
smartmicro
SMART MICROWAVE SENSORS

COMPANY

At smartmicro we design, develop and manufacture sensors for:

- ✓ Traffic management
- ✓ Automotive applications

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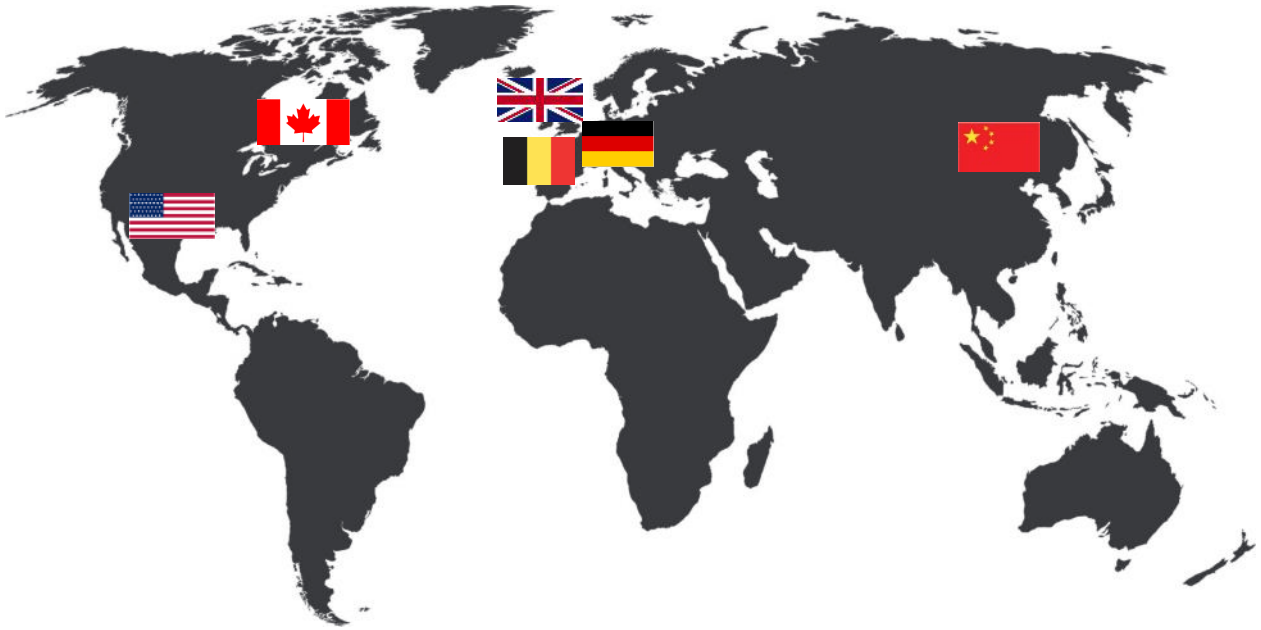
OUR MISSION

"With our innovative high performance and high quality sensor products we aim for a safer, greener and smarter future."

SMARTMICRO® | S.M.S, SMART MICROWAVE SENSORS GMBH

- ✓ Subsidiary smartmicro UK Limited & Partner smartmicro US, LP
- ✓ International offices: Germany, Belgium, Canada and China
- ✓ More than 80 distribution & OEM partners worldwide



Headquarters:

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Germany

www.smartmicro.com

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ABOUT US | SMARTMICRO

Specialist in automotive radar technology

- ✓ Over 27 years of experience
- ✓ More than 15 million vehicles run on our technology

Leader in traffic management radar

- ✓ For more than 17 years
- ✓ Over 150.000 traffic sensors deployed worldwide

- ✓ 2024: 36M€ revenue
- ✓ 187 employees & radar experts
- ✓ ISO 9001 certified
- ✓ Strong IP & patent portfolio

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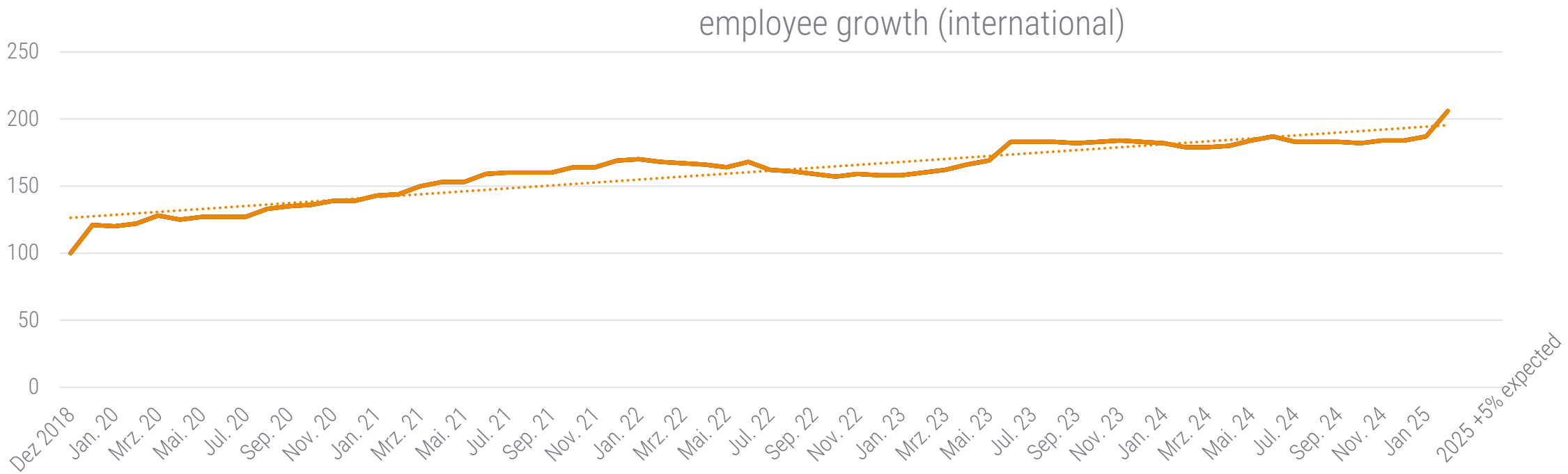
EMPLOYEE GROWTH (INTERNATIONAL) 2018-2025



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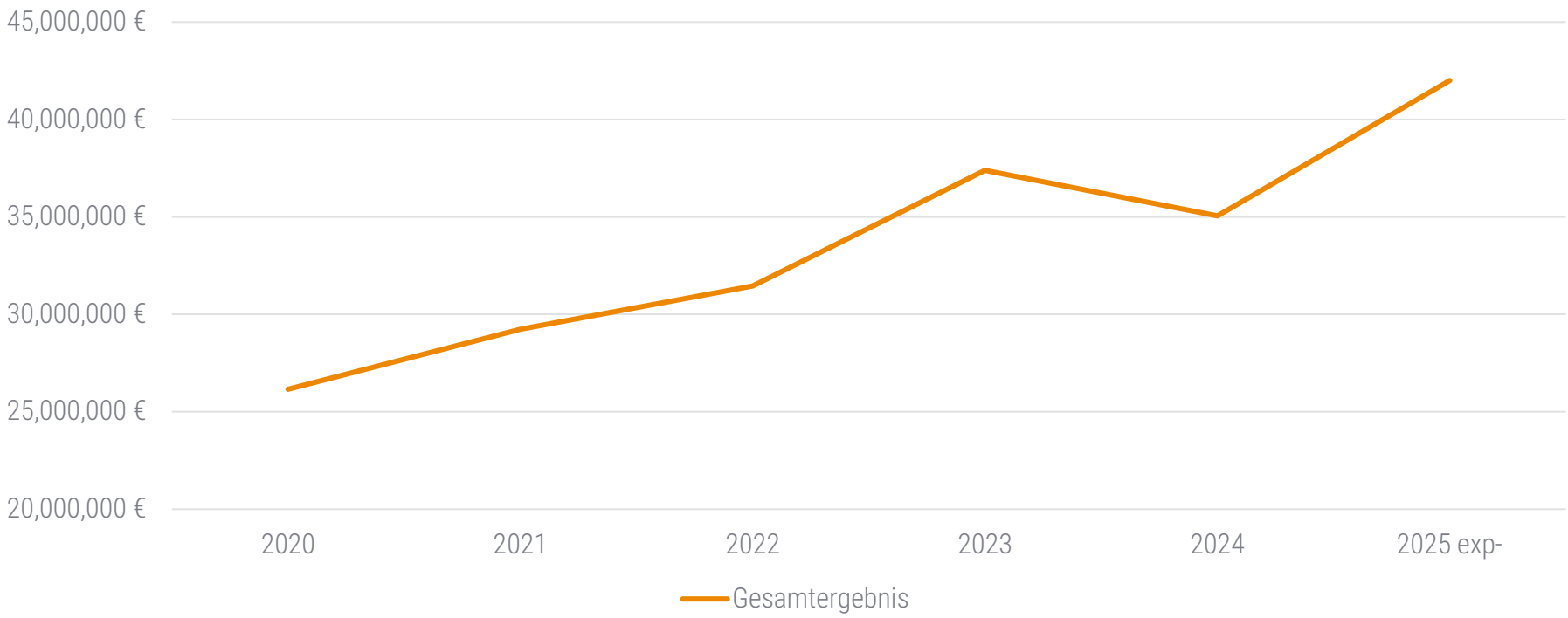
REVENUE 2020-2025



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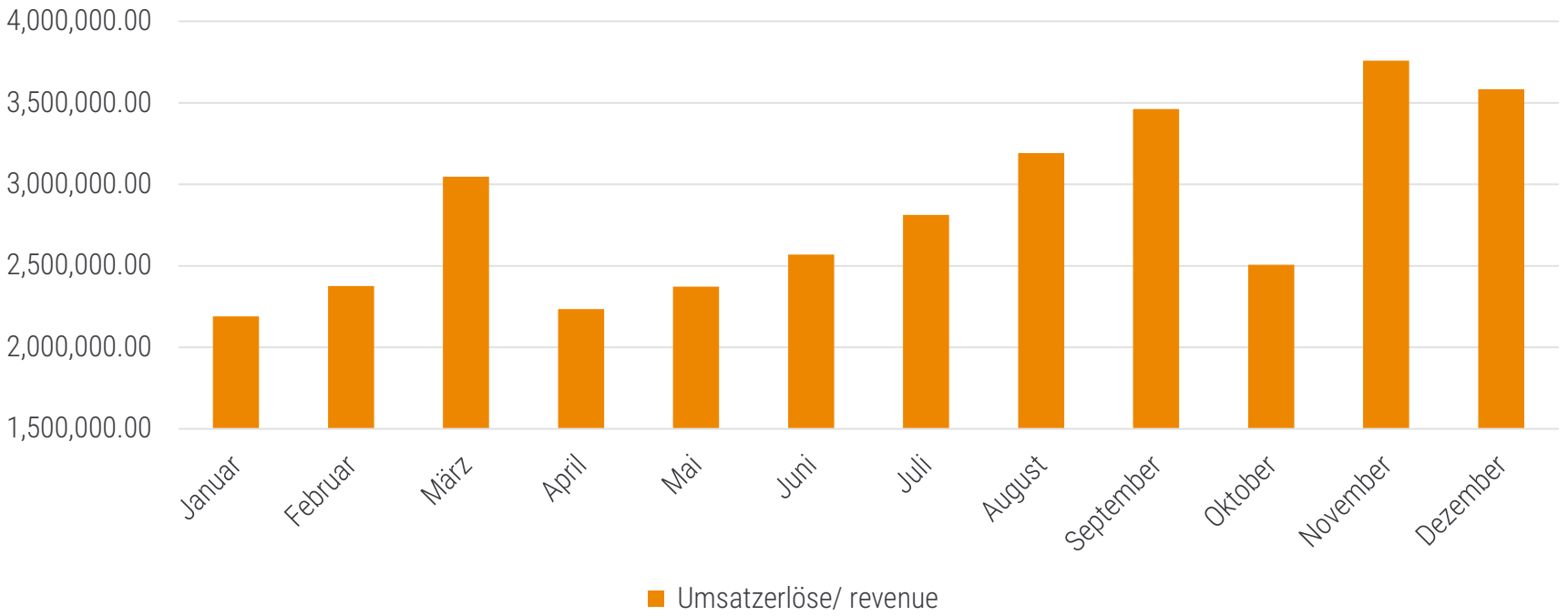
REVENUE JAN.-DEC. 2024



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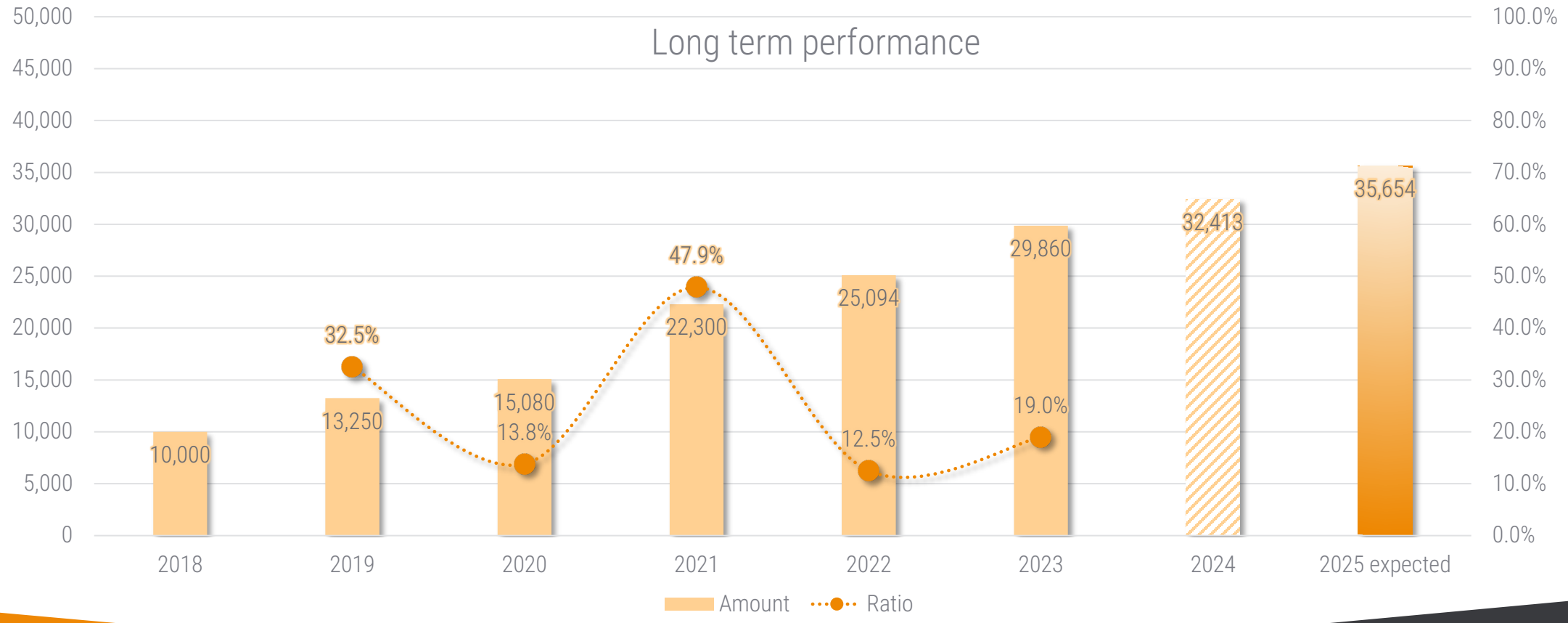
PRODUCTION



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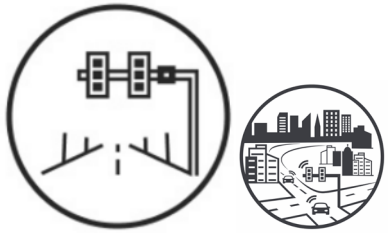
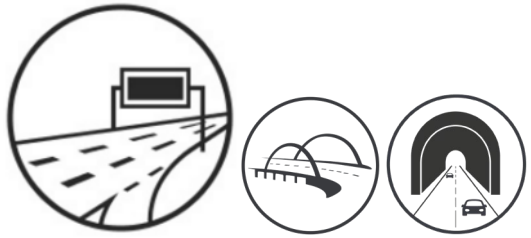
MULTI-FUNCTIONAL SENSORS | OUR APPLICATIONS



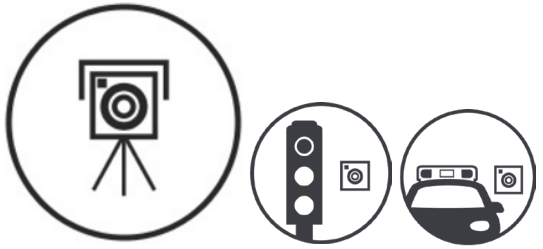
Intersection Management

- ✓ Combined stop bar & advance detection
- ✓ Stopped & moving objects
- ✓ Queue length measurement
- ✓ Smart City applications



Highway Management

- ✓ Traffic counting & classification
- ✓ Incident detection, wrong-way driving
- ✓ Ramp metering
- ✓ Tunnel monitoring
- ✓ Bridge detection



Enforcement Applications

- ✓ Red-light enforcement
- ✓ Speed enforcement
- ✓ Portable speed enforcement
- ✓ Mobile speed enforcement

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OUR USP'S | TRAFFIC SENSOR TECHNOLOGY

Direct unambiguous speed measurement

- ✓ Patented technology for up to 650km/h (-325…+325km/h)

Best coverage

- ✓ Up to 110° field of view & 12 lanes
- ✓ Range of up to 500m (1640ft)
- ✓ Works even on curved roads
- ✓ 4D technology (range, speed, azimuth and elevation angle)

Object detection

- ✓ Up to 256 objects simultaneously
- ✓ Real-time streaming

Highest accuracy

- ✓ Typ. range: ± 0.5m | Speed: ±0.1m/s
- ✓ METAS tested for up to 320km/h (199mph)
- ✓ Typ. Angle: ± 0.5deg.
- ✓ Angular separation down to 2 deg.

Fail-safe operation

- ✓ Sensor blind & rain detection
- ✓ Misalignment reporting
- ✓ Interference detection and suppression

- ✓ Low power consumption

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STRENGTHS OF OUR SENSORS | THE BEST CHOICE

- ✓ Highly accurate for all road users: pedestrians, bikes, cars, …
- ✓ Four dimensions (range, speed, azimuth, elevation)
  - ✓ 4D/UHD & 4D/PxHD technology

- ✓ Unaffected by sun, shadows, darkness, fog, …
  - ✓ Almost unaffected by rain, snow & wind
  - ✓ Fail-safe features: sensor blind, rain detection, interference
- ✓ Non-intrusive
- ✓ Maintenance-free

→ A future-proof & very flexible solution

FORWARD FIRING | TECHNOLOGY ADVANTAGES

Vehicles remain in the field of view longer

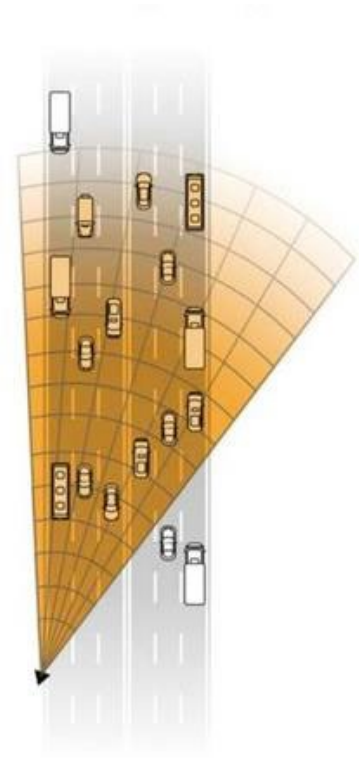
- ✓ Higher accuracy of speed and position
- ✓ Precise trajectory tracking
- ✓ Occlusion is rare

Wide beam over multiple lanes

- ✓ Multiple statistic zones possible

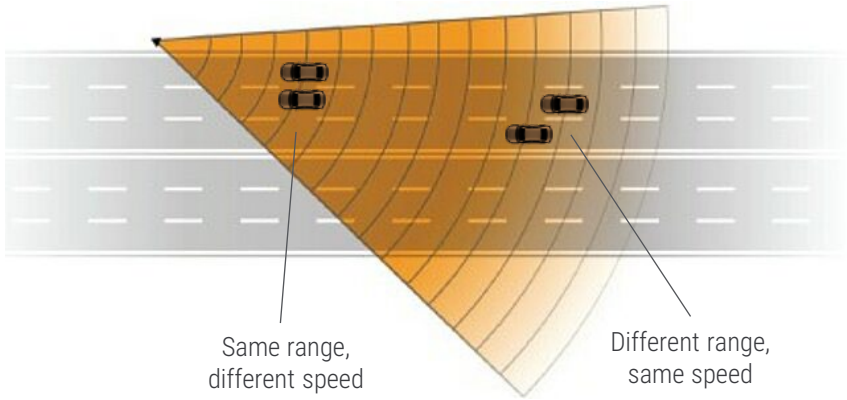
Flexible mounting positions on existing infrastructure

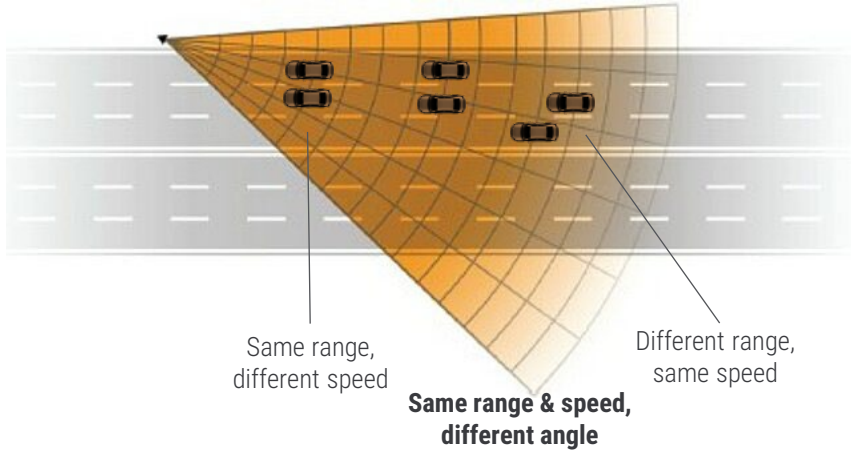
- ✓ Moderate heights are sufficient, no setback required
- ✓ Cost-efficient



BEST RESOLUTION | TECHNOLOGY ADVANTAGES

- ✓ Measurement in 4 dimensions (4D): speed, range (distance), azimuth (lane), elevation (height)
- ✓ High Definition (HD)
  - ✓ Separation in speed
  - ✓ Separation in range
- ✓ Ultra-High Definition (UHD)
  - ✓ Separation in speed
  - ✓ Separation in range
  - ✓ Separation in angle





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COMPARISON TO OTHER DETECTION TECHNOLOGIES

Inductive Loops	Video Cameras	Thermal Cameras	**smartmicro** Sensors
✓ Not applicable for bikes and pedestrians (VRUs) ✓ High costs for replacement and huge traffic impact ✓ Intrusive and not flexible	✓ Limited by visibility conditions ✓ Limited Range ✓ Regular cleaning required ✓ Affected by environmental conditions	✓ Vulnerable for environment effects ✓ Restricted visibility (rain, snow, fog) ✓ Limited range ✓ Difficult detection of electric cars	✓ Replacement of up to 32 loops ✓ Performs in all weather conditions ✓ Max range of up to 300m ✓ No regular cleaning required

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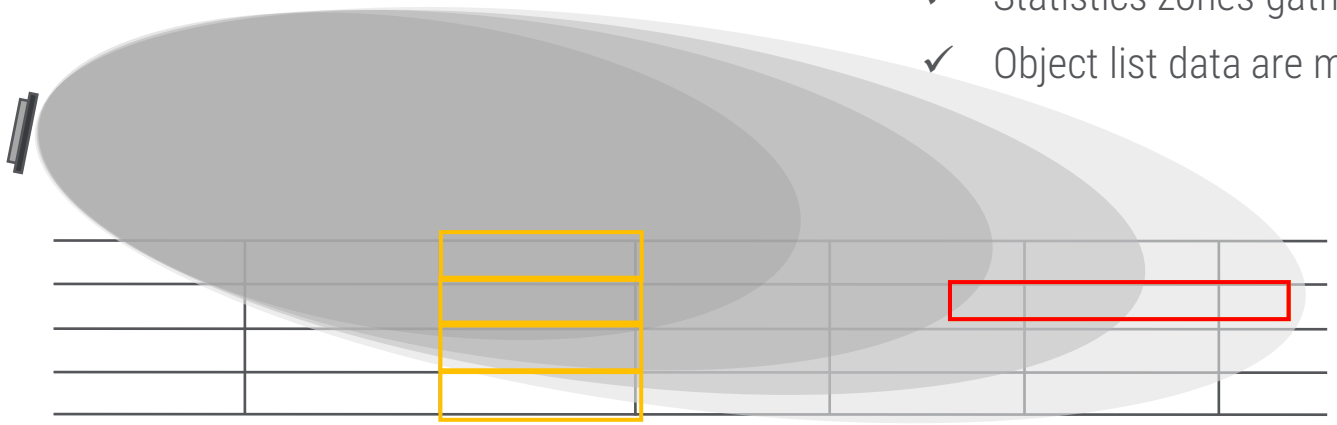
HOW IT WORKS | RADAR OUTPUTS

For different use cases, the sensor offers different outputs

- ✓ Trigger outputs are the direct equivalent of inductive loops
- ✓ Statistics zones gather traffic data per lane per time period
- ✓ Object list data are most granular, used by OEM customers



Event Trigger Module

32 Virtual Relays

Traffic Statistics

lane	# of bikes	# of cars	# of trucks	...
1	0	1	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

Object List

ID	x pos	y pos	x speed	y speed	length
17	24	4	-55	0	4.5

SENSOR MODELS | OVERVIEW

TRUGRD® Products | Premium Line

- ✓ TRUGRD 3D/UHD+ (24GHz)
- ✓ TRURGD LR 3D/UHD+ (24GHz)
- ✓ TRUGRD Stream, 3D/UHD+ (24GHz)
  - ✓ Integrated camera with supreme low light performance

UMRR-11 Models | Basic Line

- ✓ UMRR-11 Type 132, 4D/UHD (77 GHz)
- ✓ UMRR-11 Type 44, 4D/HD (24 GHz)
- ✓ UMRR-11 Type 45, 4D/HD (24 GHz)

Compact Line

- ✓ TOPGRD

TRAFFIC SENSORS

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smartmicro is the leading solution provider for several traffic management applications in the field of sensor technology

- ✓ **Intersection Management**
- ✓ Highway Management
- ✓ Enforcement Applications

TYPICAL USE CASE | INTERSECTION APPLICATIONS

Adaptive traffic light control

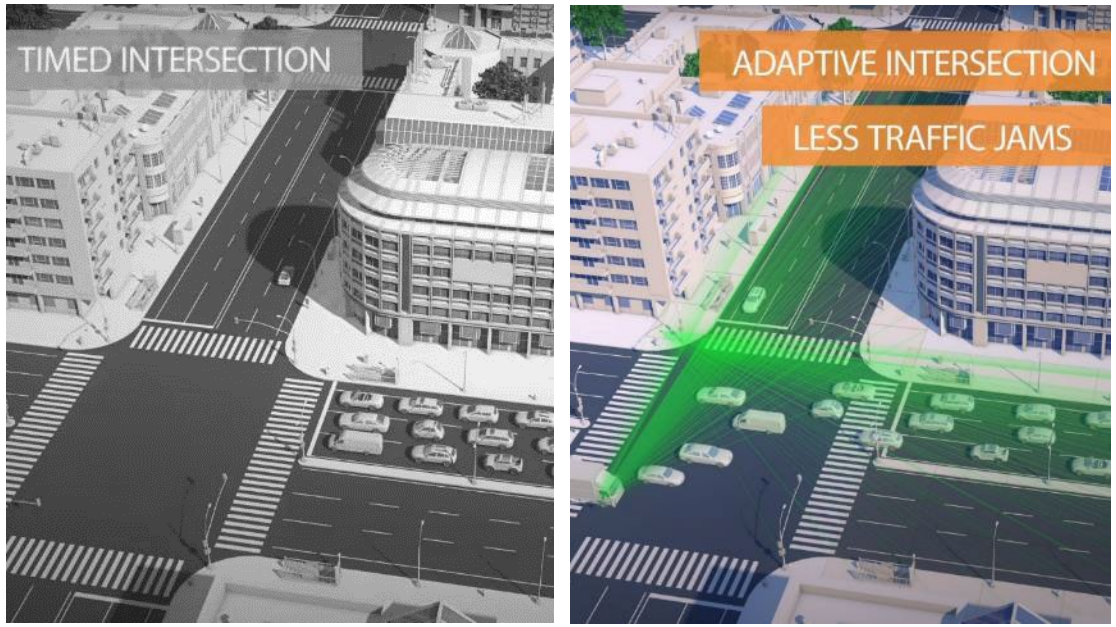
- ✓ Signal priority & signal phase extension
- ✓ Dilemma zone protection

Queue Length Estimation (QLE)

- ✓ By monitoring the objects in a pre-defined zone
- ✓ Sending signals if the queue begins to grow and a minimum length is exceeded

→ Less congestions, smoother traffic flow and less travel time

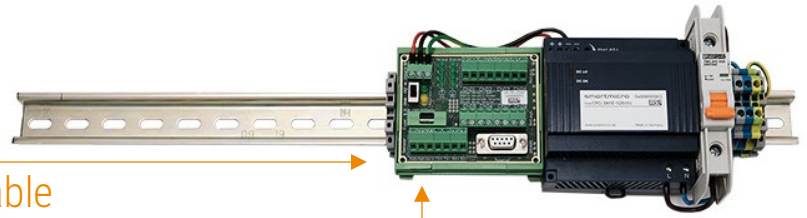
→ Reduced CO_2 emissions



See video

KEY SYSTEM COMPONENTS | INTERSECTION MANAGEMENT

Cabinet Relay Option (CRO)



Radar sensor

Junction Box (J-Box)

Field cable
2-wire/24V DC
4-wire/RS485

Landed wires

Traffic controller

TRAFFIC SENSORS

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- ✓ Intersection Management
- ✓ **Highway Management**
- ✓ Enforcement Applications

FORWARD+ | HIGHWAY MANAGEMENT

Applications:

- ✓ Counting and classification
- ✓ Wrong-Way Detection
- ✓ Real-Time data for connected vehicles

Features:

- ✓ Wide beam covering multiple lanes, Accurate per vehicle measurement
- ✓ Working on curved roads
- ✓ Accurate lane change or trajectory monitoring

→ For more road safety on highways or freeways

→ Managing maintenance of roadways efficiently

TYPICAL SYSTEM CONFIGURATION | HIGHWAY MANAGEMENT

Radar sensor

Junction Box (J-Box)

Terminal server

Network Switch

Ethernet cable

Field cable
2-wire/24V DC
4-wire/RS485

24V DC PSU

TYPICAL USE CASE | HIGHWAY APPLICATIONS

Ramp metering

- ✓ Adaptive controlling of ramps
  - ✓ On- and off-ramps
- ✓ Measurement of demand and capacity simultaneously

→ For entering and exiting highways or freeways more safely

→ For a smoother traffic flow

ADDRESS

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