

## BINARY NINJAZ

---

# Harvest

## User Manual

---

Letanyan Arumugam	14228123
Sizo Duma	15245579
Teboho Mokoena	14415888
John Ojo	15096794
Kevin Reid	15008739
Shaun Yates	16007493

---

## STAKEHOLDERS

SAMAC: Barry Christie

# Contents

<b>1 General Information</b>	<b>1</b>
1.1 System Overview . . . . .	1
1.2 System Requirements . . . . .	1
1.2.1 Android . . . . .	1
1.2.2 iOS . . . . .	1
1.2.3 Website . . . . .	1
1.3 Communications . . . . .	1
1.4 Installation . . . . .	1
1.4.1 Android . . . . .	1
1.4.2 iOS . . . . .	2
1.4.3 Website . . . . .	2
1.4.4 Location Services . . . . .	2
<b>2 Getting Started</b>	<b>3</b>
2.1 Mobile . . . . .	3
2.1.1 Creating an Account . . . . .	3
2.1.2 Logging In as a Farmer . . . . .	3
2.1.3 Logging In as a Foreman . . . . .	3
2.1.4 Logging Out . . . . .	5
2.2 Website . . . . .	5
2.2.1 Registering . . . . .	5
2.2.2 Logging In . . . . .	6
2.2.3 Logging Out . . . . .	6
<b>3 Using the System</b>	<b>7</b>
3.1 Mobile . . . . .	7
3.1.1 Navigating . . . . .	7
3.1.2 Using the Yield Collector . . . . .	7
3.1.3 Information . . . . .	9
3.1.4 Sessions . . . . .	9
3.1.5 Statistics . . . . .	11
3.1.6 Settings . . . . .	11
3.2 Website . . . . .	12
3.2.1 Navigating . . . . .	12
3.2.2 Home Page . . . . .	12
3.2.3 Tracker . . . . .	12
3.2.4 View/Edit Information . . . . .	14
3.2.5 Sessions . . . . .	18
3.2.6 Heatmap . . . . .	18
3.2.7 Statistics . . . . .	20
3.2.8 Settings . . . . .	20

<b>4 Troubleshooting</b>	<b>21</b>
4.1 Mobile and Website . . . . .	21
4.1.1 Forgotten Password . . . . .	21
4.2 Mobile Only . . . . .	21
4.2.1 Location Services . . . . .	21
4.3 Website Only . . . . .	21

## List of Figures

1	Communications . . . . .	2
2	Sign In/Up Method Choose . . . . .	4
3	Sign In/Up Methods . . . . .	4
4	Website Map . . . . .	5
5	Register Page . . . . .	6
6	Login Page . . . . .	7
7	Yield Collector . . . . .	8
8	Android Information Buttons . . . . .	10
9	Session . . . . .	10
10	Home Page . . . . .	13
11	Tracker . . . . .	13
12	View/Edit Information Page . . . . .	14
13	Workers . . . . .	15
14	Looking at a Worker . . . . .	15
15	Looking at an Orchard . . . . .	16
16	Adding an Orchard . . . . .	16
17	Modifying a Worker . . . . .	17
18	Session . . . . .	18
19	Heat Map . . . . .	19
20	Website Statistics . . . . .	19

# 1 General Information

## 1.1 System Overview

Harvest, is an application to assist growers with yield data and optimise worker, orchard, farm and foreman performance. In other words, it is a system that can efficiently measure the amount of work done by a worker, track the foremen on a farm, record information and data, and display the necessary information. This system is aimed at farming communities to help them record data and get work done more efficiently.

## 1.2 System Requirements

### 1.2.1 Android

The Android application requires:

- Either Android 4.0 OS or above
- 200 MB RAM
- 6,1 MB Disk Space
- Location Services

### 1.2.2 iOS

The iOS application requires:

- iOS 9.0 or above
- 300 MB RAM
- 50 MB Disk Space
- Location Services

### 1.2.3 Website

The website requires any modern up-to-date web browser such as Firefox, Opera, Chrome, Safari, Vivaldi, Edge, or any other.

## 1.3 Communications

All of the subsystems—Android, iOS, and website—run independently, but use a central database<sup>1</sup> to store and retrieve data from a common source. This can be seen in 1

## 1.4 Installation

### 1.4.1 Android

The application will be available for download on the Google Play Store.

---

<sup>1</sup><https://firebase.google.com>

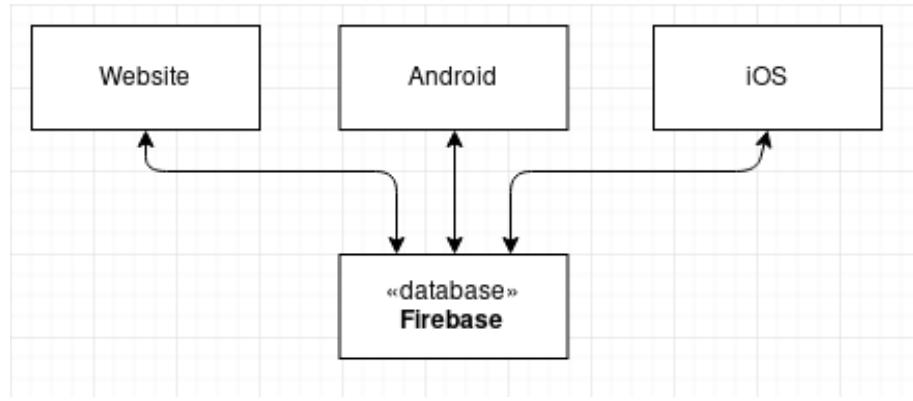


Figure 1: Communications

### 1.4.2 iOS

The application will be available for download on the Apple App Store.

### 1.4.3 Website

No Installation is required to use the website, however it can be accessed at [Harvest App](#).

#### 1.4.4 Location Services

With regards to configuring the iOS and Android applications: location services are required. The user will be prompted for the location permissions in mention to allow full functionality of the application.

Android:

1. \_\_\_\_\_

iOS<sup>2</sup>:

  1. Go to Settings › Privacy › Location Services
  2. Ensure that "Location Services" are turned on.
  3. Find and tap on "Harvest" from the list of Applications.
  4. Choose either "While Using the App" or "Always".

<sup>2</sup>instructions pertain to iOS 11.4

## 2 Getting Started

From this point on, the functioning of the Android and iOS applications are similar, so they are grouped into a single Mobile section, and unless otherwise stated, the description applies to both applications.

### 2.1 Mobile

#### 2.1.1 Creating an Account

The application will open by default on the *Choose* screen. From here the user can choose to sign in as a farmer or as a foreman, or to create a new farmer account<sup>3</sup>. A foreman does not need to create an account, they simply sign in with their phone number, however the farmer must ensure that the foreman appears on their system and that the foreman's number is correct.

To create a farmer account the following information is required:

- Email
- Password

Additionally the following information can be optionally provided:

- First name
- Surname
- Organization

Organization is most important since it will be used by foremen to identify your organization when they log in. **If it is not provided, you will be identified by your email, which will then be visible to your foremen.**

#### 2.1.2 Logging In as a Farmer

When on the log in screen enter your email and its password you used to create the account, alternatively click log in with Google to use Google credentials, which will be linked to Harvest if they have not already. Note that the user will not be logged out automatically. Instead the user must manually log out from within the applications settings.

#### 2.1.3 Logging In as a Foreman

Simply enter your mobile phone number and press the button. A verification code may be sent to you via SMS, which will then need to be entered. Once that is done a confirmation screen will be displayed, it will show the phone number saved in the system so that the farmer can confirm that it is saved correctly. Then, depending on the situation, the following will be displayed:

- If the foreman is not assigned to any organization, then they will be prompted to go back and will not be able to continue.

<sup>3</sup>Note that an email verification will be sent to the user to confirm they've entered the correct address.

What number is being displayed from the system?  
How does it figure out which one corresponds to which?  
Is this

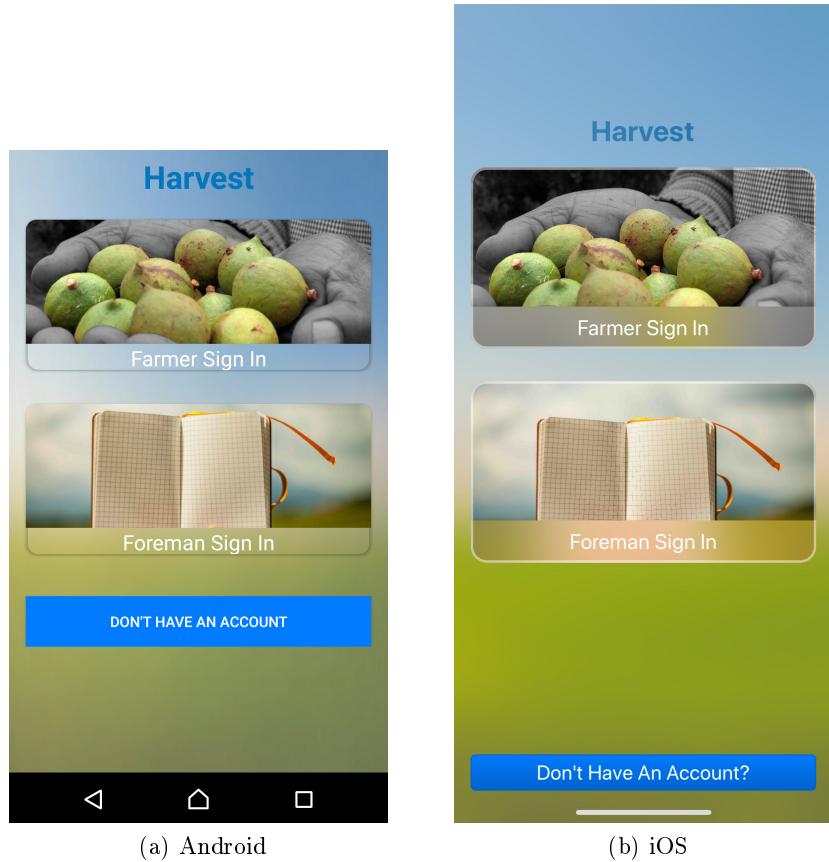


Figure 2: Sign In/Up Method Choose

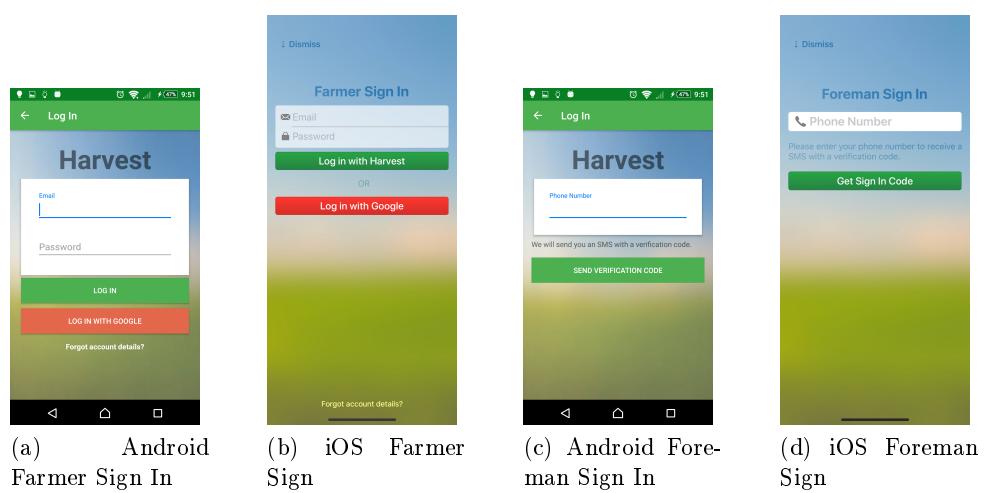


Figure 3: Sign In/Up Methods

- If the foreman is assigned to a single organization, the name will be displayed<sup>4</sup>, and they will then be able to continue to the clicker as seen in ??.
- On the off chance that the foreman is assigned to multiple organizations, they will be able to select which organization they wish to work for for the session. In order to change this, they must log out and in again.

#### 2.1.4 Logging Out

The Log out button can be found at the bottom of the Harvest "Settings" Tab on Android. On iOS the log out appears under the "User Account" section in the "Settings" Tab.

## 2.2 Website

*For ease of visualization, a diagram representing a map of the website is given in 4: each web page is given, indicating to where, and how a traversal is possible from that page.*

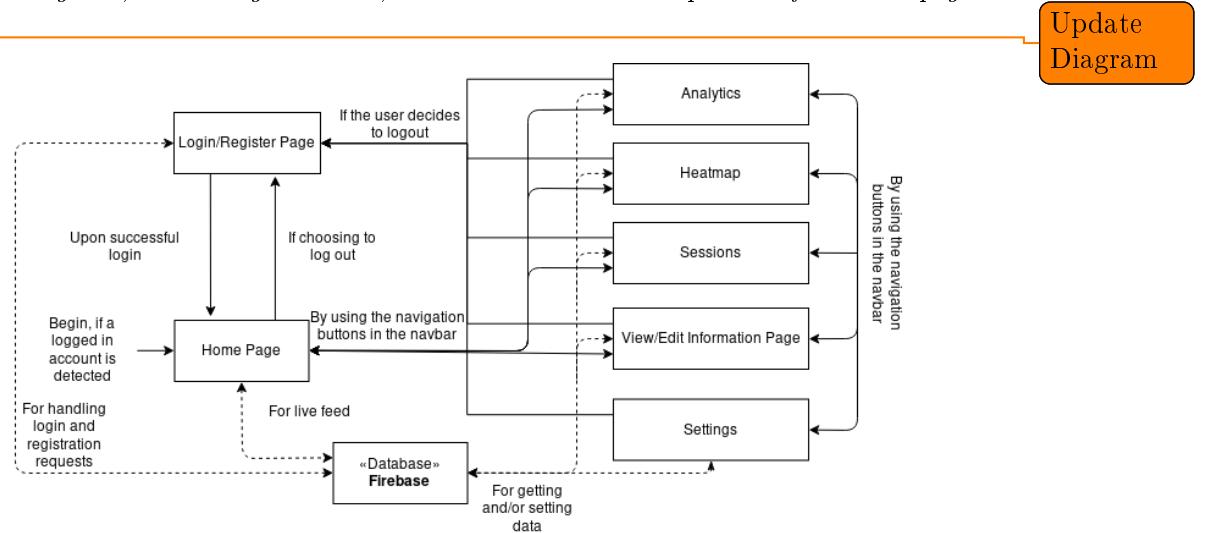


Figure 4: Website Map

#### 2.2.1 Registering

**Finding the Register Page** The login and registration page can be found at [Harvest](#), and once there the user will be presented with the page as seen in 6. To now create an account the user must click on the blue **Don't have an account? Sign Up** button. They will now be presented with 5.

**Creating an Account** Once at the register page the new user must enter their first name, surname, email address, desired password, and confirm the desired password by entering it again. When all of the information has been entered, and the user is content that the information is correct, they shall click on the green **Create Account** button.

<sup>4</sup>On iOS the foreman will simply be transferred to their assigned organization

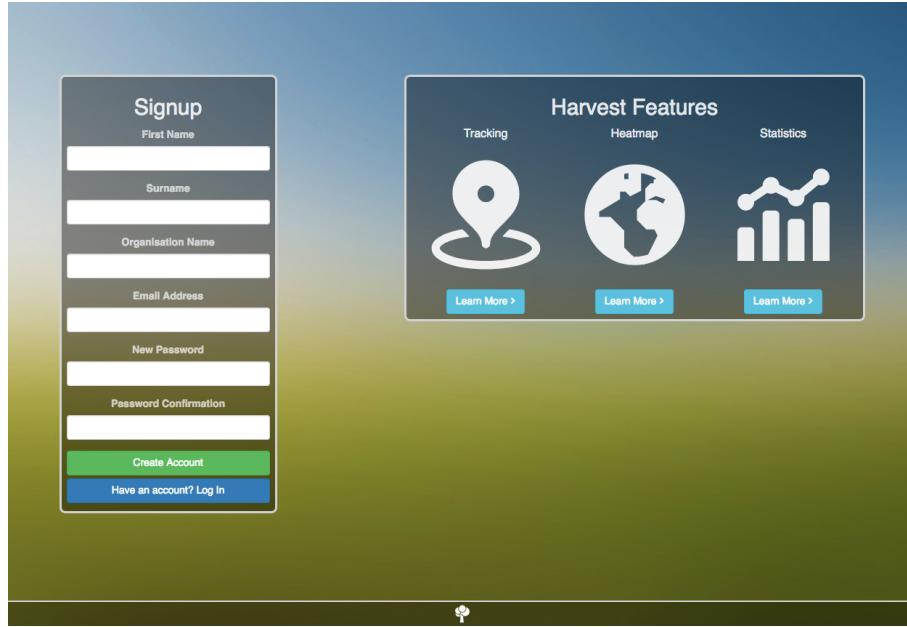


Figure 5: Register Page

They will now be taken to the login page as seen in 6. The user shall receive an email at the specified address, asking to confirm their account. The user simply needs to click on the link within the email in order to complete the account creation.

### 2.2.2 Logging In

**Finding the Login Page** The login and register page can be found at [Harvest](#).

**Logging In** The user simply enters the correct email address and password associated with their account, and clicks on the green **Log In** button. The user will then be taken to 3.2.2.

### 2.2.3 Logging Out

The **Sign Out** button can be clicked, at the top right of the navigation bar, to sign out at any time.

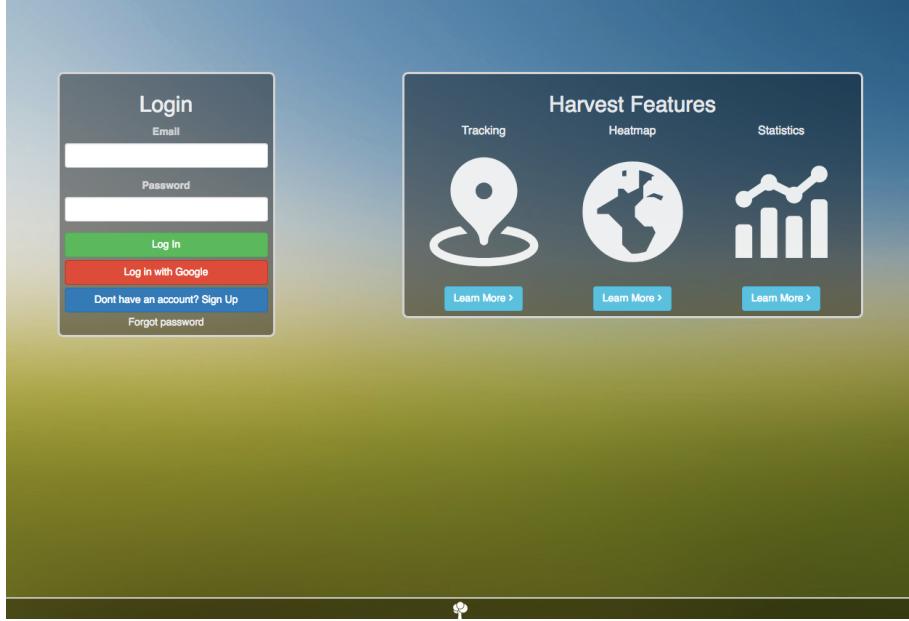


Figure 6: Login Page

### 3 Using the System

#### 3.1 Mobile

##### 3.1.1 Navigating

If a foreman is logged in, then they can only access the clicker and some foreman specific settings.

A farmer will have a navigation bar displayed at the bottom that they can use to get to different functionalities of the application.

*A discrepancy between iOS and Android exists in the form of settings. To access the settings in Android, the three dots must be pressed on, in the top right, and settings chosen.*

The following is accessible through the navigation bar:

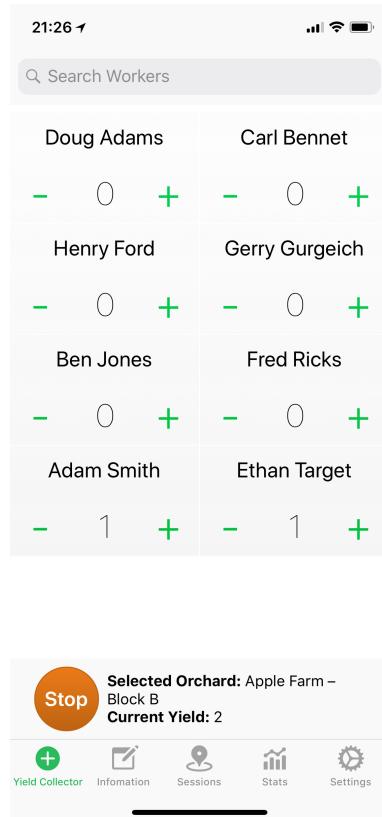
- Yield Collector (3.1.2)
- Information (3.1.3)
- Sessions (3.1.4)
- Statistics (3.1.5)
- Settings (3.1.6) [OS dependant]

##### 3.1.2 Using the Yield Collector

The Yield Collector is shown in 7. Should the required location permission be disallowed, and the GPS disabled, then this system will not work. The user will be prompted to



(a) Android



(b) iOS

Figure 7: Yield Collector

enable this service.

Note that the bar at the bottom is only displayed when a farmer is logged in. A foreman will have no access to the other functionalities of the application.

To use the Yield Collector the following process is followed:

1. Press "Start"
2. Click the plus button below a workers name to increment the amount of bags they drop off or the minus button to correct any mistakes.
3. Press "Stop"
4. A summary of the session will be displayed.
5. The session can then be saved or discarded.

### 3.1.3 Information

*Please see 3.2.4 for general information about how the Information tab works.*

To edit, create or delete entities in Android you will use buttons found in the bottom right corner. A description of what exactly each of the 4 buttons do follows:

**Add** creates a new item.

**Save** saves the item that is being modified.

**Edit** allows for editing of the currently displayed item.

**Delete** deletes the item that is being edited. A confirmation will be displayed.

Corrosponding images for each button can be found at 8.

On iOS to edit information simply tap or swipe on what you want to change. Saving and creating buttons can be found in the top right corner. A delete button can be found at the bottom of the page.

### 3.1.4 Sessions

Here a list of all sessions carried out is displayed. A session can be selected to retrieve further information about it. See 9. The button **TRACKED PATH AND COLLECTION POINTS** can be selected to see a map, where all of the orchards can be seen, as well as the path that was taken by the foreman that was administering the session. Red pins can also be seen along the path, where each indicates where the foreman was when they indicated a bag dropped by a worker.

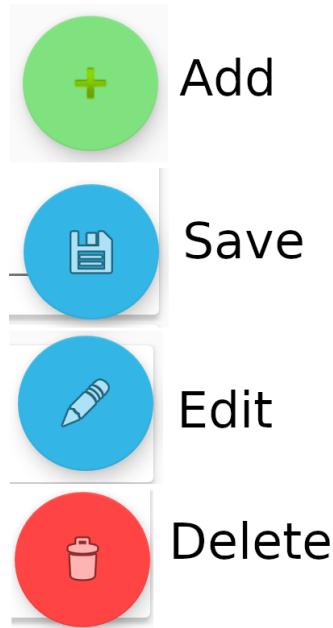


Figure 8: Android Information Buttons

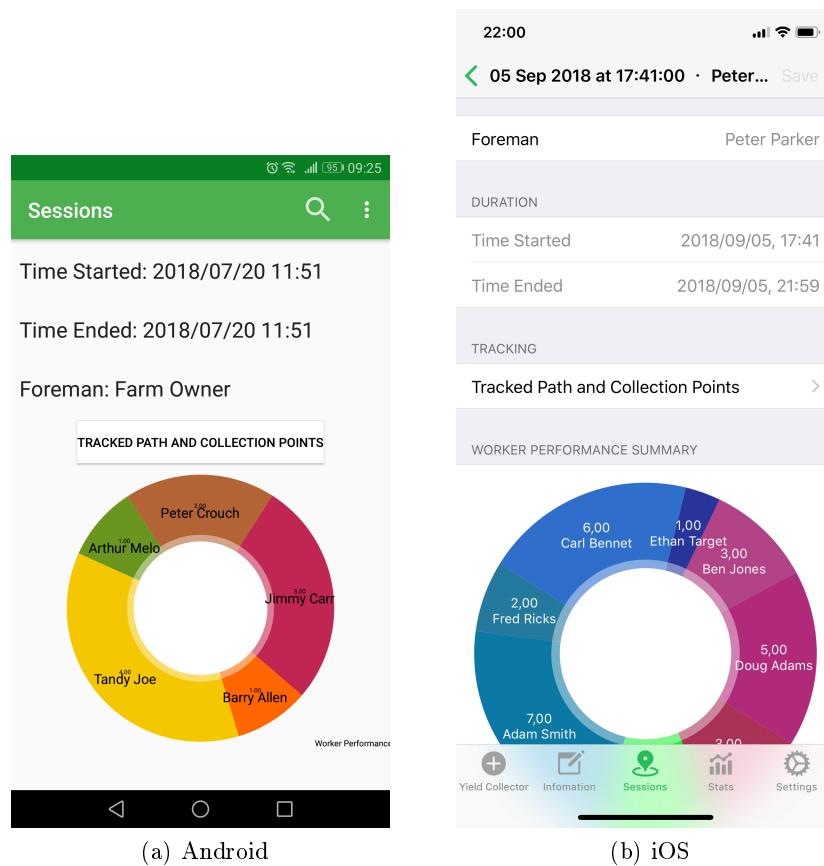


Figure 9: Session

### 3.1.5 Statistics

From here, various statistics can be seen. You are able to specify multiple options and control multiple parameters. Graphs can also be saved on mobile. On Android the save button will be present at the bottom of the page and on iOS it is present at the top right.

**Compare** Here the user can choose which entity types you wish to compare. You can compare farms, foremen, workers or orchards against each other.

**Selection** Here the user can select specifically which entities you wish to compare against each other. You may select as many as you wish.

**Time Period** This is the amount of specificity the user wants in terms of time. Here the user has the options of hourly, daily, weekly, monthly and yearly. Selecting hourly for instance will provide an hour by hour graph line, while daily will give a day by day line.

**Time Interval** Here the user can specify the time range you wish to view. Some predefined options are available to the user such as today, yesterday, this week and some others. Between exact dates is also provided to the user. This option allows any arbitrary range to be specified.

**Accumulation** Specifies how data is accumulated for the displayed graph.

- No Accumulation

No data accumulation will take place, a regular graph will be displayed whereby each entity will have its own line.

- Accumulate by Entity

The select entity will have their values for each period summed up, so that the sum of each individual entities collections across the selected time period, for that time interval will be shown, for each time period.

- Accumulate by Time

The sum across each time period will be shown, so that the total bags collect each period by each of the select entities will be shown.

### 3.1.6 Settings

The following settings are available:

- Account: account related settings.
  - Update Email: change email address (may need to re-authorize.)

- Update Password: change password (may need to re-authorize.)
- Organization: change the name of the organization, used by foremen to identify it.
- First Name: change first name.
- Surname: change surname.
- Delete Account: delete the account. **This is irreversible, all information related to the account will be lost** (may need to re-authorize.)
- Logout (iOS only, on android this is accessed from the menu that is used to access settings.)
- Resign: only available for foremen to remove themselves from an assigned organization.

*Some sensitive settings, such as deleting the account, may require the user to re-authorize. In this scenario, a dialog will pop up asking them to re-enter their email and password; after which the action will be performed.*

## 3.2 Website

### 3.2.1 Navigating

On all web pages a consistent navbar can be seen at the top of the page. The following items are always present:

- Home Page (3.2.2)
- Foreman Tracker (3.2.3)
- Information (3.2.4)
- Sessions (3.2.5)
- Heatmap (3.2.6)
- Statistics (3.2.7)
- Settings (3.2.8)
- Sign Out (2.2.3)

### 3.2.2 Home Page

Once the user has logged in, they will be taken to the home page, as seen in ???. The home page is the starting point of the system, it serves as a navigation page of the website.

### 3.2.3 Tracker

The Tracker page can be found at any time by clicking on the **Tracker** button in the navbar. Once clicked on, the user will be taken to ???, as seen in ???. It serves simply by providing an updating feed of the farm and the locations of foremen every two minutes.

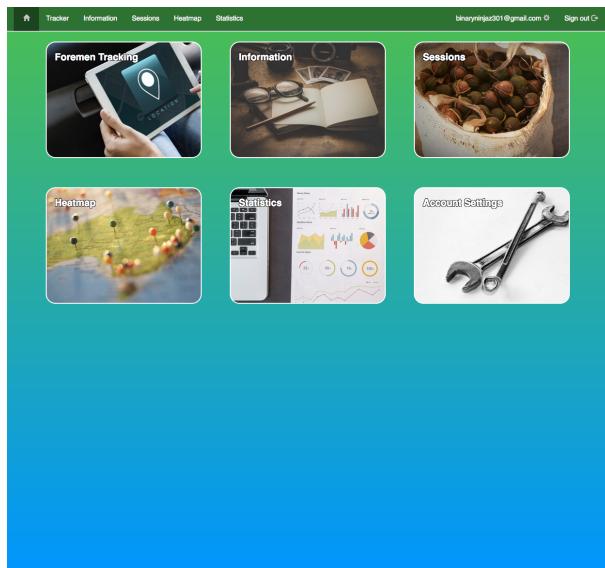


Figure 10: Home Page

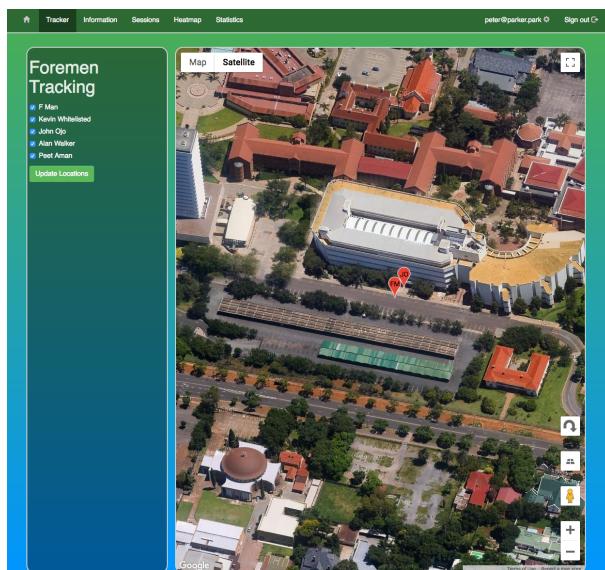


Figure 11: Tracker

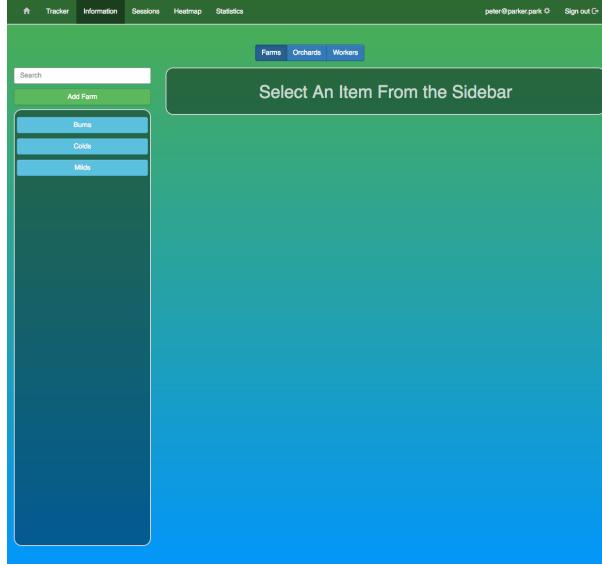


Figure 12: View/Edit Information Page

### 3.2.4 View/Edit Information

**Introduction** The View/Edit Information page can be found at any time by clicking on the **Information** button in the navbar. Once clicked on, the user will be taken to 12. The concept is that almost all administrative information can be viewed from this page, and once the relevant information has been located, it can also be edited.

**Locating the Correct Information** When in 12 there are three blue buttons available; **Farms**, **Orchards**, and **Workers**. Each of which will expand a list of the relevant items. The entire process is best described through an example, so, in this example, the goal is to locate information on a worker named *Joe Soap*. The process, however can be accomplished in multiple ways; the first, and most obvious is to select **Workers**, then *J. Soap* (the process can be seen by following 12, 13, and 14), however, if the user is looking at the **Pear Shaped** orchard, and see's that *Joe Soap* is assigned (see 15), then they can click on the button representing *Joe Soap*—labeled *J. Soap*—to go to *Joe Soap's* page, as seen in ??, note that the list of orchards is still displayed.

**Adding Information** Note that at the top of the second list in 13, 14, 15, or ?? there is a green **Add Farm**, **Add Orchard**, or **Add Worker** button, clicking this button will display the interface to enter the necessary information. An example of this can be seen in 16, where a new orchard can be created. Once all of the necessary information has been entered, then the **Save** button can be clicked to create the new orchard, note that none of the fields are required.

**Modifying Information** When looking at any information, a **Modify** button can be seen at the top (see 14, 15, or ??). In 17 the view when *Joe Soap* is being modified can be seen. The fields are already populated by the information that was already stored in them. Once the user is content with the changes, they can click on the orange **Save**

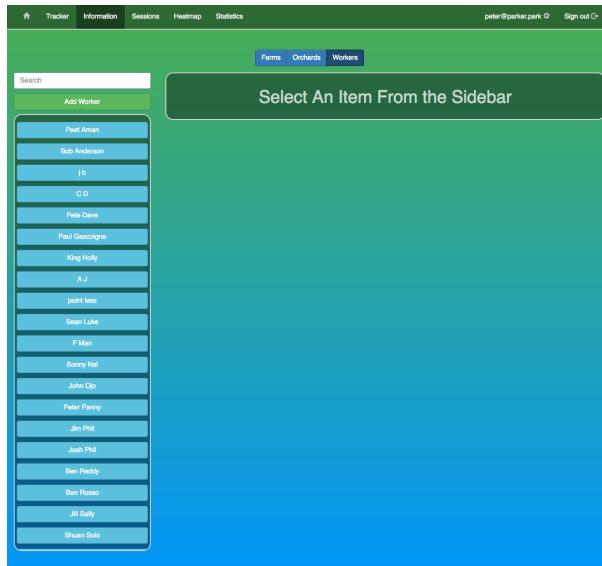


Figure 13: Workers

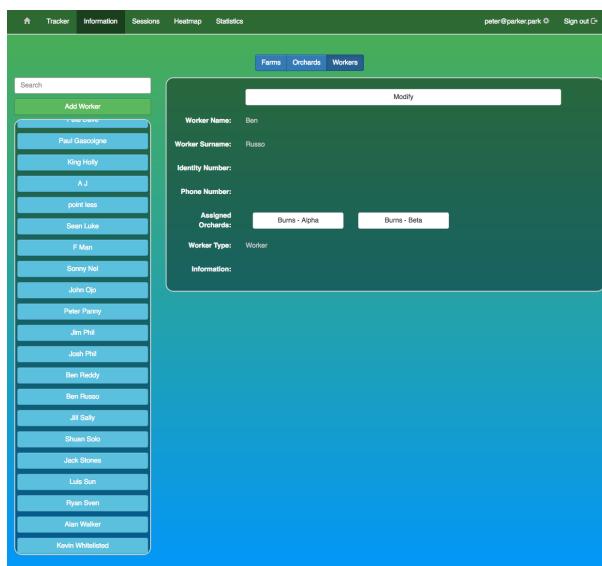


Figure 14: Looking at a Worker

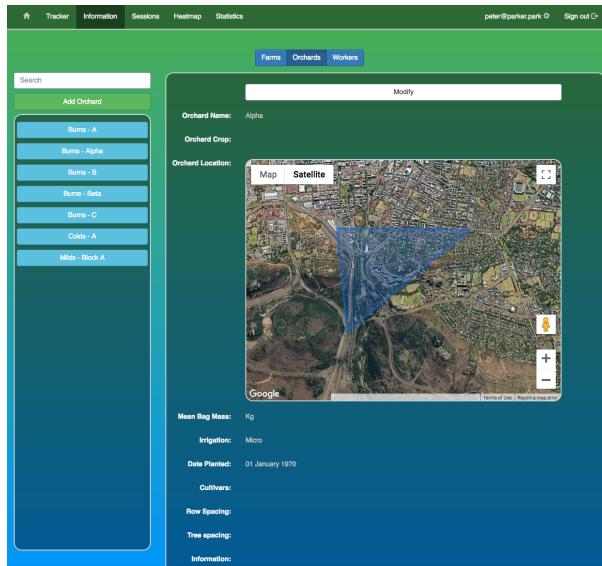


Figure 15: Looking at an Orchard

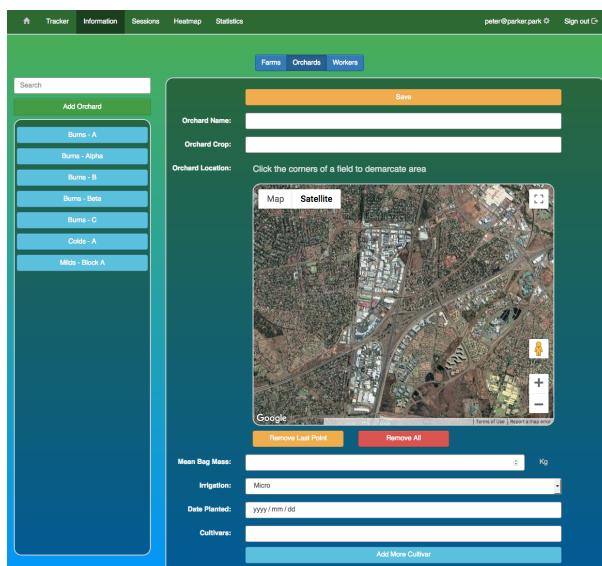


Figure 16: Adding an Orchard

Tracker Information Sessions Heatmap Statistics

peter@parker.park Ⓜ Sign out Ⓜ

Farms Orchards Workers

Add Worker

Pete Amer  
Bob Anderson  
J B  
C D  
Pete Dave  
Paul Gascogine  
King Holly  
A J  
point less  
Sean Luke  
P Moh  
Sonny Nel  
John Ojo  
Peter Parry  
Jim Phil  
Josh Phil  
Ben Reedy  
Ben Russ  
Jill Selly  
Shuan Solo

Worker Name:  Save Delete Cancel

Worker Surname:

Identity Number:

Phone Number:

Assigned Orchards:

- Burne - A
- Burne - Alpha
- Burne - B
- Burne - Beta
- Burne - C
- Colda - A
- Colda - Block A

Worker Type:  Worker  Foreman

Information:

Figure 17: Modifying a Worker

button to apply the changes. A reminder that no fields are required, so that filled in fields can be erased. The user can also click on the red **Delete** button to delete the entry in its entirety—note a confirmation dialog will appear. The user may also cancel, which will return them to before they clicked on **Modify**, as seen in 14, 15, or ??.

**Stored Information** Below, the fields stored are described.

## Farm

- *Farm Name*: the name of the farm.
  - *Information*: any further textual information about the farm.
  - *Assigned Orchards*: a clickable list of the orchards assigned to the farm.

Orchard

- *Orchard Name*: the name of the orchard.
  - *Orchard Crop*: the type of crop grown in the orchard.
  - *Mean Bag Mass*: the average mass of a bag that is harvested from the orchard.
  - *Date Planted*: the date that the orchard was planted.
  - *Spacing*: the spacing of the crops.
  - *Information*: any further textual information about the orchard.
  - *Assigned Farm*: a clickable button indicating the farm that the orchard is assigned to.
  - *Assigned Workers*: a clickable list of the workers assigned to the orchard.

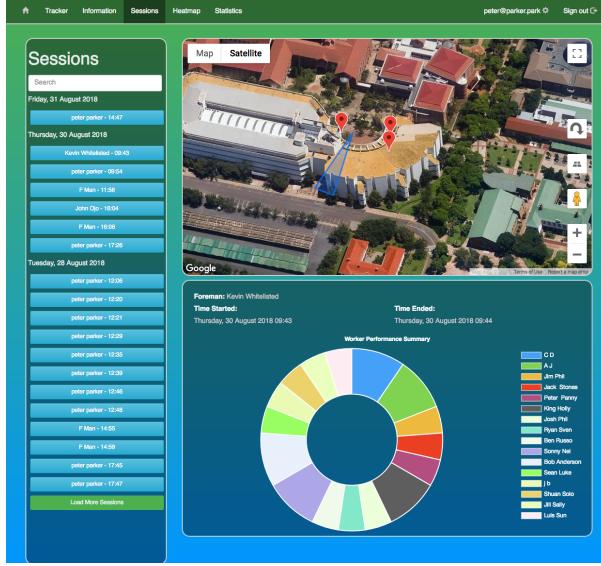


Figure 18: Session

## Worker

- *Worker Name:* the first name of the worker.
- *Worker Surname:* the surname of the worker.
- *Assigned Orchard:* a clickable button indicating the orchard that the worker is assigned to.
- *Worker Type:* indicates if the worker is a foreman or a regular worker.
- *Information:* any further textual information about the worker.
- *Foreman Email:* in the case of a foreman, their email address for linking to their app.

### 3.2.5 Sessions

From here, a list of all sessions can be seen and selected. Once selected, information about the session will be displayed. Above the map the foreman that administered the session; and the time started, and ended; are displayed. The map shows the path taken by the foreman, as well as where they were when they indicated a bag drop. Please see 18. Below the map a pie chart is displayed, showing what portion of the total bags dropped was done by each worker.

### 3.2.6 Heatmap

The Heatmap (3.2.6) shows where the majority of bag drops took place, by having more active areas be redder.

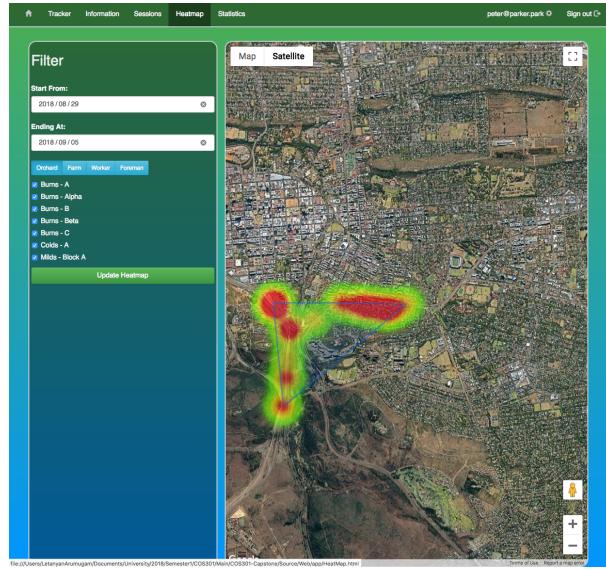


Figure 19: Heat Map



Figure 20: Website Statistics

### **3.2.7 Statistics**

The Statistics on the website can be seen in 20.

The graph displays the performance of the selected farm(s), orchard(s), foremen/foreman or worker(s), which is chosen in the tick box. Then the start and end date can be selected, and once **Update Graph** is clicked, the graph will be generated.

### **3.2.8 Settings**

The Settings allows users to edit their personal information.

## **4 Troubleshooting**

### **4.1 Mobile and Website**

#### **4.1.1 Forgotten Password**

1. On the sign in screen, tap "Forgot account details?" button.
2. When asked for your email, enter the the email address of the account with the forgotten password.
3. An email will be sent to that address.
4. Follow the instructions in the email. You will click on a link in the email.
5. From the web page that the link sent you to, Enter the new password for your account.
6. Log in to Harvest using your new details.

### **4.2 Mobile Only**

#### **4.2.1 Location Services**

1. Check that your phone supports location services
2. In the "Settings" application make sure that the Harvest app is allowed location services

### **4.3 Website Only**