

Smart City Kevelaer

SENSOR-BASED PARKING GUIDANCE



S O NAH
SUSTAINICE URBANIZATION

A CITY UNDER PRESSURE

800.000 VISITORS

More than 800,000 visitors come to the city every year. Depending on the event, this has led to chaotic traffic conditions in the city. There was a lack of information about available parking options, no guidance.



MOSTLY PASSENGER CARS

Many visitors arrive by car, and some by tour bus. In any case, the downtown area was congested, leading to traffic jams and high demand for parking in the central parking areas of downtown.



INCREASED TRAFFIC

Traffic congestion occurs during rush hour, leading to longer travel times—which can be avoided if signs at key locations indicate which parking spaces are available and which are taken.

INCREASED EMISSIONS

More cars in the city center lead to higher greenhouse gas emissions, which pollute the air and the environment and cause health issues. This is a global problem in urban areas, not just in Kevelaer.

MEASURABLE IMPACT

SMART PARKING IN KEVELAER - EVERYTHING AT A GLANCE

~4.000

detected parking maneuvers per day

~1,46 MIO.

digitally recorded parking maneuvers per year

~243.000 KM

parking traffic avoided per year*

~37 T CO₂

potential CO₂ emissions saved per year*



MEASURABLE IMPACT

AS FEW AS 1,000 DIGITIZED PARKING SPACES CAN EFFICIENTLY MANAGE OVER 1.4 MILLION PARKING TRANSACTIONS ANNUALLY, THEREBY REDUCING TRAFFIC, EMISSIONS, AND THE TIME SPENT SEARCHING FOR A SPOT.

30X LOCATIONS

Thirty LED directional signs were installed throughout the city

80X LED SIGNS

A total of 80 LED signs were installed at 30 locations (plus 5 full-matrix signs)

~1.000

Sensors track and display approximately 1,000 parking spaces daily

SENSOR MIX

Combination of ground-based and overhead sensors was selected

A MAJOR IMPACT ON CLIMATE AND TRAFFIC

4,000 parking events per day

approximately 1.46 million parking uses per year

More efficient use of existing parking spaces

1,000 digitally tracked parking spaces with an average of 4 to 5 uses per day

Less traffic and fewer emissions caused by searching for parking

Between 243,000* and 730,000 km (max) of driving potentially avoided per year

Up to 110 metric tons of CO₂ savings annually

through the targeted allocation of available parking capacity*

DIGITAL URBAN DEVELOPMENT

~ 1.46 million usage data points per year

as a basis for data-driven decisions

Greater transparency

regarding parking lot occupancy to support data-driven management.

Better planning

The city can now look back at past data 365 days a year to better plan for the future (mobility)

Foundation for further smart city applications

through actionable real-time data

* based on realistic assumptions of 500 metres of avoided searching for a parking space for every third vehicle & CO₂ emissions of approx. 150 g/km per car

EVERYTHING CONNECTED

An Overview of the Smart System

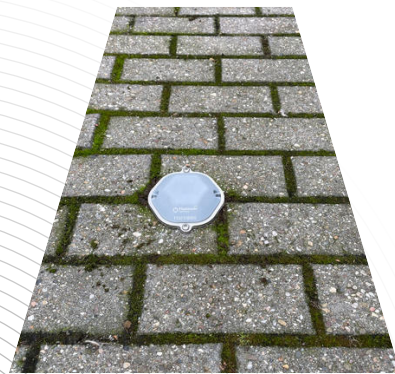
OVERHEAD SENSORS

An elevated mounting position (light point) makes it possible to digitise up to 72 parking spaces. The sensor is capable of receiving over-the-air updates, ensuring that the latest firmware is always available and that additional use cases (counting cars, detecting free bike slots etc.) can be integrated at a later date.



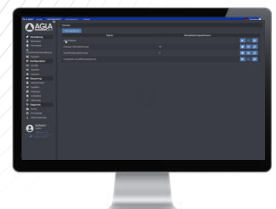
GROUND SENSORS

Ground-mounted sensors for individual parking space detection; both in-ground and on-ground versions for the digitalisation of individual parking spaces have been deployed in the field. Data transmission is carried out via LoRaWAN. Alternatively, we can also use LoRa or NB-IoT.



LED DIRECTIONAL SIGNS

Real-time display of parking information via clear, modern signage that blends into the cityscape. In addition to standard LED directional signs, easily customizable full-matrix LED displays are also available.



WEB TOOLS & ANALYTICS

All sensor data is consolidated centrally, analyzed and visualized in real time, and seamlessly integrated into other systems via standardized interfaces.

ONE SINGLE POINT OF CONTACT

AS THE PROJECTS GENERAL CONTRACTOR, SONAH TOOK ON FULL PROJECT MANAGEMENT — AND WAS RESPONSIBLE FOR EVERY STEP FROM PLANNING THROUGH TO OPERATIONAL USE.

IMPLEMENTATION AT A GLANCE

CONCEPT

Site Planning for Sensors and Control Systems

INFRASTRUCTURE

Coordination of civil engineering and energy infrastructure projects

INSTALLATION

Installation and Integration of Smart Parking Systems

DIGITAL CONTROL

Operation and Control of the Parking System

PROJECT SAFETY AND EFFICIENCY

By centrally managing all project phases, SONAH significantly reduces coordination points, coordination efforts, and risks.

Cities benefit from fast, efficient implementation with clearly defined responsibilities.

FUTURE-PROOF INFRASTRUCTURE

The modular system architecture enables flexible expansion and integration of additional smart city applications.

This creates not only a smart parking solution, but also the foundation for digital urban development.

PARTNERS FOR A SUCCESSFUL PROJECT

Various sensor technologies monitor the current parking situation in real time; the data is consolidated centrally and ultimately displayed live on the directional signs.

The complex interplay of hardware and software in an urban environment can only succeed if partners coordinate closely to implement their work packages. After all, once civil engineering work begins —if not sooner— you need partners who are knowledgeable and can respond flexibly. To ensure this, we collaborated with the following partners:

AGLA

AGLA is our partner for LED parking guidance systems and the associated management and configuration system.

This enables LED directional signs to be customised and provides a modern, modular solution for local road traffic. As a global system integrator and supplier of high-quality LED systems, we draw on the expertise of a specialist whose services are utilised by prestigious clients, such as OMEGA for the Olympic Games or the NBA for the shot clock above every basketball hoop!

OMEXOM

OMEXOM is our infrastructure partner. Under the guidance of SONAH GmbH, the company carried out the civil engineering works and installed the LED signposts throughout the city. Instead of costly conversions to a permanent power supply for the camera based sensors or rechargeable batteries, a smart lighting concept supplies the sensors with power directly. This means the city not only saves on energy costs thanks to efficient LEDs, but also avoids the need for future battery replacements. Furthermore, maintenance of the light heads can be planned from a desk using data-driven methods.

DIGIMONDO

Digimondo is our partner for the digital LoRaWAN infrastructure. All sensors that do not communicate via the mobile network are provided with connectivity via Digimondo's LoRaWAN infrastructure. This ensures that the ground sensors can provide reliable data. This infrastructure can now be used for further LoRaWAN use cases, such as reading water meters, electricity meters and similar devices automatically, without the need for an employee to be on site to take the readings.



SENSOR AGNOSTIC

A combination of overhead and ground-level sensors for maximum efficiency. The key to the project's success lies in the targeted combination of different sensor technologies.

The system combines various technologies to optimally detect and map the parking situation. Overhead sensors provide comprehensive coverage of large car parks and traffic flows, offering cost-effective benefits, particularly where there are a large number of parking spaces. In addition, ground-level sensors ensure pinpoint accuracy in areas where gaps in coverage might otherwise occur.

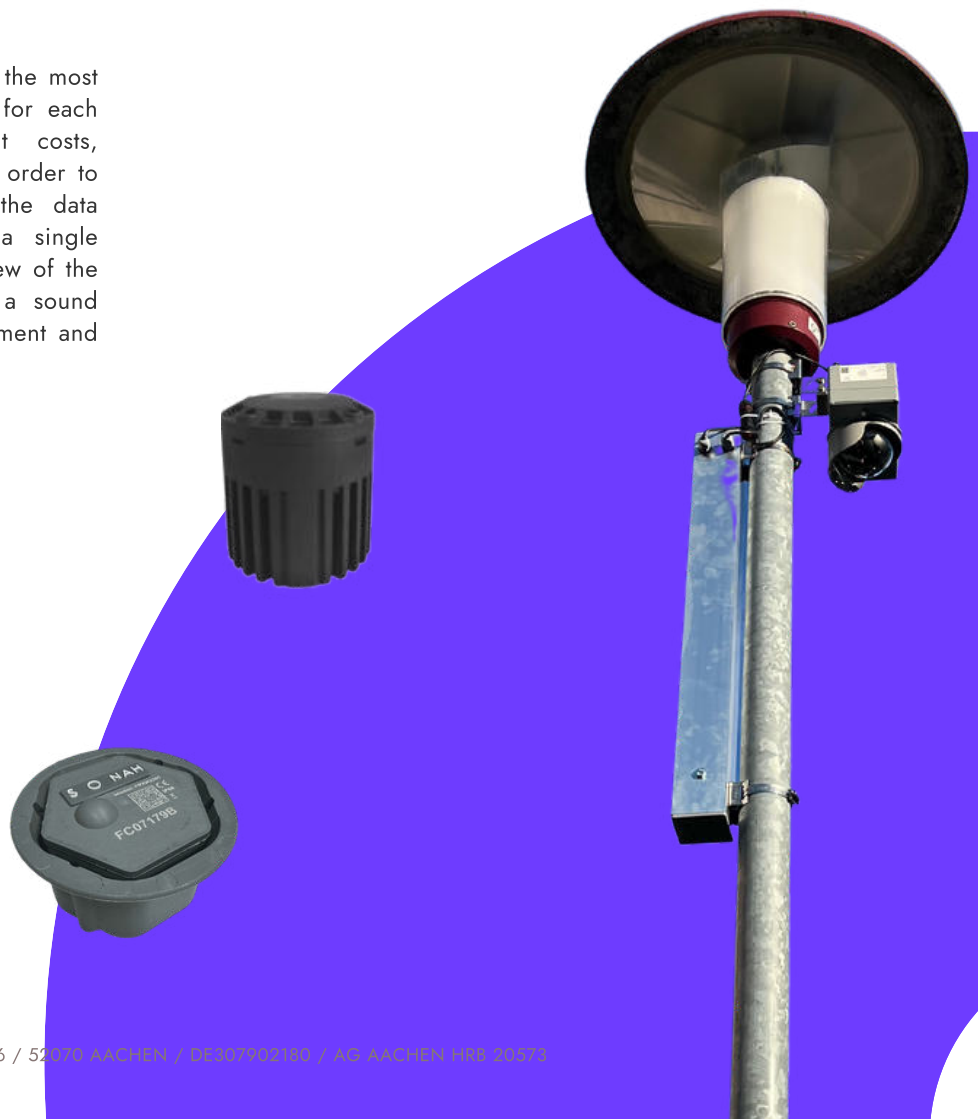
Existing infrastructure is utilised as far as possible, like streetlights or publicly owned buildings or alike. This significantly reduces implementation costs and lead times. At the same time, battery buffering can ensure a flexible energy supply in cases where a smart lighting concept or a permanent power supply cannot be implemented cost-effectively.

By combining both approaches, the most suitable technology is selected for each location, taking into account costs, benefits and local conditions in order to use resources efficiently. All the data collected is consolidated on a single platform, providing a unified view of the parking situation and creating a sound basis for smart parking management and realted analysis.

SONAH Partner



for Ground Sensors



RETROFIT

Maximum impact,
Minimum intervention

SUSTAINABLE OPERATIONS

Our sensors require a reliable power supply. If connecting them to a permanent power supply is not technically or economically feasible, we offer flexible alternatives power can be supplied either via a battery backup or by integrating the sensors into a smart lighting system. The latter not only eliminates the need for regular battery replacement, but also reduces ongoing energy and maintenance costs in the long term.

SWIFT IMPLEMENTATION

Existing infrastructure, such as street lights and public buildings, is used to install the overhead sensors.

This significantly reduces implementation costs and decreases the time to deliver for such projects.



SEAMLESSLY INTEGRATED

BLENDING INTO THE CITY & ITS STREETLIGHTS

The Kevelaer Smart City project is not just about technology. It is all about seamless and intelligent integration into the urban environment. The real challenge with digital solutions is making them highly effective without looking like awkward, out-of-place hardware.

That is precisely where SONAH comes in, combining infrastructure, function, and design. By integrating camera-based sensors directly inside the new TRILUX luminaires, the carpark can be monitored discreetly from within the columns—eliminating the need for bulky external add-ons.



LED DIRECTIONAL SIGNS

ILLUMINATED DATA SHOW THE WAY

The Kevelaer Smart City project bridges the digital and physical worlds through **80 LED directional signs** across **30 strategic locations**. Using real-time sensor data, these customizable signposts direct traffic efficiently to available spots.

Five integrated full-matrix displays expand the system's capabilities, broadcasting dynamic updates on local events, traffic detours, and town news.



LED DIRECTIONAL SIGNS

LED directional signs provide clear guidance and significantly reduce stress and the time spent searching. Real-time information enables quick and convenient navigation to the right car park.

IMPROVED VISIBILITY

The signposts feature high-quality printing on glass, engineered to maximize contrast and legibility. This ensures that directional information remains instantly readable and razor-sharp, even under harsh sunlight, heavy rain, or fog.



BACKLIGHT

Integrated backlighting transforms the directional signs into premium pieces of urban furniture. The subtle illumination accentuates the sleek glass finish, giving the signage a modern, high-end look while maintaining effortless visibility after dark.



NO ALIEN IN THE CITY

Thanks to their aluminium casings, the signs and poles are protected from the elements and blend into the cityscape as a piece of street furniture. No clamps, no brackets, no screws or similar fastenings are visible. Instead, the signposts appear as if cast from a single mould.

MODULARITY

Similar to the well-known plug-in module principle, the LED directional signs have a modular design, which forms the basis for efficient installation and customisation or expansion.

SOFTWARE

PARKING GUIDANCE SYSTEM



DATA INTEGRATION

The sensors provide real-time data which can be used to define complex scenarios and control them automatically; for example, when area A is at full capacity, redirecting traffic to area B, etc.



CUSTOMISATION

In full-matrix displays, you can customise messages to suit your requirements, display graphics and integrate third-party systems.

The Matrix system allows you to create coloured icons or banners for events, for example.



AUTOMATIC MESSAGES

By scheduling announcements, as you would in an events calendar, you save yourself the hassle of having to manually put up and take down signs or posters at the entrances to towns, as was done in the past.

ADDED VALUE

By combining real-time parking data with the flexible control of full-matrix displays, a digital communication platform is created that brings together traffic management, visitor information and city marketing within a single system.

CENTRAL CONTROL

Via a shared platform

FLEXIBILITY

Updates on events, road closures & visitor management

GRAPHS

Flexible uploading and playback

TIME CONTROL

Advertisements for events and special occasions



NEXT STEPS

REQUEST MORE INFORMATION ABOUT OUR SERVICES

GET IN TOUCH WITH OUR TEAM

ABOUT SONAH^{GmbH}

SONAH is a Germany-based smart parking company that helps cities across Europe tackle a wide range of everyday parking, traffic and waste management challenges. Using camera-based, embedded vision sensors, SONAH enables cities and businesses to simplify complex decision-making and work towards a healthier, more sustainable urban environment.

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