



**comark**

The HeArt of Traffic Detection

# Company Profile

Founded in 1994 as a consulting firm, Comark is a company specialized in the field of traffic monitoring and parking systems. It has then expanded and now takes care of the design, development and production of products for the road traffic, parking and cycling lanes market.

Nowadays Comark is present in over 45 countries, across 6 continents with a well-developed sales network.

To meet the highest standards of quality, Comark is ISO9001 certified.

# Portfolio



Traffic



Smart City



Parking







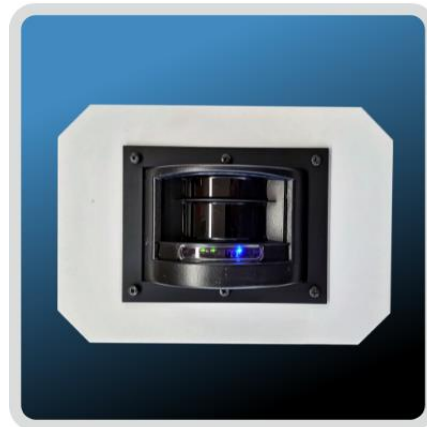
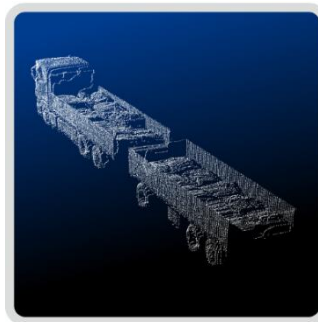
Traffic

# LSR2001 Laser Scanner

Composed by:

- Laser scanner
- CPU
- PCB with relay, watchdog, heating system, ...

The CPU receives the data from the laser scanner and provides all the algorithms to detect and recognize the transit parameters (class of vehicle, speed, length, ...)





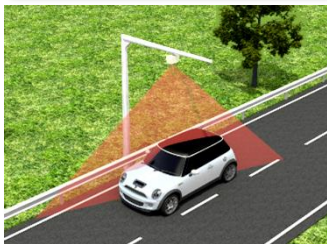
Traffic

# LSR2001 Laser Scanner

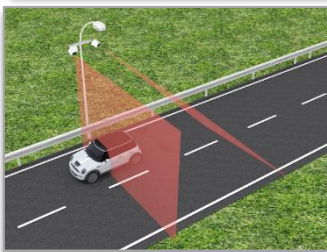
Transversal



Oblique



Double



- Counting
- 2 lines detection
- Speed
- Height
- Vehicle class
- Length
- Gap
- Headway
- Direction of travel
- Traffic status
- Trigger

Transversal	Oblique	Double
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



Traffic



The screenshot displays a VLC media player window titled "http://localhost:10000/ais-media/media.amp - Lettore multimediale VLC". The video feed shows a highway with a timestamp "2016-08-02 15:37:56". A file explorer window is open, showing a directory of image files named "Cattura34.PNG" through "Cattura46.PNG", along with "CatturaSensorProbe.PNG", "CPCD.png", and "PCD.wlmp".

ID	Class	Img

Below the table, there are checkboxes for "Class" (1-12) and "Lane" (2, 1, --, --, --). The bottom right corner features the "COMARK" logo and the text "Connected".

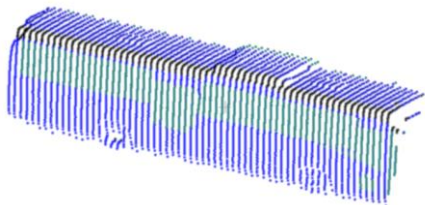
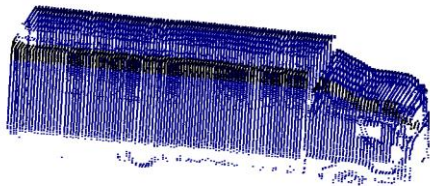
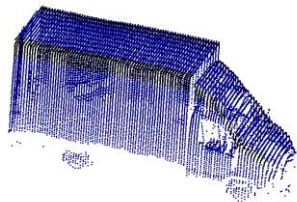
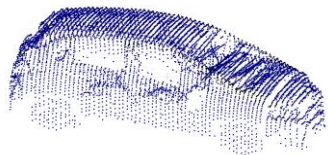
Note: This page contains a video, if you are not seeing it, please check our youtube channel:  
<https://www.youtube.com/channel/UCsgYIFZ1SuA1o3vLmTGYD2A>



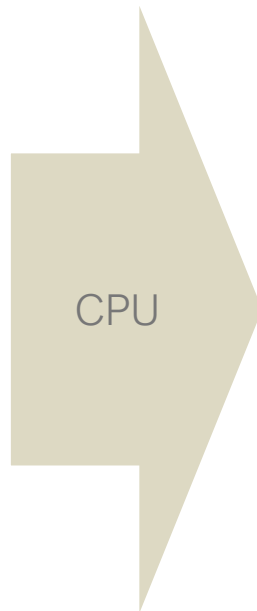
Traffic



Laser scan data



Profile analysis  
(using AI – Deep  
Learning techniques)



Detector output



CAR



VAN



TRUCK



BUS



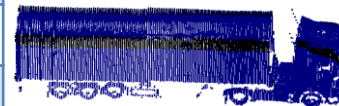
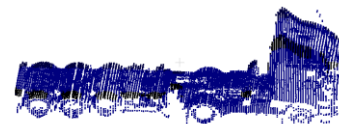
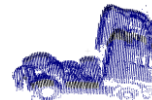


Traffic

## Vehicle classes

Class nr.	Class description
0	Unclassified
1	Pedestrian
2	Bicycle
100	Motorcycle
200	Car
220	Suv
240	Pickup
250	Car trailer
270	Suv trailer
290	Pickup trailer
300	Van

Class nr.	Class description
350	Van trailer
400	Bus
401	Coach
402	Articulated bus
403	Double-decker bus
450	Bus trailer
451	Coach trailer
453	Double-decker bus trailer
500	Truck
501	Truck trailer
502	Semitruck





Traffic

# LSR2001 Web Configuration

- Easy detector configuration with Web pages
- No need of software installed on laptop, just need a web browser (Chrome, Firefox, Safari, ...)
- Remote configuration possible
- General settings:
- Network: IP, GATEWAY, DNS
- Time: Manual setting, NTP
- Sensor configuration: various settings
- Sensor tools: tools for background, lanes, scans
- Connection configuration: Ethernet server, client, ...
- Log: sensor status, transits
- Protocol: type and configuration

## 1 - Laser settings

*Laser model	Single-plane ▾
*Laser port	P 3 ▾
*Laser communication speed	Bitrate 2 ▾
*Laser reset digitalout	Id 1 - GPIO #3 ▾
Inclination[deg]	0
Sensor X offset[mm]	0
Sensor Y offset[mm]	0
*Height alarm	Enabled ▾
*Fog analysis	Disabled ▾
Min point height[mm]	100
Max point height[mm]	5000
*Min neighbors	2
*Neighbor search range[%]	4
*Reflection analysis	Enabled ▾
*Frame height	Maximum ▾
*Min frame surface[mm]	50
*Frame build range (new frames)[mm]	500
*Frame build range (begin transits)[mm]	400
*Frame build range (active transits)[mm]	300
*Frame build range (point aggregation)[mm]	300
*Frame noise filter	Disabled ▾
Min transit height[mm]	300
Min transit width[mm]	250
Transit begin delay	2



Traffic

# LSR2001 Web Configuration

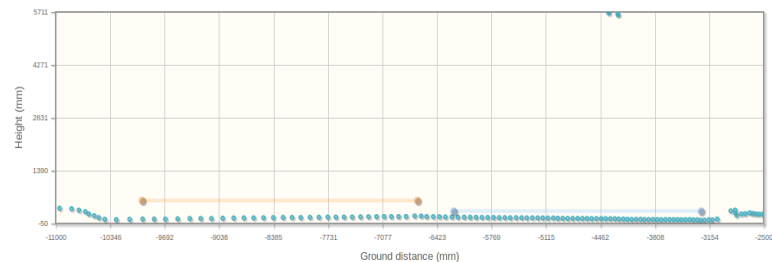
TAG NAME			transit_end
ATTRIBUTE	DATA TYPE	DESCRIPTION	
id	Number	Transit main ID (always enabled)	
lane	Number	Lane ID	
lane_id	Number	Transit lane ID	
time_iso	ISO 8601 TIME	Timestamp (yyyy-mm-ddThh:mm:ss)	
time_iso_ms	ISO 8601 TIME MS	Timestamp (yyyy-mm-ddThh:mm:ss.sss)	
time_unix	UNIX TIME	Unix timestamp in seconds	
time_unix_ms	UNIX TIME MS	Unix timestamp in milliseconds	
speed	Number	Speed (km/h)	
height	Number	Height (mm)	
width	Number	Width (mm)	
length	Number	Length (mm)	
refl_idx	Number	Reflections (%)	
refl_pos	Number	Reflections position (0: head ...200: tail)	
gap	Number	Time (ms) since the end of previous vehicle	
headway	Number	Time (ms) since the begin of previous vehicle	
occupancy	Number	Time (ms) inside the sensor range	
classification	Number	Internal classification code	
class_id	Number	Classification code	
class_name	String	Classification name	
position	Character	Position inside the lane (L: left, C: center, R: right)	
direction	Character	Direction (N: not detected, I: incoming, A: away)	
wrong_way	Flag (0/1)	The vehicle was in wrong way	
stop_and_go	Flag (0/1)	The vehicle stopped	
height_alarm	Flag (0/1)	The vehicle exceeded the maximum allowed height	
axles	Number	Number of axles	

## Installation tools

Laser tools

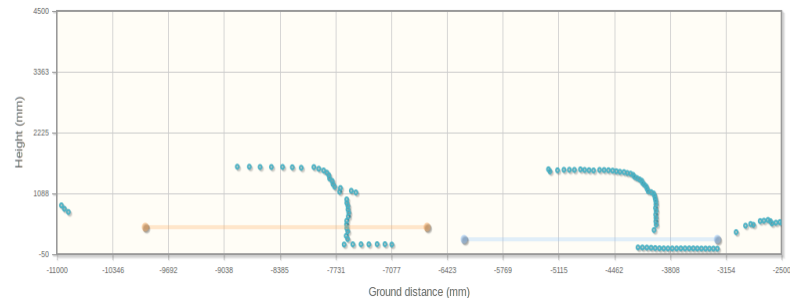
Background and position detection

Lanes detection and configuration



Edit lane #1 Edit lane #2

Chart bounds X [-11000] [-2500] Y [-50] [5711]





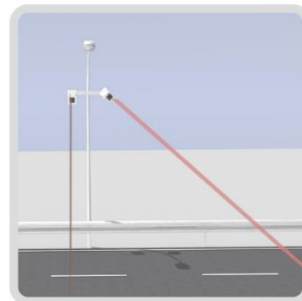
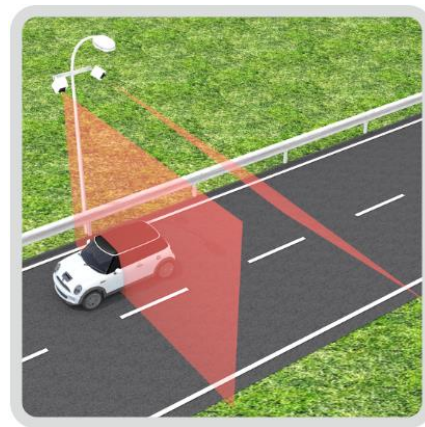
Traffic

## LSR2001 DOUBLE

The LSR2001-DOUBLE sensor uses two laser scanners to detect vehicles.

The system is able to measure speed and to detect Sense of traveling even in side installation.

The second Laser scanner is rotated to detect the vehicle at a certain distance, allowing to trigger, for example, a camera installed on the same pole.







Traffic

## Highway LSR2001 Detection video

# COMARIO

LSR2001-DOUBLE





Traffic

# LSR2001 R&S

## Laser Scanner for Range & Speed measuring

Provides the distance, speed and presence of an object in real time.

The detector continuously checks the position of the object and determines how it moves providing presence, distance and speed information.

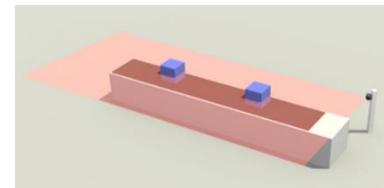
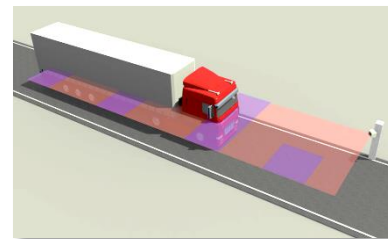
It can be used in **traffic**, **industrial automation** or whatever application where a precise control of the position of an object is needed.

The LSR2001-R&S provides the following data:

- Presence
- Distance X and Y

Among the main applications we underline:

- Vehicle position monitoring: check the position of a vehicle along 30 meters and take appropriate actions (ex. Write the distance in a display so that the vehicle stops in a precise position)
- Object position and tracking while moving on a conveyor





Traffic

## LSR2001 Axles

Laser combined with photocells



Double wheel  
detection with 4  
photocells



Special photocells very  
resistant to dirt



Traffic

# LSR21I

## Laser Scanner

The LSR-21 sensor uses laser technology to detect presence in the detection area.

The laser has two dry relays contacts that can be configured to activate when an object is inside the detection area.

The configuration of the LSR21 can be done through a remote controller

Depending on the place of installation, the laser can be supplied with a detection distance of 5, 10 or 25 m.

The sensor is very easy to install and is light and small. The IP65 degree of protection allows it to be used outdoors.

### APPLICATIONS

- Vehicle presence detection
- People presence detection




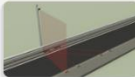







Traffic

# LSR2001

	Transversal	Oblique	Double	Axle	LSR21
					
Counting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle class	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Speed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Height	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Length	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Gap	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Headway	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Axle detection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Traffic status	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Trigger	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Direction of travel	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2 lanes detection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roadside installation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Above lane installation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

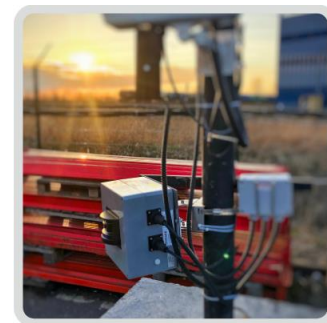
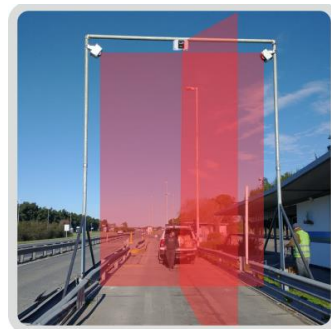
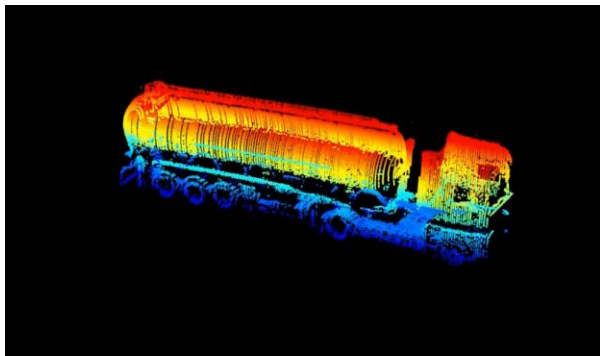


Traffic

## 3D Profiler Systems

The 3D profiling system can provide a high-resolution 3D file of the vehicles and measure them in height, width, length and volume.

The system is also able to provide a classification of vehicles and give trigger signals when the vehicle begins and when it ends.



Depending on the application, the system may be composed of 2 or 3 Laser Scanners, with different configurations.



Traffic

## Profiler Standard

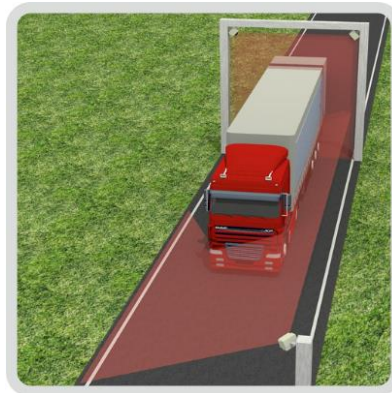
3 Laser scanners

## Profiler LTT

Single gantry 3 Laser scanners

## Profiler TT or LT

Single gantry 2 Laser scanners



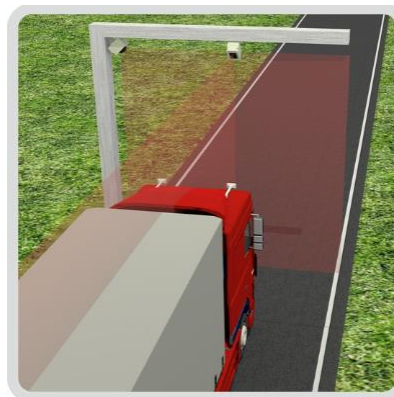
Profiler standard



Profiler LTT single gantry



Profiler TT







Profiler LT



Traffic

# Profiler

	3 LASERS	2 LASERS TT	2 LASERS LT	3 LASERS LTT
				
3D Vehicle profile	✓	✓	✓	✓
Single gantry	○	✓	✓	✓
Both vehicle sides	✓	✓	○	✓
Counting	✓	✓	✓	✓
Speed	✓	○	✓	✓
Lenght	✓	○	✓	✓
Height	✓	✓	✓	✓
Width	✓	✓	✗	✓
Stop & Go	✓	✓	✗	✗
Multiple vehicles	○	✓	✓	✓
Trigger for cameras	✓	✓	✓	✓

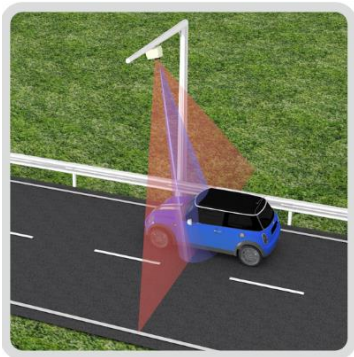




Traffic

## RSR4001 - RL4001

Laser Scanner + Radar Doppler



RSR4001

Same laser scanner characteristics as LSR 2001, in addition the RSR 4001 has also a radar doppler detector in the same box. The radar doppler is able to detect speed with high accuracy (less than 1 km/h error) and length.



RL4001

Same characteristics as RSR 4001, but with laser scanner and radar doppler in 2 different enclosures for a better orientation of each technology

Data detected:

- Counting
- Speed
- Height
- Vehicle class
- Length
- Gap
- Headway



Traffic

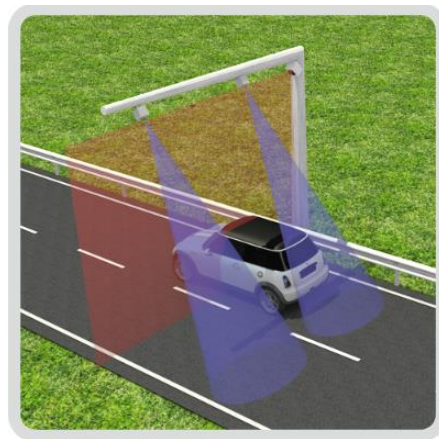
# RRL4001

Laser Scanner + n.2 Radar Doppler

Thanks to its unique conformation RRL4001 is able to detect, with high accuracy, the traffic in up to 2 lanes.

Data detected:

- Counting
- Speed
- Height
- Vehicle class
- Length
- Gap
- Headway





Traffic

## LT3001 Laser Scanner

Based on 2 laser scanners. One scanner is installed on the middle of the lane and has the detection area parallel to the lane; the other is installed on the side of the lane and detects perpendicularly to the road.

The longitudinal laser tracks the vehicle as it moves along the lane and measures its position, speed and length.

The transversal scanner measures the width, height and profile of the vehicles providing an accurate classification of the transits.





Traffic

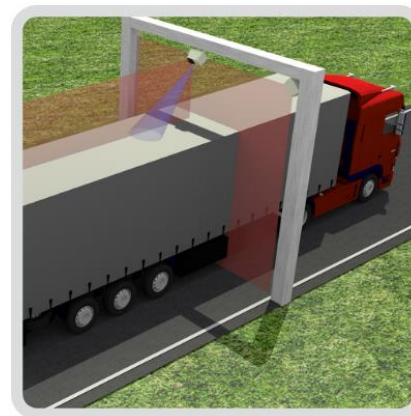
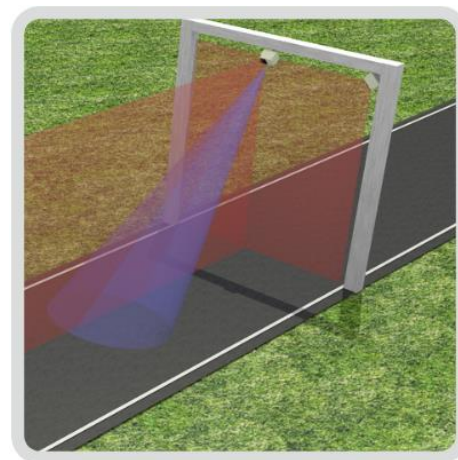
# LTR5001

2 Laser Scanners + Radar doppler detector

Based on 2 Laser Scanners and 1 Radar Doppler. One laser scanner is installed on the middle of the lane and has the detection area parallel to the lane; the other is installed on the side of the lane and detects perpendicularly to the road. The radar doppler is able to detect speed with high accuracy (less than 1 km/h error) and length.

The longitudinal Laser scanner tracks the incoming vehicle and is able to trigger an alarm from 15 to 0 meters distance.

Indicated for high demanding applications, such as Free flow tolling.







Traffic



## Free Flow Toll test in South Korea



Note: This page contains a video, if you are not seeing it, please check our youtube channel:  
<https://www.youtube.com/channel/UCsgYIFZ1SuA1o3vLmTGyD2A>



Traffic

## Over Height Detection

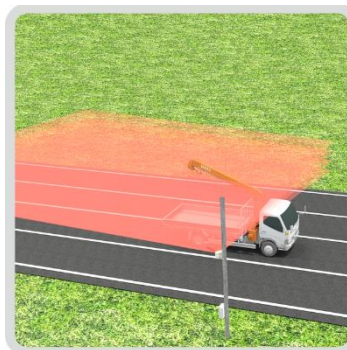
RAM01



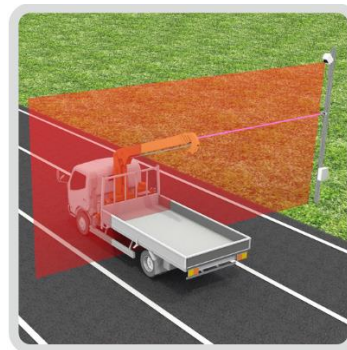
RAM11



RAM20



RAM110





Detects vehicle which are over the maximum height allowed

To be installed before bridges, underpasses, tunnels to alert the driver to stop or change road



Traffic

# Over Height Detection

	RAM01	RAM11	RAM20	RAM110
				
Over height detection	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
One side installation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Object distance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Laser Scanner	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Single Beam Laser	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Counting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
All vehicles measuring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Double height zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle class	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Direction of travel	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>





Traffic

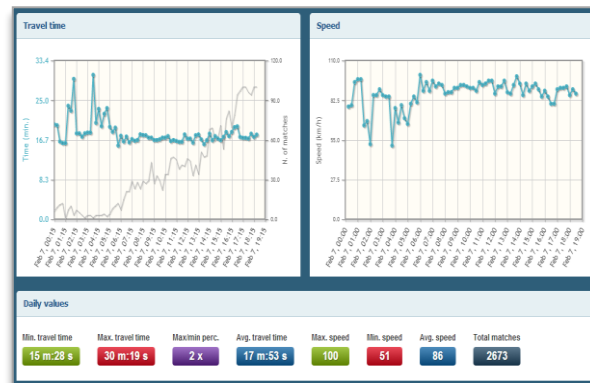
# BT100 BT200

Bluetooth Bluetooth & Wifi Traffic monitoring

Detects the bluetooth codes of active devices inside the cars. When the system detects the same code on two positions it computes the travel time, average speed or origin destination matrix.

Data detected:

- Travel time
- Average speed
- Origin-Destinations







Traffic

## MD01

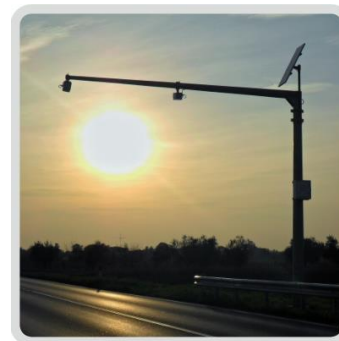
Rada Doppler



Microwave radar detector equipped with a patch antenna and a microprocessor for digital signal processing. Very accurate on speed measurement.

Data detected:

- Counting
- Speed (very accurate)
- Length
- Gap
- Headway







Traffic

USMI9601

Radar doppler + ultrasound + infrared

USM9001

Radar doppler + ultrasound

US6003

Ultrasound

MAG01

Earth magnetic field detector



US6003



USM9001



USMI9601



MAG01

Cycling & Pedestrian data collection

People counter

Totem for bicycle paths

Bicycle, pedestrian & e-scooter classification



Smart City



Smart City

# LSR2001 BC

## Bicycle & Pedestrian Data Collection

The LSR2001BC detector uses the laser technology to detect bicycles and pedestrians. The emitted laser beam is used to scan on 4 parallel planes at an angle of 96 °. For each plane the sensor detects 274 points and is able to accurately identify the profile of the bicycle or person.

The laser detector is able to:

- Count bicycles, pedestrians and e-scooters
- Discriminate between people, bicycles and e-scooters
- Detect the transit direction





Smart City

# LSR2001 BC

## Bicycle & Pedestrian Data Collection Totem Counter

The BIKECOUNT200 totem displays the data about the transits detected by the LSR2001-BC detector.

It is possible to customize the layout of the totem both on the screen printing part, with specific writings and images, and on the display part. It is in fact possible to add additional variable message areas where to write, for example, information to users.





Smart City

# MAXPEOPLE

## Laser People Counter

The MAXPeople system is composed by the CPU with software and by the people counting sensors to be installed in every entrance and exit.

A display shows the number of available entrances and the status “Free” or “Full”.





Earth Magnetic Detector



Vehicle counting

Wireless Gateway

Parking



Parking

## LOMAG

### Wireless Earth Magnetic Detector

The LOMAG is based on the earth magnetic field to detect vehicles and on the LORA technology to wirelessly send data to the gateway.

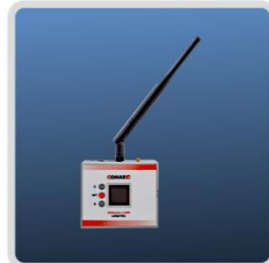
## LOGAT

### Lora Wireless Gateway

The LOGAT can receive the data from a maximum of 150 LOGAT detectors within a range of 150 m.

## NORA

The NORA is based on the earth magnetic field to detect vehicles and on the LORAWAN technology to wirelessly send data to the gateway.





Traffic



Smart City



Parking

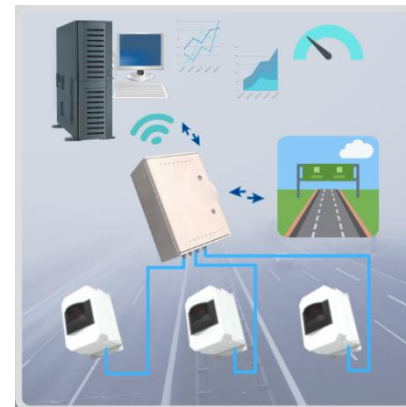
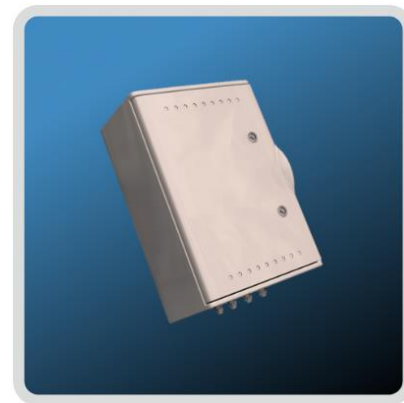
# CO1010

## Control Unit

The UC1010 is able to collect the data from up to 8 COMARK sensors, store the data locally and send it to a central software like Omniview.

### FUNCTIONS

- Poll the sensors to receive the transit data
- Analysis of congruity on the data received
- Local storage of data
- Aggregation of data according to configurable periods
- Traffic status processing (stopped, slowed down, regular)
- Configuration of the unit and of the sensor through a web interface
- Sensor diagnostics
- Sending data to the control center on an Ethernet line or wireless 3G/4G





Traffic



Smart City



Parking

# OMNIVIEW

## Data Analytics Software

The Omniview is a software to be installed in a server and collects data from all the UC1010.

### FUNCTIONS

- Configuration of sensors and control units
- Data acquisition from devices in the field
- Storing data on the database
- Device diagnostics
- Processing and aggregation of data
- Creation of reports with graphics and tables
- Map with location of the stations
- Users management



USER CONFIGURATION - Users									
Show <input type="text" value="10"/> entries								Search: <input type="text"/>	
ID	Type	Description	Username	Created	Timezone	Manage	Modify	Cancel	
1	superadmin		comark	2015-01-10 21:59:35.359537	Europe/Rome				
2	admin		adminusr	2015-01-10 22:00:44.893931	Europe/Rome				
3	admin	sdddd	comunita	2015-02-09 08:22:48.723899	Europe/Rome				
4	user		comune	2015-07-02 10:53:20.614837	Europe/Rome				
5	admin		superadmin	2016-12-02 14:57:01.97862	Europe/Rome				
6	admin	Enctech admin	enctech	2017-06-07 14:49:56.521364	Asia/Kuala_Lumpur				
9	admin	IT-RAM: Liew Chee Wah	88096603	2017-06-21 09:18:01.977004	Asia/Kuala_Lumpur				
10	admin		genting_r	2017-06-21 09:24:56.829337	Asia/Kuala_Lumpur				
11	admin	IT-RAM: Tiu Sion Wei	88096619	2017-06-21 09:28:46.190081	Asia/Kuala_Lumpur				
13	user	Finance: Andrew Ting	88078051	2017-06-22 04:35:15.572108	Asia/Kuala_Lumpur				
Showing 1 to 10 of 21 entries									



Traffic



Smart City

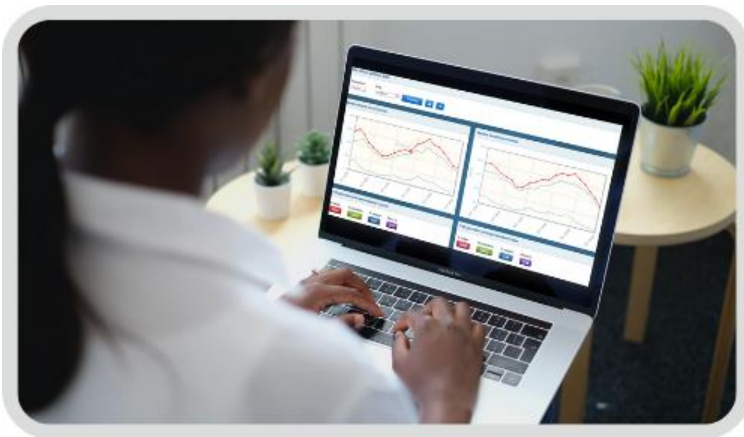


Parking

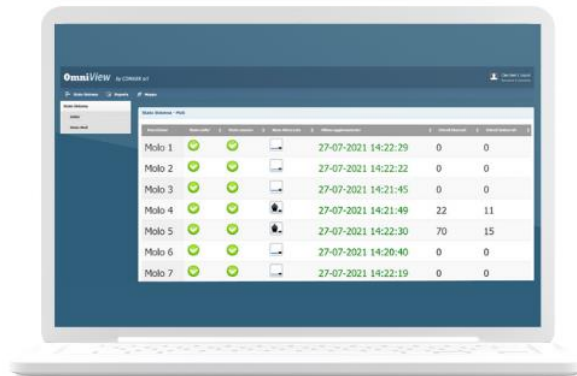
# OMNIVIEW

Data Analytics Software

## REPORT



## DIAGNOSTICS



## MAPS





## References



Traffic



Smart City



Parking

# References

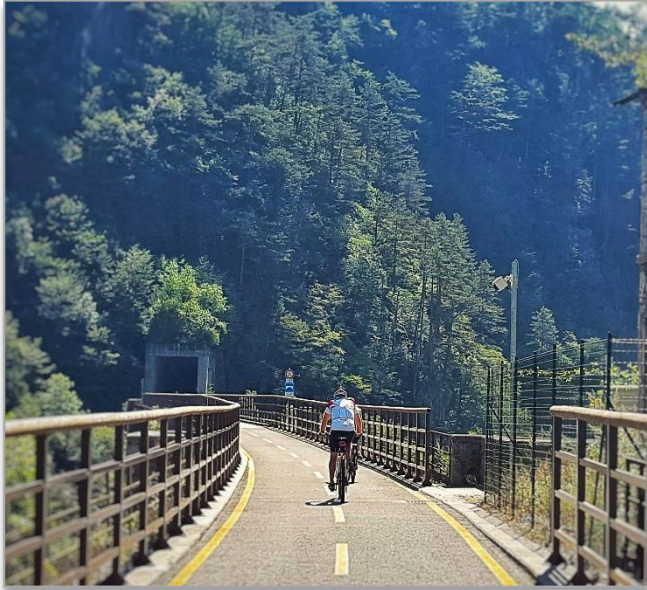
LSR2001 Laser Scanner Detector  
ITALY



# References

LSR2001 Bicycle & Pedestrian Data Collection

ITALY



SWITZERLAND



# References

## LSR2001 Bicycle & Pedestrian Data Collection

ITALY



SPAIN



# References

## LSR2001 Laser Scanner Detector



RUSSIA



BRASILE



# References

## LSR2001 Laser Scanner Detector



VIETNAM



# References

## LSR2001 Laser Scanner Detector



ITALY



PERU'



# References

## LSR2001 Laser Scanner Detector

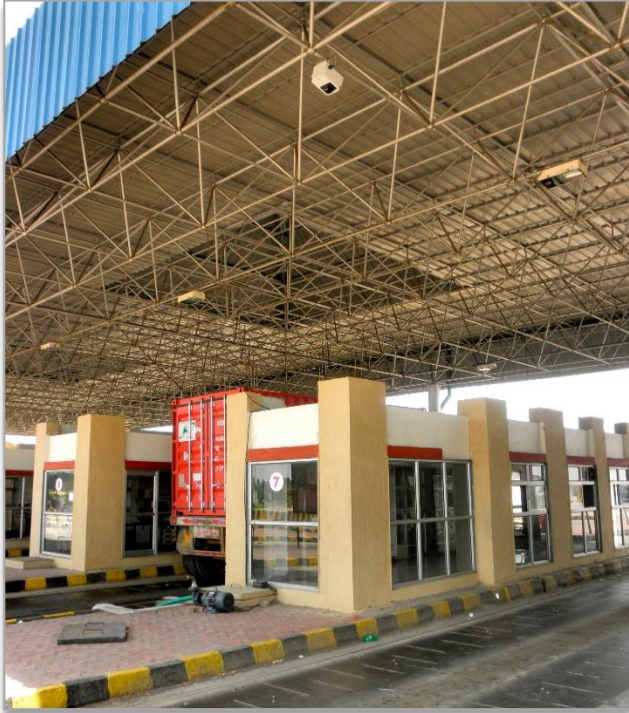


SPAIN



# References

## LSR2001 Laser Scanner Detector



INDIA



ITALY



# References

LSR2001 Laser Scanner Detector



ITALY

KURDISTAN





# References

## LSR2001 Laser Scanner Detector



BRASIL

# References

LSR2001 Laser Scanner Detector



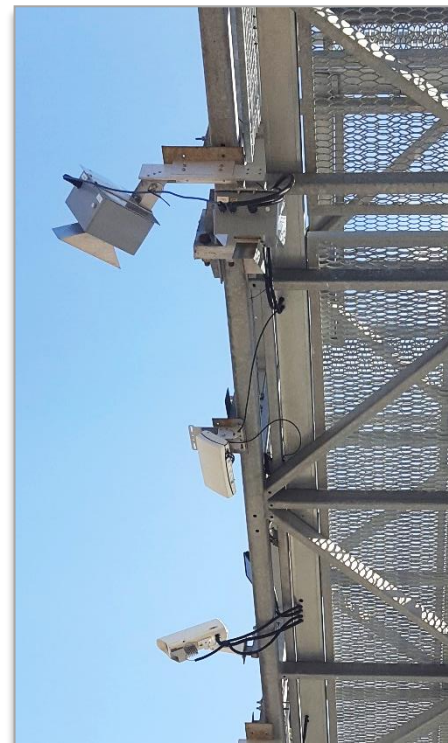
MALAYSIA - INDONESIA

# References

## LSR2001 Laser Scanner Detector



MALAYSIA



RUSSIA



# References

## LSR2001 Laser Scanner Detector

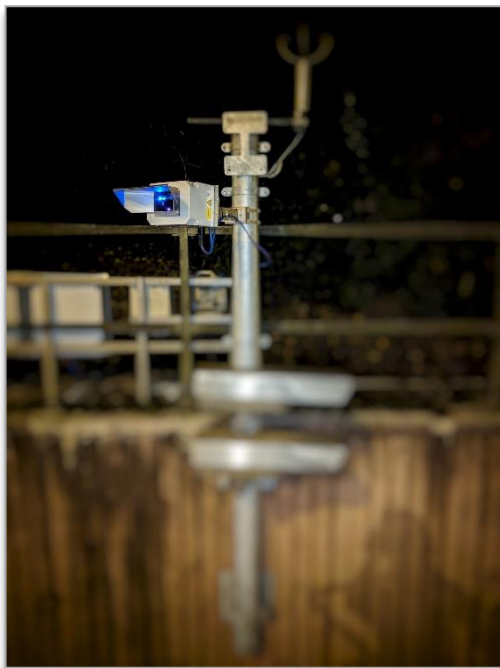


SOUTH KOREA



# References

## RAM20 Over Height Vehicle Detection



United Kingdom



# References

## RAM20 Over Height Vehicle Detection



ITALY



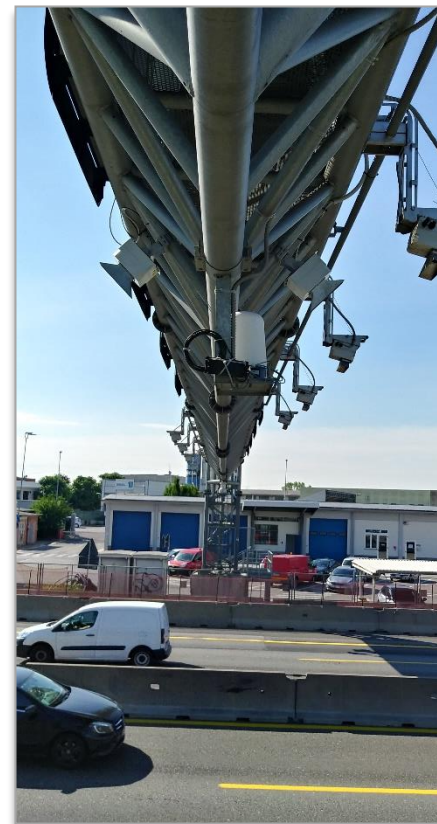
SPAIN

# References

RSR4001 Laser Scanner + Rada Doppler



ITALY



# References

RSR4001 Laser Scanner + Rada Doppler



MALAYSIA

INDIA



# References

RSR4001 Laser Scanner + Rada Doppler



ITALY





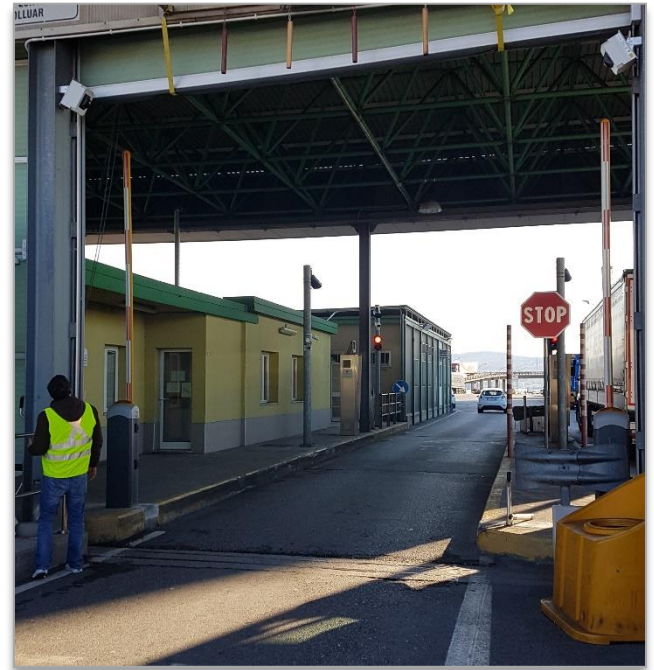
# References

LSR2001 Profiler



MALAYSIA

ITALY





# References

LSR2001 Profiler



CROATIA



# References

MD01 Rada Doppler



ITALY



ARGENTINA

# References

MD01 Rada Doppler



ITALY





The HeArt of Traffic Detection

Comark srl

Via Galileo Galilei, 5  
33010 Tavagnacco (UD) Italy  
[www.comarkud.it](http://www.comarkud.it)



Made in Italy