Reverse Recipe

Concepts & Early Prototypes

Shannon Farazi
Department of Electrical Engineering and Computer Science, Oregon State University
Corvallis, Oregon, United States
farazis@oregonstate.edu

Carter Fritsch
Department of Electrical Engineering and Computer Science, Oregon State University
Corvallis, Oregon, United States
fritschc@oregonstate.edu

Dylan Kieu
Department of Electrical Engineering and Computer Science, Oregon State University
Corvallis, Oregon, United States
kieud@oregonstate.edu

Yu Chuan Tey
Department of Electrical Engineering and Computer Science,
Oregon State University
Corvallis, Oregon, United States
teyy@oregonstate.edu

Michael Ton
Department of Electrical Engineering and Computer Science,
Oregon State University
Corvallis, Oregon, United States
tonm@oregonstate.edu

ABSTRACT

This paper examines one of the possible solutions to food sustainability--by decreasing food waste, we will in turn reduce our carbon footprint [2]. The primary target demographic are adult-age individuals who have busy daily work lives and family obligations. The proposed approach is a user-friendly application, *Reverse Recipe*, which attempts to empower users to be able to shop, cook, and organize the kitchen in a revolutionary way. We will examine several interface design concepts and a low fidelity storyboard interface prototype to bring our vision to life.

KEYWORDS

Usability; Recognition vs. recall; Error prevention; Discovery; Flexibility and aesthetics; Innovative

I. Introduction

Many people live busy lives and schedules, but in the midst of it all, these people must always find time to prepare food for either themselves or their families. Preparing a meal can sometimes be difficult and frustrating, especially when we are so focused on our everyday lives-- even with a fridge stocked with ingredients, it can still be a hassle to decide on a specific recipe for the whole family.

Often we find ourselves asking questions like: What can I cook? How many meals can I get out of these ingredients? How can I get creative and cook a fancy or authentic meal? Is it possible to cook a decent meal in a short amount of time? How can I recreate the dish I cooked last time that everyone loved? What meals can I cook because of the allergies someone within the family has? What are my vegan options because our daughter just declared out of the blue that she is going vegan?

This project will focus on providing busy users with intuitive, hassle-free tools to empower their home-cooking experience, which include but is not limited to: meal planning, recipe discovery, grocery list generation, and refrigerator/pantry inventory tracking. In addition, the program assists users with saving time, money, keeping their family members healthy by providing a method of dietary management and an overall better kitchen experience.

II. Problem Summary

The goal of our research project is to gain insight into the current experiences of busy individuals with preparing meals everyday. We plan to incorporate our analysis into a proposed solution for maximizing a family's finances, time and meal preparation[1]. User engagement is the key to

improving mundane household kitchen affairs and guiding users to positively affect their communities in the bigger picture.

According to the United States Environmental Protection Agency (EPA) the benefits of reducing wasted food is not only about saving money or supporting the community, but also helps reduce methane emissions while conserving energy and other resources[3]. To achieve such goals, the EPA recommends a few steps: shopping your refrigerator first, planning food menus before going shopping, being creative and etc [3].

The proposed app aims to help users achieve these goals through flexible and aesthetic design. In this paper, we will present and discuss several interface concepts which attempt to address ease of usability, innovative utilization of pattern recognition vs. recall, importance of error prevention and finally discoverability. Further, we will present an annotated low fidelity storyboard of a prototype for a multiplatform application and web service that we believe addresses the problems identified above.

III. INTERFACE CONCEPTS

We decided to present our project through two different concepts and let our conducted research demonstrate which design is preferred by users. The two concepts that are depicted in this paper provide users with the opportunity to compare and contrast, and report back on their opinions and preferences.

The first concept attempts to display options as buttons on any given screen, whereas the second concept attempts to utilize hamburger menus where users are provided with a list of options.

Concept #1 Workflow Design Narrative:

Upon opening the application, users are given options of registering or logging in. The “Register” button navigates new users to registration screen where they can create a new account. The “Login” button navigates returning users to the login screen, and the “Next” button takes users to “Home Page”.

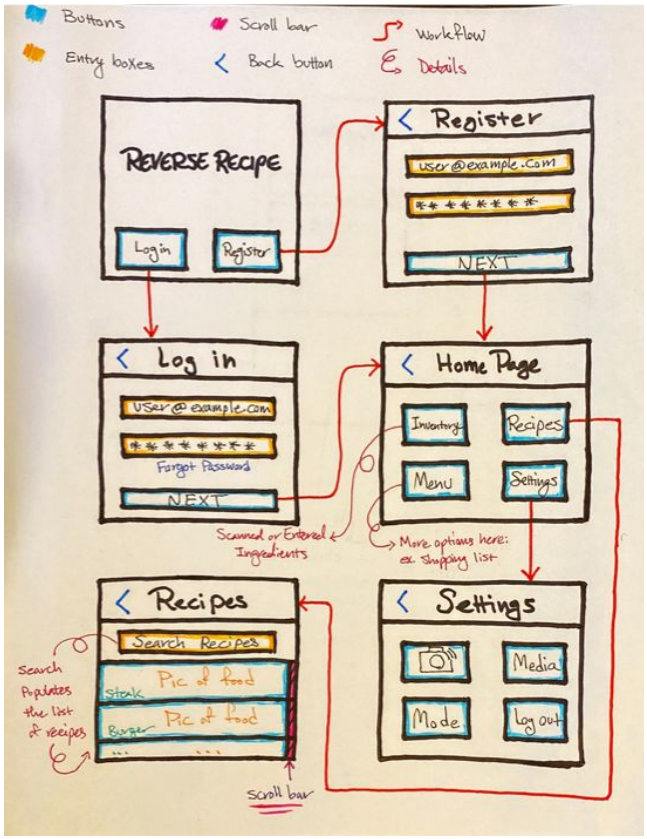

Figure 1: Reverse Recipe Concept #1

There, “Home Page” serves as the main screen for navigating users through the application. This screen consists of four navigation buttons: “Inventory”, where users can access the feature for scanning or manually entering their kitchen ingredients; “Menu”, where users access more options such as creating shopping lists and searching for available coupons; “Recipe”, where users can access saved recipes or search for recipes; and “Setting”, where users can adjust their application settings, preferences, and log out.

The “Recipes” screen depicts a “Search” entry box, which allows users to populate a list of recipes based on their chosen search criteria and scroll down to see their search results. Names and images of each recipe are displayed as buttons that will navigate users to instructions for preparing and cooking their chosen dish.

The “Settings” screen illustrates the extra features available to users in the form of buttons, such as “Camera”, “Media”, “Mode”, and “Logout”. “Camera” navigates users to the next screen to take pictures used for ingredient or recipe entry.

The “Media” button would navigate users to a screen giving them the ability to share their favorite recipes via their email

or upload. “Mode” navigates users to a screen where they can change the display between light mode and dark mode. ”Logout” allows users to log out of their accounts. The “Back” button is available on all screens, and returns users their previous screens.

In addition, it should be noted that the screens for “Inventory” and “Menu” are not provided so that Concept #1 and Concept #2 can be compared, regardless of the number of screens.

Concept #2 Workflow Design Narrative:

Hamburger menus (UI button for menus that typically appear as three stacked horizontal lines) are a common UI pattern. Upon opening the application, users are greeted by a welcome message. The first page contains no information and requires the user to navigate through separate menus via utilization of hamburger menu buttons.

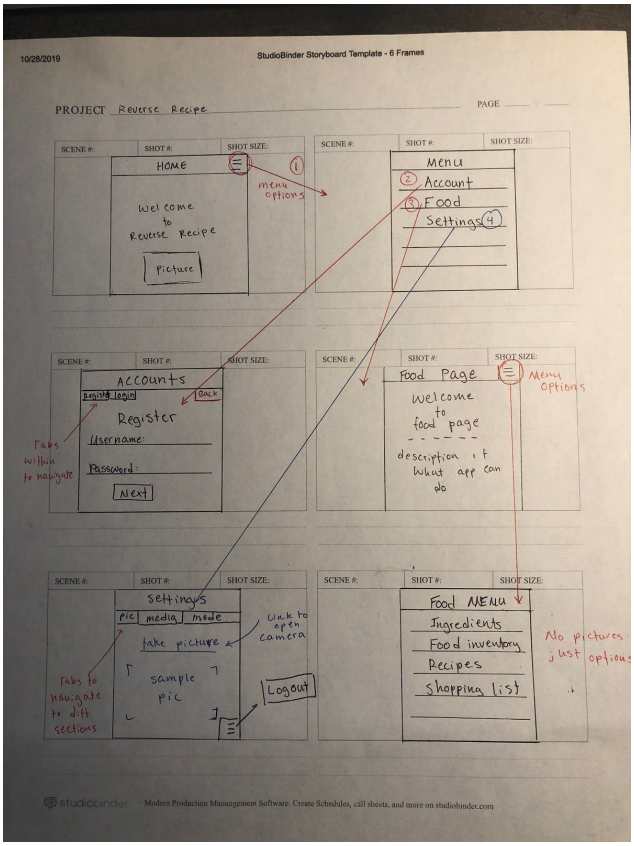

Figure 2: Reverse Recipe Concept #2

When the menu is expanded, it will provide three options: Account, Food and Settings. “Account” opens up a page for registration and login. “Food” opens up another menu describing what the food page is, what the application does, and has a hamburger button for further options.

Inside the hamburger menu are options to check the user’s inventory of ingredients. Users can also search for recipes or create a shopping list. “Settings” opens up a setting menu. The menu is split into tabs and users have to navigate each tab individually to access the features they need, such as options to add a picture to your account, share to social media and different theme settings.

IV. Revised Prototype for Concept #1

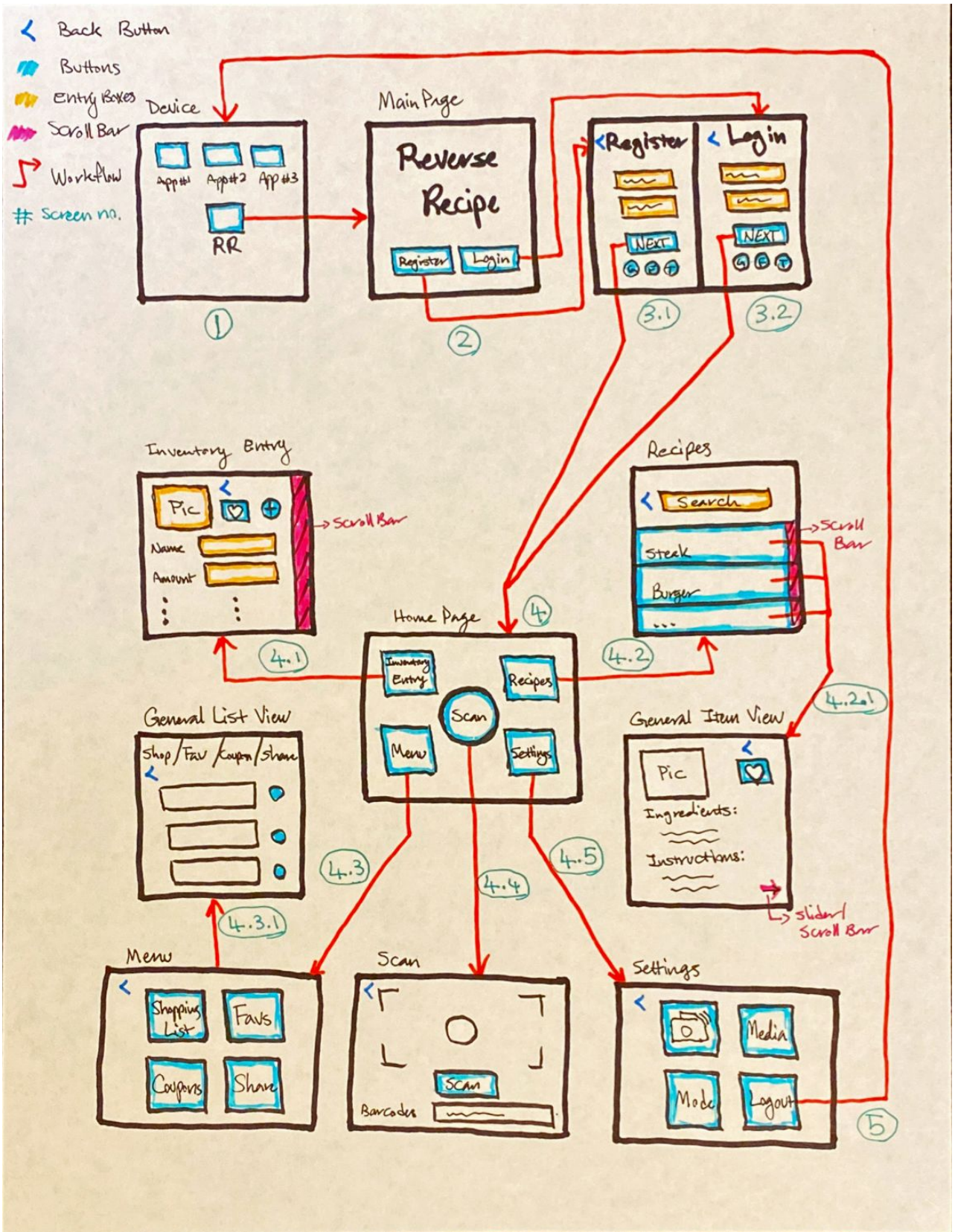
Back Button
Buttons
Entry Boxes
Scroll Bar
Workflow
Screen no.
Device
App#1
App#2
App#3
RR
1
Main Page
Reverse Recipe
Register
Login
2
Register
Login
NEXT
NEXT
3.1
3.2
Inventory Entry
Pic
Name
Amount
Scroll Bar
4.1
Recipes
Search
Steak
Burger
...
Scroll Bar
4.2
4
Home Page
Inventory Entry
Recipes
Scan
Menu
Settings
4.2.1
General List View
Shop/Fav/Coupon/Share
4.3
4.4
4.5
General Item View
Pic
Ingredients:
Instructions:
slider/ Scroll Bar
4.3.1
Menu
Shopping List
Favs
Coupons
Share
Scan
Scan
Barcodes
Settings
Media
Mode
Logout
5

Figure 3: Revised Prototype for Concept #1

Research on our target demographic led to the conclusion that prototype concept #1 was better suited for the application. The initial prototype was revised to address issues and challenges that were discovered. The legend on the top-left corner of the **Figure 3** describes the color coding used in the revised prototype for Concept #1.

Screen 1 (Device):

- The user opens the Reverse Recipe application on the home screen of their mobile device by pressing the Reverse Recipe icon labeled “RR”..

Screen 2 (Main Page):

- A new user chooses “Register” button to access the “Register” screen to create an account..
- Alternatively, a returning user chooses “Login” to be navigated to “Login” screen to input their credentials.

Screen 3.1 (Register)/3.2 (Login):

- User will enter their email and password, or utilize the provided buttons for other login credential options such as Gmail, Facebook, etc., On both screens, the user chooses “Next” button to proceed.

Screen 4 (Home Page):

- User can select any of the buttons on this screen: Inventory Entry, Recipes, Menu, Scan or Settings to proceed to a new screen.

Screen 4.1 (Inventory Entry):

- User enters their ingredients, generating a new entry by choosing “+” button. User may use the “Heart” button to designate an ingredient as a favorite.

Screen 4.2 (Recipes):

- User searches and accesses recipes.
- **Screen 4.2.1 (General Item View):** A depiction of what the user can see when viewing a recipe, including images, ingredients, and methods for preparation and cooking.

Screen 4.3 (Menu):

- User explores additional options such as generating a shopping list based on their favorite recipes and ingredients used. User can also view available coupons, and look through their saved recipes and ingredients. User also has the option to upload their account onto a smart refrigerator and/or email.
- **Screen 4.3.1 (General List View)**: A depiction of what the user can see when exploring through the options available in “Menu”. Each option is displayed in a list format that the user may edit.

Screen 4.4 (Scan):

- The user can scan their inventory for entry. Barcodes will automatically populate as user scans items, and the results are logged in the database.

Screen 4.5 (Settings):

- The user can customize their account on this screen, such as taking pictures to add to their recipes for entry or profile pictures. An option to share information such as favorite recipes, ingredients, or pictures to their linked social media accounts are also available. The user may switch between Dark or Light mode settings for the application based on their preferences. The user may choose to log out of their account from this screen.

V. Prototype Storyboard Concept #1

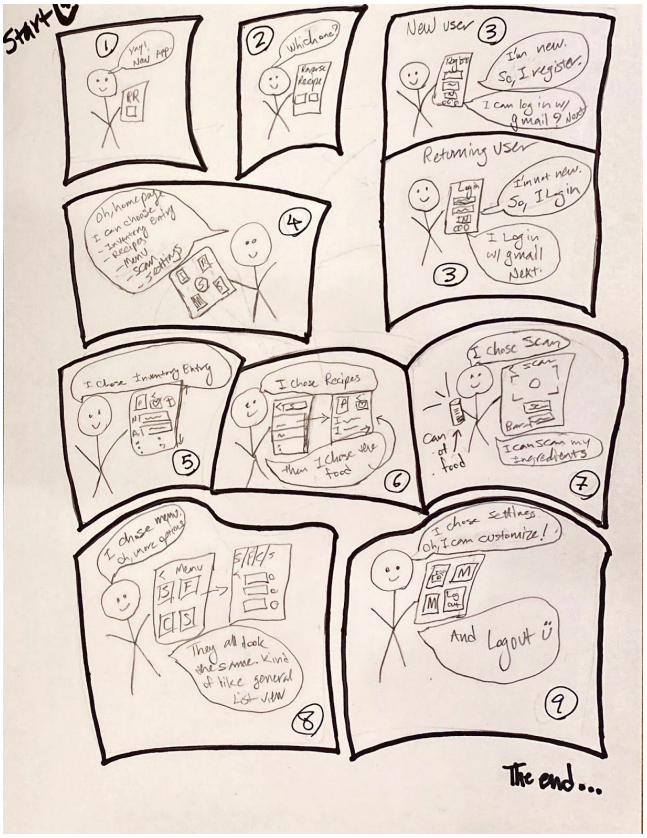

Figure 4: Storyboard for Concept #1

Please refer to **Figure 4** for an annotated storyboard of our interface design. A larger resolution image of the storyboard is attached at the end of this paper. The reasoning behind them our storyboard will be discussed in the next section.

VI. Concept Discussion & Justifications

In designing our concepts and prototypes, we kept our primary goals of convenience, efficiency, and accessibility in mind. Researching our target demographic found that users felt they preferred buttons that were both easy to find and click (****Michael Q11**) [5]. Accordingly, the application's design includes larger buttons and text in order to create a simple navigation experience. Adequate amounts of white-space were also determined to be important for reducing clutter, thus making the interface more visually appealing. These two design choices aim to create a pleasant aesthetic experience that users can become familiar with, potentially encouraging long-term usage of the application as users prefer tools that are comfortable and familiar (****Michael Q11**) [5].

Because the application involves information pertinent to each user, such as their favorite recipes, it was determined that the first screen upon start-up should prompt the user to log in to their account, or register if they do not have one. Peer reviews support the notion that account registration should an option upon start-up for new users (****Lukas Johnson**) [5].

To support this interest, an additional option we have explored is allowing users to log in using popular third-party services, such as Google or Facebook. This would help accomplish two goals: first, it falls in line with the UI Heuristic of Minimalism [4] - why force users make a new account if they can use one they already have?; second, it would set up the potential for future integration with other relevant services such as shopping lists already maintained by Google Keep and Google Assistant.

The home screen features a few key buttons that allow users to quickly access the features that will often be used, rather than requiring them to navigate through multiple screens to reach them. Since the application focuses on ingredients and recipes, the screen includes "Inventory" and "Recipe" buttons to take the user to those features quickly. Some individuals have found themselves searching for a recipe again for needed ingredients when shopping if they were not familiar with it (****Shannon, Yu Chuan, Michael Q8**) [5], making access to saved recipes a priority.

While the primary workflow of the app was intended to be built around scanning in your inventory first, then generating relevant recipes second, a concern raised in research was that for most users, their natural starting point is often the other way around: searching for interesting recipes first, and planning shopping around these recipes afterwards. (****Carter Interview**) [5] Accordingly, it was decided that giving the app's two primary functionalities equal status from the home page would allow users to pick the workflow that works best for them, while still maintaining continuity and clear focus on the app's intended purpose: preventing food waste.

The "Menu" button bundles other important features that may not necessarily be a priority for all users, such as searching for coupons and creating shopping lists. For example, it was found that not all users make use of shopping lists (****Michael, Dylan Q5**) [5], but those who do tend to consistently rely on it (****Yu Chuan, Shannon Q5**) [5]. Furthermore, some users have already developed strong ties to one of many existing shopping list apps, and their usage of this app's core functions need not be complicated based on other tools they might already have implemented. (****Carter Interview**) [5]. Thus, these features are accessible with an extra click to the "Menu" screen so it remains fast, but not necessarily in the way of users who do

not care for the feature, or those who mainly focus on ingredients and recipes.

Peer reviews brought attention to the need to consider users who are color-blind. It was found that the colors chosen for concept #1 were beneficial to color-blind users as it avoided color combinations that are commonly problematic, such as red-green. (****Kevin Dong**) [5]. Thus, the original color scheme has remained and will be kept in consideration moving forward for improved accessibility.

It was initially planned for users to access their camera via the "Inventory" option, or navigating to the settings and using a camera option there. A peer review (****Lukas Johnson**) [5] determined that a highlighted feature like the scanning tool must be more prominent and accessible, prompting an adjustment to add a button to access the camera on the home screen. This will help keep the design in alignment with our goals, as users can open the camera and then choose what the image is for, such as ingredient or completed recipe entry, sending them to the necessary screen afterwards.

In general, a consistent theme of found in the conducted research and feedback was the emphasis of a minimalistic approach. As cooking and shopping are often a consistent part of any given user's routine (****Carter Interview**) [5], and either frequently incorporates pre-existing technology or none at all (****Dylan Interview**) [5], it is ideal for the workflow of Reverse Recipe to remain uncluttered and refrain from inhibiting the user in any way to ensure its core functionalities provide their greatest potential utility in improving a user's meal preparation process, while simultaneously reducing food waste.

VII. Conclusion

A main focus of our application is to create a convenient tool for our consumers to utilize in order to reduce the amount of time and/or effort required to plan, shop and cook a meal – a common task in each household.

Our primary target demographic are adult-age individuals who lack free time due to work and family obligations. Innovative features such as utilization of smartphone scanning, reverse recipe creation from fridge and pantry ingredients, customization options and ease of creating accurate inventory, favorite designation and automated shopping list creation are key components that sets our proposed app apart from other existing food organizer apps. Thus, our project aims to create a quick and convenient experience in the kitchen in order to potentially reduce stress, save money, increase the time available for other activities, and potentially reduce food waste.

ACKNOWLEDGMENTS

Shannon Farazi, Carter Fritsch, Dylan Kieu, Yu Chuan Tey, and Michael Ton, "Project 5", pp 1-9, unpublished.

REFERENCES

[1] Anon. 2019. Food Waste. (September 2019). https://www.hsph.harvard.edu/nutritionsource/sustainability/food-waste/

[2] Anon. 2018. Reducing Wasted Food At Home. (August 2018). https://www.epa.gov/recycle/reducing-wasted-food-home

[3] Washington State recycling Association (WSRA).Admin. Reducing Food Waste Basics. https://www.wsra.net/reduce-food-waste

[4] Jakob Nielsen. 1994. 10 Heuristics for User Interface Design. (April 1994) https://www.nngroup.com/articles/ten-usability-heuristics/

[5] Intro To Usability Engineering CS_352_400_F2019. W5 - Design Gallery #1 https://oregonstate.instructure.com/courses/1738960/discussion_topics/8598265

Design Concept #1:

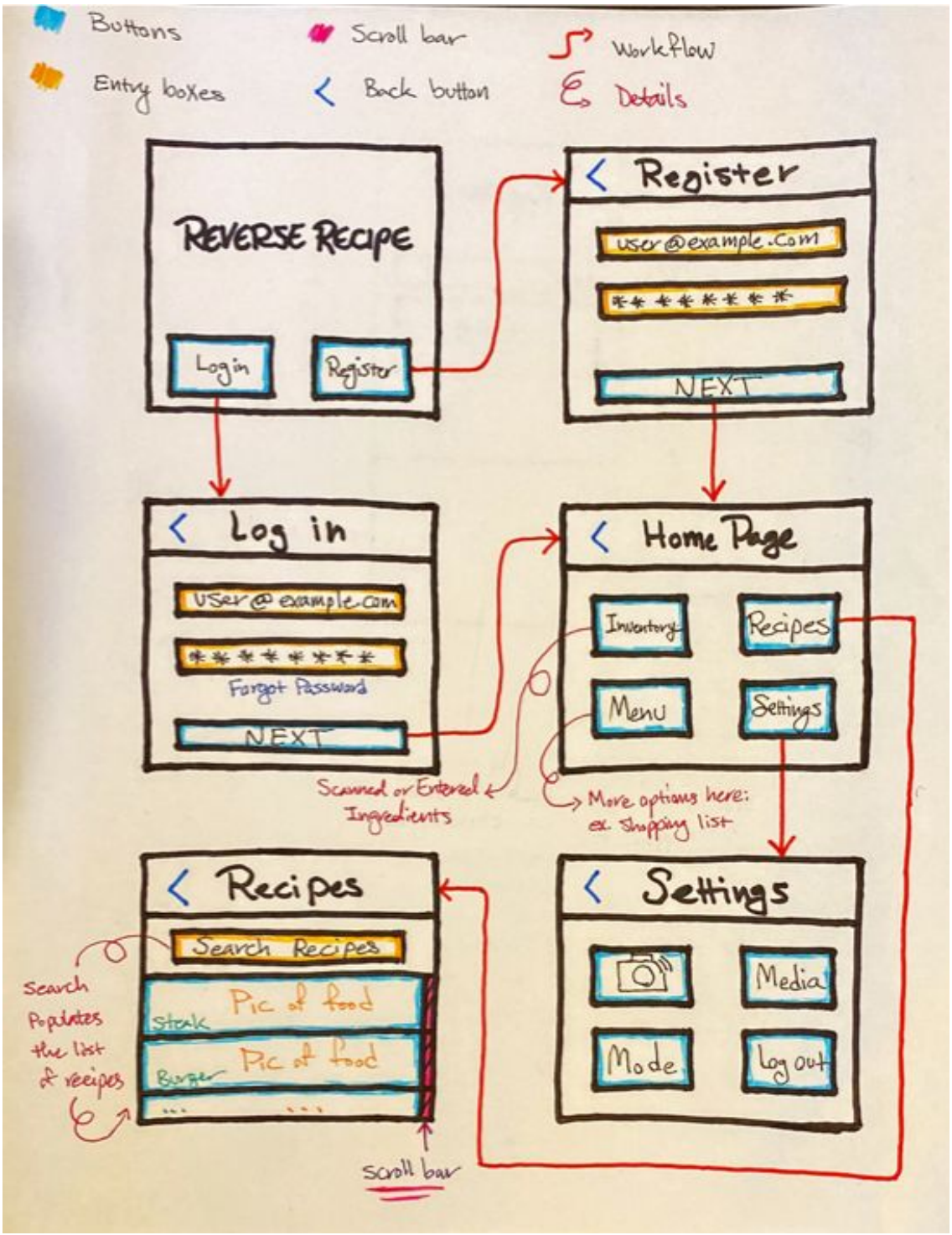

Figure 1: Reverse Recipe Concept # 1

Design Concept #2

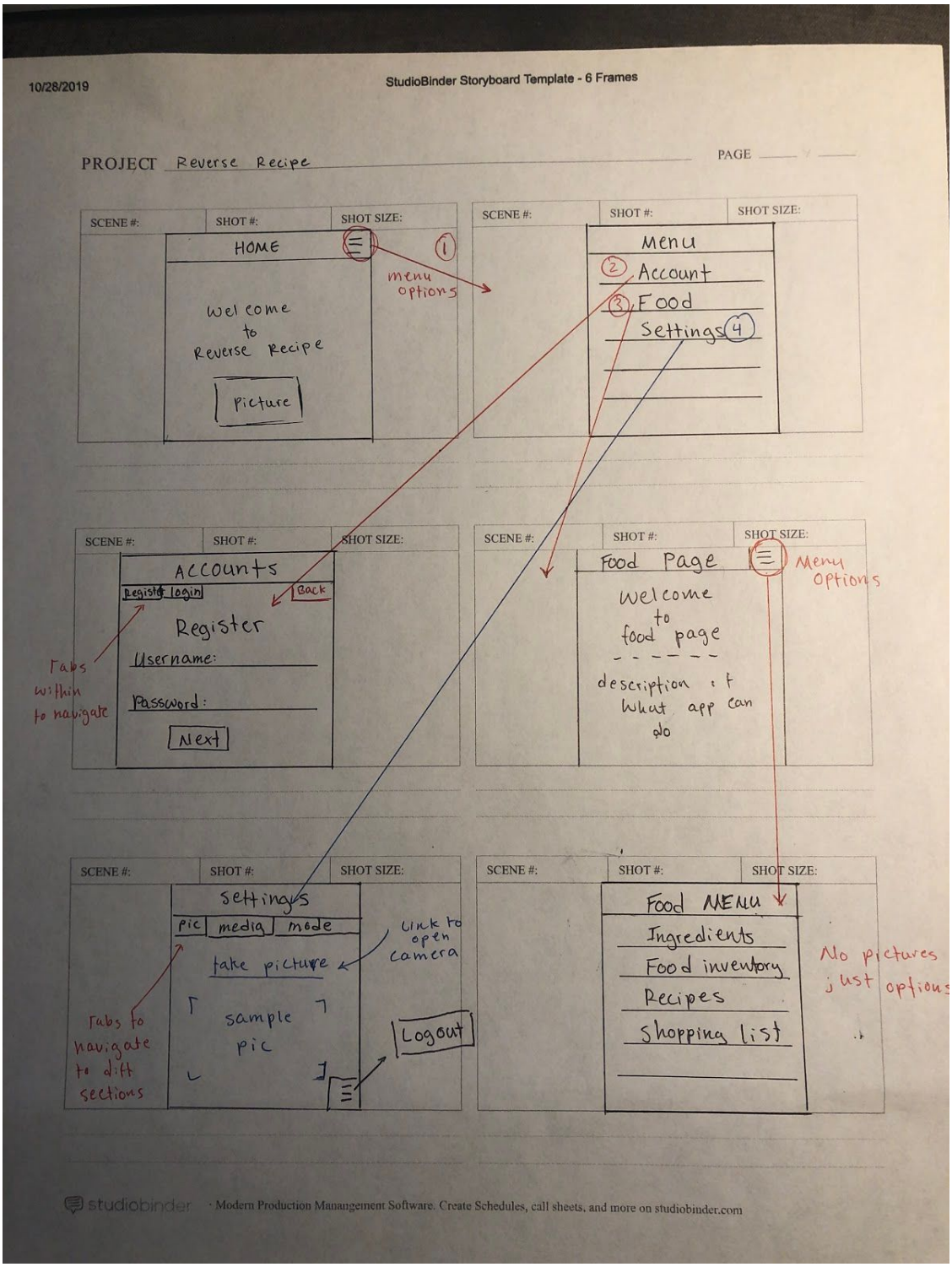

Figure 2: Reverse Recipe Concept # 2

Revised Prototype for Concept #1

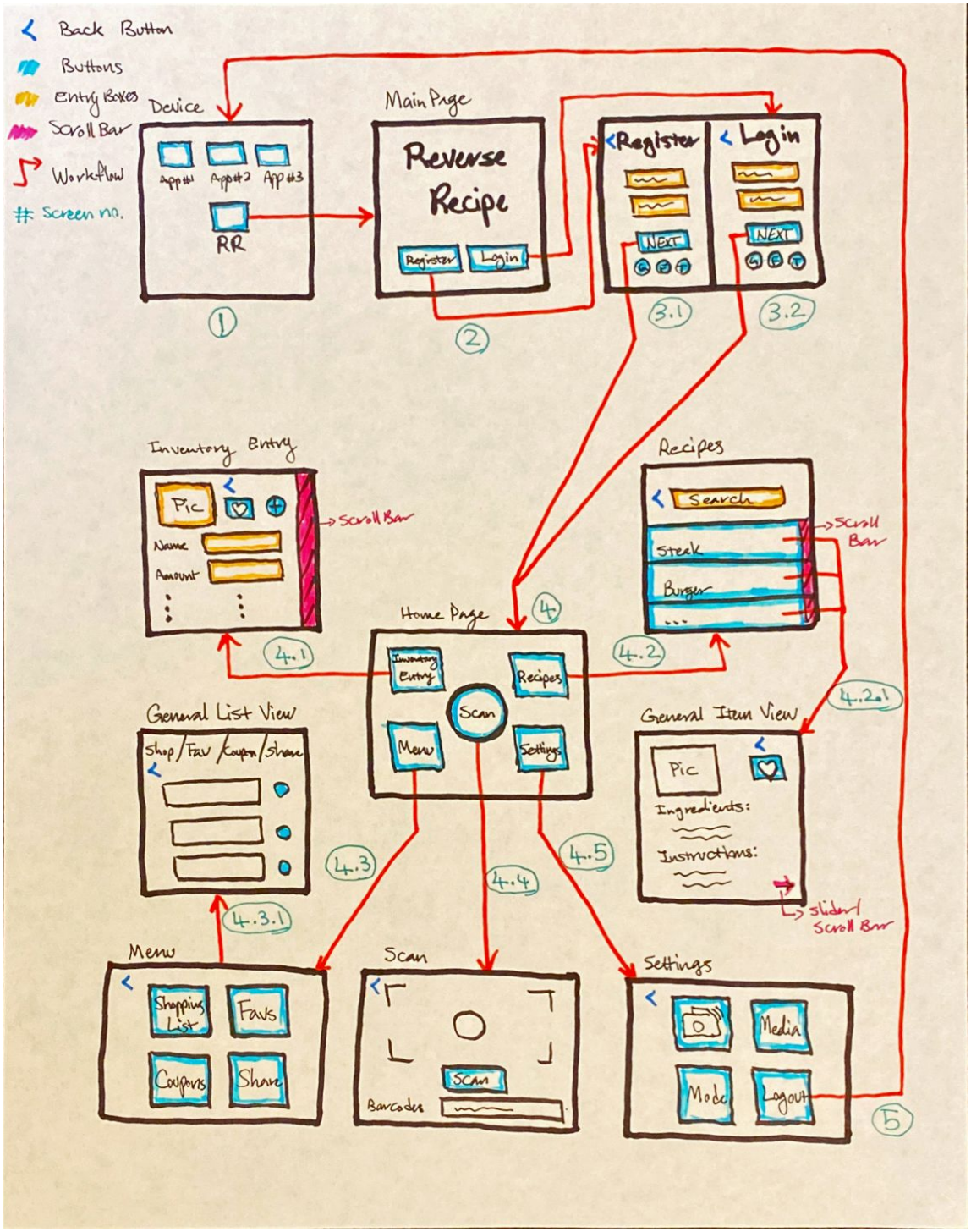

Figure 3: Revised Prototype for Concept # 1

Storyboard Prototype for Concept #1:

Figure 4: Storyboard for Concept #1

Peer-Evaluation of Team Members:

Table 1: Group members, Assigned Tasks, and Task Completeness Grade

Group Member name	Role	Responsibilities and Assigned tasks	Tasks Completeness Grade* 0-5
Shannon Farazi	Leader	● Managing the meetings ● Gallery Design ● Intro, Problem Summary, IC, Prototype Storyboard ● Helping on writing the document	5
Carter Fritsch	Collaborator	● Discussion ● Helping on writing the document	5
Dylan Kieu	Collaborator	● Gallery Design ● Helping on writing the document	5
Yu Chuan Tey	Collaborator	● Conclusion ● Helping on writing the document	5
Michael Ton	Collaborator	● Discussion ● Helping on writing the document	5