FinEst Centre
for Smart Cities

SMART CITY CHALLENGE 2025
Solution idea for the city challenges
Max 3 pages
send to smartcity@taltech.ee by Nov 30, 2025

Solution Idea Title (max 5 words, no acronyms) – City tree remote monitoring system
Planned pilot project duration – 24 months
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[Please note that we (TalTech researchers) are interested in this challenge and would like to collaborate with cities and other potential partners to offer a complete solution. We offer our competence to a part of the overall solution.]

1. **Which urban challenge or problem are you planning to provide a solution to?**

- Tree Pits for Challenging Urban Conditions

2. **The solution you are proposing**

We propose an IoT system that can be used to monitor status of city trees. For alleys of trees we can propose IoT system to monitor tree growth and soil moisture. Collect data per each tree and set of trees. Build a similar real-time dashboard system as for network monitoring. For community-supported watering practices -- an app tells to people about trees that require watering; individuals can be paired with a tree to take care -- app provides telemetry data about the tree and suggestions for maintenance; people can report incidents related to city trees.

How does it solve the city challenge you target?

This solution helps to solve challenge of community-supported watering practices and reinforcing civic engagement.

3. **Innovation and piloting of your pilot solution.**

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Treeparker system creates a good tree pit with water irrigation system[1]. Greenmax has a combined irrigation and aeration system[2] for trees planted into tree pits. GreenBlue has urban tree planting technologies[3]. Citygreen has solutions to plant city trees in large pots[4]. Citygreen can do soil moisture monitoring[5] with hourly transmission of real time soil moisture data. Treesense offers sensor system for monitoring trees for optimal tree irrigation[6]. Project Vitalitree[7] has proposed a solution to monitor soil moisture, compaction, pH, salinity, and air quality and temperature. The monitoring of trees helps trees to grow. In the city of Maastricht the trees with sensors and taking care of trees based on sensor data resulted 100% of survival of planted trees in 5 years[8]. The municipality of Campobasso is running a "Smart Green City" project that integrates IoT sensors with a decision-support platform to monitor green areas and the health of urban trees. Data includes soil moisture, water potential, air quality, and other environmental parameters. The platform uses real-time data and predictive models to optimize irrigation and maintenance scheduling — helping city managers decide when and how much to water public trees and green spaces[9]. Our solution consisting of IoT sensor network can be used to monitor the status of the tree pit and potentially detect and notify blockages in the water system, status of soil in tree pit, and can monitor tree growth.

- What do the cities need for piloting the proposed solution? How the piloting could work?

Densely populated areas have good coverage of cellular communication networks. The communication networks can be used for sensor data transmission for city tree health monitoring and maintenance.

Team: Our team is primarily composed of TalTech researchers. The team consists of experts contributing to connectivity infrastructure. The TalTech team has extensive relevant experience delivering solutions at TRL 7 in numerous EU and international projects. The key team members are working in Communication Systems research group at Thomas Johann Seebeck Department of Electronics, TalTech, Tenured Professor Muhammad Mahtab Alam, Head of the Communication Systems Research Group; Data analytics specialist, Lecturer, Marika Kulmar, Wireless Communication

[1] https://www.green-tech.co.uk/hard-landscaping/urban-tree-planting-systems/treeparker-cell-system
[2] https://greenmax.eu/en/solutions/aeration-and-irrigation/luwa/
[3] https://greenblue.com/gb/products/
[4] https://citygreen.com/product_info/urbangrove-tree-planter-system/
[5] https://citygreen.com/product_info/treebit-soil-moisture-monitoring/
[6] https://www.treesense.net/en/staedte-kommunen/
[7] https://www.sensingthecity.com/vitalitree-street-tree-health-monitoring/
[8] https://www.nadinagalle.com/blog/trees-can-talk-are-we-listening
[9] https://arxiv.org/abs/2507.12106

Researcher Osama Elgarhy; 3GPP Solution Expert Margus Rohtla and and Junaid Sajid, Early-stage researcher on AI/ML.

4. Expected impact of your pilot solution.

City environments are harsh for tree growth, but large trees benefit the urban climate more than smaller trees. Real-time tree monitoring helps to plan tree care better and more accurately, especially watering, where both too much and too little watering can harm a tree.

Disclaimer: by submitting this form you will give the FinEst Centre for Smart Cities the right to share this idea with cities and other researchers, companies through FinEst Centre homepage. If this idea is selected, the FinEst Centre for Smart Cities has the right to implement this idea with offering you an active role in conducting the pilot. If this pilot is selected then the financing is an investment by the FinEst Centre for Smart Cities.