

# 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 1SO9001 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, ...)





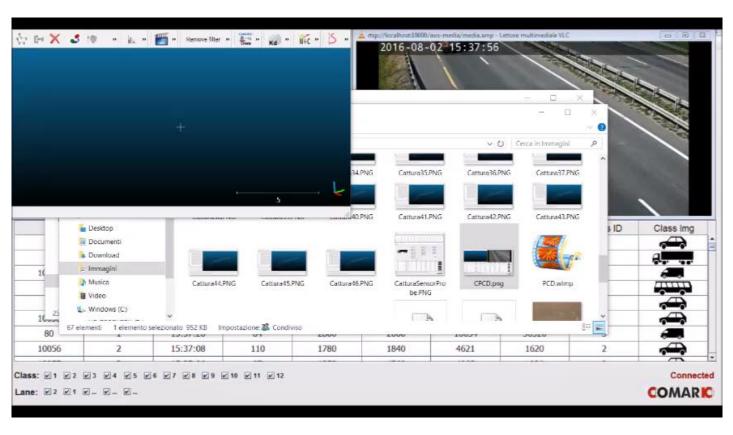






Traffic

3D image of vehicle created by the LSR2001 video





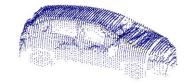
Note: This page contains a video, if you are not seeing it, please check our youtube channel: https://www.youtube.com/channel/UCsgYIFZ1SuA1o3vLmTGYD2A



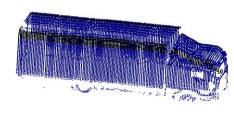
Traffic

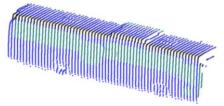


Laser scan data

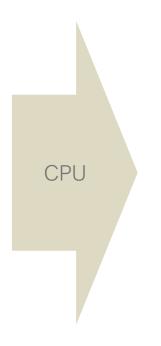








Profile analysis (using AI – Deep Learning techniques)



Detector output



CAR



VAN



TRUCK















# Vehicle classes

	Class nr.	Class description	Class nr.	Class description	
	0	Unclassified	350	Van trailer	
	1	Pedestrian	400	Bus	'
	2	Bicycle	401	Coach	
	100	Motorcycle	402	Articulated bus	
	200	Car	403	Double-decker bus	
	220	Suv	450	Bus trailer	
	240	Pickup	451	Coach trailer	, AJINI
	250	Car trailer	453	Double-decker bus trailer	
	270	Suv trailer	500	Truck	
	290	Pickup trailer	501	Truck trailer	
	300	Van	502	Semitruck	











# 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	P3 🗸
*Laser communication speed	Bitrate 2 ✔
*Laser reset digitalout	Id 1 - GPIO #3 V
Inclination[deg]	0
Sensor X offset[mm]	0
Sensor Y offset[mm]	0
*Height alarm	Enabled V
*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

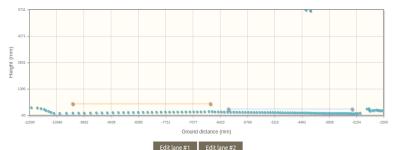


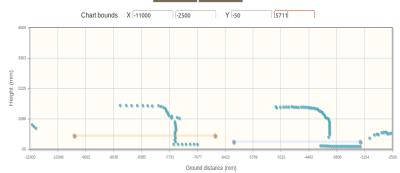


# LSR2001 Web Configuration

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: head200: 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		











# LSR2001 Laser Scanner

### Data provided by the different LSR2001 types and installations





Oblique



Double



	Transversal	Oblique	Double
Counting	$\bigcirc$	$\bigcirc$	$\bigcirc$
2 lines detection	$\bigcirc$		$\bigcirc$
Speed		$\bigcirc$	$\bigcirc$
Height	$\bigcirc$	$\bigcirc$	$\bigcirc$
Vehicle class	$\bigcirc$	$\bigcirc$	$\bigcirc$
Length		$\bigcirc$	$\bigcirc$
Gap	$\bigcirc$	$\bigcirc$	$\bigcirc$
Headway	$\bigcirc$	$\bigcirc$	$\bigcirc$
Direction of travel		$\bigcirc$	$\bigcirc$
Traffic status	$\bigcirc$	$\bigcirc$	$\bigcirc$
Trigger	$\bigcirc$	$\bigcirc$	$\bigcirc$





### LSR2001 Laser Scanner

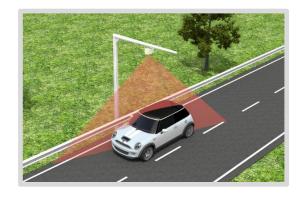
Traffic

The LSR2001 can provide high accuracy data on:

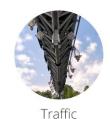
- Counting
- Classification of vehicle based on profile
- Width & height measurement
- Detection up to 200 km/h.

Depending on how the sensor is installed it can provide different data









# LSR2001 DOUBLE

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

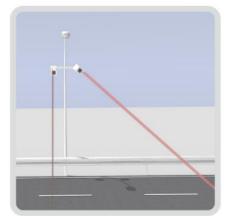
The system is able to measure speed and to detect direction of travel even in side installation.



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.





Also used in FREEFLOW systems





### Highway LSR2001 Detection video



LSR2001-DOUBLE







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



# LSR2001 Axles

Laser combined with photocells

Traffic



Double wheel detection with 4 photocells





Special photocells very resistant to dirt





# 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 ob-ject is needed.

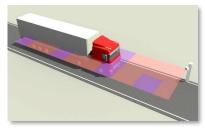
The LSR2001-R&S provides the following data:

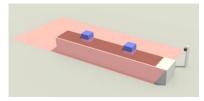
- Presence
- Distance X and Y

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 con-veyor











### LSR100 Laser Scanner

The LSR100 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 LSR100 can be done through a remote controller

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











	Transversal	Oblique	Double	Axle	LSR100
Counting	$\oslash$	$\oslash$	$\bigcirc$	$\oslash$	$\oslash$
Vehicle class	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Speed	$\circ$	$\oslash$	$\bigcirc$	$\bigcirc$	$\circ$
Height	$\oslash$	$\bigcirc$	$\oslash$	$\bigcirc$	$\bigcirc$
Length	$\bigcirc$	$\oslash$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Gap	$\oslash$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Headway	$\oslash$	$\oslash$	$\bigcirc$	$\bigcirc$	$\circ$
Axle detection	$\bigcirc$	$\circ$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Traffic status	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Trigger	$\bigcirc$	$\oslash$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Direction of travel	$\bigcirc$	$\oslash$	$\bigcirc$	$\bigcirc$	$\bigcirc$
2 lanes detection	$\oslash$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\circ$
Roadside installation	$\bigcirc$	$\bigcirc$	$\oslash$	$\bigcirc$	$\bigcirc$
Above lane installation	$\circ$	$\oslash$	$\circ$	$\circ$	$\oslash$

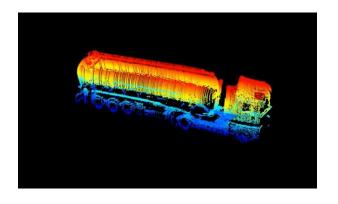


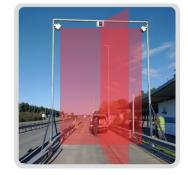


# 3D Profiler Systems

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.















# 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

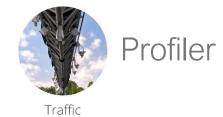


Profiler TT



Profiler LT





	3 LASERS	2 LASERS TT	2 LASERS LT	3 LASERS LTT
3D Vehicle profile	$\odot$	$\odot$	$\bigcirc$	$\bigcirc$
Single gantry	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\otimes$
Both vehicle sides	$\bigcirc$	$\oslash$	$\circ$	$\bigcirc$
Counting	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Speed	$\bigcirc$		$\bigcirc$	$\bigcirc$
Lenght	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\otimes$
Height	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Width	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\oslash$
Stop & Go	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Multiple vehicles		$\bigcirc$	$\oslash$	$\bigcirc$
Trigger for cameras	$\bigcirc$	$\bigcirc$	$\oslash$	$\bigcirc$





Traffic

### RSR4001 - RL4001

Laser Scanner + Radar Doppler



RSR4001

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.



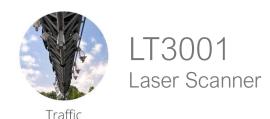
RL4001

### Data detected:

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

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





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 the its position, speed and length.

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

Used in FREEFLOW systems







### 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.

Used in FREEFLOW systems.







Traffic





### Free Flow Toll in Brazil













### 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

### LP series

The LP10 and LP20 are compact yet powerful sensors. Designed for cost-effective traffic data collection. Low power and easy to install



### LP10

Composed by one single beam Laser.

Can count vehicles on 2 lanes and detect the traffic status.

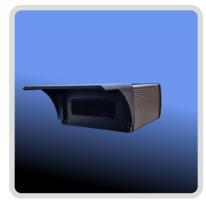
Can be used also for vehicle presence detection.

### LP20

Composed by 2 single beam Laser.

### Can provide:

- Time
- Count
- Class
- Speed
- Direction









# RAM SERIES - Over Height Detection

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



### RAM01

Composed by one single beam Laser.
Best for indoor Applications or simple outdoor applications

### RAM11

Composed by two single beam Laser. Redundacy of sensors that reduce false alarms



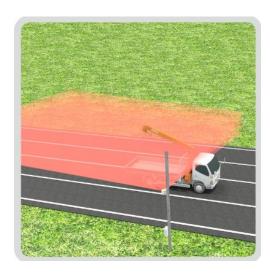




# Over Height Detection

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



### RAM20

Composed by one laser scanner installed horizontally.

### RAM110

Composed by one laser scanner and one single beam laser







# Over Height Detection

	RAM01	RAM11	RAM20	RAM110
Over height detection	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\oslash$
One side installation	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Object distance	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Laser Scanner	$\circ$	$\bigcirc$	$\bigcirc$	$\oslash$
Single Beam Laser	$\bigcirc$	$\bigcirc$	$\circ$	$\bigcirc$
Counting	$\circ$	$\circ$	$\circ$	$\bigcirc$
All vehicles measuring	$\circ$	$\circ$	$\circ$	$\bigcirc$
Double height zones	$\circ$	$\bigcirc$	$\circ$	$\oslash$
Vehicle class	$\circ$	$\bigcirc$		$\bigcirc$
Direction of travel	$\circ$	$\bigcirc$	$\bigcirc$	$\bigcirc$









# BT100 BT200

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















# MD01 Rada Doppler

Traffic



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

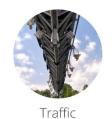
### Data detected:

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









USMI9601 USM9001 US6003 MAG01

Radar doppler + ultrasound + infrared

Radar doppler + ultrasound

Ultrasound

Earth magnetic field detector







USM9001



USMI9601



MAG01





# VISIBILITY AND WEATHER SENSORS

Traffic

VISIO1 and VISIO+ are suitable for applications where accurate atmospheric measurements are required. By using the backward scattering principle, SENSE 1 measures the horizontal visibility, while SENSE+ measures both precipitation and visibility radar detector equipped with a patch antenna

### VISIO 1

- Horizontal visibility range: 10m 5Km (resolution 10m);
- Communication line: RS232, RS485;
- Data update interval: 30 seconds.

### VISIO +

- Horizontal visibility range: 10m –
   20Km (resolution 10m, accuracy 10%);
- Observed precipitation: clear, drizzle, rain, shower, mixture of rain and snow, hail, snow;
- Communication line: RS232, RS485;
- Data update interval: 1 minute (precipitation data is of last 5 min)







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











### 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.









Parking





### PARKING AVAILABLE SPACES

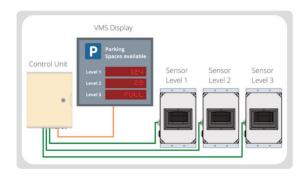
IN – OUT detection with Laser scanner

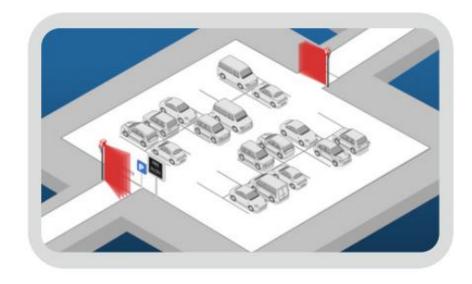
Parking

The LSR2001PARK detector uses the laser technology to detect vehicles that enter and/or exit a parking area.

#### The LSR2001 PARK sensor can:

- Count vehicles
- Detect the transit direction









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.















# PARKING SPACE PROTECTION PSP10

Parking

Smart parking – Fully automatic

Comark Parking Space Protection is a remote controlled system that differs from other solutions due to its strength and fully automatic mechanism.

Comark has two models available: with or without solar pannel and both models are powered with long life buffer batteries.









Traffic



**Smart City** 



Parking

### CO1010

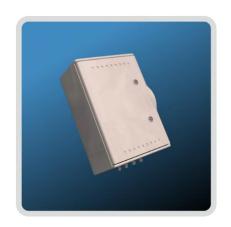
#### Control Unit

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

### **OMNIVIEW**

#### Data Analitics Software



**Smart City** 



Parking

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



Sho	w 10 ~	entries		Search:				
Id	Туре 🛊	Description \$	Usernam¢	Created \$	Timezone 🛊	Manag¢	Modif	C
1	superadmin	1	comark	2015-01-10 21:59:35.359537	Europe/Rome			
2	admin		adminusr	2015-01-10 22:00:44.893931	Europe/Rome			E
3	admin	sdddd	comunita	2015-02-09 08:22:48.723899	Europe/Rome			E
4	user		comune	2015-07-02 10:53:20.614837	Europe/Rome			E
5	admin		superadmin	2016-12-02 14:57:01.97862	Europe/Rome			E
6	admin	Enctech admin	enctech	2017-06-07 14:49:56.521364	Asia/Kuala_Lumpur			E
9	admin	IT-RAM: Liew Chee Wah	88096603	2017-06-21 09:18:01.977004	Asia/Kuala_Lumpur			E
10	admin		genting_it	2017-06-21 09:24:56.829337	Asia/Kuala_Lumpur			E
11	admin	IT-RAM: Tiu Sion Wei	88096619	2017-06-21 09:28:46.190081	Asia/Kuala_Lumpur			E
13	user	Finance: Andrew Ting	88078051	2017-06-22 04:35:15.572108	Asia/Kuala_Lumpur			E





Traffic

# OMNIVIEW Data Analytics Software

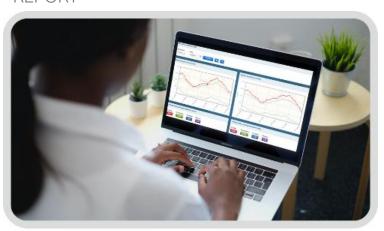
#### **REPORT**



Smart City



Parking



#### DIAGNOSTICS



#### MAPS







Traffic



Smart City



Parking



LSR2001 Laser Scanner Detector ITALY







LSR2001 Bicycle & Pedestrian Data Collection ITALY





SWITZERLAND



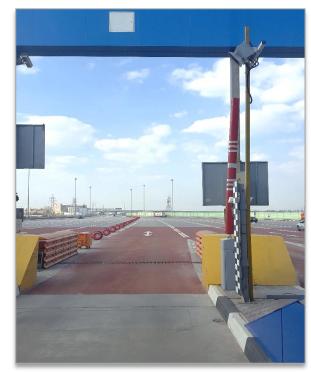
LSR2001 Bicycle & Pedestrian Data Collection ITALY





**SPAIN** 





RUSSIA



**BRASILE** 



#### LSR2001 Laser Scanner Detector



#### VIETNAM







ITALY



PERU'





### LSR2001 Laser Scanner Detector



**SPAIN** 











ITALY



#### LSR2001 Laser Scanner Detector



ITALY

#### KURDISTAN









**BRASIL** 









MALAYSIA - INDONESIA





MALAYSIA



**RUSSIA** 





SOUTH KOREA



### LSR2001-Double Free flow



THAILAND



**BRAZIL** 



### RAM20 Over Height Vehicle Detection





United Kingdom



### RAM20 Over Height Vehicle Detection



ITALY



**SPAIN** 



### RSR4001 Laser Scanner + Rada Doppler



ITALY







### RSR4001 Laser Scanner + Rada Doppler



MALAYSIA

INDIA





### RSR4001 Laser Scanner + Rada Doppler



ITALY





### LSR2001 Profiler



MALAYSIA







### LSR2001 Profiler



CROATIA





### MD01 Rada Doppler



ITALY



ARGENTINA



MD01 Rada Doppler



ITALY







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