

FarmerAid

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Repo: <https://github.com/adshayanB/ECE452>

What is your project?

FarmerAid is a mobile application engineered to transform inventory management for farmers. It offers an effective solution by integrating speech to text technology, providing a user-friendly platform that enables the simplification of processing, updating and tracking inventory. The application has an extensive range of features tailored to different farming scenarios. The first is home mode, which allows farmers to create and manage data related to their inventory, including market allocation and distribution. The second core mode is farm mode, in which farmers can update their inventory using voice commands through the app. This allows them to work efficiently even without steady network access, with data syncing to a central database once they can connect to a network. Market mode is the third mode which assists in the tracking of sales, revenue and other market activities. This mode provides farmers with valuable insights about their business performance. Finally, there is charity mode, which promotes community engagement, allowing farmers to identify local community fridges in need of their excess produce. This mode promotes sustainable practices and allows farmers to reduce their food waste. FarmerAid's extensive approach, flawless integration of speech to text technology, and focus on empowering farmers through technology enable it to be a potential revolutionary solution for farmers and the agricultural industry.

Why is it interesting?

This project is interesting as it brings a solution to a problem that is faced by many farmers. FarmerAid addresses the challenges faced by farmers in inventory management. By utilizing speech to text technology, it offers a unique and practical solution that enables the simplification of data entry as well as simplifies workflows. The addition of market and charity mode further adds to its utility by promoting community collaboration and eco-friendly practices. This comprehensive solution utilizes state of the art technology to solve the needs of individuals in the agricultural sector, making it a fulfilling and fun project from a technical perspective. This project is also interesting due to the fact it has the potential to significantly improve productivity for farmers, optimize inventory management processes and foster collaboration between farmers and members of their community. Overall, FarmerAid is a project that can revolutionize the way farmers choose to manage inventory, make accurate decisions and allow them to contribute to a more sustainable way of living. FarmerAid's focus on user-friendly interfaces ensures accessibility for farmers from varying technological backgrounds, maximizing its potential impact!

Describe and justify your project selection.

We selected this project to provide farmers with an efficient and effective solution to manage inventory and streamline their operations. This project holds great utility as it supports and enhances the productivity of farmers while benefiting the community as a whole. In addition, we are utilizing an innovative solution by leveraging speech to text technology, eliminating the need for extensive typing. The integration of market and charity mode promotes community engagement and collaboration. Such an impact on the community makes us excited to develop such a tool as we are promoting collaboration within the community to create a better environment for everyone!

Why does this project make sense in a mobile form factor?

FarmerAid makes sense in a mobile form factor due to its ability to provide farmers with portability, accessibility and seamless integration into their workflow. FarmerAid's speech to text service removes the need for extensive typing, enabling farmers to seamlessly update their inventory while on the field with just their phone. Real-time data synchronization ensures that farmers can access and modify inventory information even in areas with limited network access. Through a simple user-friendly interface and just a mobile phone, farmers can efficiently manage inventory anywhere, make accurate decisions and enhance productivity. FarmerAid's mobile form factor enables real time updates, enabling farmers to stay connected and streamline their operations on and off the field.

What are the functional properties of your system? Numbered point form is fine (e.g., 1, 1.1, 1.2).

1.1 - Authentication

- 1.1.1 - The user can signup or login to the app using their email, name, and phone number.
- 1.1.2 - The user can create a farm and they would be assigned as the farm's admin.
- 1.1.3 - The user can join a farm by inputting a 4-digit farm code created by a farm admin.

1.2 - Farm Setup

- 1.2.1 - The farm admin can create a farm by inputting details about the farm. A unique 4-digit farm code will be provided for the farm admin to share with other farmers using the app. Farmers can join the farm using the farm code.

1.3 - Home Mode

- 1.3.1 - The farm admin can define details for the specific produce that will be grown in the farm. For each produce that they add, the following details must be filled:
 - a) Name of produce
 - b) An initial amount of the produce that you currently have
 - c) A list of markets that this produce will be sold to
 - d) Price of produce for each market
- 1.3.2 - Under every defined produce, the farm admin can set quotas for each market that must be met. They can set how many of said produce they must sell over a specified period of time. Each quota can be set to recurring.
- 1.3.3 - Any user in the farm can see a list of all the quotas to meet and their inventory.

1.3 - Farm Mode

- 1.3.1 - Update inventory with yield gained from harvest using speech-to-text. After analyzing speech, the app confirms if it interpreted the speech correctly before proceeding with the update.
- 1.3.2 - Provide ability to manually enter fields to update or adjust yields stored during session.
- 1.3.3 - Should work offline so that farmers don't need access to the internet when harvesting. The app temporarily stores information locally which will sync with the main inventory database when connected back online.

1.3 - Market Mode

- 1.3.1 - Use speech-to-text in order to update inventory on how much of a certain produce was sold. After analyzing speech, the app confirms if it interpreted the speech correctly before proceeding with the update.
- 1.3.2 - Ability to manually enter produce sold through application and adjust other entries that may have previously been incorrect
- 1.3.3 - Update earnings as produce is sold based on price set by farm for the individual crops
- 1.3.4 - Should work offline in markets where internet access is not available by locally storing information on:

- a) Produce sold
- b) Produce leftover
- c) Money made

1.3.5 - Syncs local data stored about market visit when internet access is eventually gained

1.4 - Charity Mode

1.4.1 - Display a map with all the community fridge located near the user

1.4.2 - The user can select a community fridge to to view its location and contents

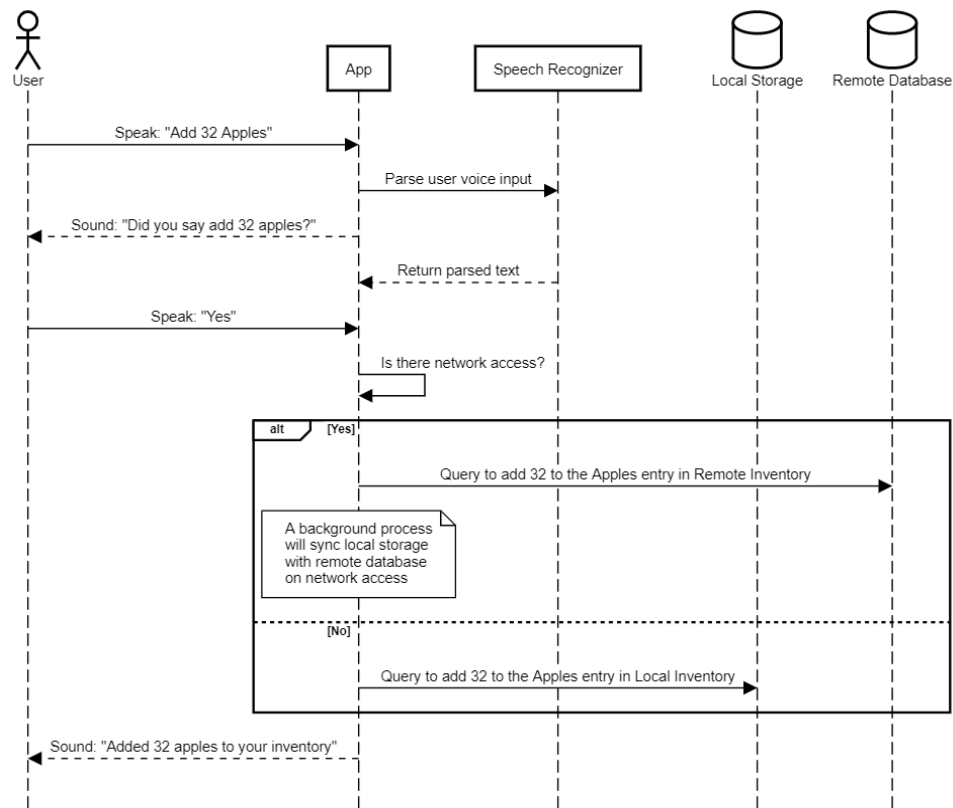
1.4.3 - The user can track a donation to the community fridge by inputting how many of each type of produce they have donated, and uploading proof pictures of their food in the fridge

1.4.4 - When the user creates a donation, an instagram post is automatically created for them with the proof pictures and the details on how much of each produce was donated. This spreads awareness of food in the community drive.

User Scenarios:

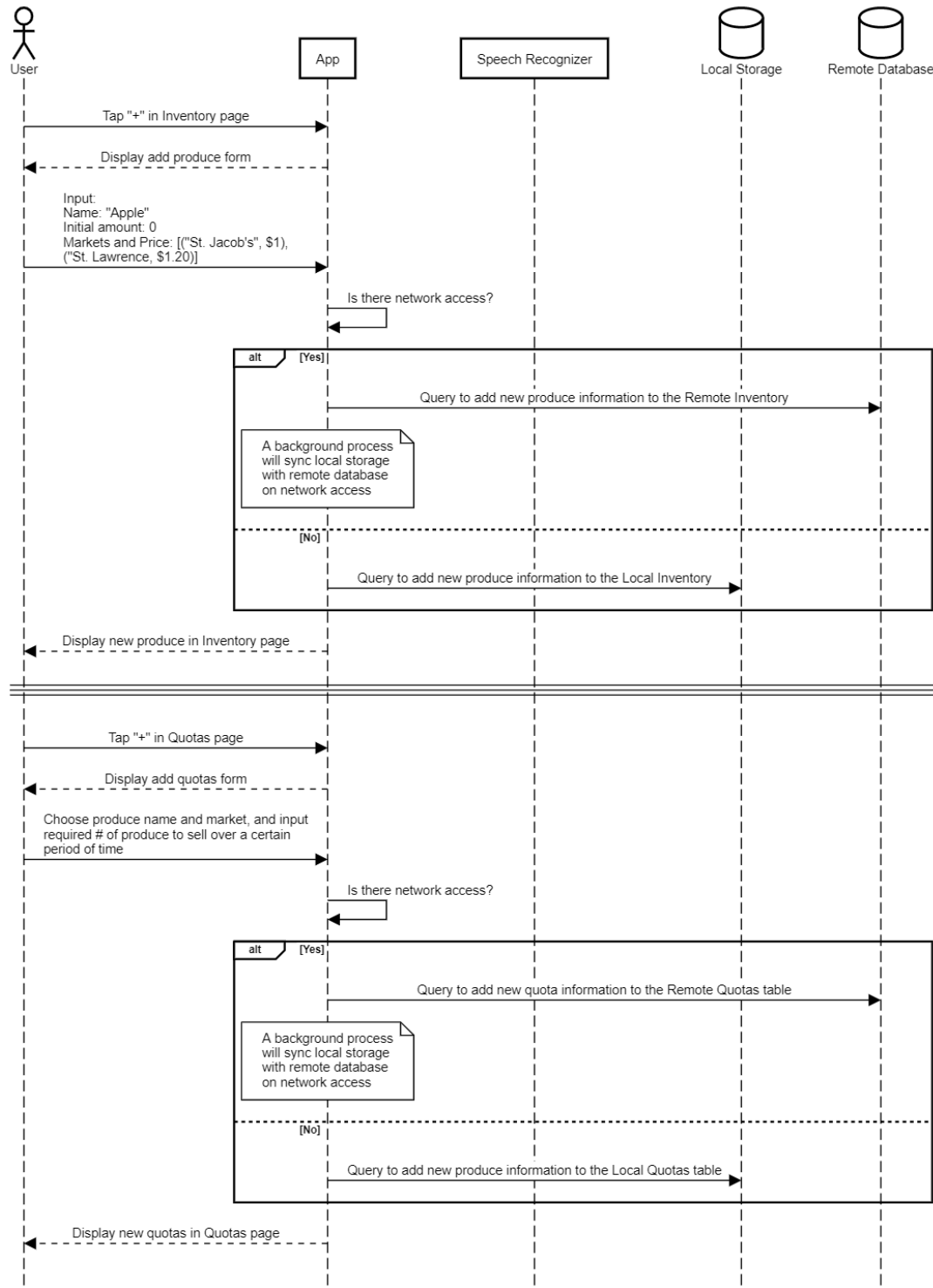
- 1) FarmAid will benefit the farmers responsible for harvesting crops from various areas of the farm. Due to the demands of their jobs the users hands are often in constant use and there are also scenarios where users are wearing protective equipment specifically on their hands. With this application in Farm mode users can speak to the application in order to track the yields from harvest which will then be saved as they continue their work (1.3). This allows a hands free experience for the worker which improves user productivity. Moreover, due to these tasks often occurring in areas where network services are scarce, data is locally stored and updated upon network access which improves the utility and flexibility of the application for farmers.

Farm Mode Sequence Diagram



- 2) In Home mode the user is able to set up the logistics for the farm. Through the app a farmer can specify the types of crops that will be grown and also set up price points for those being sold in markets. Moreover, it gives farmers the ability to allocate the portion of every produce to different markets that are supplied by the farm. This helps users deal with how the inventory is being handled and takes care of the major logistics of the business side of the farm in one space.

Home Mode Sequence Diagram



A description of the non-functional properties your system needs to support. There should be at least two of these. Justify why these properties are important for your system.

1.1 - Responsive: Nowadays, there is a wide range of smartphone screen sizes. To account for this and provide fine user interface experience regardless of screen size, the application must be responsive, and accommodate screen sizes in the range of 4.0 - 7.5", as well as screen resolutions in the range of 720p - 4k.

1.2 - Compatibility: To ensure that users with smartphones not on the latest Android versions can still use the app without any particular downsides, we must ensure that our app is compatible with various versions of Android from Android 4.0 onwards. In order to achieve this, we can predefine an API level which corresponds to a platform version, so we are limited to the APIs available at that API level and no newer APIs developed past that point; this ensures that our app is compatible with the minimum Android version associated with the chosen API level.

1.3 - Usability: Farmers will likely not have network access when at work, so it is therefore of high importance to allow farmers the option to make updates to their inventory and record sales (activities they would do while out at work) without network access. On a similar note, farmers often cannot use their hands while at work to manually input inventory updates and record sales on the phone app as their hands will often be dirty. To account for this and make the app as usable for the farmers as possible, the app should have an alternate option for the farmers to input their inventory updates and sales (likely they can just speak and the app will interpret their input).

1.4 - Reliability/Correctness: Relating back to 1.3, where we allow farmers to input updates to inventory and sales without network access, the app will likely need to sync local updates to the cloud centralized database once the farmer gets network access. Consider a case where multiple farmers are syncing their local updates to the cloud database at the same time (this is possible as a farm team can have multiple farmers); the app will need to synchronize these updates so that correctness of data is maintained and not overriding one another's updates (much like the usage of mutexes to protect critical sections for multi-threaded programs).

A description of the human values addressed in the system.

In this app, the main human values addressed are accessibility and social service. In terms of accessibility, in the farmer and market mode which involve voice to text capability, farmers, whose hands may not be free when performing farmwork or selling produce, will be able to effectively update their inventory or enter sales and revenue information simply by speaking to the app, without the need to enter information by hand. For the human value of social service, in the charity mode, farmers will be able to perform a social gesture, by sharing excess produce with community fridges to feed individuals in need.

Who are the stakeholders of the system?

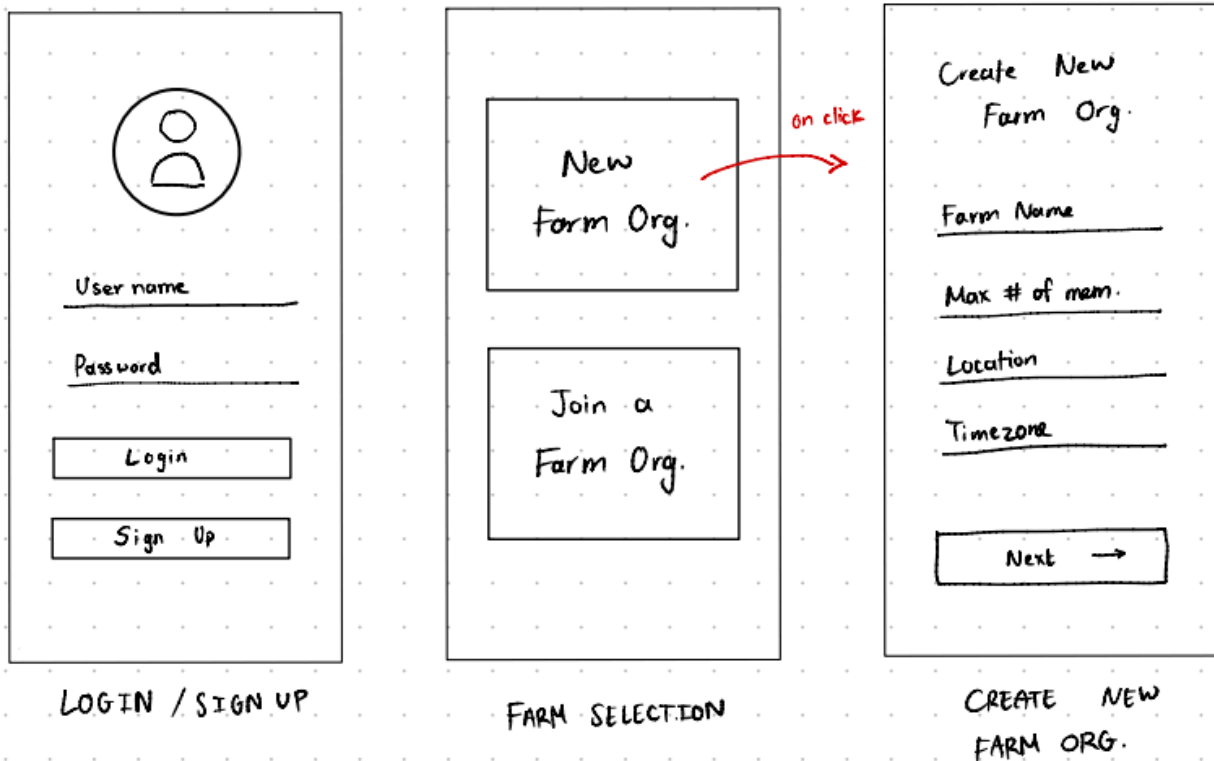
In this project, the main stakeholders are the farmers using the app, who will be interacting with its various modes. In home mode, farmers will be able to manage and create data for grown produce. In farm mode, they will be able to update inventory via voice to text technology. In market mode, they will be able to input information on revenue and sales also through voice to text. Finally, in charity mode, they will be able to find community fridges near them that require extra produce and donate to them. Other stakeholders will include the parties managing the community fridges, who will be posting images on social media for the farmers to view and use in the app. They will post pictures regarding what their community fridges do and do not contain, to allow farmers to both determine which fridges are near them, and understand what produce the fridges are lacking. The teaching assistants and instructors of ECE 452 will also be stakeholders in this project, as they will be the individuals viewing and interacting with the app to grade it based on the code, functionality, design, and other related criteria.

Therefore, it is important that the code is written in a readable fashion, and the interfaces for the different screens on the app are user friendly and easy to use, to allow for a seamless grading experience for course staff, while importantly allowing the app to function effectively for farmers.

Which population of users will use this system?

This app will be used by the population of farmers around the world, who will benefit from the system, and be able to efficiently manage their farming, sales of produce, and social service activities, all in one place. The instructors and TAs of ECE 452 will also use this app for grading purposes.

Low-Fidelity Mockups to Showcase the App





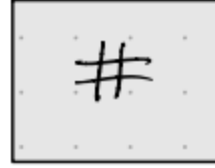
Congrats!
You successfully created
a new farm organization.

Share this code:

1 2 3 4

Start

This code
can be used by
other users to join
this farm organization



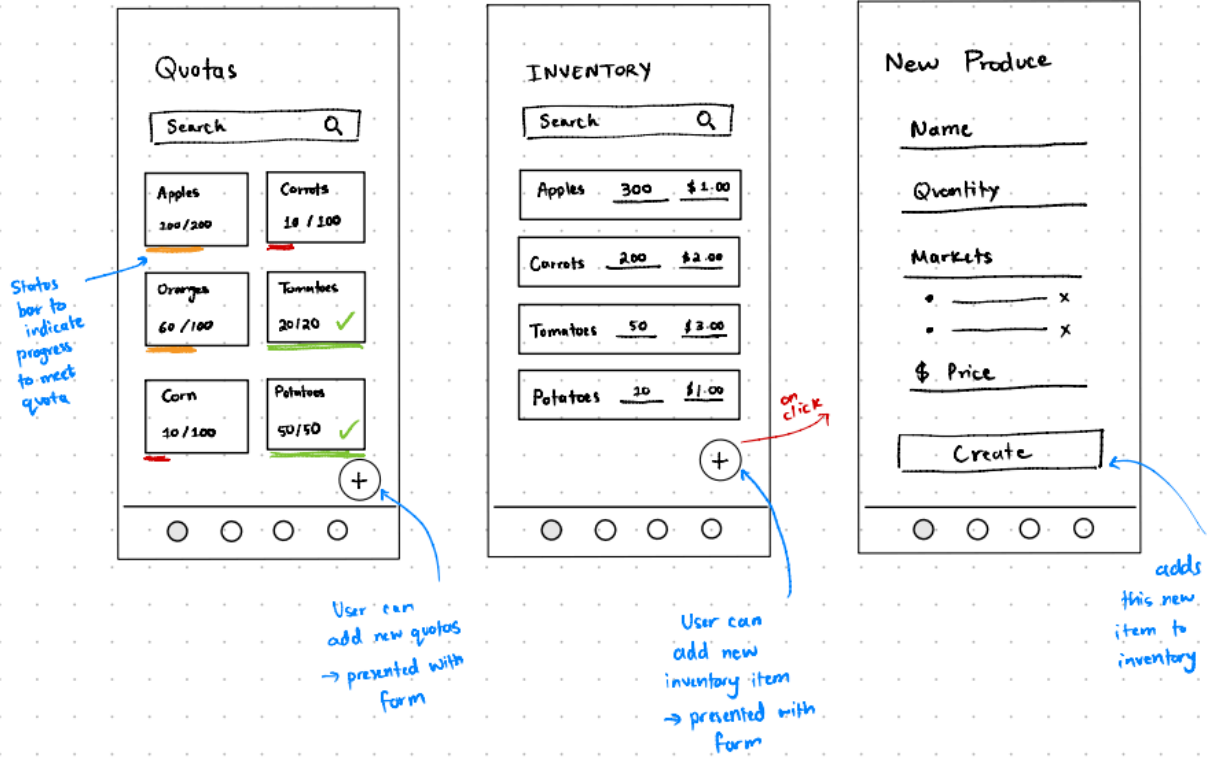
Join an Org. with
a code

Enter Code

Know the code of an org?
Enter it above.

JOIN

HOME MODE



FARM MODE

Harvest

voice input

Increment crop count

Apples - 100 +

Carrots - 0 +

Tomatoes - 50 +

Potatoes - 60 +

SUBMIT

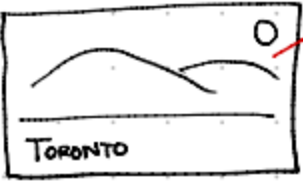
+

update inventory on submit

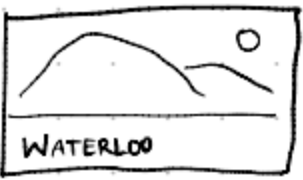
add new crop

MARKET MODE

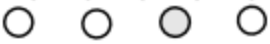
MARKETS 



TORONTO



WATERLOO



on click

TORONTO 

Total Earnings: \$ 9 000

Apples - 0 + \$ 2000

Oranges - 0 + \$ 3000

Potatoes - 0 + \$ 4000

SUBMIT





Sum of all earnings

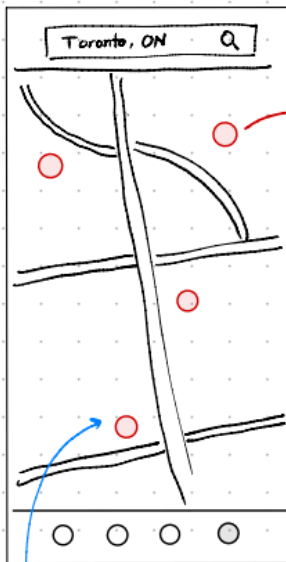
of crops sold in current session

total earnings for each crop

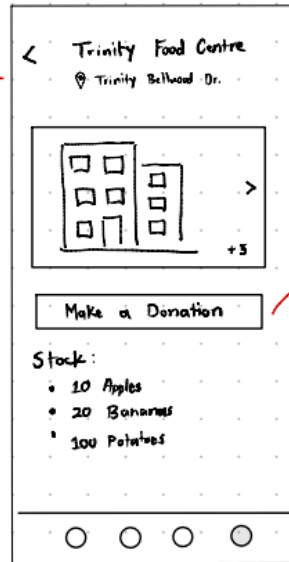
add new crop

Submit new Session with all crops sold

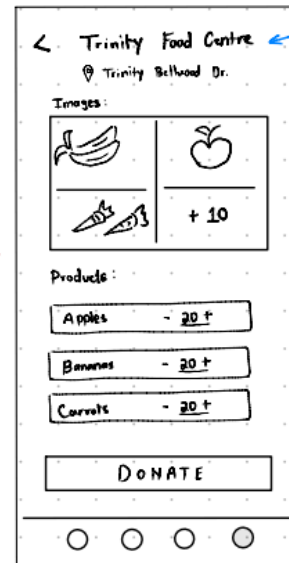
CHARITY MODE



on click



on click



Community Centre and location

local community fridges
based on location