

FinEst Centre
for Smart Cities

SMART CITY CHALLENGE 2025

City Challenge

Max 3 pages

send to smartcity@taltech.ee by Sept 30, 2025

Challenge Title – Infrastructure for Autonomous Mobility

City/county and country – Tartu, Estonia

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Domain of your challenge – Resilient city

1. What is the future urban challenge that would need a solution to?

Tartu faces the challenge of reducing its dependency on private cars, which contribute over 10% of the city's total CO₂ emissions and continue to grow. Current infrastructure does not sufficiently support sustainable mobility solutions such as autonomous public transport. Without modernization, the city cannot test or scale new modes of mobility that are critical for meeting climate goals and improving quality of life.

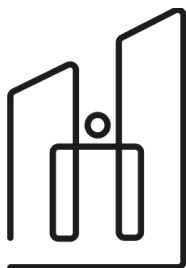
- **Please describe the challenge of your city / county neighbouring a city?**

The existing traffic infrastructure is outdated and does not support key protocols (DSRC, C-V2X) needed for safe autonomous vehicle deployment. Data about mobility patterns is fragmented, often unreliable, and lacks the resolution to support advanced planning or AI-based traffic management. This creates barriers for piloting new transport services and limits innovation in both public and private sectors. Neighbouring municipalities face similar mobility challenges, especially with suburban commuting flows, so the issue extends beyond Tartu.

- **Why is it important for your city to solve it? How big priority it is for you and why?**

Mobility is one of the most critical responsibilities of the City of Tartu, shaping both the quality of life and the city's climate footprint. Private cars currently account for more than 10% of the city's CO₂ emissions, and this share is growing. Without decisive action, Tartu cannot meet Estonia's national climate neutrality goals for 2050. Autonomous and demand-responsive





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public transport offers a direct pathway to reduce emissions, improve traffic safety, and optimize the use of limited urban space. This challenge is a top strategic priority for the city because it addresses environmental sustainability, social inclusion, and economic efficiency at the same time. Solving it will also position Tartu as a frontrunner in Europe for next-generation mobility solutions.

- **Is this a unique challenge/problem of your city, why or is this by your knowledge a challenge/problem that many cities have – which kind of other cities?**

This challenge is not unique to Tartu. Many medium-sized European cities with growing populations and suburban commuting patterns face the same issues: over-reliance on private cars, outdated infrastructure, fragmented data, and rising emissions. European cities face comparable difficulties in upgrading infrastructure to support autonomous and sustainable transport. However, Tartu has the opportunity to become one of the first cities in Europe to implement city-scale machine-readable infrastructure for autonomous vehicles. By doing so, Tartu can create a model for other mid-sized cities in Europe that want to transition toward sustainable, data-driven, and autonomous mobility systems.

2. Innovation.

So far, Tartu has tested small autonomous shuttle pilots (e.g., the 'Culture Bus' in 2024) and collected mobility data through conventional monitoring. However, the city lacks the ability to pilot full-scale autonomous bus services due to insufficient infrastructure and weak data integration.

Current solutions are not good enough because:

- Traffic lights and sensors are not machine-readable.
- Data is incomplete, scattered, and technologically outdated.
- No methodology exists for assessing long-term impacts of infrastructure changes.
- Without upgraded infrastructure, autonomous vehicles cannot safely operate in mixed urban traffic.



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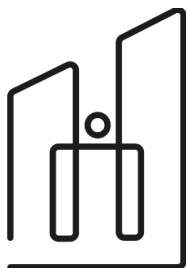


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- **How have you solved that issue so far? Why aren't the present solutions good enough? Are there legal obstacles, which ones?**

Autonomous driving pilots have so far used cameras to read the traffic lights. Camera-based traffic light detection is problematic if the view is blocked by sun, rain, fog or occlusion. This limits the reliability of autonomous vehicles and their operation area – no pilot has demonstrated completely driverless vehicle yet. With safety driver in place autonomous vehicles fail to live up to the promise of cost savings. Introducing machine-readable traffic lights to city infrastructure would make it possible to validate truly driverless autonomous vehicles.

- **What should be the main features, characteristics of the future solution to be potentially best for that challenge or problem?**

Future solutions must include machine-readable traffic lights and dense sensor networks, support for DSRC and C-V2X, robust data collection and modelling capabilities, and capacity to pilot autonomous city buses up to 50 km/h.

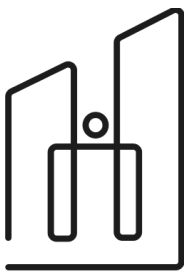
3. Expected impact of your pilot solution.

Expected impact on city environment:

- Reduction of CO₂ emissions by shifting from private cars to sustainable autonomous mobility.
- More efficient use of urban space through reduced parking demand and optimized road capacity.
- Contribution toward climate neutrality goals.
- Increased tourism?

- **What is the expected impact to your citizens you expect to see if the challenge gets solved?**





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Expected impact on citizens:

- Safer traffic with fewer accidents compared to human drivers.
- Better accessibility and convenience through demand-responsive transport.
- Improved public health through cleaner air and safer walking/cycling infrastructure.

- **What is the expected impact to your city governance you expect to see if the challenge gets solved?**

Expected impact on city governance:

- Data-driven planning and decision-making.
- Reduced costs of public transport operations (savings of €4–5 million annually in driver costs).
- Stronger innovation ecosystem linking the city with universities, research institutions, and service providers.

4. Piloting

Tartu has experience in running mobility pilots and a clear strategy to modernize its infrastructure to support autonomous vehicles. The city can offer:

- A mid-sized urban environment with diverse traffic conditions.
- Existing collaborations with universities (University of Tartu, TalTech) and private technology providers.
- Commitment to invest in machine-readable infrastructure (traffic lights, sensors, V2X).
- Ability to host and co-design pilots with international partners, creating reference models for other European cities.

