



EMTP Self-Organising Dispatching System

Final Presentation

July 29th, 2022

Agenda



**Introduction to
the project**

Our product

Discussion



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Project Team



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Project Setup



Project Goal

Create a Dispatching System that is:

 **INTELLIGENT**

 **SUSTAINABLE**

 **COST-EFFECTIVE**

Initial Settings



New York

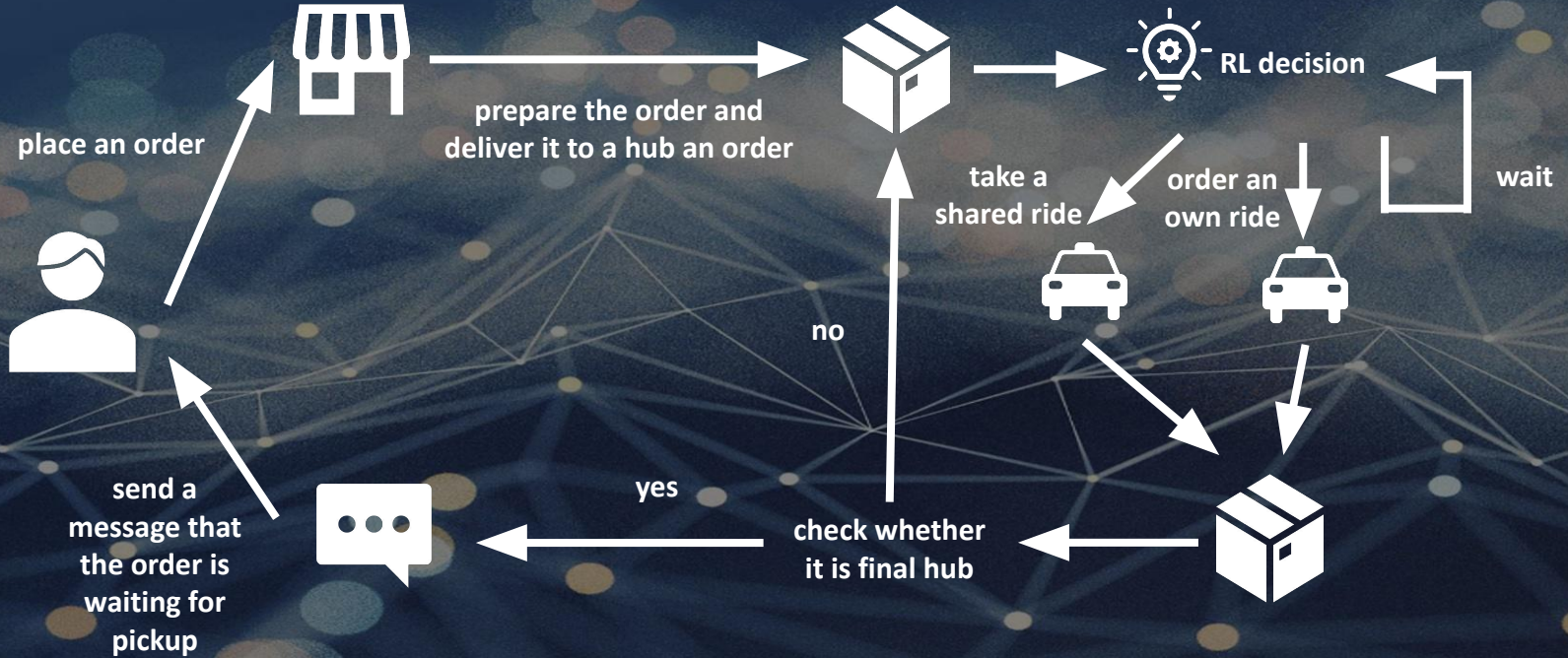


Hubs

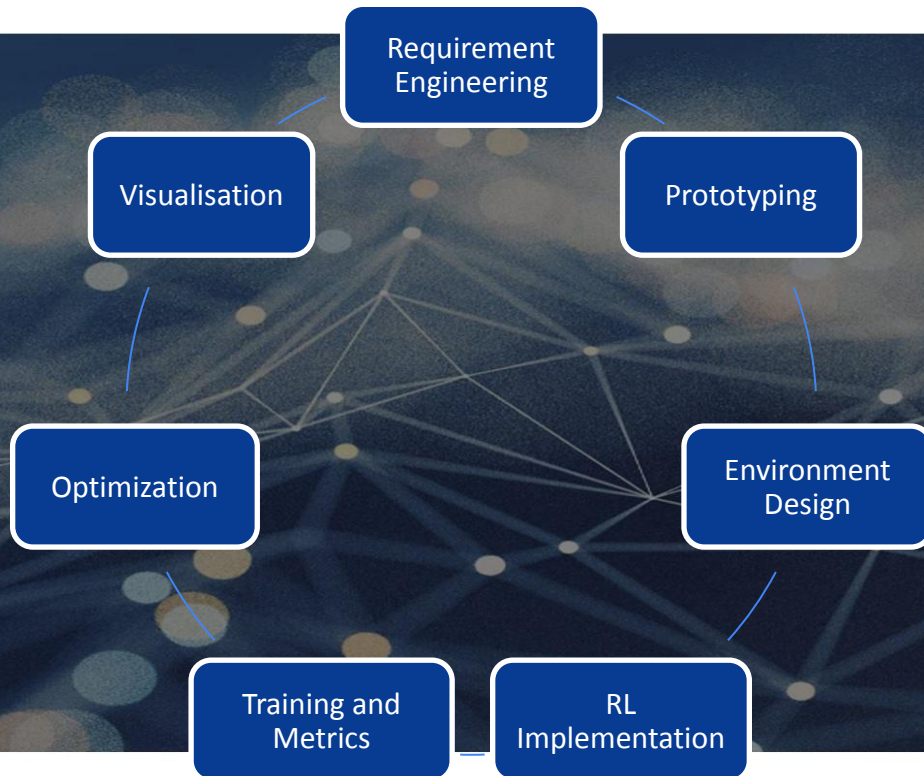


Taxis

Our Product



Project Phases





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Conceptualization



New York

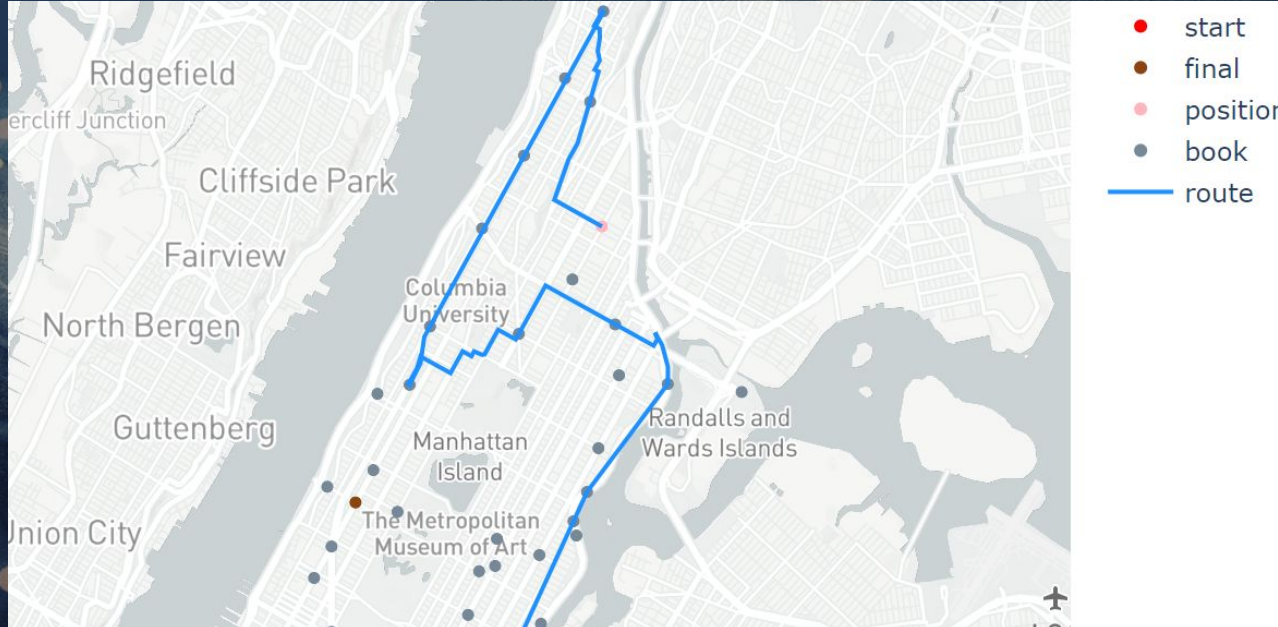


Hubs



Taxis

Environment Design



- street network as graph
- 92 hubs across Manhattan
- 1.3 Mio Taxi rides -> 18 000 hitchhike opportunities per day

RL Implementation

Who is our agent?



An intelligent Box with an order (pickup hub, drop-off hub, pickup time, deadline)

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What does the agent see?



Observation Space:

- destination hub
- remaining distance
- distinction vector: share vs. book vs. wait
- indication whether a book own ride option is allowed

RL Implementation

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What action can it take?



Action Space:

- all hubs that it can go to (either with taking a shared or own ride)

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How do we reward the agent?



After each action taken we **reward** it by looking at:

- type of action (wait +100, take a shared ride +1000, order your own ride -1000)
- the distance that it is closer to the final hub
- if the action took it to the final hub
- if yes, was it on time?

Demonstration

Evaluation

Baselines

- (1) Take random steps
- (2) Book direct ride to final hub
- (3) Always choose the available shared ride that reduces the distance the most
- (4) Like (3) but book own ride 2 hours before delivery deadline

Metrics

- Delivered on time ratio
 - Share to Own rides ratio
- 
- Distance Reduced by Shares
 - Rides delivered without own booking

Performance

| | Distance Reduced with Shares | Total Distance Taken | Reward |
|---|------------------------------|--------------------------|--------------------------|
| 1 | SharesBookBackup (989.02) | Bookown (7.085) | Rainbow (12309) |
| 2 | Shares (873.67) | SharesBookBackup (7.34) | Shares (10051) |
| 3 | Rainbow (567.83) | Shares (7.363) | SharesBookBackup (10049) |
| 4 | Random (411.85) | Rainbow (115.912) | Random (8120) |
| 5 | Bookown (0) | Random (492.559) | Bookown (5090) |



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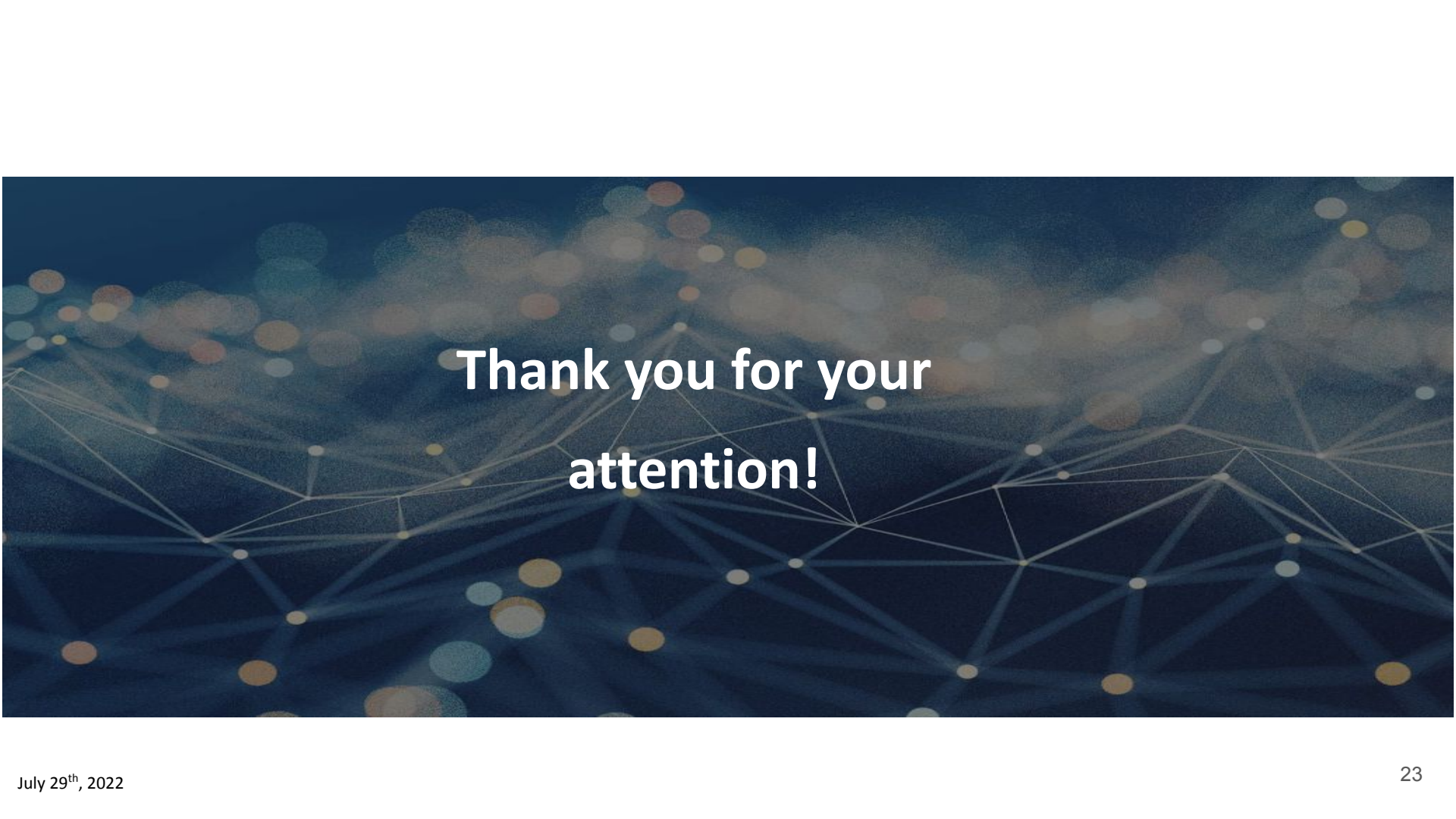
Discussion

Limitations

- o Same delivery deadline for all packages
- o Historical trip data, no live feed
- o Live feed simulated by 5 minute time window
- o Routes of taxis are only estimated based on optimal route
- o Taxis do not deviate from their route

Outlook





**Thank you for your
attention!**