The impact of shared and autonomous robo-taxis on future urban mobility

Uno Sguardo al futuro: l’impatto della guida autonoma nel Car-Sharing
I robo-taxi nella mobilità urbana del 2030 a Milano

Oliver Wohak, d-fine
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- Combining business and IT competences
- Academic background in STEM disciplines
- Data analysis and technology
Our study with AMAT: The impact of shared and autonomous robo-taxis on future urban mobility

A Simulation-Based Approach for Milan 2030

Uno Sguardo al futuro: l'impatto della guida autonoma nel Car-Sharing
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Innovative mobility concepts use the elements of CASE to provide efficient and ecological mobility solutions.

Challenges faced:
- Urbanisation
- Limited infrastructure
- Emissions
- Inefficient utilization

Innovative trends:
- Connected
- Autonomous
- Shared Services
- Energy

The innovative mobility concepts are **enabled by digitization** and can sustainably **increase the living quality** in urban and rural areas through efficient connectivity and infrastructure utilization.
Our study focuses on robo-taxis as a ride-pooling service and analyses the potential benefit for traffic flow and emissions through traffic simulations.
Our simulations compare traditional traffic to traffic with integrated robo-taxi fleets assuming level 5 automation.

<table>
<thead>
<tr>
<th>LEVEL 0</th>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
<th>LEVEL 4</th>
<th>LEVEL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRIVER ONLY</td>
<td>DRIVER ASSISTANCE</td>
<td>PARTIAL AUTOMATION</td>
<td>CONDITIONAL AUTOMATION</td>
<td>HIGH AUTOMATION</td>
<td>FULL AUTOMATION</td>
</tr>
</tbody>
</table>
Comparing traditional traffic to modern mobility, the perspective is shifting from the vehicle to the person.
Our simulation approach focuses on the mobility demand of the individual and integrates the four steps of ride-pooling:

1. Identification
2. Matching
3. Route adaptation
4. Driving
The modular simulation framework makes use of various data sources and enhancing functionality to derive outcomes.
Microscopic traffic simulation enables bottom-up analysis: Our results in numbers

6 seaters offer good **capacity** for urban ride-pooling

9500 **robo-taxis** are necessary to avoid traffic jams during rush-hour

Typical **waiting time** for robo-taxi is below 15 minutes

10% **peak shaving** is considered as a complementing measure
The results of our simulation indicate the potential benefit of robo-taxis on infrastructure utilization.
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Freed space can be reallocated to the public or used for modern infrastructure!

Fewer parking spaces will be needed.
Efficiently shaping mobility and promoting public life: Milan 2030

No Congestions.  
Senza traffico.

Low Emissions.  
A bassa emissione.

Liveable!  
Vivibile!
Cities, traffic agencies, and mobility service providers face both challenges and potential in respect to innovative mobility solutions.

- **Frameworks and Conditions**
  - Intermodality & Mobility Hubs
  - User Experience
  - Understanding Regulation

- **Investment Potential**
  - Integrating E-Mobility
  - Autonomous Vehicles
  - Dynamic Pricing Strategies

- **Integrated Services**
  - MaaS Platform
  - App Development & API Integration
  - Fleet Management

- **Enhancing Micro Services**
  - Smart Ticketing
  - Pooling Algorithms
  - Demand Prediction

- **Cost-Benefit Analysis**
- **Service & System Integration**
- **Data Analytics and Algorithms**
- **Study and Roadmap Analysis**

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