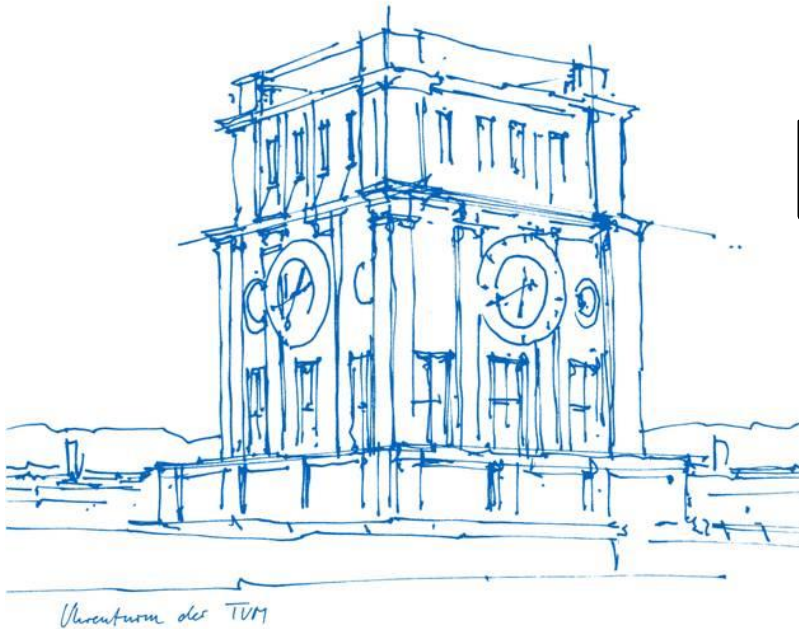


Simulation of Last-Mile Logistics in Urban Areas

Richard Strunk, Yannis Matezki
17.01.25 München



Overview

- Problem Statement
- Last Mile Models
- Our Simulation
- Results & Outlook

Problem Statement

- Packet delivery volumes are increasing
- Non-cooperating parcel services cause traffic congestions with big vans



Last Mile Models: Current

Big storage hub outside the city

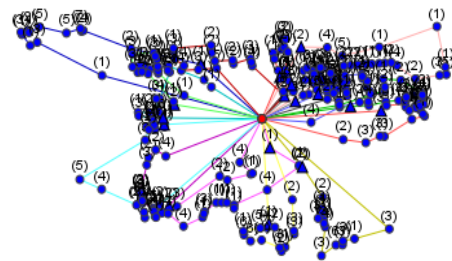
Vans deliver parcels optimally directly from hub

Problem: Congestion, non-cooperation





Solution



Last Mile Models: Micro Hubs

20 small hubs within the serviced area

Cargo bikes deliver parcels in multiple runs from the micro-hubs, hubs serviced by trucks

Possible problems: Spots for microhubs required, more labour required

Simulation: Software

Simulation of Urban MObility

Welcome to Eclipse **SUMO** (Simulation of Urban MObility), an open source, highly portable, microscopic and continuous multi-modal traffic simulation package designed to handle large networks.

SUMO 1.21.0 for Windows 64-bit ▾

[Latest Development Version \(Nightly Snapshots\) >](#)

[Older releases >](#)

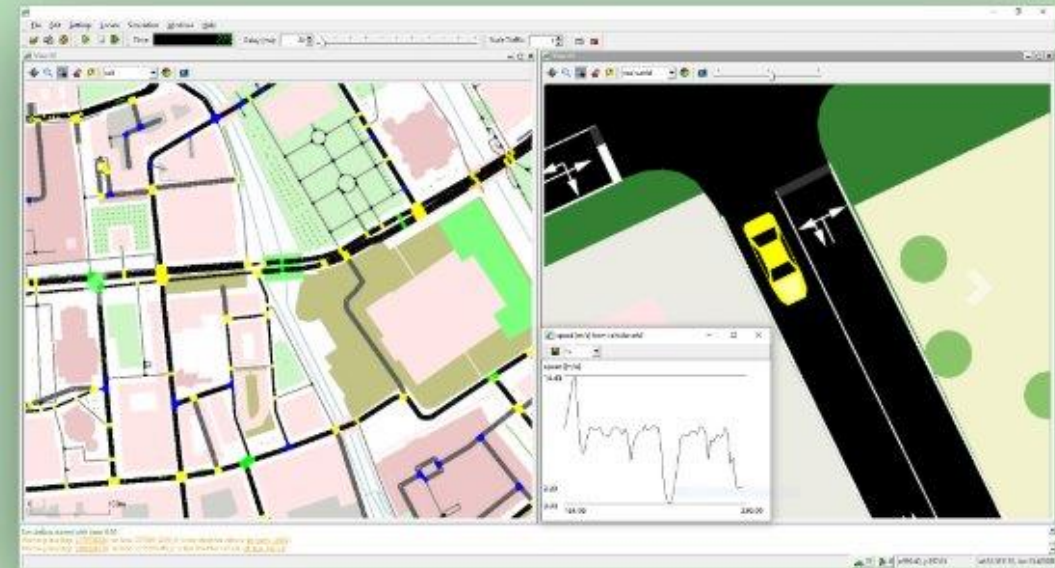
[View on GitHub](#)

[Star](#)

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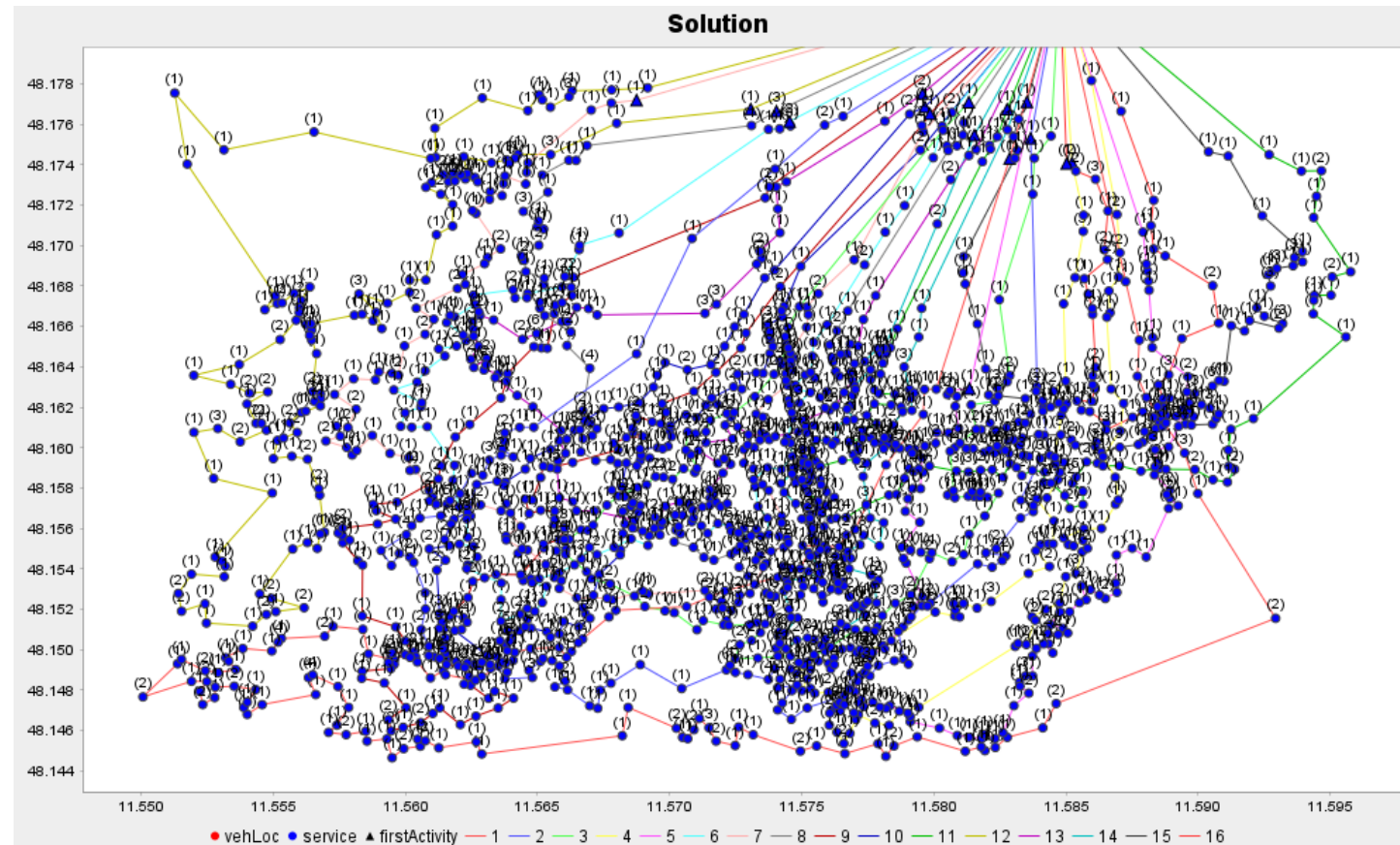
[Fork](#)

1,441



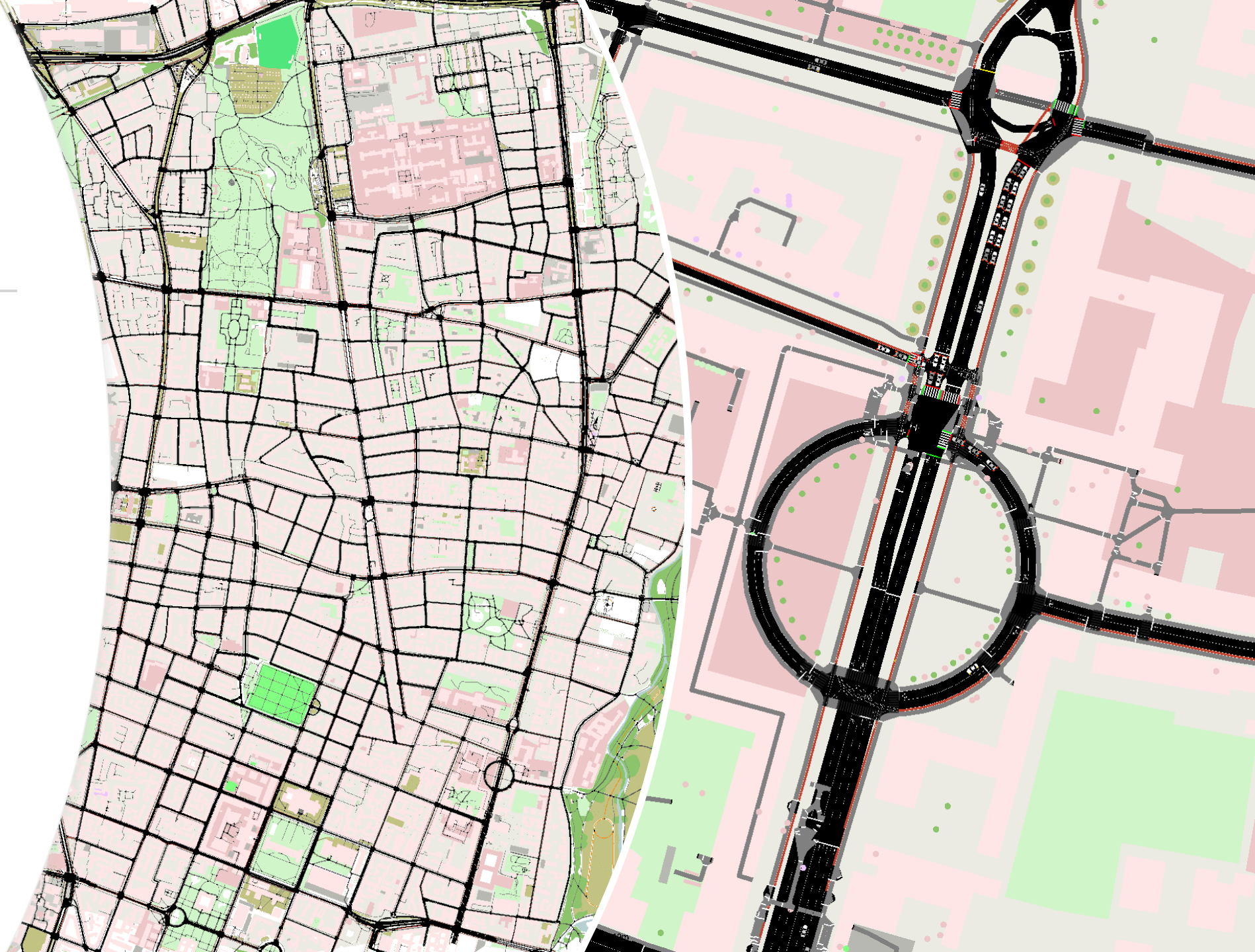
Simulation: Software

- Jsprit (github.com/graphhopper/jsprit) for solving delivery routes



Simulation: Schwabing

- OSM Maps of Schwabing
- Traffic estimates from TomTom
- 15k parcels/day
- Delivered to random addresses, often multiple per address



Simulation: Delivery Time



Time to find parking



Load/Unload Time



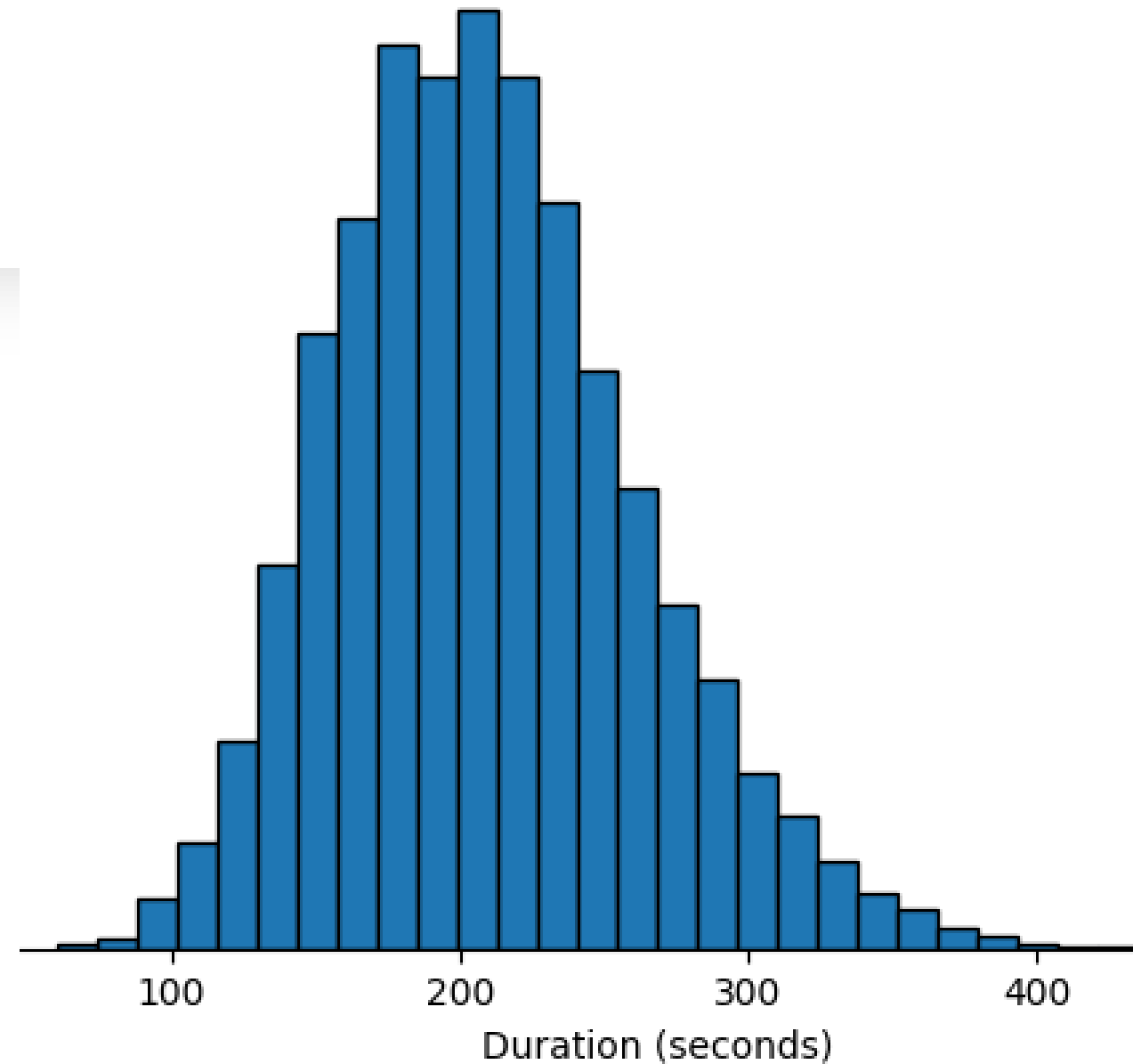
Approach residence



Stair time



Waiting time



Results of a Simulated Day

	Current model (multiple carriers, vans)	Shared micro-hubs (hubs shared, cargo bikes and vans)
Trips	81 (usually all in parallel)	381 (one vehicle can service multiple trips) + 40 (micro-hub setup)
Total delivery duration	588h	553h + 11h
Total delivery route length	2183km	981km + 123km
CO2 emissions	~2000kg	0kg + ~50kg
Estimated total carrier costs	9744.40 EUR	8297.7 EUR + 187.50 EUR
Average wait time for other traffic participants	527 sec	503 sec

Digital Participation

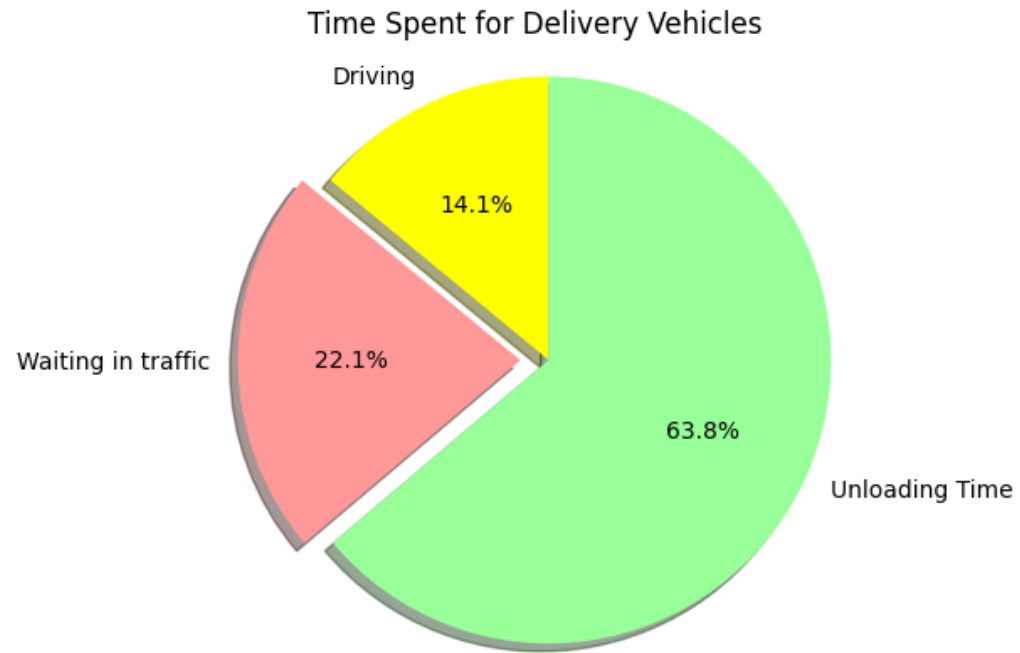
- Open Source software and Open Data allows free access and more possibilities for digital participation
- The city could profit from crowd-sourcing some traffic data and design suggestions



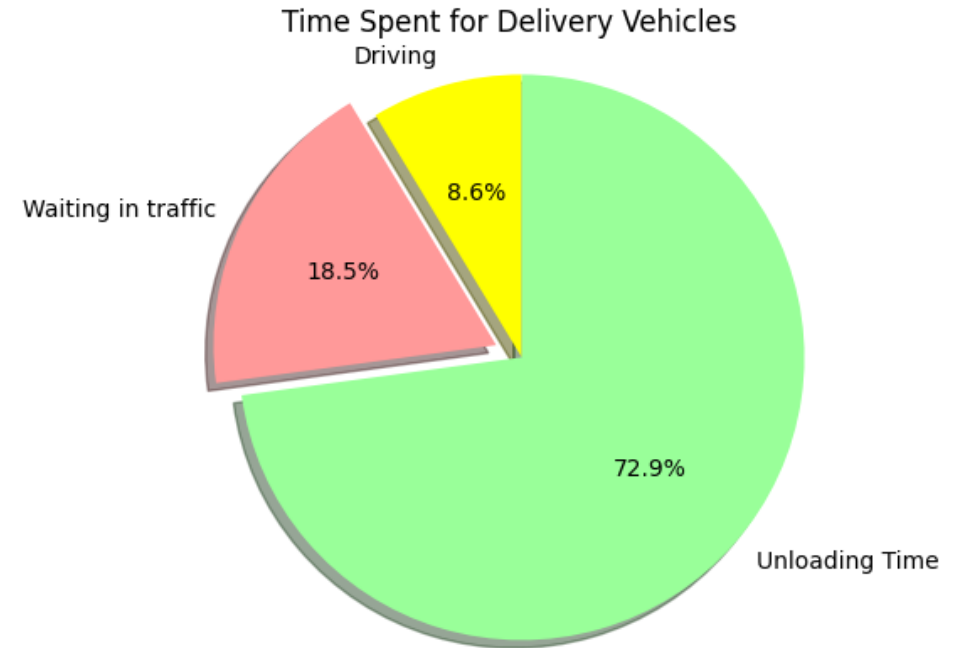
Outlook

- Better data for more detailed and accurate simulation
- Improved routing for deliveries
- Modelling a larger area for further insights
- Simulating more different delivery models

More data for the interested (1/3)

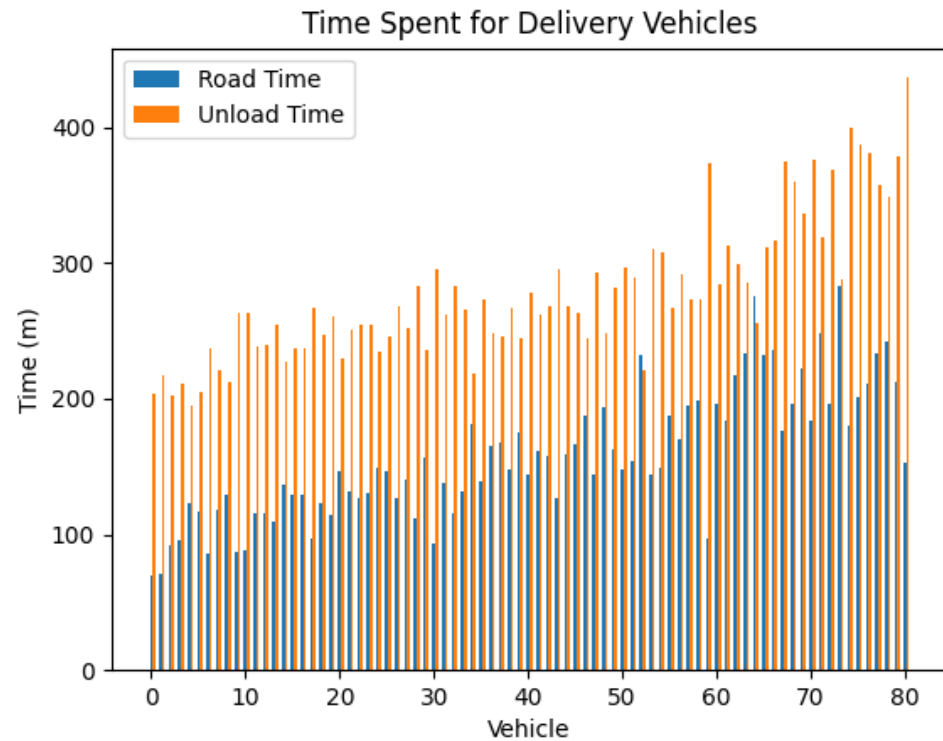


Carrier Vans

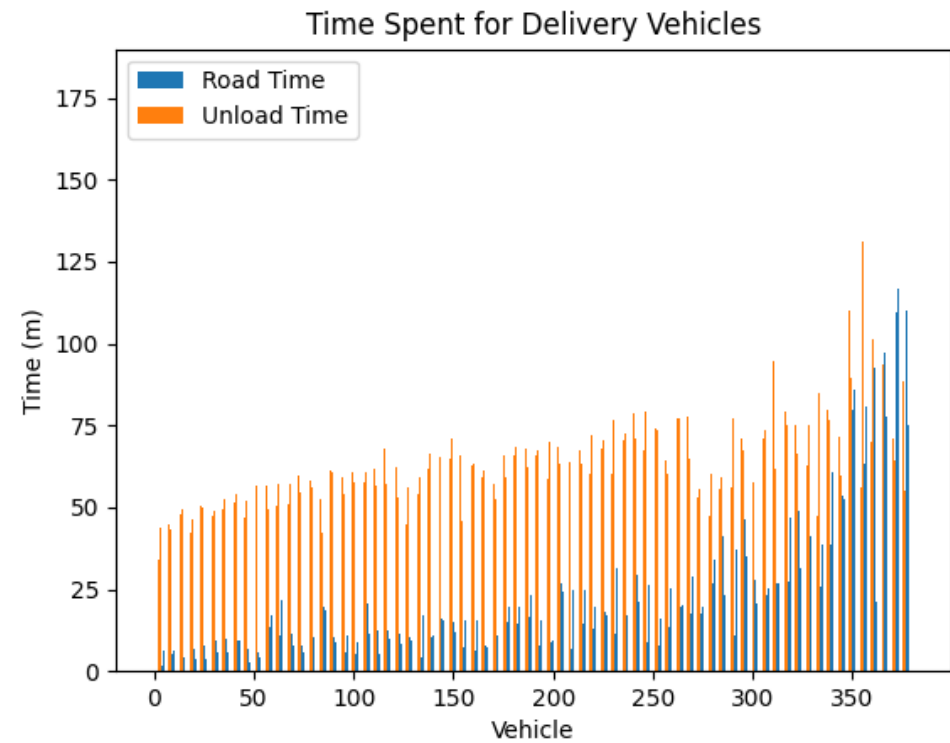


Bicycle Microhubs

More data for the interested (2/3)



Carrier Vans



Bicycle Microhubs

More data for the interested (3/3)

