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IONNA
EV Charging Landscape

I Know the Struggle

My first electrified vehicle was a 2013 Ford Fusion Hybrid, followed by a 2017 Ford Fusion Energi. I grew to love the green efficiency leaves on my gauge cluster, and wanted to make the switch to fully electric. My current vehicle is a 2019 Jaguar I-Pace, which I've driven almost 70,000 miles.

I understand the challenges that come with the transition to electric vehicles. I've been there since the early days, when finding random Level 2 ChargePoint and ClipperCreek stations was a challenge, to now, with the rollout of multiple Level 3 charging networks and the explosion of new vehicle models.

My iPhone has over 10 different EV-related charging apps installed, either for initiating a charge on specific networks or for using third-party apps dedicated to locating charging stations and seeing availability.

Currently, cross-network operability does not exist. Any previously announced partnerships in this area have not materialized. "Plug and play" charging is limited to a few vehicles and networks, and it is not universal—it may never be backwards compatible. The reality is that if you operate a charging network, you need an app.

At present, most charging applications are quite similar: they start with a map, you enter a location, and hope for the best. This document is an exercise in evaluating the general usability of these applications and highlighting opportunities to rethink the model. It is not a full competitive analysis, or based on prior research.

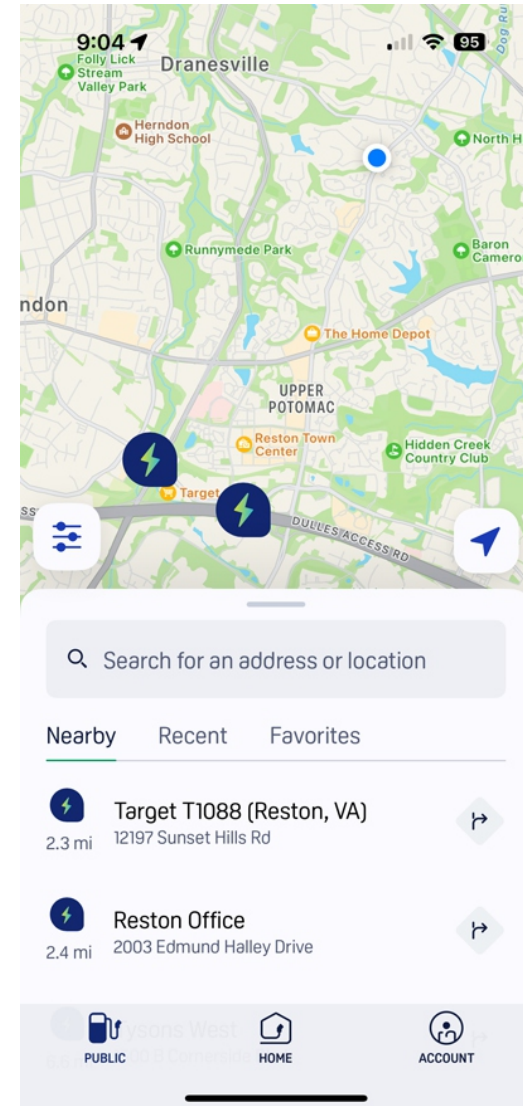


A Standard Model

The model used by most applications includes:

- A large map positioned based on your geolocation.
- A search box that allows users to set a location based on their destination.
- An indicator for available chargers in proximity to you or your destination.
- Access to details about a station, including its availability, cost, and the ability to initiate a charging session.

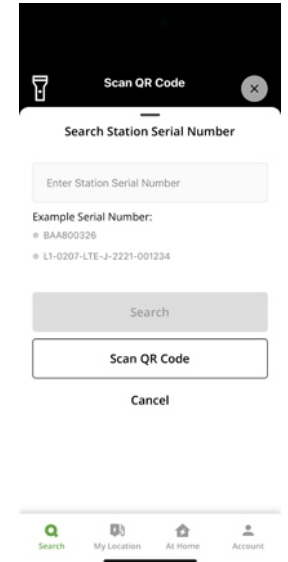
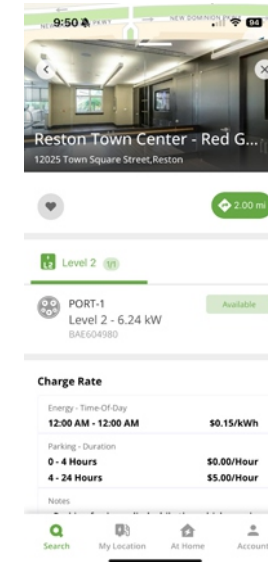
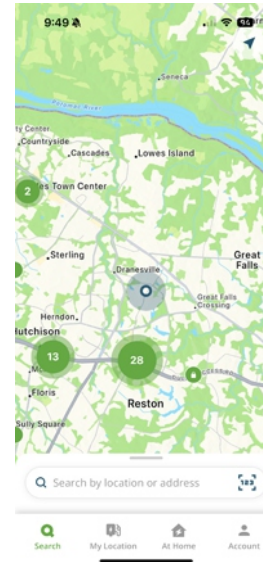
The remaining pages of this document will identify unique features or areas of opportunity beyond these common elements.



Blink

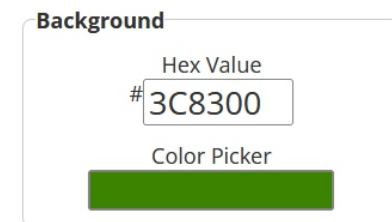
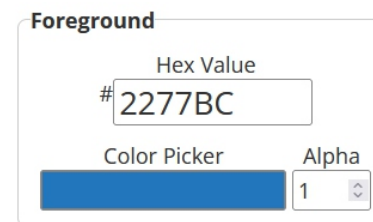
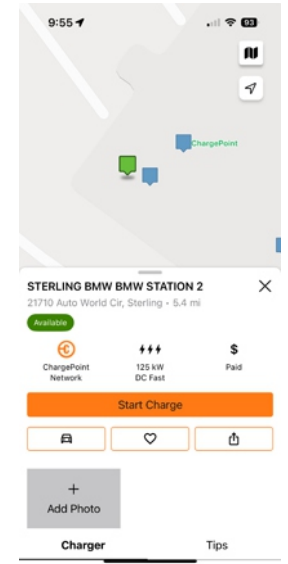
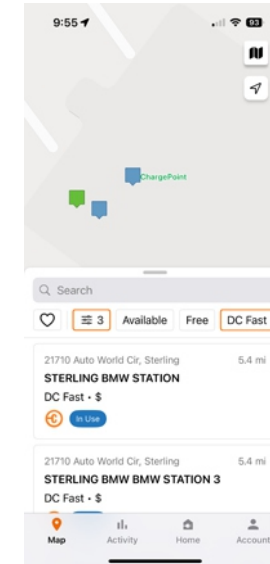
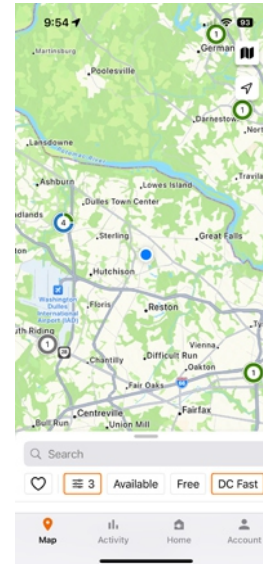
The Blink app integrates functionality from their merger with SemaConnect, which had a very simple method for starting a charge: type in a code on the side of the unit to begin.

- The code entry icon has recently been relocated inside the search bar for improved access.
- There is no way to see the availability or status of chargers from the map view.
- Clusters of stations are grouped together, requiring the user to tap and zoom in further, which may result in displaying a smaller cluster.
- Station details include “Nearby Amenities,” but these suggestions may not always be useful.
- Users can mark stations as “Favorites” but no concept of recent stations.



ChargePoint

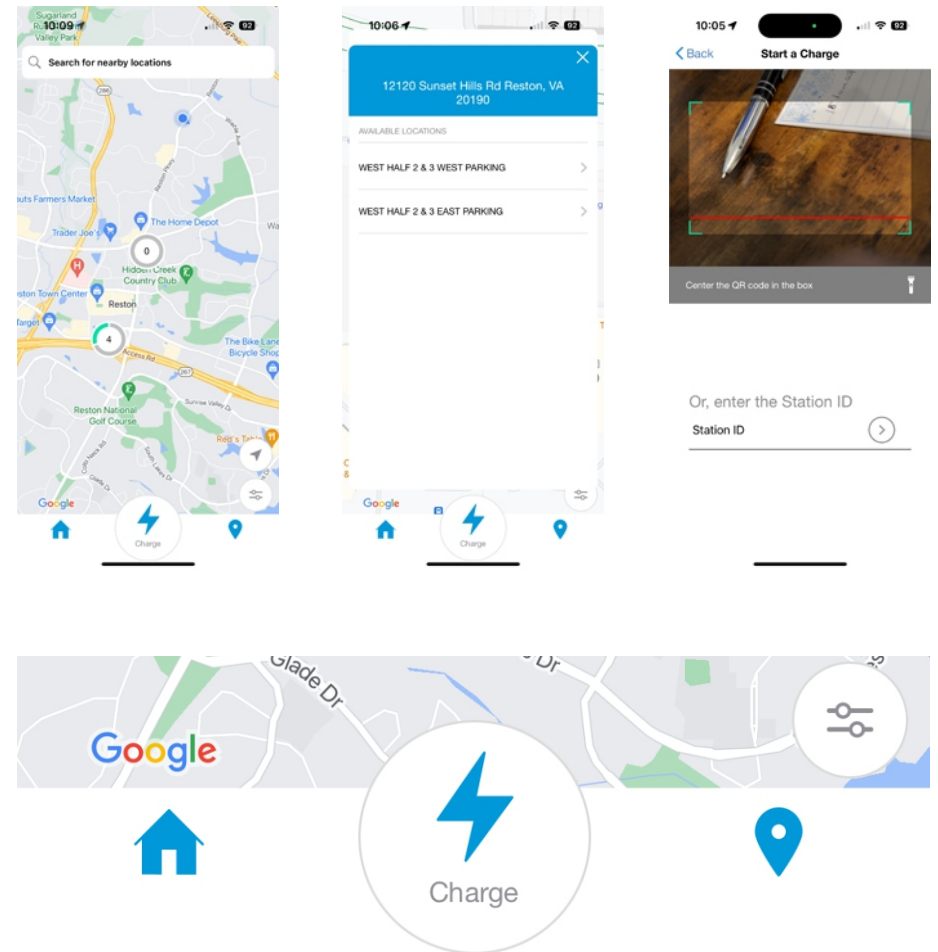
- Map indicators attempt to convey the number of connectors per charging station and the availability of stations.
- There are accessibility issues with the colors used, as there isn't enough contrast between them to distinguish them. Using color alone to convey information is also not considered an accessibility best practice.
- The colors persist when zoomed to the individual station level. Users must check the individual station listed below the map to see its status and associate it with the color shown.
- Quick access to filters is available below the search to highlight available chargers, Level 3 chargers, and free chargers.



For colors displayed next to each other, a contrast ratio of 4:1 is ideal to ensure they are distinct from one another.

EV Connect

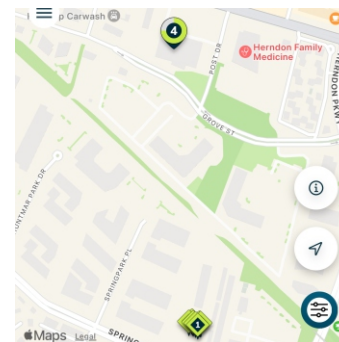
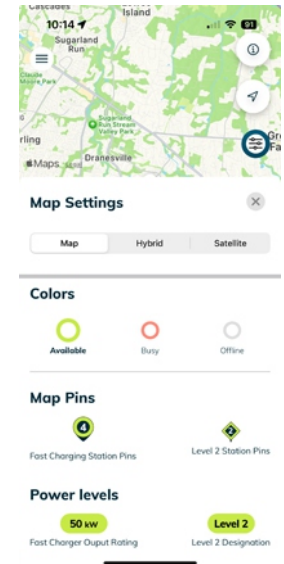
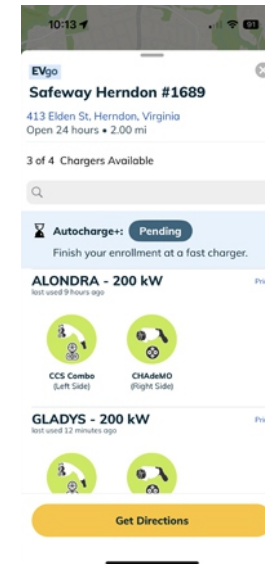
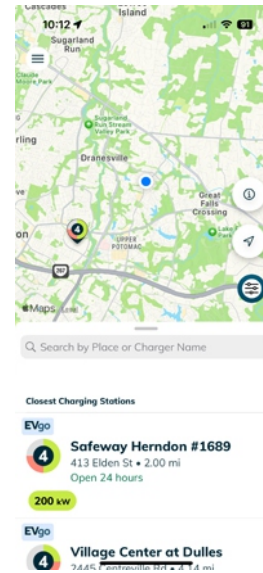
- The map displays charging stations across various networks, including their own.
- It is not clear from the map which network a cluster of charging stations belongs to. Depending on the zoom level, a cluster may include stations from multiple networks.
- The colors used on clusters to indicate station availability face similar accessibility issues as ChargePoint.
- The charge button at the bottom appears to be the currently selected item in the tab bar but instead launches the camera to scan a barcode at one of their stations.
- There does not appear to be a way to filter the map to show only EV Connect network stations.



It's not clear which tab is currently active. While the second "Charge" tab might appear to be active, it's actually the third tab that is active.

EVgo

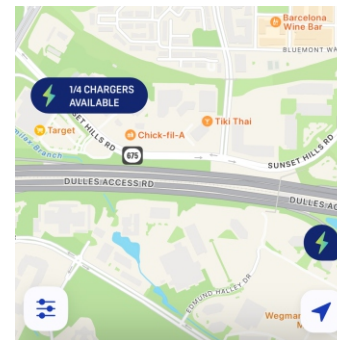
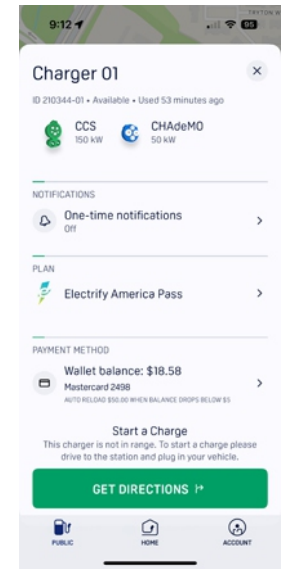
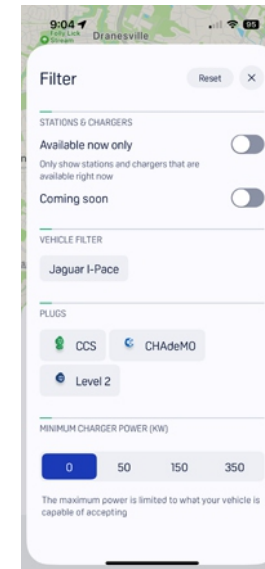
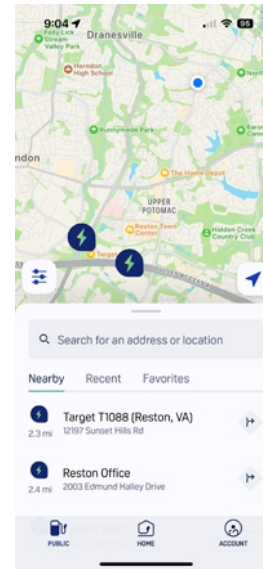
- The colors used to indicate availability at a station are more distinct than others but still fail to meet accessibility recommendations.
- A key for their color usage is available through the “i” icon on the map.
- The filter allows users to remove third-party partner networks to easily identify EVgo stations.
- Different-shaped indicators are used for Level 2 versus Level 3 charging stations.



EVgo makes a clear visual distinction between Level 3 stations (round) and Level 2 stations (diamond). However, there is no indication of which network those stations belong to.

Electrify America

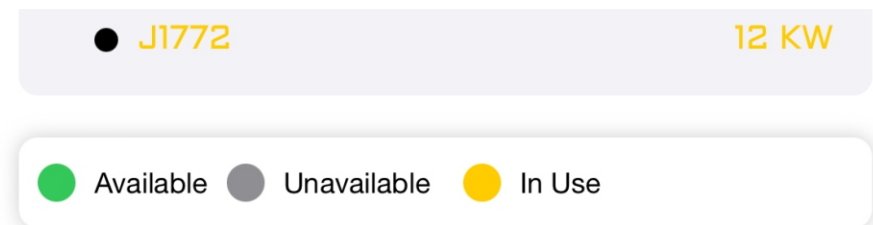
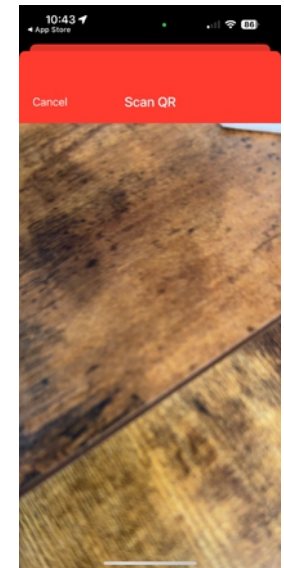
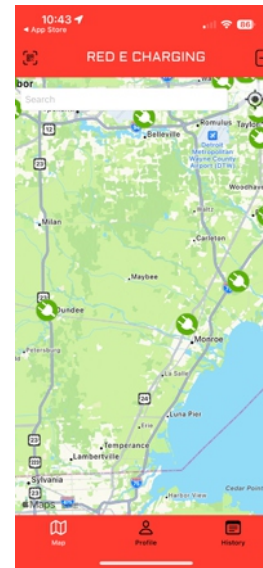
- Location indicators on the map are represented by a basic icon until selected, at which point they expand to show the number of available chargers.
- “Available Chargers” refers to the count of physical units and does not account for units that are out of order.
- The app tracks and organizes nearby, recent, and favorite stations for quick access.
- Filtering allows users to display only those stations currently available. However, there is no indication of when a station might become available based on the vehicle’s current state of charge.



Electrify America avoids the accessibility issues present in other apps by using text to communicate charger availability. However, it doesn't indicate chargers that are out of order, which could create a false expectation of the true capacity at a location.

Red E Charge

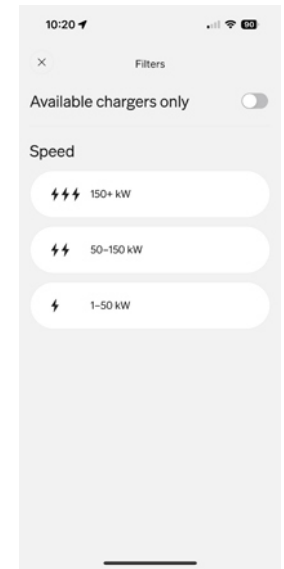
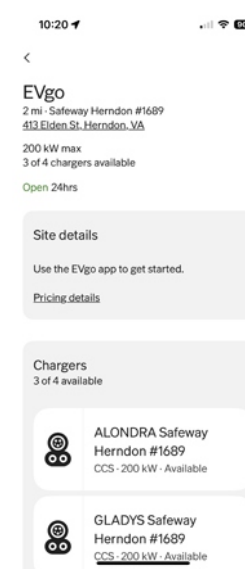
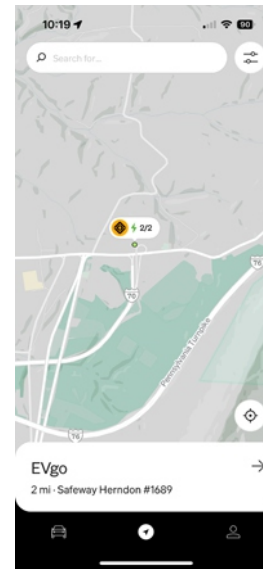
- Black on red is technically accessible, but can be difficult to read due to the red's vibrancy.
- Location indicators don't communicate availability or the number of stations. Tapping an indicator provides a tooltip displaying the address of the location.
- The list of individual stations at a location includes a key for color usage. However, the color for "in use" stations are not accessible.
- Users have to navigate through multiple steps to finally reach the screen where they can start a charging session.
- On the station detail page, the user must select a radio button for the station they want to charge at, which uses the same green as the "Available" color and isn't obvious.



For colors to be accessible, they need to be not only distinct from the background they sit on but also distinct from one another. "In Use" fails against all color combinations, while "Unavailable" fails against light gray and when placed next to "Available."

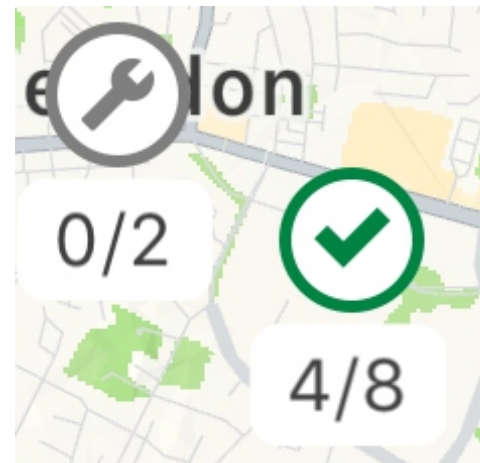
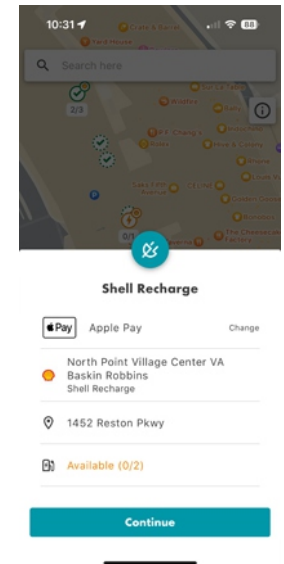
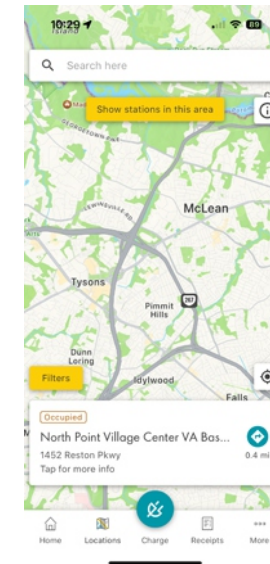
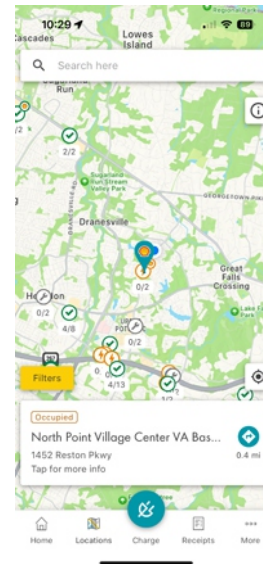
Rivian

- Rivian shows partner network locations on their map but doesn't provide a way to filter them out. Rivian-specific location indicators display a Rivian logo.
- Location indicators use lightning bolts to signify charger speed, but users need to access the filter to see this explanation.
- Rivian stations only require the vehicle to plug in, including Level 2 chargers open to the public. All other locations direct users to use the third-party app, but there is no direct link to the app store for download.



Shell

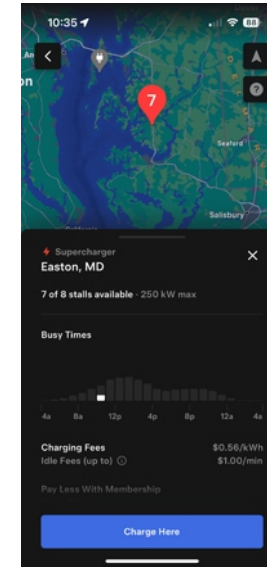
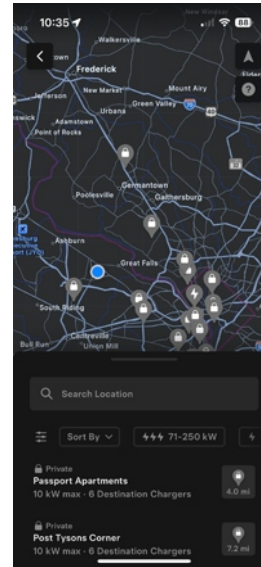
- Shell makes a similar mistake as EV Connect with placement of the “Charge” action in the tab bar, without a clear indicator of which tab the user is on.
- Location indicators are a mix of Shell and partner network locations, colors indicating availability, icons indicating availability, and numerical counts indicating availability.
- Selecting a location doesn’t inform you what network those stations are on unless it is a Shell station, then a shell logo will appear along side the location icon.
- No filtering exists to identify Shell or former Volta locations.
- If user adjusts map position, they have to manually update the results.



Where Electrify America is simplistic in its location indicators and ChargePoint is detailed, Shell goes over the top. The use of an icon, Shell logo, color, and text all compete with one another, increasing the cognitive load for users trying to determine where to charge. Simply eliminating the icon and using that space for the network logo would go a long way toward simplifying this approach.

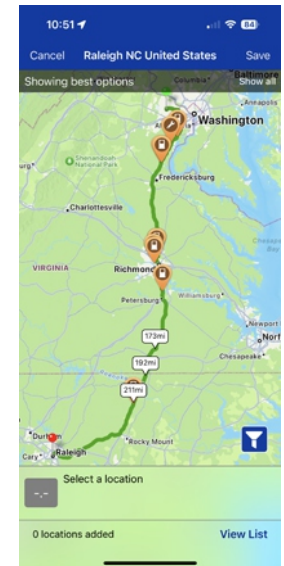
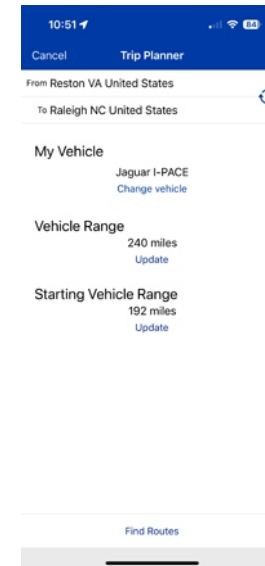
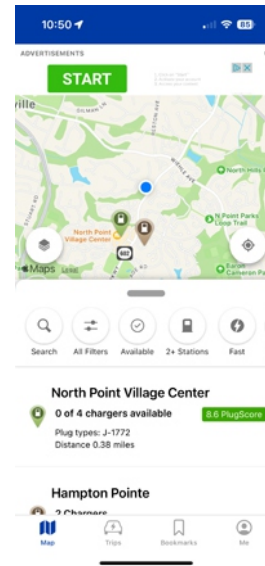
Tesla

- Makes filtering easy to access, located just below the search box.
- Nearby locations are displayed by default, along with information on whether they are public or private. However, there doesn't appear to be a way to filter out private chargers.
- Tapping on an indicator for a Supercharger shows how many stations are available and displays a graph of typical activity for that station at the selected time.
- Users can access a tutorial that walks them through how to start a charge for non-Tesla drivers using a Magic Dock.



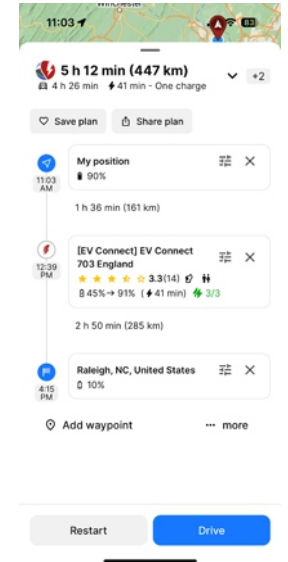
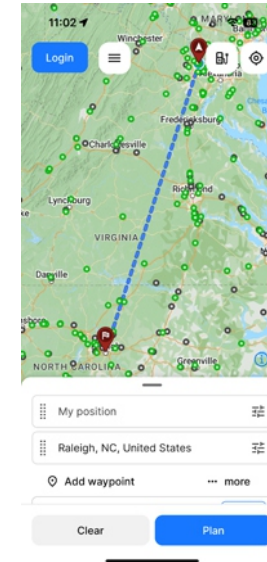
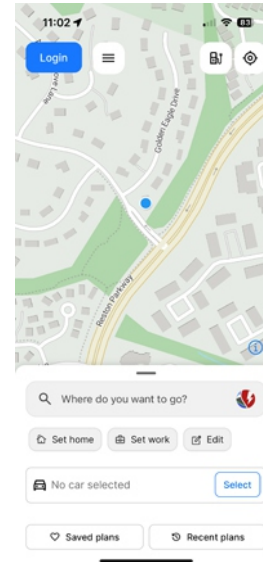
Plugshare

- Provides basic charging station location search, similar to other apps.
- Includes route planning functionality but doesn't display estimated charge times at each stop.
- Colors used for location indicators are overloaded—they can represent either the speed of the station or its availability.
- Filters are conveniently available on the main screen above the list of nearby locations and support filtering by network.
- It's not clear which network a location belongs to, even after accessing the location details.
- Users can "check in" and mark that they are waiting to charge, but there is no indication of the wait time.



A Better Route Planner

- Provides basic charging station location search similar to other apps.
- Allows for route planning with detailed stop and necessary charge time estimates but does not appear to allow users to exclude network suggestions for which they don't have an account.
- Can connect to an OBD2 dongle for select vehicles and provide additional charging data, such as state of charge and battery temperature.
- Can calculate a route based on either the fastest time or the most fuel-efficient route.



Summary

This is the view from my car on April 6th, 2024, at an Electrify America station in Bedford, PA. It was the weekend before the solar eclipse. I was the 11th car in line due to only one station being operational. Based on my calculations, I was facing a four-hour wait to charge. I booked a hotel room for the night and charged at 7 a.m. before other travelers began to arrive.

This is the fear of every internal combustion engine owner when they consider taking a long-distance trip in an EV. We are still in an era where trips need to be carefully planned. On this day, the nearest DC fast charger was almost an hour away in the wrong direction.

Most of what I identified from reviewing these apps were basic usability and accessibility issues. However, as I reflect on what could have been done to prevent the situation in this photo, one thought comes to mind: shifting from a model that simply dumps location data based on where a driver is or where they're going, to one that actively communicates with the driver.

IONNA, in theory, would have a semi-captive audience across the venture partners and should be able to integrate network status data with vehicle APIs to act as a co-pilot for the journey.

In this photo, the EA app should have been able to identify its reduced capacity, allow drivers to notify the system that they were waiting, inform other drivers heading toward this station to top up before it's too late, and then help reroute them. For those for whom rerouting isn't an option, it should calculate and share the anticipated wait time based on the vehicles in the queue and their charging speeds.



Thank You