DecorEase

Revamping spaces

By

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Decorease

A research report

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A research report submitted for evaluation to School of Art Design and Architecture 0n 3rd June 2024, in partial fulfillment if the requirement for the degree of B.ID.

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Abstract

This thesis explores the development of DecorEase, a versatile tool designed to empower DIY enthusiasts and home decorators to achieve professional-quality results independently. The growing trend of DIY home improvement projects highlights a significant market demand for user-friendly and efficient decorating tools. Traditional painting and decorating methods can be time-consuming, messy, and require a level of skill that many DIYers lack. There is a clear need for an innovative solution that simplifies these processes while enabling users to personalize their spaces creatively. This project aims to democratize interior decoration by making it accessible and convenient for a broader audience, addressing key user needs identified through comprehensive research. This thesis provides an in-depth examination of the product's background, the necessity for such a tool in the market, technical specifications, user research, and its potential impact on the DIY home improvement industry.

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Background and context

Overview of the DIY Interior Decor Market

The DIY (Do-It-Yourself) interior decor market has seen substantial growth over the past decade, driven by a combination of economic factors, cultural shifts, and technological advancements. Consumers are increasingly taking on home improvement and decor projects themselves, motivated by the desire for personalization, cost savings, and the satisfaction of creating something with their own hands.

1. **Market Size and Growth**:
    a. **Global Market Value**: The global DIY home improvement market is estimated to be worth billions of dollars, with steady growth projected over the coming years. This growth is particularly strong in regions like North America, Europe, and parts of Asia-Pacific.
    b. **Market Segmentation**: The market can be segmented into various categories such as painting, wallpaper, furniture refinishing, textiles, flooring, and decorative elements.
2. **Key Players**:
    a. **Retail Giants**: Companies like Home Depot, Lowe's, IKEA, and B&Q dominate the market by offering a wide range of DIY products and tools.
    b. **Online Platforms**: E-commerce platforms such as Amazon and specialized online retailers have expanded access to DIY supplies and tools.
    c. **Boutique Brands**: Smaller, specialized brands provide unique and niche products catering to specific DIY projects and styles.

Current Trends in DIY Interior Decor

1. **Personalization and Customization**:
    a. **Unique Designs**: Consumers are increasingly looking for ways to personalize their living spaces with unique designs that reflect their individual styles and preferences.
    b. **Customizable Products**: Products that allow for customization, such as printable wallpaper, modular furniture, and bespoke textiles, are in high demand.
2. **Sustainability and Eco-Friendliness**:

    a. **Eco-Friendly Materials**: There is a growing preference for sustainable and eco-friendly materials, such as low-VOC paints, reclaimed wood, and biodegradable wallpaper.
    b. **Upcycling and Repurposing**: Upcycling old furniture and repurposing materials for new uses are popular trends that promote sustainability.
3. **Technological Integration**:
    a. **Smart Tools**: The integration of smart technology in DIY tools, such as app-controlled devices and augmented reality (AR) for visualization, is enhancing user experience and project outcomes.
    b. **Online Tutorials and Communities**: The availability of online tutorials, instructional videos, and DIY communities on platforms like YouTube, Instagram, and Pinterest provides inspiration and guidance.
4. **DIY Kits and Bundles**:
    a. **All-in-One Kits**: DIY kits that include all necessary materials and instructions for specific projects are gaining popularity, making it easier for beginners to get started.
    b. **Subscription Services**: Subscription boxes offering monthly DIY projects and materials are emerging, catering to hobbyists looking for regular, new challenges.
5. **Minimalist and Functional Design**:
    a. **Clean Lines and Simplicity**: Minimalist design with clean lines and functional aesthetics continues to be a strong trend, emphasizing quality over quantity.
6. **Biophilic Design**:
    a. **Incorporation of Nature**: There is a growing trend towards biophilic design, which incorporates natural elements such as plants, natural light, and organic materials into interior decor.

Challenges in the DIY Interior Decor Market

1. **Skill and Knowledge Gap**:
    a. **Technical Skills**: Many consumers lack the technical skills and knowledge needed to execute more complex DIY projects, leading to frustration and abandoned projects.
    b. **Quality of Results**: Achieving professional-quality results can be challenging for novices, affecting the overall satisfaction and success of DIY projects.
2. **Time and Effort**:
    a. **Labor-Intensive**: DIY projects can be time-consuming and labor-intensive, which can be a deterrent for individuals with busy schedules or limited physical capabilities.
    b. **Project Management**: Managing large projects from start to finish, including planning, execution, and cleanup, can be overwhelming.
3. **Tools and Equipment**:

    a. **Accessibility and Cost**: Access to high-quality tools and materials can be limited by availability and cost, especially for those living in remote areas or on a tight budget.
    b. **Proper Use**: Proper use and maintenance of tools and equipment can be challenging without adequate guidance.
4. **Material Selection**:
    a. **Variety and Quality**: The wide variety of materials available can make it difficult for consumers to select the right ones for their projects, and ensuring material quality can be a concern.
    b. **Sustainability**: Finding affordable, sustainable materials that meet project needs can be difficult.
5. **Safety Concerns**:
    a. **Health Risks**: Exposure to hazardous materials such as certain paints, adhesives, and solvents can pose health risks.
    b. **Physical Strain**: DIY projects often involve physical labor, which can lead to strain or injury if not done correctly.
6. **Market Saturation and Competition**:
    a. **Brand Differentiation**: With the increasing number of brands and products in the market, standing out and effectively reaching target consumers can be challenging.
    b. **Innovation**: Constant need for innovation to stay ahead of competitors and meet evolving consumer preferences.

Problem Statement

Individuals who engage in DIY home décor projects, especially interior painting, encounter difficulties in effectively transferring several styles and genres onto surfaces. The laborious and time-consuming process often leads to unsatisfactory results and dependence on external assistance.

Objectives

1. **Design and Develop an Innovative Product**:
    a. **Objective**: Create a product, a versatile DIY decorating tool with interchangeable modules that cater to unique styles.
    b. **Outcome**: A functional and aesthetically pleasing product that meets the needs of DIY enthusiasts and home decorators.
2. **Enhance User Experience and Accessibility**:

    a. **Objective**: Ensure that the product is easy to use for individuals with varying skill levels and physical capabilities.
    b. **Outcome**: An intuitive and ergonomic design that reduces user fatigue and simplifies the decorating process.
3. **Incorporate Advanced Technology**:
    a. **Objective**: Integrate smart technology through a mobile app to control and customize the tool's functions.
    b. **Outcome**: A seamless user experience that allows for precise control over patterns, paint flow, and other settings.
4. **Promote Customization and Creativity**:
    a. **Objective**: Provide users with a wide range of patterns and customization options through the app.
    b. **Outcome**: A tool that empowers users to personalize their spaces with unique designs, enhancing their creativity and satisfaction.
5. **Ensure Product Safety and Sustainability**:
    a. **Objective**: Design with materials and features that prioritize user safety and environmental sustainability.
    b. **Outcome**: A safe and eco-friendly product that meets industry standards and minimizes environmental impact.
6. **Conduct Comprehensive User Research**:
    a. **Objective**: Gather insights from target users to inform the design and development process.
    b. **Outcome**: A product that is tailored to the specific needs, preferences, and pain points of its users.
7. **Validate Design through Testing and Iteration**:
    a. **Objective**: Test prototypes with real users and iterate based on feedback.
    b. **Outcome**: A refined product that has been validated through rigorous testing, ensuring high usability and functionality.

Literature Review

Introduction

The realm of DIY interior painting has witnessed a surge in interest, with homeowners seeking tools that streamline the process, from color selection to mural creation. This literature review explores existing technologies, tools, and research related to DIY decoration, focusing on the development of an all-in-one tool that caters to diverse styles, including murals, patterns, textures, and solid colors. The project aims to revolutionize the DIY interior decor experience by developing an innovative multi-tool with technologies that streamline the process of do-it-yourself home decor. This review will examine the current landscape of DIY interior decor tools, highlighting their strengths and limitations, and identify knowledge gaps that can be addressed through future research.

Surge in Interest: A Closer Look

One notable source that explores the surge in interest in DIY interior painting is a research article by Nurhayatu Nufut Alimin titled "DIY as Interior Design Education: 'Everybody Can Be Designer'." According to Alimin, the popularity of DIY for home decor has increased significantly, particularly on the internet. Alimin highlights that DIY has the potential to provide a straightforward solution for people who want to decorate or repair their homes without relying on professional services. Alimin collected data from popular DIY accounts, practitioner responses, and interviews with interior design lecturers to analyze the difference between the job of an interior designer and the emerging role of DIY interior decorators. One notable thing in their story is that they always write about the sponsors behind the story (Alimin, 2019). According to Alimin, DIY interior painting allows individuals to take control of their home decor and provides a sense of accomplishment and personalization.

The surge in interest in DIY interior painting, in my opinion, can be attributed to several factors, including the desire for personalization and the increasing availability of tools and resources. As homeowners seek to express their individual style and taste, they are turning to DIY interior painting to achieve a unique and customized look for their living spaces. Additionally, the accessibility of online tutorials and step-by-step guides has made the process more approachable for individuals with varying levels of experience.

With the widespread use of social media platforms such as Pinterest and Instagram, there is also a growing trend of sharing DIY interior decor projects, fueling inspiration and motivation among homeowners. This trend has created a sense of community and support for individuals undertaking their own painting and refurbishing endeavors.

Overall, the surge in interest in DIY interior painting reflects a broader cultural shift towards self-expression and creativity within the realm of home decor and design. As tools and technologies continue to evolve, it is likely that this trend will continue to grow, empowering homeowners to take creative control of their living spaces.

The State of DIY Home Improvement: A Comprehensive Survey Analysis

A survey, conducted by Angi Inc., gathered responses from 1,000 U.S. adult homeowners who undertook DIY projects since March 2020.The margin of error is 3.1%, and gender was weighted during sampling. According to this survey, DIY home improvement and renovation projects have surged in popularity during the pandemic, with 81% of homeowners undertaking at least one project. While the trend is on the rise, the survey reveals that DIY endeavors are not always smooth sailing.

81% of homeowners engaged in DIY projects since the pandemic's onset. Nearly two-thirds of respondents tackled projects they had not planned before the pandemic. The pandemic served as a major motivator, with 93% considering another DIY project in the next year.

Motivations and Challenges and Common Mistakes

The survey showed that top reasons for DIY include saving money (62%), spare time/boredom (56%), and the desire for fun or learning new skills. Over 40% of DIY projects proved more challenging and expensive than anticipated. Almost 80% encountered minor or major mistakes during their DIY projects. Common minor mistakes included redoing tasks (44%), paint spills (39%), and using the wrong tool (33%). Major mistakes, experienced by 27% of homeowners, included expensive damage (52%) and serious injuries (47%).

Home Care Expert Bailey Carson advises thoughtful consideration of project choice. Carson suggests calling a professional for complex projects, emphasizing the potential long-term costs of DIY mistakes. 93% of homeowners hired professionals for at least one project, highlighting a balanced approach. Trust in professionals was evident, with half of those hiring pros reporting better-than-expected outcomes.

Additional Insights include; 77% of primary residences require renovations. Solar installation consideration is high (69%). Motivation for home improvement includes increasing future sale value (77%). Moreover, demographic differences showed that men are more likely to undertake DIY projects to prove someone wrong or match professional quality. Larger projects, like additions and standalone structures, are prone to going over budget and resulting in major mistakes when done DIY.

These results helped me understand that not all kinds of projects can be DIY-ed and many complex ones require professional help and guidance.

DIY Decor as a Practice

The research paper, Mackay, Michael D., Harvey C. Perkins, and Robert GA Gidlow. "DIY" worlds" and the co-construction of home and self." (2013). delves into the cultural practice of do-it-yourself (DIY) home improvement in New Zealand, tracing its historical roots back to the colonial era when material and labor shortages necessitated that settlers construct their own dwellings. This tradition has evolved into a cultural norm, where a

significant number of New Zealand homeowners engage in DIY as a means of personal expression and home creation. This longstanding practice is not simply about home modification; it is also a production of the self, intertwining with concepts of pride, identity, and self-accomplishment.

DIY practices have given rise to a broader social 'DIY world,' consisting of a network of people and organizations that support and enable these activities, including friends, family, retail sectors, and media. Since the 1950s, the DIY industry in New Zealand has grown significantly, benefiting from increased consumerism and prosperity. In contemporary times, DIY is conceptualized as a leisure activity, especially for male workers, and functions as a creative outlet.

Gendered roles within DIY have historically been portrayed in advertising, with men typically shown in active building roles and women in supportive capacities. However, these representations have evolved over the years. DIY is a widespread activity that incorporates interior decorating, house repairs, building, and gardening, catering to people of diverse backgrounds.

The planning phase of DIY is an essential aspect, involving research, negotiation, purchasing decisions, and often entails familial engagement for intellectual stimulation and bonding. DIYers employ various modes of preparation, such as using paint color charts, test pots, and samples to envisage the result of their projects. While budgeting is critical, with some projects necessitating loans, many individuals rely on borrowing tools and materials from their social networks rather than owning extensive tool collections.

The paper reveals that home improvement acts are complex, convoluted by an array of social, cultural, and economic considerations. These activities are increasingly seen as lifestyle choices, powered by the enjoyment of productive leisure, the creation of comfortable living spaces, and the desire for control over one's environment. Despite the challenges associated with certain materials and tasks, many DIY enthusiasts find pleasure in the work, whether it involves personal or collaborative efforts. The result of DIY is a 'DIYed home'—a personalized living space representing the homeowner's efforts and individuality, resonating with spirited experiences, and yielding a deep sense of satisfaction and pride.

DIY Interior Decor Tools: Current Landscape

Several studies have explored the use of innovative tools and technologies in the field of DIY interior decor. McLoughlin and Lee (2010) discuss the use of personalized and self-regulated learning in the Web 2.0 era, highlighting the role of social software in facilitating innovative pedagogy. They emphasize the importance of user-friendly experiences and personalized customization, which can be applied to the development of DIY interior decor tools.

In the realm of DIY painting, the last several years have ushered in a wave of innovation. Key advancements include sophisticated color matching software, which allows users to capture and replicate hues from their environment, significantly enhancing the color selection process (Brown et al., 2023). Furthermore, ergonomic tools have been developed that reduce physical strain and cater to users of all abilities (Johnson, 2022). The exploration

of such technological progress is pivotal in understanding the evolving landscape of interior painting.

Strengths and Limitations of Existing Tools

When it comes to DIY interior decor painting, several tools commonly used include paintbrushes, rollers, and sprayers. Paintbrushes offer precise control over intricate details but may require more time and effort for larger areas. Rollers provide efficient coverage but can be challenging to use on tight corners or uneven surfaces. Sprayers offer quick application but may result in overspray and require proper ventilation.

In order to address the limitations mentioned above, specific improvements can be made to enhance performance and user experience, in my opinion. Such as advancements in technology or design could lead to better ergonomics for improved comfort during long painting sessions. The development of high-quality materials can ensure durability while maintaining affordability for a wider range of users.

Despite the availability of various tools and technologies for DIY interior decor, there are still limitations that need to be addressed. Marion and Fixson (2020) discuss the transformation of the innovation process and how digital tools are changing work, collaboration, and organizations in new product development. They highlight the need for tools that streamline the design-to-build transition, which can be applied to the development of all-in-one tools for DIY interior decor. By integrating various functionalities into a single tool, users can have a more efficient and enjoyable experience.

Makri et al. (2021) conducted a systematic literature review on digital escape rooms as innovative pedagogical tools in education. While their focus is on education, their findings can be applied to the development of DIY interior decor tools. They emphasize the importance of user-friendly interfaces and advanced color selection processes, which can enhance the overall experience of DIY decorators.

Case Studies

A comprehensive search of academic databases, online libraries, and other relevant sources revealed that there are several tools available in the market that cater to DIY interior painting. However, most of these tools are designed for specific tasks, such as color selection or mural creation, and do not provide a comprehensive solution. This gap in the market has led to the development of several all-in-one tools that aim to streamline the DIY interior decor experience.

One such tool is the **Paint Zoom Pro**. This tool is designed to provide a user-friendly experience, with an advanced color selection process that allows users to choose from a wide range of colors. It also provides personalized customization options, allowing users to create their own unique designs. The Paint Zoom Pro is also designed with safety considerations in mind, with a built-in safety switch that prevents accidental spraying.

Another all-in-one tool that has gained popularity in recent years is the **Wagner Flexio 590**. This tool is designed to cater to diverse styles, including murals and solid colors.

It provides a user-friendly experience, with an advanced color selection process that allows users to choose from a wide range of colors. The Wagner Flexio 590 also provides personalized customization options, allowing users to create their own unique designs.

Despite the availability of these all-in-one tools, there are still gaps in the market that need to be addressed. For example, most of these tools are designed for indoor use only and cannot be used for outdoor painting. Additionally, some of these tools are expensive and may not be affordable for everyone. Further research is needed to develop more affordable and accessible all-in-one tools that cater to diverse styles and provide a comprehensive solution to the DIY interior decor experience. The development of all-in-one tools that cater to diverse styles, including murals and solid colors, is a promising solution to the challenges faced by DIY interior painters. The Paint Zoom Pro and Wagner Flexio 590 are two examples of such tools that provide a user-friendly experience, advanced color selection process, personalized customization options, and safety considerations.

In addition to these tools, there are several free and paid software tools available that allow users to design and visualize their DIY interior decor projects. Some of the popular ones include Roomtodo, SketchUp, Floorplanner, Planner 5D, and HomeByMe 123. These tools provide a user-friendly interface and a wide range of features, including 2D and 3D floor planning, furniture addition, and wall, floor, and ceiling finishes. However, there are still gaps in the market that need to be addressed to develop more affordable and accessible all-in-one tools.

Knowledge Gaps and Future Research Directions

Despite the existing research on DIY interior decor tools, there are still knowledge gaps that need to be addressed. For example, there is a lack of research on the integration of safety considerations into DIY interior decor tools. El-Naggar et al. (2020) discuss an innovative low-cost biosorption process, highlighting the importance of safety in the development of modern technologies. Future research can explore the integration of safety features into all-in-one tools for DIY interior decor, ensuring that users can engage in the process without any risks.

Another knowledge gap is the lack of research on the use of digital tools in the informed consent process. Gesualdo et al. (2019) conducted a systematic review on digital tools in the informed consent process, highlighting their potential benefits. Future research can explore the use of digital tools in the DIY interior decor process, particularly in terms of providing users with information and guidance on the materials and techniques used.

Future Scope and User Needs

The scope of DIY decor is vast and includes a wide range of projects, from painting and wallpapering to furniture building and upholstery. DIY decor projects can be undertaken by individuals of all skill levels, from beginners to experts. The benefits of DIY decor include cost savings, personalization, and the satisfaction of creating something with one’s own hands. DIY decor also provides an opportunity for individuals to express their creativity and experiment with different styles and designs.

Emerging trends indicate that there is potential for further innovation in DIY interior decor painting tools. Customization options that allow users to create unique patterns or textures could become increasingly popular among homeowners seeking personalized aesthetics. Additionally, sustainability is an important aspect that manufacturers should consider by exploring eco-friendly alternatives or reducing waste generated from disposable products.

Conclusion

In conclusion, the development of an all-in-one tool for DIY interior decor can revolutionize the DIY experience. By integrating various functionalities, such as advanced color selection processes, personalized customization, and safety considerations, users can have a more accessible, efficient, and enjoyable experience. However, there are still knowledge gaps that need to be addressed through future research, such as the integration of safety features and the use of digital tools in the DIY interior decor process. By addressing these gaps, it is possible to contribute to a more innovative and user-friendly DIY interior decor experience.

Mackay, Perkins, and Gidlow's research reveals the deep-rooted cultural practice of DIY in New Zealand, evolving into a lifestyle choice tied to identity. DIY acts as a creative outlet, offering satisfaction in crafting personalized living spaces.

Existing DIY interior decor tools show strengths and limitations. Advances like color matching software enhance the process, but comprehensive all-in-one tools are lacking. Case studies on tools like Paint Zoom Pro and Wagner Flexio 590 show promise, but challenges remain in affordability and outdoor use. Software tools like Roomtodo and SketchUp offer design capabilities but leave gaps in accessibility and individual skill level.

While DIY decor offers benefits like cost savings, knowledge gaps persist. Future research should explore safety integration and the use of digital tools in informed consent. Emerging trends suggest potential innovations in customization and a focus on sustainability. Manufacturers should consider eco-friendly alternatives. The landscape is dynamic, presenting opportunities for user-friendly products that align with evolving DIY aspirations.

Research Methodology

The research for this project follows a mixed-methods approach, combining both qualitative and quantitative techniques to gain comprehensive insights into user needs, preferences, and pain points. This approach ensures a well-rounded understanding of the target audience and informs the design process effectively.

Data Collection Methods

3. **Surveys and Questionnaires**

- **Purpose**: Gather quantitative data on user demographics, decorating habits, tool preferences, and common challenges faced during DIY projects.
- **Participants**: 120 DIY enthusiasts, homeowners, and renters from diverse backgrounds.
- **Distribution**: Online platforms such as Google forms and social media groups.

4. **Interviews**
    - **Purpose**: Obtain in-depth qualitative insights into user experiences, needs, and expectations regarding decorating tools.
    - **Participants**: 20 participants selected from survey respondents willing to provide more detailed feedback.
    - **Format**: Semi-structured interviews conducted via Zoom or in-person.
5. **Focus Groups**
    - **Purpose**: Facilitate group discussions to explore collective views on existing decorating tools and desired features in a new product.
    - **Participants**: 3 focus groups with 3-4 participants each, consisting of a mix of skill levels.
    - **Format**: Sessions conducted in a local community center or via online conferencing tools.
6. **Observational Studies**
    - **Purpose**: Observe users as they engage in decorating projects to identify usability issues and unmet needs.
    - **Participants**: 5 participants performing DIY tasks in their homes.
    - **Format**: In-person observation and video recordings (with participant consent).
7. **Usability Testing**
    - **Purpose**: Test low-fidelity prototypes with real users to evaluate functionality, ease of use, and overall satisfaction.
    - **Participants**: 15 participants representing the target audience.
    - **Format**: Hands-on sessions where participants complete specific tasks using the prototype, followed by feedback collection.

Sampling

- **Selection Criteria**: Participants were selected based on their involvement in DIY decorating projects, willingness to participate, and representation of diverse demographics.
- **Recruitment**: Participants were recruited through social media, DIY forums, local community gatherings, and online survey platforms.

Data Analysis

8. **Quantitative Analysis**
    - **Techniques**: Descriptive statistics, cross-tabulation, and regression analysis.
    - **Tools**: Excel.
9. **Qualitative Analysis**
    - **Techniques**: Thematic analysis to identify common themes and patterns.
    - **Tools**: Manual coding.
10. **Usability Metrics**
    - **Measures**: Task completion rate, time on task, error rate, and user satisfaction scores.
    - **Tools**: Observation checklists, user feedback forms.

Ethical Considerations

- **Informed Consent**: All participants provided informed consent before participating in the research.
- **Confidentiality**: Participant data was anonymized to ensure privacy and confidentiality.
- **Voluntary Participation**: Participants were informed that their involvement was voluntary, and they could withdraw at any time without penalty.

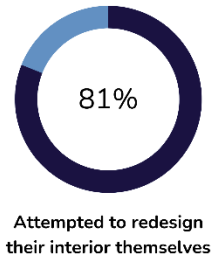
User Research

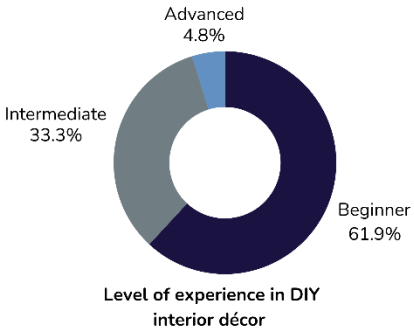
Target Audience

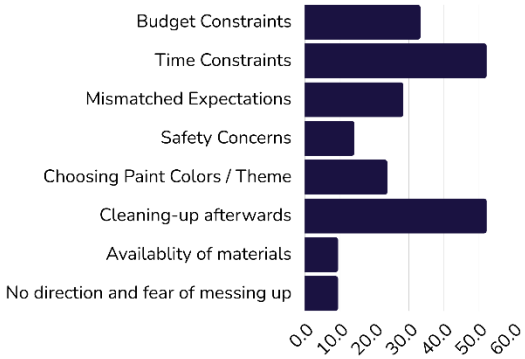
- DIY Enthusiasts
- Homeowners and Renters
- Artisans and Hobbyists

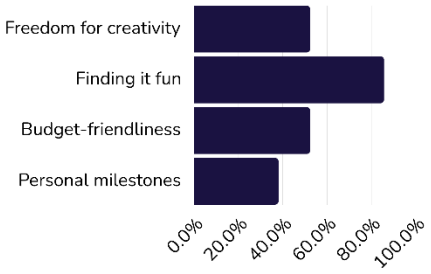
User Needs and Insights

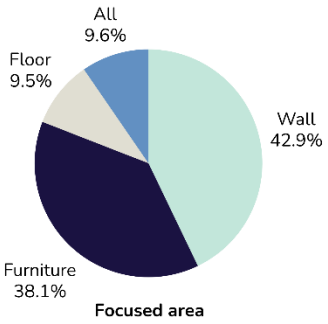
Key findings from Surveys, interviews, focus groups and observations:

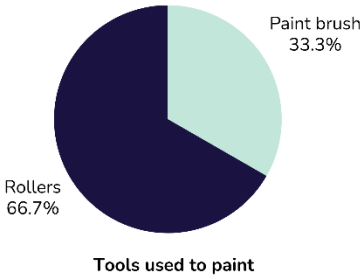












Personas:

- Haider Khan
  23 years old
  Occupation: Graphic Designer
  "Transforming my living space into a canvas for self-expression is my next exciting project. I'm on the lookout for a tool that not only simplifies the process but also lets my creativity flourish without breaking the bank."

- Sarah Ahmad
  38 years old
  Occupation: Office Administrator
  "I'm excited to embark on my home decor journey, but I need tools that understand my beginner-level skills and physical limitations. Simplified guidance and lightweight options would make this experience more enjoyable for me."

Mapping:

User Journey Map

DIY Enthusiast Redecorating with Existing Tools

User Persona:
Meet Ahmad, a 35-year-old DIY enthusiast with experience in home improvement. Ahmad is redecorating a room in their house and is using currently available tools and equipment for the project.

1. Inspiration:
- **Touchpoint**: Online Platforms, DIY Magazines
- **Action**: Ahmad explores online platforms, DIY blogs, and magazines to gather inspiration for the redecoration project.
- **Pain Points:**
  Overwhelmed by an abundance of ideas.
  Difficulty translating inspiration into a cohesive plan.

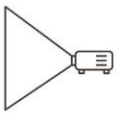
2. Planning:
- **Touchpoint**: Mood Board Apps, Notebook
- **Action**: Ahmad uses mood board apps and a physical notebook to organize ideas, colors, and textures.
- **Pain Points:**
  Limited digital tools for effective organization.
  Manual process may feel time-consuming.

3. Color Selection:
- **Touchpoint:** Paint Color Visualizers, Sample Paints
- **Action:** Ahmad experiments with paint color visualizers online and purchases sample paints to test on the walls.
- **Pain Points:**
  Difficulty visualizing true colors digitally.
  Limited options for testing multiple colors.

4. Furniture and Décor Selection:
- **Touchpoint:** Online Furniture Stores, Local Shops
  - **Action:** Ahmad browses online furniture stores and visits local décor shops to find suitable furniture and décor items.
  - **Pain Points**:
    - Inability to visualize how furniture will fit in the space.
    - Limited variety in local shops

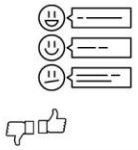
5. Project Execution:
- **Touchpoint:** Cordless Tools, Paint Brushes, Wallpaper Tools
  - **Action**: Ahmad uses cordless tools, paintbrushes, and wallpaper tools to execute the planned redecoration.
  - **Pain Points:**
    - Cumbersome manual tools.
    - Challenges in achieving professional finishes.

6. Real-Time Visualization:
- **Touchpoint:** DIY Assistance Guides, Smartphone Camera
  - **Action:** Ahmad follows DIY assistance guides and uses a smartphone camera for real-time visualization.
  - **Pain Points:**
    - Lack of advanced technology for seamless visualization.
    - Difficulty capturing accurate colors with a smartphone camera.

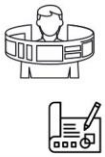


7. Completion:
- **Touchpoint:** DIY Communities, Social Media
  - **Action**: Ahmad shares the completed project on DIY communities and social media platforms for feedback and inspiration.
  - **Pain Points:**
    - Limited constructive feedback.
    - Challenges in finding like-minded DIY enthusiasts.

8. Reflection:
- **Touchpoint**: Personal Reflection, Feedback from Others
  - **Action**: Ahmad reflects on the redecoration experience and considers feedback from others.
  - **Pain Points:**
    - Limited ways to measure project success.
    - Difficulty in tracking improvement areas.



9. Future Planning:
- **Touchpoint**: DIY Forums, Home Improvement Shows
  - **Action**: Ahmad engages with DIY forums and watches home improvement shows for future project ideas.
  - **Pain Points:**
    - Limited exposure to innovative tools and techniques.
    - Challenges in finding reliable information.



Empathy Map

Scenario:
Meet Amna, a 30-year-old professional who has recently moved into a new apartment. Excited about turning her new space into a cozy haven, Jane has decided to embark on her first DIY interior decor project. She aims to infuse her personality into every corner of the apartment but is feeling a mix of excitement and uncertainty about the process.

Say:
"I'm really excited to make this apartment my own."
"I have no experience in DIY decor, but I want to give it a try."
"I'm not sure which colors and patterns will look good together."
"I wish there was an easy way to visualize how everything will come together."

Think:
Concerned about making design mistakes.
Hopes the process will be fun and rewarding.
Wants the decor to reflect her personality and style.
Worried about choosing the wrong colors and ending up dissatisfied.

AMNA

Feel:
Excited about the prospect of a personalized living space.
Anxious about not having prior experience in interior decor.
Eager to learn and explore new possibilities.
Hopeful that the end result will be aesthetically pleasing.

Does:
Researching online for DIY interior décor tips.
Looking for tools or apps to assist in design and execution.
Asking friends for advice or recommendations.
Planning to start small and gradually tackle larger projects.

Pain Points:
Fear of making design mistakes.
Uncertainty about choosing the right colors and patterns.
Lack of confidence in executing DIY projects.
Concerns about the final result not meeting expectations.

Gains:
Personal satisfaction from creating a unique living space.
Learning new skills and gaining confidence in DIY decor.
A sense of accomplishment when the project is successfully completed.
Excitement about having a personalized home that reflects her style

Ideation and Concept Development

Exploration of form and function

Usability Testing Report

Part A: Handle Mockup Testing

Objective:
The objective of this usability testing was to evaluate the usability of three different handle mockup designs for the final solution. By conducting usability testing, the aim was to refine and optimize the handle designs to deliver exceptional user experience. The key aspects of usability assessed included ease of use, grip comfort, durability, and overall user satisfaction.

Usability Goals:

11. **Assess ease of use**: Evaluate how easily users can grasp and manipulate each handle design.
12. **Measure grip comfort**: Determine the level of comfort experienced by users while holding each handle.
13. **Evaluate durability**: Assess the perceived durability, stability and sturdiness of each handle design.
14. **Measure overall user satisfaction**: Gather feedback from users to understand their overall satisfaction with each handle design.

Usability Testing Plan:

Testing Methodologies: Comparative testing (A,B testing) will be conducted to compare the performance of three different handle mockup designs.

Test Scenarios:
Task 1: Carry a weighted object (like the final module) using each handle design.
Task 2: Rotate the indoor handle clockwise and counterclockwise to simulate repetitive use.
Task 3: Moving the mockup along the surface horizontally and vertically pretending to apply something with it.

Recruitment Criteria: Participants aged between 18-30 years were recruited to represent the target user group. 15 participants aged between 18-30 years were recruited for the usability testing session. Each participant interacted with all three indoor handle mockup designs and completed the designated tasks.

Testing Environment: Usability testing was conducted in an indoor environment resembling typical usage conditions. Participants interacted with the handle mockups indoor door setting.
Data Collection and Analysis: Data was collected through observation, video recording (where consent was given), and post-test questionnaires. Qualitative feedback was analyzed for common themes and patterns, while quantitative data was analyzed using graphs and charts.

HANDLE MOCKUP TESTING

Handle Type	Comfort	Grip Strength	Ease of Use	Durability
Handle A				
Handle B				
Handle C				

Heatmap of mockup testing result

Test Results:
The collected data revealed several usability issues and areas for improvement across the handle mockup designs. Grip comfort emerged as a significant concern, with participants expressing discomfort with certain handle shapes. Additionally, durability and sturdiness varied among the designs, with some handle designs perceived as more robust than others. Overall user satisfaction varied, with participants preferring certain handles over others based on their ergonomic features and ease of use.

Iteration and refining design solutions:
Based on the findings from usability testing, design iterations were implemented to address identified usability issues. Adjustments were made to the handle shapes to enhance grip comfort and usability.

Part B: Working Prototype Testing

Objective:
This usability testing's objective was to evaluate the usability of a modified paint roller prototype equipped with a paint tub, pipe, and pump mechanism. The prototype aimed to streamline the process of paint application by pumping paint directly from the tub to the roller, ensuring equal distribution of paint for both horizontal and vertical surfaces. The key aspects of usability assessed included ease of use, efficiency of paint distribution, user comfort, and overall satisfaction with the prototype.

Usability Goals:

1. **Assess ease of use**: Evaluate how easily participants can operate the modified paint roller prototype.
2. **Measure efficiency of paint distribution**: Determine the effectiveness of the pump mechanism in distributing paint evenly across horizontal and vertical surfaces.

3. **Evaluate user comfort:** Assess the ergonomic design of the prototype and its impact on user comfort during paint application.
4. **Measure overall user satisfaction**: Gather feedback from participants to understand their overall satisfaction with the prototype's performance and usability.

Usability Testing Plan:

Testing Methodologies: Comparative testing will be conducted to evaluate the modified paint roller prototype's performance on horizontal and vertical surfaces.

Test Scenarios:

Task 1: Apply paint using the modified roller prototype on a horizontal surface (e.g., tabletop).
Task 2: Apply paint using the modified roller prototype on a vertical surface (e.g., wall).
Task 3: Evaluate the ease of refilling the paint tub and priming the pump mechanism.

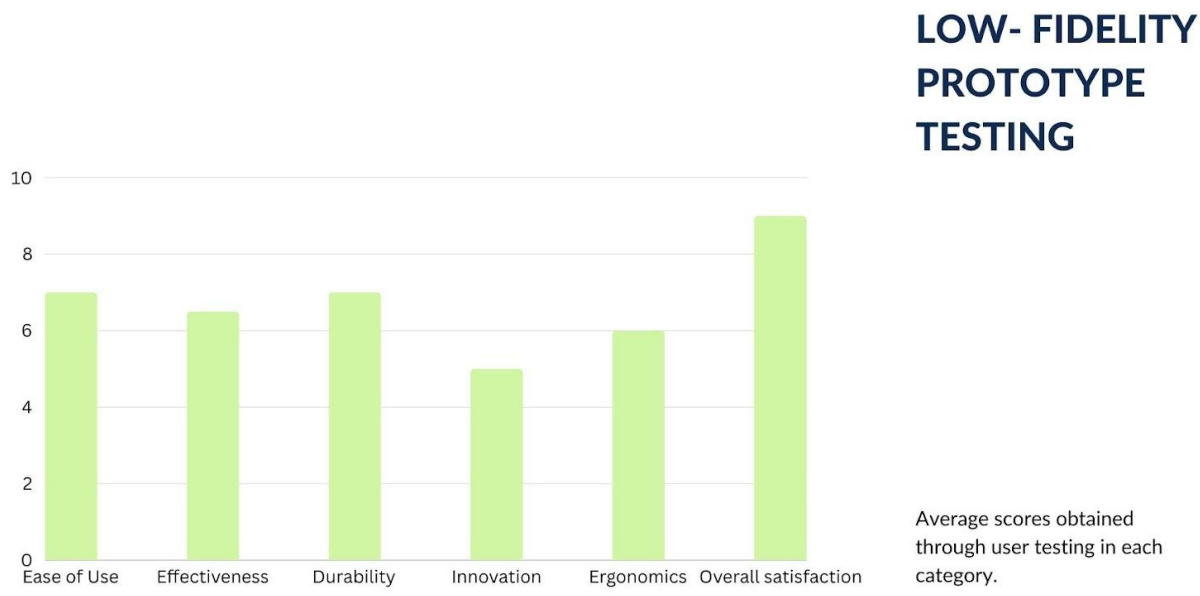
Recruitment Criteria: 20 participants were recruited for the usability testing session. Participants had experience with traditional paint rollers to provide valuable insights into the prototype's usability.

Testing Environment: Usability testing was conducted in a controlled indoor environment resembling typical painting conditions. Participants interacted with the prototype on surfaces mimicking real-world applications.
Twenty participants with prior experience in using traditional paint rollers were recruited for the usability testing session. Each participant tested the prototype on both horizontal and vertical surfaces, completing the designated tasks outlined in the testing plan.

Test Results

The collected data revealed several insights into the usability of the modified paint roller prototype. Overall, participants found the prototype easy to use and appreciated its efficiency in paint distribution. However, some participants encountered challenges with refilling the paint tub and priming the pump mechanism, highlighting areas for improvement in usability.

Based on the findings from usability testing, design iterations will be implemented to address identified usability issues. Improvements will be made to enhance the ease of refilling the paint tub and priming the pump mechanism, ensuring a smoother user experience during paint application.



Final Design

The final design of Decorease consists of a versatile handle and two interchangeable modules, each tailored to specific decorating tasks. This innovative system is designed to provide users with a seamless, efficient, and sustainable way to enhance their interior spaces.

The handle is the core component of Decorease, designed for ergonomic comfort and ease of use. It is crafted from lightweight, durable materials to ensure long-term usability and minimal user fatigue. The handle features:

Integrated peristaltic pump: Built into the handle, the pump efficiently draws paint directly from the container to the roller in the painting module. This ensures a consistent paint flow and minimizes waste.

Pump control button: Located on the handle, the pump control button allows users to adjust the paint flow rate, providing precise control over the amount of paint applied. The button is covered with a cap when the printing module is in use to prevent accidental activation.

Universal connector: The handle is designed with a universal connector that allows quick and secure attachment of both the painting and printing modules.

Painting Module

The painting module is designed to apply solid colors and textures with ease and efficiency. Key features include:

Automatic paint roller system: This system utilizes a high-density foam or microfiber roller that ensures smooth and even application of paint on various surfaces. The roller is designed to be easily replaceable.

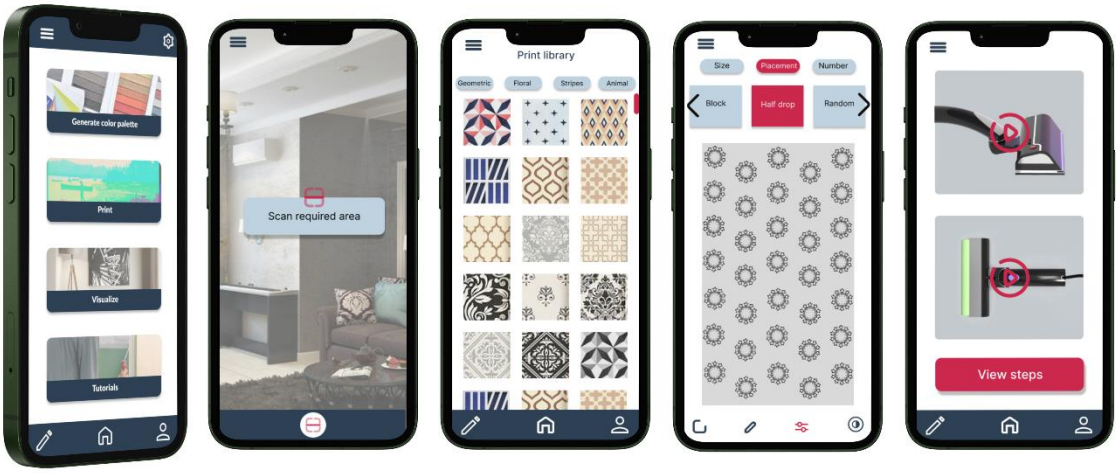
Peristaltic pump: The painting module benefits from the handle's integrated pump, which draws paint directly from the container and delivers it to the roller through a refill pad. This closed system reduces paint wastage and promotes sustainability.

Adjustable paint flow: Users can control the paint flow rate via the handle, allowing for customization based on the surface and desired coverage, thus ensuring optimal use of paint and minimal mess.

Printing Module

The printing module transforms the decorating process by allowing users to print intricate patterns and murals on walls and furniture. Its features include:

- Thermal Inkjet Printer: This component enables high-resolution printing on flat surfaces. By sliding the module across the surface, users can apply detailed patterns and designs seamlessly.
- LED Strip Indicator: To ensure precise operation, the module includes an LED strip indicator that guides users on when to start and stop sliding the device. This feedback mechanism ensures accurate and consistent prints.



App Control: The printing module is controlled via a companion mobile app, which offers a library of patterns and customization options. Users can select designs, adjust print settings, and monitor the process through the app, providing a high degree of flexibility and control.

User Experience and Sustainability

Decorease's design prioritizes user experience and sustainability. The handle's ergonomic design and lightweight construction reduce strain during use, while the intuitive controls and feedback systems make the decorating process straightforward and enjoyable. The automatic paint roller system's efficient use of paint and the customizable print options contribute to a more sustainable approach to interior décor, minimizing waste and promoting the use of eco-friendly materials.

Facilitation of Easy Cleaning, Storage, and Design for Manufacturability (DFM)

Detachable Components:

Interchangeable Modules; both the painting and printing modules can be easily detached from the handle. This allows users to clean each component separately without risking damage to the electronics or mechanisms within the handle.The paint roller in the painting module can be quickly removed for thorough cleaning or replacement. This prevents paint buildup and ensures smooth operation over time.

Smooth Surfaces and Minimal Crevices:

The design of Decorease features smooth surfaces with minimal crevices where paint or ink could accumulate. This makes it easier to wipe down and maintain the cleanliness of the device.

Easy-Access Cleaning Points:

The thermal inkjet print head includes easy-access points for cleaning nozzles and removing any dried ink, ensuring consistent print quality and longevity.

Easy Storage

The handle and modules are designed to be compact and lightweight, making them easy to store in small spaces, such as a closet or a tool cabinet.

Design for Manufacturability (DFM)

Simplified Assembly:

- Modular Construction: The modular design allows for separate manufacturing and assembly of the handle, painting module, and printing module. This modular approach simplifies the production line, enabling parallel assembly processes and reducing overall assembly time.
- Standardized Components: Utilizing standardized components across both modules, such as screws, connectors, and housing materials, reduces complexity in the assembly process and simplifies inventory management.

Ease of Maintenance and Repair:

- Replaceable Parts: Key components such as the paint roller, print head, and internal pump can be easily replaced without requiring specialized tools. This design consideration not only facilitates maintenance and repair but also extends the product's lifespan.
- Diagnostic Features: Built-in diagnostic features within the app can alert users to potential issues, guiding them through simple maintenance procedures.

Cost-Effective Manufacturing:

- Injection Molding: The use of injection-molded plastic parts for the handle and module housings ensures consistent quality and cost-effective mass production.
- Efficient Use of Materials: The design minimizes material waste by optimizing the shapes and sizes of components, reducing the cost of raw materials and contributing to sustainability.

Scalability:

- Modular Design: The modular approach allows for scalable manufacturing. Each module can be produced independently and in varying quantities based on market demand, providing flexibility in production planning.
- Customization Options: Different versions of the modules can be developed and manufactured without significant changes to the core design, catering to varying user needs and preferences.

Product Specifications

Handle

- Material: Lightweight and durable aluminum or high-strength plastic.
- Grip: Ergonomic, non-slip rubberized grip.
- Length: Adjustable from 12 inches to 24 inches.
- Weight: Under 1 lb.
- Battery: Rechargeable lithium-ion battery, 7.4V (nominal), 2000mAh capacity, providing up to 4 hours of continuous use.
- Charging: USB-C port, with quick-charge capability.
- Control Interface: Integrated buttons for controlling the peristaltic pump and power switch, with a protective cap over the pump button when the printing module is in use.
- Connectivity: Bluetooth 5.0 for app control and firmware updates.
- Safety Features: Automatic shut-off when not in use, overheat protection, and battery level indicator.

Painting Module

- Roller Width: Standard 9 inches.
- Roller Material: High-density foam or microfiber for smooth application.
- Paint Pump System: Integrated peristaltic pump within the handle, capable of drawing paint directly from standard 1-gallon paint cans.
- Paint Flow Rate: Adjustable from 5 to 20 ml/min, controlled via the handle.
- Refill Pad: Easily replaceable, high-absorption material ensuring consistent paint delivery to the roller.
- Weight: 1.5 lbs.
- Dimensions: 10 x 5 x 3 inches.
- Cleaning: Detachable roller for easy cleaning and maintenance.
- Compatibility: Suitable for use with latex, acrylic, and oil-based paints.

Printing Module

- Print Technology: Thermal inkjet.
- Resolution: 600 DPI (dots per inch) for sharp patterns and designs.
- Printing Width: Adjustable from 2 to 6 inches.
- Ink System: Replaceable ink cartridges, compatible with various surface types.
- Operation: Slide-to-print functionality with real-time feedback.
- LED Strip Indicator: Provides visual feedback on when to start and stop sliding for accurate printing.
- Weight: 1.2 lbs.
- Dimensions: 8 x 4 x 3 inches.
- App Compatibility: iOS and Android, offering a library of patterns, customization options, and print settings. Connectivity: Bluetooth 5.0 for app control.
- Cleaning: Easy-access cleaning points for maintaining the print head.
- Safety Features: Automatic shut-off when not in use, overheat protection.

Mobile App

- Platforms: iOS and Android.
- Library: Over 500 pre-designed patterns and themes.
- Customization: Tools for creating and uploading custom patterns.
- Control Features: Adjust paint flow rate, select print patterns, and monitor battery life. Tutorials: Step-by-step guides for beginners.
- Community: Platform for users to share designs and ideas.

Technical Specifications

Power and Battery

- Battery Type: Rechargeable lithium-ion.
- Voltage Rating: 7.4V (nominal).
- Capacity: 2000mAh.
- Charging Time: Approximately 2 hours to full charge.
- Usage Time: Up to 4 hours of continuous use.

Connectivity and Control

- Bluetooth: Version 5.0 for reliable and low-energy connectivity.
- Control Interface: Physical buttons on the handle, app-based controls for detailed settings.

Materials and Construction

- Handle Material: Lightweight aluminum or high-strength plastic.
- Roller Material: High-density foam or microfiber.
- Printer Module Housing: Durable plastic with a sleek finish.

Safety and Compliance

- Certifications: CE, FCC, and RoHS compliance.
- Safety Features: Automatic shut-off, overheat protection, battery level indicator.

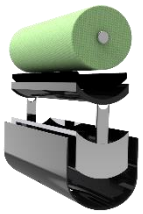
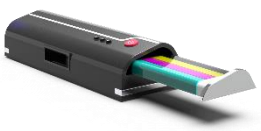
Environmental Considerations

- Eco-Friendly Materials: Use of low-VOC (Volatile Organic Compounds) paints and environmentally friendly materials in construction.
- Waste Reduction: Efficient paint and ink usage to minimize waste.

Conclusion

The modular design of Decorease not only enhances the user experience by facilitating easy cleaning and storage but also aligns with principles of Design for Manufacturability (DFM). By incorporating detachable components, smooth surfaces, and standardized parts, the product ensures ease of maintenance, efficient storage, and cost-effective production. These design considerations contribute to the overall value proposition of Decorease, making it a practical and appealing solution for DIY interior decorators.

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