

TRAZE



**Traze: A Real-Time Routing, Scheduling, and Monitoring
Android Application for Delivery Services using Dijkstra
Algorithm and Ant Colony Optimization**

An Undergraduate Thesis
Presented to the Faculty of the
College of Information and Communications Technology
West Visayas State University
La Paz, Iloilo City

In Partial Fulfillment
of the Requirements for the Degree
Bachelor of Science in Computer Science

by

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Disclaimer

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Getting Started

Introduction

This is the user manual for Traze, a delivery services mobile app. This app is designed to make the delivery process easier and more convenient for both customers and delivery personnel. With this app, you can track deliveries, schedule deliveries, and manage your account all from the palm of your hand. In this manual, you will find detailed instructions on how to use all the features and functions of the app, so you can make the most of your delivery experience.

System Requirements (Android)

Operating System: Android 11
Processor: Octa-core 2.3 GHz
Ram: 4GB
Internet

Installation

1. To download the application, please follow the link provided: (<https://github.com/Mariaarlyn14/Traze/releases/latest/download/Traze.apk>). By accessing the link, you will be directed to the latest release of the Traze application. From there, you can proceed to download the Traze.apk file and install it on your Android device.
2. Enable unknown sources: Go to "Settings" > "Security" > "Unknown Sources" and toggle the switch to allow installation of apps from sources other than Google Play Store.
3. Install the APK: Tap on the APK file and follow the on-screen instructions to complete the installation process.

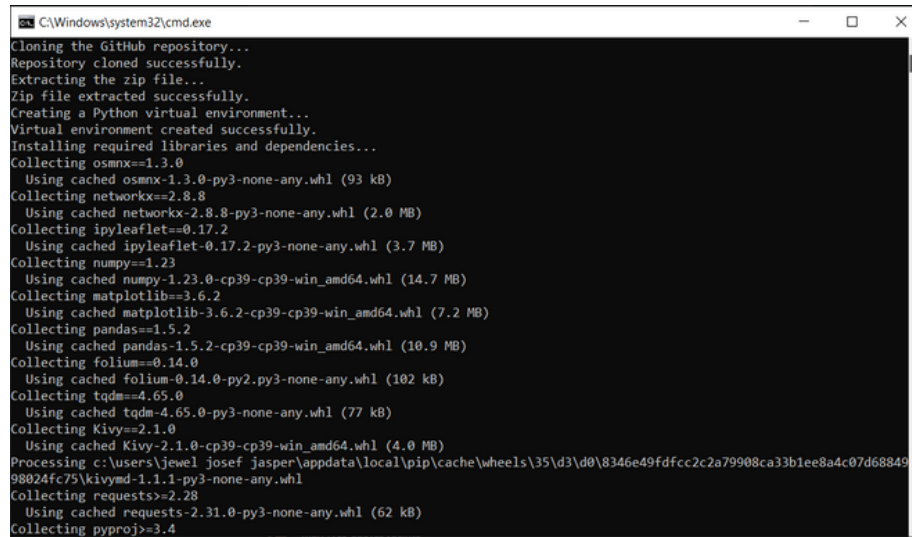
System Requirements (Windows)

Operating System: Windows 10/11
Processor: 2Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.11GHz
Ram: 8GB
Python Version: Python 3.9.0

Running the Application from the Source Code (Use Visual Studio Code to execute the source code)

Setting up the Source Code

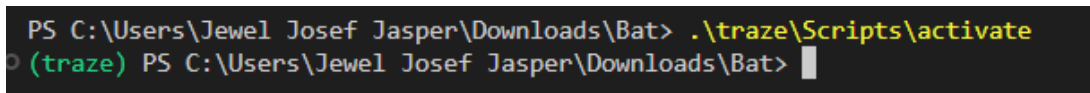
1. Download the "setup.bat" from the link (<https://github.com/Mariaarlyn14/Traze/releases/latest/download/setup.bat>), save it on a separate folder, and run the ".bat" file to automatically clone the repository, create a virtual environment, and install the needed libraries with "pip install -r requirements.txt"



```
C:\Windows\system32\cmd.exe
Cloning the GitHub repository...
Repository cloned successfully.
Extracting the zip file...
Zip file extracted successfully.
Creating a Python virtual environment...
Virtual environment created successfully.
Installing required libraries and dependencies...
Collecting osmnx==1.3.0
  Using cached osmnx-1.3.0-py3-none-any.whl (93 kB)
Collecting networkx==2.8.8
  Using cached networkx-2.8.8-py3-none-any.whl (2.0 MB)
Collecting ipyleaflet==0.17.2
  Using cached ipyleaflet-0.17.2-py3-none-any.whl (3.7 MB)
Collecting numpy==1.23
  Using cached numpy-1.23.0-cp39-cp39-win_amd64.whl (14.7 MB)
Collecting matplotlib==3.6.2
  Using cached matplotlib-3.6.2-cp39-cp39-win_amd64.whl (7.2 MB)
Collecting pandas==1.5.2
  Using cached pandas-1.5.2-cp39-cp39-win_amd64.whl (10.9 MB)
Collecting folium==0.14.0
  Using cached folium-0.14.0-py2.py3-none-any.whl (102 kB)
Collecting tqdm==4.65.0
  Using cached tqdm-4.65.0-py3-none-any.whl (77 kB)
Collecting Kivy==2.1.0
  Using cached Kivy-2.1.0-cp39-cp39-win_amd64.whl (4.0 MB)
Processing c:\users\jewel josef jasper\appdata\local\pip\cache\wheels\35\d3\d0\8346e49fdcc2c2a79908ca33b1ee8a4c07d68849
98024fc75\kivymd-1.1.1-py3-none-any.whl
Collecting requests==2.28
  Using cached requests-2.31.0-py3-none-any.whl (62 kB)
Collecting pyproj==3.4
```

Running the ".bat" file

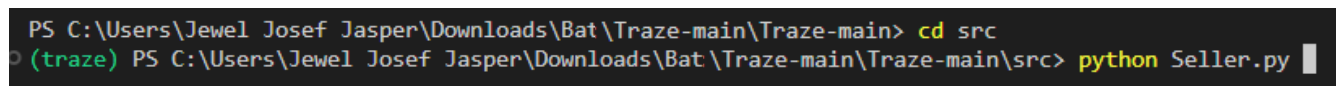
2. After the ".bat" file is finished executing, open your Visual Studio Code, and open the folder that you created on the vscode. Open a new terminal and then execute ".\traze\Scripts\activate" to activate the virtual environment.



```
PS C:\Users\Jewel Josef Jasper\Downloads\Bat> .\traze\Scripts\activate
(traze) PS C:\Users\Jewel Josef Jasper\Downloads\Bat>
```

Activating the Virtual Environment

3. To run the source code from the "src" folder, write "cd src" to go to the directory of the source code, and from there you can run the python files by typing "python <space><name of python file>" do note that **main.py**, **DeliveryPerson.py**, **map_ACO.py**, **map_Dijkstra.py**, **account.py** won't run since it has a module that will only run once compiled into an apk.



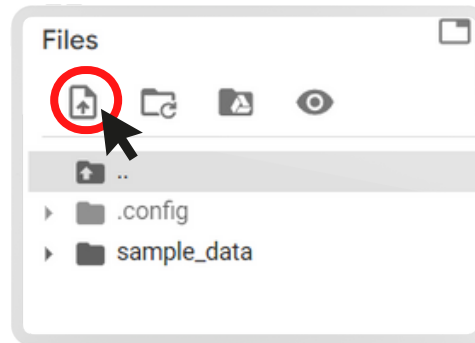
```
PS C:\Users\Jewel Josef Jasper\Downloads\Bat\Traze-main\Traze-main> cd src
(traze) PS C:\Users\Jewel Josef Jasper\Downloads\Bat\Traze-main\Traze-main\src> python Seller.py
```

Run the Python files

Compiling the Source code into an apk. Open the link below:

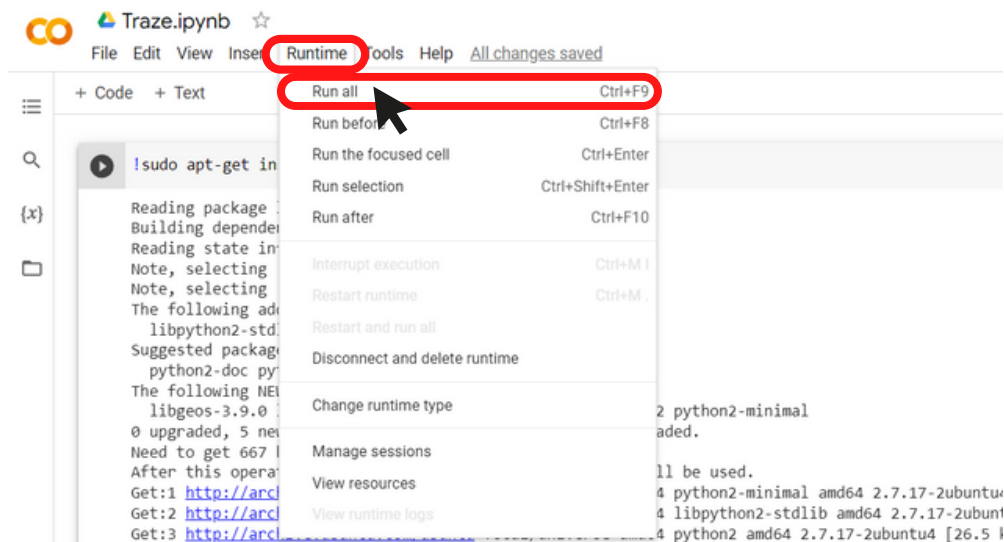
(https://colab.research.google.com/drive/18dwTfOZV5ZT0rZHVKD73pWirgY1DDm6?fbclid=IwAR3VN1n8A0Oc4jK-bWf3D10QrtzQwpffoaD0Jvnmk4u2Wd3ThV_toK2hcWp8#scrollTo=BPfpyjcGpR-D)

1. Upload all the files from the "src" folder that was extracted earlier, which includes the buildozer.spec file.



Click on this icon to upload files

2. On the menu bar, click on "runtime", and on the dropdown, click on "run all". This will run all the code cells which will install all the dependencies to compile the source code into an apk, and ultimately compile the source code into an apk.



Run all code cells

3. After it's done compiling, the apk will appear on the bin folder which can be found on the side bar, ready for download.



Usage

Welcome page

The homepage consists of the Application's logo and a continue button. Pressing the Continue button will direct the user to the Login Page



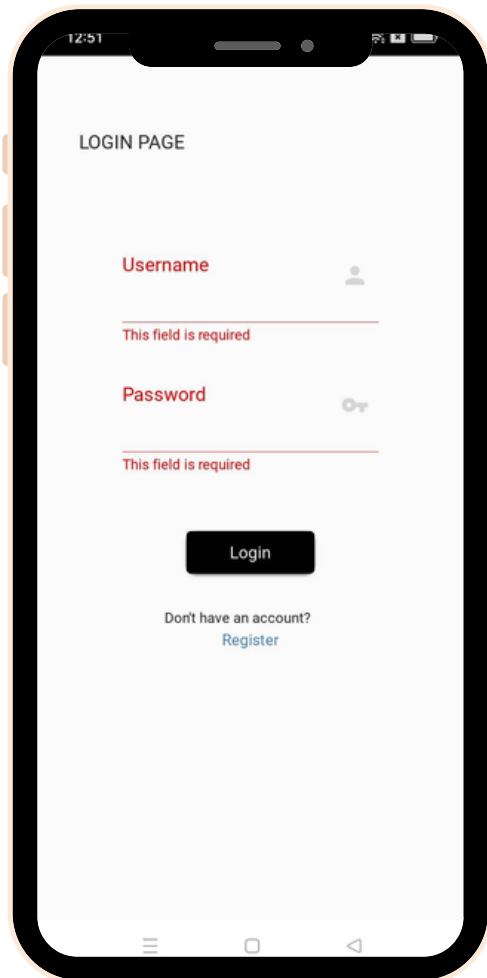
This is the Welcome Page



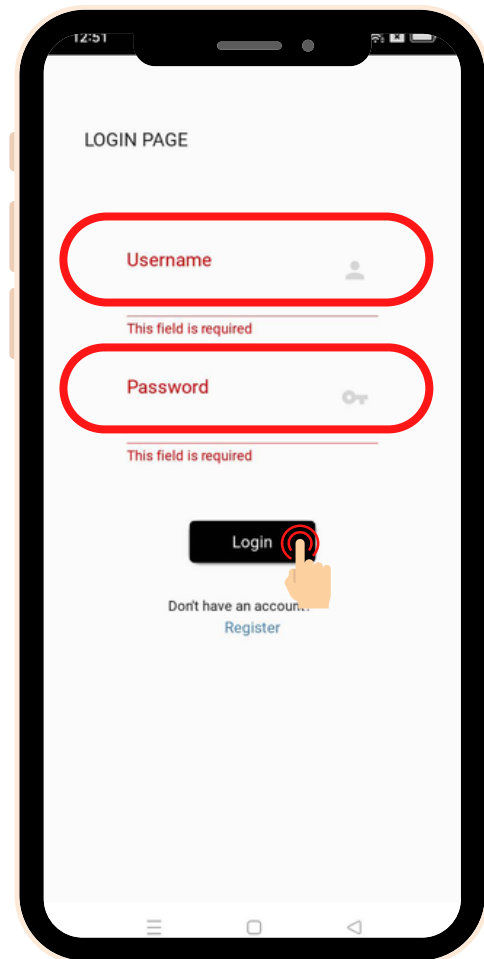
Clicking "Continue" will direct the user to the Login Page

Login page

The login page is where the user will enter their username and password in order to access the application's features, clicking on it will direct the user to their role pages which are either Delivery Person, Seller, or Customer. It also has a register hyperlink where the user will be redirected to the Signup page if the user has no existing account.



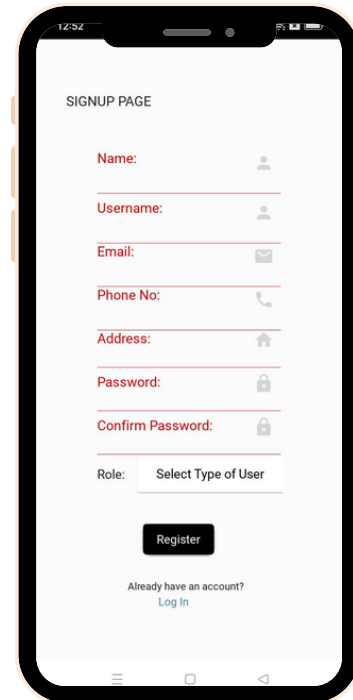
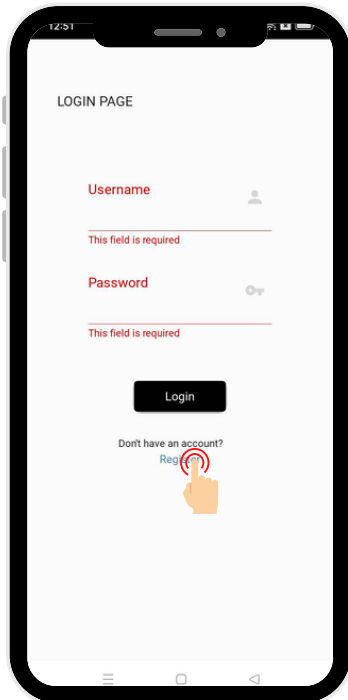
This is the login page that displays the required fields to be filled in.



Enter your username and password before pressing Login to have access to your account

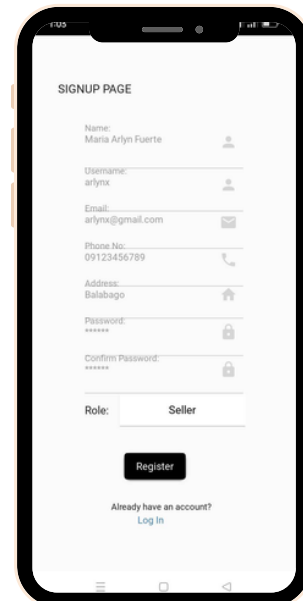
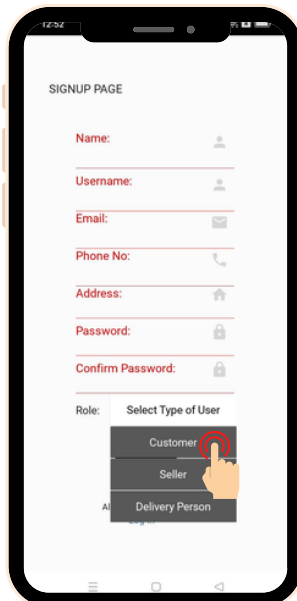
Sign Up page

The Sign up page is for new users where they can enter their credentials which will be stored in the database after pressing register. Pressing on "Select Type of User" will give a dropdown list of types of users which are: Customer, Seller, and Delivery Person.



If you don't have an existing account:
From the Login Page, press Register to proceed to The Signup page

This is the Signup Page that requires the user to fill in the required information in order to be registered

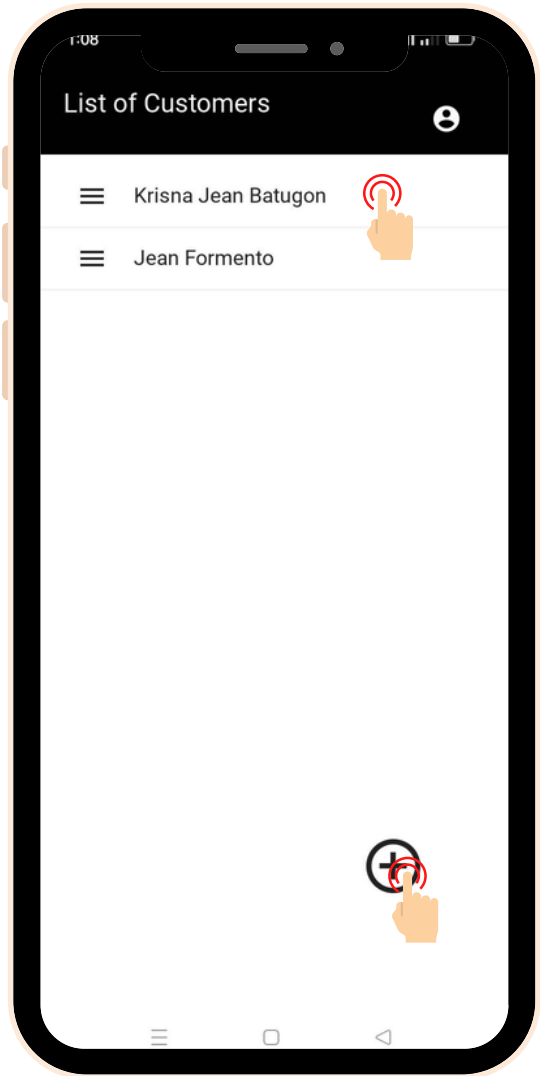


If you don't have an existing account:
Enter your credentials and select your role which are either: Customer, Seller, or Delivery Person.

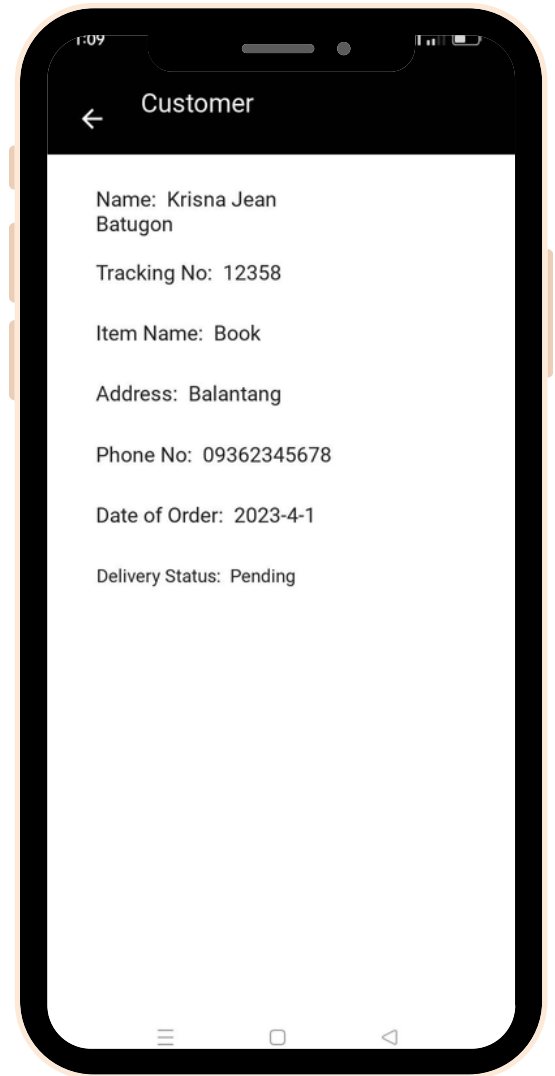
If you don't have an existing account: Press Register to Register your account. You can then proceed to the Log In page to enter your registered username and password

Seller Homepage

Clicking on Seller User Type will redirect the user to the seller homepage, where the seller's customers are displayed as well as the details of their orders. Clicking on the customer's name will direct the seller to a page where it displays the details of their customers' orders.



This is the Seller Homepage. It lists the names of the customers. Clicking on one of the listed items will show the details of each item. Clicking on "+" will open up a page where the seller will input the details of the customer and their order



This will be displayed after clicking the name of the listed customer. It contains their details, and the tracking No. which will be used by the Customer to track their order.



← ADD CUSTOMER

Name of Customer

Customer Phone No.

Item Name

Customer Address

Pick-up Address

Date of Order

Category:

Add

Here, the seller will input the necessary details of the customer. During the process of entering the Customer and Pick-up Address, the Seller should ensure that the locations are included in our dataset, which specifically consists of Barangays in Iloilo City.

To check for the availability of data, open the link below:

(<https://docs.google.com/spreadsheets/d/1d3newLsaYNU39O1xKI7xx6Tz1tsxgYTsW9Vpl2Gkj5o/edit?usp=sharing>).

The new listed customer is now then displayed on the Homepage of the Seller.

← ADD CUSTOMER

Name of Customer
Jirah Solano

Customer Phone No.
09456789315

Item Name
Comb

Customer Address
Danao

Pick-up Address
Bakhaw

Date of Order
2023-4-2

Category: Non-Perishable

Add

Click Add button to add the customer on the list displayed on the homepage, which will then generate the tracking number for the order.

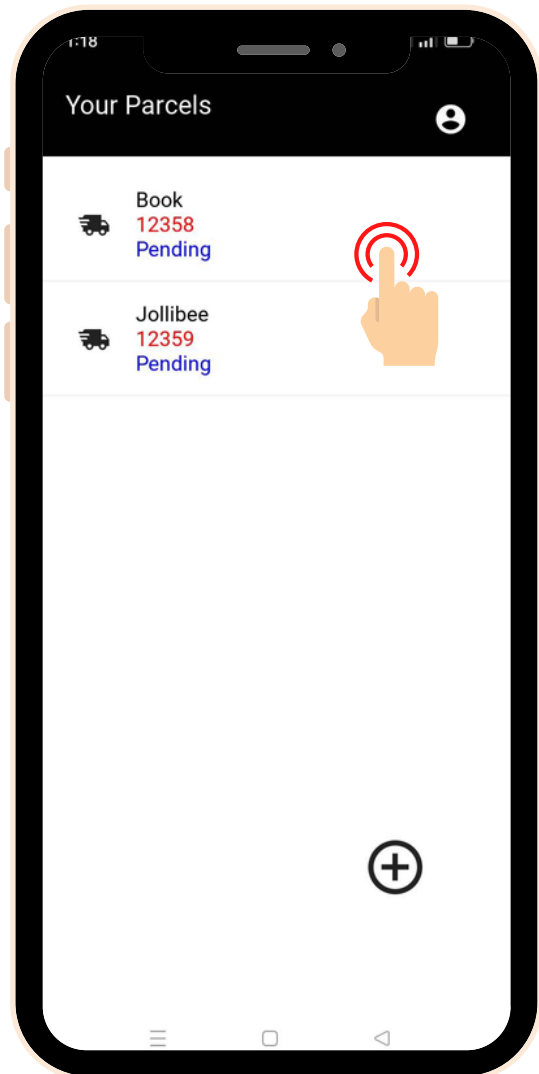
List of Customers

- Krisna Jean Batugon
- Jean Formento
- Jirah Solano

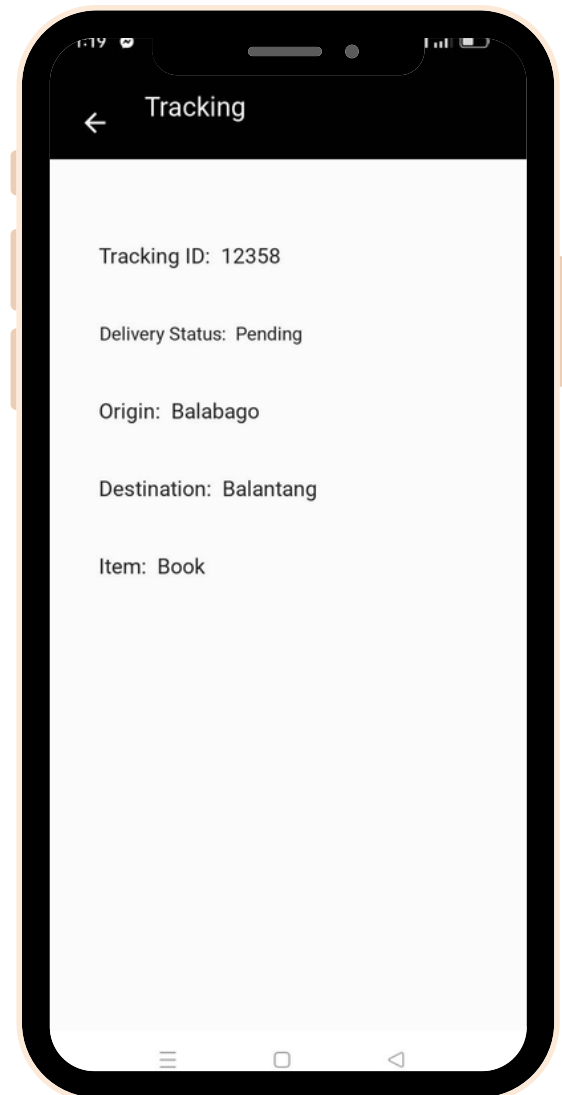
Customer Added Successfully

Customer Homepage

Clicking on Customer User Type will redirect the user to the customer homepage, where the customer's orders are displayed. There's also an add button where the customer can input the tracking number to track their orders.

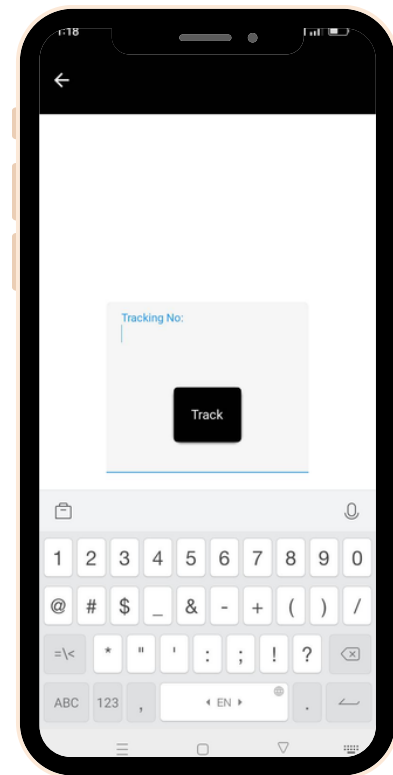
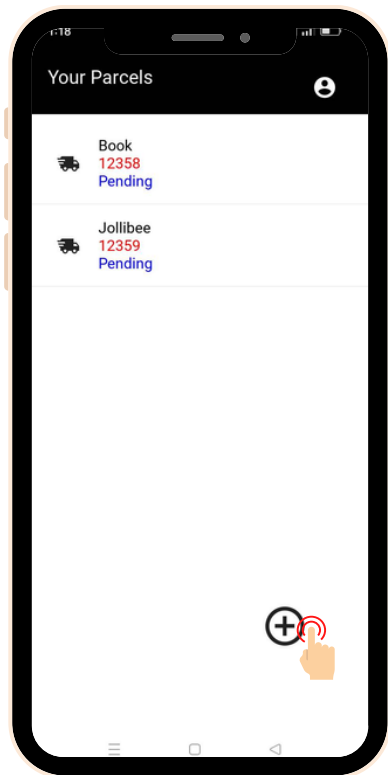


This is the Customer Homepage, it will contain the list of deliveries so that the customer can monitor it. Pressing on one of the displayed items will direct you to the Tracking Info the displays the Information for the delivery of your item.

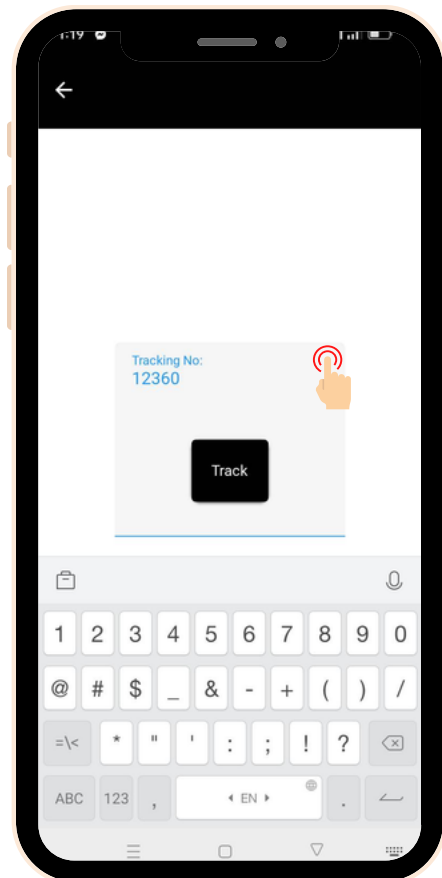
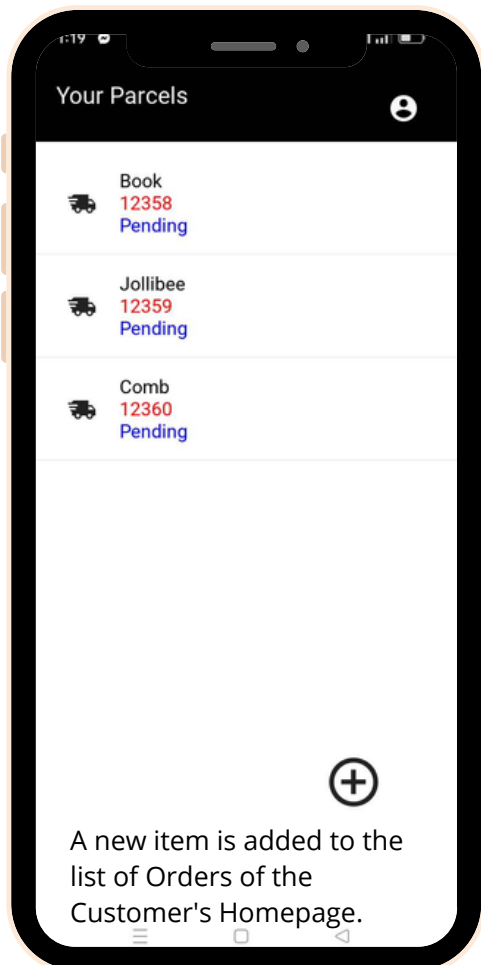


This is the displayed information of the listed item which will display its Tracking ID, Delivery Status, Origin, Destination, Estimated Time of Arrival and the type of Item





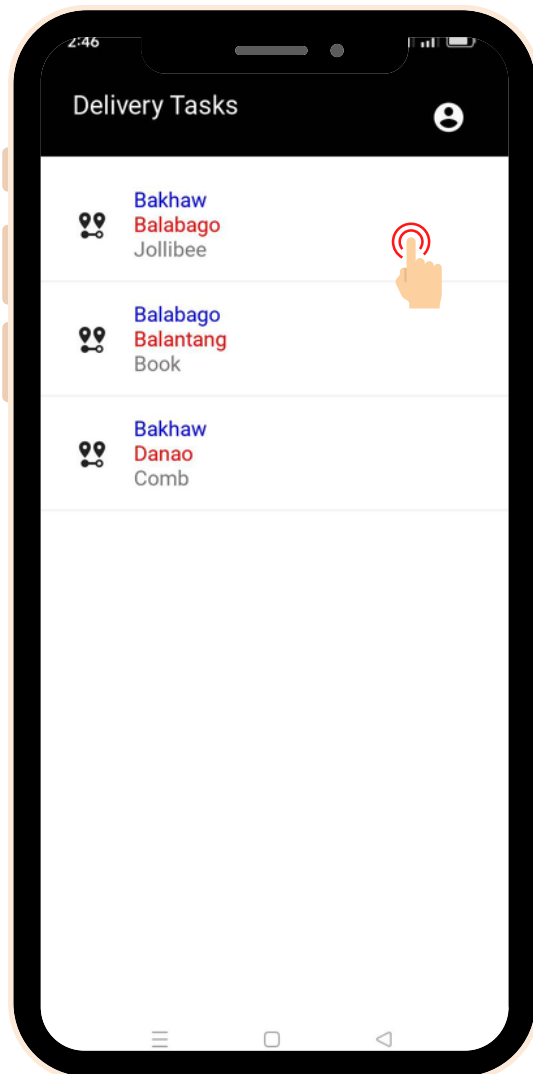
Press the "+" button to add a tracking No.
In order to Track your deliveries



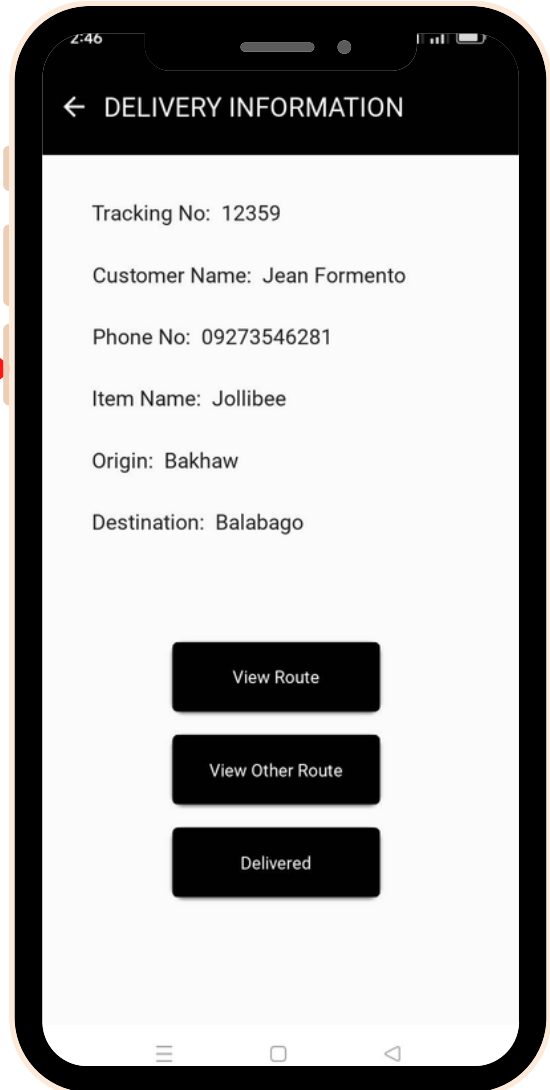
Input the Tracking No. Which will be provided
by the seller to the Customer. Press Track
Button to Add your deliveries on the list of
orders that are being monitored

Delivery Person Homepage

Clicking on Delivery Person User Type will redirect the user to the Delivery person homepage, where the delivery person's deliverables are displayed as well as the origin and destination of these orders. Clicking on it will direct the user to a page that lists the details of the said order; and the main route from the Dijkstra Algorithm and the Alternative routes from the ACO algorithm



Delivery Person Homepage with tasks listed. If user presses one of the listed items, it will go to the Information Page.

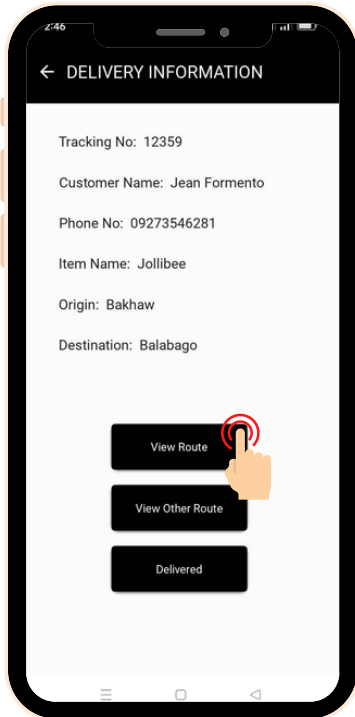


Information about the delivery task displayed if a task is pressed. Which contains the routes for the task.

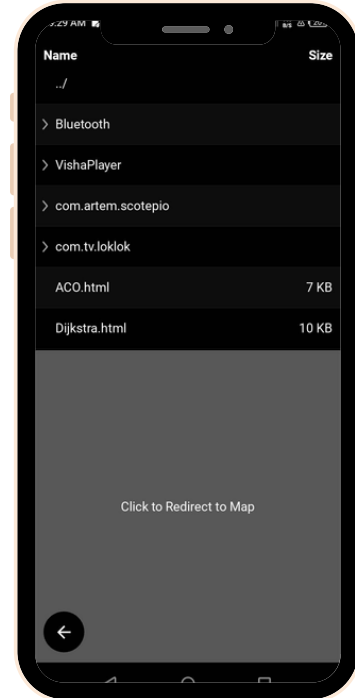


Main Route (Dijkstra Algorithm)

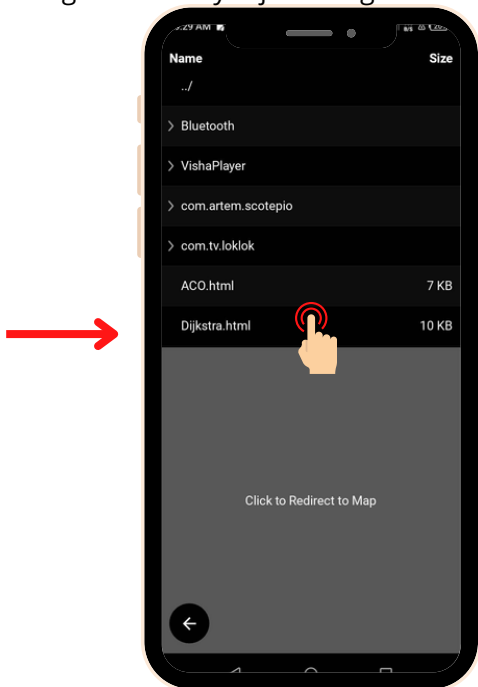
The Dijkstra simulation will show the shortest distance (green) and the shortest time (dark blue) to arrive at the destination (Red tag) from the origin (Blue tag). Clicking on the path will show its details.



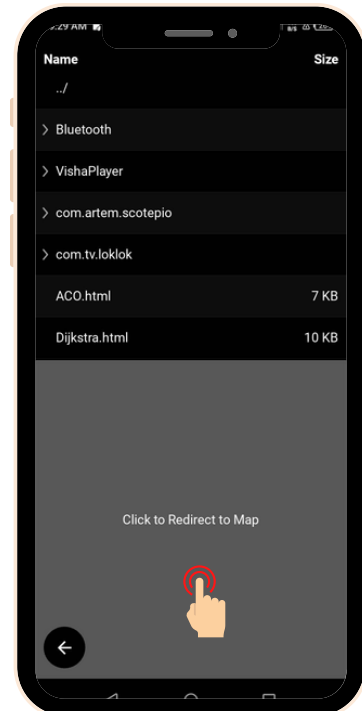
Press View Route to show the routes generated by Dijkstra Algorithm



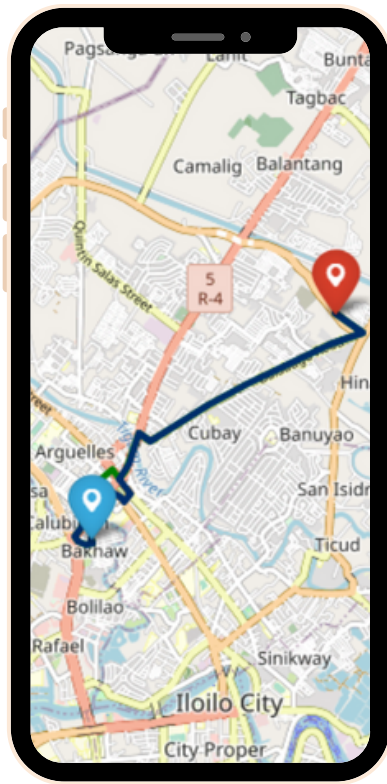
The File Browser is then displayed where you can only view html files.



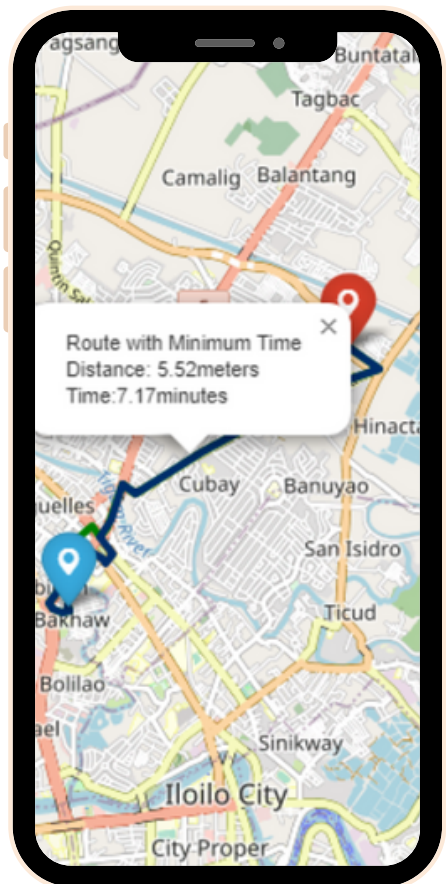
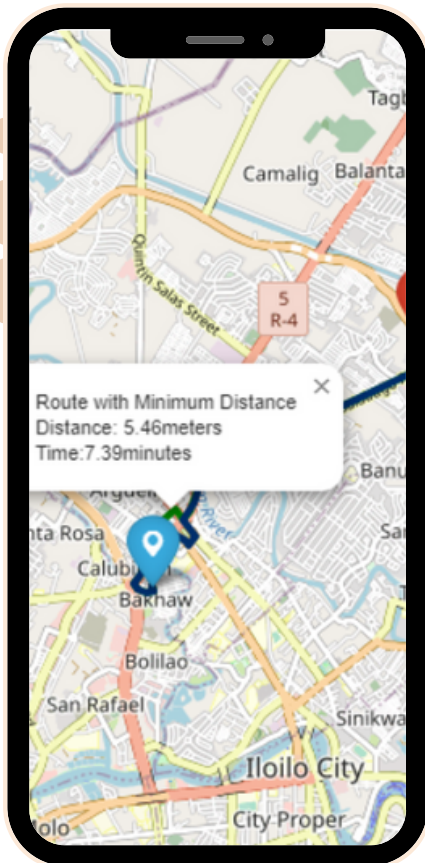
Press the "Dijkstra.html" to display the routes generated by Dijkstra Algorithm.



Press Click to Redirect to Map to redirect to the map



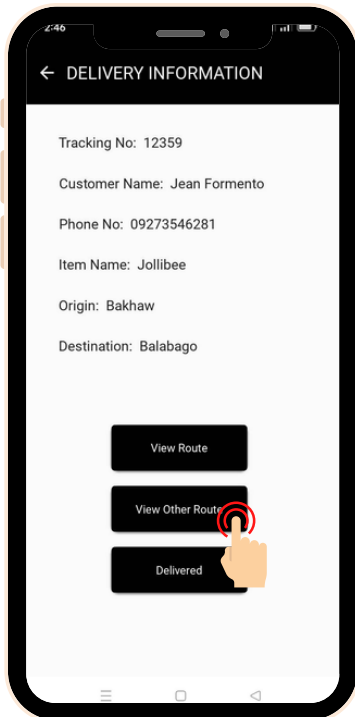
This is the displayed routes for the Dijkstra Algorithm



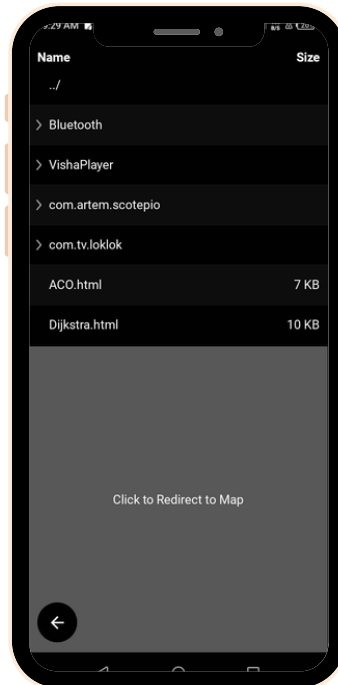
Pressing on the colored lines (Green for Minimum Distance Route and Blue for Minimum Time Route) will show the Distance and Time for each route

Alternative Route (Ant Colony Optimization)

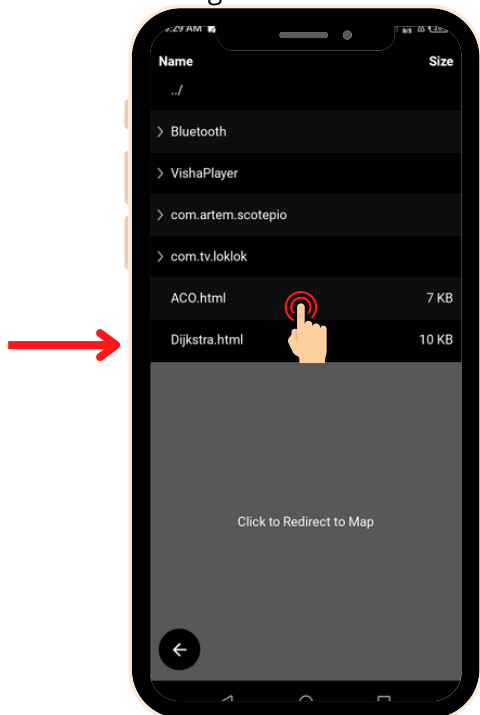
The ACO simulation will show the alternative route to arrive at the destination (Red tag) from the origin (Blue tag). Clicking on the path will show its details.



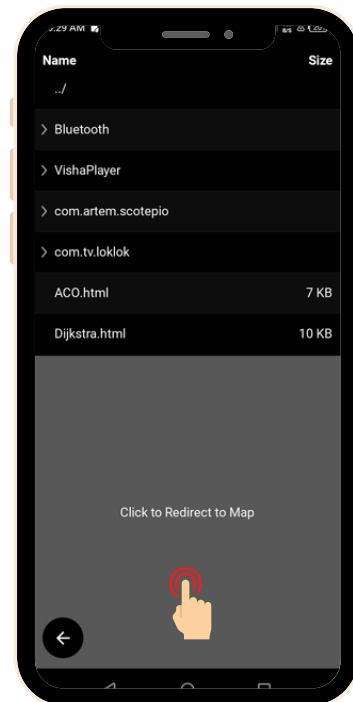
Press on the "View Other Route" to view the route that was executed by the ACO algorithm.



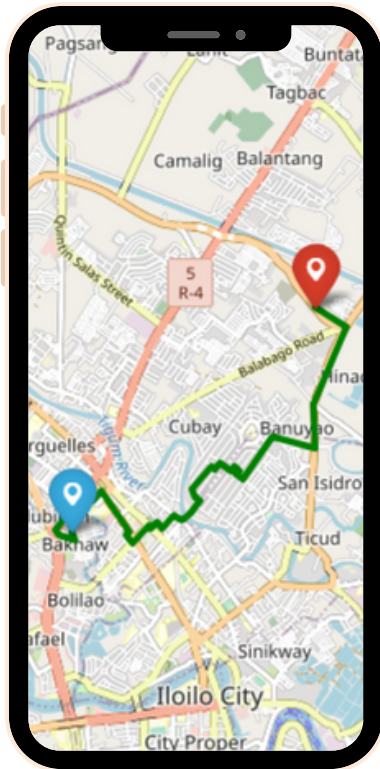
The File Browser is then displayed where you can only view html files.



Press the "ACO.html" to display the routes generated by ACO Algorithm.



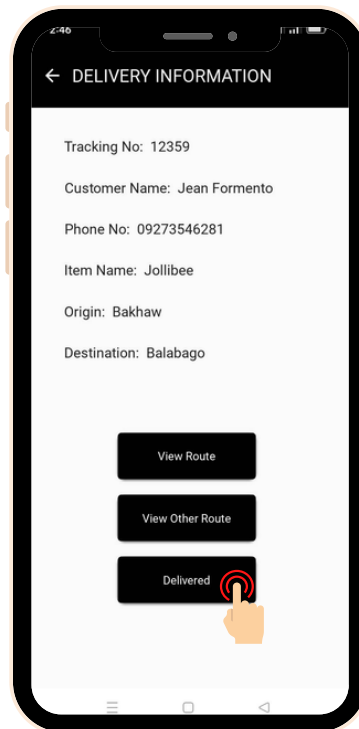
Press Click to Redirect to Map to redirect to the map



The ACO Route is then displayed on the map with its origin (blue tag) and Destination (red tag) with green path as the path for the alternative route.



Pressing on the colored lines (Green for Minimum Distance Route and Blue for Minimum Time Route) will show the Distance and Time for each route



Press Delivered if the Delivery was successful and the parcel was delivered safely to the Customer.

Working with the Algorithms

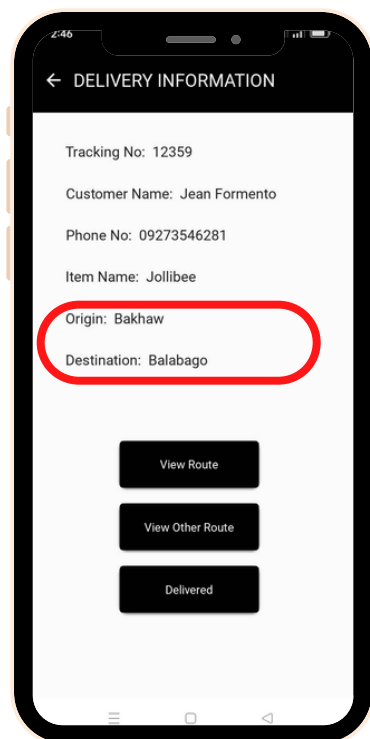
To produce the HTML files required for the Delivery Person application, the initial step involves executing the algorithms. This necessitates the installation of python3 and the fulfillment of the requirements outlined in the "requirements.txt" file. Subsequently, the Dijkstra ("Dijkstra.py") and ACO ("ACO.py") algorithms should be executed.

To enhance accessibility and facilitate smoother execution of the algorithms, a Google Collab notebook has been created. This notebook offers a more efficient platform for running the code.

link for Google Colab notebook:

(<https://colab.research.google.com/drive/1dSlbjAXhbsRaO5O8azrfq-hAqGfk0whj?usp=sharing>)

To ensure the algorithm functions properly, manually input the origin and destination information from the Delivery Information page. This input enables the algorithm to effectively process and calculate results based on the specified points. Your active involvement in providing this information is crucial for accurate algorithm performance.

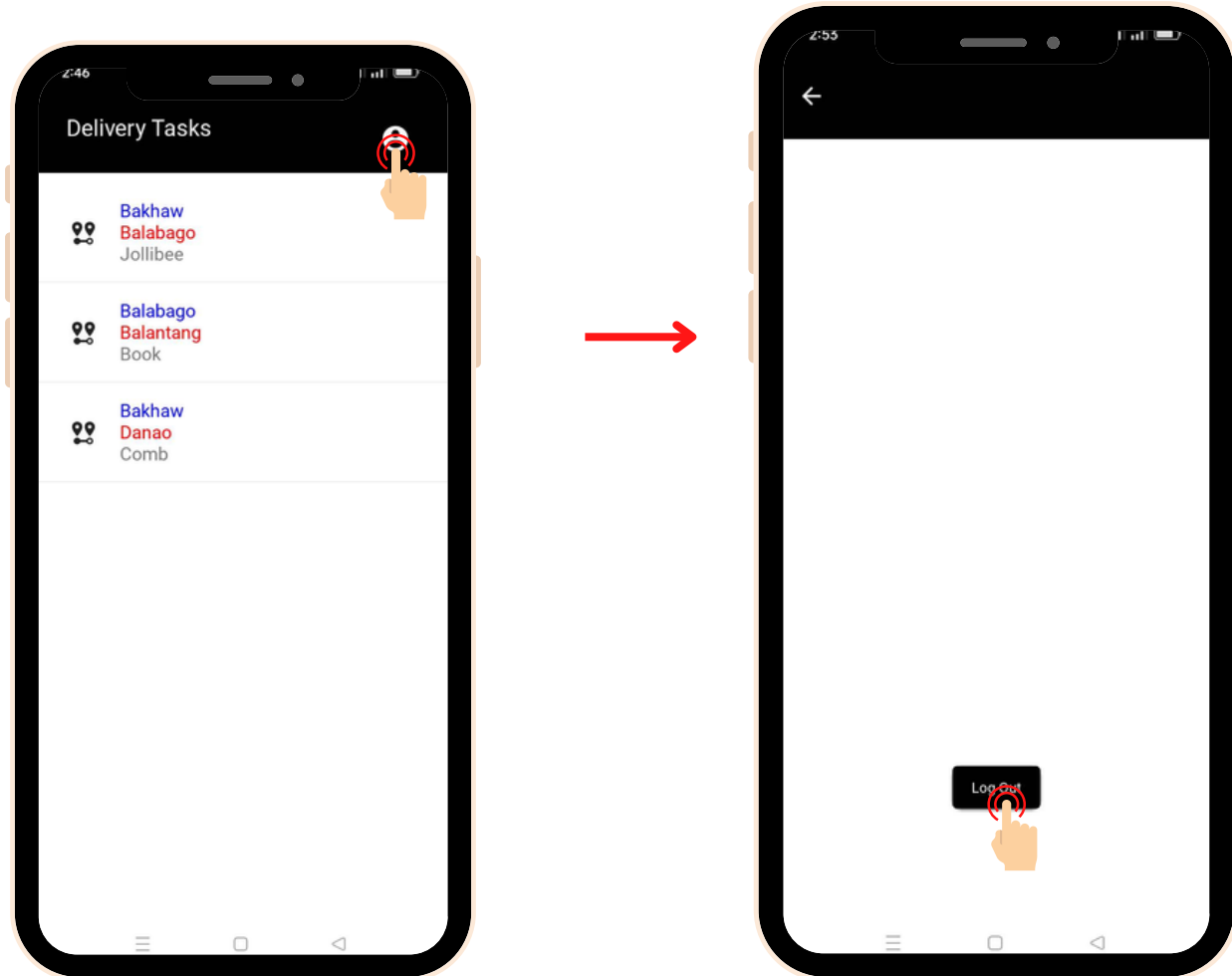


```
Origin: Bakhaw
Destination: Balabago
```

Once you have finished inputting the origin and destination values, the algorithm will initiate the process of determining the most efficient route using both Dijkstra and ACO algorithms. Once the computation is completed, the system will generate an HTML file as an output. It is necessary for you to download this file onto your Android device. By doing so, you will have access to the results and can review the optimized path for your journey.

Logging out

By logging out of the system, you gain the ability to switch between various roles available within the system. This action allows you to transition from one role to another, granting you the flexibility to perform different tasks and access different features based on the privileges associated with each role.



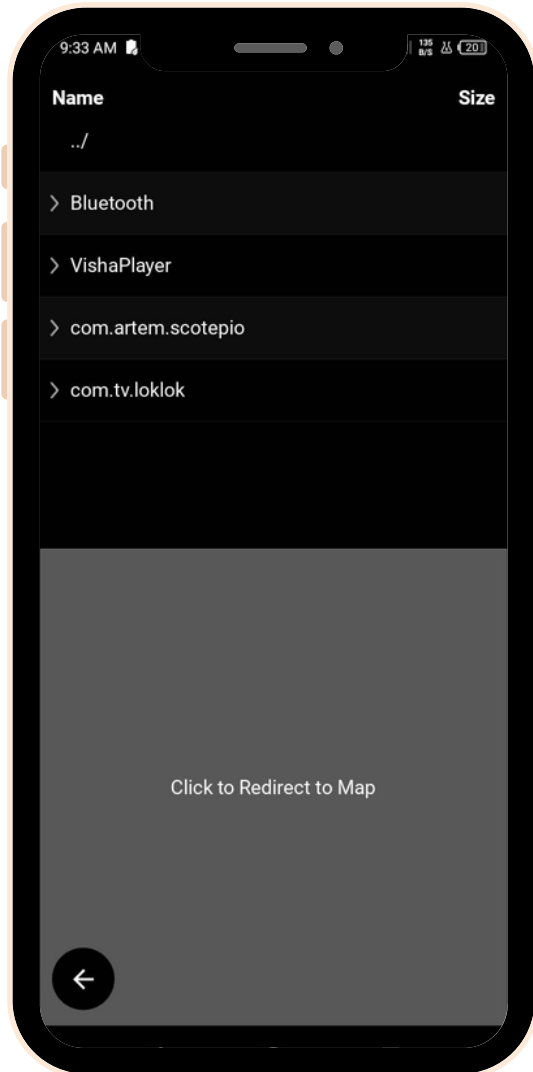
Press the account button located in the right upper corner of the application.

Press the Log Out button to log out of the application. This will redirect you back to the Log in Page.

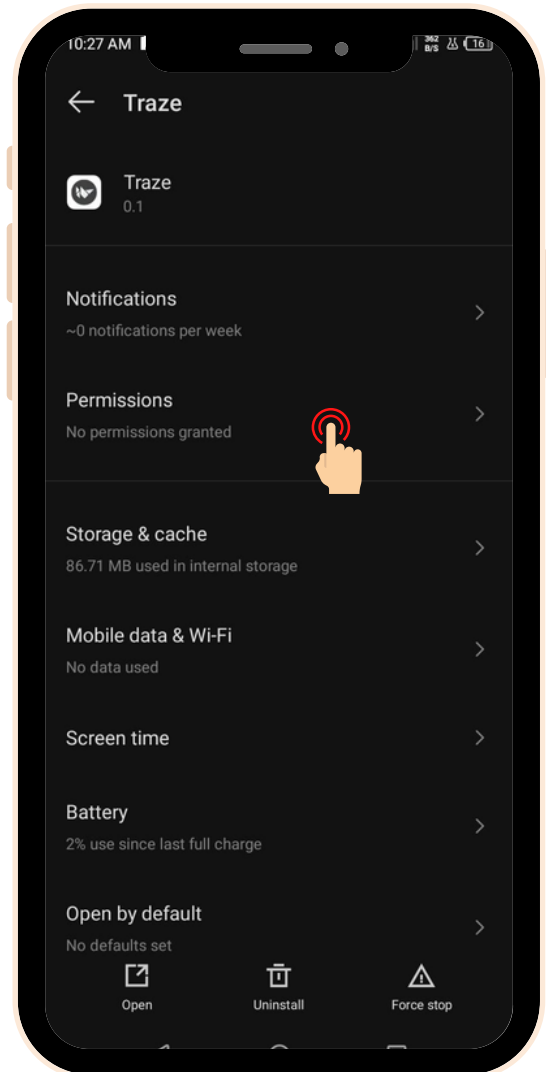
Troubleshooting for fixing possible bugs

The File Browser exclusively shows folders, with no visible display of files.

1



2



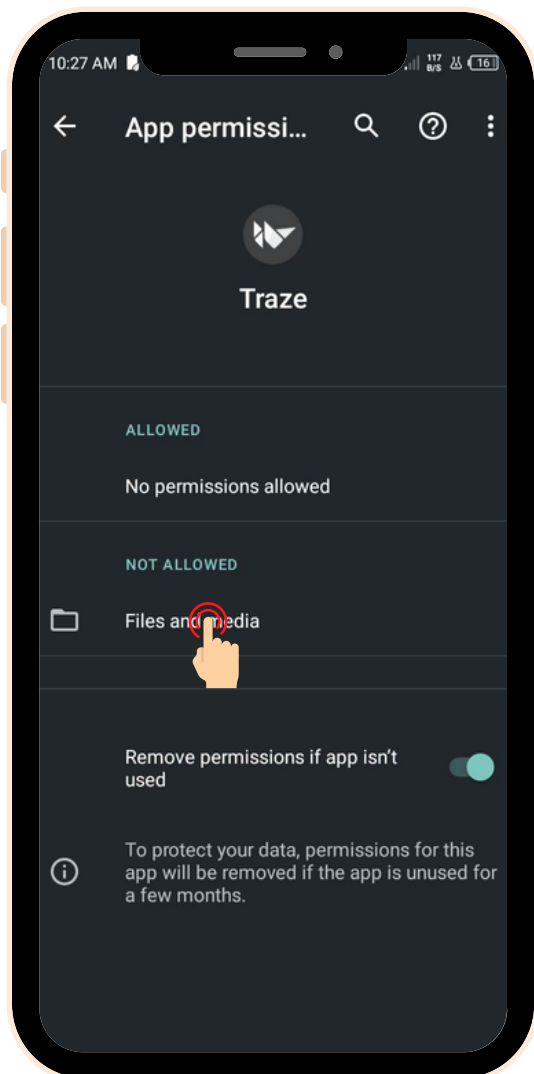
If HTML files are not visible in the file browser, it indicates that there is an issue with the permission settings on your phone, preventing their display.

Go to the app setting of Traze then click Permission. From there, you can access and manage the permissions granted to the app.



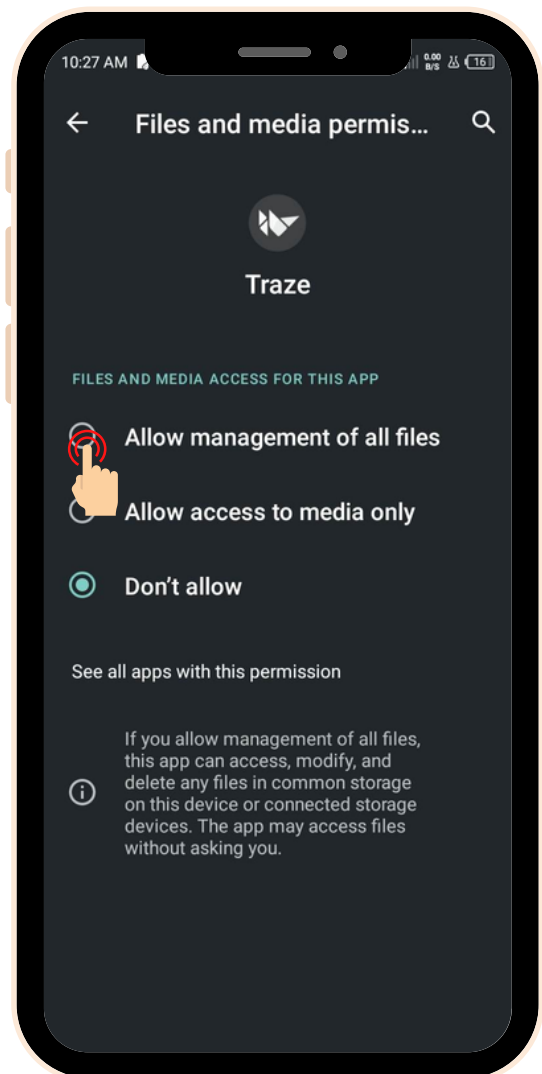
The File Browser exclusively shows folders, with no visible display of files. (continuation)

3



Click Files and Media to give access the files on your phone.

4



Click allow management of all files to give full access of the files stored in your Android storage

Frequently Asked Questions (FAQs):

Q: How do I place an order through the delivery system?

A: You cannot place an order directly through the delivery system as it is designed for the seller to input customer details for delivery purposes.

Q: Can I track my order through the delivery system?

A: Yes, as a customer, you can track your order through the delivery system. The delivery system will generate the information for the customer to track their order.

Q: How does the Delivery System work?

A: the seller inputs the customer details for delivery, and the system generates a map for the delivery person and tracking information for the customer to track their order.

Q: What is the scope of the map generated by the delivery system?

A: The map generated by the delivery system is limited to Iloilo City, and it only shows the delivery route and delivery location within the city. The system is designed to track orders that are delivered within the city limits and does not provide mapping information outside of Iloilo City.

Contact Details of Development Team: Thesis Members

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