

Modeling the Autonomous Mobility-on-Demand System

Senlei Wang, Gonçalo Homem de Almeida Correia, Hai Xiang Lin

Wechat: SenleiWang

Email: s.wang-3@tudelft.nl



Outline

- 1) Existing literature;
- 2) Model specifications and operations;
- 3) Experiment setup;
- 4) The analysis of simulation results.

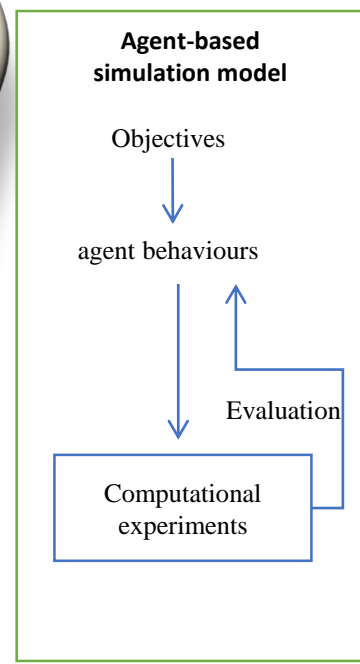
1.Existing literature

The implications of the Autonomous Mobility-on-Demand (AMoD) System on:

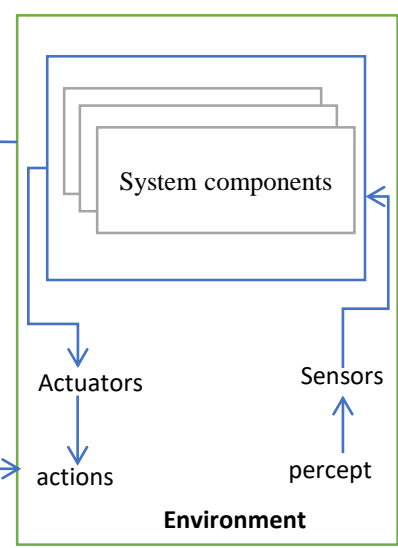
- urban parking demand,
- pricing scheme,
- Energy use,
- complementarity with other modes,
- traffic congestion
-,etc.



An artificial AMoD system:



The actual AMoD system



Real-time state update

Recommendations

1

The “actual” AMoD system

2

The management system of the actual AMoD system

Agent-based simulation model

An agent-based model (ABM) is developed to simulate different operations of SAVs. With the help of ABM, conceptual design and a preliminary study are presented for different operations:

1. Providing different service schemes;
2. Operating in a platooning fashion;
3. Transporting the travelers in the case of multiple fleet operators.

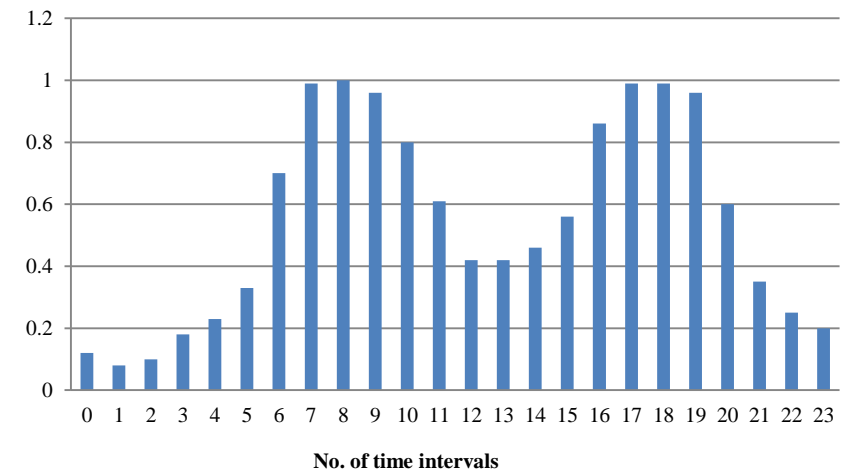
Experiment setup:1

1



The road network

2



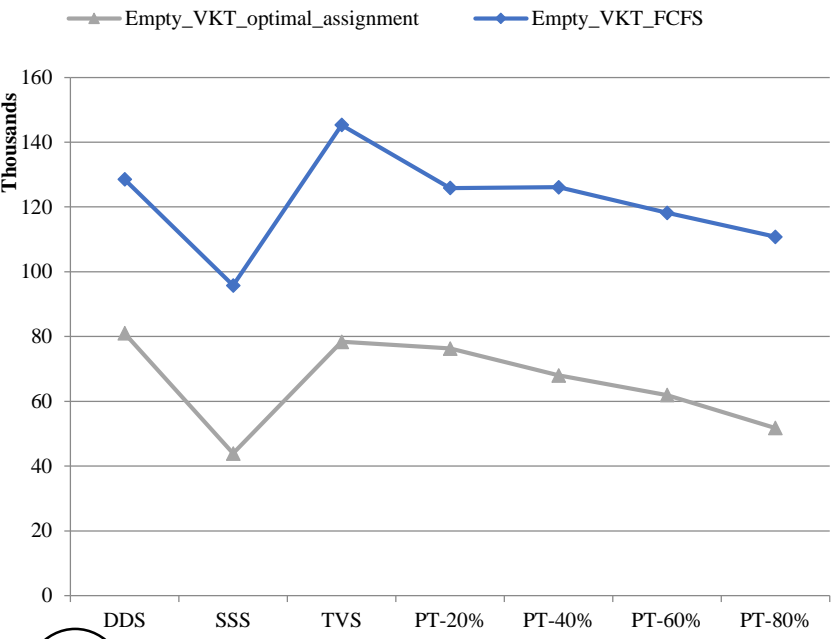
Detailed overview of departure time distribution

Results analysis (1): the impact of vehicle assignment methods

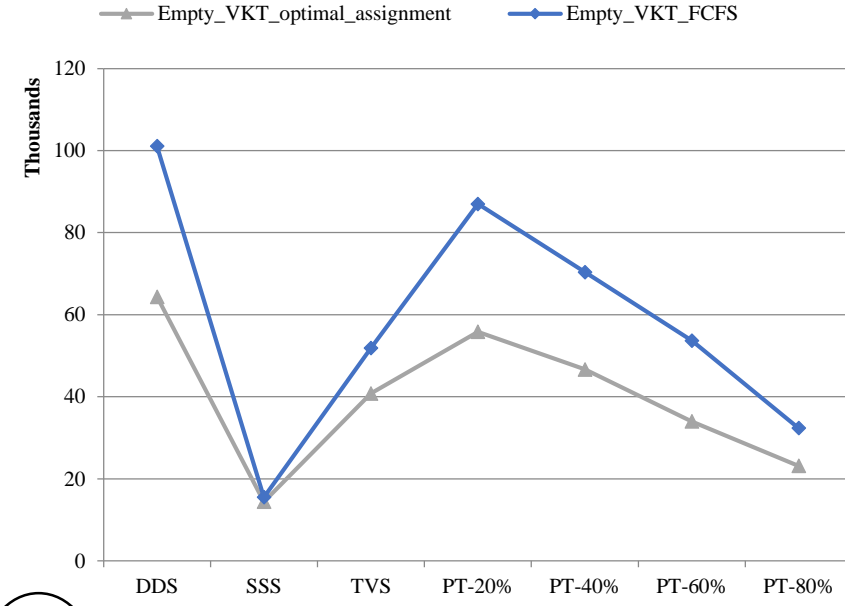
To look at how the optimal vehicle assignment method impacts the performance of different SAVs systems, 70 scenarios for different AMoD systems with variations of fleet size are simulated (see in following table).

Table: Combinatorial scenarios for the simulation of vehicle assignment

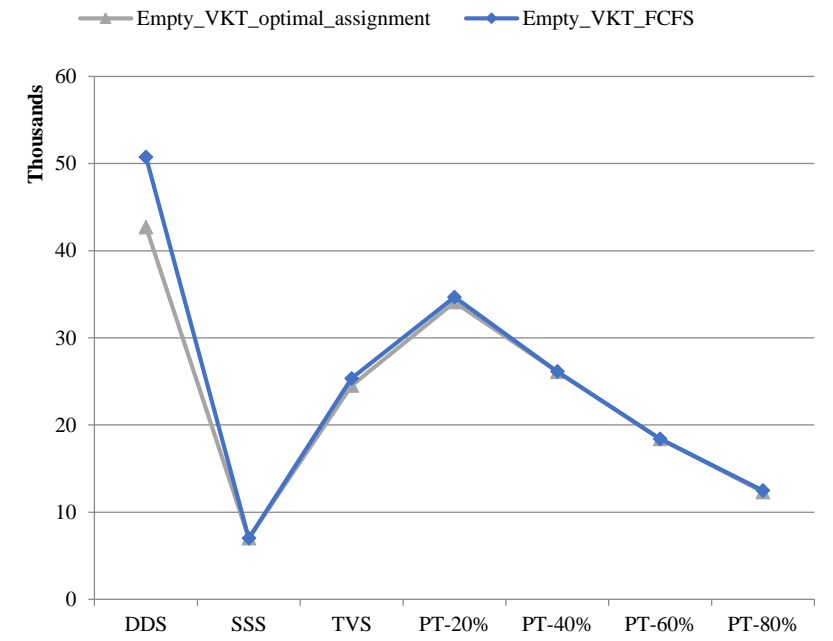
<i>Assignment method</i>	<i>Optimal assignment method</i>			<i>FCFS assignment method</i>			
Systems	DDS	SSS	TVS	PTS-20	PTS-40	PTS-60	PTS-80
Fleet size	2000	2500	3000	3500	4000		



1 Comparisons of VKT with the 2000-SAV fleet size



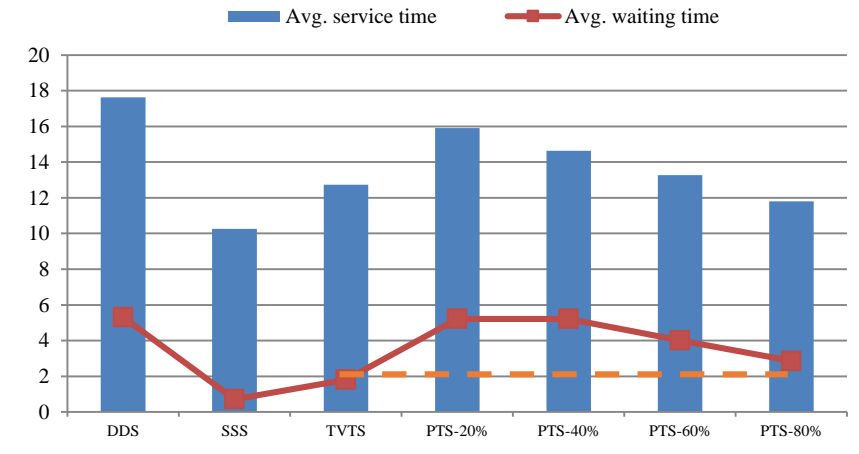
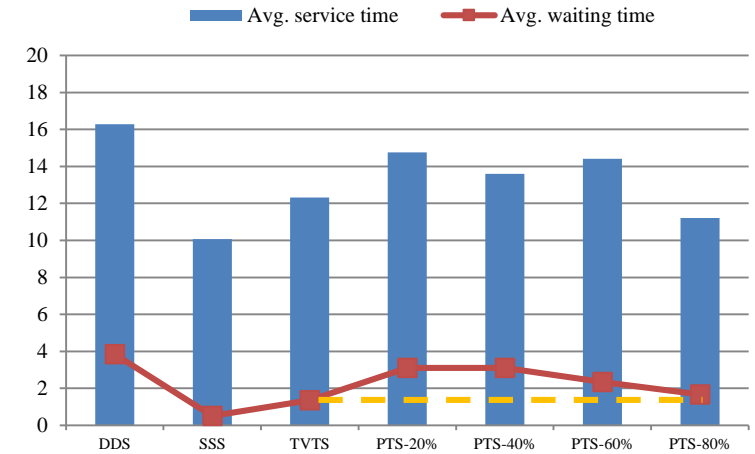
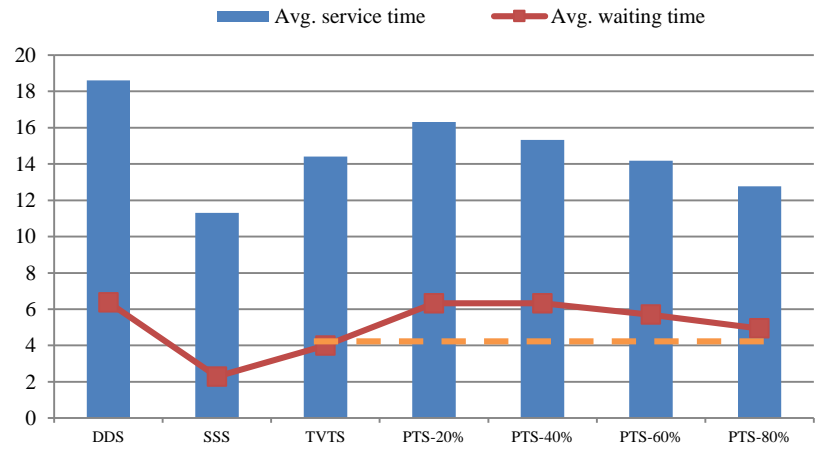
2 Comparisons of VKT with the 3000-SAV fleet size



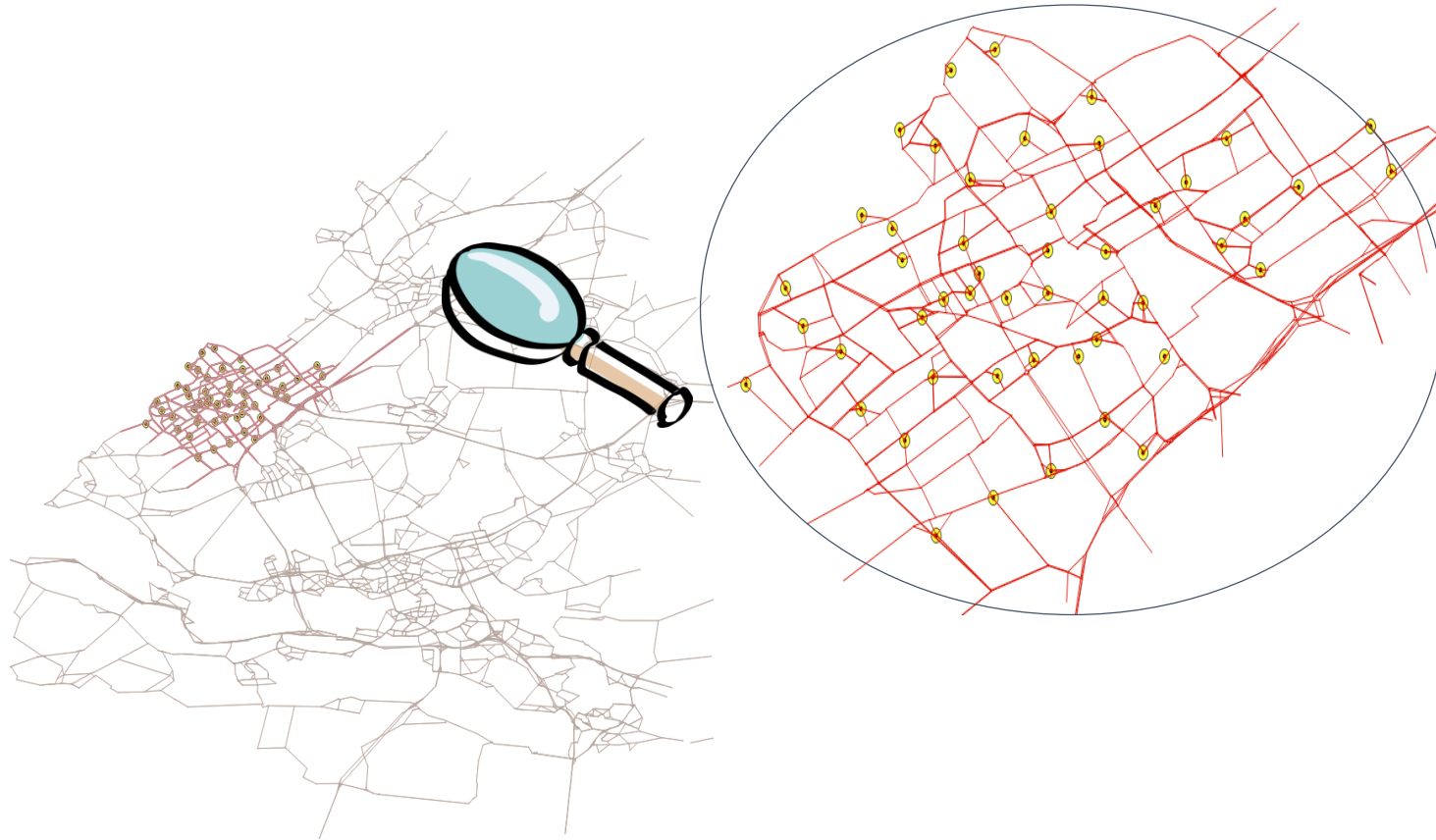
3 Comparisons of VKT with the 4000-SAV fleet size

Figure 1: Comparisons of generated empty VKT for different assignment methods with variations of fleet size

Results analysis (3): the analysis of Avg. waiting time and Avg. in-vehicle travel time



Experiment setup: 2



Impact of Vehicle platooning

Impact of introducing multiple fleet operators

THANK YOU
FOR
YOUR ATTENTION!
ANY QUESTIONS?