EZSustain

A technological tool for more effective sustainable practices

Requirements Analysis Document

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Introduction

In recent years, the world has seen a major uptake in our use of available resources. As such, there are a lot of renewable and reusable resources being wasted by being tossed in the trash, due to lack of knowledge on sustainable materials and facilities to handle these resources. This Android application hopes to change this trend by providing a way to checkout potential objects materials before they get thrown away and increase the amount of recycling done in the user's local community.

Proposed System

The scenario is as follows, When the user is about to throw out a specific item, they will open the app and have a list of ways to check objects. One way is using the device's camera to scan the barcode of the packaging or material, this will read the information from the barcode, and connect to a populated database, which stores the barcode number, name of the product, materials that product is made of, and its recyclable status. If it is recyclable in the user's defined area, it will display whether the area's local waste management service will pick it up for recycling. If it is a material that local waste management won't, but it can still be recycled, then the app will display a list of recycling facilities nearby that take those materials, and their location, which will use Google Maps API and can be forwarded to the app for navigational purposes. The app will also have a manual search option, where the user can use keywords typed into a search bar for a list of items matching the entered search query. The app will then proceed as described above. Also, if an item is too new to be in any database, the user may upload information about the item, and request it should be added, this will also hold true if an item's information is inaccurate, the user may request changes to an already cataloged item in the database. If the area's waste management information is wrong, or they have policy changes (i.e. they don't recycle, they take new materials, etc.), A user may request this data get updated, and our team will fact check the info for accurateness and non-maliciousness.

The system proposed has the intent of allowing users to get more educated about sustainable practices, by allowing the user a quick and convenient way to check and see if a material can be recycled. This app will also be useful on college campuses who employ a sustainability project and operations, where a lot of potential waste could be saved. Also, this app fills a niche market for those looking to go greener by using products made with or using reusable or renewable resources.

Functional Requirements

The functional requirements for the system are listed below.

1. The application allows users to scan barcodes of materials.
2. The application can display information about scanned or searched items.
3. The application allows users to manually search for items by text queries.
4. The application can display area's waste management service information and recyclability of items in that area.
5. The application can pull data from Google Maps, and display a list of recycling facilities near the area of the user if the item can't be recycled by the users' area's waste management.

The above options are usable by any general user, however, to access information editing requests (such as requesting to edit area waste management services and info, or requesting new item input into a database), a user account must be created, these items, in addition to the items above, are for registered users

6. The application allows registered users to input information about an item not found in the database, and request the database(s) be updated
7. The application allows registered users to input information about their areas waste management services, and request it be changed

Non-Functional Requirements

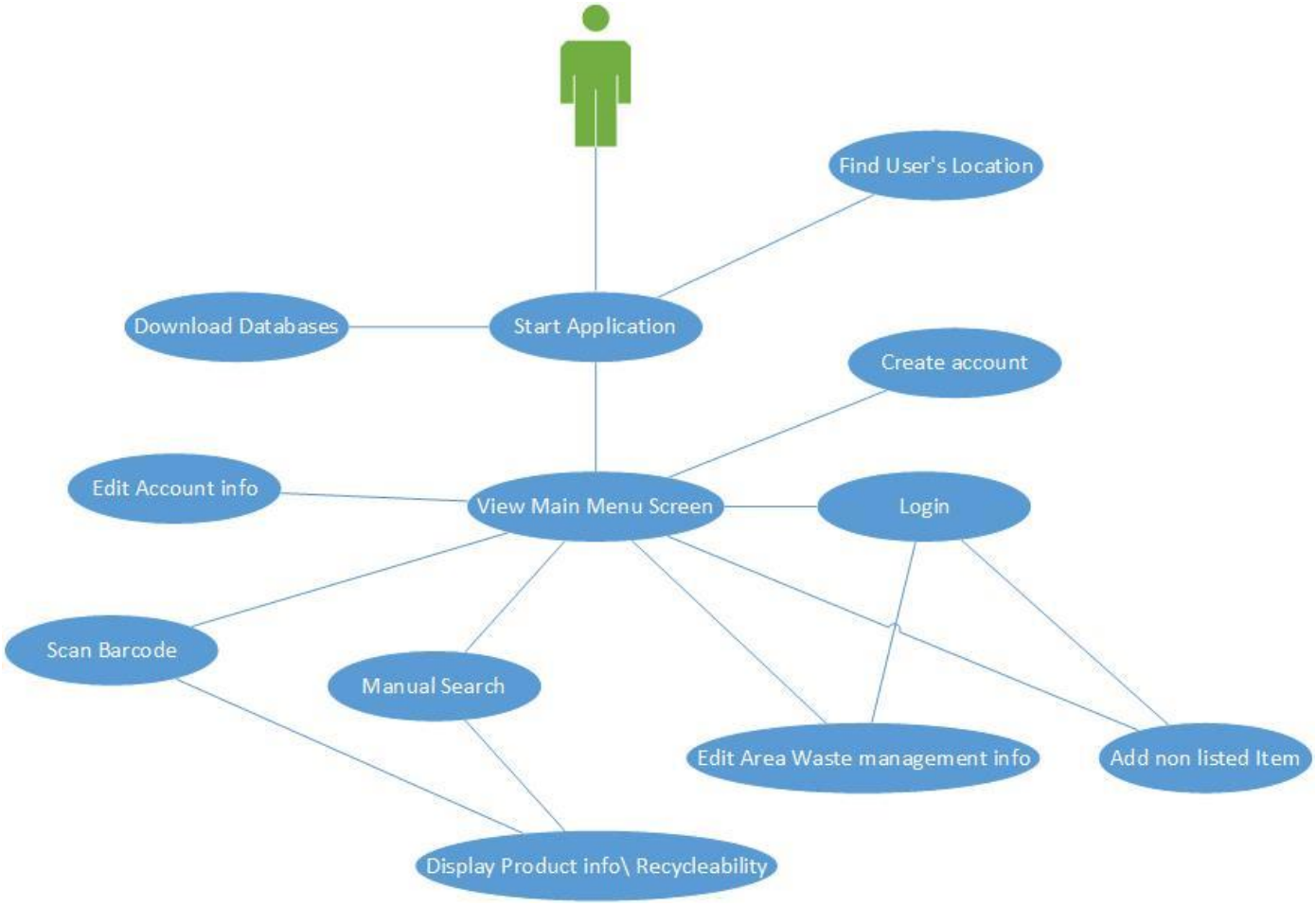
The non-functional requirements for the system are listed below.

1. This app doesn't require a user account to use basic the app
2. The user may download the current cloud-based databases locally, for use offline or where data and internet access may be limited.
3. The user may save a search query when offline, so that info can be pulled when connected to a network if the item isn't in the downloaded database or save it for a later reference.
4. All product info will be available for anyone to view

5. The Information editing portions of the app are only available to registered users with

   valid account credentials

Use Case Model



Use Cases

I. *Use case name: Start Application*
II. Participating Actors: User
III. Entry Conditions: User has installed the application on a valid android device, the user will then press the app icon to launch the app
IV. Flow of Events:
    a. The main screen will come up, showing the camera search and manual search options
    b. The app will ask if the user wishes to make a user account, this can be dismissed on startup by a simple clickable checkbox that, when clicked, disables the startup message for future startups
V. Exit Conditions: The user is on the main screen, and the search options loaded
VI. Exceptions: The application fails to start
VII. Quality Requirements: The application gets to the screen without issue

I. *Use Case Name: View main menu screen*
II. Participating actors: User
III. Entry Conditions: The app loads successfully
IV. Flow of Events:
    a. The user should be looking at the main menu screen
V. Exit conditions: The main screen is loaded
VI. Exceptions:
    a. The application fails to start
VII. Quality Management:

I. *Use case name: Scan barcode*
II. Participating actors: User
III. Entry Conditions: The user is on the main screen
IV. Flow of Events:
    a. The user will press the “Scan Barcode by camera” option on the main screen
    b. The device will ask permission to use the camera, the user will grant permission for the device to do so
    c. The camera will be pointed in the direction of the barcode to be scanned
    d. The camera will take the scanned barcode, and compare it to the product database
    e. If a relevant item is available, the system will display its product info
V. Exit Condition: The user scans a barcode successfully
VI. Exceptions:
    a. The device doesn’t have a camera
    b. The user denies usage of the camera
    c. The user’s device camera is broken, or doesn’t respond to the system
    d. The item isn’t in the database

e. The database can't be accessed, either remotely or locally

VII. Quality Requirements: The application can open the camera, and connect to the database

I. *Use Case Name: Manual Search*
II. Participating Actors: User
III. Entry Condition: The user is on the main screen
IV. Flow of Events:
    a. The user will press the "Manual search" option on the main screen
    b. A search bar will appear on the top of the screen
    c. The user will type a search query into the search bar, and press enter
    d. The app will compare the search query to matching words in the database
    e. A scrollable list will be displayed
    f. The user will select the item best matching their search
    g. The system will display its product info
V. Exit Conditions: The user finds the item based on their search successfully
VI. Exceptions:
    a. The item isn't in the database
    b. The database can't be accessed, either remotely or locally
VII. Quality Requirements: The application must be able to connect to the database, and display relevant info

I. *Use case name: Create Account*
II. Participating Actors: User
III. Entry Condition: The user is on the main screen
IV. Flow of Events:
    a. The user will select the menu icon in the app, then the user will select "Create Account" in the menu
    b. The user will be brought to an account login screen, the user will press "First time user? Create Account" at the bottom of this screen
    c. The user will be asked to then enter a valid name, and email to register for an account
    d. The account will be registered with the account database
V. Exit Conditions: The user successfully created an account
VI. Exceptions:
    a. The account database can't be accessed
    b. The email supplied is not valid
VII. Quality Requirements: The application must be able to connect to the account database for proper registration

I. *Use case name: Login*
II. Participating Actors: User

III. Entry Condition: The user is on the account login page
IV. Flow of Events:
    a. The user will supply their credentials registered previously into the account database.
    b. The user will be returned to the main screen if successful
V. Exit Conditions: The user successfully logs in
VI. Exceptions:
    a. The user doesn't have an account registered with the system
    b. The user doesn't supply the right credentials
    c. The application cannot access the accounts database
VII. Quality Requirements: The app can access the accounts database

I. *Use case name: Edit area waste management info*
II. Participating Actors: User
III. Entry Condition: The user is logged into a registered account, and is on the main screen
IV. Flow of Events:
    a. The user will select the "Edit area waste management info" on the main screen
    b. An info screen will appear based on where the user is currently located
    c. The user will click on the "edit info" button
    d. The user will type new information into text fields
    e. The user will press the "submit for evaluation" button
V. Exit Condition: The user successfully enters text, and presses the submit button
VI. Exceptions:
    a. The user doesn't have an account registered
    b. The user isn't logged into the app
VII. Quality Requirements:

I. *Use case name: Edit account info*
II. Participating actors: User
III. Entry condition: The user has a registered account, and is logged in
IV. Flow of Events:
    a. The user will select the menu, and select "Edit account info"
    b. The user will be brought to an edit account screen, with editable text fields for username, name, email, and password.
    c. The user will select the confirm icon when finished
V. Exit condition: The user successfully edits their account information as needed
VI. Exceptions
    a. The user doesn't have a registered account
    b. The user enters the same information as before
    c. The account database cannot be accessed
VII. Quality requirements: The application can pull data from and write data to the account database

I. *Use Case Name: Download Databases*
II. Participating Actors:

III. Entry Condition: The application is open
IV. Flow of Events:
    a. When the app opens, a sync process occurs, syncing the local databases with the cloud databases
    b. This will occur in the background, silently
V. Exit Condition: The application successfully syncs the databases contents
VI. Exceptions:
    a. The device isn't connected to the cellular network, Wi-Fi, or Ethernet
    b. The local database becomes corrupt, and cannot sync properly
    c. The cloud database becomes corrupt, and cannot sync properly
VII. Quality requirements: The application can read, write, and compare databases.

I. Use Case Name: Add non-listed item
II. Participating Actors: User
III. Entry Condition: The user clicks the "Add unlisted item" option on the main screen, and is logged into their user account
IV. Flow of Events:
    a. The user will click on the Add unlisted item option
    b. The app will ask for the name of the item, what it is, and the materials used to manufacture the item, as well as UPC info
    c. The user will press the "Submit for approval" button, which will send the request to an application admin for approval
V. Exit conditions: The user successfully submits the request
VI. Exceptions:
    a. The device isn't connected to a Cellular network, Ethernet, or Wi-Fi
    b. The request fails to send to the approval administrator
    c. The user isn't logged in to their user account
    d. The user doesn't have a user account
VII. Quality requirements:

I. Use Case Name: Find User's location
II. Participating Actors:
III. Entry Condition: The application is loaded successfully
IV. Flow of Events:
    a. When the application is started, the application will find the location of the device
    b. This will happen in the background
V. Exit conditions: The application successfully finds the user's location
VI. Exceptions:
    a. The device isn't connected to a cellular network, Wi-Fi, or Ethernet
    b. The Google Maps navigation system is down
VII. Quality Requirements

I. Use case name: Display product info\recyclability
II. Participating Actors: User
III. Entry conditions: The user searched for a product, either by camera, or by manual search

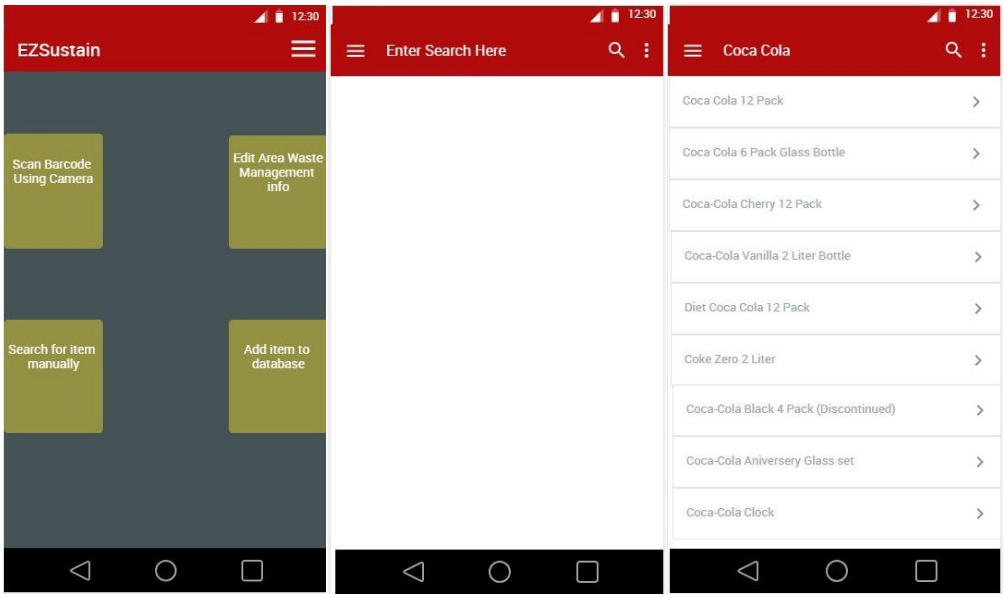
IV. Flow of Events:
   a. A list of items matching the search query will be displayed
   b. The user will click on a matching item, after that, the product's info will be displayed

V. Exit conditions: The user finds what they are looking for, or they want to go back to the search results

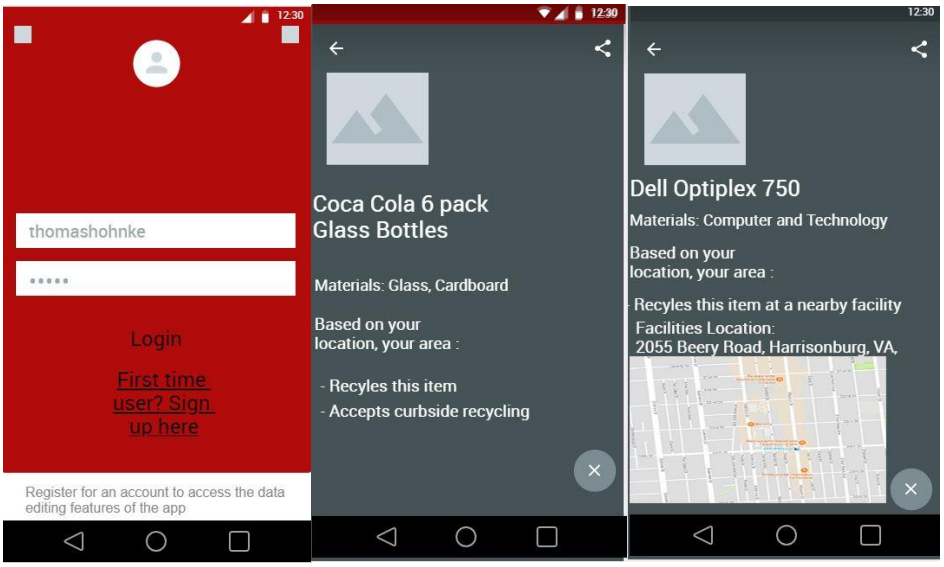
VI. Exceptions:
   a. The item doesn't exist in the database
   b. The item doesn't exist in general

VII. Quality Management:

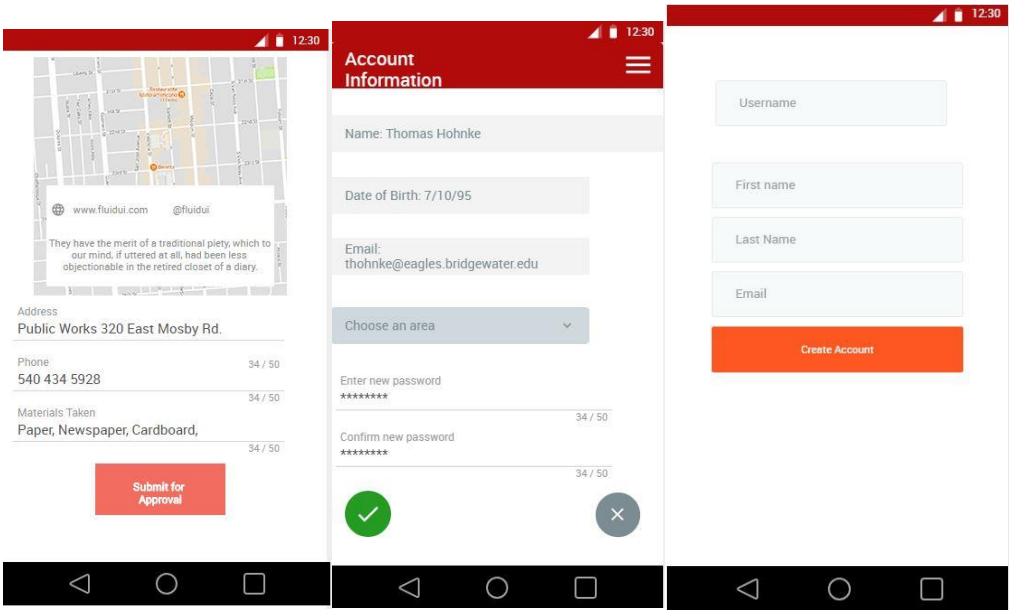
User Interface



Main Screen Manual Search Manual Search Populated



Account Login Page Material Info Page Material Info Recycle Facility



Waste Info Edit Page Account Information Page Account Creation Page

Database Tables

User Accounts

ID	Name	Email	Password
1	Thomas Hohnke	thohnke@eagles.bridgewater.edu	11223333221
2	John Doe	jdoe@gmail.com	47856987
3	Jane Doe	jadoe@hotmail.com	87yt256
4	Amazon Alexa	aalexa@aws.com	amZ1999

Item Info

ID	Item	Materials Used\Included	Barcode Info UPC
1	Coca-Cola 12-Oz. Glass Bottle	Glass	049000004632
2	Diet Coke Pack of 6 330ml Glass E	Glass, Cardboard	721864879723
3	Dr. Pepper Cherry 2 Liter Bottle	Plastic	078000098464
4	Marie Callender's Key Lime Pie, 3	Aluminum	612781102400
5	Chef Boyardee Spicy Beef Ravioli	Tin	064144020706

Waste Management Info

	Area Name	Contact Info	Curbside Recycling?	Public Recycling Facilities?	Facilities Location	Materials
1	City of Harrisonburg, VA	Public Works 320 East Mosby Rd.	No	Yes	2055 Beery Road, Harri	Plastics #1-#7, Household Batteries, Aluminum, Tin, Glass, Paper, Newspaper,
2	Town of Bridgewater, VA	Public Works Department (540) 908-3397	Yes	No		Aluminum, Tin, Newspapers, Cardboard Boxes, Plastic #1-#7
3	City of Staunton, VA	1911 Craigmont Road, Staunton, VA 24402-0058	Yes	No		Mixed Paper, Cardboard, Plastic #1-#7, Glass, Metal Cans, Aluminium
4	Town of Dayton, VA	125-B Eastview Street, Dayton, VA 22821 (540) 879-2241	Yes	No		Plastics, Aluminum, Glass, Tin, Paper, Newspaper, Cardboard
5	Town of Grottoes, VA	601 Dogwood Avenue, Grottoes, VA 24441, (540) 249-5896	No	Yes	1005 20th Street, Grott	Yard Waste, Grass, Glass, Aluminum, Newspapers, Cardboard, Plastic, Ferrous
6	Town of Elkton, VA	20593 Blue & Gold Dr	Yes	No		Aluminum, Tin, Steel, Cardboard, Plastic, Paper
##						

Glossary

Android: A portable and tablet OS, based on the Linux OS, Most phones use this as their main user interface for general navigation

Cellular Data: The cell service, provided by a phone service provider

Database: A table of data that the system pulls and reads from

Main Screen: The first screen the user interacts with when they start the app

Network: The method of data connectivity, either using Wi-Fi, Ethernet, or Cellular service.

Query: Another name for a search term, i.e. what the user is searching for

Registered User: A name for a user who has created a user account and registered with the system.

Sustainability: A common business term, the ability to recycle and reuse resources

User: a participating human actively engaging with the app

User Account: An account containing the user's personal info, such as name and email

User Name: A given name or handle for a registered user, that identifies them as a person

User Interface: The screen in which the user interacts with