ADAPTIVE RECOGNITION
Image Recognition Products for Traffic, Security, ID Data Entry Automation and Biometric Identification

INTELLIGENT TRANSPORTATION SYSTEMS

RECOGNITION SOFTWARE & CAMERAS

IDENTITY DOCUMENT READERS & BIOMETRICS
market presence in 220+ countries worldwide

10,000+ satisfied partners

300+ employees

50,000+ ID scanning systems

80,000+ traffic systems
RECOGNITION SOFTWARE

SMART SURVEILLANCE

INTELLIGENT TRAFFIC SYSTEMS

IDENTITY DOCUMENT READERS & BIOMETRICS

RECOGNITION CAMERAS

OCR RESULTS:

- NUMBER PLATE: ARH 001
- NATIONALITY: EU-HUNGARY
- SPEED: 158 MPH / 254 KMH
- BLACKLIST: --- NO ---
- COLOR: BLUE METAL
- RECOGNITION TIME: 2018-06-12T15:19:21+03:00
• NUMBER PLATE: ARH 001
• VEHICLE TYPE: MERCEDES BENZ
• NATIONALITY: EU-HUNGARY
• SPEED: 158 MPH / 254 KMH
• BLACKLIST: --- NO ---
• COLOR: BLUE METAL
• OWNER: ZSOLT VANYI
• RECOGNITION TIME: 2018-01-12T15:19:21+00:00
TYPICAL APPLICATIONS

Traffic analytics? Access control? Logistics track-and-trace? The answer is ARH's CARMEN® license plate recognition – possibly the best engine that effectively reads over 28,000 plates types all over the world. But Carmen can do more: ARH’s CARMEN® software family reads container codes, wagon codes, hazmat plates and more. The following examples include typical applications where ARH’s plate recognition engines offer unique benefits.

TRAFFIC MONITORING

- Airport and harbour logistics
- LAW ENFORCEMENT
- PARKING MANAGEMENT
- LOGISTICS TRACK-AND-TRACE
- Gas station security
- Container code recognition
- ACCESS CONTROL
- CONGESTION CHARGING
- USDOT code recognition
- Railway code recognition
- ADR (HAZMAT) CODE RECOGNITION
- TRAFFIC ENFORCEMENT
- TRAFFIC ANALYTICS
- campus security
- TOLL COLLECTION
- AVERAGE SPEED MEASUREMENT
- BORDER CONTROL
INTRODUCTION TO THE ANPR/LPR PROCESS

WHAT IS ANPR/LPR?

Automatic Number Plate Recognition/License Plate Recognition (ANPR/LPR) has been ARH’s core technology for over 27 years – software and hardware development and manufacturing.

ANPR/LPR is a traffic surveillance method based on optical character recognition (OCR).

A specific OCR algorithm processes captured images or footage to recognize the plate characters. ANPR/LPR can be implemented in any traffic related application using either an existing CCTV/IP camera system or dedicated ANPR/LPR cameras, which ensure high recognition rates and true 24/7 operation.

The operation of any ANPR/LPR system can be divided into three main steps. It is important to highlight that CARMEN® ANPR/LPR technology provides a fully adaptable solution delivered either as an SDK (software development kit) that can be seamlessly integrated with any existing workflow – or as a standalone, ready to use application.

HOW DOES ANPR/LPR WORK IN PRACTICE?

The operation of any ANPR/LPR system can be divided into three main steps.

1. Detection & image capturing
   At the front end of any ANPR/LPR system there is a camera that captures images of the plates. The camera plays an important role in the ANPR/LPR process, by making sure that the captured images are appropriate for ANPR.
   This highly determines the overall performance of the system. The best results are achieved by using specialized cameras designed for ANPR/LPR.
   ARH offers a wide range of dedicated ANPR/LPR cameras.

2. Image preselection and plate recognition
   The main software aspect of an ANPR/LPR system is reading the plate text from the preselected set of captured images.
   This automated recognition has several steps, including image normalization and enhancement, as well as detecting the vehicle in the image. The final step is taken by the OCR algorithm that recognizes the individual characters.
   CARMEN® ANPR is the world leader in ANPR software, and it’s a result of over 26 years of continuous development. It facilitates country-independent recognition, in case of dense traffic reading of multiple plates from one image, color recognition, state or country identification, accomplishing all of this extremely fast with high accuracy.
3. Data record and end-user application
Besides the characters of the vehicle plate, CARMEN® also returns plenty of additional information, such as an image with the recognized plate(s) and the confidence level assigned to each character as well as the whole plate. Once all license plate data is saved to a database, the data record serves as input to the end-user’s business logic. Automated number plate recognition may be a key component of vehicle access control, traffic and toll enforcement and many other applications.
CARMEN® ANPR FREEFLOW is the unlimited version of the ANPR product line. Designed to read and process a large number of license plates in 24/7 traffic monitoring, security, highway tolling and congestion charging systems. It offers country-independent recognition as well as recognition of number plates featuring not only Latin characters but also characters from Arabic, Cyrillic, Chinese, Korean, Thai alphabets, and many more. Other applications that can benefit from its fast and accurate automatic recognition capabilities include speed and journey time measurement, access control, parking management, bus lane enforcement, border control or gas station monitoring, etc. CARMEN® ANPR FreeFlow reads license plates from any image source extremely fast and with outstanding accuracy.

MAIN BENEFITS

- Increases security and safety of highways and access control areas
- Enhances fidelity by handling various plate sizes, syntaxes, and distorted plate images
- Allows smooth and problem-free 24/7 operation
- Saves time and energy with fast and reliable automated license plate reading
- Decreases data entry errors with improved accuracy and recognition rates
- Ensures easy installation through SDK and user-friendly API

KEY FEATURES

- Automatic recognition of license plates in free flowing traffic environments
- Fast, easy, and straightforward use
- Hardware independence: compatible with any image source (analog/digital/still images/MJPEG video streams)*
  - Country, state or province, and plate type recognition
  - Country-independent recognition including Latin, Arabic, Chinese, Korean, Thai, etc. characters
- Optional License plate color recognition
- Non-empty dangerous goods plate recognition included

* ARH’s dedicated ANPR/LPR cameras are available for high quality image capturing and industry leading recognition rates.
In applications where the vast potential of CARMEN® FreeFlow is not necessary, one of the CARMEN® ANPR 5K/8K/11K versions may be the ideal choice. In fact, CARMEN® ANPR 5K/8K/11K may be the optimal cost-effective choice for roads with low traffic density or 3rd party smart cameras with not so powerful processors. CARMEN® 5K/8K/11K can also be recommended for vehicle access control systems.

**CARMEN® ANPR 5K, 8K and 11K: principle of operation**

In these versions, before actually starting to process an image, CARMEN® needs a credit. New credits are generated throughout the day (24 hrs). However, the number of available daily credits are limited – hence the name 5K, 8K and 11K. In these 3 cost-effective versions of CARMEN®, operation is dependent on 2 parameters: one is a time factor indicating the time lag between generation of new credits; the other is the maximum credit buffer size – these 2 factors determine the processable number of images in a given time period. Calculating with 3 images per vehicle, there are enough credits for a peak of 180-200-220 vehicles per hour. These CARMEN® versions are ideally used for vehicle access control in corporate headquarters, as well as on roads with low traffic density – where the cameras installed or the processing hardware have limited performance.

**MAIN BENEFITS**

- Offers the high recognition rates of CARMEN® FreeFlow with quad-core operation
- Saving time and energy in data entry by automating plate reading
- Centralising registration eliminates the need for access cards or codes to system users
- Increasing safety and security of access control areas
- Boosting reliability by handling various plate sizes, syntaxes, and distorted plate images
- Allowing smooth and problem-free 24/7 operation
- Cost effective versions of CARMEN® FreeFlow ANPR

**KEY FEATURES**

- Automatic recognition of analog/digital input plate images of vehicles in stop and go or reduced speed traffic situations
- Fast, easy, and straightforward use
- Country, state or province, and plate type recognition
- Country-independent recognition including Latin, Arabic, Chinese, Korean, Thai characters, and many more
- Optional license plate color recognition

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**NUMBER PLATE**

<table>
<thead>
<tr>
<th>Number Plate</th>
<th>Parking Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNX - 058</td>
<td>18h 47min</td>
</tr>
<tr>
<td>WTS - 402</td>
<td>08h 23min</td>
</tr>
<tr>
<td>GRW - 051</td>
<td>13h 11min</td>
</tr>
<tr>
<td>XFR - 453</td>
<td>01h 27min</td>
</tr>
<tr>
<td>LWE - 245</td>
<td>05h 07min</td>
</tr>
<tr>
<td>KOP - 983</td>
<td>03h 34min</td>
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<tr>
<td>KOP - 983</td>
<td>03h 34min</td>
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<tr>
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</tr>
<tr>
<td>KOP - 983</td>
<td>03h 34min</td>
</tr>
</tbody>
</table>

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**ARH**
CARMEN® GO

Are you looking for a simple app to transform any video stream into ANPR results? Would you like to build your own system, without the need for ANPR integration? Motivated by these challenges and capitalizing on our 27 years of experience, we have created the forward-thinking Carmen® GO, the plug and play ANPR application. It only takes a few clicks to set up Carmen® GO upon first use. All you need to do is link your camera stream(s) to Carmen® GO and you will get ANPR results directly from the stream(s). By using Carmen® GO you can focus on what matters most to you: your customers and your core business.

CARMEN® GO is a truly camera independent solution, letting you use any IP camera from any vendor.

CARMEN® GO uses the same industry leader CARMEN® ANPR engine that is at the heart of top systems around the world but it goes to the next level by self-adjusting settings to achieve optimal results. This is how we can ensure that CARMEN® GO will return the best possible result based on the given stream.

MAIN BENEFITS

- Camera independent: processes streams of any commonly available IP camera
- No need for ANPR expertise nor any ANPR integration skills
- Fully automatic operation adapts to incoming stream, self-adjusts to produce the best ANPR results
- Scalable solution that can handle up to 8 different streams adaptable to available processing power
- Automatic data storage options selectable by user: internal database, data file, FTP or data stream

KEY FEATURES

- Stream processed automatically, no need for trigger or manual selection
- Available as standalone product
- Adaptable license options, available in 3 different performance packages, each up to 8 streams (24 different options in total)
- Built in advanced vehicle detection algorithm (VehDet)

CARMEN® SERVER

Are you looking for a centralized, server based ANPR? Would you like to build your own, powerful backend? Your dedicated cloud or video management system? Think BIG! We have the solution: CARMEN® Server. This version enables your system to perform dozens, even hundreds, of number plate recognitions simultaneously.

- Available to serve 32 / 64 / 128 / 256 parallel ANPR processing tasks
- Enables you to build your own dedicated ANPR cloud server, capable of serving local, regional or nationwide systems
- Daily processed images can reach up to 200+ million*

* 256-core system, 100 ms average processing time
The CARMEN® Railway Code Recognition (CARMEN® UIC) software automatically extracts and reads the UIC numbers from railroad wagons. Much like commercial motor vehicles and ISO containers, railroad cars carrying freight or passengers also have unique and internationally standardized identification numbers. Railway companies and logistics operations can significantly benefit from implementing CARMEN® UIC which reads railroad car codes from an image or video signal with the highest accuracy possible.

The CARMEN® Automatic Container Code Recognition (CARMEN® ACCR) software has been specifically designed to extract and read the Container Codes of ISO containers – the primary identification number of intermodal (shipping) containers. The code identifies the owner and the type/category of the container, and it serves as a unique serial number. Reading the ISO 6346 (BIC code), ILU and MOCO container codes of shipping containers can automate and simplify road, railway, or harbor operations, help border control, manage inventories and run container surveillance systems.

The CARMEN® Automatic Dangerous Goods Recognition (CARMEN® ADR) software has been developed to recognize the Hazard Identification Numbers (Kemler codes) of vehicles carrying hazardous materials. The automatic reading of Hazard Identification Numbers (HIN) in a traffic monitoring or safety system increases safety on roads, bridges, in tunnels – wherever hazardous materials are transported. CARMEN® ADR identifies materials in transport through HIN codes that indicate primary and secondary hazards, which gives emergency responders the ability to quickly reference critical information about potential dangers.

The CARMEN® DOT software has been created to extract and read the DOT number of a CMV (Commercial Motor Vehicle). All commercial vehicles in the United States have to have a unique identification number obtained from their respective Dept. of Transportation: the USDOT (or DOT) number. CARMEN® DOT functions as a highly accurate tool for automatic identification and tracking, as well as supporting inventory control systems.
## COMPARISON CHART

<table>
<thead>
<tr>
<th>AVAILABLE VERSIONS</th>
<th>CARMEN® ANPR 5K / 8K / 11K</th>
<th>CARMEN® ANPR/ADR FREEFLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available versions</td>
<td>QUAD</td>
<td>SINGLE / DUAL / QUAD</td>
</tr>
<tr>
<td>Supported operating systems</td>
<td>Windows, LINUX</td>
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<td>Supported platforms</td>
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<td>x86_64</td>
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<td>Suggested CPU cores</td>
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<td>NNC required, available NNC types</td>
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<td>USB (internal 4 pin or type A), PCIe card (X1), Mini PCIe</td>
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<td>Available tools</td>
<td>SDK/API, license manager, engine manager (for Windows) ADI demo, AVI Demo *</td>
<td>SDK/API, license manager, engine manager (for Windows) ADI demo, AVI Demo *</td>
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<tr>
<td>Supported programming languages</td>
<td>Windows and Linux: C/C++, Java Windows only: C#, Visual Basic .NET</td>
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</tr>
<tr>
<td>Engine update availability</td>
<td>One year from purchase included, optional subscription available on yearly basis</td>
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</tr>
<tr>
<td>Capacity (images/day)</td>
<td>5760 / 8640 / 11250</td>
<td>unlimited**</td>
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<tr>
<td>Processing threads</td>
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<td>1 / 2 / 4 parallel threads</td>
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<tr>
<td>Credit buffer</td>
<td>300 / 240 / 200</td>
<td>unlimited</td>
</tr>
<tr>
<td>Time for 4 new credits (sec)</td>
<td>60 / 40 / 30</td>
<td>–</td>
</tr>
</tbody>
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### INTERFACE

<table>
<thead>
<tr>
<th>Input</th>
<th>Image (1 still image or 1 frame from a video stream)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>Through SDK functions: NUMBER PLATE RESULTS (multiple if applicable), COUNTRY/STATE, PLATE TYPE, TIP LIST, COLOR, CONFIDENCE LEVEL, POSITION, etc.</td>
</tr>
</tbody>
</table>

* For more TOOLS: check our SOLUTIONs or SMARTCAM product range
** Depends on CPU speed, settings, engine type
### Software & SDK

<table>
<thead>
<tr>
<th>CARMEN® ANPR/ADR SERVER</th>
<th>CARMEN® GO ANPR</th>
<th>CARMEN® ACCR/DOT/UIC</th>
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<td>$\text{x86}_64$</td>
<td>$\text{x86}_32$</td>
</tr>
</tbody>
</table>

| Suggested CPU cores         | 1–4 | 2 / 2 / 4 | 2 / 2 / 4 |

<table>
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<tr>
<th>Hardware requirements</th>
<th>NNC required, available NNC</th>
<th>NNC SERVER</th>
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<tr>
<td>- types</td>
<td>USB (internal 4 pin or type A), PCIe card (X1), Mini PCIe</td>
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</tr>
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</table>

| Engine update availability     | One year from purchase included, optional subscription available on yearly basis | One year from purchase included, optional subscription available on yearly basis | One year from purchase included, optional subscription available on yearly basis |

| Capacity (images/day)          | 5760 / 8640 / 11250 unlimited** | 5760 / 8640 / 11250 unlimited** | 5760 / 8640 / 11250 unlimited** |

| Processing threads             | 4 parallel threads | 1 / 2 / 4 parallel threads | 1 / 2 / 4 parallel threads |

| Credit buffer                  | 300 / 240 / 200 unlimited | unlimited | unlimited |

| Time for 4 new credits (sec)   | – | – | – |

### Interface

- **Input Image** (1 still image or 1 frame from a video)
  - Image (1 still image or 1 frame from a video)
  - Through SDK functions: NUMBER PLATE RESULTS (multiple if applicable), COUNTRY/STATE, PLATE TYPE, TIP LIST, COLOR, CONFIDENCE LEVEL, POSITION, etc.

- **Output**
  - Through SDK functions: NUMBER PLATE RESULTS (multiple if applicable), COUNTRY/STATE, PLATE TYPE, TIP LIST, COLOR, CONFIDENCE LEVEL, POSITION, etc.
  - Live video stream, 1–8 parallel – selectable at purchase
  - Direct output to INTERNAL DATABASE, FTP, CSV, DATA STREAM formats. Output data: NUMBER PLATE RESULTS, Plate country, images, stream ID, time stamp

- **Set of images (multiple still images or frames from videos)**
  - Through SDK functions: OCR RESULTS TYPE, TIP LIST, CONFIDENCE LEVEL, POSITION

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Technical specifications are subject to change without prior notice. This document does not constitute an offer.

* For more TOOLS: check our SOLUTIONs or SMARTCAM product range

** Depends on CPU speed, settings, engine type
Parking? Toll collection? Enforcement? ARH’s new lineup of purpose-built license plate recognition cameras, as well as a new container camera, are optimized for the World’s No. 1 ANPR engine, Carmen® – functioning as the strong backbone of systems used in these application areas.

**TYPICAL APPLICATIONS**

- **TOLL COLLECTION**
  - Public parking lots
  - Parking revenue systems
  - Visitor parking
  - Residential areas
  - Shopping mall parking
  - Company employee parking

- **TRAFFIC SECURITY MONITORING**
  - Residential areas
  - Public parking lots

- **SPEED ENFORCEMENT**
  - Shopping mall parking
  - Visitor parking

- **VEHICLE ACCESS CONTROL**

- **LAW ENFORCEMENT**
  - Company employee parking

- **BARRIER/GATE CONTROL**

- **ADR (HAZMAT) CODE RECOGNITION**

- **ANPR IMAGING**

- **BORDER CONTROL**

- **TOLL COLLECTION**

- **AVERAGE SPEED MEASUREMENT**

- **CONTAINER/RAILWAY CODE RECOGNITION**
LITTLE KNOWN FACTS ABOUT ANPR CAMERAS

THE MEGAPIXEL MYTH
A common misunderstanding about recognition cameras: higher megapixel means better recognition accuracy. However, this is not true. A superior ANPR software like our neural network based CARMEN® needs a character to be only 16 pixels high (20 pixels in case of non-Latin characters). This means that a 1 or 3-megapixel resolution camera is more than enough to cover one lane of the road for license plate recognition. Higher resolution than that, like 5-7 megapixel cameras, are not only unnecessary for ARH’s ANPR engine CARMEN®, but will actually increase processing time without any benefits.

ILLUMINATION
All of ARH’s purpose-built ANPR cameras have integrated illumination – this is not the case for all manufacturers. ARH’s range of LED illuminators include white or 2 different wavelengths of infrared light sources – preset to focus the maximum amount of light to the perfect distance for the actual camera. Integrated lights are synchronized with the camera for perfect time flashing, with extra low energy consumption while maintaining high performance and high power output. Frame Parity Flashing – an innovative solution that improves illumination for ANPR purposes of both reflective and non-reflective license plates at the same location with the same camera. If necessary, a maximum of 7 additional fully compatible external flashes can be connected to ARH recognition cameras from our own product line: the FreewayCAM IR-LIGHT series.

VEHICLE DETECTION (VEHDET)
A common problem in license plate recognition is selecting the right images. If there is no trigger mechanism, the recognition engine needs extreme processing power to keep up with the continuous flow of images or the live video stream. If there is an image-based trigger spotting a vehicle in the live view of the camera, then the ANPR engine can start processing the license plate right away. Benefits: lower hardware requirements and lower overall consumption; improved performance and faster processing. Our unique solution is called Vehicle Detection. This image-based vehicle detection does the frame preselection for the ANPR engine. It is capable of detecting the shape of a vehicle – note that it is not the license plate it detects but the vehicle itself. VehDet will trigger an event – even if there is no license plate on the detected object. The result: no lost event, even without a license plate on the vehicle.

PROCESSING POWER
The industry average is a dual-core processor – other manufacturers call them smart ANPR/LPR cameras. Our cameras, by default, have a dual-core CPU and an FPGA integrated circuit dedicated to image processing itself – plus there is an extra quad-core 1.0 (ARM) or 1.9 GHz (ATOM) CPU dedicated to ANPR processing. This processing power is truly unique on the market. Running our CARMEN® engine parallel on 4 cores, processing 4 plates simultaneously aboard the camera, produces extremely fast ANPR processing. It blows competition away.
CERTIFIED SPEED DATA

VEHICLE FRONT NUMBER PLATE: EU KOD 768
VEHICLE REAR NUMBER PLATE: EU KOD 768

DATA OBTAINED FROM THE INSTALLED OBU OF A VEHICLE
VEHICLE LICENCE PLATE NUMBER, VEHICLE AXLES, VEHICLE CLASS, VEHICLE WEIGHT LIMITS, EQUIPMENT OBU IDENTIFIER

LENGTH: 2,350 CM
WIDTH: 355 CM
HEIGHT: 488 CM
NUMBER OF AXLES: 5
SHAPE: CATEGORY (J2, J3, J4)
CERTIFIED SPEED DATA: 82 KM/H
Where do you need traffic data? License plates, vehicle speed, dimensions, number of axles, weight, journey time and more? ARH’s multi-sensor traffic data collection point is designed to monitor a wide range of vehicle attributes. The massive amount of traffic data is expertly handled by ARH’s combined data server and backend software – connected to one or multiple endpoints. The following examples include typical application areas where ARH’s Intelligent Traffic System solutions offer unique benefits.

TYPICAL APPLICATIONS

WEIGH-IN-MOTION

Bus lane enforcement

Traffic enforcement

Traffic security monitoring

Law enforcement

Toll collection

Automated border control

Parking management

Smart city

Speed enforcement

Congestion charging

Vehicle categorisation

Average speed measurement

Waiting time detection (ELI)

Red light enforcement

100% Video based detection

Journey time monitoring
SMART CITY / SAFE CITY SOLUTIONS

OUR VISION OF SUSTAINABLE, SECURE AND AGILE METROPOLITAN MOBILITY

A key area in every smart city concept is efficient traffic management. If done right, it can have a great positive impact on urban growth, safety and environment. ARH’s non-intrusive intelligent traffic monitoring devices with on-board video analytics can build up an entire smart city system. You will get real-time, accurate information on the level of service, the ability to predict traffic trends, identify potential threats or know immediately when an incident has occurred.

BENEFITS OF ARH’S INTEGRATED SMART CITY SOLUTION

1. **Vehicle identification, traffic count and prediction of trends**
   ARH offers both fixed and portable sensors that detect and count each and every vehicle, read their license plate, identify their nationality, speed and category.

2. **Proactive traffic management**
   ARH provides the data to make smart decisions, show real-time traffic data as a heat map, predict congestion and warn of potential traffic incidents.

3. **On-street parking enforcement**
   Parking enforcement on busy city roads requires tremendous effort when done manually. ARH’s solution collects evidence and provides an automated way of reading plates on the move.

4. **Vehicle fingerprinting**
   Tampering with a license plate is a common offence that was once hard to detect. ARH’s system successfully addresses this problem by creating a fingerprint based on the physical characteristics of a vehicle and assigning license plate data to it. If the same LP appears on a different type of vehicle, the system will immediately spot the non-matching plate.

5. **Safe roads thanks to average speed measurement**
   Local drivers tend to remember where to push the brake when they reach fixed speed radars. However, average speed measurement cannot be deluded as it calculates the vehicle’s speed from journey time and distance between checkpoints.

On the following pages you will find further information on ARH’s intelligent traffic solutions that provide prosperity, safety and a more liveable urban environment.
PARKIT SYSTEM® APPLICATION WITH ANPR CAMERAS AND GRAPHICAL INTERFACE FOR PARKING AND ACCESS CONTROL

AUTOMATED, EXPANDABLE VEHICLE ACCESS CONTROL SYSTEM FOR ANY SIZE OF INSTALLATION

ParkIT System® is a complete end user system specifically developed for vehicle access control that is highly flexible and customizable for use from a small residential to an industrial, commercial or government installation of any size. The system can even be installed at multiple sites at once. The system components are designed and built together to achieve simple and easy integration into any access control environment without the need for programming or other specialized skills. ParkIT System® is easy to set up, simple to operate, and it permits separate user access and administration levels for straightforward operation and data management.

Components of the system are comprised of one or more ParkIT camera(s), the industry-leading CARMEN® ANPR/LPR engine, ParkIT® Application software and customizable graphical management and user interface (GMI/GUI) for all levels. The entire secure system is accessible through thin client or other (even mobile) IP-based connections.

NEW! As of September 2018, ParkIT System® is available as a software module prepared to cooperate with 3rd party cameras.

MAIN BENEFITS

• Fast automated or predetermined vehicle access – with a powerful reporting module
• Simple ANPR/LPR-based access permission without key, card or code
• Easy installation, straightforward IP connection
• Uncomplicated graphical management and user interface

KEY FEATURES

• Unlimited expandability from 1 to even 1000 access points
• Customizable roles at 3 levels (user, admin, developer)
• License plate-based security and surveillance functions
• Black- and whitelist management, statistical functions
• Multi-language GMI / GUI
• Available with pre-installed server option as well
TrafficSpot® is a variable sensing and monitoring system installed on a single, fixed detection point (i.e.: traffic gantry or pole) for accurate surveillance and data gathering. The standard list of components includes: radar, laser, overview camera, ANPR camera and industry-leading CARMEN® ANPR/LPR software.

The additional integrated processing unit intelligently computes all measured and detected data; marks each vehicle-related event with a timestamp, location and lane identification; bundles the gathered data in an encrypted package and sends it to a pre-designated central location. In addition to toll collection and traffic monitoring, the added modules and detection systems enable TrafficSpot® to perform traffic light and lane enforcements or weigh-in-motion functions as well.

**MAIN BENEFITS**

- All the necessary traffic information gathered and processed in a single location
- Ideal for toll collection; speed, lane and traffic light enforcement; weigh-in-motion
- Quick ROI
- Simple maintenance
- Scalability; cost effective installation and deployment

**KEY FEATURES**

- 100% TÜV certified vehicle detection via multiple detectors including radar trigger, virtual loop and laser trigger
- Purpose-built to gather valuable traffic data by way of a multi-sensor traffic monitoring gantry
- Secure data retention; continued functioning offline for at least five days
- IP-based communication
- Efficient data compression and upload
- Each necessary data set bundled in a single “event” package for ARH GLOBESSEY® Data Server (GDS)
- Modular scalability for individual needs – you pay only for what you need
- Monitoring and management of each components through ARH GLOBESSEY® Data Server
- Comprehensive data gathering regarding each passing vehicle (front/rear/overview/side images, ANPR results, vehicle dimensions, category, axle numbers, weight, speed, possible traffic violations, location/date/time information)
INTELLIGENT TRAFFIC SYSTEMS

GLOBESSEY® DATA SERVER (GDS)

ROBUST AND FAST ITS DATA STORAGE MIDDLEWARE

Globessey® Data Server (GDS), is a combined data server and middleware, gathers information from different endpoints to make them available for various end user applications. The operators of GDS can manage the processes through a dedicated graphical interface, which is supplied along with the system, running in a web browser.

MAIN BENEFITS

- Optimized traffic speed, easier toll collection, safer roads
- Support of other traffic-related agencies (parking, law enforcement, border control, tariff, tax and statistics)
- User and developer friendly; fast ROI
- Useful outside traffic-related applications where complex image- and text-based data is mass processed (international borders, shipping ports, logistics, airports, etc.)
- Needs only a thin client at end user side

KEY FEATURES

- SUPPORTS ANY NUMBER OF ENDPOINTS
  - Standard, customizable independent data packages from endpoints
  - Central server connected via secure SSL
  - Fast IP traffic in- and outflow with xml or binary communication

- HIGH AVAILABILITY: SUPER FAST AND SECURE DATA STORING
  - Data redundancy through high-availability replication and clustered storage
  - Highly efficient image storage
  - Dynamic hardware scalability without maximum limits

- BUSINESS DOMAIN EXPERTISE
  - Multiple business applications made possible by a single central backend, effectively and reliably
  - Each data record is searchable, with custom-tailored access
  - Wide selection of premade modules available (e.g.: stolen vehicle search)

- BUSINESS LOGIC WITH ITS OWN DATABASE
  - Highly effective remote operation, reflects detailed conditions in real-time
  - User-friendly display; maps and statistics
  - Search; fast and flexible with preset automation, export functions
  - Customizable GUI and search functions
## COMPARISON CHART

<table>
<thead>
<tr>
<th></th>
<th>TRAFFICSPOT® LIGHT (WITH SMARTCAM OR SPEEDCAM)</th>
<th>TRAFFICSPOT® LIGHT (WITH 2D SCANNER)</th>
<th>TRAFFICSPOT® PRO (WITH 3D SCANNER)</th>
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<tbody>
<tr>
<td><strong>Non-intrusive</strong></td>
<td>•</td>
<td>•</td>
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<tr>
<td><strong>Mounting options</strong></td>
<td>single gantry or pole</td>
<td></td>
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<tr>
<td><strong>Traffic situation</strong></td>
<td>free-flow</td>
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<tr>
<td><strong>Multi-lane management</strong></td>
<td>•</td>
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<tr>
<td><strong>Detection rate</strong></td>
<td>over 80 %</td>
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<tr>
<td><strong>Front and rear ANPR</strong></td>
<td>•</td>
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<tr>
<td><strong>ANPR accuracy</strong></td>
<td>up to 98.5 %</td>
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<tr>
<td><strong>Overview imaging</strong></td>
<td>optional</td>
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<tr>
<td><strong>Side-view imaging</strong></td>
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<tr>
<td><strong>Speed measurement</strong></td>
<td>optional (radar based)</td>
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<tr>
<td><strong>Traffic enforcement (red-light-, emergency/bus lane-, forbidden zone-, white line crossing-, wrong way/turn detectors)</strong></td>
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<tr>
<td><strong>Vehicle categorization</strong></td>
<td>optional (5 categories)</td>
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<tr>
<td><strong>Vehicle categorization accuracy</strong></td>
<td>approx. 80 %</td>
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<tr>
<td><strong>Vehicle dimension measurement</strong></td>
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<tr>
<td><strong>Dimension measurement accuracy</strong></td>
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<td><strong>Axle counting</strong></td>
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<tr>
<td><strong>WIM – Weigh-In-Motion (integrated into road pavement)</strong></td>
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<tr>
<td><strong>WIM accuracy</strong></td>
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<tr>
<td><strong>DSRC</strong></td>
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<tr>
<td><strong>Onsite processing</strong></td>
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<tr>
<td><strong>Encrypted data storing at the site</strong></td>
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<tr>
<td><strong>Encrypted data forwarding</strong></td>
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<tr>
<td><strong>3rd party support</strong></td>
<td>•</td>
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<tr>
<td><strong>GDS compatibility</strong></td>
<td>–</td>
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<tr>
<td><strong>Device health monitoring</strong></td>
<td>–</td>
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<td></td>
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<tr>
<td><strong>24/7 operation</strong></td>
<td>•</td>
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– : not included  • : included
<table>
<thead>
<tr>
<th>Feature</th>
<th>TRAFFICSPOT® (WITH 2D SCANNER)</th>
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<td>free-flow and stop-n-go</td>
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</tr>
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<td>Multi-lane management</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
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<td>over 95%</td>
<td>100%, TÜV certified</td>
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<tr>
<td>zone-, white line crossing-, wrong</td>
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<tr>
<td>way/turn detectors)</td>
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</tr>
<tr>
<td>Vehicle categorization</td>
<td>8+1 categories</td>
<td>28+1 categories</td>
</tr>
<tr>
<td>Vehicle categorization accuracy</td>
<td>approx. 96%</td>
<td>approx. 98%</td>
</tr>
<tr>
<td>Vehicle dimension measurement</td>
<td>width and height</td>
<td>width, height and length</td>
</tr>
<tr>
<td>Dimension measurement accuracy</td>
<td>approx. 10 cm</td>
<td>approx. 10 cm</td>
</tr>
<tr>
<td>Axle counting</td>
<td>optional (indirect or direct)</td>
<td></td>
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ABOUT ARH

100,000+ LPR SYSTEMS

License Plate Recognition (LPR) – also known as Automatic Number Plate Recognition (ANPR) – is ARH’s flagship technology. The 2 key components of LPR systems are the LPR software, purpose-made to read vehicle license plates, and dedicated LPR cameras.

ARH’s flagship software product is the Carmen® ANPR engine trained in-house to reliably read all license plates in the world. Carmen’s cutting edge is its alphabet-independent operation of unrivalled speed and accuracy. Carmen® ANPR reads license plates from many image sources: still images as well as live or recorded video streams. It offers country-independent and alphabet-independent recognition of not only Latin characters, but also Arabic, Cyrillic, Chinese, Korean, Thai and many more alphabets.

We at ARH develop, manufacture and offer a broad range of purpose-built LPR cameras. For LPR-optimized imaging, purpose-built cameras yield far better results than general-purpose cameras. This is why ARH developed a line of dedicated plate recognition cameras – for fixed, portable and mobile use – designed with the entire process of LPR in mind: triggering, image capturing, image preselection and, optionally, onboard plate recognition.

License Plate Recognition is used excessively all over the world for plate-based toll collection, automated border control, traffic monitoring, traffic security monitoring, traffic and speed enforcement, parking management, vehicle access control and many other application areas.

With hardware and software development in one hand, in-depth industrial expertise accumulated in the course of 28 years of in-house product development, we have:

• The potential to develop electronic, mechanical and optical systems and software;
• Our own manufacturing base to produce electronic and mechanical equipment as well as complete systems;
• Service potential – from installation through operation.

In other words, ARH can offer unrivalled benefits in License Plate Recognition.

60,000+ ID READER SYSTEMS

We design and deliver purpose-made ID scanners and passport readers that can read ALL identity documents in the world. ARH passport readers extract both printed and electronic data from official travel documents and national IDs including ID cards and driver’s licenses. A technologically more challenging task is detecting fake, forged or tampered ID documents – a process called verification or authentication. ARH’s passport readers perform identity document authentication within seconds by checking a range of document-specific security features in various wavelengths of light. Authentication includes analyzing data integrity, too: cross-checking the captured printed and electronic information in compliance with the latest and most advanced e-passport standards.

ID document reading is widely used all over the world for 24/7 Automated Border Control (ABC), e-gates, airline check-in systems, know-your-customer schemes in banking, hotel guest registration, physical access control systems and age verification in bars, casinos and the gaming industry.

With hardware and software development in one hand, field-tested innovative technology, in-depth industrial expertise accumulated in the course of 28 years of product development, we have:

• A team of over 200 engineers;
• Our own manufacturing base to produce electronic and mechanical equipment;
• The potential to develop electronic, mechanical and optical systems and dedicated OCR software.

In other words, ARH can offer unrivalled benefits in ID reader systems.
Many of ARH’s clients are system integrators creating LPR systems and ID reader systems – both of which are based on Optical Character Recognition (OCR). Read about these technologies here.

Beside OCR-based technologies, we have multiple other product lines. A key area in every Smart City concept is efficient traffic management. Intelligent Transportation Systems (ITS) can have a great positive impact on urban growth, safety and environment. ARH’s non-intrusive intelligent traffic monitoring devices with on-board video analytics deliver real-time, accurate information with the aim to streamline traffic and maximize urban infrastructure potentials.

Video analytics plays a great role in traffic enforcement by automatically recognizing traffic offences and assisting the work of traffic authorities with photo and video evidence records.

Smart CCTV detecting user-defined events is used for monitoring urban areas, sport stadiums, shopping malls, fleets of public transportation as well as logistics and manufacturing sites – not only as a means of proactive security management, but also as a new and untapped marketing tool. Intelligent video surveillance will never completely replace human workforce – but it can always ideally support personnel in their daily work with smart technology.

As a privately-owned company with headquarters in Budapest, Hungary, ARH has direct market presence in 140 countries and a network of 50 country-level sales representatives. We have:

- Multiple market-leading ARH products
- A team of over 200 engineers
- Product development potential – turning ideas into prototypes and serial production

Beside LPR systems and ID reading systems, our technology is used in ITS, plate-based vehicle access control, traffic enforcement based on video analytics and intelligent Video Management System or Smart CCTV systems.

In other words, ARH can offer unrivalled benefits – as proven by over 12,000 satisfied partners worldwide.
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CERTIFICATIONS

We are committed to delivering quality products and services that exceed customer requirements and expectations at all times, in an environment that supports and promotes continuous improvement. Three ISO certificates recognize that ARH’s operation conforms to the highest international standards.

- **ISO 9001:2015**
  Quality management – manufacturing, sales, marketing and customer support.

- **ISO 14001:2015**
  Environmental management – ARH is committed to being a green company.

- **ISO 27001:2013**
  Information security management – protection of confidentiality, integrity and availability of sensitive data at ARH.

SOCIAL MEDIA

- [linkedin.com/company/adaptive-recognition](https://linkedin.com/company/adaptive-recognition)
- [youtube.com/arhungary](https://youtube.com/arhungary)
- [twitter.com/aracorpusa](https://twitter.com/aracorpusa)

MICROSITES

- [https://carmen.hu/](https://carmen.hu/)
- [https://carmen-go.com/](https://carmen-go.com/)
- [http://prmc.eu/](http://prmc.eu/)

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