

FinEst Centre
for Smart Cities

SMART CITY CHALLENGE 2024

Solution idea for the city challenges

Max 3 pages

send to smartcity@taltech.ee by Sept 16, 2024

Solution Idea Title (max 5 words, no acronyms) - **AI-Driven Smart Parking Management System**

Planned pilot project duration – 36 months

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

- We aim to provide a solution to the challenge of Smart Parking Management in Maribor, Slovenia. The city faces traffic congestion and inefficiency in parking space utilization due to the lack of real-time information about available spaces. The current physical control system performed by parking supervisors and wardens cannot deliver the level of efficiency needed to solve these issues. The proposed solution aims to reduce traffic jams, optimize parking lot occupancy, and make the work of supervisors and wardens more efficient by providing a real-time digital monitoring system for parking lots across the city.

2. The solution you are proposing

Our proposed solution is a comprehensive **AI-driven smart parking management system** that combines machine vision, AI algorithms, and data integration to provide real-time monitoring and control of parking spaces in Maribor.

The key components of the solution are:

1. Camera-Based Monitoring Using Machine Vision:

Cameras equipped with AI-driven image recognition algorithms will be deployed to monitor individual parking spaces and entry/exit points. These cameras will track parking lot occupancy and vehicle movements without the need for costly physical sensors for each parking space. The system will also use license plate recognition (LPR) to track vehicles entering and leaving parking areas.



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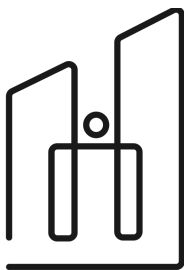
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2. **Real-Time Data Access for Supervisors and Wardens:**

The system will feature a centralized dashboard that allows supervisors and wardens to monitor parking availability, detect violations (e.g., unregistered vehicles or overstays), and view live statistics on parking usage. This real-time access will reduce the need for physical patrols and improve the efficiency of parking enforcement.

3. **Integration with Existing Parking Registration System:**

Some cities already use an SMS and/or app-based system for parking registration. If possible, our solution will integrate this data with the real-time monitoring system, cross-referencing registration data with actual parking occupancy to improve accuracy and streamline parking management.

4. **Dynamic Signage and Mobile App for Drivers:**

Digital signs will be installed at parking lot entrances, displaying real-time information on available parking spaces. Additionally, a mobile app will guide drivers to the nearest available parking spot. The app will be voice-accessible and can be integrated into vehicle navigation systems for hands-free operation.

5. **Data Analytics and Reporting:**

The system will collect and analyze data on parking usage, enabling city officials to generate detailed reports on parking patterns, traffic flows, and environmental impacts. This data can be used for long-term urban planning and to optimize parking lot locations or capacities.

3. Innovation and piloting of your pilot solution.

- **Current Solutions:**

Existing parking management systems often rely on ground-based sensors for each individual parking spot, which can be costly and require significant infrastructure. Some solutions use basic camera systems, but these are usually limited to monitoring specific parking lots without integration with broader city-wide data.

- **Our Innovation:**

Our solution provides a hybrid approach, using AI-driven machine vision to monitor parking lots, eliminating the need for individual sensors at each spot. By leveraging existing camera infrastructure where possible, and installing new cameras only where necessary, the solution reduces costs while providing high accuracy. Integration with existing SMS/app-based registration systems further enhances the solution's usability, making it a cost-effective, scalable solution for both structured and unstructured parking spaces.

- **Piloting:**

We propose a pilot program focusing on high-traffic parking lots in Maribor. The pilot will include the deployment of cameras, integration with the registration system, and real-time data processing to track parking availability and violations. The solution will be expanded to other parking areas based on data collected during the pilot, with the potential for full city-wide deployment.



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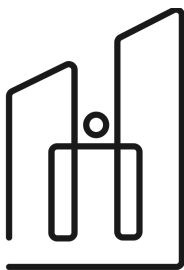
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During the pilot, supervisors and wardens will receive training on using the dashboard and app for real-time monitoring and enforcement.

4. Expected impact of your pilot solution.

- **Environmental Impact:**

By reducing the time drivers spend searching for parking, the system will contribute to a **decrease in CO2 emissions and overall pollution levels**. Real-time data will also help optimize traffic flows around parking lots, further reducing environmental impacts.

- **Social Impact:**

Citizens will benefit from **time savings** and **improved convenience**, as they will be able to find parking faster and avoid unnecessary driving. Disabled individuals will also benefit from the inclusion of dedicated parking spaces that can be identified in the app.

- **Governance Impact:**

City officials and wardens will **benefit from** a user-friendly digital **monitoring system that optimizes their work**. Real-time access to parking data and statistics will reduce the need for physical patrols and make enforcement more efficient. **Additionally, the system's integration with broader smart city solutions will provide valuable data for urban planning and traffic management.**

Conclusion

Our AI-driven smart parking management system leverages advanced machine vision technologies and past experiences of our Embedded Research Lab to deliver an innovative, cost-effective, and scalable solution. By addressing Maribor's parking challenges and supporting the work of city officials and supervisors, the system will provide significant benefits in terms of traffic management, environmental sustainability, and city planning.

***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.*



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