SourceAmerica Design Challenge 2018-2019

# RecipEasy: A Hands-Free Recipe Helping Mobile Application

Video Link: https://www.youtube.com/watch?v=knWadJPkdaM

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**Abstract**

*That's a Wrap Deli* (hereinafter referred to as TAW) is a nonprofit 501(c)(3) organization in Darnestown, Maryland that employs people with disabilities. Their employees love to cook, but are unable to do so independently at all times as a result of certain cognitive and developmental disabilities. Working with TAW's manager Arnel Cervantes, we have constructed a mobile application entitled "RecipEasy" for the employees at TAW which will enable them to work through each recipe more easily, more accurately, and, most importantly, more independently. Our mobile application will be used in the kitchen at TAW in the area of work of Stephen Cowan — a cook at TAW and our Subject Matter Expert (SME) — as well as his coworker Brenton Bryan, who both make salads and wraps at TAW.

The application consists of a set of hands-free, camera-activated, step-by-step recipe instructions which will help Stephen execute each recipe independently with ease, speed, and accuracy. These instructions consist of each salad and wrap recipe offered at TAW along with their ingredients, with one step per screen and one Graphics Interchange Format (GIF) and descriptive caption per step. The screen is advanced by holding up a spatula, which the camera can detect.

Testing has shown that RecipEasy has cut in half the amount of assistance Stephen needs while cooking, therefore increasing his level of independence. RecipEasy has also been able to accomplish our secondary goals of improving Stephen's accuracy, ease, and confidence throughout a typical workday.

If later altered to be implemented on a broader level, RecipEasy will be able to provide aspiring cooks and kitchen employees who have cognitive and developmental disabilities across the world with an amazing opportunity to easily fulfill their dream, and to do so without dependence on their coworkers or job coaches. In the future, the app could even be reprogrammed to allow for customization, so that users could input their own recipes and choose their own most convenient object for camera detection. This could extend RecipEasy to be applicable to any person who enjoys cooking at home and could use a reliable hands-free recipe guide.

**Statement of Problem**

Employees at TAW, including our SME Stephen Cowan, are occasionally unable to execute certain recipes independently and therefore require the assistance of either job coaches, the manager, or the assistant manager at times during their workday. In some situations, this may be the result of either losing track of certain steps and ingredients in a recipe, losing count of certain food items, or being unable to make replacements on the spot during ingredient shortages. These problems are especially prevalent when Stephen or other employees are working with an unfamiliar recipe.

**Background**

Disabilities

TAW employs people who have developmental disabilities and provides them with a variety of opportunities within their workplace. Developmental disabilities are usually lifelong disabilities that involve impairment in physical, behavioral, language or learning areas. Examples of these disabilities include, but are not limited to, autism, behavior disorders, cerebral palsy, and Down syndrome. These differing abilities vary from person to person, and each person is impacted differently. People with developmental disabilities are able to live happy and healthy lives, and do what they love, like the employees at TAW. Efforts such as the ones we are taking to create this mobile application for Stephen are meant to provide people who have disabilities with broader opportunities to complete enjoyable, challenging, and necessary tasks that they may otherwise not view as simple or accessible to them.

Patents

There are numerous patents tagged as recipe helpers, but none are used to specifically help kitchen workers recall specific recipes with step by step instructions that clarify and keep track of the the process in a hands-free manner. Our product is innovative and unique due to its upgradability and customization, as well as the camera-activated methodology designed specially to allow for the advancement steps of a recipe without having to unnecessarily remove gloves to operate the application. After extensive research, even the patents for products most similar to ours do not seem to infringe upon the design and functionality of our app.

The first of these patents includes patent US20110167100A1, a mobile application that assists cooks by displaying recipes from various different cookbooks found on the internet. This feature is set up through a website — something that our application does not involve — whose information is then redistributed throughout the application. Though this application, like ours, incorporates personalized visuals to assist the cook, its purpose is not centered around the cooks' effort to learn and retain the steps of each recipe, and does not do so in the structure or the hands-free manner that our application does it.

The second similar patented device is patent US20150290795A1, for a program that gives specific directions for executing recipes. This program, however, is an algorithm specifically designed to help robots cook in a kitchen, and therefore takes the human effort out of the picture. On the other hand, our application is built so that it assists the chef and guides them through existing problems, instead of replacing them and doing their job on their behalf.

A third similar patented device we researched was patent CN103454929A, which included both a program and a device. The software component of this product is a recipe generator with which

users can create recipes and share them with others. The device also utilizes a variety of sensors that enable the cook to prepare the food for best quality, which is a main feature for this product that our application lacks the use of.

Overall, our device does not infringe upon any known patented devices, and would be very helpful due to its current need in the market and workplace. Because our device is specifically used to help aid chefs in small and large restaurants, and has a useful hands-free mechanism, it is expandable yet also unique, innovative, and truly helpful in a new light in its own sector of the cooking application market.

**Rationale**

Our reasons for creating this application are to increase the levels of independence for cooks like Stephen and their ability to learn, practice, and execute new recipes in a more efficient and enjoyable manner. Our creation of this application is also intended to help other workers at TAW, and potentially other cooks with disabilities, increase their levels of independence as well, thanks to its customizable and widely accessible nature. Our methods for constructing this application and all its specific features — from hands-free assistance to the variety of efficient methods of keeping track of all necessary information — were chosen very thoughtfully to be as helpful as possible. Our application, the way it has been designed, should successfully address the necessity of decreasing frustration in the workplace as well as enjoyability, efficiency, and reduction of time and effort for employees everywhere who could use this new, user-friendly form of assistance as much as Stephen at TAW could.

We found it best to create a mobile application due to its simplicity. The nature of the kitchen environment makes it difficult to have to interact with physical hands-on devices, and the busy kitchen at TAW doesn't leave much room for easily accessible and upgradable visual aids. After agreeing upon the necessity for a hands-free software, we decided upon an iPad capable of camera detection, along with an adjustable tablet holder. We chose camera detection over the alternative of audio detection due to the better reliability of camera detection, as well as the occasional noisiness in the kitchen.

**Development**

Swift 4 Xcode 10 is the software we used to code and run this application. Being new to this software, we occasionally sought and utilized assistance from experts for minor coding details. Xcode 10 provides a screen with a visual map/storyboard of the app's screens as well as a separate screen for coding. The ratio of time spent coding versus using the map was split about 30 percent to 70 percent, respectively.

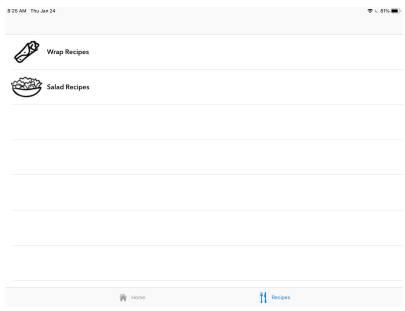
Each singular screen on the app is called a ViewController, of which RecipEasy for TAW has 4 main types: the home screen, the screen with a list of food categories, the screens with the list of food items within each category, and one screen per recipe. Each recipe cycles through a loop of GIF files, starting from the ingredients picture, then going through each step in the recipe, and ending with a picture of the final recipe. Each of these steps have their own captions.

The screen must be physically touched all the way from the homescreen to the beginning of each recipe, but after the recipe's ingredients show up on the ViewController, the rest is hands-free. Progression of the steps of a recipe is controlled by the camera, which detects when the user holds up a spatula (which has been programmed to signify going forward). The purpose of holding up a spatula that can be camera detected is due to the option for cooks to not have to remove gloves and press the screen while at the same time cooking. (The original plan was to detect a thumbs up and thumbs down, though the finickiness of the camera detection feature of our app prevents hand gestures from being detected.) At the last step of the recipe, going forward will send the app back to the screen with the list of recipes in the category that the cook was just in. To click on the next recipe, the cook must use their hands, though this isn't an issue because gloves are replaced between each recipe anyway.

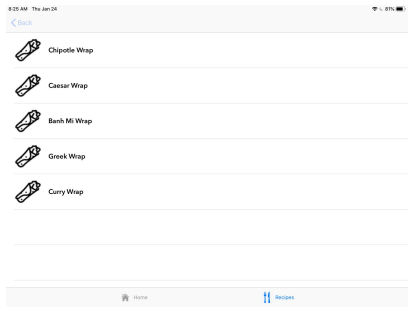
**Final Design**

**Home Screen**

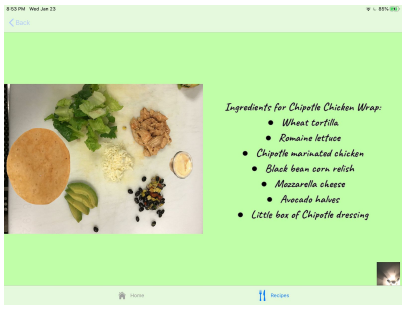

**Categories**



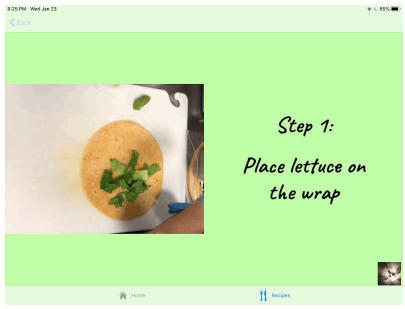

**Wraps List**



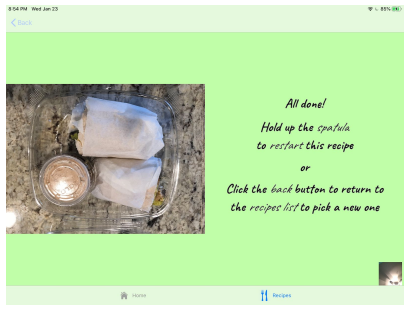

**Ingredients**

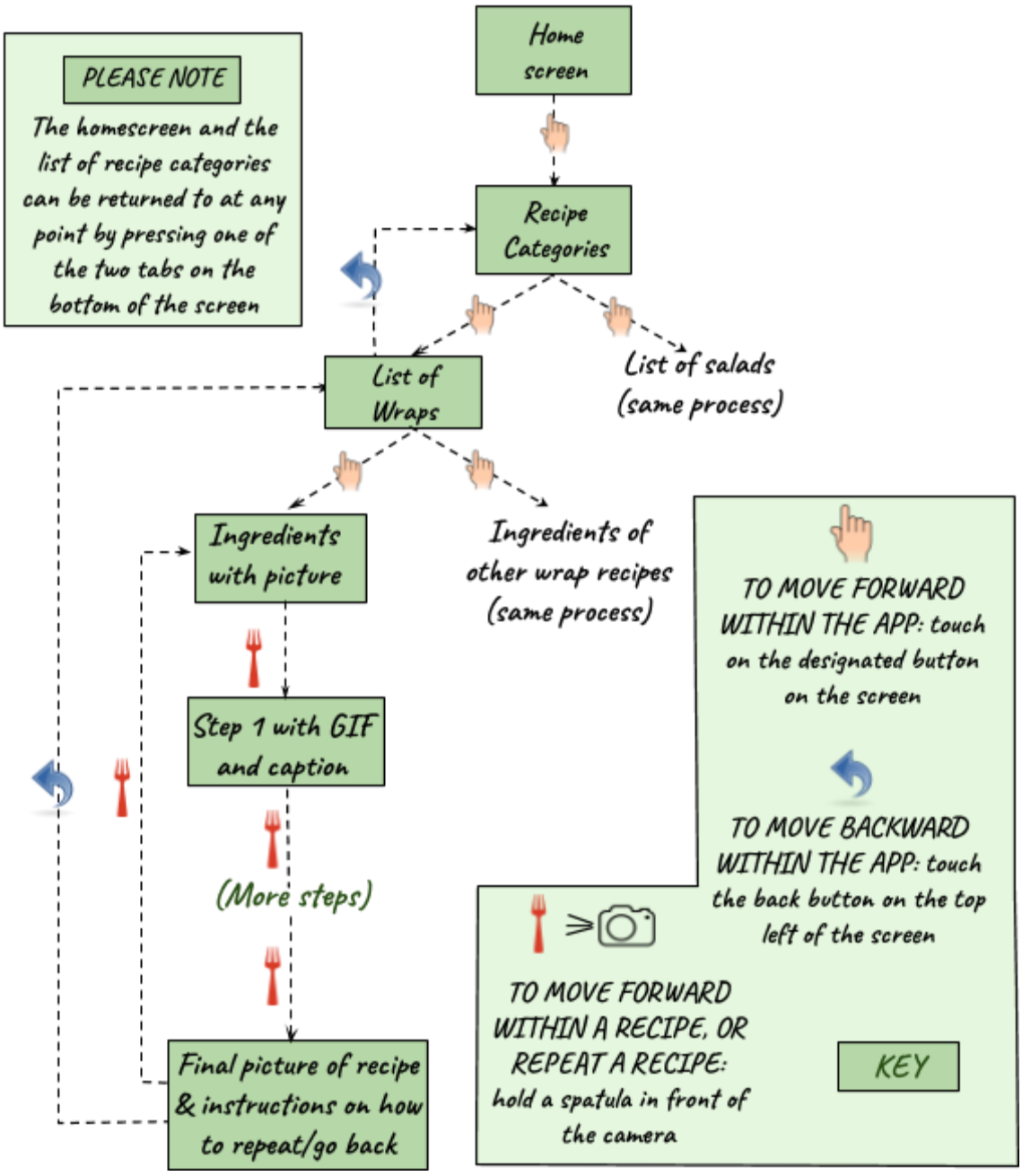



**First Step**




**Final Step**






**Cost Analysis**

1. iPad, or any device that can run iOS 12 - $0.00 (previously owned by NPO - may vary)
2. Gooseneck tablet holder - $35.00 (may vary with preference)
3. Swift 4 XCode 10 software (not required to download the app) - $0.00

4. Spatula - $9.21 (May vary with preference, though the range/ability of camera detection is limited)

Total Cost of RecipEasy: $44.21

**Testing Procedure**

The application's main purpose is to increase the employees' independence while cooking. Therefore we primarily observed and recorded the amount of times that assistance is needed both before and after the application is introduced to the workplace.

To further test the efficacy of the app as a whole, we will also observe the change in the time taken to complete a recipe, the amount of mistakes made, and the level of ease felt by Stephen, our SME.

**Results**

Note: Values with boxes shaded red (or with a star next to the value) indicate that the result was better before using the app. The rest of the values are shaded green, indicating an improvement or no change after the app was introduced.

| Food Item | Measure of Efficacy | Before RecipEasy | After RecipEasy |
|---|---|---|---|
| **Chicken Caesar Wrap** | **# Times Assistance Needed** | 2 | 0 |
| | **Time (min)** | 4:00 | 2:52 |
| | **# Mistakes** | 1 | 0 |
| | **Level of Ease (1-10)** | 8 | 10 |
| **Chicken Banh Mi Wrap** | **# Times Assistance Needed** | 1 | 1 |
| | **Time (min)** | 1:39 | 2:48* |
| | **# Mistakes** | 0 | 0 |
| | **Level of Ease (1-10)** | 10 | 10 |
| **Caesar Salad** | **# Times Assistance Needed** | 0 | 0 |
| | **Time (min)** | 1:28 | 2:01* |
| | **# Mistakes** | 0 | 0 |

| | | | |
|---|---|---|---|
| | **Level of Ease (1-10)** | 10 | 10 |
| **Mango Quinoa Salad** | **# Times Assistance Needed** | 3 | 2 |
| | **Time (min)** | 3:10 | 3:11* |
| | **# Mistakes** | 0 | 0 |
| | **Level of Ease (1-10)** | 10 | 10 |

| **Average Improvements** | | | |
|---|---|---|---|
| **Measure of Efficacy** | **Before RecipEasy** | **After RecipEasy** | **Overall Change** |
| **# Times Assistance Needed** | 1.5 | 0.75 | -0.75 |
| **Time (min)** | 2:35 | 2:43 | +0:08* |
| **# Mistakes** | 0.25 | 0 | -0.25 |
| **Level of Ease (1-10)** | 9.5 | 10 | +0.5 |

**Community Impact**

We have been able to build a strong, friendly relationship with Stephen and Arnel throughout our many meetings. At every meeting we've been able to not just observe, but to talk to Stephen and understand his personality and interests, and use this to improve and personalize our app for him and for people who face problems in the cooking environment similar to those that he does. We've been able to discuss with both Stephen and Arnel every aspect of the app that we believed would benefit from their input. We have received their input on the design, including the app icon, color scheme, and background of the homescreen; we have also received input on the functionality, including discussing different methods of hands-free app control, screen layouts, and choosing necessary components.

We are extremely glad to have been able to bring Stephen some excitement in the workplace, now that he has the opportunity to be more independent, confident, and passionate when it comes to cooking. Arnel has also assured that there is more excitement at TAW after introducing an iPad into their workplace. We enjoy going to TAW and seeing the smiles we are able to bring as we talk to the cashier while we wait for food, meet customers as they walk in, talk to Arnel about

our hopes and goals, talk to Stephen and Brenton about their work, play basketball with Stephen, and hear him sing/rap.

**Conclusion**

Our data has shown that Stephen is able to cook with twice as much independence after using RecipEasy. As a bonus, using our app has helped Stephen improve his accuracy, and maximize his sense of ease, making sure that he feels as fulfilled and comfortable with his work as possible. We expect that Stephen's overall time and independence will continue to improve as he uses RecipEasy over an extended period of time, and, given the chance to expand it to apply to more restaurants and kitchens, we can hopefully see these positive results for more employees just like him.

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**Acknowledgements**

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Noah Zolt - Videographer

Stephen Cowan - Employee at TAW, Subject Matter Expert