

Assignment 3

Implementation and Testing

COSC 4375 - Group 1

CS: Produce a Software Design Document

Completed Program Units Code Snippets:

For the sake of the reader, and for the overall structure of the report, we are going to condense our modules into broad sections so that we don't run into redundancy or a 10 page explanation of this section

Login Method ();

```
class _LoginPageState extends State<LoginPage> {
    // text controllers
    final TextEditingController emailController = TextEditingController();
    final TextEditingController passwordController = TextEditingController();

    // login method
    void login() async {
        // show loading circle
        showDialog(
            context: context,
            builder: (context) => const Center(
                child: CircularProgressIndicator(),
            ), // Center
        );

        // try sign in
        try {
            await FirebaseAuth.instance.signInWithEmailAndPassword(
                email: emailController.text,
                password: passwordController.text,
            );

            // pop loading circle
            if (context.mounted) Navigator.pop(context);
        }

        // display any errors
        on FirebaseAuthException catch (e) {
            // pop loading circle
            if (context.mounted) Navigator.pop(context);
            if (context.mounted) displayMessageToUser(e.code, context);
        }
    }
}
```

Register Method ();

```
class _RegisterPageState extends State<RegisterPage> {
    // text controllers
    final TextEditingController usernameController = TextEditingController();
    final TextEditingController emailController = TextEditingController();
    final TextEditingController passwordController = TextEditingController();
    final TextEditingController confirmPasswordController =
        TextEditingController();

    // register method
    void registerUser() async {
        // show loading circle
        showDialog(
            context: context,
            builder: (context) => const Center(
                child: CircularProgressIndicator(),
            ), // Center
        );

        // make sure passwords match
        if (passwordController.text != confirmPasswordController.text) {
            // pop loading circle
            Navigator.pop(context);

            // show error message to user
            displayMessageToUser("Passwords don't match!", context);
        }

        // if passwords do match
        else {
            // try creating the user
            try {
                // create the user
                UserCredential? userCredential =
                    await FirebaseAuth.instance.createUserWithEmailAndPassword(
                        email: emailController.text,
                        password: passwordController.text,
                    );

                // create a user document and add to firestore
                createUserDocument(userCredential);

                // pop loading circle
                Navigator.pop(context);
            } on FirebaseAuthException catch (e) {
                // pop loading circle
                Navigator.pop(context);
            }
        }
    }
}
```

Estimation Method();

```
class PaintEstimationScreen extends StatefulWidget {
  const PaintEstimationScreen({Key? key}) : super(key: key);

  @override
  _PaintEstimationScreenState createState() => _PaintEstimationScreenState();
}

class _PaintEstimationScreenState extends State<PaintEstimationScreen> {
  // Define TextEditingController for input fields
  final TextEditingController widthFeetController = TextEditingController();
  final TextEditingController widthInchesController = TextEditingController();
  final TextEditingController heightFeetController = TextEditingController();
  final TextEditingController heightInchesController = TextEditingController();
  final TextEditingController baseboardHeightController =
    TextEditingController();
  final TextEditingController crownMoldingHeightController =
    TextEditingController();
  final TextEditingController numberOfWallsController = TextEditingController();

  // Result controller to display the calculated gallons needed
  final TextEditingController resultController = TextEditingController();

  bool showGallonsNeeded = false;

  @override
  void dispose() {
    // Dispose of controllers when no longer needed
    widthFeetController.dispose();
    widthInchesController.dispose();
    heightFeetController.dispose();
    heightInchesController.dispose();
    baseboardHeightController.dispose();
    crownMoldingHeightController.dispose();
    numberOfWallsController.dispose();
    resultController.dispose();
    super.dispose();
  }
}
```

```
void calculatePaintEstimation() {
  const double feetToInches = 12;

  // Convert width to total feet
  double width = (double.tryParse(widthFeetController.text) ?? 0) +
    (double.tryParse(widthInchesController.text) ?? 0) / feetToInches;

  // Convert height to total feet
  double height = (double.tryParse(heightFeetController.text) ?? 0) +
    (double.tryParse(heightInchesController.text) ?? 0) / feetToInches;

  double baseboardHeight =
    (double.tryParse(baseboardHeightController.text) ?? 0) / feetToInches;
  double crownMoldingHeight =
    (double.tryParse(crownMoldingHeightController.text) ?? 0) /
    feetToInches;
  int numberOfWalls = int.tryParse(numberOfWallsController.text) ?? 1;

  // Calculate total square footage
  double totalSquareFeet = width * height;

  // Subtract baseboard and crown molding square footage
  totalSquareFeet -= (baseboardHeight * width) + (crownMoldingHeight * width);

  // Calculate gallons needed (1 gallon per 400 square feet)
  double gallonsNeeded = totalSquareFeet / 400;

  // Multiply by the number of walls
  gallonsNeeded *= numberOfWalls;

  // Update the result text
  resultController.text = gallonsNeeded.toStringAsFixed(2);

  setState(() {
    showGallonsNeeded = true;
  });
}
```

The **Login Method()** snippet demonstrates code that sets up two inputs (username and password) and awaits the system for an input. Upon the button ‘Login’ being pressed, the system runs whatever information they put back to firebase to see if there is a match, thus authenticating the user into the system. If it’s not a valid login, the system throws an appropriate error message.

The **Register Method()** asks the user for their username, email, and a password. When these are input, this sends that account to the database connected with firebase and creates an account for that user.

The **Estimation Method()** shows a summary of how each estimation tool (painting, flooring, or roofing) works. Variables are initialized (in this snippet, they are specific to paint estimation) and then disposed to clear the screen in case a user hits the back arrow. After the user enters their inputs, they click ‘Calculate!’ and the system passes the input through calculatePaintEstimation() to generate a result on the screen. The remainder of this estimation method isn’t shown because it just deals with the formatting and interface appearance.

We do have other features, like contractors, and a way to browse through a list of contractors, but these simply use the same authentication methods as listed before, the only difference is that these credentials get put in a separate database related to contractor information. This sums up the key methods, third party usages, and dependencies for the app.

Overall Structure: The structure of our app, in broad terms, is pretty simple. We have a login method, estimate method, and contractor method.

The login method consists of a login screen, a sign up screen, and a password recovery screen for users to use if they forgot the password to their account.

Once logged in, the user is sent to the home screen. On there is a How to Use button, shown by a question mark. Next is a button called ‘Estimate!’, followed by a button called ‘Become/Find a Contractor.’

When the user clicks the ‘?’ button, they are shown steps on how to use the app. Within these steps, is a hyperlink that says ‘here’ and when clicked on it will send the user to the Measure app that typically comes pre-downloaded on their phone (if it’s not pre downloaded, they can just click on download because the link sends them to the app/google play store URL of the AR Measurement App).

Within the ‘Estimate!’ module, there are three options: Painting, Flooring, or Roofing. Each of these have variables specific to that type of measurement, and when interacted with will generate a value based on the given inputs.

The next button on the home screen is called ‘Become/Find a Contractor.’ Within this button, the user has 2 options: ‘Browse Contractors’, or ‘Become a Contractor’. When they browse contractors, they are shown a list of every contractor who was registered with the app, and when their profile is clicked on it will send the user to that specific contractor’s profile screen which houses all of their details (name, business email, phone number, zip code, and whatever their hourly rates are for painting, flooring, or roofing). The other button, ‘Become a Contractor,’ is exactly how it sounds. It gives the user a form to fill out, and when they’re done with it they click ‘Register!’ and now their account is added to the Browse Contractors page in the list.

This is a quick, overall summary of the function of our app. Below I will list these broad methods in a more legible manner in a little bit more detail than the snippets of code provide.

Program Unit Name: Login Screen

Purpose: This is what the users see as soon as they open the app. There is an option to Sign In, Sign Up, and also an option called Forgot Password that will send the user an email on how to recover their password. Once the user enters the appropriate details on sign in, they can click ‘Login’ to be sent inside of the app to the home screen.

Third Party Usage: Firebase (needed to store username/email/passwords for authentication)

Program Unit Name: Estimation Logic

Purpose: There are 3 estimation options: Painting, Flooring, and Roofing. When one of these is clicked, the user is shown a screen where they will input the values that they recorded from their Measure App (preferred) or if they already have the measurements either by blueprints or a tape measure. Each estimation screen asks for the necessary inputs, and then has a calculate button which generates an accurate result based on the given data.

Third Party Usage: Measure App* (not required for the app to function)

Program Unit Name: Contractor Features

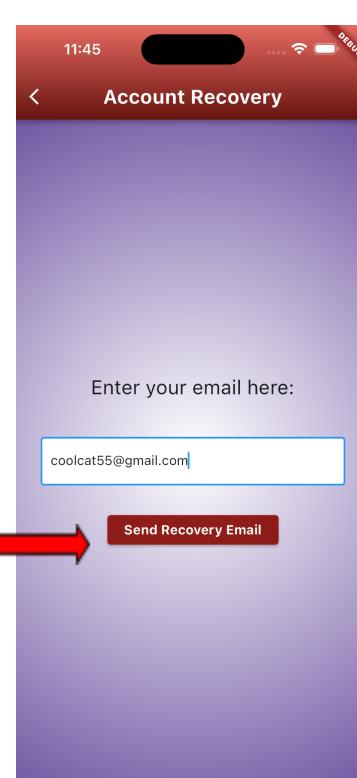
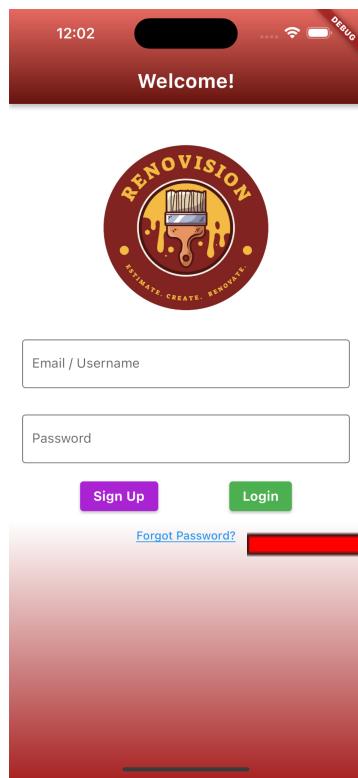
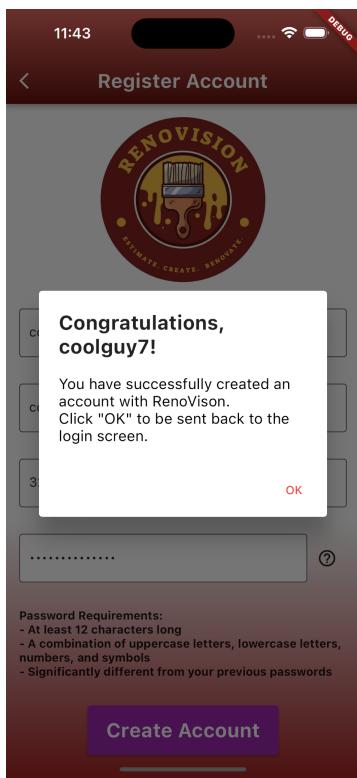
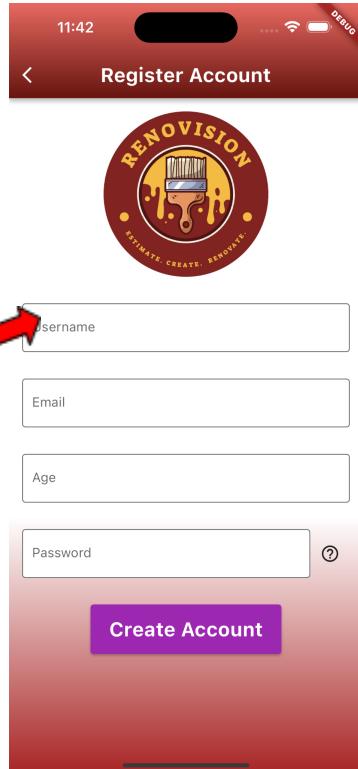
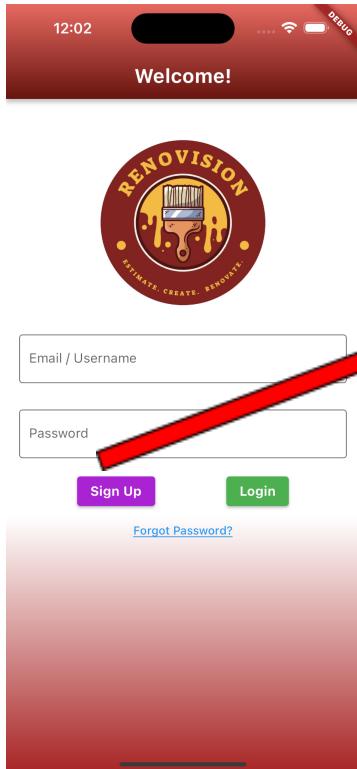
Purpose: The point of this module is to allow users to either search for a contractor to hire, or become a contractor so that they can be hired by someone. There is a button that allows the user to browse contractors, which shows a list of every contractor and is ordered by their name followed by hourly rate of the service(s) they provide. When a profile is clicked on, the user can see more details about that contractor that weren't shown on the initial browse contractors screen. The next portion of this module is simply a screen that allows a user to register as a contractor within the app. After they register, they are appended to the list of all the other contractors that have registered.

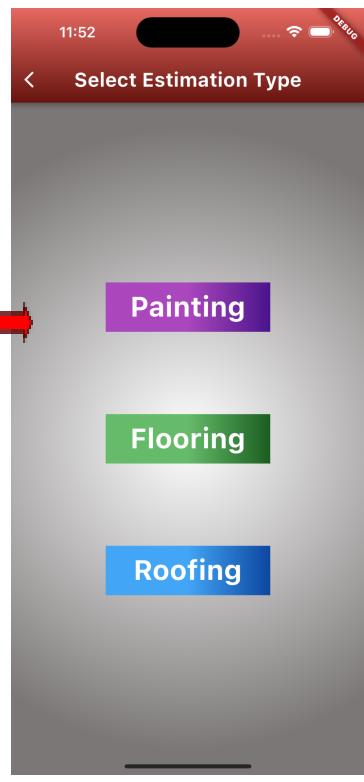
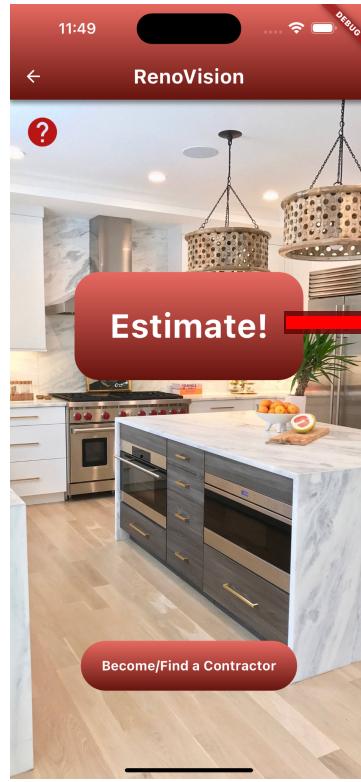
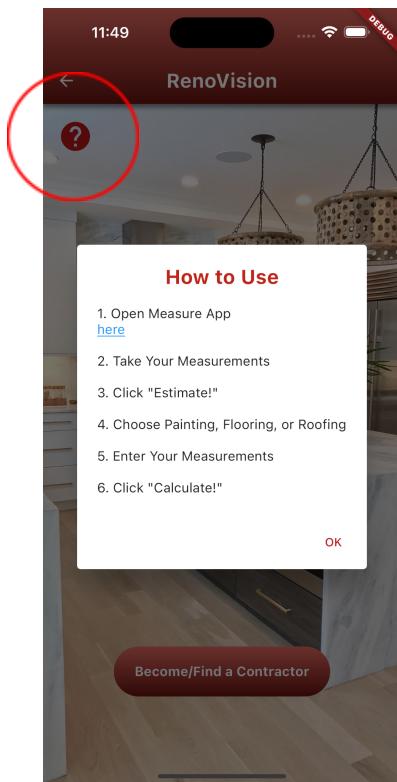
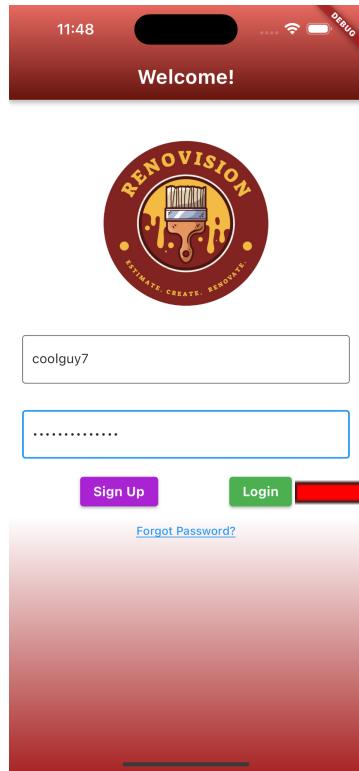
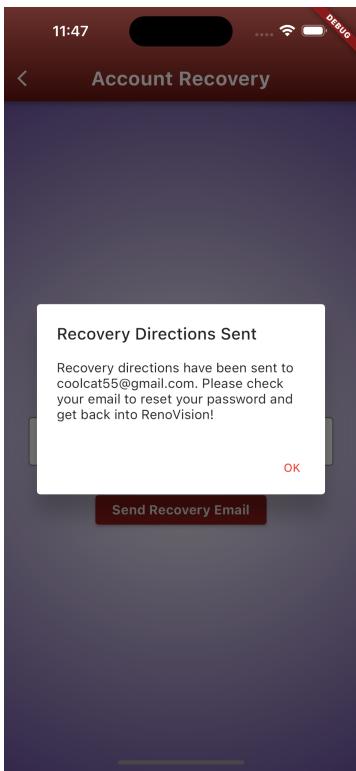
Third Party Usage: Firebase (needed to store necessary fields for contractor info)

Expected Functionality:

The user will measure their area with the Measure app from their phone, come to our app, log in, enter the measurements in the appropriate section (paint, floor, or roof), and click calculate to see their result. Login info & contractor info is stored in a firebase database that is linked to the program so that users can be authenticated properly.

Screen Captures of Software as it's Running (read from left to right):





The Paint Estimation app interface consists of two screens. The first screen, titled "Paint Estimation", has a purple header and a green "Calculate!" button. It displays a section titled "Size of Wall:" with four input fields: "Width (Feet)", "Width (Inches)", "Height (ft)", and "Height (in)". Below these are "Baseboard Height..." and "Crown Molding H...". A "Number of Walls" input field contains the value "4". The second screen shows the results of the calculation: "Gallons Needed: 1.93".

11:53 Paint Estimation

11:54 Paint Estimation

Size of Wall:

Width (Feet) Width (Inches)

Height (ft) Height (in)

Baseboard Height... Crown Molding H...

Number of Walls: 4

Calculate!

Gallons Needed:
1.93

The Flooring Estimation app interface consists of three screens. The first screen, titled "Flooring Estimation", has a green header and a green "CONFIRM TO CONTINUE" button. It displays a section titled "Size of Tile or Hardwood:" with input fields for "Width (inches)" and "Length (inches)", separated by a multiplier "X". The second screen shows the input values "12 X 12" and a green "CONFIRM TO CONTINUE" button. The third screen displays the results: "Size of the Floor:" with input fields for "Width (feet)" and "Inches", and "Length (feet)" and "Inches". It also features a green "Calculate!" button. The final result screen shows "Pieces Needed: 770".

11:55 Flooring Estimation

11:56 Flooring Estimation

11:57 Flooring Estimation

Size of Tile or Hardwood:

Width (inches) X Length (inches)

CONFIRM TO CONTINUE

Size of Tile or Hardwood:

12 X 12

CONFIRM TO CONTINUE

Size of the Floor:

Width (feet) Inches

Length (feet) Inches

Calculate!

Pieces Needed:
770

Roofing Estimation

Size of Shingles:

Width (inches) X Length (inches)

of Shingles in Bundle

CONFIRM TO CONTINUE

Size of Roof:

Width (feet) _____ Inches _____

Length (feet) Inches _____

Calculate!

Size of Shingles:

Width (inches) X Length (inches)

of Shingles in Bundle

CONFIRM TO CONTINUE

Size of Roof:

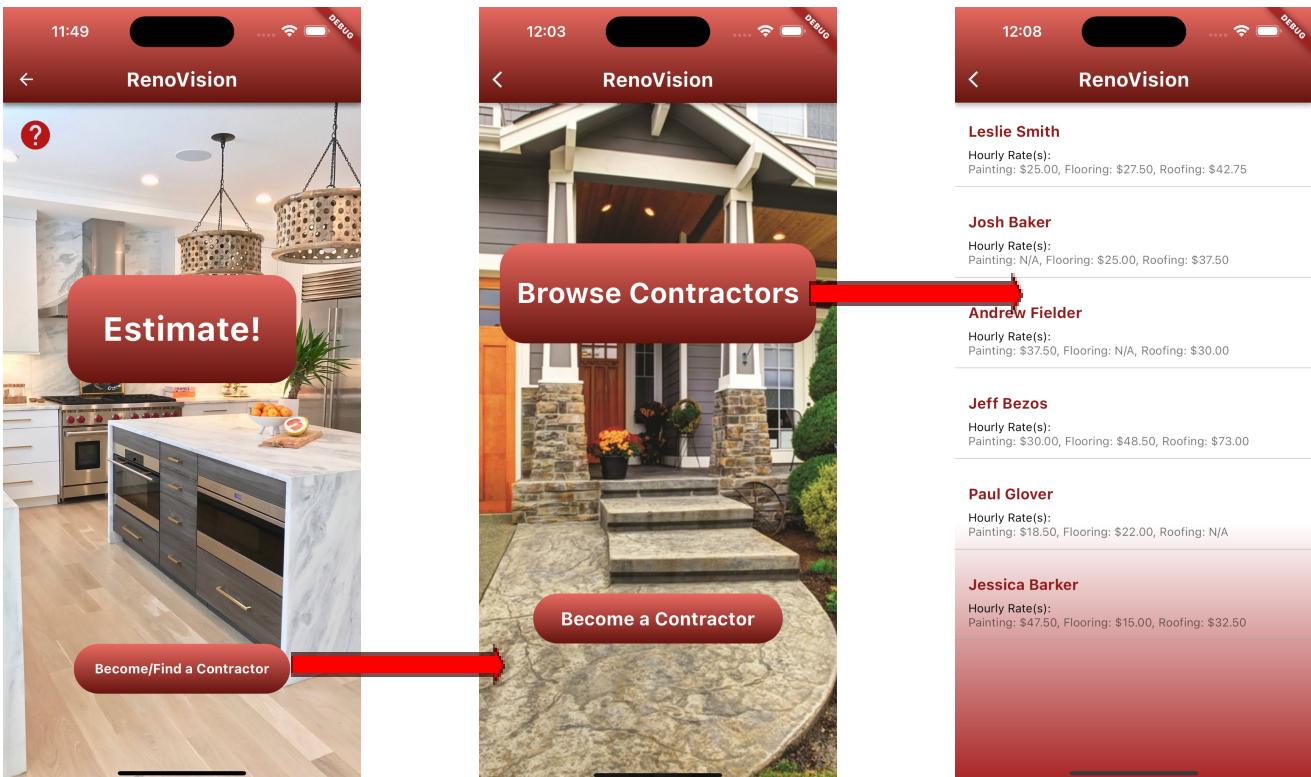
Width (feet) Inches

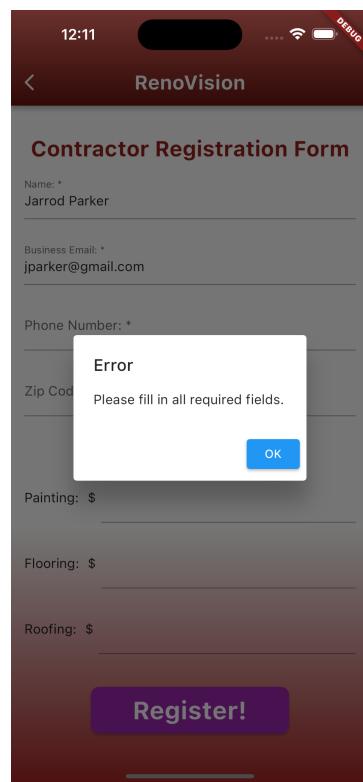
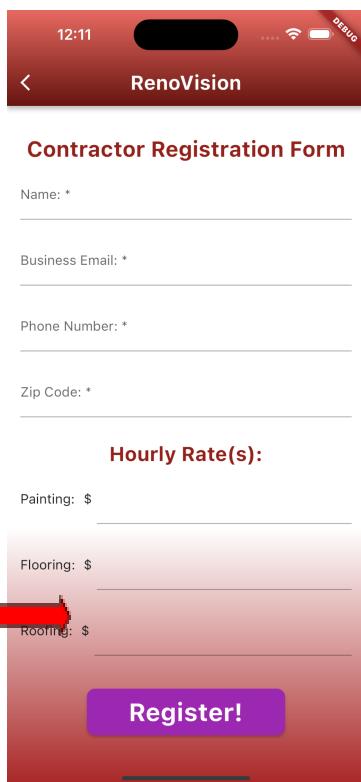
Length (feet) Inches _____

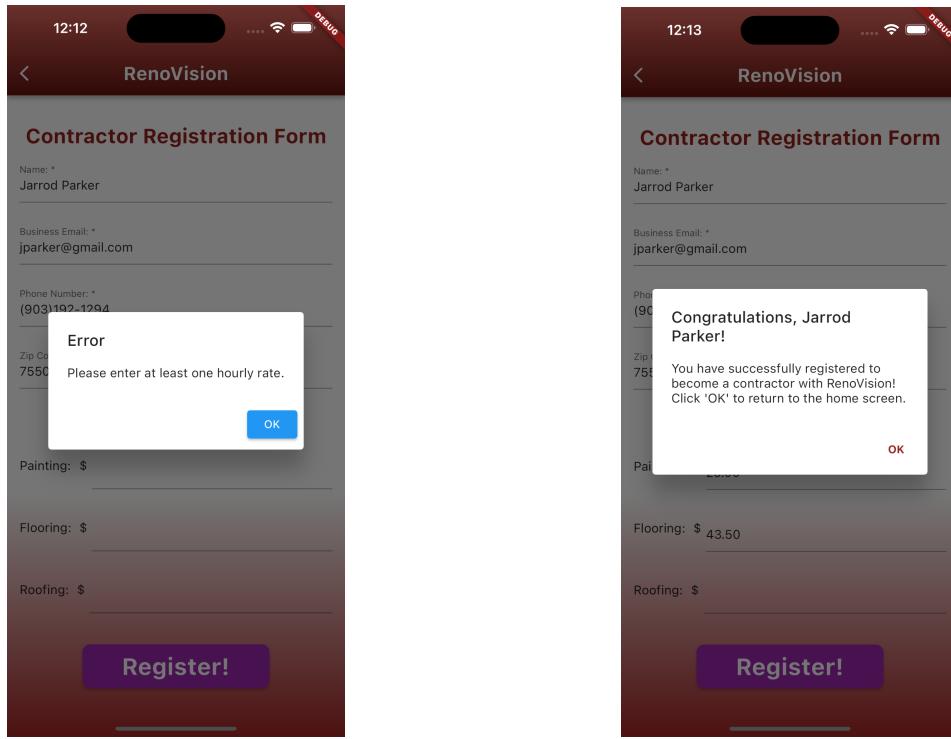
Calculate!

Bundles: 82

Total Shingle Count: 2863







Overview of Screens Start to Finish:

Login Method: (1-8 screen captures) First you're shown the Sign Up form, then you are shown the forgot password? Button, followed by the user entering their credentials and logging in.

Main Dashboard: (9th screen capture) This shows the main dashboard.

How to Use Button ‘?’: (10th screen capture) On this screen the user can see steps on how to use the software. The ‘[here](#)’ in the instructions links them to their Measure app on their phone.

Estimate! Button: (11-20 screen captures) After you click Estimate! you see a screen with 3 options for estimation: Painting, Flooring, or Roofing. Each section has its own color code and title so it's easy to tell what type of estimation is being done. After clicking an estimation type, the user sees a screen for inputs. When the inputs are entered, the system will output the appropriate result in big text at the bottom of the screen.

Become/Find a Contractor Button: (21-last screen captures) When this button is clicked, the user has an option to browse current contractors, or to become a contractor. When they browse contractors, they see a list of every contractor who has previously registered. If they click on a name, they are sent to a profile screen with all of the details of that contractor. If the user wants to become a contractor, they simply click on that button. They will then be given a registration form which has required fields so that accounts all have a standard and consistent look to them. (error messages are shown to show how some input HAS to be filled out in order to successfully register)

CIS: Business Model

Introduction to the Business Model Canvas for RenoVision: A Comprehensive Blueprint for Success

In the ever-evolving landscape of entrepreneurial endeavors, where innovation is the compass guiding ventures toward success, the Business Model Canvas emerges as a transcendent tool for RenoVision, the avant-garde mobile application poised to revolutionize the realm of home renovation. At the core of this strategic apparatus lies a multifaceted tapestry of simplicity and clarity, rendering complex business intricacies comprehensible for stakeholders. For RenoVision, the canvas becomes not just a visual roadmap but an intricate guide, delineating the interwoven threads of its business model through nine distinct building blocks. These blocks are the pillars supporting a comprehensive overview that extends beyond the conventional boundaries, encapsulating the essence of value propositions, customer relationships, revenue streams, and the intricate web of key resources, activities, and partnerships. It is a holistic lens through which RenoVision gains strategic insight into its strengths and weaknesses, transcending the binary realm of success and failure. The canvas becomes a living, breathing entity, adapting to the dynamic evolution of RenoVision's trajectory, ensuring flexibility in the face of industry shifts. Beyond its structural utility, the canvas becomes the vernacular of communication and collaboration, offering a shared language that unites team members, investors, and stakeholders in the pursuit of a common vision. In this expansive canvas, innovation burgeons, and creativity flourishes, providing RenoVision with a visual playground to explore, iterate, and envision novel possibilities. Resource efficiency becomes an art form, as the canvas guides RenoVision in identifying and allocating resources to elements that catalyze growth and profitability. Yet, its utility extends further, acting as a sentinel for risk mitigation, casting a comprehensive gaze across the business model to identify potential challenges. As we embark on an exploration of the anatomy of the Business Model Canvas for RenoVision, we unravel the intricacies of organizational structures, processes, systems, customers, offers, infrastructure, and financial viability. Each block becomes a narrative thread, weaving a strategic tapestry that propels RenoVision on its transformative odyssey in reshaping the home renovation experience.

Customer Segments:

The customer segment of the business model canvas for RenoVision, the innovative home renovation mobile application, is meticulously designed to address the diverse needs and preferences of its target audience. The venture aims to reach and serve various groups of users who engage in home improvement projects, catering to both individuals and organizations involved in the renovation ecosystem.

Mass Market Homeowners:

- *Description:* This segment constitutes the broad spectrum of homeowners seeking a user-friendly and efficient solution for their painting and renovation projects. These individuals are typically engaged in DIY home improvement and value tools that simplify the process.
- *Distinct Offer:* RenoVision provides an intuitive mobile app with features for accurate wall measurements, precise paint resource estimates, and a user-friendly interface tailored to the needs of DIY enthusiasts.

Professional Contractors:

- *Description:* Professional contractors represent a niche market within the customer segment. These users require advanced features and tools to streamline their renovation projects efficiently.
- *Distinct Offer:* The Pro Edition of RenoVision is specifically designed to meet the unique needs of professional contractors. It offers specialized measurement tools, project management features, and additional resources to enhance their workflow.

E-Commerce Partners:

- *Description:* This segment includes businesses operating in the e-commerce space, such as suppliers of paints and renovation materials. These partners are essential for the integration aspect of RenoVision, where users can directly purchase materials through the app.
- *Distinct Offer:* RenoVision offers an integrated platform for e-commerce partners to showcase and sell their products directly to users, creating a new revenue stream through affiliate marketing or sales commissions.

Multi-Sided Platform Users:

- *Description:* RenoVision serves as a multi-sided platform by connecting homeowners, contractors, and e-commerce partners on a single interface. This segment involves users who benefit from the collaborative ecosystem created by the app.
- *Distinct Offer:* The app fosters collaboration and communication between homeowners and contractors, creating a seamless experience for project planning and execution. It also facilitates direct transactions between users and e-commerce partners.

Potential Collaborators (B2B):

- *Description:* This segment comprises businesses and organizations involved in the home improvement industry, such as interior design firms or real estate agencies. They may explore collaborative opportunities with RenoVision to enhance their services.
- *Distinct Offer:* RenoVision offers collaborative features and potentially tailored solutions for businesses, fostering partnerships that could leverage the app's capabilities to enhance their service offerings.

By delineating these customer segments, RenoVision ensures that its value proposition is tailored to the distinct needs of each group, creating a versatile and inclusive platform for anyone involved in the home renovation process.

Value Proposition:

In the context of the Business Model Canvas, the value proposition for RenoVision delineates a straightforward and purposeful bundle of products and services aimed at creating distinct value for its diverse customer segments. RenoVision's commitment to simplicity and effectiveness is evident in the following elements:

Newness and Innovation:

- *Description:* RenoVision introduces an innovative mobile app that simplifies home renovation. With features like advanced measurement tools and project visualization, it offers a fresh approach to painting and remodeling projects.
- *Distinct Elements:* Cutting-edge measurement tools, advanced project visualization, and real-time collaboration features contribute to the innovative allure.

Performance Excellence:

- *Description:* The application guarantees precision and efficiency in measurements, providing accurate paint resource estimates and reliable project management tools. This performance-driven focus caters to the needs of both DIY homeowners and professional contractors.
- *Distinct Elements:* High-speed data processing, real-time rendering, and reliable project management functionalities set RenoVision apart in terms of performance.

Customization for Varied Users:

- *Description:* Recognizing the diverse needs of its customer segments, RenoVision tailors its features to offer a customizable experience. DIY enthusiasts and professional contractors can personalize their interactions with the application based on their unique project requirements.
- *Distinct Elements:* User-configurable measurement preferences, customizable project dashboards, and adaptable collaboration features provide a tailored experience.

"Getting the Job Done" with Efficiency:

- *Description:* RenoVision's value proposition centers around efficiency and practicality. It empowers users to get the job done with minimal effort, simplifying complex renovation tasks through intuitive interfaces and streamlined workflows.
- *Distinct Elements:* User-friendly design, intuitive navigation, and a straightforward measurement process contribute to the efficiency-driven value proposition.

Design Aesthetics and User Experience:

- *Description:* Aesthetic appeal and an enhanced user experience are integral elements of RenoVision's value proposition. The application boasts an aesthetically pleasing interface that complements its intuitive functionality.
- *Distinct Elements:* Intuitive UX/UI design, visually engaging project renderings, and a cohesive color scheme contribute to a visually appealing and user-friendly experience.

Brand Status and Recognition:

- *Description:* RenoVision positions itself as a premium brand in the home renovation tech space, offering a prestigious status to users who align themselves with the application.
- *Distinct Elements:* High-quality branding, exclusive Pro Edition features, and strategic partnerships enhance the brand's perceived value.

Competitive Pricing:

- *Description:* While delivering premium features, RenoVision maintains a competitive pricing strategy. This value proposition attracts cost-conscious homeowners and contractors without compromising on quality.
- *Distinct Elements:* Transparent pricing models, affordable subscription plans, and a clear distinction between free and premium features contribute to the competitive pricing strategy.

Cost Reduction for Professionals:

- *Description:* Professional contractors benefit from RenoVision's value proposition by experiencing a reduction in operational costs. The application streamlines project management, reducing the time and resources required for each project.
- *Distinct Elements:* Advanced collaboration tools, project scheduling features, and real-time communication contribute to cost-saving efficiencies.

Risk Reduction Through Precision:

- *Description:* RenoVision mitigates risks associated with renovation projects by providing precise measurements and accurate paint resource estimates. This risk reduction is particularly crucial for both homeowners and professionals.
- *Distinct Elements:* Advanced measurement algorithms, real-time error detection, and detailed project visualizations contribute to risk mitigation.

Accessibility for All Users:

- *Description:* RenoVision's value proposition emphasizes accessibility, ensuring that its benefits are extended to a wide range of users. The application's user-friendly interface and affordable pricing contribute to this inclusivity.
- *Distinct Elements:* Accessibility features, language support, and intuitive onboarding processes enhance the inclusivity of the application.

Convenience and Usability:

- *Description:* At the core of RenoVision's value proposition is the promise of convenience. The application is designed for seamless usability, allowing users to navigate effortlessly through the features.
- *Distinct Elements:* Intuitive touchscreen controls, clear project workflows, and easily accessible support contribute to the overall convenience and usability.

Channels:

Within the Business Model Canvas, the Channels section for RenoVision intricately outlines how the company establishes communication pathways and delivers its Value Proposition to the diverse Customer Segments. This strategic aspect involves multiple types of channels, each serving a specific function within the customer experience.

Communication Channels:

- *Description:* RenoVision employs various communication channels to engage with its customer segments. This includes online platforms, social media, and targeted marketing campaigns to raise awareness about the innovative features and benefits of the mobile application.
- *Customer Touch Points:* Social media platforms, official website, email newsletters, and online forums serve as key touchpoints where potential users can discover RenoVision.

Distribution Channels:

- *Description:* Distribution channels for RenoVision involve the pathways through which the application is made available to users. This includes app marketplaces (such as the Apple App Store and Google Play Store) and direct downloads from the official website.
- *Customer Touch Points:* App marketplaces, official website, and other online platforms where users can access and download the application contribute to the distribution channels.

Sales Channels:

- *Description:* While RenoVision offers a free version of its application, the Pro Edition and potential partnerships with e-commerce partners represent its sales channels. Users can upgrade to the Pro Edition through in-app purchases, and partnerships with e-commerce platforms facilitate direct purchases of renovation materials.
- *Customer Touch Points:* In-app purchase options within the application, collaboration with e-commerce partners, and targeted promotions serve as touchpoints for sales-related channels.

Awareness and Evaluation Functions:

- *Function:* Channels play a crucial role in raising awareness and helping customers evaluate RenoVision's Value Proposition. The communication channels contribute to creating brand awareness, while distribution and sales channels facilitate users in exploring and understanding the features and benefits offered by the application.
- *Execution:* Online advertisements, social media campaigns, and app store descriptions are executed through these channels to inform and educate potential users.

Post-Purchase Customer Support:

- *Function:* Channels continue to play a vital role post-purchase by providing customer support. Users may encounter queries or require assistance, and these channels ensure a seamless support experience.
- *Execution:* Customer support channels include in-app chat support, email support, and an FAQ section on the official website, ensuring that users have access to assistance when needed.

The integration of these channels is instrumental in shaping the overall customer experience with RenoVision. From the initial introduction of the application through communication channels to the seamless delivery and support facilitated by distribution, sales, and customer support channels, every touchpoint contributes to the holistic journey of the users.

In essence, RenoVision's Channels strategy is designed to foster effective communication, smooth delivery of services, and ongoing customer support. The diverse channels contribute not only to the acquisition of users but also to the cultivation of a positive and supportive user experience throughout their interaction with the RenoVision application.

Customer Relationships:

The Customer Relationships component of the Business Model Canvas for RenoVision delineates the varied types of relationships the company establishes with its specific Customer Segments. These relationships are crafted with a keen understanding of user preferences and needs, contributing to a more personalized and engaging experience.

Personal Assistance:

- *Description:* RenoVision recognizes the significance of personal assistance in the realm of home renovation. For users seeking dedicated guidance, the application provides a personalized assistance feature. This may include access to a customer support representative who can address queries, offer guidance on using advanced features, and provide tailored recommendations.

- *Execution:* In-app chat support, dedicated helpline, and personalized assistance for Pro Edition users constitute the personal assistance channel.

Self-Service:

- *Description:* Understanding the desire for autonomy, RenoVision offers a self-service model for users who prefer to navigate the application independently. This includes comprehensive tutorials, user-friendly interfaces, and an intuitive design that empowers users to explore features and functionalities on their own.
- *Execution:* In-app tutorials, tooltips, and a user-friendly interface ensure that users can easily navigate and utilize RenoVision without extensive external assistance.

Automated Services:

- *Description:* Recognizing the need for efficiency, automated services are integrated into RenoVision's customer relationships. Automated features streamline processes, providing quick and precise measurements, automated project visualizations, and instant feedback on user inputs.
- *Execution:* Automated measurement algorithms, instant error detection, and real-time project renderings contribute to the automation of services within the application.

Communities:

- *Description:* To foster a sense of community among users, RenoVision incorporates community-building features. This includes online forums, social media groups, and collaborative spaces within the application where users can share insights, tips, and experiences.
- *Execution:* Online forums, community discussion boards within the app, and social media groups create spaces for users to connect, share ideas, and seek advice from fellow RenoVision enthusiasts.

Co-Creation:

- *Description:* RenoVision embraces a co-creation model, inviting users to actively contribute to the application's evolution. Users can provide feedback, suggest features, and participate in beta testing, creating a collaborative environment where their input directly influences the application's development.
- *Execution:* Feedback forms, beta testing programs, and feature suggestion mechanisms invite users to actively participate in the co-creation of RenoVision.

Proactive Education and Engagement:

- *Description:* Recognizing the dynamic nature of home renovation, RenoVision establishes proactive educational relationships. Regular updates, newsletters, and educational content keep users informed about new features, industry trends, and best practices.
- *Execution:* Regular newsletters, in-app announcements, and educational content contribute to keeping users engaged and informed about the evolving capabilities of RenoVision.

Exclusive Pro Edition Support:

- *Description:* Users subscribed to the Pro Edition receive exclusive support to maximize their experience. This may include priority access to customer support, advanced training resources, and specialized assistance tailored to the unique needs of professional contractors.
- *Execution:* Dedicated helpline for Pro Edition users, exclusive webinars, and advanced training modules contribute to the exclusive support provided to Pro Edition subscribers.

In summary, the Customer Relationships strategy for RenoVision is a dynamic blend of personalization, autonomy, collaboration, and proactive engagement. By offering diverse relationship models, RenoVision aims to cater to the individual preferences of its users, ensuring a meaningful and supportive journey throughout their interaction with the application.

Revenue Streams

Within the Business Model Canvas, the Revenue Streams section for RenoVision outlines the diverse cash generation mechanisms associated with each Customer Segment. These revenue streams are strategically designed to not only cover costs but also contribute to the sustainable growth of the company.

Asset Sale:

- *Description:* RenoVision generates revenue through the sale of assets, such as exclusive Pro Edition features, advanced measurement tools, and premium project visualization options. These assets enhance the user experience and are offered as one-time purchases.
- *Pricing Strategy:* Fixed list pricing for asset sale items, with exclusive Pro Edition features priced at \$19.99 each, providing a tangible and immediate value for users seeking advanced functionalities.

Usage Fee:

- *Description:* A fundamental revenue stream for RenoVision is the usage fee, particularly for professional contractors who extensively utilize the application for multiple projects. This fee model is based on the volume of measurements and projects undertaken by users.
- *Pricing Strategy:* Market-dependent pricing, with a usage fee of \$0.99 per square meter measured. This flexible pricing model ensures that professional users are charged based on their specific needs and project requirements.

Subscription Fees:

- *Description:* RenoVision offers subscription plans to both homeowners and professional contractors, providing access to a range of premium features, exclusive tools, and enhanced project management capabilities on a monthly or annual basis.
- *Pricing Strategy:* Fixed list pricing for subscription fees, with monthly plans starting at \$9.99 for homeowners and \$19.99 for professionals. Annual plans offer a discount equivalent to two months' fees, encouraging long-term commitments.

Lending/Renting/Leasing:

- *Description:* In certain instances, RenoVision explores revenue generation through the lending, renting, or leasing of specialized measurement equipment or advanced project visualization tools to professional contractors who may have temporary needs.
- *Pricing Strategy:* Lease pricing at \$49.99 per month for specialized measurement tools, providing a cost-effective solution for contractors with occasional high-volume projects.

Licensing:

- *Description:* RenoVision explores licensing agreements with industry partners, allowing them to integrate the application's measurement algorithms or project visualization tools into their own software solutions. Licensing fees are generated through these partnerships.
- *Pricing Strategy:* Negotiated licensing fees, with an estimated market value of \$10,000 per annum per partner, ensuring that the licensing model contributes significantly to overall revenues.

Brokerage:

- *Description:* RenoVision acts as a brokerage platform, facilitating transactions between users and partner e-commerce platforms for the direct purchase of renovation materials. A percentage of each transaction is retained as a brokerage fee.
- *Pricing Strategy:* Percentage-dependent pricing, with a 5% brokerage fee on the total value of materials purchased through the application, creating a symbiotic relationship with e-commerce partners.

Advertising:

- *Description:* The free version of RenoVision is monetized through advertising, where relevant advertisements for renovation materials, tools, and services are displayed to users. Advertising revenue is generated based on user interactions.
- *Pricing Strategy:* Cost-per-click advertising model, with an estimated market value of \$0.50 per click, ensuring advertisers receive value for their promotional investments.

Marketplace Commission:

- *Description:* RenoVision acts as a marketplace for users to discover and purchase renovation materials directly through the application. A commission is charged on each transaction facilitated through the platform.
- *Pricing Strategy:* Market-dependent commission pricing, with a 3% commission on the total value of materials purchased through the application, creating an additional revenue stream.

In conclusion, the Revenue Streams strategy for RenoVision is diversified, encompassing a mix of one-time purchases, subscription-based models, strategic partnerships, and transaction-based fees. This approach not only ensures financial sustainability for the company but also aligns with the diverse needs and preferences of its user base.

Key Resources:

The Key Resources section of the Business Model Canvas for RenoVision identifies the critical assets necessary to bring the business model to life. These resources, spanning physical, intellectual, human, and financial categories, are strategically harnessed to ensure the seamless functioning and growth of the innovative home renovation application.

Physical Resources:

- *Description:* Physical assets form the backbone of RenoVision's operations, encompassing servers, data storage facilities, and hardware infrastructure to support the robust performance of the mobile application.
- *Strategy:* Emphasizing reliability and scalability, RenoVision strategically invests in state-of-the-art physical resources hosted on secure and efficient cloud servers. Regular maintenance and updates ensure optimal performance, even during periods of high user activity.

Intellectual Resources:

- *Description:* Intellectual assets play a pivotal role in RenoVision's success, including proprietary measurement algorithms, advanced project visualization technologies, and software code that underpins the unique functionalities of the application.
- *Strategy:* Guarding intellectual property is a priority for RenoVision. The company employs legal measures, such as patents and trademarks, to protect its algorithms and technologies. Ongoing research and development efforts focus on innovation to maintain a competitive edge.

Human Resources:

- *Description:* The human element is indispensable to RenoVision, encompassing skilled software developers, UX/UI designers, customer support representatives, and business development professionals who contribute to the application's development, refinement, and user support.
- *Strategy:* A strategic hiring approach ensures a diverse and talented team. Regular training programs foster skill development, and a supportive work culture encourages collaboration and creativity. Customer support representatives are well-trained to provide personalized assistance.

Financial Resources:

- *Description:* Financial assets are crucial for RenoVision's operations, covering initial startup capital, ongoing operational expenses, marketing budgets, and strategic investments in research and development.
- *Strategy:* A balanced financial strategy involves securing initial investment through venture capital and strategic partnerships. Ongoing revenue streams from subscriptions, usage fees, and advertising contribute to operational sustainability. Budget allocation is dynamic, focusing on areas that drive user acquisition and retention.

Strategic Partnerships:

- *Description:* External partnerships with e-commerce platforms, hardware manufacturers, and industry stakeholders serve as invaluable resources. These partnerships contribute to the expansion of functionality, user engagement, and revenue streams.
- *Strategy:* Proactively seeking strategic partnerships, RenoVision aligns with leading e-commerce platforms to enhance its marketplace functionality. Collaborations with hardware manufacturers ensure compatibility with the latest measurement tools, expanding the application's capabilities.

User Data:

- *Description:* User data is a valuable resource for RenoVision, providing insights into user behavior, preferences, and usage patterns. This data is utilized for continuous improvement, targeted marketing, and personalization of the user experience.
- *Strategy:* Upholding stringent data privacy measures, RenoVision prioritizes ethical data collection practices. User consent is actively sought, and anonymized data is utilized to enhance features, tailor marketing efforts, and maintain a user-centric approach.

Financial Management Systems:

- *Description:* Efficient financial management systems, including accounting software, budgeting tools, and payment processing platforms, are essential resources for maintaining fiscal responsibility and transparency.
- *Strategy:* Implementing robust financial management systems ensures accurate tracking of revenues, expenses, and overall financial health. Regular audits and adherence to accounting best practices contribute to the company's financial stability.

Brand Reputation:

- *Description:* RenoVision's brand reputation is a valuable intangible asset that influences user trust, loyalty, and market positioning. Positive reviews, user testimonials, and industry recognition contribute to the brand's perceived value.
- *Strategy:* Prioritizing user satisfaction, continuous improvement, and ethical business practices, RenoVision actively cultivates a positive brand image. Engaging with users through feedback mechanisms and addressing concerns promptly enhances brand credibility.

In summary, the Key Resources strategy for RenoVision involves a meticulous approach to acquiring, protecting, and leveraging assets. By strategically investing in physical infrastructure, safeguarding intellectual property, nurturing a skilled and diverse workforce, maintaining financial prudence, fostering strategic partnerships, utilizing user data ethically, implementing robust financial management systems, and cultivating a positive brand reputation, RenoVision positions itself for sustained success in the dynamic landscape of home renovation applications.

Key Activities:

The Key Activities section of the Business Model Canvas for RenoVision delineates the pivotal tasks and operations that form the backbone of the business model. These activities, categorized into production, problem-solving, and platform/network functions, are strategically executed to ensure the efficiency, innovation, and continuous improvement of the RenoVision application.

Production Activities:

- *Description:* At the core of RenoVision's operations are production activities, encompassing the development, enhancement, and maintenance of the mobile application. This involves coding, testing, and deploying updates to ensure a seamless user experience.
- *Strategy:* Adopting an agile development methodology, RenoVision iteratively enhances its application based on user feedback and industry trends. Continuous integration and regular updates keep the application technologically current and responsive to user needs.

Problem-Solving Activities:

- *Description:* Problem-solving is a critical activity for RenoVision, involving the identification and resolution of technical issues, user challenges, and market dynamics. It also includes adapting to evolving industry standards and addressing user feedback.
- *Strategy:* A dedicated customer support team actively engages with users to address queries, troubleshoot technical issues, and gather valuable feedback. An agile approach to problem-solving ensures quick responses to emerging challenges and continuous improvement.

Platform/Network Activities:

- *Description:* RenoVision operates as a platform connecting users with measurement tools, e-commerce partners, and a community of fellow renovators. Platform/network activities involve maintaining these connections, fostering collaborations, and ensuring a robust infrastructure.
- *Strategy:* Strategic partnerships with e-commerce platforms and hardware manufacturers contribute to a thriving ecosystem. Community-building initiatives, including forums and social media groups, create a network where users can share experiences and insights. Regular platform maintenance ensures seamless connectivity.

User Training and Education:

- *Description:* Ensuring users can maximize the potential of the application involves proactive training and education initiatives. This includes creating tutorials, organizing webinars, and providing resources to enhance user proficiency.
- *Strategy:* Regularly updated tutorials and in-app guidance contribute to user empowerment. Webinars, especially for Pro Edition users, offer advanced training on utilizing premium features. Educational content on industry trends and best practices keeps users informed.

Market Research and Trend Analysis:

- *Description:* Staying ahead in the dynamic home renovation landscape requires ongoing market research and trend analysis. This involves monitoring competitor activities, identifying emerging technologies, and understanding user preferences.
- *Strategy:* Regular market research, competitor analysis, and trend monitoring contribute to informed decision-making. Surveys and feedback mechanisms collect user opinions, ensuring that RenoVision remains aligned with evolving market demands.

Security and Data Privacy Measures:

- *Description:* Safeguarding user data and ensuring the security of the application are paramount activities. This involves implementing robust cybersecurity measures, adhering to data protection regulations, and regularly auditing security protocols.
- *Strategy:* Regular security audits, encryption protocols, and compliance with data protection laws form the foundation of RenoVision's commitment to user privacy and data security. Transparent communication on security measures builds user trust.

Marketing and User Acquisition:

- *Description:* Driving user acquisition and maintaining a strong market presence requires strategic marketing activities. This involves digital marketing campaigns, social media engagement, and targeted promotions to reach diverse customer segments.
- *Strategy:* A multichannel marketing approach includes online advertisements, social media campaigns, and collaboration with industry influencers. Incentivized referral programs and limited-time promotions contribute to user acquisition strategies.

Continuous Innovation and Feature Development:

- *Description:* The landscape of home renovation is ever-evolving, necessitating continuous innovation and feature development. This involves ideation, prototyping, and implementing new functionalities to meet user expectations.
- *Strategy:* Establishing an internal innovation culture encourages team members to propose and explore new features. Beta testing programs involving user feedback contribute to the refinement and launch of innovative features.

Quality Assurance and Testing:

- *Description:* Ensuring the reliability and accuracy of the application requires rigorous quality assurance and testing activities. This involves testing for usability, functionality, and compatibility across various devices and operating systems.
- *Strategy:* A comprehensive quality assurance process, including beta testing with diverse user groups, ensures that the application meets high standards. Regular testing cycles for new updates contribute to a seamless user experience.

In conclusion, the Key Activities strategy for RenoVision is a dynamic orchestration of development, problem-solving, and network-building activities. By strategically producing and enhancing the application, actively addressing user needs, fostering a connected ecosystem, and embracing a culture of continuous improvement, RenoVision positions itself as a leading player in the home renovation application landscape.

Key Partnerships

Key Partnerships are a cornerstone of RenoVision's business model, forming a dynamic network of suppliers and collaborators that amplify the application's capabilities and reach. These partnerships are strategically forged to optimize operations, mitigate risks, and acquire essential resources and activities.

Optimization and Economy of Scale:

- *Description:* Collaborative efforts with suppliers and partners aim to optimize costs and achieve economies of scale. By partnering with established brands, RenoVision can access resources more efficiently and enhance its overall cost-effectiveness.
- *Strategy:* Forming strategic alliances with renowned hardware manufacturers, such as Bosch and Stanley, allows RenoVision to access cutting-edge measurement tools at scale, reducing production costs and providing users with high-quality, reliable equipment.

Reduction of Risk and Uncertainty:

- *Description:* Collaborative ventures are instrumental in reducing risks and uncertainties associated with technological developments and market dynamics. Partnering with industry leaders helps RenoVision navigate uncertainties and stay resilient in a rapidly evolving landscape.
- *Strategy:* Strategic collaborations with established software security firms, such as McAfee and Norton, provide RenoVision with robust cybersecurity solutions. This reduces the risk of data breaches, safeguards user trust, and ensures compliance with evolving data protection regulations.

Acquisition of Resources and Activities:

- *Description:* Key partnerships serve as a means of acquiring critical resources and activities that complement and enhance RenoVision's core competencies. These collaborations provide access to specialized skills, technologies, and market channels.
- *Strategy:* Collaborating with e-commerce giants like Amazon and Home Depot transforms RenoVision into a comprehensive marketplace. This allows users to seamlessly purchase renovation materials directly through the application, enriching the user experience and providing a new revenue stream.

Strategic Technology Alliances:

- *Description:* Establishing partnerships with leading technology firms ensures that RenoVision remains at the forefront of innovation. By integrating emerging technologies and staying aligned with industry trends, these alliances contribute to the application's technological prowess.
- *Strategy:* Partnering with AR/VR technology providers, such as Oculus and Microsoft, enhances RenoVision's capabilities. This collaboration enables the

incorporation of augmented reality features, allowing users to visualize projects in real-time and fostering a cutting-edge user experience.

Educational Institutions and Industry Associations:

- *Description:* Collaborations with educational institutions and industry associations contribute to RenoVision's commitment to user education, industry standards, and continuous learning. These partnerships provide valuable insights and access to emerging talent.
- *Strategy:* Partnering with institutions like the National Association of Home Builders (NAHB) and collaborating with universities for research initiatives ensures RenoVision stays informed about industry trends, regulations, and user expectations.

Exclusive Partnerships with Pro Edition Users:

- *Description:* Building exclusive partnerships with professional contractors subscribing to the Pro Edition offers additional value. These collaborations provide Pro Edition users with specialized tools, resources, and support tailored to their unique needs.
- *Strategy:* Partnering with industry associations for exclusive webinars and training sessions for Pro Edition users ensures that professionals receive advanced training. Exclusive partnerships with tool manufacturers offer discounts on premium measurement equipment for Pro Edition subscribers.

Collaborative Content Creation:

- *Description:* Content creation partnerships with influencers, home improvement experts, and design professionals contribute to the application's content ecosystem. These collaborations enhance user engagement and provide diverse perspectives.
- *Strategy:* Partnering with popular home renovation influencers and collaborating with interior design professionals for exclusive content creation ensures that RenoVision remains a hub for inspiration and expertise. This enriches the user experience and attracts a broader audience.

Hardware and Software Integration Partnerships:

- *Description:* Integrating RenoVision with compatible hardware and software solutions amplifies its functionality. Collaborations with leading hardware and software providers ensure seamless compatibility and expanded capabilities for users.
- *Strategy:* Partnering with hardware manufacturers like DeWalt and software integrators like Autodesk allows RenoVision users to export project data seamlessly. This interoperability enhances the application's utility, providing a holistic solution for home renovation projects.

In summary, RenoVision's Key Partnerships are strategically crafted to optimize efficiency, reduce risks, and enrich the user experience. By collaborating with renowned brands, industry leaders, educational institutions, and content creators, RenoVision creates a synergistic ecosystem that not only amplifies its offerings but also ensures continuous innovation and resilience in a dynamic market.

Cost Structure

The Cost Structure of RenoVision is a comprehensive framework that outlines the expenses incurred to operate the business model efficiently while maximizing the value delivered to users. Distinguishing between cost-driven and value-driven elements, and considering fixed and variable costs, the cost structure aligns with RenoVision's commitment to providing a feature-rich and personalized home renovation experience.

Cost-Driven Elements:

- *Minimization Focus:* RenoVision adopts a cost-driven approach, emphasizing efficiency and cost minimization where possible. This includes optimizing operational processes, negotiating favorable contracts with suppliers, and leveraging technology to streamline development and maintenance processes.
- *Operational Efficiency:* By implementing agile development methodologies and automation tools, RenoVision minimizes development and maintenance costs. Operational efficiency is further enhanced by outsourcing non-core functions, such as customer support, to cost-effective service providers.

Value-Driven Elements:

- *High Personalization:* While cost-driven considerations are crucial, RenoVision recognizes the importance of providing a high degree of personalization to meet diverse user needs. This involves investing in advanced measurement algorithms, augmented reality features, and user-centric design to enhance the overall value proposition.
- *User-Centric Features:* Investing in value-driven elements, such as personalized project recommendations and exclusive Pro Edition features, enhances user satisfaction. By understanding user preferences and investing in tailored functionalities, RenoVision increases user engagement and loyalty.

Fixed Costs:

- *Server Infrastructure:* Hosting the application on reliable cloud servers, such as those provided by AWS or Azure, incurs fixed costs. These costs remain constant regardless of the number of users or volume of data processed, providing stability in operational expenses.

- *Software Development Team:* The salaries of the core software development team, including developers, UX/UI designers, and quality assurance professionals, represent fixed costs. These skilled individuals contribute consistently to ongoing development and maintenance.

Variable Costs:

- *Usage-Based Costs:* As a mobile application, RenoVision incurs variable costs related to user usage, particularly for users subscribed to usage-based pricing models. This includes costs associated with data storage, data processing, and server usage that scale with the volume of measurements and projects.
- *Customer Acquisition Costs:* Variable costs related to marketing and user acquisition strategies fluctuate based on the success of promotional campaigns. Cost-per-click advertising on platforms like Google and social media incurs variable expenses directly tied to user engagement.

Economies of Scale:

- *Server Costs and Maintenance:* RenoVision benefits from economies of scale in server-related costs. As the user base grows, the cost per user for server maintenance decreases, resulting in lower per-unit costs for hosting, data storage, and overall server infrastructure.
- *Development Costs:* The initial investment in software development, including coding, testing, and deployment, yields economies of scale as the application reaches a broader user base. The fixed costs associated with development are distributed over a larger user pool.

Economies of Scope:

- *Integrated Marketplace Costs:* The introduction of an integrated marketplace, facilitating direct purchases of renovation materials through partnerships with e-commerce platforms like Amazon and Home Depot, contributes to economies of scope. Shared transactional infrastructure and collaborative marketing efforts reduce per-transaction costs.
- *Content Creation Costs:* Collaborative content creation with influencers and design professionals leverages economies of scope. The costs associated with creating diverse and engaging content are distributed across the entire user base, enhancing the overall value proposition.

Cost Structure Scenario Analysis:

- *Prediction Scenario 1 - User Growth:* With a 20% increase in user growth, the server-related costs per user decrease by 15%, resulting in a significant reduction in variable costs. This illustrates the economies of scale achieved as the user base expands.

- *Prediction Scenario 2 - Pro Edition Adoption:* If there is a 30% increase in Pro Edition subscriptions, the additional revenue generated offsets the costs associated with exclusive features and advanced training sessions. This demonstrates the value-driven approach contributing to revenue growth.

In conclusion, RenoVision's Cost Structure is a delicate balance between cost-driven efficiency and value-driven personalization. By strategically managing fixed and variable costs, embracing economies of scale and scope, and predicting scenarios for user growth and feature adoption, RenoVision positions itself for financial sustainability while continuously enhancing the value delivered to users.

Diagram:

Key partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Partners are vital for extending our app's capabilities and reach. For RenoVision, collaborating with paint brands enables us to offer a comprehensive palette selection, while partnerships with technology providers ensure a robust and scalable app infrastructure. Strategic alliances with home improvement stores can also drive user acquisition and retention.	The core activities for RenoVision involve developing a reliable app, creating a seamless user experience, conducting market analysis for ongoing improvement, and providing top-notch customer service. These activities are critical to ensure that the app not only meets but exceeds user expectations.	RenoVision's value lies in its ability to provide precise measurements and paint estimations, a user-friendly interface, and a direct connection to paint suppliers. These offerings solve real problems for our users, saving them time and reducing waste, thereby delivering a tangible benefit that sets us apart from the competition.	Our approach to customer relationships focuses on personalized support, incorporating user feedback into regular updates, and fostering a community where users can exchange home renovation tips. This engagement is designed to build loyalty and encourage ongoing use of the RenoVision app.	RenoVision targets a diverse range of users, including DIY enthusiasts looking for a convenient renovation tool, professional decorators seeking efficiency, and contractors needing accurate estimations. Understanding and catering to these segments ensures our app remains relevant and essential.
Key Resources	Channels			
The development team, our app's proprietary technology, and user data constitute our key resources. These are the backbone of RenoVision, enabling us to deliver a reliable and secure service while continually enhancing the app's features based on user insights.			We leverage various channels to reach our customers, such as app stores for distribution, social media for engagement, and targeted online advertising for acquisition. These channels are chosen for their effectiveness in reaching our target segments and driving app downloads.	
Cost Structure	Revenue streams			
Our costs are primarily related to app development, marketing efforts, staff salaries, and operational expenses. Maintaining a lean cost structure while investing in growth areas is essential for our business model's sustainability and scalability.	RenoVision's revenue comes from multiple streams, including in-app purchases for premium features, subscription fees for extended functionalities, and partnerships with paint brands. These streams are balanced to provide steady income while offering users value for their investment in our app.			

IT: Testing Plan

Unit Tests for Renovision App:

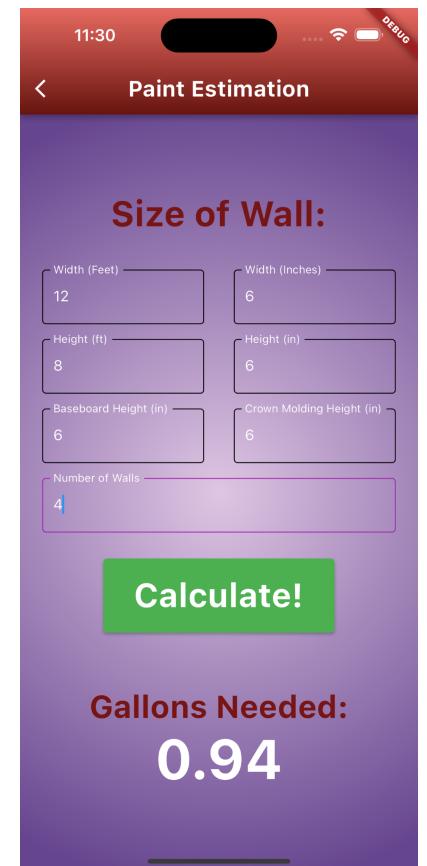
Unit Test for Paint Estimation - Size of Wall Screen

Module: Paint Estimation - Size of Wall Screen

Functionality: Validates the calculation of paint required based on wall dimensions and subtracts areas where paint is not required (like baseboards and crown moldings).

Test Case:

- Inputs:
 - Width in feet: 12
 - Width in inches: 6
 - Height in feet: 8
 - Height in inches: 6
 - Baseboard Height: 6 inches
 - Crown Molding Height: 6 inches
 - Number of Walls: 4
- Expected Output:
 - Calculated gallons of paint needed: approximately 0.94 gallons
- Test Explanation:
 - Given the inputs above, the app was expected to create the same output. Shown in the image to the right, the app did function properly and generate the same result.



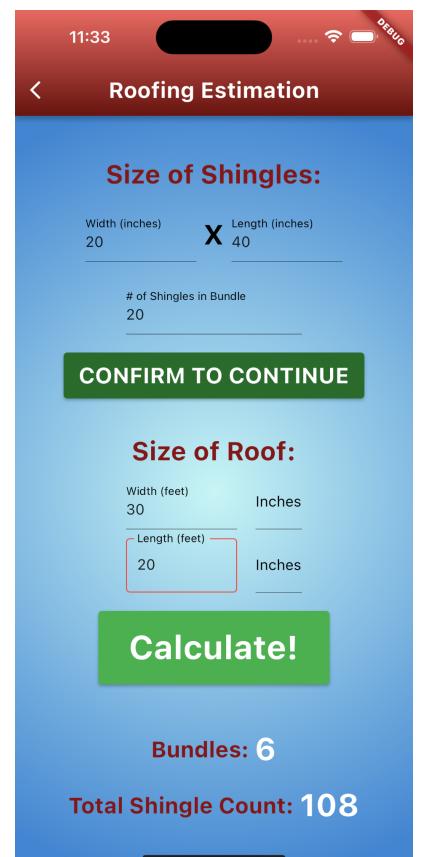
Unit Test for Roofing Estimation

Module: Roofing Estimation

Functionality: Calculates the number of shingle bundles required based on roof size and shingle dimensions.

Test Case:

- Inputs:
 - Shingle Width: 20 inches
 - Shingle Length: 40 inches
 - Number of Shingles per Bundle: 20
 - Roof Width: 30 feet
 - Roof Length: 20 feet
- Expected Output:
 - Total bundles needed: 6
 - Total individual shingles needed: 108
- Test Explanation:
 - Given the inputs above, the app was expected to create the same output. Shown in the image to the right, the app did function properly and generate the same result.



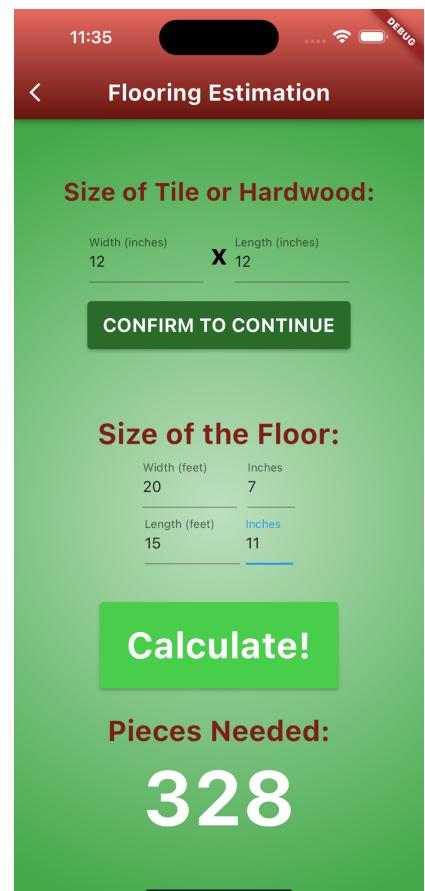
Unit Test for Flooring Estimation

Module: Flooring Estimation

Functionality: Determines the number of tiles/hardwood needed based on floor size and tile dimensions.

Test Case:

- Inputs:
 - Tile Width: 12 inches
 - Tile Length: 12 inches
 - Floor Width: 20 feet, 7 inches
 - Floor Length: 15 feet, 11 inches
- Expected Output:
 - Total tiles needed: 328 tiles
- Test Explanation:
 - Given the inputs above, the app was expected to create the same output. Shown in the image to the right, the app did function properly and generate the same result.



Summary for Unit Testing: Every unit test worked exactly as it was intended to. Given randomly generated sample cases, with a result figured out by a calculator, the unit test's purpose was to see if these inputs and outputs would match up with the app itself. Every test worked, and we don't have to worry about any user error in the fields since inputs are restricted to positive

integer values. We did more testing, but for the sake of the document size, we are only showing one unit test per estimation module. Furthermore, every other method (regarding login and contractors) works as intended, and is not subject to user error based on restrictions written into the code (ie: phone number has to be a 10 digit int, zip code must be 5 digit int, can't move on without completing required fields, etc.). Any time a user might create an error (not entering a value that's required, not entering at least one hourly rate to become a contractor, etc.), a pop up box will appear that will instruct the user on where they went wrong and allow them a chance to fix it appropriately.

Integration Tests Plan:

Approach: Top-Down (Tier 1-Tier 9)

Introduction (tier 1):

RenoVision is an app that's value lies in giving people access to measure and calculate results for a range of home renovation projects simply by owning a smartphone.

Since we are using Flutter for development, our app will be available on both iOS and Android devices to make sure we can reach the overall majority of smartphone owners.

Our app's main purpose is to give people, whether it be DIY home renovators, or contractors, a way to calculate the amount of materials needed for projects such as gallons of paint needed for painting rooms, installing hardwood floors/tile, or installing shingles on a roof.

We also are trying to expand to be a platform for both homeowners and contractors to use by not only giving the previously described estimation function, but also a section where people can browse contractors to do work for them, or sign up to be a contractor (with proper credentials). With that being said, the primary functionalities of this app are a login function, estimation function, and contractor features.

Authentication and User Registration (tier 2):

The initial screen that the user will see upon launching the RenoVision app is a login screen. Here, there are 3 buttons. One button is called Sign Up which allows the user to register for an account. Another button is called Forgot Password which allows the user to send an email to themselves in case they forgot their password. The last button is a Login button that, when clicked and the username/password are filled in, sends the user to the home screen thus entering the main functionality of the app. This login screen is connected to firebase in order to securely store user credentials and to be able to have a solid base for user authentication.

Main Dashboard (tier 3):

After the user logs in, they are taken to the forefront of the app which can be called the main dashboard. On this screen, there are 3 buttons: How To Use, Estimate!, and Become/Find a Contractor.

How to Use Button (tier 4):

The How to Use button is a ? symbol, and when clicked on shows the user some steps on how to use the app as intended. The first step has a hyperlink that sends the user to their measure app on their phone to take their measurements. From there, the user is instructed to input the values into the appropriate section of Estimate! and to click Calculate! to generate a result.

Estimate! Button (tier 5):

The Estimate! button is the main function of the app. Inside of this button are 3 different sections: Painting, Flooring, and Roofing estimations. When the input values are properly entered, the user clicks Calculate! to generate an accurate estimation of materials amount.

Become/Find a Contractor Button (tier 6):

The last button on the main dashboard is a Become/Find a Contractor button. Within this, the user can sign up to become a contractor, or they can browse a list of contractors that have already registered within the app.

Become a Contractor (tier 7):

This button is a subsection of the previous section. When clicked on, the user is shown a registration form to sign up to be a contractor. Once all the values are entered, they click Register! to add their newly created contractor profile to the list of contractors (explained below). This is then added to a firebase database so that the profiles are housed securely, and there can't be any duplicates.

Browse Contractors (tier 8):

Within this button is a list of every contractor that has registered. Initially, the user will see a bunch of profiles with the contractor's name and hourly rate for the service(s) they provide (painting, flooring, and/or roofing hourly rate). If a profile is clicked on, the user is shown a profile page which houses all of the extra details of the selected contractor like their email, phone #, and zip code.

Conclusion (tier 9):

Through the use of Flutter technology, RenoVision provides homeowners with a convenient way to renovate their homes using their smartphones. Its three primary features—Login, Estimation, and Contractor Functions—are designed for optimal user experience. The integrated How to Use guide walks users through necessary steps, while the Estimate! button accurately calculates the required materials for painting, flooring, and roofing.

Users can either register as contractors or browse a secure list using the Become/Find a Contractor feature. RenoVision's goal is to serve as a community center that facilitates cooperation between homeowners and contractors, ensuring successful and precise home improvement projects.

User Testing Plan:

RenoVision

The following section outlines the user testing plan for the RenoVision application, a comprehensive tool designed for home renovation estimations. User testing is crucial for ensuring that the app is not only functional but also aligns with user expectations and needs. We have adopted a top-down approach in our testing strategy, focusing on major system components first, which allows us to efficiently identify and address core issues early in the development process.

The Importance of User Testing

User testing is pivotal in app development as it provides real-world feedback and insights into how the application performs outside the development environment. It helps identify usability issues, bugs, and other areas for improvement, ensuring that the final product is robust, user-friendly, and meets the market demands.

Testing Overview

Testing Period:

The testing phase is constrained by the semester timeline. We began testing roughly 6 weeks prior to the semester end and plan to continue to test and resolve any issues.

Methodology:

Given our time constraints and project scope, we've selected the Alpha Testing method over Beta Testing. This decision is based on the need for a focused and rapid

assessment of core functionalities, particularly given our limited resources and the technical nature of our app.

Alpha Testing

Objective:

To identify and fix major functional and usability issues within the RenoVision app.

Team:

Comprising the five of us who are developing the application, bringing diverse perspectives and expertise to the testing process.

Duration:

Split into two phases - the first three weeks will focus on critical functionalities like login processes and estimation calculations, while the remaining time will be dedicated to usability and performance testing.

Focus Areas and Methods

1. Authentication and User Registration:

- Functionality Checks:**

Validating the login, sign-up, and password recovery features.

2. Estimation Logic

- Accuracy Assessment:**

Verifying the precision of our painting, flooring, and roofing estimations.

- User Input Validation:**

Ensuring the app handles various input scenarios correctly.

3. Usability and Performance

- Interface Testing:**

Evaluating the app's layout, design, and navigational flow for user-friendliness.

- **Load Testing:**

Assessing app performance under different data and usage conditions.

- **Beta Testing**

We decided against conducting Beta Testing primarily due to our limited timeframe and resources.

Testing Results and Observations

- **Functionality:**

The RenoVision app performed well in core functional tests, particularly in the estimation calculations.

- **Usability:**

Initial feedback indicates a high level of ease of use, with intuitive navigation and clear instructions within the app. This suggests a strong appeal to our target audience of DIY enthusiasts and professional contractors.

- **Areas of Improvement:**

As of the time of this writing, there have been no issues with the application. That being said, we will continue to improve the usability, layout and design to keep improving on the RenoVision Application.

Post-Testing Phase

- **Data Analysis:**

We will thoroughly analyze the collected data to identify patterns and recurring issues.

- **Issue Resolution:**

Priority will be given to resolving any functional or usability issues uncovered.

- **Final Preparations:**

Refinements will be made based on testing insights to prepare the app for its final iteration before the semester's end.

The Alpha Testing phase for the RenoVision app is a critical step in our development process. By focusing on the key components of our app within a controlled environment, we have been able to quickly identify and address major issues. This approach ensures that we deliver a high-quality, user-friendly product that meets the needs of our target audience, thereby increasing the likelihood of its success in the market. The insights gained from this phase will be invaluable in guiding future enhancements and ensuring the long-term viability of the RenoVision app.