C.H Robinson Discount App
Functional Specification Document

App Overview:

Our Driver App is designed to simplify the process of finding gasoline, lodging, and food for the truck drivers of our third party logistics providers. The app will be linked with our Navisphere app, allowing drivers to be signed in on the same account on both applications and for the transfer of data between both applications depending on the status of the freight trip. Drivers can set up a trip and pick up freight on Navisphere, and then move over to the Driver App to set up the details of their drive including stops for discounted or regularly priced food, gas, and potential overnight stays depending on the length of the trip. Drivers will also be able to find discounted lodging if necessary for the end of their trip leave through our app. The app can focus on safety by having voice recognition so drivers can use the app hands free while driving, and can also use the app manually when parked at a rest stop. Upon the end of a route, drivers can end their trip and be directed back to Navisphere to complete the rest of their processing for that freight haul.

Key Assumptions :

- Carriers can issue their drivers either android or ios phones, so we must ensure that we have an app for both platforms.
- Any driver using this app works for a carrier that is signed up for the Navisphere carrier program, and uses the Navisphere app to manage deliveries already.
- We will also be issuing an update to the Navisphere app that includes a button in the order screen that opens up the freight trip in our Driver App, which can be accessed after freight has been loaded in the truck and the trip is about to begin.
- This app will be connected to either google or apple maps, depending on the company smartphone issued to drivers and licensing agreements from C.H Robinson
- While this app will have food & lodging discounts, since food costs are minimal and truckers spend the vast majority of nights in their sleeper cabs instead of hotels, the algorithm we use will focus mainly on finding cheap/discounted gas along with cheap overnight parking at truck stops where applicable, as those would lead to a greater cost savings overall.
- Because this app is only used for setting trip preferences and does not contain any sensitive information pertaining to the freight product, there is no need for admin user accounts except for testing. No trip specific data will be stored in the app permanently, since at the end of each trip all relevant data will be sent to our database.
- The trucks have an electronic display that can accurately provide information on the driving range of the vehicle to drivers at any time

- Google Maps/Apple Maps API can provide accurate information on hotel prices and availability.

Risks

- Using our database data to find discounted truck stop parking might cause us to miss out on free parking spots
- Relying on a third party GPS tool for tracking location
- App must gain permissions to enable voice recognition and location tracking
- App relies on strong internet access
- App mistakenly detects driver exiting freeway repeatedly or arriving at location, causing distracting voice prompts
- Google Maps/Apple Maps API might not provide accurate information on hotel prices and availability.

Technical Specifications:

- App must be developed in both Android Studio and in Xcode to be compatible with iphone and android phones.
- App must gain permissions to enable voice recognition and location tracking.
- API's to google/apple maps and a secure link to the Navisphere app for automatic log in.

Users:

- Truckers with Navisphere accounts
- C.H Robinson Personnel with Navisphere accounts, for testing purposes

App Features:

Trip Setting Algorithm/Functionality

- The algorithm will use an API to apple/google maps (depending on the operating system used) to first determine a base route with a parameter set in searching for gas stations that provide discounts and cheap gas along the route (google maps has data on gas prices per gas station). The algorithm can compare the cheapest regular gas cost with the cheapest discounted gas cost that is accessible within the first 400 miles of the trip (or a little less so we don't run the gas tank dry). Since gas is the largest expense overall for trucking this will be the first priority. The second cost saving priority will be parking at truck stops and searching for truck stops that have a discount in our database along the route. The algorithm will also search for and display discounted/cheaper hotels near the end of the route or along the 14 hour mark according to the duty period law if a trip exceeds that time and/if the trucker specifies preference for staying in a hotel that night. These three factors go into optimizing the route and pre planned stops. The algorithm must also be able to re-run itself and produce a new route with new stops if the driver decides to stop and change his preferences for lodging, gas, or parking destinations during the trip.

- Finally, food preferences and discounts will be loaded in by a separate function only when drivers arrive at destinations or signal to the app that they are looking for food, since food discounts of a couple dollars are not worth significantly altering the route of a day long route.

Trip Log/Data Gathering

- A log of all the stops a driver has made via the app, such as for food or gas that the driver searched for, for data gathering purposes and to provide data insights on how we can improve processes.

Exception Handling/Error Reporting

- One plausible error that could happen would be if a trip is selected and there is no gasoline available within the inputted vehicle range that would allow the driver to complete the trip with just one gas stop. In that case the driver must be prompted to make sure they entered in the right mileage, and then to find gas locally and fill up if needed as well before starting the trip. If the trip is still not possible,
- Any errors that cause the app to catch must be caught and reported to a database dedicated to data gathering and error gathering that we will set up to run in tandem with this app.

Databases

We will need two databases. One will be the C.H Robinson partner discount database. This database should be queried from the app securely (authentication credentials with each data request) for data on discounts.

The second database will receive data on trips and any errors in the application for our records. Both databases will need safeguards to prevent hacking through SQL injections and other security breaches.

<u>User Interface & Implementation notes</u>

Home Screens and associated screens (1-3 as referenced in the user flow document)

The three main “Home Screens” serve as entry points into the app, depending on factors such as the status of the driver's trip and how the app is activated.

Note: All of the Home Screen renditions need to have a “Show me food and lodging options in this area” button that can be used regardless of whether or not a driver is engaged in an active trip. All home screen renditions also need to have a support tab with the option to call C.H Robinson technical support. All renditions also need to have a “make changes” button which is visible if there is a trip that is active, and it should direct the app to follow the flowchart to the “enter vehicle range” part of the flow and move forward from there

- **Home Screen 1 (used to initiate the trip):**

    - This screen is accessed when the driver clicks the button in Navisphere to set up their trip. Navisphere sends the trip details including final destination and distance to the driver app so the driver app can then come up with a preliminary route.
    - Screen one is a map screen with the drivers current location and the destination and an optimal route with no stops added, with a pop up screen asking for the current vehicle range followed by the three following input screens(with a back button to cycle back):
        - **Input Lodging Preferences**
            - This screen will have three options for the drivers overnight lodging plans:
                - Sleep in cab
                - Sleep in hotel/motel
                    - Hotels can be found via the google maps API
                - Return to residential home after trip
                - “Other” option for edge cases
            - If the trip is calculated to take multiple nights, since we will be pulling trip information from Navisphere, the trucker will have to select the lodging plans for all of the nights that the trip will take (Have a screen for night one, then proceed to night two in a new screen and so on)
        - **Input Food Preferences**
            - The screen will have cuisine options (Fast Food, Chinese, American, Italian, etc….)
            - N/A option for edge cases or if they are meal prepping
            - The application can use this data to recommend restaurants to a driver when they use a voice assistant to ask for restaurants in the area, that way they don’t have to specify their preferences in the moment to the voice assistant as that can get complicated.
        - **Input Gas Preferences**
            - The driver can specify if they need any specific type of gas/diesel in this screen
                - Drop down menu Diesel, E-85, etc...
            - N/A option for edge cases

        - Now, the app will have a **Recommended Route** screen generated with the algorithm including a map with a recommended route listed which will include gas stops and lodging stop(s) if applicable. There will be two button options, to make changes or accept the route and stops.
        - The make changes button will allow the driver to drag the route on the map around, similar to what is possible on Google Maps with route modification. The driver can also use the back button to go back and change preferences, and the algorithm will calculate a new route. (call the algorithm function every time the driver modifies the route or edits preferences and comes back to the **Recommended Route** screen.
        - Clicking Accept Route will then open the route in Maps/Google Maps and the driver can start driving
- **Home Screen 2 &3 (Driver opens app while stopped, once trip has been activated):**
    - If the driver parks the truck these screens will apply when the driver opens the app. If the driver is at the destination (within 150 feet or so), the app will automatically display food/lodging options in close proximity to the gas station. It would be a good idea to discuss with the legal team about whether or not we should require drivers to confirm they are parked with a voice verification system before letting them use the app due to liability issues.
    - If the driver is parked further away or the location service is not accurate, the Home Screen (**3**) will have a slide option with a "slide to confirm arrival at destination x" option to confirm the driver has parked the vehicle safely.
    - There will be three button options that can pop up over the map (food, lodging, gas) that can then be selected and backed out of. The driver can choose from a list of close locations and also any available discounts pulled from our database. Once an option is selected the option is added to the trip log and the app can open up maps with the address and the driver can go there.
- **Voice Prompting situations (4&5 in flow chart)**
    - The driver will first need to use voice to open the driver app (Hello Google or Siri), then our app can listen for any requests they have.
        - Multiple options can be considered for voice recognition depending on the proficiency of the AI we use. We might need to train an AI with pre recorded voice cues from a diverse array of drivers to prepare it for this task. It is also possible to use a third party software plugin for this task.
    - If navigation in our app detects the driver exiting the freeway, we will need to prompt the driver to confirm this and then can provide gas/food/lodging options by securing the answer to "Are you looking for food, gas, lodging, or something else?".

    - The voice prompt can then list options depending on the preferences the driver selected in (**1**) and the driver can select one of them and navigation can automatically commence, while the trip is added to the trip log.
- **Ending the Trip**
    - Once the driver reaches a final destination, they can click the "End Trip" button which is always available by either voice activation in the app or pressing a button at the bottom right corner of the map portion of the screen at any time.
    - If the driver doesn't end the trip, the app can continue to guide them to the next destination, and have the map open with the full route and options to find food/lodging/gas options nearby or edit the trip settings in **(1).** This can function as a sort of "loop" that can be exited by ending the trip, which will redirect the user back to the Navisphere app and the page in there that corresponds to their current haul of freight.
- Signing out of Navisphere should sign the driver out of the Driver app, and signing into Navisphere should sign the driver into the Driver app.

Comprehensive Sample Use Case (follow along with the FlowChart PDF for a visual representation)

1. One day trip, first time using app (Truck range 400 miles, distance to target 600 miles)
    - Driver clicks the "set trip preferences" button in Navisphere and is directed to the Driver App Home Screen
    - App asks for permissions to access location and microphone and voice assistant, and turn on voice notifications, then the driver is prompted to enter in the range of their vehicle
    - If the driver does not provide the necessary permissions, a pop up alert will appear asking the driver to go to settings and enable the necessary permissions to continue. Do not ask for the vehicle range until permission is satisfied.
    - The driver sets lodging preferences as "Overnight sleep in Cab", food preferences as "fast food", and doesn't select any gas preferences.
    - The algorithm then sets a route and presents it to the driver similar to how apple maps displays a route preview, and selects a BP gas station in Omaha, Nebraska 300 miles away due to a hypothetical fuel saver discount C.H Robinson has with them.
    - The driver accepts the route, and starts their journey but feels a little hungry 100 miles in, so activates the app via voice control of Siri as he sees an exit to a small town is coming in 2 miles.

- The app prompts the driver if they want food, lodging, or gas and the driver responds with “food”, then the app uses the drivers food preferences to list options, and McDonalds seems to offer 15% off to truck drivers of C.H robinson which the app informs him of, along with two other options which are a local joint called Tasty Joe’s and a Taco Bell.
- The driver opts for Tasty Joes and the detour is added to the trip log and he is directed there for lunch, where he spends 30 minutes. He also decides to fill up on gas and selects the “make changes” button on the home screen, re enters his vehicle range as 800 miles, which is more than enough to not need to fill up anymore. The app recalculates his route and takes him straight to his destination in Des Moines, Iowa where he delivers some grain.
- Once he gets to Des Moines, he opens the app after ending his route to find a hotel. On the home screen, he selects the “Show me food, lodging, and gas options in this area” button and narrows it down to lodging, and C.H Robinson lists a number of hotels and it turns out that Marriott Hotels has a employee discount, and the driver wants to treat him/her/they self. He selects the hotel and is given navigation over there, as the app uses the google maps API to determine the cost and availability of rooms in the hotel.