrated system can address common usage barriers—such as the difficulty in switching between appliances, the inconvenience of unplugging and re-plugging devices, and the cognitive overload of managing different tools for sequential tasks. By designing for compatibility and modularity, future kitchen systems can offer enhanced usability, adaptability, and comfort, especially in Indian households where kitchen sizes vary widely and family needs evolve quickly. [5][6]

In essence, the opportunity lies in redefining the role of small appliances from individual devices to interconnected components of a thoughtfully designed system—one that adapts to the user, the space, and the cooking process itself.

CHAPTER 3 RESEARCH

3.1 RESEARCH METHODOLOGY

To design a meaningful and user-centered kitchen appliance system, this project adopted a mixed-method research approach, combining both secondary and primary research techniques. The intent was to gain a multi-dimensional understanding of user behavior, market trends, and existing product ecosystems. This method helped uncover opportunities for innovation by balancing macro-level market intelligence with micro-level user insights.

3.1.1 Secondary Research

Secondary research aimed to analyze the current state of the market by studying leading brands, their product ecosystems, and existing technological directions. It involved:

- Reviewing product portfolios of established brands through their websites, manuals, product pages, and YouTube channels.
- Studying design languages, material use, and interaction patterns.
- Identifying gaps in modularity, portability, and cross-device compatibility.
- Analyzing product reviews, tear down videos, and user feedback available publicly.
- This analysis helped position each brand on axes such as modularity, cordless capability, and ecosystem design—highlighting the white space in the market for a new solution.

3.1.2 Primary Research

Primary research focused on understanding real-world user needs and validating the assumptions drawn from secondary research. It was conducted in two phases:

Quantitative Study via Surveys:

A structured online survey was distributed among over 60 participants across metro and semi-urban households. The survey aimed to capture trends in:

- Daily usage of appliances

- Kitchen space and storage constraints
- Preferences for cordless and multi-purpose appliances
- Perceived pain points with existing tools

Qualitative Study via Interviews:

In-depth, semi-structured interviews were conducted with 8 participants including bachelors, working couples, homemakers, and students. These interviews allowed exploration of:

- Day-to-day pain points while cooking
- Storage habits and kitchen layout challenges
- Expectations from future appliances
- Perceptions of value, aesthetics, and convenience

To organize and synthesize findings:

- Interview keywords were clustered to identify common patterns.
- A word cloud was created to visually represent the most frequently mentioned themes.

3.1.3 Insight Integration

Insights from both research streams were used to:

- Identify opportunity areas like cordless operation, ergonomic usability, and integrated storage.
- Benchmark features that users value most but are under served by current market solutions.
- Validate the feasibility of building an appliance ecosystem suited to urban Indian kitchens—compact, multi-functional, and visually cohesive.

This layered research methodology allowed the project to move forward with clarity, grounding the concept ideation in both market reality and user empathy.

3.2 SECONDARY RESEARCH

3.2.1 Brand analysis

To understand the scope for innovation and benchmark against industry standards, four prominent international brands—Braun, Philips, Bamix, and Black+Decker—were studied in detail, along with several others like KitchenAid, Hamilton Beach, Ninja, Wonderchef, Morphy Richards, Inalsa, and Bajaj.



Figure 3.1. Logos of brands that specialize in kitchen appliance, accessed in Secondary research

- **Braun**

[7] A German brand known for its emphasis on ergonomics, engineering precision, and minimalist aesthetics. Braun's products are built for functionality and longevity but often lack modularity and ecosystem connectivity. Their wired hand blenders and mixers are robust and reliable, though not very adaptable to dynamic kitchen environments.

BRAUN



Figure 3.2. Braun Multiquick 9 Blender, attachment ecosystem

- **Philips**

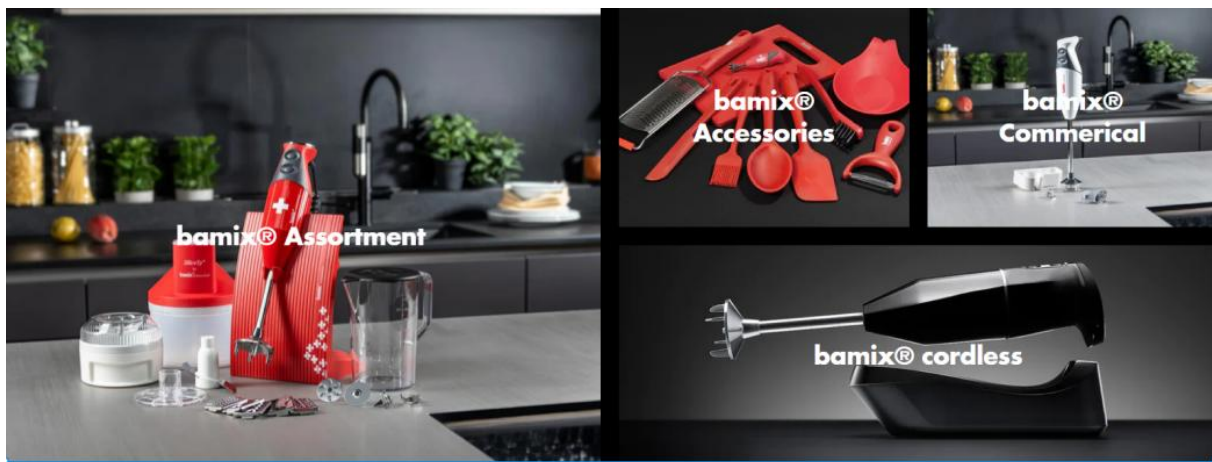
[8] A Dutch multinational with a strong presence in India. Philips focuses on safety, innovation, and product diversity, offering a range of food processors and mixers. However, their designs tend to be bulky, conventional, and largely wired, lacking adaptability or modular options that would make them more efficient in compact urban kitchens.



Figure 3.3. Philips offering for a cordless hand blender with the attachments

- **Bamix**

[9] A Swiss brand famous for inventing the hand blender. Bamix is recognized for its compact, minimal, and high-performance appliances. Their products are durable and often used by chefs, but they stick to a single-tool philosophy, offering limited attachments and no true modularity or ecosystem.



bamix® Stabmixer



Figure 3.4. Bamix range of cordless hand blenders

- **Black+Decker**

[10] An American brand leaning heavily into the cordless utility segment. They've introduced cordless hand blenders and other small kitchen appliances that offer freedom of movement. While the brand has modularity in mind, the ecosystem is still emerging. Their product appeal lies in practicality and convenience rather than premium aesthetics.

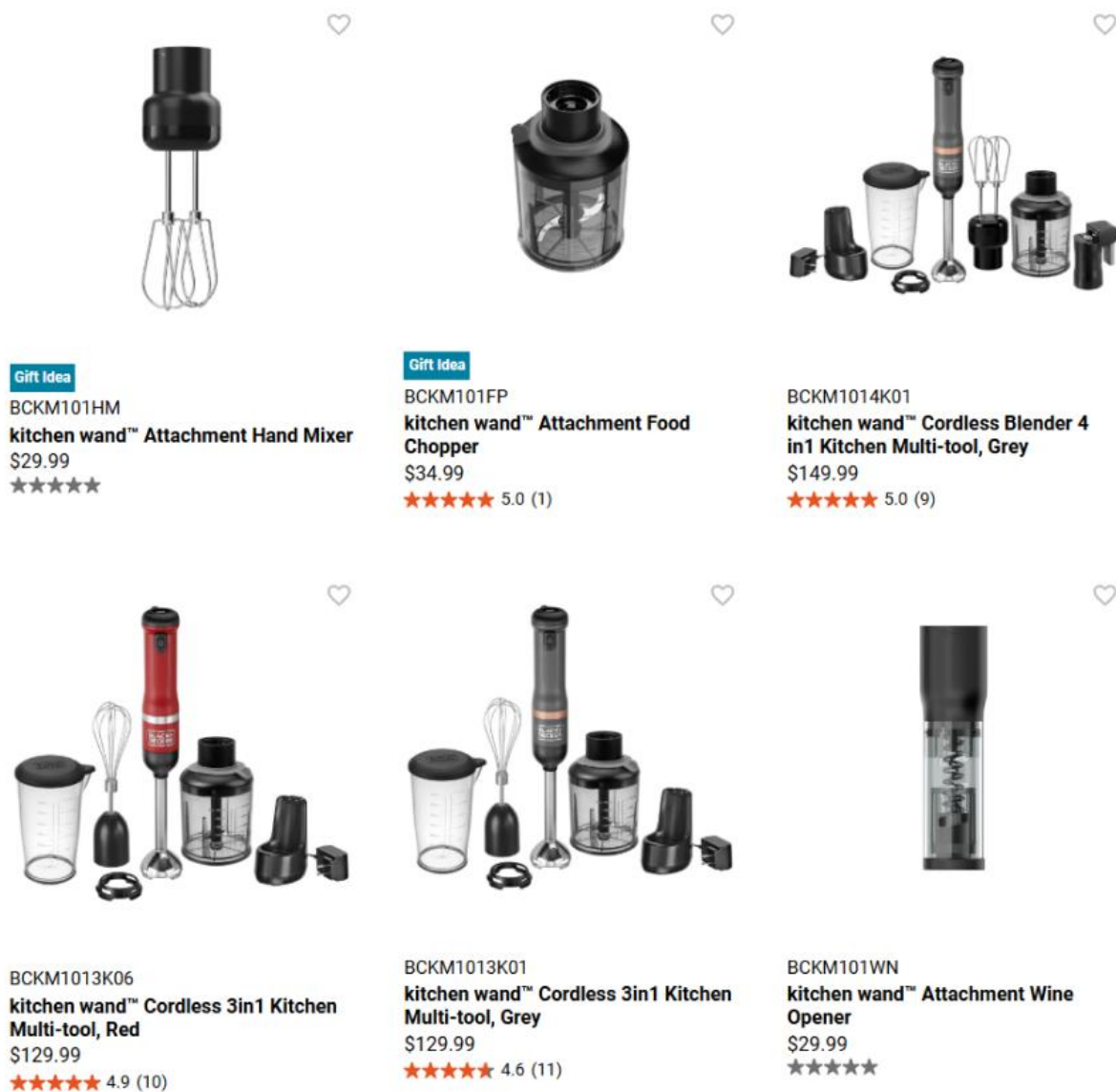


Figure 3.5. Black + Decker Kitchen wand and the attachment ecosystem

- **Hamilton Beach**

Focuses on affordability and function-first appliances for North America. Their products are largely wired and fixed-function, with limited ecosystem compatibility.

Hamilton Beach®

 2 Speed Immersion Blender MODEL: 59742F \$26.99 ADD TO CART	 2 Speed Hand Blender MODEL: 59762FG \$29.99 ADD TO CART	 Hamilton Beach® Professional Variable Speed Hand Blender MODEL: 59750 \$76.99 ADD TO CART
 2 Speed Hand Blender MODEL: 59759G \$21.99 ADD TO CART	 7 Piece Hand Blender Set MODEL: 59768G \$32.99 ADD TO CART	 Immersion Blender with 3 Attachments MODEL: 59745 \$38.99 ADD TO CART

Figure 3.6. Hamilton Beach offerings in the category of hand blender

▪ Ninja

An emerging brand popular for its innovative kitchen tech. Ninja offers modular designs and some wireless features but does not yet offer a comprehensive ecosystem across tools.

 Ninja® Foodi® Power Blender Ultimate System & Smoothie Maker Bundle • Smoothie bowl maker bundle • Pitcher blender & processor • Dough blade • 7 functions \$249.99 As low as \$23/month with affirm Learn more Add to Cart  FREE SHIPPING	 Ninja® Foodi® Power Mixer™ System Hand Blender and 5-Speed Hand Mixer Combo \$99.99 Add to Cart  FREE SHIPPING	 Ninja® Foodi® Smoothie Bowl Maker and Nutrient Extractor™ 1200WP 4 Auto-iQ® • Single-serve blender • 4 functions \$89.99 119.99 Add to Cart	 Ninja® Nutri-Blender Pro with Auto-iQ® • Single-serve blender • 2 functions \$99.99 Add to Cart  FREE SHIPPING
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 Includes 750-peak-watt PowerBase™, 9-inch Immersion Blending Arm, Hand-Mixer Attachment, EasyGlide™ Beaters, Whisk, 3-cup Blending Vessel, and 20-recipe Inspiration Guide.	 Variable speed control The PowerBase™ recognizes each attachment, giving you total control with 5 mixing speeds and 2 blending speeds.	POWERBASE One base transforms into two appliances  One PowerBase™, two appliances Easily swap between powerful hand mixing and immersion blending.
 Easy to store Fits easily in your kitchen drawer or cabinet.	POWERBASE™ One base transforms into two appliances  Mixing mode (blue arrow) and Blending mode (green arrow)	

Figure 3.7. Some selected products from Ninja, showing a variety of products and their offering for a form changing power-base concept

- **Wonderchef, Morphy Richards, Inalsa, Bajaj**

Indian and UK brands with strong presence in the Indian market. Their products are generally wired, fixed-function, and budget-focused. Modularity, ecosystem thinking, and cordless innovation are largely missing. They cater to price-sensitive consumers but do not lead in user-centered innovation.

3.2.2 Comparative analysis

Table 3.1. Comparative analysis of analyzed brands

Brand	Price Range	Power (W)	Key Features	Modularity	Cordless
Braun	Premium	500–1200	ActiveBlade™ tech, EasyClick Plus system, SplashControl, 10+ attachments	Yes	No
Philips	Mid to Premium	300–750	Turbo mode, ergonomic design, stainless steel blades, anti-splash jars	Limited	No
KitchenAid	Premium	250–800	Durable motors, 15+ speed settings, sleek finishes	Limited	Yes
Sujata	Budget	500–1000	Heavy-duty motors, stainless steel jars, unbreakable polycarbonate bodies	No	No
Bamix	Luxury	140–200	Swiss-made motors, 20,000 RPM, surgical-grade blades	No	Yes
Ninja	Mid-Range	1000–1500	Auto-iQ programs, CrushIQ tech, dishwasher-safe parts	Limited	No
Black & Decker	Budget	200–400	Compact design, 2-speed control, snap-on attachments	No	No

Hamilton Beach	Mid-Range	500–800	Stainless steel blades, jar blender compatibility, snap-lock system	Limited	No
Samsung	Premium	700–1000	SmartThings connectivity, AI-driven modes, Bixby voice control	Limited	Yes
Wonderchef	Mid to Premium	600–900	Air frying attachments, delay timers, non-stick coatings	Yes	No
Inalsa	Budget	450–750	Anti-splash jars, pulse function, detachable rods	Limited	No
Bajaj	Budget	300–500	Basic speed settings, compact design, heat-resistant blades	No	No
KAFF	Budget	400–600	Stainless steel blades, compact food processors	Yes	No
Morphy Richards	Mid-Range	500–800	Turbo boil, multi-purpose blades, heat-resistant motors	Limited	Yes

This mapping (Shown in Table 3.1) revealed a gap for a product that is cordless, modular, and ecosystem-based—something that could combine premium user experience with functional efficiency for Indian kitchens. [11-15]

3.2.3 SWOT Analysis

Strengths

- **Brand Reputation:** Established players like Braun and KitchenAid dominate with premium branding and loyal customer bases.
- **Technological Innovation:** Ninja and SharkNinja lead in multi-functional appliances (e.g., air fryers, blenders).
- **Distribution Networks:** Wide retail and online presence (e.g., Philips, Black & Decker).

- Cordless Offerings: KitchenAid's Go Cordless System (12V battery) and Bamix's high-end cordless blenders.

Weaknesses

- Limited Modularity: Most brands lack true modular systems (e.g., Braun's EasyClick is attachment-based but corded).
- High Cost: Premium brands like Braun and KitchenAid are priced out of reach for budget-conscious users.
- Battery Fragmentation: No unified battery ecosystem (e.g., KitchenAid's system is brand-specific).
- Bulkiness: Countertop appliances (Ninja, SharkNinja) occupy significant space.

Opportunities

- Urbanization: Rising demand for compact, space-saving solutions in small kitchens.
- Sustainability: Growing preference for upgradable, repairable appliances (modular design).
- Smart Integration: IoT-enabled devices (e.g., Xiaomi's smart rice cooker).
- Cordless Growth: Market shift toward wireless appliances (CAGR 5.9% by 2030).

Threats

- Price Wars: Budget brands (Bajaj, Inalsa) undercut premium pricing.
- Tech Obsolescence: Rapid innovation risks outdated features (e.g., Ki wireless power standard).
- Market Saturation: Overcrowding in blenders, choppers, and mixers.
- Regulatory Hurdles: Stricter energy efficiency/safety standards. [15-22]

3.3 PRIMARY RESEARCH

Primary research was undertaken to validate the assumptions made during the observational and secondary research phases. The objective was to gather real-world user insights about kitchen appliance usage, frustrations, storage patterns, and openness toward innovation like cordless or modular tools.

3.3.1 Survey Research

A detailed online survey was conducted with over 30 respondents across Indian urban households, ranging from students and working professionals to homemakers. The survey was structured to extract both behavioral and attitudinal data, focusing on (Responses illustrated in Figure 3.8 - 3.10) :

- Frequency and duration of appliance usage
- User challenges with wired systems
- Appliance storage and maintenance concerns
- Awareness and interest in modular/cross-functional tools
- Perceived value in cordless functionality

3.3.2 Key Findings from Survey:

Experience with Appliances:

Most-used appliances include mixers, hand blenders, and grinders, confirming their daily utility.

Pain Points:

Top frustrations with current appliances include wire clutter, difficulty in storage, and lack of modularity.

A significant number of users felt that wires make appliances harder to clean and organize, and limited power socket availability compounds the issue.

Cordless Preference:

76.7% of respondents stated they would prefer a cordless appliance, especially for compact kitchens or shared spaces.

Storage & Portability:

Users expressed dissatisfaction with how existing appliances are stored unattractively or inefficiently, often crammed into cabinets or drawers.

There was high interest in modular solutions that could reduce clutter.

User Rating for Key Needs:

Users were asked to rate the importance of several parameters (5 being the most important):

Portability: 3.87

Ease of Use: 4.12

Cordless Operation: 4.0

Design/Aesthetic Appeal: 3.7

Ease of Storage: 4.1

These ratings demonstrate that users place strong emphasis on ease of use, storage, and cordless functionality—a validation for a solution that combines all three.

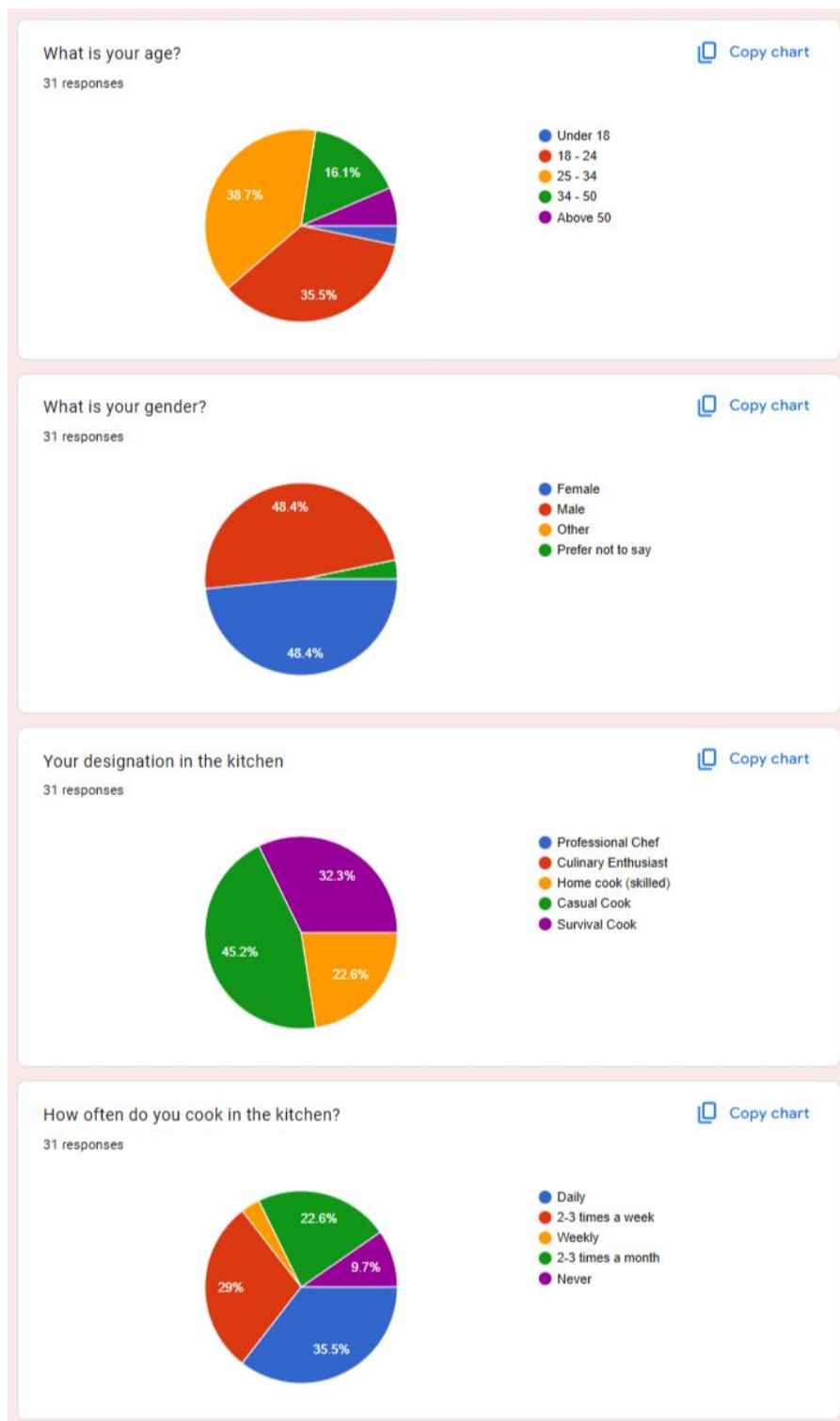


Figure 3.8. Responses to the survey - Participants' information

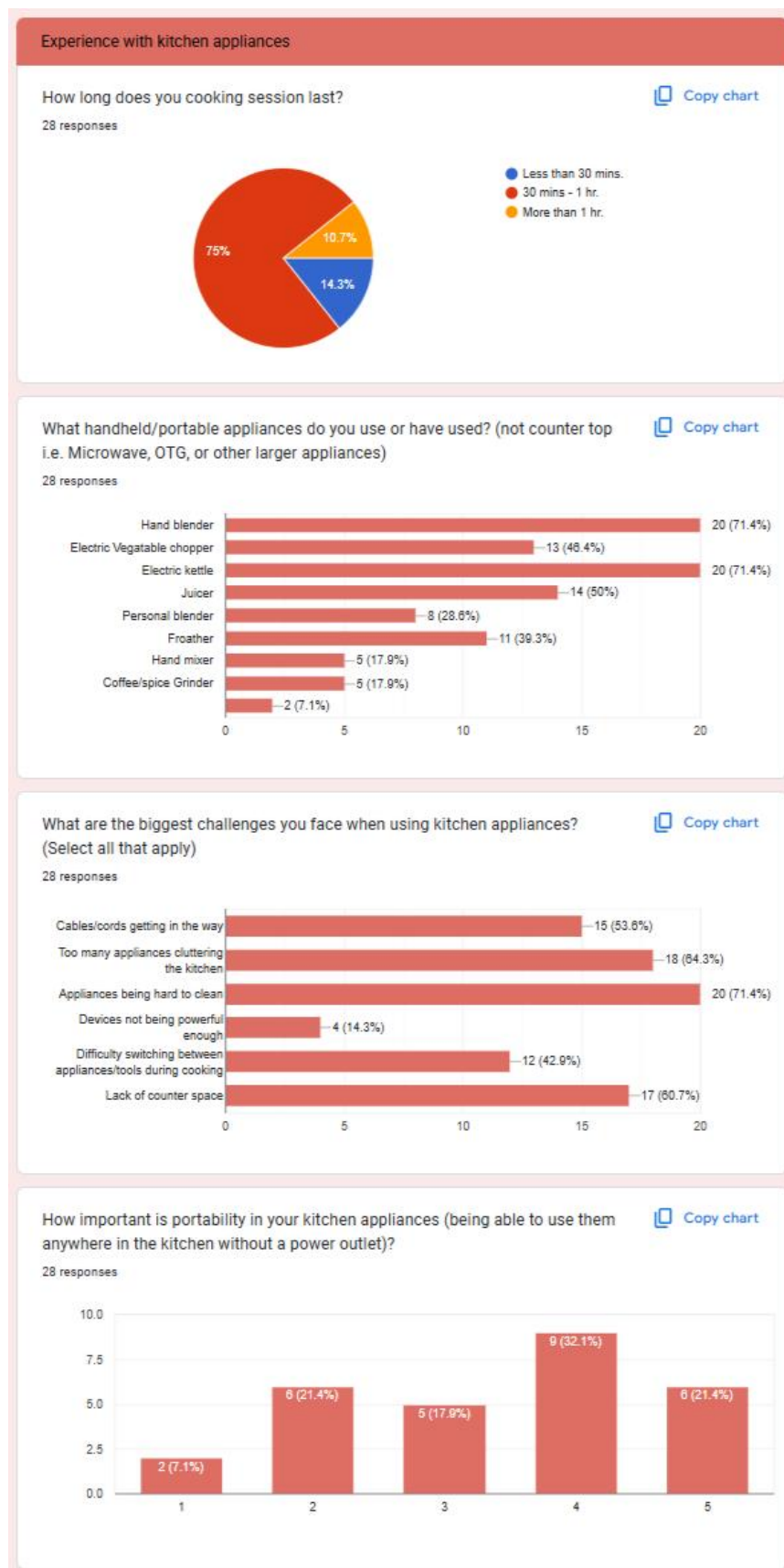


Figure 3.9. Responses to the survey - Experience with kitchen appliances

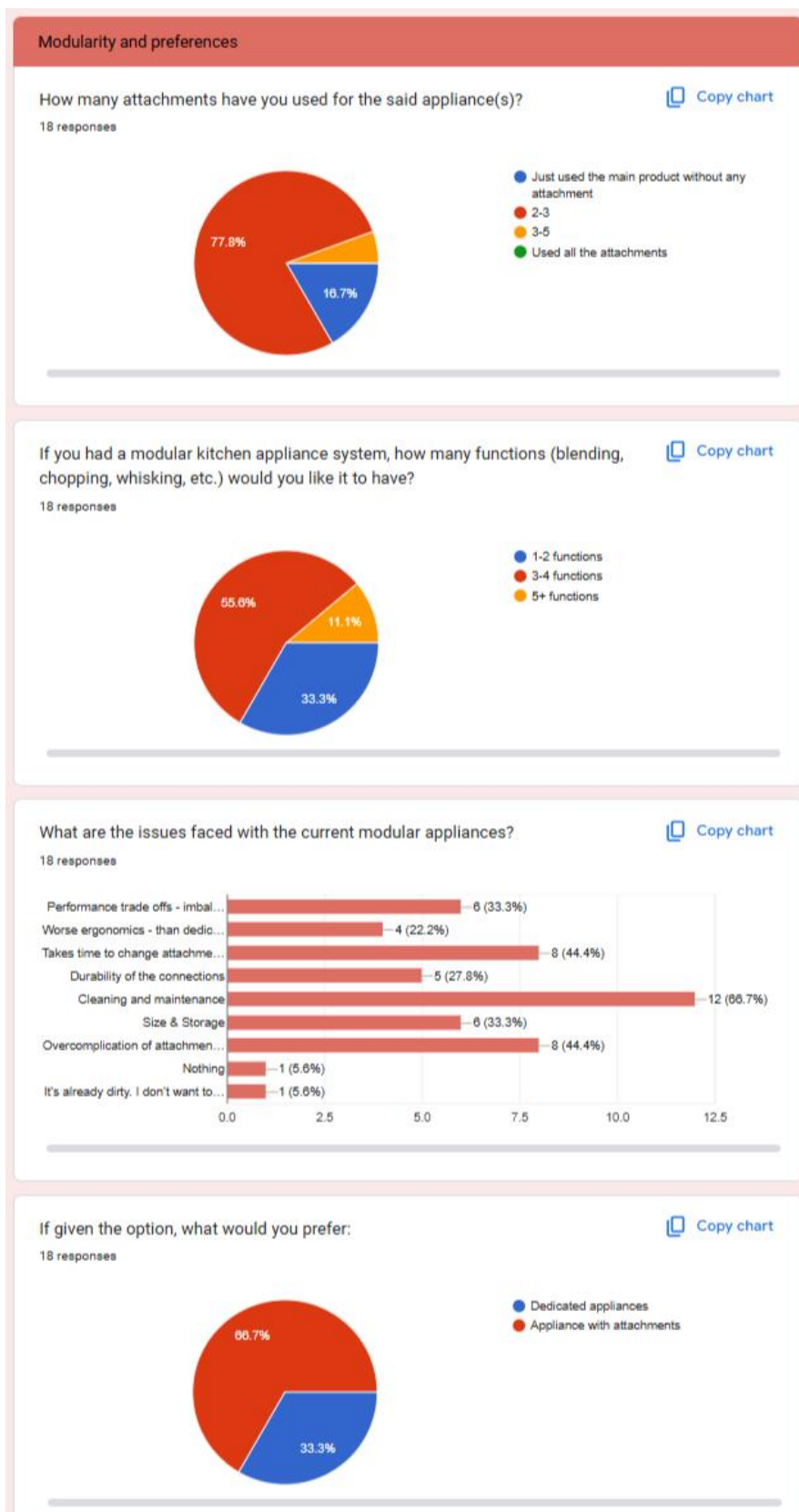


Figure 3.10. Responses to the survey - Preferences

3.3.3 Interviews

To complement the survey data, semi-structured interviews were conducted with 8 users representing varied household types and age groups. The aim was to go beyond numbers and capture emotional and experiential insights.

Interview Focus Areas:

- Frustrations in daily cooking setups
- Unused or underused appliances and why
- Emotional connections (or disconnections) with existing tools
- Wishlist for future appliances

Interview Themes:

From the transcripts, recurring words and themes were extracted and visualized using a word cloud. Prominent keywords included (Shown in Figure. 3.11):



Figure 3.11. Word cloud of keywords from interviews

These terms clearly underscore the emotional fatigue users experience due to disorganized and inefficient appliance ecosystems.

3.4 POSITIONING GRAPH

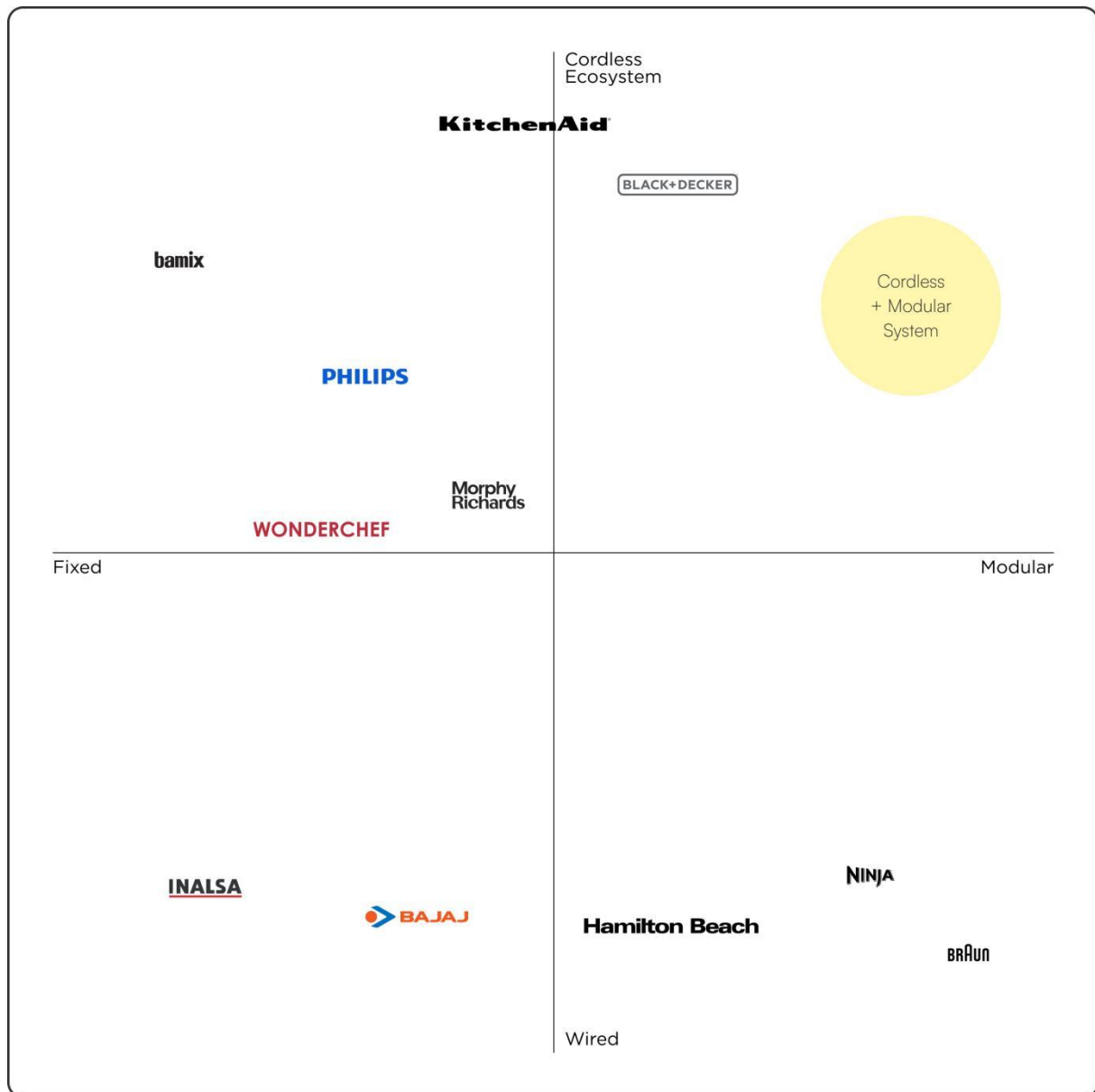


Figure 3.12. Brand positioning graph showing the opportunity area on a 2 axes graph

To better understand where the product fits within the existing market landscape, a Positioning Graph was developed based on two key axes:

- X-axis: Modularity & Ecosystem Integration (ranging from single-use tools to fully modular systems)
- Y-axis: Cordless Technology (ranging from fully wired appliances to fully cordless systems)

Most existing brands occupy the lower-left quadrant—wired and non-modular. For instance, brands like Bajaj, Inalsa, and Wonderchef offer affordable, fixed-function appliances with little to no modularity or cordless flexibility. Brands such as Braun and Philips bring in superior build and performance but still remain mostly in the wired segment, with limited ecosystem thinking (Refer Figure 3.12).

Black+Decker and Ninja are beginning to explore the cordless space but have yet to offer a truly cohesive, modular appliance ecosystem.

Position in the upper-right quadrant—high modularity and fully cordless—a space that remains largely untapped. This strategic positioning highlights a clear market gap and an opportunity to redefine the cooking experience for urban, design-conscious users looking for efficiency, flexibility, and a clutter-free kitchen.

CHAPTER 4 IDEATION AND CONCEPT DEVELOPMENT

4.1 DESIGN OPPORTUNITY

The research phase revealed a disconnect between user needs and the offerings of current kitchen appliances, particularly in Indian urban households. Despite the increasing reliance on compact, multi-functional kitchen tools, most products available today are still wired, single-purpose, and poorly adapted to constrained spaces. The survey and interviews highlighted several recurring frustrations: tangled wires, difficulty accessing sockets, cluttered countertops (Figure 4.1), appliances that are hard to store, and the absence of an integrated system that could adapt to a range of cooking tasks.

At the same time, emerging global trends—such as cordless appliances, modular design thinking, and minimal countertop ecosystems—indicate a clear shift toward more flexible, space-efficient, and visually cohesive kitchen tools. However, these innovations are not yet widely available or optimized for Indian kitchens, where affordability, compactness, and utility are primary concerns.



Figure 4.1. Image of the observed kitchen showing majority of the pain points

Opportunity Statement

“To create a new-age kitchen appliance ecosystem that is cordless, modular, and minimal, capable of adapting to multiple cooking tasks while addressing storage, usability, and aesthetic needs for the modern Indian household.”

The design direction aims to re imagine the role of everyday appliances—not as isolated tools, but as interconnected components of a smarter, cleaner, and more user-centered kitchen experience.

The key insights that led to this opportunity include:

- Cluttered kitchen environments resulting from multiple wired appliances with incompatible forms.
- Under utilization of appliances due to hassle in setup and cleaning.
- A growing interest in modular tools that offer flexibility without compromising performance.
- Aesthetic fatigue from loud designs that clash with modern interiors.
- This chapter builds on these insights, translating them into actionable ideas and design directions.

4.2 IDEATION PROCESS

With clear insights gathered from research, the next phase involved ideating potential design directions that could address the key issues identified—particularly clutter, lack of modularity, and absence of a cohesive appliance ecosystem. The ideation process began with early brainstorming sessions, heavily guided by the SCAMPER technique to expand possibilities and encourage lateral thinking.

SCAMPER in Early Ideation

SCAMPER is a structured ideation framework that helps in generating innovative ideas by manipulating existing solutions through seven techniques: Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, and Reverse. Here's how each was applied in context:

Substitute

Replace wired power with cordless battery systems. Substitute conventional heavy materials with lighter, compact alternatives to improve portability.

Combine

Integrate multiple appliances into a single ecosystem. Merge attachments into a unified module-based system that fits a single base.

Adapt

Draw inspiration from power tools and grooming devices that use shared batteries or bases. Explore form factors from outside the kitchen domain.

Modify

Change the shape and size of components to make them more ergonomic and storable. Introduce modularity by re-sizing attachments for various needs.

Put to another use

Envision the appliance system as not just a cooking aid but also a countertop organizer or even a travel-friendly cooking kit for compact kitchens or hostels.

Eliminate

Remove unnecessary wires, extra buttons, and bulky components. Strip the product down to essential, intuitive interactions.

Reverse

Rethink the order of how appliances are used or stored—store attachments in the base, or design for vertical stacking to save counter space.

Using this method helped frame the problem from multiple angles and resulted in a broad spectrum of initial ideas, from detachable cordless attachments to compact, stack-able appliances.

Key Focus Areas During Ideation:

- Designing around one shared base with swappable heads for blending, grinding, whisking, etc
- Exploring form factors that enable minimalist storage in Indian kitchens.
- Creating a product language that feels cohesive and modern, suitable for a visible countertop presence.
- Enabling easy charging and battery removal, without compromising safety or hygiene.
- Integrating soft UX elements: intuitive indicators, click-in mechanisms, and reduced mental load during assembly or cleaning.
- These early brainstorming outcomes laid the groundwork for concept generation and form exploration, which are discussed in the following section.

4.3 CONCEPT DIRECTION

To translate early ideas into tangible explorations, a low-effort, high-impact approach was



Figure 4.2 Early ideation sketches, showcasing variety of ideas.

adopted using readily available cylindrical household items such as paper rolls, aerosol cans, plastic bottles, and tin cans. These served as stand-in mockups for the appliance's central module and swappable attachments.

This approach allowed rapid iteration without requiring foam or paper prototypes and provided valuable insights into ergonomics and user comfort.

4.3.1 Grip Size Exploration

Three different cylindrical (Figure 4.3) items were used to study how varying diameters influence hand comfort and control:

- A paper roll represented the thinnest grip scenario.
- A spray can simulated a medium-sized handle.
- A 1L plastic bottle approximated a thicker, more robust grip.



Figure 4.3. Series of images showing the process images of determining the suitable diameter for grip

These trials revealed:

- Thicker grips offered more surface contact but became harder to control with smaller hands.
- Medium-diameter objects struck a balance between comfort and grip security.
- Grip texture and tapering would be essential to prevent slippage in future iterations.

4.3.2 Determining Comfortable Wrist angles

One of the key ergonomic concerns was wrist alignment during prolonged use. A study was conducted using a plastic bottle at different orientations. Angles were mapped to understand how wrist flexion and extension change with tool alignment (Figure 4.4):

- 18° forward tilt allowed relaxed wrist posture for downward pressing motions.

- 83° neutral angle aligned with comfortable mid-air usage.

This analysis informed the ideal orientation and inclination for the appliance's handle, leading to a slightly offset grip in later form development.

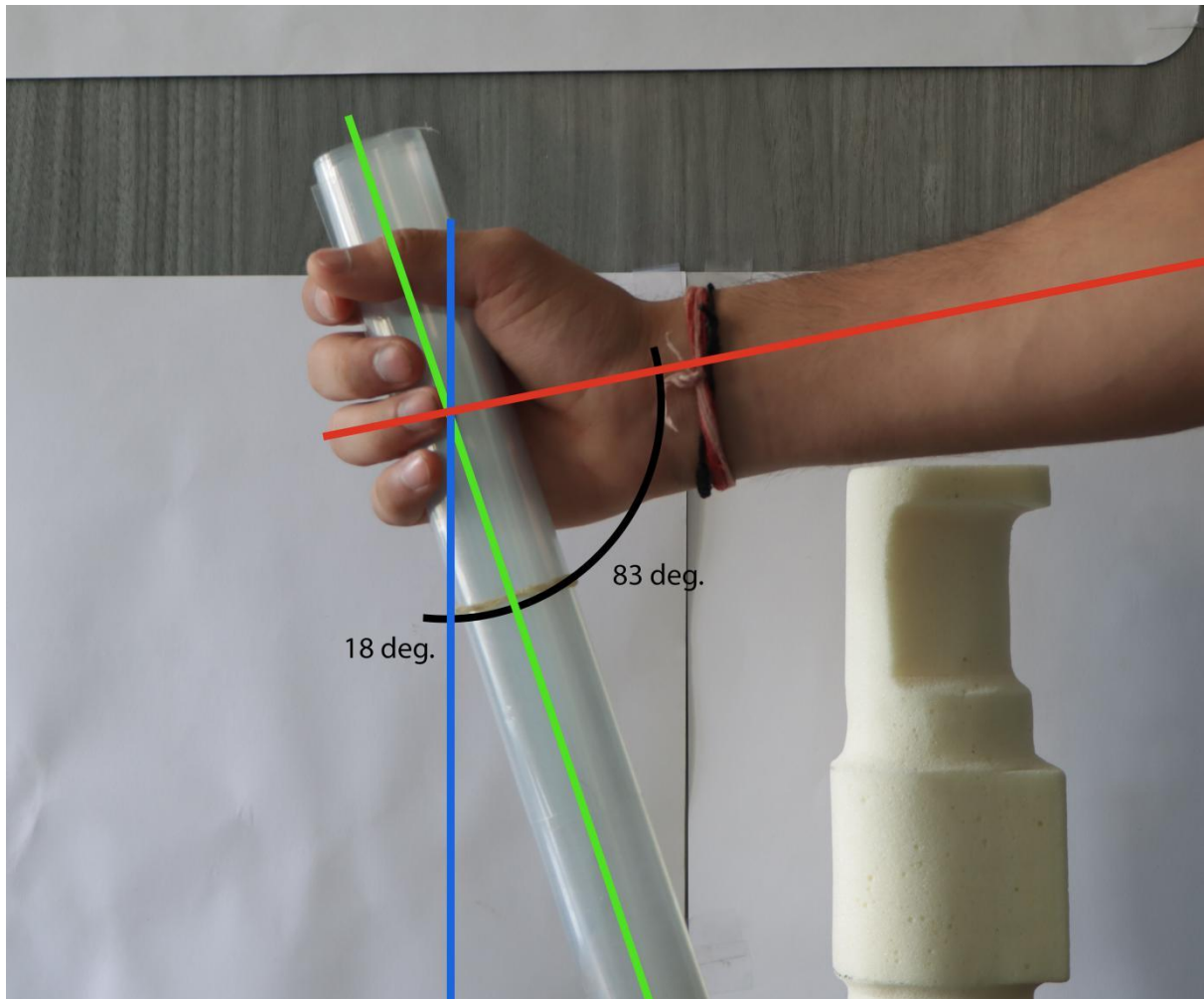


Figure 4.4. Comfortable angle to hold and use a hand blender vertically

4.3.3 Mockup testing with Weighted bottles

To simulate real usage scenarios like blending or whisking, weighted mockups (Figure 4.5) were created by taping tin cans to empty bottles. This helped assess balance, wrist strain, and control:

- Various placements of weights (top-heavy, bottom-heavy, and central) were tested.
- Central or bottom-heavy configurations offered better control and reduced fatigue.
- Top-heavy setups caused over-rotation and discomfort during repetitive tasks.

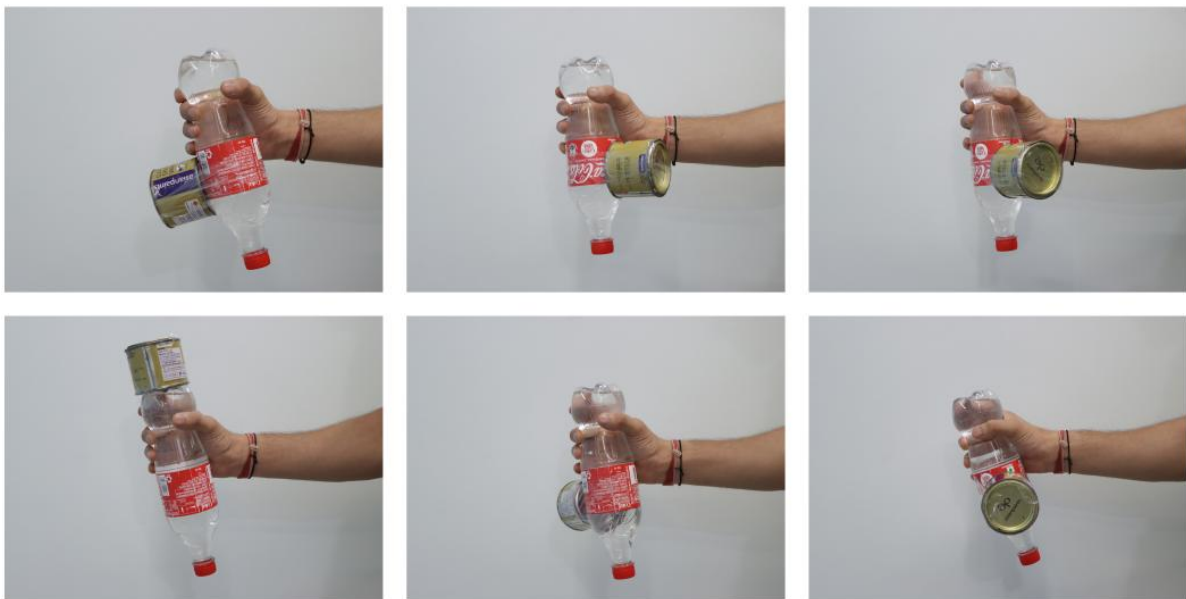


Figure 4.5. Series of images from the process of determining the least intrusive and most efficient place for battery through weighted mock-ups

These tests helped validate the hypothesis that ergonomics and weight distribution should guide the form and module alignment in the final product.

4.4 FORM DEVELOPMENT

With insights gained from ergonomic testing and mockup evaluations, the focus shifted to developing a visual and physical form that integrates functionality, aesthetics, and user comfort. The goal was to create a centralized core unit that feels intuitive in the hand while supporting a modular attachment system.

4.4.1 Ideation Moodboard

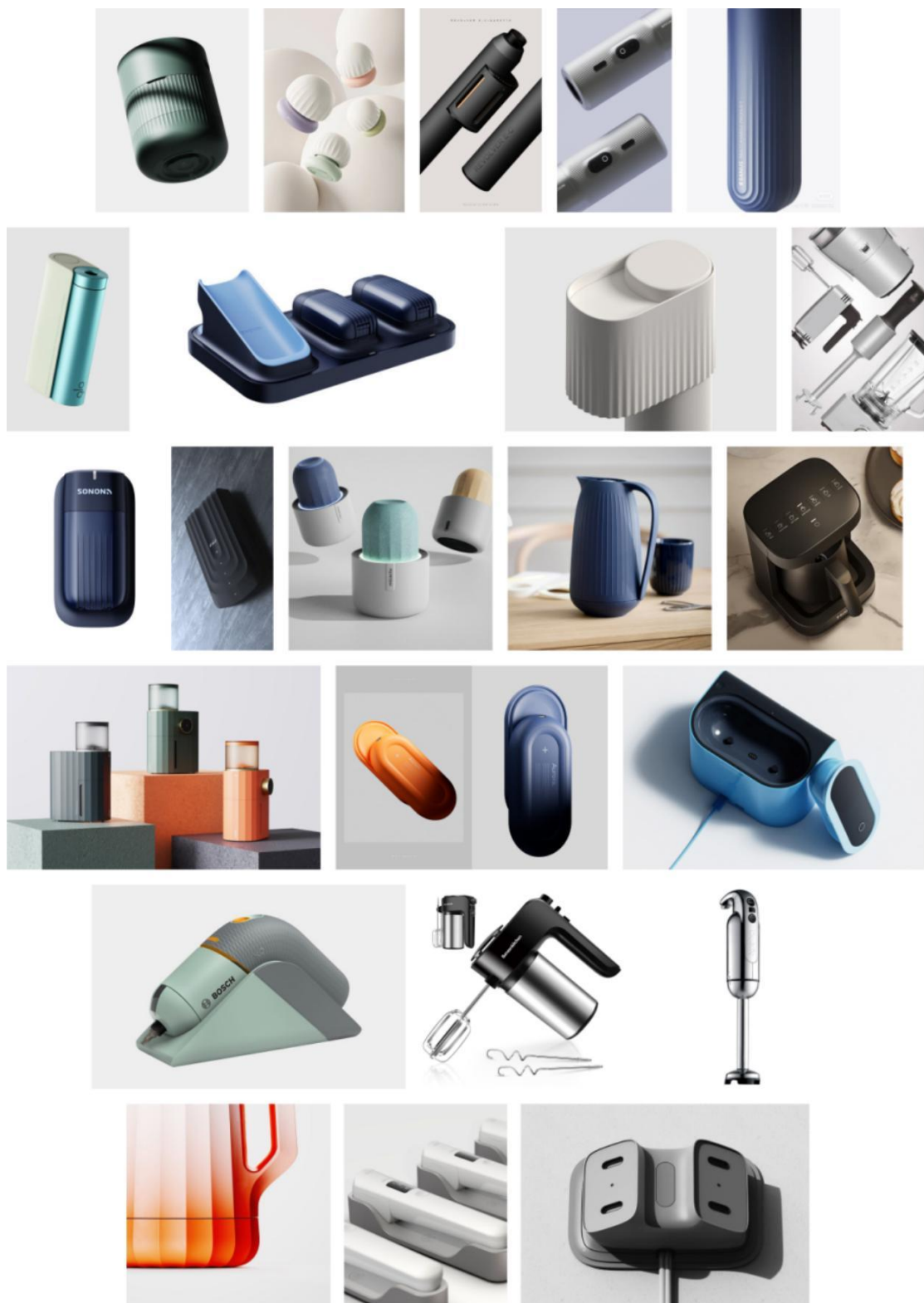


Figure 4.6. Ideation moodboard: curation of images for inspiration for functionality and form ideation

4.4.2 Form Ideation

The sketches represent a wide-ranging exploration (Figure 4.7 & 4.8) of geometry, attachment placement, grip comfort, and visual identity. These were categorized into evolving families of forms based on their defining features:

- **Cylindrical Core Variations:** Leveraging familiarity and symmetry, these concepts examined how attachments could dock around a tubular center. These forms supported ease of rotation and grip adaptability.
- **Offset Grip Profiles:** A set of iterations focused on improving ergonomics by offsetting the handle slightly to align better with the natural wrist position determined in mockups. These forms also visually differentiated the handle from the attachment axis.
- **Attachment Integration:** Orange highlights throughout the sketches indicated different design proposals for how modules attach—ranging from rail slides to magnetic locking systems. Emphasis was placed on keeping the mechanism intuitive and minimal in footprint.

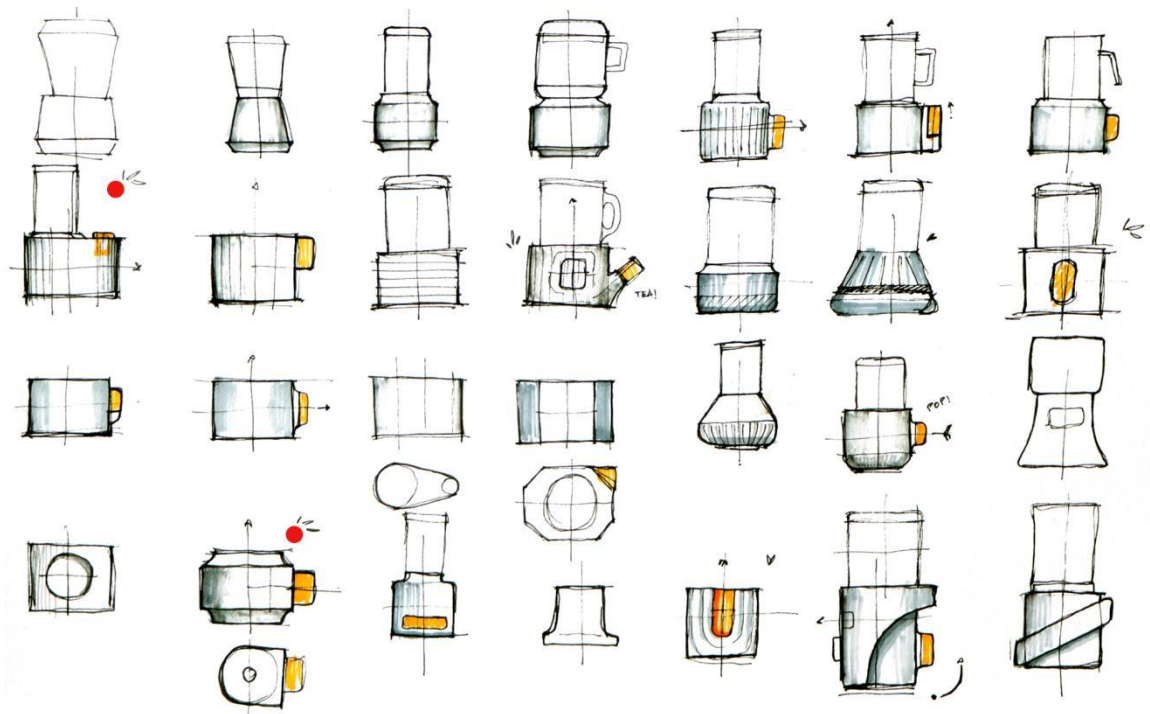


Figure 4.7. Form ideation sketches: showcasing the explorations of possible design language. Selected ideas marked with Red circles



Figure 4.8. Form ideation sketches: showcasing different options for battery attachment and form of the appliances

Selected ideas marked with Red circles

4.4.3 Concept Evaluation Criteria

To narrow down the concepts (Figure 4.9) the following filters were applied:

- Ergonomic feasibility: Could the grip work in multiple orientations?
- Ease of manufacturing: Would the form allow for easy molding and assembly?
- Visual cleanliness: Could the product still appear compact and clean with attachments?

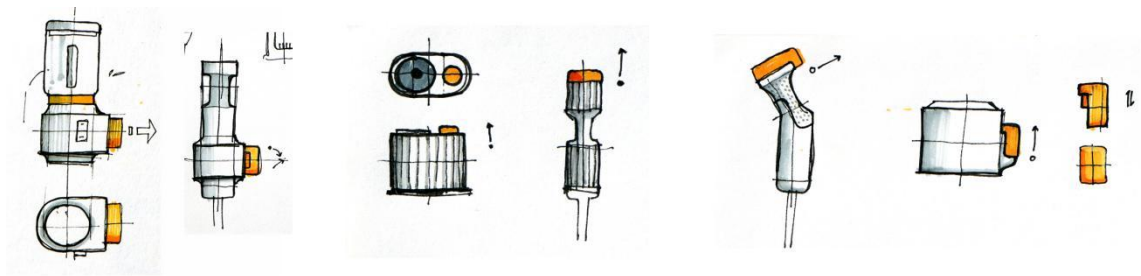


Figure 4.9. Sketches of selected form ideations

Select directions were marked with red dots and circles to indicate potential for further development. These showed promise in balancing modularity with ergonomic efficiency.

4.4.4 Key observation from sketches

- Forms with a slightly flared base or neck helped improve grip stability.
- Side-mounted vs. top-mounted attachments changed the device's center of gravity and impacted hand strain.
- Rounded edge transitions were preferred for visual softness and comfort, especially near hand-contact areas.
- The highlighted final directions suggested a vertical alignment of modules with a continuous silhouette, allowing the product to feel like a single unit even when assembled.

4.5 ATTACHMENT MECHANISMS

As part of building a modular product ecosystem, special attention was given to how individual modules would attach and detach from the main unit. The goal was to ensure that

switching components felt seamless, secure, and intuitive for the user—without compromising on functionality or aesthetic consistency.

This ideation phase (Figure 4.10 & 4.11) explored a variety of attachment methods using hand sketches and cross-sectional studies, considering mechanical feasibility and user ergonomics.

Twist-and-Lock: Leveraging rotational motion for engagement, this mechanism relies on grooves or tabs that interlock with a satisfying twist, offering a robust physical connection.

Snap-Fit and Click-Lock: Designed with small flexible latches that lock into place with an audible click. Some concepts included integrated side-release buttons for easy detachment.

Push-Button Release: This mechanism utilized a spring-loaded pin system activated by pressing a flush-mounted button. It allowed one-handed operation while keeping the exterior clean and minimal.

Slit and Slide Track: A guided slide-in system using slots and channels that naturally align modules and hold them via friction or a secondary lock.

Pivot Clip System: A hinge-based connector that snaps into place with a pivoting motion, often combined with tactile feedback elements like detents or ridges.

Detailed Multi-Part Concept: One of the most developed concepts included layered components—elastomer buffers for damping, spring-loaded locking pins, and rotary alignment tabs. This mechanism was detailed in section sketches with color-coded materials for clarity.

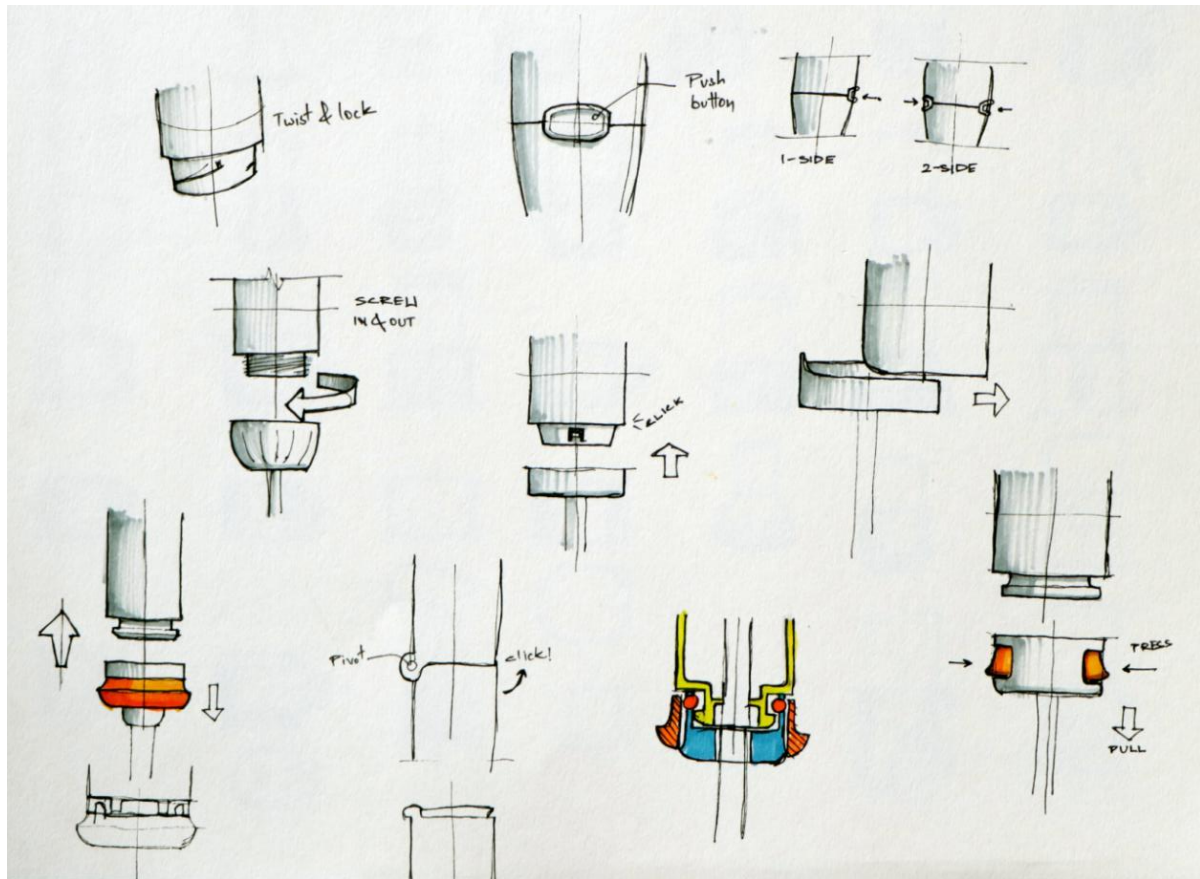


Figure 4.10. Explorations for different attachment mechanisms

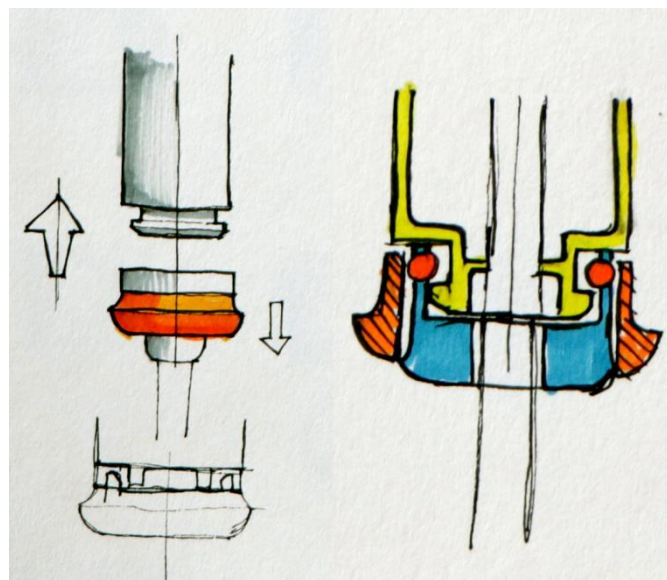


Figure 4.11. Sectional sketch of the finalized attachment mechanism

4.5.1 Physical Validation

To evaluate this concept beyond paper, a 3D-printed prototype (Figure 4.12 & 4.13) of the detailed locking mechanism was created. This physical model helped test tolerances, tactile

response, and the ease of module engagement/disengagement. It provided valuable insights into scale, ergonomics, and potential friction points—confirming the mechanical feasibility of the concept and informing further refinement.

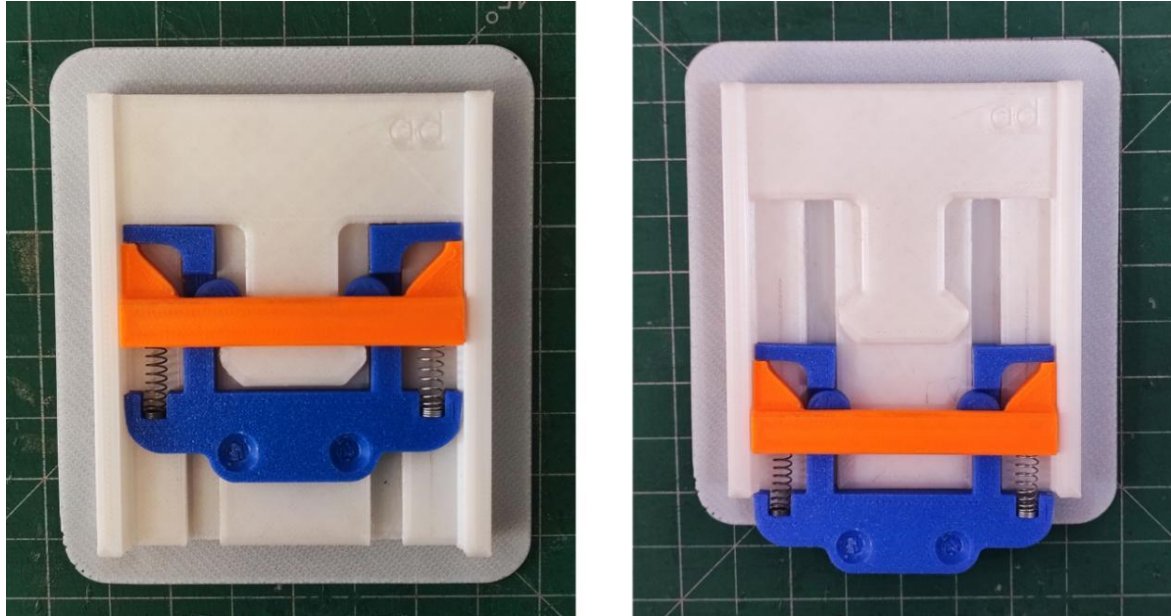


Figure 4.12. 3D printed proof of concept model for attachment mechanism, Left - Engaged, Right - Disengaged

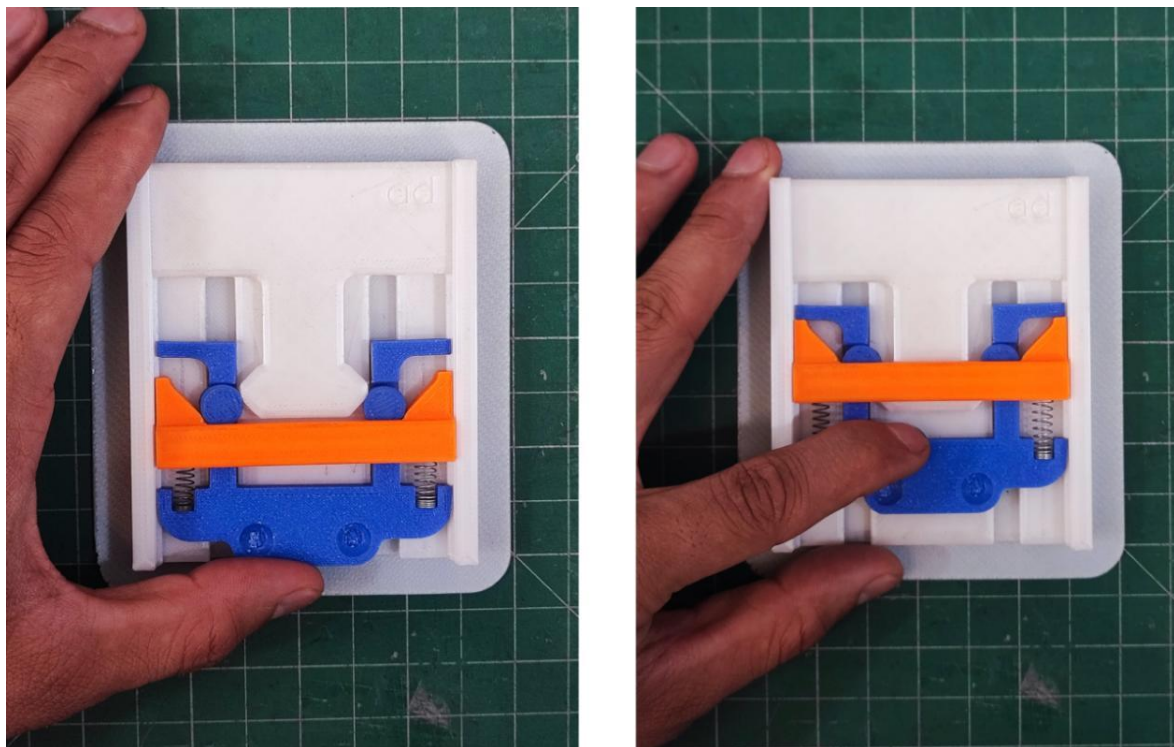


Figure 4.13. 3D printed proof of concept model for attachment mechanism, Left - Putting on, just push till click to lock. Right - Engaged and cant be removed directly

4.6 FOAM MODEL DEVELOPMENT & INTERACTION STUDY

To evaluate the shortlisted form directions, three full-scale foam models were developed (Figure 4.14) . These models not only helped in visualizing the physical proportions of the product but also allowed for hands-on interaction studies to understand ergonomics, grip comfort, and module handling.



Figure 4.14. Collection of PU foam models used to test and visualize finalized concepts

Purpose:

- Assess visual massing and balance in 3D.
- Validate ergonomic comfort in various holding and operational postures.
- Test module interaction — attaching, detaching, and aligning motions.

4.6.1 Concept 1 - Symmetric and Compact

A blocky and stable form that sits confidently on a surface (Figure 4.15) . The centrally mounted attachment and symmetrical shape aim for functional clarity.

Insights:

- Easy to place and align modules.
- Less intuitive grip due to the boxy form.
- Visual presence felt bulky when not in use.

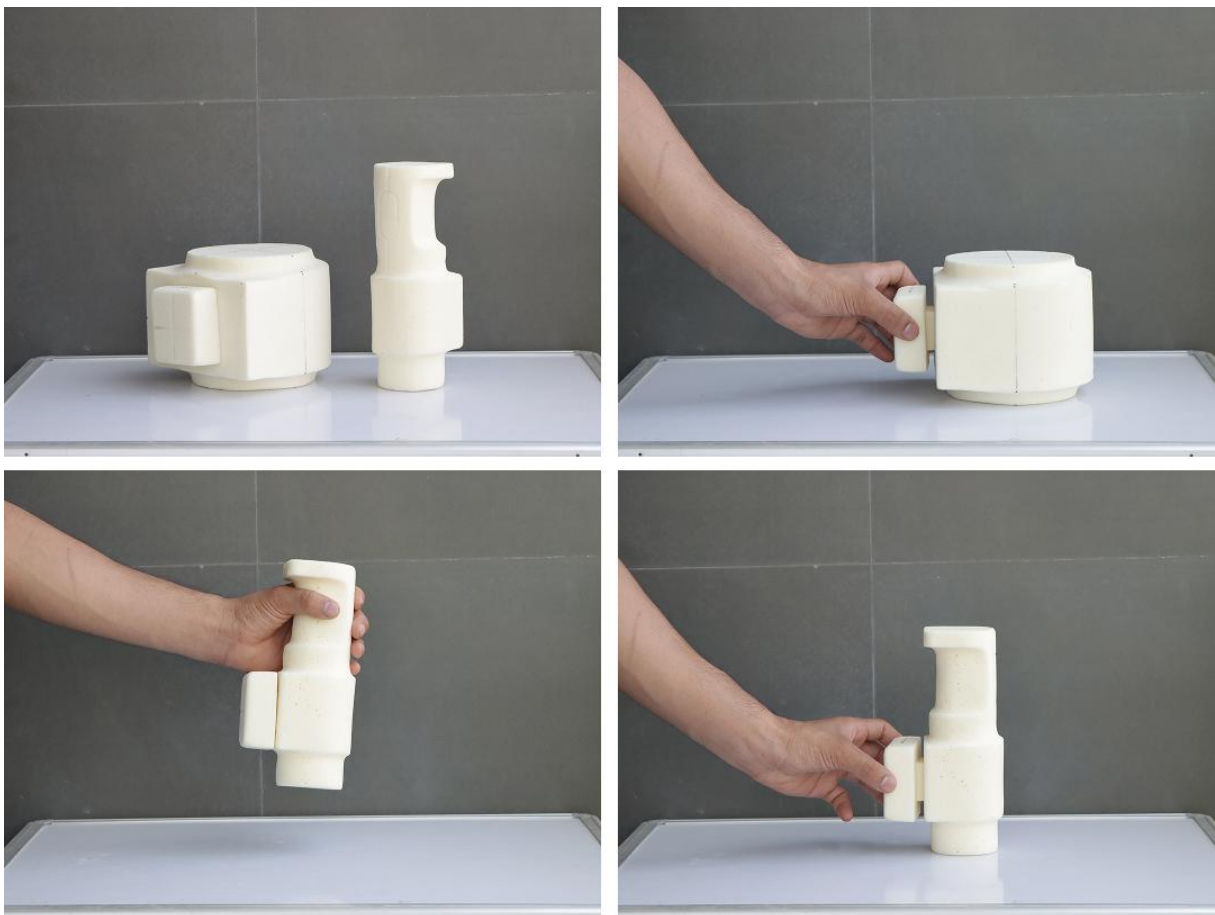


Figure 4.15. Series of images of PU foam model of Concept 1 - Symmetric and compact

4.6.2 Concept 2 - Ergonomic grip Curve

This concept (Figure 4.16) explored a contoured vertical body with a swept-back handle for natural hand alignment. The angle supports an intuitive wrist posture during use.

Insights:

- Most comfortable to hold and maneuver.
- Curved body offered strong directional cues for use.
- Attachment area had slight visual disconnect due to contrasting geometry.



Figure 4.16. Series of images of PU foam model of Concept 2 - Ergonomic grip curve

4.6.3 Concept 3 - Vertical Stackability

Here, the core module aligns vertically with the attachments, making stacking intuitive (Figure 4.17). Ribs on the surface improve grip while also breaking visual monotony.

Insights:

Excellent visual and modular consistency.

Grip was decent, though cylindrical shape was less stable on surfaces.

Strong visual identity through verticality and texture.

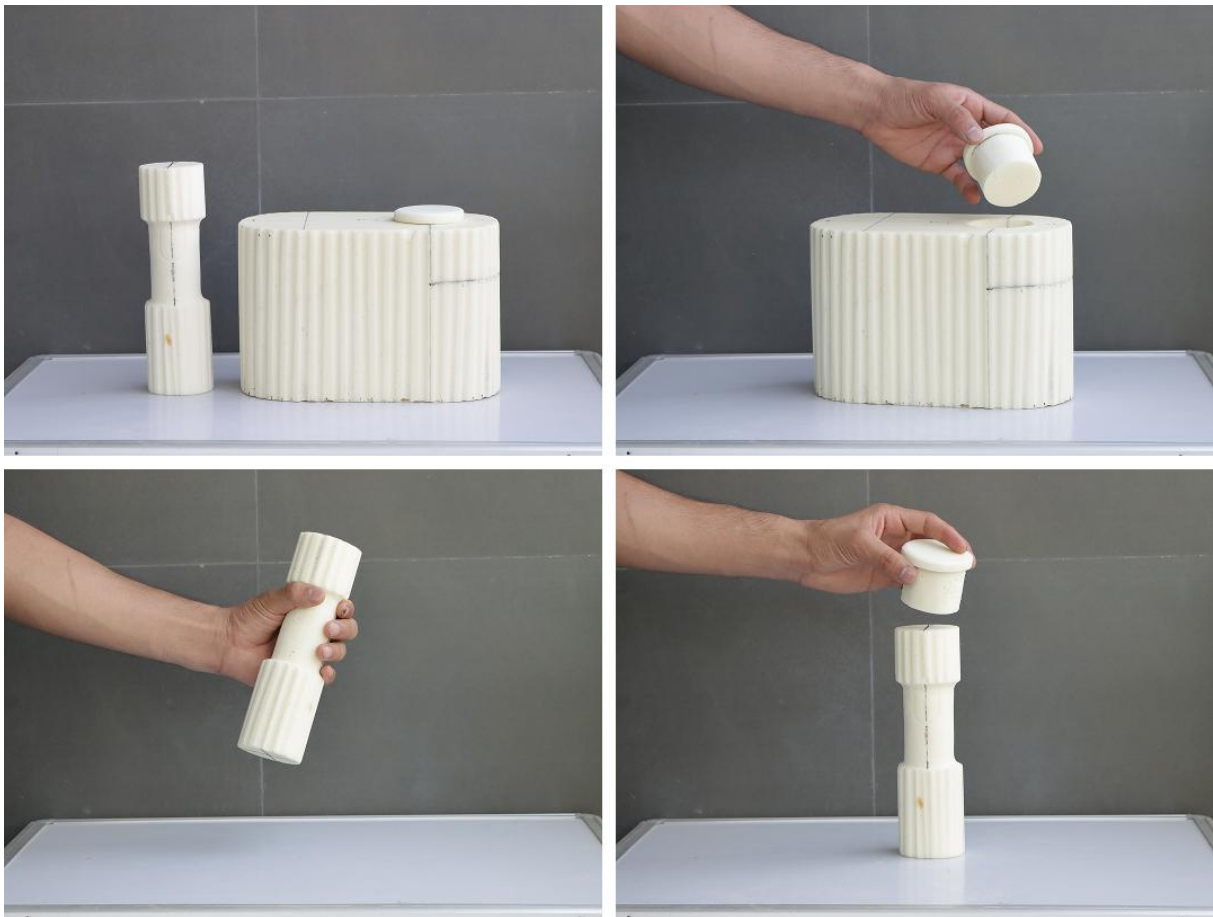


Figure 4.17. Series of images of PU foam model of Concept 3 - Vertical stackability

Interaction Takeaways

- A comfortable grip angle and defined holding zone greatly influenced perceived ease of use.
- Attachment interaction needed to feel deliberate but not resistive — users favored smoother motion over forceful clicks.
- The final direction would benefit from merging the ergonomics of Concept 2 with the visual modularity of Concept 1.

CHAPTER 5 COREKIT - CORDLESS AND MODULAR

5.1 WHAT IS COREKIT?

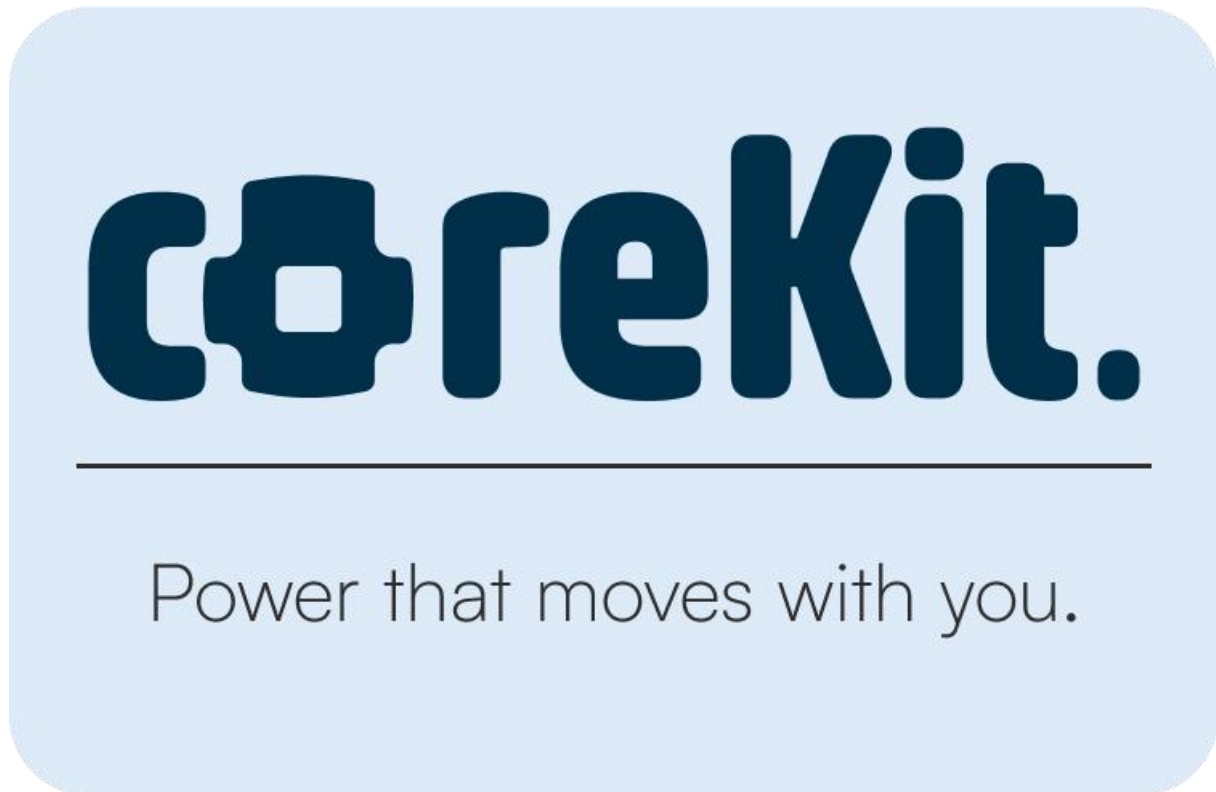


Figure 5.1. Logo and slogan for CoreKit

CoreKit (Figure 5.1) is a modular, cordless kitchen appliance ecosystem designed to streamline cluttered kitchen environments by replacing multiple standalone appliances with a single, versatile system. It is centered around a unified power unit — the “core” — which can connect to various modular attachments, enabling a wide range of culinary tasks with minimal footprint and maximum flexibility. The system is built upon three integrated subsystems (Figure 5.2):

Cordless System - This includes rechargeable batteries housed within the core unit and a dedicated charging dock. The cordless system ensures unrestricted mobility during kitchen tasks, addressing the common frustration of tangled wires and limited socket availability.

Power Core System - Comprising two types of power delivery modules — a Countertop Power Core and a Handheld Power Core — this system is responsible for transferring power from the core to the attachments. The Countertop Power Core serves as both a charger and a

display dock, while the Handheld Power Core allows direct control and use of the attachments in-hand.

Attachment System - Designed to accommodate a variety of interchangeable kitchen tools (e.g., blender, whisk, chopper), this system connects seamlessly with the power base. While the attachment concepts were ideated, their final development is kept out of scope for this project to focus on the core design systems and mechanisms.

Together, these subsystems define CoreKit as a future-ready kitchen solution that merges cordless convenience, modular efficiency, and design simplicity into one coherent ecosystem.

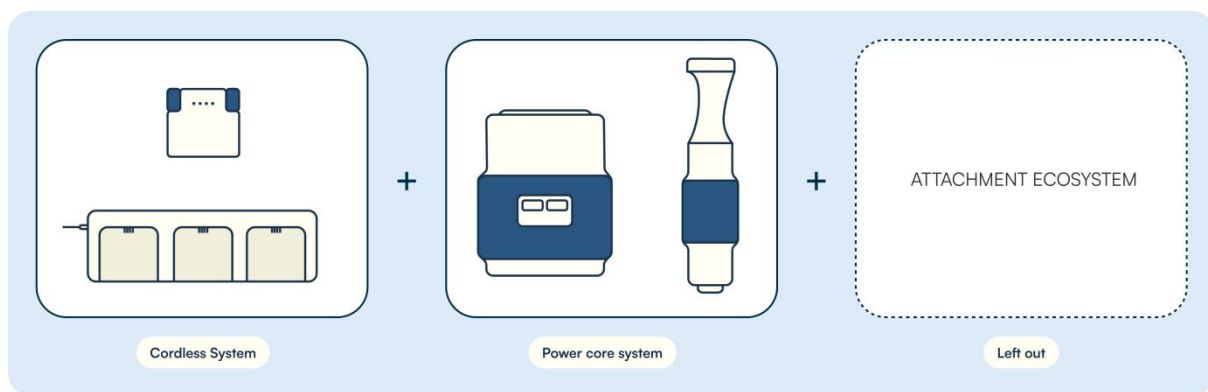


Figure 5.2. Illustration explaining the CoreKit ecosystem

5.2 SYSTEM ARCHITECTURE

CoreKit is composed of three integrated systems that work together to enable a modular and cordless kitchen tool ecosystem:

This includes (Figure 5.3):

- Countertop Power Core – A stable, high-power unit for heavy-duty kitchen tasks.
- Handheld Power Core – A portable, ergonomic unit for lighter, quick-use operations.
- Battery Packs – Interchangeable Li-ion units that power both cores.
- Charging Dock – A multi-slot base for charging multiple batteries simultaneously.



Figure 5.3. Rendering showing all the components of CoreKit

5.2.1 Cordless System

The Cordless System (Figure 5.4) forms the foundational layer of CoreKit's modular ecosystem. Designed to eliminate cable clutter and enable seamless portability, this system is powered by compact, high-efficiency lithium-ion battery packs. These battery units are interchangeable and can be inserted into either of the power cores—Countertop or Handheld—providing consistent power across various use cases.

To support uninterrupted usage, the system includes a Charging Dock with dedicated slots for recharging up to three battery packs simultaneously. The dock is intended to be a fixed fixture in the kitchen, ensuring that batteries are always ready for use. This not only promotes ease of operation but also enhances the sustainability and lifespan of the system by encouraging hot-swapping instead of full-unit replacements.

By separating the power source from the attachment tools and enabling quick, cordless operation, this system addresses both functional efficiency and spatial flexibility in the modern kitchen environment.

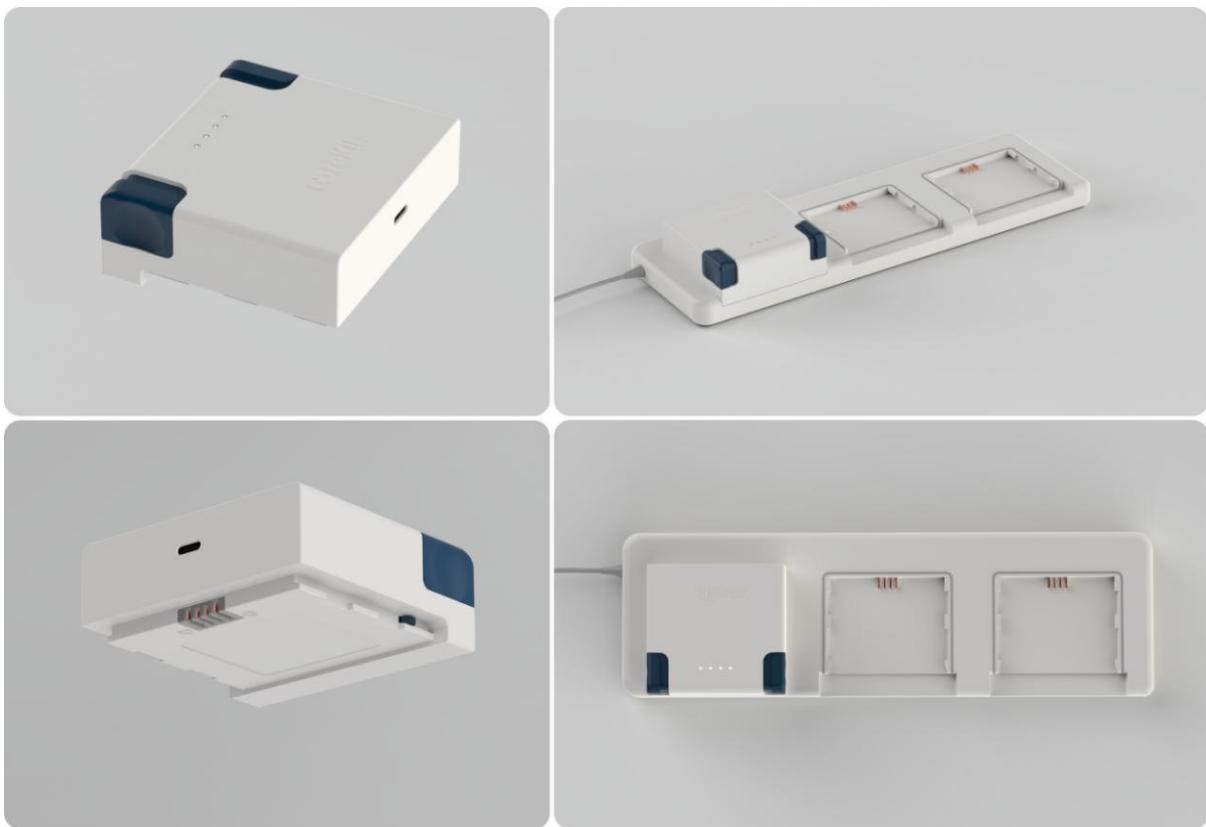


Figure 5.4. Renderings showing Battery (Left side) and Charging dock (Right side)

5.2.2 Powercore System

The PowerCore system (Figure 5.5) is the central operational unit of the CoreKit ecosystem, responsible for delivering power to the various attachments. It is designed in two variants to suit different kitchen tasks and user preferences: a Countertop PowerCore and a Handheld PowerCore.

The Countertop PowerCore is a stationary unit that remains placed on the kitchen surface, ideal for tasks that require stability and continuous power, such as blending or mixing. Its base allows for secure attachment and detachment of various accessories while keeping the workspace organized and efficient.

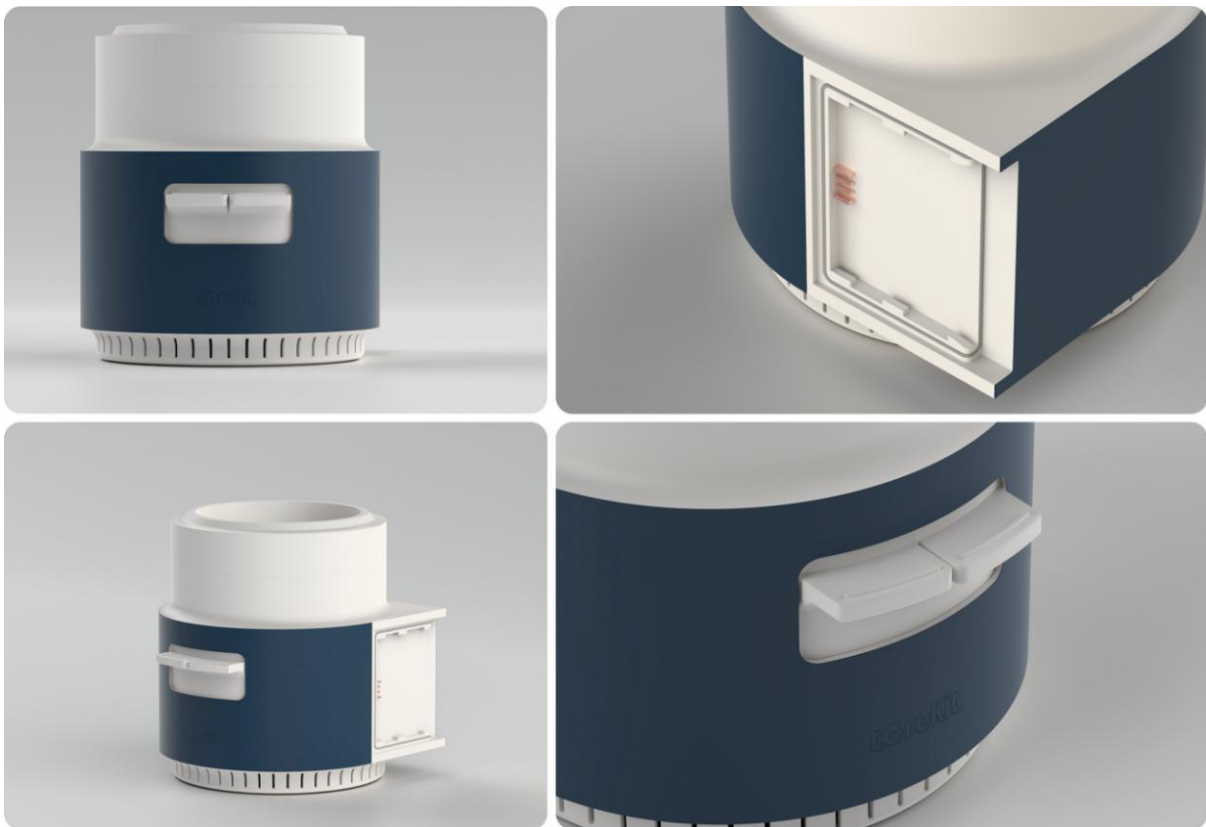


Figure 5.5. Renderings showing Countertop PowerCore

The Handheld PowerCore (Figure 5.6), on the other hand, offers portability and ease of use, especially for tasks that require greater control or mobility. Its ergonomic grip and balanced weight distribution ensure comfort during prolonged use.



Figure 5.6. Renderings showing Handheld PowerCore

Both PowerCores are equipped with a universal battery slot, allowing them to draw energy from the same set of removable, rechargeable batteries provided in the Cordless System. This modularity ensures seamless integration and interchangeability across different tasks, making the PowerCore system a truly versatile powerhouse within the CoreKit ecosystem.

5.2.3 Attachment System (Out of scope)

The Attachment System is envisioned as the most dynamic and expandable part of the CoreKit ecosystem. While detailed development of individual attachments was kept outside the scope of this project, the system has been designed to support a wide variety of kitchen tools that seamlessly integrate with the PowerCore units.

The long-term vision for the Attachment System is to build an ecosystem of modular, interchangeable attachments specifically optimized for Indian kitchens and cooking practices.

Indian households frequently rely on multiple small-scale appliances and manual tools for repetitive tasks like spice grinding, chopping, and whisking—often resulting in clutter and redundancy. The CoreKit Attachment System aims to consolidate and simplify these needs.

One concept currently under exploration involves modular spice containers that function like automated pepper mills, but are powered by the Handheld PowerCore. These spice containers would allow users to store, dispense, and freshly grind whole spices such as cumin, peppercorns, or cardamom directly into their dishes, bringing convenience and freshness without extra devices.

The attachment interface has been carefully designed to ensure secure locking, intuitive alignment, and reliable power transmission. Future possibilities include tools for chopping, frothing, mixing, and more—each tailored for specific Indian cooking requirements. The system is built to grow, adapt, and evolve with the user’s needs, making CoreKit a future-ready platform for smart and efficient cooking.

5.3 TECHNICAL DATA

[30,31,32]

5.3.1 Battery Pack

Voltage: 10.8V (nominal)

Capacity: 3Ah

Chemistry: Lithium Polymer (LiPo) or Lithium-ion, chosen for high energy density and lightweight construction

Estimated Weight: ≤350g (including ABS housing and integrated Battery Management System)

Battery Management System (BMS)

Protects against overcharge, over-discharge, and short circuits

Monitors cell balance and temperature for safety and longevity

Calculated Energy Storage

Energy (Wh)=Voltage (V)×Capacity (Ah)=10.8×3=32.4 Wh
Energy (Wh)=Voltage (V)×Capacity (Ah)=10.8×3=32.4Wh

5.3.2 Handheld Power Core

Motor Power: 75W

Battery Used: 10.8V, 3Ah (shared)

Runtime Calculation:

Runtime (h)= $\frac{32.4}{75}$ =0.432 h≈26 minutes
Runtime (h)= $\frac{32.4}{75}$ =0.432h≈26minutes

Features:

Compact, lightweight design for comfortable handheld use

Optimized for tasks such as blending, whisking, and chopping

Ergonomically designed grip and balanced weight distribution

5.3.3 Countertop Power Core

Motor Power: 180W

Battery Used: 10.8V, 3Ah (shared)

Runtime Calculation:

Runtime (h)= $\frac{32.4}{180}$ =0.18 h≈11 minutes
Runtime (h)= $\frac{32.4}{180}$ =0.18h≈11minutes

Features:

5.4 PROTOTYPES

5.4.1 Functional + Interaction Testing

To test the form, fit, and interaction of CoreKit's modular design, multiple 3D printed prototypes were developed for both the battery system and the countertop power core. These

prototypes were essential in evaluating how users would engage with the product ecosystem and how effectively the modularity and attachment systems could perform in real-world use.

Battery Module

The battery unit was prototyped in three distinguishable parts to understand the interaction mechanism:

- **White Body:** Represents the main battery housing, designed to be compact and comfortable to handle.
- **Orange Release Switch:** A tactile, thumb-operated component that allows users to quickly disengage the battery from any core device, ensuring effortless swapping.
- **Blue Socket:** Acts as the universal slot embedded into every CoreKit module (both handheld and countertop), enabling cross-compatibility across the ecosystem.

This physical model (Figure 5.7 & 5.8) helped verify the ease of insertion and removal, the intuitiveness of the release switch, and the snugness of fit to prevent unintentional disconnection during operation.



Figure 5.7. 3D printed models of battery and slot with working attachment mechanism

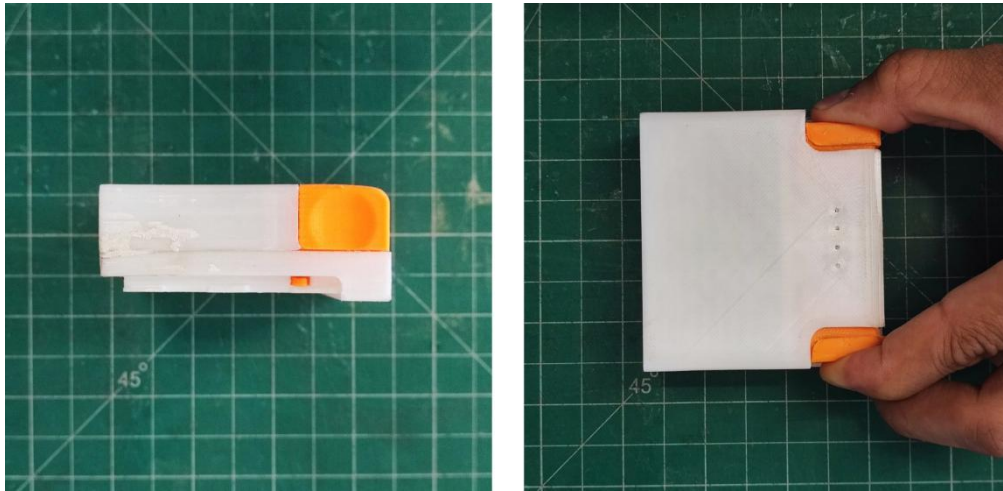


Figure 5.8. 3D printed models of battery showing the working of attachment mechanism

Countertop PowerCore

The Countertop PowerCore was prototyped (Figure 5.9 & 5.10) to explore multiple aspects of its functionality and form:

Switch Design: Vertical slider switches were tested, which provided better tactile feedback and ergonomic interaction compared to buttons or dials. This aligns well with typical kitchen scenarios where quick, intuitive control is essential.

Battery Integration: The slot for the detachable battery was integrated seamlessly at the back, and interaction was tested with the earlier battery prototype to validate the plug-in experience and balance.

Attachment System: The top of the PowerCore features a universal interface for connecting different food prep modules. A locking ring mechanism was trialed for secure placement of attachments.

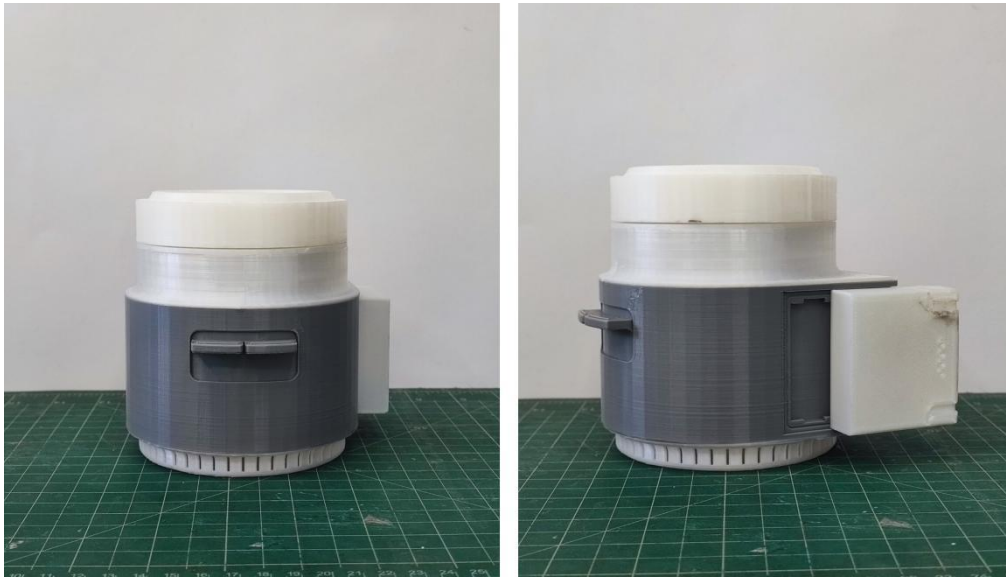


Figure 5.9. 3D printed models of Countertop PowerCore to test the interaction and usability

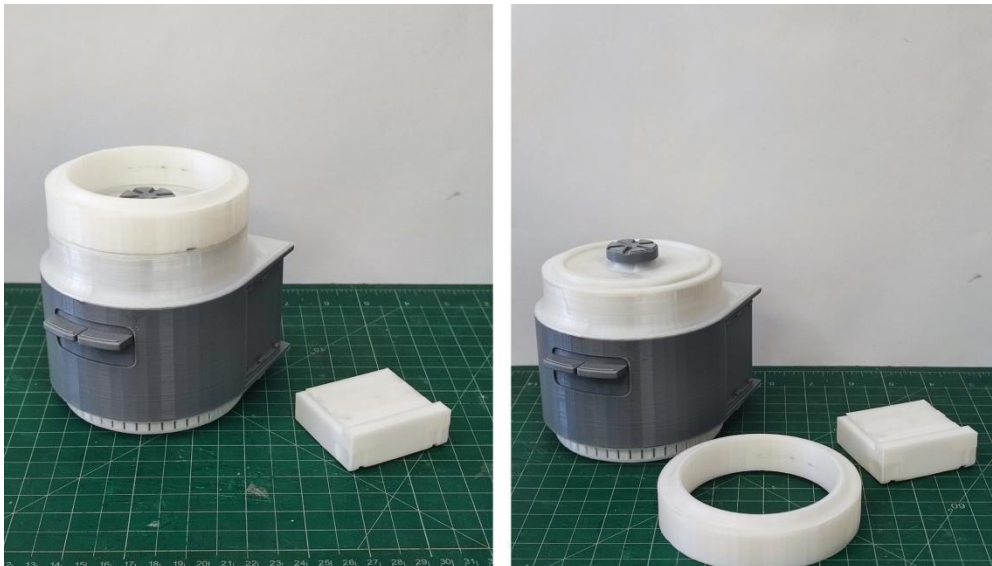


Figure 5.10. 3D printed models of Countertop PowerCore to test the interaction and usability

5.4.2 Learnings and Insights

Modular Battery Design Works Effectively

- The detachable battery concept proved to be intuitive and practical.
- The orange release switch offered a satisfying click and was easy to operate one-handed.
- The blue socket mechanism provided a firm, reliable connection across components, validating the idea of a common power interface.

Importance of Tactile Feedback in Switches

- Testing revealed that vertical slider switches are more intuitive and comfortable than dials or push buttons.
- The movement felt deliberate and precise, which is especially beneficial in kitchen settings where feedback and control are important.

Attachment Interface Must Be Guided and Secure

- Ensuring a guided fit and locking system for attachments is crucial to prevent wobble or misalignment during use.
- The locking ring approach showed promise but will need refinement for better feedback and easier usability.

Form and Balance Matter in Interaction

- The prototypes helped evaluate the ergonomics and weight distribution of the modules.
- The handheld components felt more usable when the battery weight was aligned with the grip area, ensuring balance during operation.

Material Contrast Helps Clarify Functionality

- Using color-coded parts (white, orange, blue) significantly improved the user's understanding of functional areas—power, release, connection.
- This reinforces the decision to use visual hierarchy in the final product.

5.5 FUTURE SCOPE

The CoreKit system has been intentionally designed as a scalable and future-proof platform, not just a standalone appliance. The modular nature of its three-part structure—Cordless System, PowerCore System, and Attachment System—opens up a wide range of opportunities for product extension and customization. [34][35].

5.5.1 Expandable Attachment Library

A key future direction involves the development of a diverse range of attachments catering to specific kitchen use cases. These attachments can be sold individually or in curated sets, enabling users to build a toolkit tailored to their cooking style and needs. For example:

- Spice grinders and dispensers for Indian masalas
- Small-scale choppers and mincers for meal prep
- Frothers and whisks for beverages and batters
- Dosa batter stirrers or tempering pans with rotation

This approach promotes incremental adoption and sustainable usage, reducing the need for redundant devices and encouraging long-term brand engagement.

5.5.2 Tiered PowerCore Offerings

To cater to different user profiles and budgets, PowerCores can be introduced in tiers—from basic to advanced. Higher-end PowerCores can offer:

- Greater torque or power output
- Longer battery life or dual-battery operation
- Smart features like speed control, preset modes, or safety locking

Importantly, all upgraded PowerCores will be designed with backward compatibility, ensuring they work seamlessly with previously purchased attachments. This supports both upgradability and user loyalty, encouraging users to invest in the ecosystem over time.

5.5.3 Smart Ecosystem Possibilities

In the long run, CoreKit can evolve into a smart kitchen ecosystem, integrating with mobile apps for recipe assistance, attachment recognition, and usage tracking. IoT integration could enable features such as auto-sensing ingredients or voice-assisted operation.

Together, these future developments point toward a flexible, modular, and user-adaptive product family that grows with the evolving habits of modern Indian kitchens—offering not just tools, but a complete experience.

CONCLUSION

This project proposes a transformative shift in how Indian households interact with their kitchen appliances. By introducing a modular, cordless ecosystem built around three integrated systems—Cordless, PowerCore, and Attachments—the design addresses core inefficiencies found in conventional kitchens: cable clutter, fragmented tools, and lack of adaptability.

The outcome is not just a new product, but a platform that brings clarity, order, and flexibility into the cooking space. It simplifies storage, reduces redundancy, and creates opportunities for seamless upgrades without replacing the entire system. The cordless functionality enhances mobility and safety; the PowerCore introduces a scalable source of energy distribution; and the potential for India-specific attachments opens the door for culturally relevant innovation.

- If implemented, this system could:
- Reduce the number of appliances required in a typical kitchen.
- Enable a neater, more organized and aesthetically cohesive kitchen space.
- Support evolving user needs through expandable attachments.

Establish a new standard for long-lasting, upgradeable kitchen tools in the Indian market.

Ultimately, this design challenges the fragmented nature of current kitchen solutions and introduces a more integrated, future-proof, and user-focused approach—one that has the potential to change not only how we use kitchen appliances, but how we think about their role in our homes.

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