SMART CITY CHALLENGE 2024
City parking management challenge

Solution Idea Title eParkly: Real-time Parking Monitoring

Planned pilot project duration – 36 months

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1. The urban challenge we provide the solution

City parking management challenge

2. Our solution

Introduction

eParkly is a women-led project that will produce a platform for providing 1) information on real-time availability of parking spaces in the city centre from all parking facilities (including the navigation to them) and other parking-related key info on a public dashboard, 2) collecting city-wide parking statistics for urban development. If needed, the platform also provides 3) pre-booking and 4) dynamic demand based pricing options - hence the workname *Marketplace*. The solution will be provided as PAAS (Platform as a Service) which the parking providers can utilise and engage with their users.

The parking providers will be able to list all their parking lots in our marketplace and in return we will provide the real time availability of all the parking spaces, making the availability thus more transparent to the users. Furthermore, our platform offers a fully new kind of city-wide parking data ecosystem, enabling many kinds of new public service and business opportunities. To enable wide data collection and thus the parking data ecosystem, our research work will mainly focus on the local digital conditions, parking and enforcement arrangements, and parking stakeholder analyses in the participating cities. In chosen parking lots the project can provide sensors and cameras with suitable AI tools.

Problem

Over half of humankind, about 4.000 million people, live in cities presently. Among which, 35% travel during rush hours looking for free parking spaces which are usually hard to find[1]. Furthermore, bigger events in evenings and weekends make cities congested frequently. The car users, parking operators and cities face following problems:

- **Car drivers drive around randomly:** Car users spend excessive time searching for parking spaces in crowded cities. On average, U.S. drivers spend 17 hours per year searching for parking at a cost of $345 per driver in wasted time, fuel and emissions contributing to $72.7 billion searching for the elusive parking space in U.S[2].
- **No visibility to available parking spaces:** Drivers have no access to the available parking spaces due to lack of real-time information of parking spaces nearby in a convenient user interface. There are a lot of parking info sites online, but they are typically based on rather non-accurate open data. However, while strong multinational parking operators have muscles to advertise their services, the less resourced public and other car parks may remain in shadows. The big picture stays invisible.
- **Under-utilisation of parking facilities and parking data:** Since available parking spaces nearby are not easily visible and accessible to all users, many of them lay vacant while users struggle in the immediate vicinity. Since the existing or easily produced parking data is not shared, cities are **unaware** of the actual parking demand, supply and use rates in different times of a day, week or a month. Shared and simply presented parking data enables better strategic urban transport planning and better info service for everybody, especially tourists.

Ironically, local zoning ordinances, building codes, and other development practices can result in an oversupply of parking spaces elsewhere. Also, different pricing policies and business models among

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[1] https://circontrol.com/the-parking-of-the-future-problems-challenges-and-solutions/

[2] https://inrix.com/press-releases/parking-pain-us/

parking providers may cause partial optimisation in real-estate business and non-functional parking behaviour among parkers, which in city-wide perspective creates non-optimal usage of public spaces and parking infrastructures. Finding parking optimally is also necessary to regulate vehicle's flow in the cities and reduce atmospheric pollution. The city-wide real-time parking data ecosystem also enables new public info systems and new business opportunities for many data operators and for many local, parking related but also non-parking related services. For example, shop-keepers can offer parking-related services and discounts for their customers, or the city or other bigger players can utilise the real-time city-wide parking (=mobility) data, instead of tele-operators' data services that are expensive and delayed.

Market Potential

In the Global North, the demand for parking spaces in city centres is rather steadily following patterns based on weekdays and annual seasons. Only shopping malls on the outskirts of the city affect the parking demand. In Africa and Asia, where automobility is rapidly growing but urban infrastructure adopts them very slowly, if at all, the parking demand is even bigger. Same applies to smaller European mediaeval towns with historic sites.

Business model

Because of parkers' reluctance to pay mobility info *per se*, the payment for this info service must be embedded in normal parking payments. In bigger cities with numerous parking facilities, our commission can be lower than in smaller cities, roughly one, or a half (or even less) percent of the normal parking fees. For the first two years of the service, the city also should pay little annual maintenance fee, especially for the city-wide parking dashboard and the possible sensors.

3. Innovation and piloting our pilot solution

Commercial actors in market

Figure 1: The competitors in the market

The competition analysis has been performed based on the features and services provided by various competitors in the market. The diagram on the left was done some years ago. It will be updated in the project. Two main dimensions are considered to illustrate market positioning -- (1) how dynamic or static their pricing model is, (2) whether they have real-time pre-booking facility, and (3) do they offer a city-wide view. So, what is interesting and what eParkly strives to achieve is showing the availability of all parking facilities in the city, and real-time pre-booking, if needed. One close competition is from BestParking and SPOT from the USA. BestParking provides a similar dynamic pricing solution for parking along with a pre-booking facility and SPOT provides the facility of renting and finding private parking spaces.

Piloting details

The research phase will clear out

  1) the level of digitalisation of the parking facilities of every partner city plus needs to improvements, and

  2) the willingness of the existing parking stakeholders in the city to collaborate and share their real-time parking data to the city-wide parking data ecosystem that we will create.

The idea is to create a user-friendly platform which can be offered as a mobile or web application with the real-time availability of the parking spaces using sensors or computer vision. The real-time
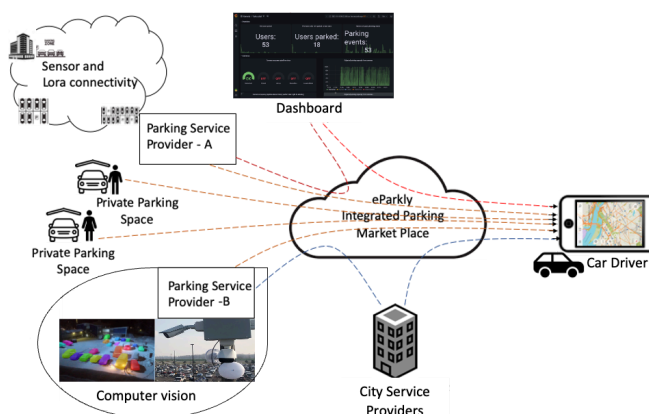

Figure 2: eParkly platform

parking pricing will also be displayed on the application for the car drivers in choosing the parking. The parking providers as well as private parking spaces can list their parking facilities on our platform to make them more visible to end users and to increase the utilisation of the parking spaces while giving transparent pricing at the same time on the user's app. The platform has been tested on a smaller scale with limited functionality in Turku city under Business Finland's 0.9M€ project. The next step is to create the parking data ecosystem in several cities for giving the more transparency on the availability as well as prices and acting as a middleware platform in facilitating this service to the car drivers. Based on the number of inhabitants, the cities interested in this pilot can be divided into

1) Bigger 2 (>1M in Bursa and Milano)
2) Middle-size 3 (ca 250 000 in Gdynia, Dún Laoghaire, Kiel)
3) Smaller 6 (50 000 - 100 000 in Jablonec nad Nisou, Alba Iulia, Pula, Caen, Narva, Pärnu, Maribor)
4) Very small 2 (< ca 30 000 in Saaremaa island and Kuldiga) cities. Urban density in listed cities is very low, excluding Narva, Caen and Milano. Almost half of these cities already have a dedicated web page for car parking in the city, mostly for tourists. The city-wide parking dashboard will improve the existing web-pages remarkably, and enable a parking page for the rest of cities. The participating cities and their roles in the pilot will be clarified based on our research results during the pilot preparation, and more precise needs of the so far interested cities.

Core team

	Team Member	Role	Experience
Management	Dr. Avleen Malhi	Coordinator	15 years -AI, Machine learning, Research, Business
	Prof. Kary Främling	Project Owner	22 years - Data Science, IoT Security, Communication
Business	BBE, Jukka Näräkkä	Project Manager	40 years of sales and business development.
	Dr. Kalle Toiskalio	Commercial Advisor	30 years – Innovation, local parking facilities, Commercialisation
Research	M.A. Rauli Rinnekangas	Commercial researcher	3 Masters, 15 years of experience in parking research
	PhD student Samanta Knapic	Researcher	5 years – Human-Centred AI with Slovenia's local knowledge, native Slovenian speaker
Production	M.A. Tuomas Keyriläinen	Lead Programmer	12 years - Software Development
	M.A. Jussi Pirilä	Programmer	10 years - Software Development

Two technical universities ensure the capabilities of the team: **FinEst Centre for Smart Cities** as in TalTech is the lead research organisation and **Aalto University** as the support organisation. The following companies will develop the results of this project further, immediately after the project's life-time: **AviAIConsulting Oy** - AI consultancy specialised in artificial intelligence, **CommuniThings** - a device provider and **Enterlot Oy** - a consultant company specialised in parking.

4. Expected impact of your pilot solution

Within the following five years, the eParkly pilot can significantly impact drivers, parking providers, and cities:

- **Drivers:** There will be 50% reduction in search time of a parking space, lower fuel consumption and emissions (and increased convenience with pre-booking and real-time pricing, if needed)
- **Parking Providers:** Our solutions will provide 30-40% higher space utilisation (revenue growth from dynamic pricing) and data-driven operational improvements
- **Cities:** 20-30% reduction in traffic congestions, increased public parking revenue, positive environmental impact, and improved impression of hospitality of the particular city. Less informal double on-street parking. New city-provided public data ecosystem enabling new digital services
- **Local Businesses:** More foot traffic due to better access to centralised parking facilities, and potential for parking partnerships
- **Social/Economic:** Job creation and innovation leadership as well as scalable for expansion