Designing for Connected Mobility For Electric Vehicles

by Onething Design

Domain Intro

In less than 10 years, Uber went from being non-existent to being worth $75 billion in its IPO. This meteoric rise spearheaded a new era of connected mobility apps, designed to either take you places, bring things to you, or put you in touch with your vehicle no matter where you physically are. The entire tech industry fell in love with the "Uber for X" hype, and even coined a term for it based on the unicorn - "Uberisation".

Many of the largest startups today - Ola, Zomato, Swiggy, Dunzo, Waymo, Lime, Urban Company, Myntra, Lyft, GrubHub, Practo, and Delhivery, just to name a few - are run wholly or partially on elements of connected mobility. Connected mobility platforms have already attracted over $110 billion in investments by 2018, according to research done by McKinsey.

Over the next 10–15 years, connected mobility has the potential to revolutionize the way we live our lives. We can already see e-scooters and on-demand cabs become an expectation in urban environments, signalling the rise of shared, app-based mobility solutions over individual petrol-fueled transport options. Another major area of development is in autonomous vehicles, which will render the prospect of driving redundant within the next two decades.

OLA

zomato

DUNZO

SWIGGY

WAYMO

lyft

Myntra

GRUBHUB

UC Urban Company

Technology

The biggest enabler of connected mobility came in 2005 in the form of Google Maps; more specifically the API that enabled third-party vendors to build entire platforms using real-time locations of their platform's users. Smartphones were becoming increasingly versatile, and soon with technologies like GPS and GLONASS could pinpoint themselves anywhere on Earth with an accuracy of one feet. It's hard to believe that just 30 satellites are powering geolocation services for nearly 50 billion devices and 800 million people worldwide.
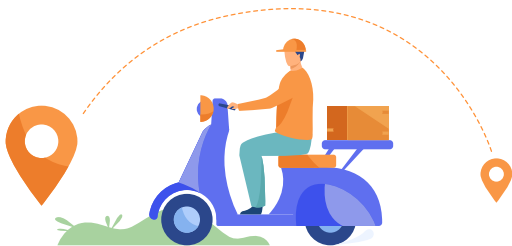
There are largely three elements with which connected mobility platforms work:

Direct trackers

where the vehicle or mode of transport itself is connected to the internet, and is periodically or continuously transmitting data to the cloud about aspects like its location, condition, and status;

Indirect trackers

an auxiliary device (usually a smartphone) connected to the internet that is serving as a proxy for location tracking of an individual or vehicle. Conditional and status data is usually entered manually by the individual in this case.

Stations or hubs

stationary aggregation venues such as petrol stations, warehouses or storage lots, charging stations etc. transmit and respond to data about their interactions with various mobile units in the same ecosystem.
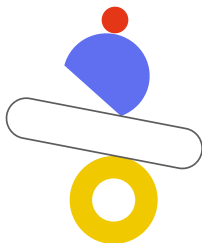
User Research

Governments across the world are heavily investing into (and pushing for) electric or hybrid vehicles, each of which will most likely be connected to the internet; over 300 million CAVs (connected and autonomous vehicles) are expected to be on the road by 2030. As of now however, CAVs remain expensive and the infrastructure required for such vehicles (internet access and electric charging stations) remain intermittent and concentrated in urban areas.

Due to these reasons, the primary users of such connected mobility apps are largely tech-friendly wealthy personnel living in urban metropolitan areas. It is also very common for these individuals to have multiple vehicles for personal use – the other vehicles usually being more conventional with petrol or diesel engines. However, it bears mentioning that emerging economies the world over are slowly, but surely making the switch to electric vehicles as well. Take India for example, where the government is aiming to achieve 30% EV adoption on-road by 2030, supplemented by local, and global powerhouses of the auto industry, from Tata to Tesla launching electric models in the market. Not to mention that this trend is only set to grow, with the government having sanctioned over 2,500 new charging stations to be built this year alone.
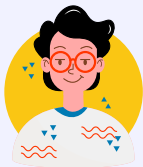
Persona 1 : Rohit Bhatia

Basic Data

Age: 29
Occupation: Software Developer
Marital Status: Single
Location: New Delhi, India

Bio

Generally tech-savvy, with interest in the newest breakthroughs in consumer and general technology, including everything from smartphones, to SpaceX.

Short daily commute of 20 kilometers total from home to work and back, besides that, little to no commuting on regular days.

Making the shift towards more environmentally conscious choices, such as trying to be a vegan!

Favorite Brands:

Google
Beyond Meat
Royal Enfield
Tesla

Persona 2 : Shashank Bhatia

Basic Data
Age: 37
Occupation: Financial Consultant
Marital Status: Married
Location: Mumbai, India

Bio
A motorbike enthusiast, up to date with the latest models, and innovations of the industry.

Financially settled, already owning a house and car, and possessing a high disposable income.

Works from home full time, doesn't have a daily commute.

Prefers not to go beyond his city for travel or leisure, likes to explore new local spots instead.

Favorite Brands:
Apple
Harley Davidson
Bloomberg

Problems that
design can solve

01. **Explaining how the product works to the users:**
Often, a mobile app is the primary gateway for users of a connected mobility platform; therefore, it is essential for the UX to make it immediately clear to users how the physical product works, how the ecosystem works, and what is the order of interactions expected from the user.

02. **Showing the states of the product or ecosystem:**
Mobile units by definition are not stationary. They may be online or offline, too far away, going too fast or not moving at all, low on battery, have their doors open, be out of resources or refilling/refueling and so on. It is important for a user to be able to quickly view and comprehend these states of the system, as well as understand how it impacts their decisions and priorities.

03. **Keeping it accessible and inclusive:**
Designing for connected mobility is tricky, as often you have no direct control over who your users are – the product's users are your application's users. On top of that, the tolerance for bad accessibility is even smaller in connected mobility apps because of how intertwined the experience is with the physical product or ecosystem.

04. Ensuring on-the-move usability: Aside from being used by a wide variety of audiences for a myriad of different objectives, these apps are often used in very different environments compared to conventional mobile apps. Eg. with social apps, people are often in a comfortable position on their bed or couch and are using the smartphone one-handed. By contrast, mobility apps are often used (and running continuously) while the smartphone is mounted onto a vehicle, meaning the use is often from a much greater physical distance and/or in more restricted settings and postures. Hence, it is crucial to have an UX that is quite straightforward and can be used quickly on the go.

Design-driven Solutions
that can improve business ROI

1. **Guide users through the steps:**

Use familiar patterns and mental models to guide users through the expected flow or journey.

Use Primary and Secondary CTAs together to guide users to the action that takes them forward (Primary) and the action that takes them elsewhere (Secondary).

Also use verbs (actions) rather than nouns (destinations) when labelling CTAs; eg. "find nearby stations" which is a verb, rather than "nearby stations", which is a noun.

Also allow easy affordances; users should be able to move back and forth in the flow easily in case of any accidental interactions or misunderstandings (the likelihood of which is exponentially higher since the users are prob ably on the move).

2. Show them where things are:

The most important attribute in connected mobility is locations.
Eg. in the case of an e-scooter app, the most critical orientational elements are

1. where they are currently,
2. where (and how far away) is the nearest e-scooter from them, and
3. how much time will it take them to get to it.
The map is your best friend here; users should be able to quickly locate and assess the positions, speed (if needed) and relative distance between all major elements in the connected mobility ecosystem.

Image: Map screen showing battery locations and quantities in Revolt app

3. **Adapt the interface based on the user's situation:**

There are some features which will only be available in certain system states. The doors of a car cannot be opened remotely when the car is in motion; delivery personnel cannot say an order is delivered if they are nowhere near the drop–off point for the order; users cannot request for a refuel at stations that are out of fuel.

It is important for the interface to be continuously adaptive, and dynamically adjust functionalities a user can access based on both the state of the user and the state of other elements in the system that they wish to interact with.

Image: Battery level indicators with changing colours in Revolt app

4. Design to forgive mistakes:

Mobility apps are often used in less-than-ideal conditions. The phone might be mounted, users may be wearing gloves, there may be strong sunlight or glare reflecting off the screen, and only a few seconds on a stoplight are available to interact with the application.

Design an interface that has large, easy-to-tap buttons. Avoid interactions like pinch-to-zoom or edge swipe which are much harder to use on the move.

Use big, easily legible, and short text to convey critical information (if not simple icons).

**Maximise contrast** in the design to ensure visibility even in harsh daylight.

And, always look for alternate means of interaction (eg. voice) to convey users in a non-invasive and distraction-free manner while they're on the move.

Image: Change bike sound screen, with large clickable icons in Revolt App

Here's your quick checklist:

- ☐ **Ensure mental models to guide users**
- ☐ **Use verbs in CTAs**
- ☐ **Ensure easy affordances**
- ☐ **Easily accessible maps**
- ☐ **Cross-check all use case scenarios**
- ☐ **Easy-to-tap buttons**
- ☐ **No interactions like pinch-to-zoom or edge swipe**
- ☐ **Big, legible, and short text**
- ☐ **Use simple icons**
- ☐ **Maximise contrast to ensure visibility**
- ☐ **Keep them updated in every interaction**
- ☐ **Alternative means such as voice assistant**

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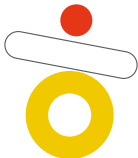
Performance driven UI UX Company

CLUTCH RATINGS	IBDA 2019 AWARD	DESIGN X AWARDS	SILICON INDIA
4.8/5	**Winner**	**Finalist**	**Awardee**
Rating on Clutch	IBDA Best Design Studio	Design X Awards	Company of the Year

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