Project Thunderbird

Introduction:

Preface:

Transportation in large urban areas is stuck in a paradox.
Since the emergence of new innovative mobility such as “on-demand mobility” in the early 2010s (mobility services available on a smartphone), the scope of mobility possibilities has never been so wide. When getting from point A to point B. All of these new modes have shared a common promise: to make urban mobility more convenient, faster (in other words — less congested) and even greener (cities less polluted).

When it comes to urban mobility there exists a gap between innovative mobility and conventional transit systems. To look into this gap we have to understand the challenges facing urban transport in the current times.

In the last few years, there has been a resurgence of interest in demand responsive shared-ride systems for the general public. This has been fuelled in part by concerns for the environment; each commuter using a separate car leaves a large carbon footprint and also causes congestion in central business districts. Thus, the notion of a sharing economy that advocates a shift from car ownership to mobility as a service gained popularity. right now it is a billion dollar business.

Description:

Project Thunderbird is a project that aims to make this gap even narrower, until now it comes as a responsibility on the user to manage all the bookings and assure he doesn't miss any ride. This contingency component results in adding more transfer times if the user is having a trip with more than one mode of transportation.

Of course there's research in multimodal trip planning, there are also very famous mobile applications such as "CityMapper"that we use everyday to find the best transportation mode to go from point A to point B.

Although some of these apps will allow you to book your ride that will get you to the train station, neither the app nor the mobility on demand service provider will be responsible if you arrive late for the train.

Project Thunderbird is a Framework that is threefold:

- **Data Collection**: It collects all available transit data available in the region of interest.
- **Data Aggregation**: It combines this data to connect between different modes of transportation.
- **Trip planning:** It contains a trip planning tool that returns all possible routes between origin and destination in the region of interest.

Structure:

The project is structured as follows:

Mobility Data Loader	the data loader is a package that get the input from the user, the input is the area of interest and the data loader instantiates a graph object
Transit Data to Directed Graph Converter	the transit data is then transformed into a directed graph with nodes as stops and edges as trips
Path Search and shortest path finder tool	the search algorithms are embedded in the graph object and it gets the start station and destination station and looks for the shortest path

As an alpha version, the tool is capable of exploring the mobility data given, the mobility is now divided into four types.
Transit Data:
Walking data:
Mobility on demand data:
Informal transit data:

The tool then transforms the data into a directed graph, this custom built graph is a cohort of nodes (stops) and edges (trips) that represent the trip between two locations.

For now the search can only be applied to the existing nodes but we invite you to read the roadmap to see where the project is headed to.

The trip has all the data we need from location of origin and destination to transportation mode, duration and also many other attributes can be added later such as quality, influence.

The user can input the origin and destination and in return the search algorithm will find the best trip to get from og to destination in the shortest time.

Purpose:

Motivation:
In the context of mobility, the user has many options to travel from the origin to destination. From mobility on demand options to rentals and using public transport the combination of these options are numerous.
Many services are available to book a trip but not so many that help you plan a trip.
Moreover, if we add informal transit into the equation. We double the options of travel modes that exist and the trip planning solutions become almost nonexistent.

This was the first seed of motivation that pushed to the creation of this alpha version.

The second reason is the fact that there's no tool that can assure the time constraints of the intermodal nature of the trip. Add case study here.

The objective of this app is to build a seamless commute experience. A one stop ticket for lal modes of the day.

Let's say we have Fathy who wants to go from new Cairo to Ramses. His commute will include: walking (behavior change the trip is cheaper if he walks more)
Riding a taxi, riding a bus and then Metro.

Instead of paying for each service separately we will pay a single ticket for the whole commute that of course will be cheaper.

Value:

The value of this project depends on the number of users engaged. But the real value is that it offers a service in a market that has an obvious gap and creates competition.

The real value is the data collected in the first phase of the project and then market created.
The data will be collected from mainly two parties. Riders and mobility modes.
The tool will contain road network analysis.

Demand and ridership analysis.

Scope:

Open Source:
The tool will also have an open source part that can help researchers read and analyze transit data.

Services:
Trip planning
Transit network analysis
Mobility on demand services
Trip companion
Ticketing
Other services

Roadmap:

An operator and single ticket for the trip
Route analysis and transit network optimisation/opportunities

The alpha version only reads gtfs transit data, the goal is to use a routing api to get the walking graph and be able to include mobility on demand graph based on mod operators in the area.