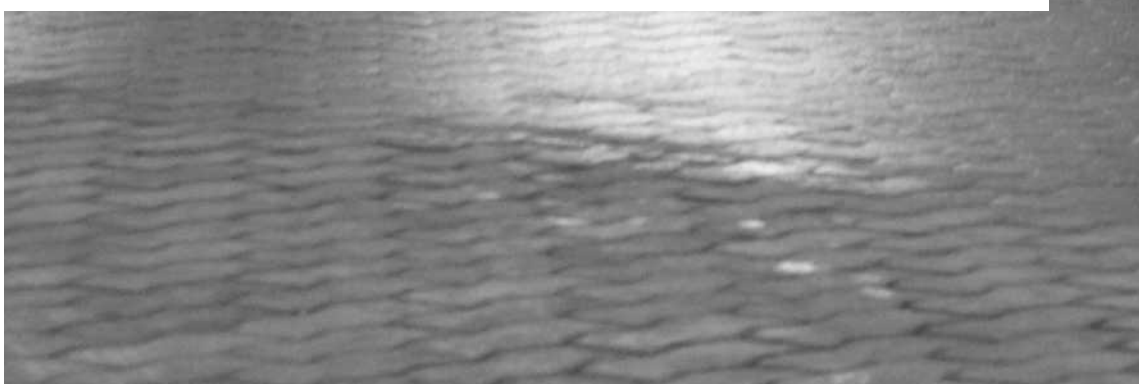
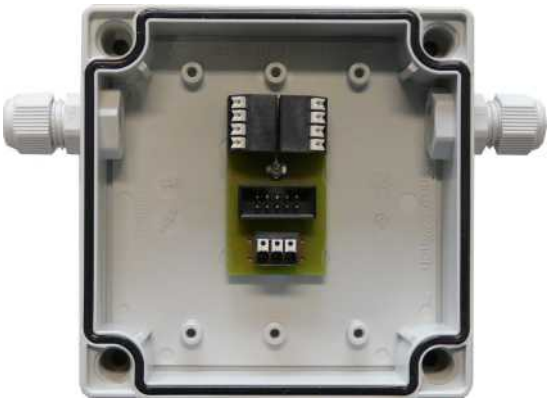
c|u|r
Systemtechnik


# CUR parking guidance system

The perfect solution for every car park



The LED displays can be read easily even in direct sunlight



Fast and easy installation of the sensors due to spring terminals

External lamps in the lane display the actual parking situation

# What are the advantages of the CUR parking guidance system?

A parking guidance system not only saves a lot of time and nerves in finding a free parking space, it also reduces the traffic searching for parking spaces in a car park and therefore reduces the emission of pollutants and noise. The capacity utilization and the acceptance of the car park is increased.

### Accurate sizing to the requirements

The CUR parking guidance system has a modular structure. Almost all components of the CUR parking guidance system are equipped with a basic functionality, which can be extended with additional modules according to customer demand. Whether it is an additional indication of the parking space occupancy in the driving lane or a relay output for controlling a traffic light by one of our controllers. The system can precisely match your requirements, regardless of whether you want to monitor 10 or 10,000 parking spaces. The chance of an expensive oversizing is practically eliminated.

### Innovative technology

Our development department is continuously working to advance our products. An example of innovative technology, for example, are our LED displays. Ultra-bright LEDs with a typically luminosity of greater than 2 cd are used. Motorists under an overcast sky or at night are not blinded by the display as it uses a light sensor to dim the LEDs. By using LEDs with an oval shape, the radiation angle in the horizontal is increased to 100°. Therefor, the display is readable from a wide angle.

### Low installation costs

Time is money. For this reason, great value is placed on a simple and quick installation of our components. For example, spring terminals are used in the sensor to easily loop the cable through. A cable termination is not required. Furthermore, the ultrasonic sensors are separated into a connection module and a sensor module. The connection modules are also suitable for harsh environmental conditions and can thus be assembled and electrically connected, while the sensor modules are needed only at the commissioning and can be screwed to the connection module. The cable costs are low: Specified is a simple telephone cable (2x2x0.8).

### Easy integration of customer specific systems

The CUR parking guidance system can be expanded by various input and output modules. The communication protocol is disclosed, providing easy integration of customer specific systems. And if there is no suitable solution available for your problem, we can develop one in collaboration with you, starting with individual LED signs, software enhancements in controllers or CUR Visual Control Center.

### Everything from one source

Single space- or directional sensors, residual space- and open / full / closed displays, visualization and control of the entire car park on a PC, everything from a single source.

# How is the CUR parking guidance system structured?

**The CUR parking guidance system has a hierarchical system structure. The components can operate either autonomously or as a slave to a controlled higher-level system.**

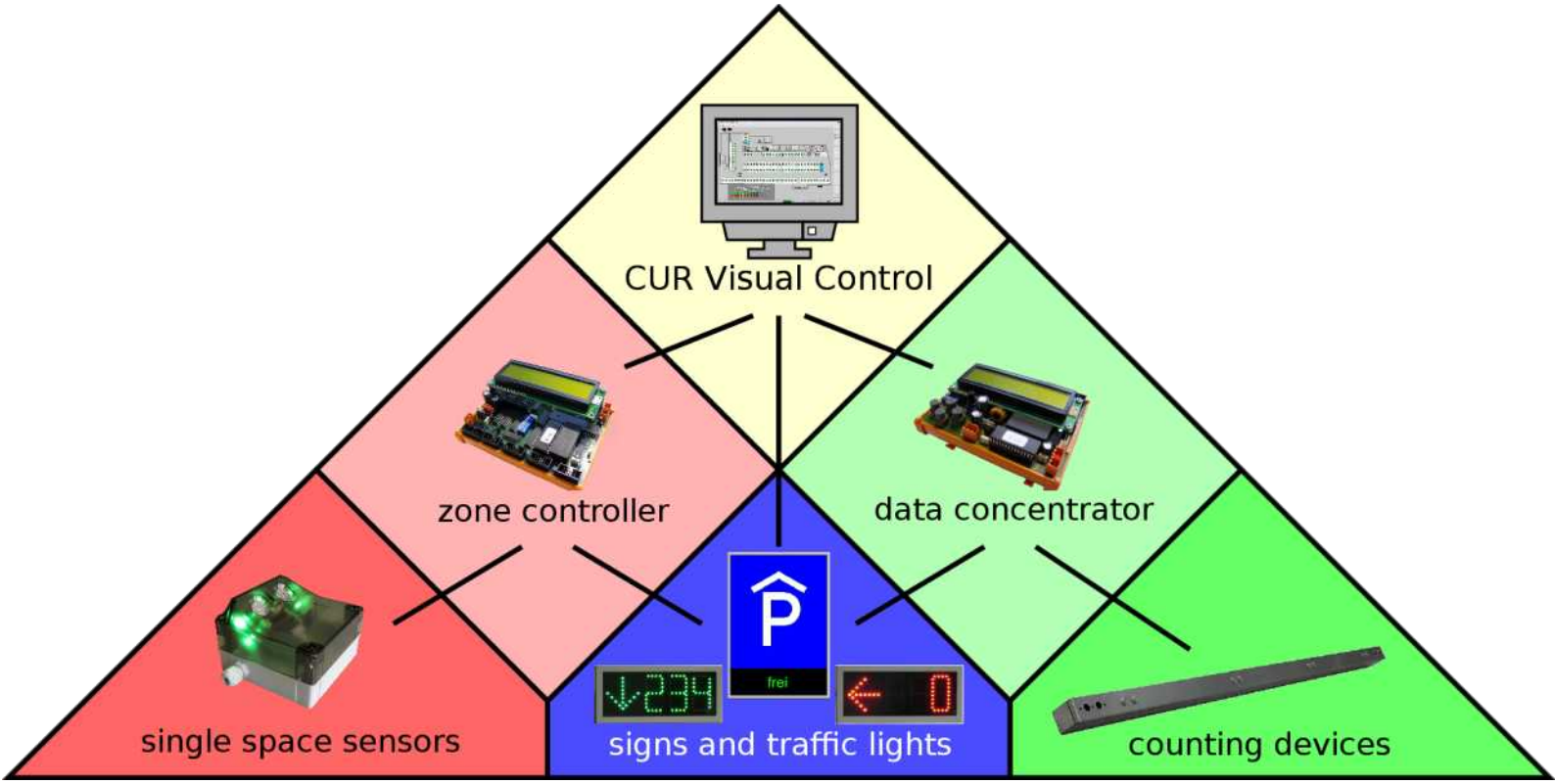
For this reason, the components can continue their work, even if the superior system is no longer available. If, for example, the central computer with the CUR Visual Control Center software fails due to power failure, the zone controller automatically takes over the control of the connected sensors and displays.

### Single space monitoring or vehicle counting?

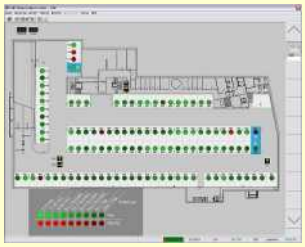
The single space monitoring has many advantages over a vehicle counting. The accuracy of the single space monitoring is nearly 100%. Unlike the counting, it may not add up errors, so the system is quite maintenance free. Because of the exactly known place of the parking cars, signs can display the shortest way to a free parking space within a parking level. In addition, the driver receives an overview of all the parking spaces in the driving lane through the red / green signaling of the sensor. Coupled with the Visual Control Center, a lot more data and statistics are available, for example to find out how long a parking space has already been occupied.

### If the single space monitoring only has advantages over vehicle counting, then why do you also offer components for the counting?

There are parking spaces, where a single space monitoring is not always possible, for example on the top parking deck, which is not covered, or open areas. Vehicle counting is required in this case. The CUR parking guidance system is specifically designed to combine the single space monitoring and the vehicle counting in a car park.




# Visualization and control



**CUR Visual Control Center**
for controlling and visualization of the entire car park.

# Controllers

ZK300-Controller

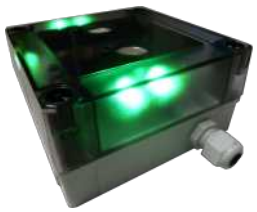
**Zone controller ZK300**
for controlling up to 96 sensors and three residual space displays.

ZK300-3

DC300-Controller

**Data concentrator DC300**
for vehicle counting. Connection of the USDS300 ultrasonic directional sensor, input for potential-free count contacts (from a barrier system), connection of displays.

# Components of the single space monitoring



USS 350

**Single space sensor**
to detect vehicles. Mounted directly above the parking lot. Internal LEDs to indicate the state of the parking space.

USS 350d

PLL 450

**External lamp**
for signaling the parking space situation in the driving lane. Connected to the single space sensor.

PLL460

# Components of the vehicle counting

USDS 300

**Directional detector**
For counting the incoming and outgoing vehicles. Direction dependent counting.

# USS 350e - combines sensor and external lamp

### The evolution

Early 2011 CUR Systemtechnik started to develop a new and revolutionary single space sensor. The idea was that the sensor should be mounted in the driving lane and detect the situation in the parking space from there. Due to the mounting position, it is not covered by pillars and beams and visible in the driving lane over long distances. The installation of an external lamp is unnecessary.

### The technology

As in every sensor of the CUR parking guidance system, the proven ultrasonic technology is used to detect the vehicle. The internal detection algorithm was changed from zero-base to adapt it to this new mounting position. Thereby, further advantages were made: on commissioning, the sensor gets calibrated and blanks out disturbing objects or piping in the near of the sensor.

### Complete replacement of the external lamp

To prepare the sensor for its additional function as an external lamp, five very bright LEDs per color are used to display the state of the sensor. The LEDs have a typical luminous intensity of more than 2 candela, combined with the new mounting position in the driving lane, the sensor is visible over long distances.

**The sensor can be mounted in the driving lane and has five ultra bright LEDs. Thus, the sensor is visible from long distances.**

### Economic benefits

In addition to these functional advantages this sensor also offers economic benefits. Since this sensor makes an installation of an external lamp unnecessary, this results in lower hardware costs, as well as a significantly lower installation time and lower installation costs.

### A story of success

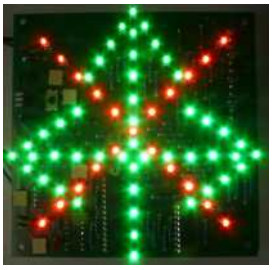
End of 2011, the sensor is installed thousand times over and has proven itself in several car parks around the globe.


# Displays in LED technology

ZM 30 A

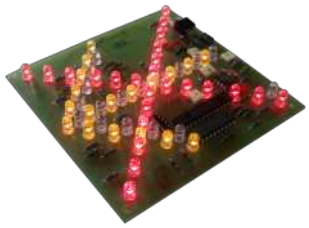
**Residual space displays**
to display the residual parking spaces available in the car park. 3- to 4- digits, red zero or red "FULL", in different sizes.

ZM 30 A



PM3X

**Directional arrows**
to show the driving direction within the car park.



PMX

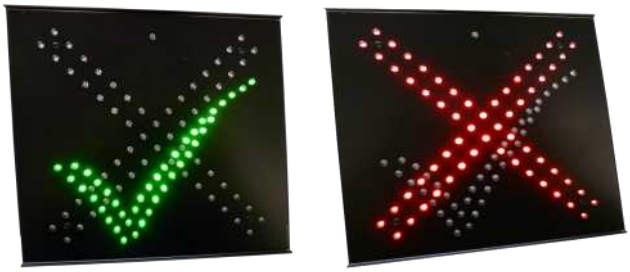

frei / besetzt / geschlossen

**Information sign**
to show the state of the car park in the acces road


frei / besetzt / geschlossen

# Examples for customized LED signs


FREI / BESETZT /
GESCHLOSSEN



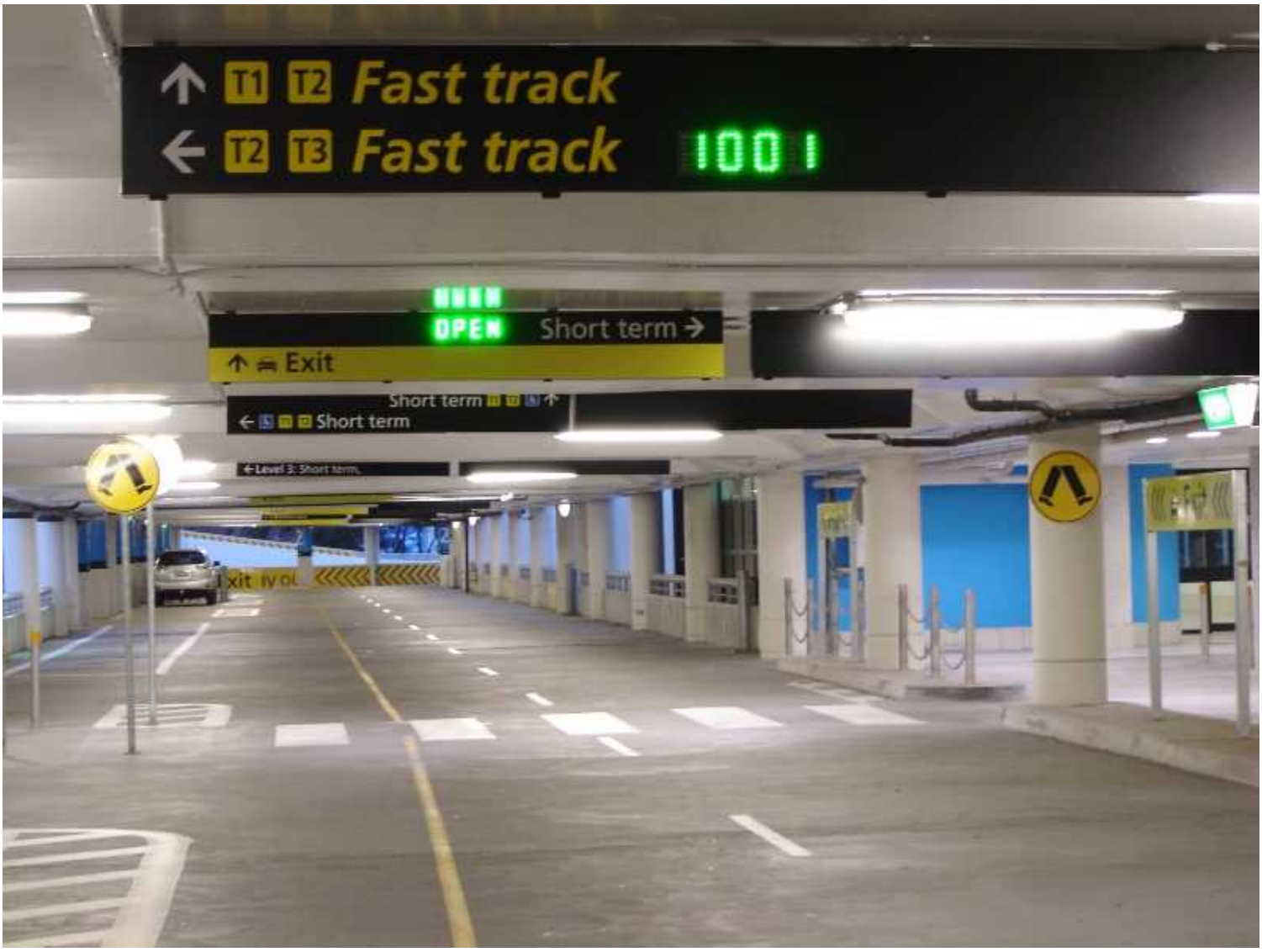
"Hakerl" to display the
passable slopes at ski resorts


Customized text in LED
technology


Information sign with residual space display


Height warning sign


Customized sign with residual
space displays and parking
levels in LED technology




# Solutions with the single space monitoring

**Solution for indiviual parking spaces**
USS350PK – single space sensor with potential free contacts
Control of an information sign with the potential free contact

**Solution for up to 96 parking spaces**
ZK300 – zone controller
USS350 / USS350d / USS350e single space sensors
Control of residual space-, arrow- and information signs with the zone controller

**Solution for more than 96 parking spaces**
CUR Visual Control Center
ZK300 – zone controllers
USS350 / USS350d / USS350e single space sensors
Control of all installed signs with the Visual Control Center

# Current projects

## Switzerland
Blickpunkt Buchs, underground parking with 47 parking spaces.
Included in delivery: 47 single space sensors USS350e 3-color, 1 zone controller, 1 information sign, 2 LED-displays "Ausfahrt".
Completion in 2013

## Turkey
Taurus Ankara, shopping center with 1460 parking spaces.
Included in delivery: 1460 single space sensors USS350d, 18 zone controller.
Completion in 2013

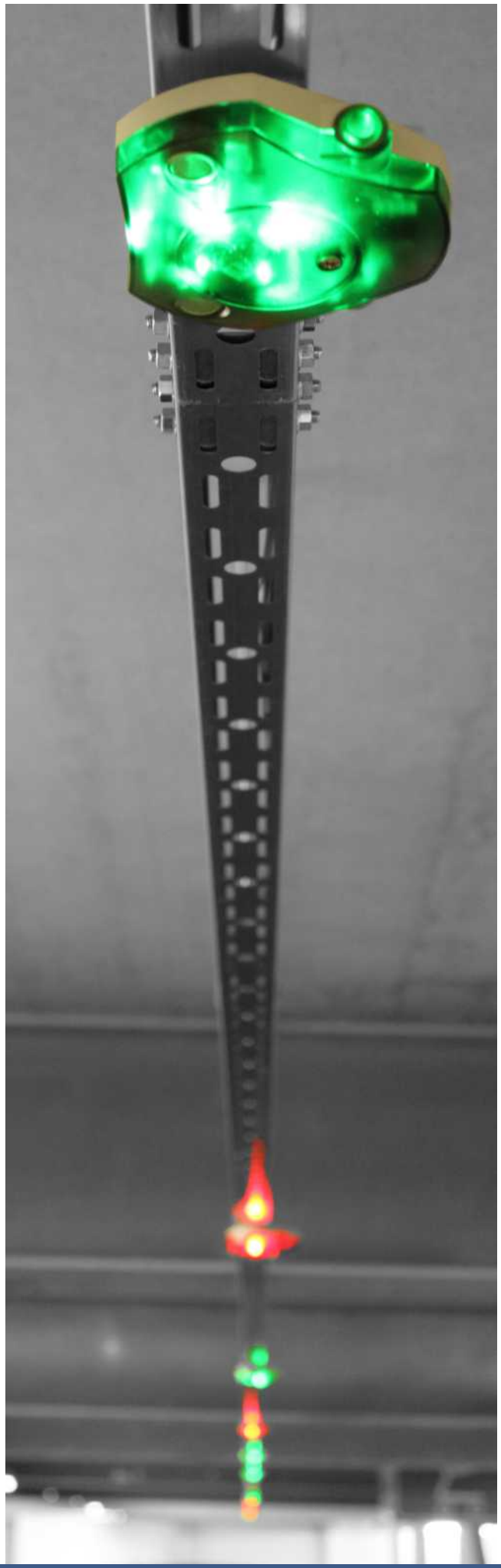
## USA
Car park with 129 parking spaces.
Included in delivery: 129 single space sensors USS350d, 3 zone controller.
Completion in 2013

## Germany
A2 Center Hannover/Isernhagen, shopping center with 922 parking spaces.
Included in delivery: 922 single space sensors USS350e, 15 zone controller, 24 LED-signs.
Completion in 2013

## Canada
Car park with 675 parking spaces.
Included in delivery: 675 single space sensors USS350d, 15 zone controller.
Completion in 2013

## Switzerland
Tägipark Wettingen, shopping center with 500 parking spaces.
Included in delivery: 500 single space sensors USS350e, 7 zone controller, 33 LED-signs.
Completion in 2013

Effective December 2013



# Case study "Shopping Center Globus Völklingen / Germany"

**In 2011, Globus Völklingen decided to install a parking guidance system in their parking facility to optimize the parking occupancy and customer satisfaction. To this time, a new parking garage was built to meet the raised attendances of the shopping center. The parking guidance system should cover both, the existing parking garage with 250 indoor and 130 outdoor parking spaces, and the new parking garage with overall 300 spaces.**

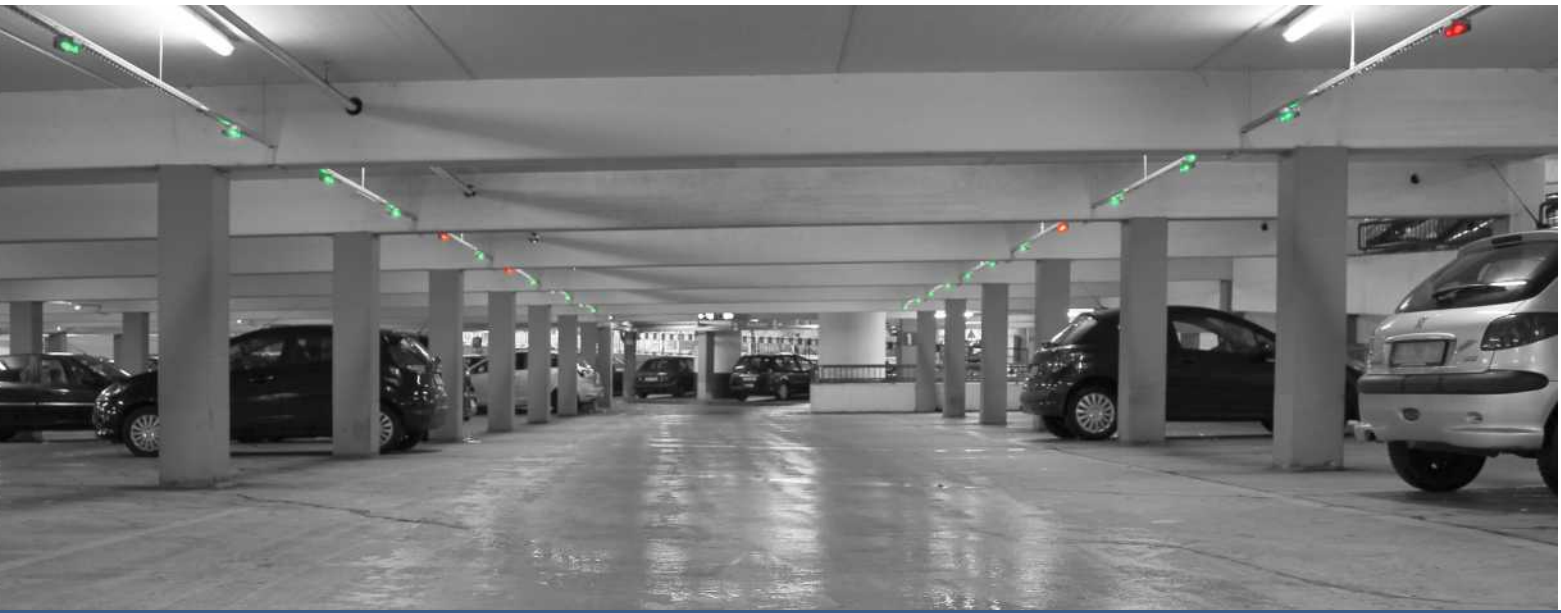

**Information sign in front of parking garage**

Because of this fact, the requirements of the parking guidance system are varying in the different parts of the parking garage. They can be divided into three main parts.

### Parking levels P1 and P2:

In the lower two floors of the existing parking garage, called P1 and P2, there are many pillars and downstand beams. In addition, in some parts of the two floors, the downstand beams are only 2,30m high.

To get a high visibility of the actual parking situation in this non-transparent parking deck, it is necessary to display the actual situation of every of the 250 parking spaces in the driving lane. This can be done by whether connecting



**Parking levels P1 and P2**

an external lamp to the sensor, or by using the new USS350e single space sensor, which can be installed in the driving lane to detect the actual situation of the parking space. The decision went to the USS350e, because of the 50% decreased installation time and costs and the 20% decreased hardware costs as compared to the solution with an external lamp. In addition, 12 LED-Signs, type ZM30A, were used to direct the customers to the nearest free parking space.

### Parking level P3

In the upper outdoor floor of the existing parking garage, called P3, only a few parking spaces are roofed, so the installation of single space sensors is not possible.
Therefore, four USDS300 directional detectors and relay contacts of the three barriers are used to count the in- and outgoing vehicles on this floor. They are connected to a DC300 with an eight-port input interface and an USDS-interface. Six outdoor LED-signs show the residual spaces of the lower floors and the new parking garage.


**Parking level P3**

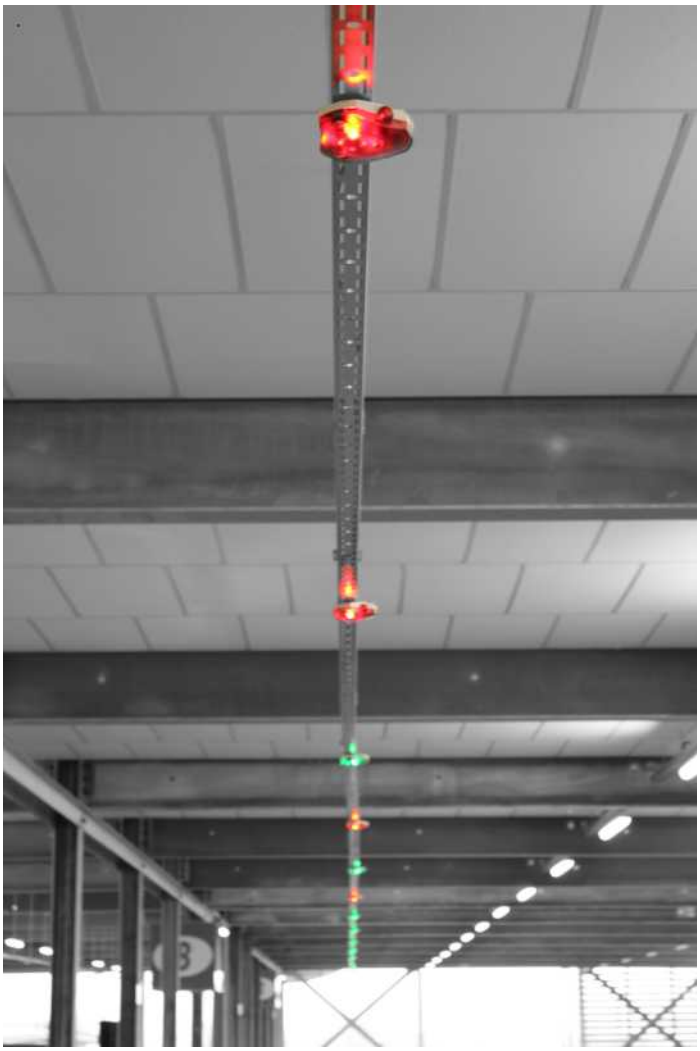
**Single space sensor USS350e**

## Parking levels PA, PB and PC

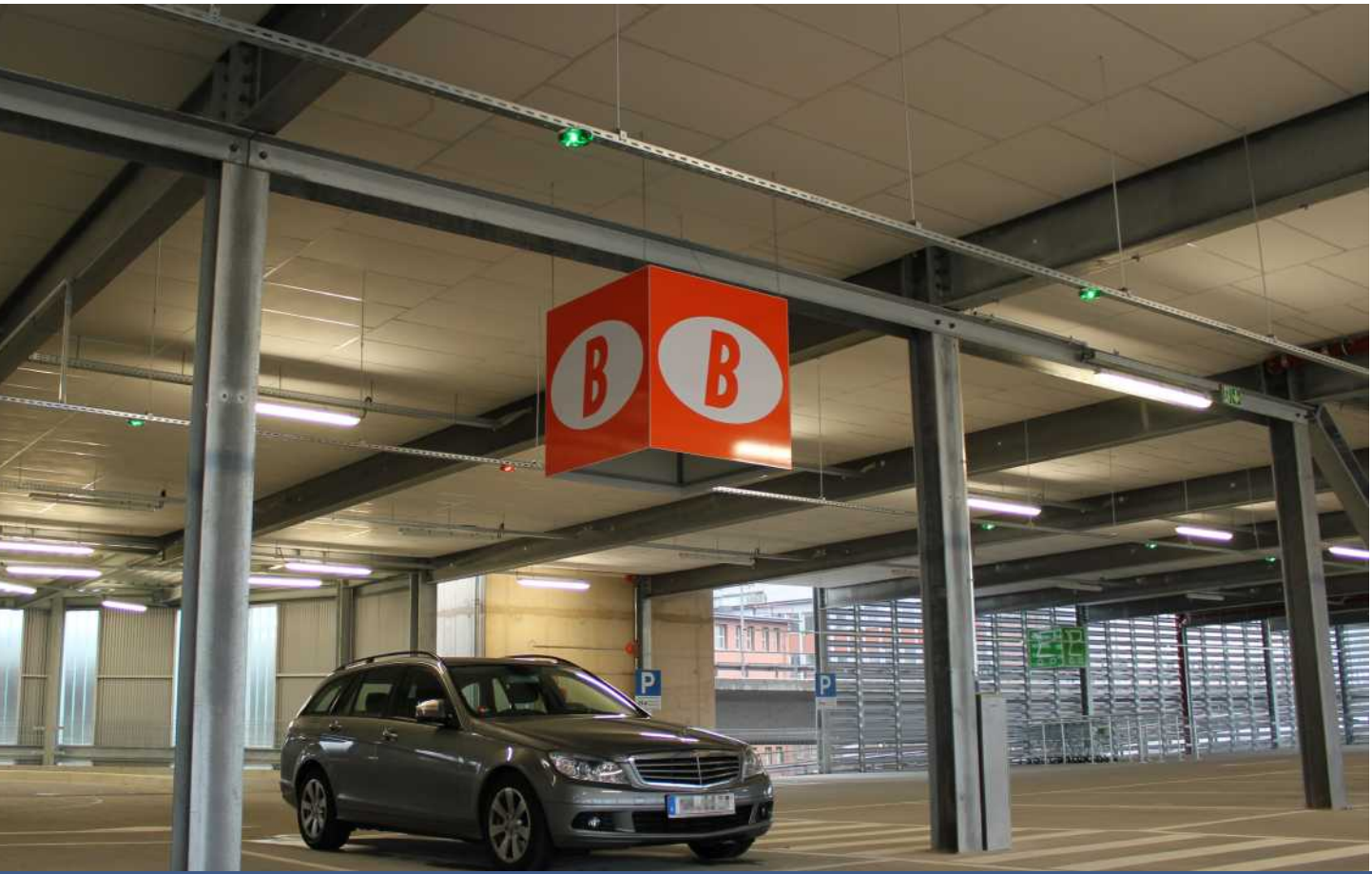
The floors of the new parking garage, called PA, PB and PC, are clear and without disturbing downstand beams. The 100 sensors per parking level are visible from the driving lane. Therefore, an additional signalisation in the driving lane is not necessary. For this reason, the USS350d single space sensor is used. This sensor is mounted centered above the parking space.

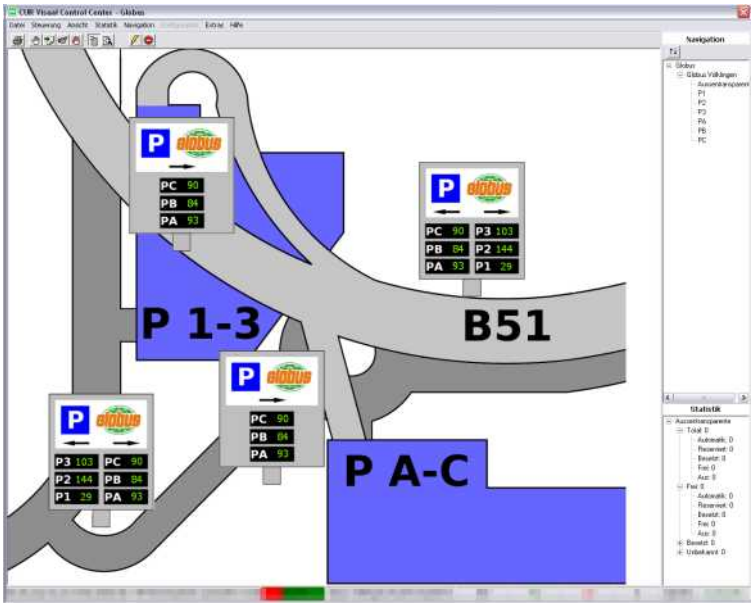
There are 12 LED-Signs installed to show the way to the free parking spaces within the floor, on the upper/lower floors and to the existing parking garage.

**Single space sensor USS350d**



**Parking levels PA, PB and PC**



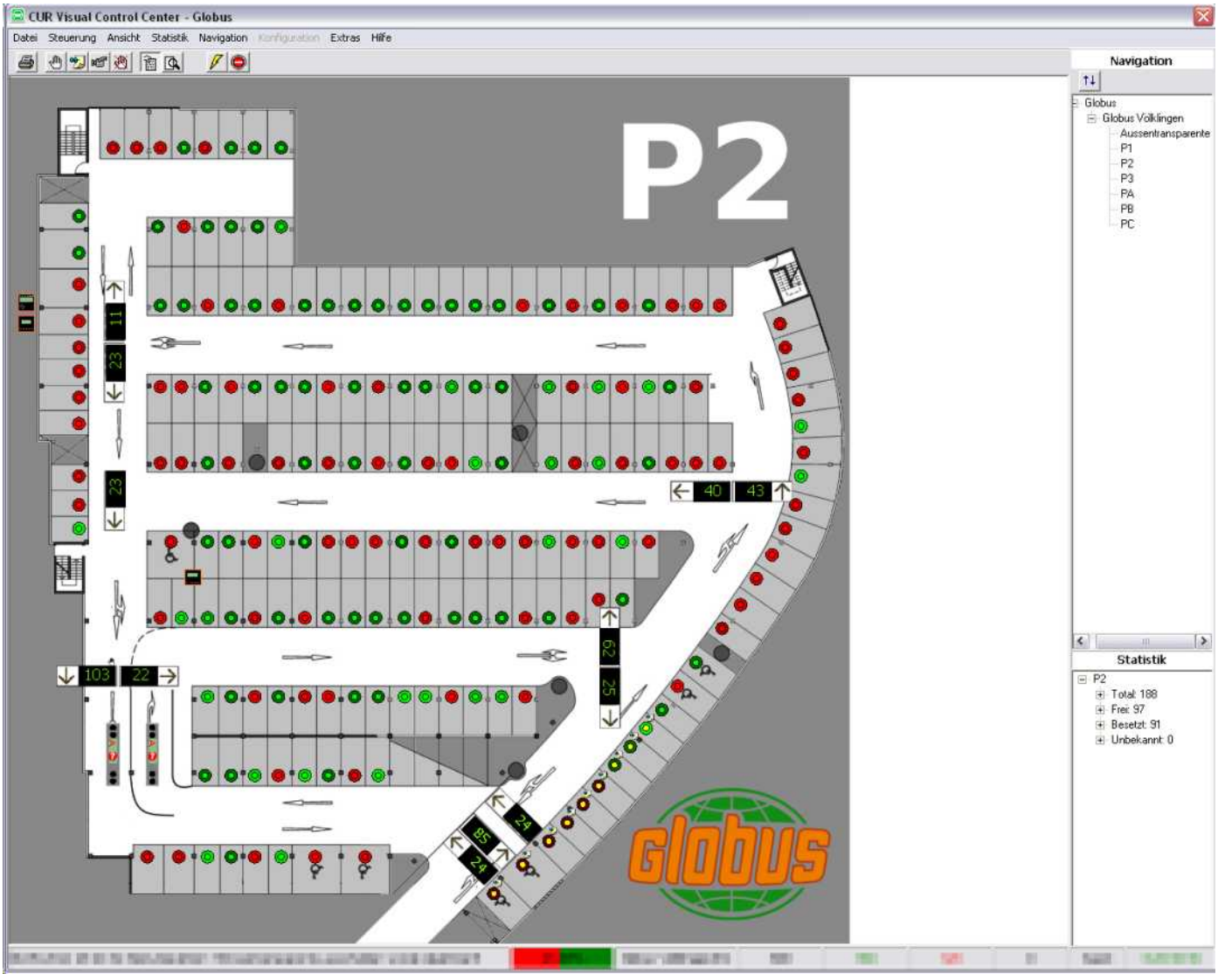



**Overview of the information signs**

## Control and visualization

The CUR Visual Control Center Software is used to control and visualize the current state of the car park. Every floor has its own sheet, showing every single space sensor, LED-sign, directional detector and relay contact in the floor. There is an additional sheet for the four information signs, which are located on the access roads around the car park.

The car park is opened from Monday-Saturday, 8 am to 8 pm. To save energy, all LED-signs and sensors are configured to get dark from 08:30 pm to 07:30 am and on sundays. In this state, the energy consumption of the whole parking guidance system is reduced by half, resulting in an overall 25% energy saving over time.




**Overview of parking level P2**

# Case study - Applications of the DC300 data concentrator

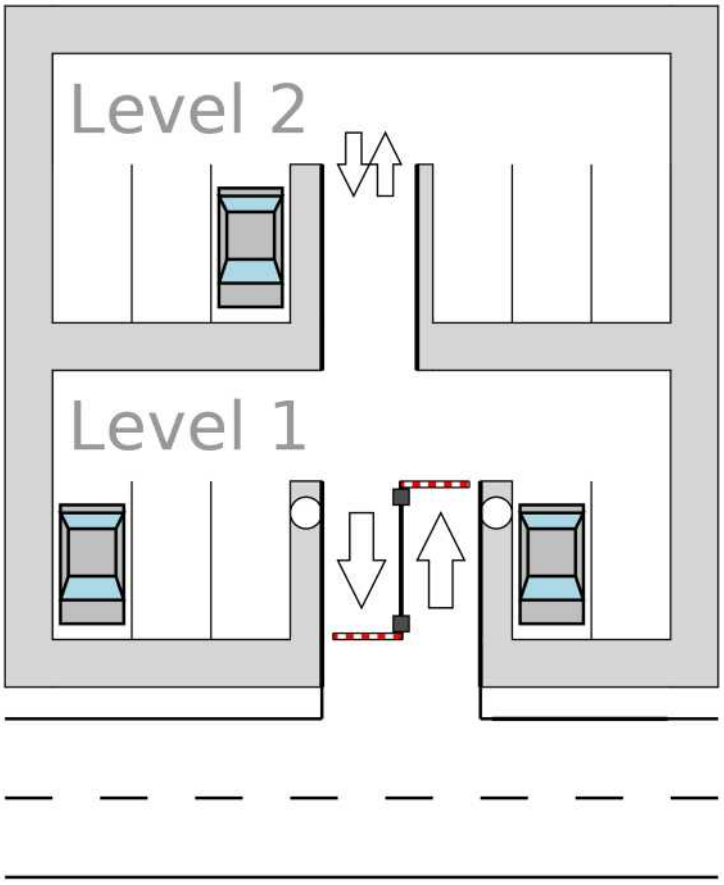
**The data concentrator DC300 is a device that can manage counting inputs from different sources, like USDS directional detectors or relay contacts, calculate the residual spaces and send this information to connected signs or output modules. The DC300 comes with basic functionality and is expandable by different modules to fit the customer requirements.**

On the following pages, two typical applications of the DC300 are shown.

**DC300 data concentrator**

## Case 1: Counting the free parking spaces with a barrier system

As an example project, a small parking garage with two levels and an overall amount of eleven parking spaces is used. The in- and outgoing vehicles are counted with the help of a barrier system. That the visitors know the current parking situation inside the garage before they drive in, a LED-sign in front of the parking garage shall display the current amount of free parking spaces.

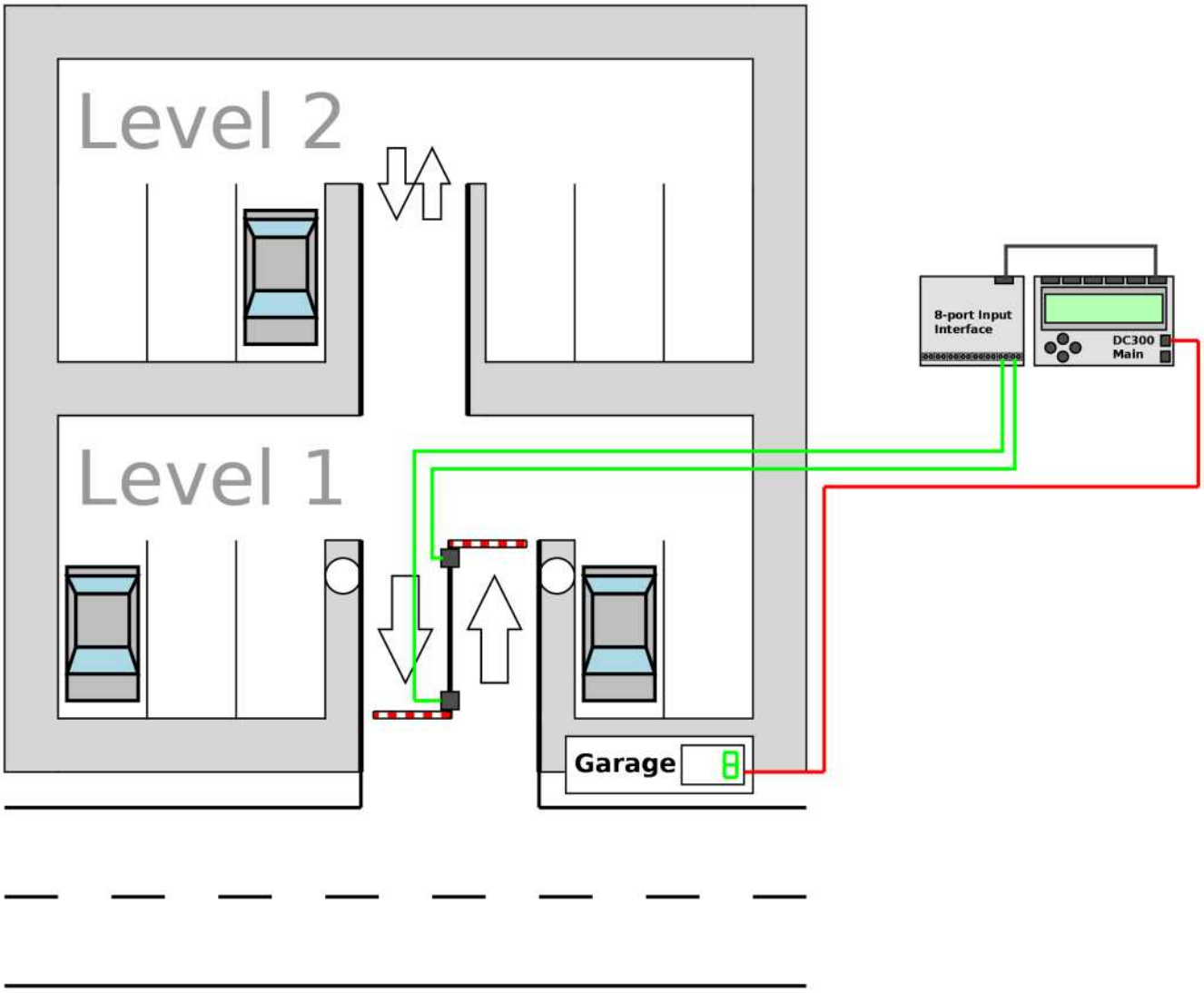



### Realization

The realization of this problem is possible with the data concentrator and the 8-port input module.

Most barrier systems are equipped with a relay contact, which is triggered every time a car drives through. This potential free contact is connected via the 8-port input module with the DC300 data concentrator. The use of the relay contacts of an induction loop system is also possible.

The residual space display is connected via the RS485 communication connector directly with the data concentrator.




**LED-Display ZM30A**

## Configuration

The configuration of the data concentrator for this specific task is explained below:

The data concentrator can handle up to 8 different counters, which can be configured freely. On the first step, the potential free contacts are assigned to a counter. The contact of the entry barrier is configured to count negative, the contact of the exit barrier is configured to count positive.

The next step is to configure a sign, which is assigned to the counter. After configuration, the DC300 sends the sign information over its RS485 interface to the connected signs.

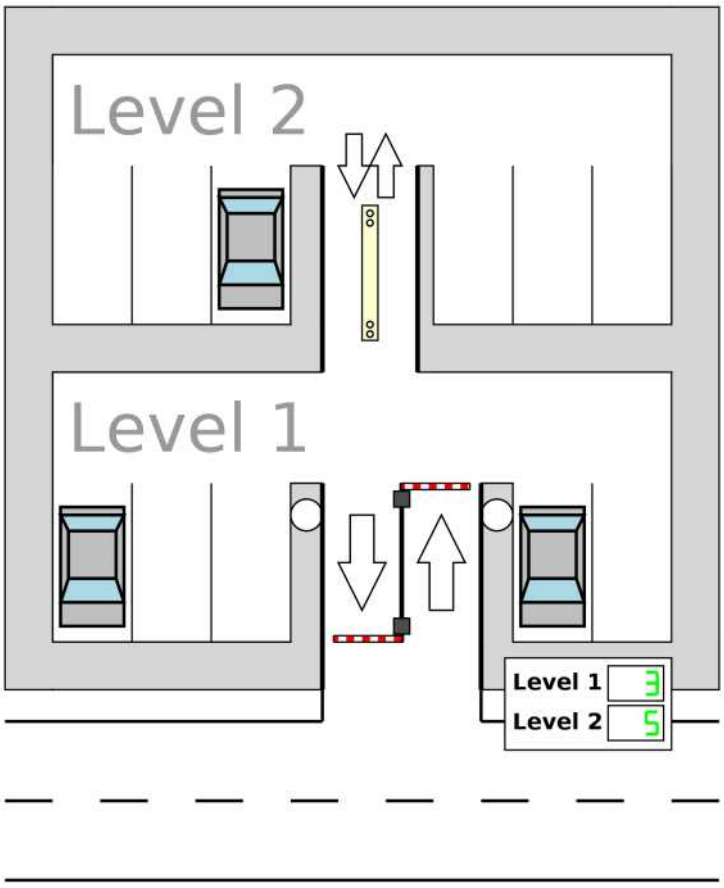
On the last step, the counter has to be set to the actual value of free parking spaces. The system is now ready and shows the residual spaces on the sign in front of the parking garage.

### Case 2: Expansion to a level-dependent counting

On the next step, this system gets expanded with a level-dependent counting. The residual spaces are not only shown for the whole parking garage, but for each level separately.

To meet this requirement, an additional sensor is required to detect vehicles and the driving direction on the ramp to the next level. The USDS300 is very well suited for this application, because it detects the vehicles direction dependent and can be easily mounted on the ceiling above the ramp. If it is not possible to mount an USDS, e.g. on open air parking floors, it is also possible to connect an induction loop system over the potential free contacts.

*Note: In a parking garage, mostly two or more driving lanes are used for entry and exit in the other parking levels. In this case, an USDS300 is needed for every driving lane. It is not possible to mount the USDS300 between two driving lanes in order to detect both.*




**Ultrasonic drive-through sensor USDS300**

## Realization

The USDS300 directional detector is connected via the USDS-Interface with the data concentrator. Both signs are connected with the RS485 communication of the data concentrator. Only one RS485 bus is necessary to control both signs. For differentiation of both signs, an address can be assigned to the sign. For example, the sign for level 1 is set to address 1, the sign for level 2 is set to address 2.

## Configuration

To get the system running, the data concentrator has to be configured first.

To differentiate the vehicle direction on the USDS300, one side of the USDS is named A, the other is named B, so there are two directions: A→B and B→A.
Because there are two different levels that we want to count, we need two counters for that. For example, we use counter 1 for level 1 and counter 2 for level 2.

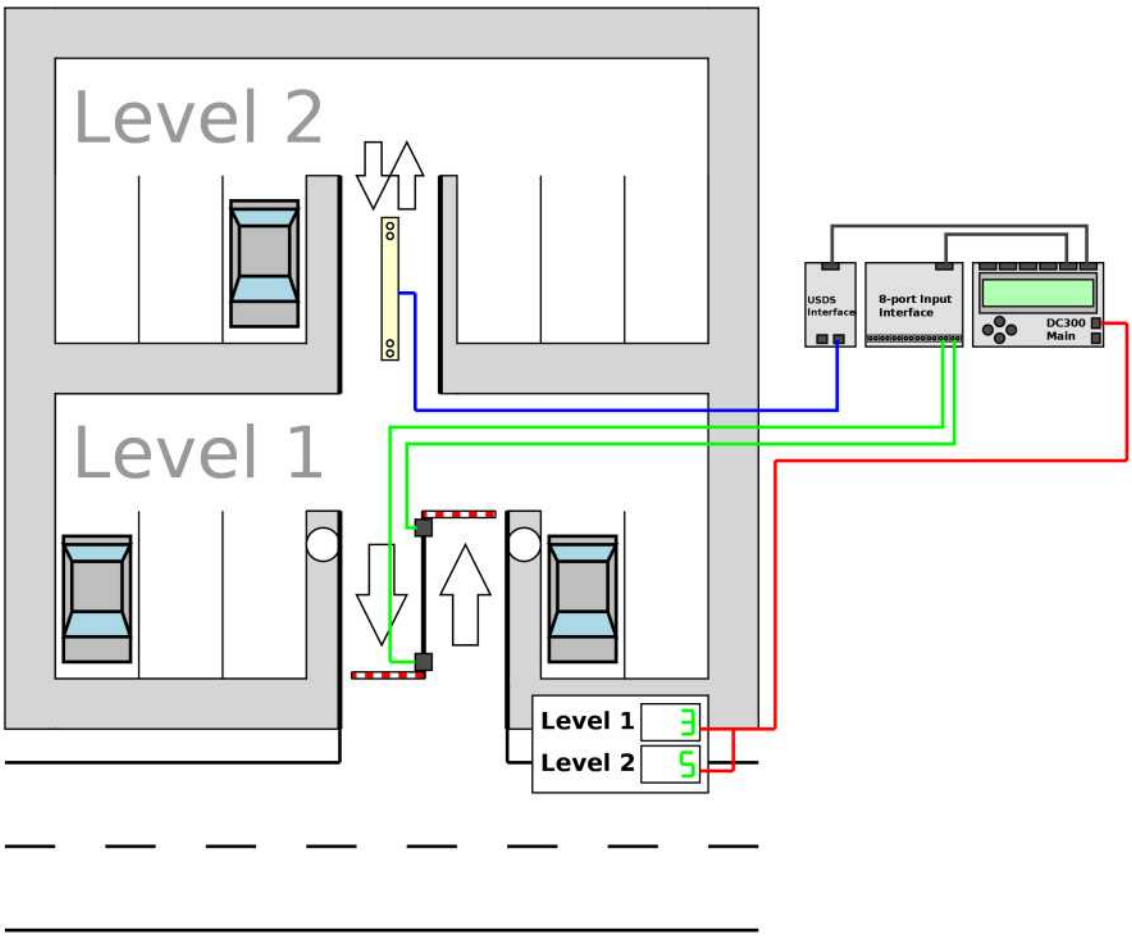
Now, the counter for level 1 gets configured. To drive into level 1, there are two possibilities:

Driving through the entrance barrier or driving from level 2 to level 1 (USDS A → B). Both events result in a lower available parking space count in level 1, so these events shall count negative to this counter. Driving through the exit barrier or from level 1 to level 2 (USDS B → A), the available parking spaces increase, so these events shall count positive.

Counter 2, responsible for level 2, is only affected by the USDS. Driving from level 1 to level 2 (USDS B → A) shall count negative on this counter, driving the opposite way (USDS A → B) shall count positive.

The next step is to assign the counters to the signs, counter 1 to sign 1 and counter 2 to sign 2.

The last step is to set both counters to the actual value of the free parking spaces. The system is now ready und showing the residual spaces of every level on the entrance of the parking garage.



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