Macq Mobility

Mobility Software

The modular approach

5 Platforms, infinite Modules

Key words & selling points

- Smart Mobility & ITS
- Protection, Safety & Security
- Improved Quality of Life, Health, and Environment
- Generates abundant mobility data for analysis and decision-making
- Automated operations 24/7 - 365 days per year
- 100% Proven State-of-the-Art Technology
- 100% In-house Development
- Modularity & Easy to Implement
- Reliable, Scalable and Redundant
- Open system by integrating all existing third-party sensors, databases and interfaces
- High access and data security in accordance with GDPR
- Excellent proven results for all types of stakeholders, such as:
    - Police & National Authorities
    - Cities, Road & Highway Managers
    - Schools
    - Traffic Experts and Analysts
- TÜViT rated by SIG

Why should you need a mobility platform?

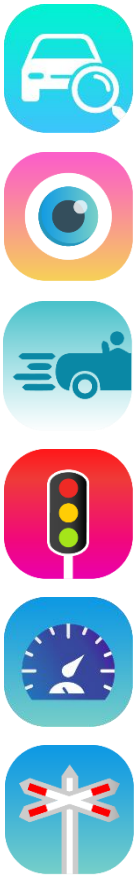
Both the Macq Mobility Manager (M³ platform) and the School Safety System (S³ platform) are software application suites that bring the ultimate innovative power to your smart sensor systems, typically an Automated License Plate Recognition (ALPR) camera network, but almost all other existing smart sensors can easily be integrated.

Recently, many of the most innovative cities already deployed measures to improve both the PROTECTION and QUALITY OF LIFE of their citizens, by improving their SAFETY, MOBILITY and ENVIRONMENT (low emission zones, air quality, noise) and therefore the general urban living ATMOSPHERE in the heart of their communities and city centers.

With that aim, an ever-increasing number of fixed or mobile smart sensors (such as ALPR camera systems) are being deployed. The use of high-performance cameras is an important part of the solution, but it is even more important to also have a suitable processing

platform, capable of taking advantage of this huge collection of data and transforming it into useful information for end users. That is why Macq developed the M³ and the S³ platforms, innovative concept for managing large data sets.

Both platforms are designed to offer high added-value data processing power through a set of specially developed software application modules, organized in five domains: POLICE for law enforcement purposes, CITIES, ROAD & HIGHWAY for higher quality of life in urban regions and cities, SCHOOL for protecting our children, ENVIRONMENTAL MONITORING for augmented health environments and finally, an extensive ANALYTICS & STATISTICS section for all stakeholders and traffic researchers. Each axis groups together all the modules and associated services.



Police

Being able to automatically identify and register all vehicles that enter or exit a designated area 24/7 and 365 days a year, combined with an easy accessible, powerful database search module is obviously a tremendous added value for law enforcement (police, customs, security agencies) and thus a significant augmentation of inhabitants' protection.

The M³ for Police platform is perfectly equipped for:

- Complex police investigations and search vehicles
- Automated 'Blacklist' alerts
- Monitoring and tracking of vehicles
- Section control (average speed measurements)
- Red traffic light violation detection
- Instant speed control
- Railway crossing protection
- Rat running detection
- Overtaking detection
- Ghost driver detection
- Measurement of the height of vehicles
- Detection of overloaded vehicles and of dangerous goods transports (ADR)
- And many more modules (tailored to your specific requirements)












Cities, Road & Highway

Quality urban mobility is a key criterion for the success of all other sectors of activity. It not only contributes to the creation of new jobs and businesses, but also contributes greatly to the creation of an attractive environment and atmosphere for the inhabitants.

One of the biggest challenges that large cities (and increasingly small urban centers) face today is the very great variability over time of the demands in terms of mobility (day/night, commuters, public transportation, etc.). This requires the active management and real time distribution of resources, infrastructure and reliable information to travelers.

The "M³ for Cities, Road & Highway" platform is perfectly equipped for:

- Identifying (ALPR), recognizing (make, model, color) and classifying all kind of vehicles (heavy/light duty traffic, trucks, buses, cars, motorcycles, bicycles, etc.), objects and people
- Area access monitoring and registration
- Controlling authorized vehicle access zones (white lists)
- Controlling permanent restricted traffic zones (e.g. historic city centers, pedestrian areas), or temporary restricted traffic zones (events, festivals, etc.)
- Controlling of carpooling lanes
- Managing variable message signs (VMS)
- Allowing citizens to visualize all mobility related information in a single, centralized place
- And many more modules (tailored to your specific requirements)

School

A study by the independent Belgian Road Safety Institute Vias (*) shows that 78% of accidents involving children and occurring during school hours occur within 300 m of the school and 5% in the school-specific 30 km/h zone. So, it is important to continue working on increasing the safety of children around schools.

The "S³ - School Safety System" platform is perfectly equipped for:

- Controlling average speed and other dangerous driving behaviors (double parking, overtaking, use of cell phone, seat belt violations, etc.) to encourage all users to follow the rules
- Monitoring of temporary restricted traffic zones in which only certain vehicles can drive
- Management of variable message signs (VMS) alerting road users to the presence of children during specific time periods
- Stimulate good driving behavior thanks to the use of intelligent cameras
- Monitoring "Kiss & Ride" zones and detecting road users who stay too long in these areas
- Display meaningful statistics & information raising awareness of the risk of accidents involving children
- Real time "Pedestrian warning system"
- And many more modules (tailored to your specific requirements)

Environmental Monitoring

Innovative cities have already deployed measures to improve both the QUALITY OF LIFE and the HEALTH of their citizens, by reducing air pollution created by traffic. At the same time, by discouraging heavy duty

traffic, they significantly improved the SAFETY and urban living ATMOSPHERE in the heart of their city centers.

A Low Emission Zone (LEZ) is an urban area where the most polluting vehicles are banned (or at least their entry is discouraged financially by toll or fines). Vehicle emissions are classified by European Standards. Before traveling to the LEZ area, a driver must therefore find out if his vehicle complies with the standards. Typically, older cars, buses or trucks will not comply.

The "M³ for Environmental Monitoring" platform is perfectly equipped for:

- Controlling low emission zones (environment, air quality)
- And many more modules (tailored to your specific requirements)

Analytics & Statistics

Macq has recently created an 'open community' where all stakeholders can meet, ranging from traffic experts and analysts (universities, governmental policy & decision makers, etc.), over dedicated M³ module designers and programmers (engineers, software developers) up to our most demanding end-users. As such, the parties share and combine their needs, expert knowledge and results to extensively use and constantly improve the already existing, powerful analytical and statistical data modules of the M³.

The "M³ for Analytics & Statistics" platform is perfectly equipped for:

- Counting vehicles
- Measuring transition times of vehicles
- Creating an 'Origin-Destination' matrix of all vehicles in designated areas
- Showing the traffic accidents on a map
- And many more (tailored applications at your specific request)

Endless flexibility, tailored towards the most demanding professionals

In addition to an open, flexible architecture and their unique combination of features and modules, the M³ and the S³ platforms have been specifically designed to deliver a customized answer to each group of end users via a fully modular and adaptable functionality.

On top of that the platforms offer a great flexibility for interfacing with third party systems through a wide range of Web Services, obviously using standardized and documented methods to minimize development efforts and thus reduce associated costs.

What does Macq offer you?

As for all our demanding clients, we offer you a 100% fully integrated and automated solution. Highly reliable, low maintenance technology, proven 'in the field'. Everything will be fully tailored to your specific needs, completely designed in-house and 100% compliant with all European standards and regulations.

M³ was recently certified by SIG (www.sig.eu) on behalf of the international quality organization TÜViT and based on ISO/IEC 25010:2011, the international standard for software quality. Governments in many countries already require this certification and quality standard. The strict quality norms guarantee, for instance, reliability, modularity, scalability and low-cost maintainability and security of the software suite.

Why Macq?

Macq is the uncontested authority in fully automated & integrated ALPR camera solutions for (urban) access control and area supervision. Our innovative cameras and smart software systems are successfully used by some of the most demanding clients worldwide (governments, law enforcement, nuclear plants, etc.). We empower our clients to drastically improve the safety and mobility on their territory and therefore improve the Quality of Life of their inhabitants and visitors, with reliable discretion and respect for their Privacy. Our 100% automated systems are for instance already installed in 70+ police zones and are operated with extreme high reliability (100% proven technology 'in the field').

Macq uses its own fully integrated smart technology (cameras, environmental quality sensor, imaging software and central data management). Everything is in-house developed by our engineers, with special care for easy automated operation and extreme low maintenance (TÜViT certified).

The M³ & S³ platforms perfectly embody our innovative "Smart City" concept. That is why Macq should be your preferred partner to optimize the Quality of Life of your citizens. Our mission is to help those who want to lead their city into the smart mobility of the future.

Some of the key modules described in detail

Low Emission Zone & Restricted Traffic Zone

The purpose of the Low Emission Zone module is to allow **only environmentally friendly vehicles** to enter a given urban area for reasons of **air quality**, **health** and general **well-being**. In order to ensure the compliance of the vehicles moving within this area to the actual environmental restrictions, ALPR cameras recognize the vehicles, check instantaneously and automatically their environmental footprint by retrieving the corresponding information from a centralized vehicle registration database and finally decide if the vehicles are allowed to move in the given urban area or not. In this way, the user is able to immediately see in a candidate list all vehicles violating the applicable restrictions and to take appropriate sanction measures.

The Low Emission Zone module is comparable with the Restricted Traffic Zone module, in which case the access to a given urban area is restricted to certain vehicles, permanently or during certain periods or hours of the day. For instance, priority vehicles (police, ambulances, fire trucks, etc.) can always get access to a restricted urban area in a city, without being reported as a violation candidate. Taxis or drivers with special permissions (e.g. handicapped people) could be allowed in a traffic restricted medieval city center, whereas normal cars are restricted. Public transportation (e.g. buses) could be allowed in a tunnel, whereas trucks with dangerous goods are not allowed.

Both, the Low Emission Zone and the Restricted Traffic Zone modules in M³ are very versatile and user friendly. It is possible, for instance, to define exceptions and integrate them into M³ so that some vehicles can still enter certain areas even if they do not comply with the restrictions (**white lists**). Or, one can program certain (recurring) events in a city center (e.g. market day, festivals, ...) during which special permissions are needed to enter certain areas. Garbage trucks that enter only during certain days, trucks that can only enter for loading and unloading during certain hours of the day, etc.

A great advantage of this solution is that the installed ALPR camera network can be used for endless other Smart Mobility applications/modules. The use of the cameras can therefore be designed very flexibly in order to meet also changing customer requirements.

Section Control

The Section Control module measures the vehicle's **travel time** between two fixed points (e.g. equipped with ALPR cameras) along a defined road section and simply calculates its **average speed** from those two metrics. The aim of such a system is to secure road sections with high accident rates by automatically, autonomously and continuously measuring all vehicles' average speed over the road section. The system of average speed measurements over a longer distance (road section) is also perceived to be **more 'honest'** than an accidental local speed trap (radar + camera).

At least 2 ALPR cameras, one at the entry and one at the exit of the road section, capture and process the license plates of vehicles passing at their position with an extremely high hit rate (plate recognition over 98%). Each detected license plate is very accurately time-stamped (to the millisecond). Each camera read-out result is sent to the M³ platform in real time for processing. The central M³ platform is also responsible for distributing a very accurate clock signal to the different cameras in the field for synchronization and calibration reasons. Since the exact distance between the two measuring points is fixed and precisely known, the average speed of each vehicle can easily be calculated. If this average speed exceeds the authorized speed limit, the vehicle is declared a 'violation candidate' and a fully automatic report, which only needs simple validation by the law enforcement agency (police), will be drawn up against the offender. After validation, all data related to infringement cases are then exported in a standard format to an external system for automatic fines generation.

Only two conditions must be met in order to be able to operate an approved system:

1. The maximum speed limit must be unique and constant throughout the section under surveillance;
2. The length of the road section must be at least 500m, to eliminate every influence of possible time measurement error.

Search Vehicle & Blacklist Management

ALPR cameras, that are often primary used for, for instance, Section Control or Low Emission Zone, generate a vast number of images of passing vehicles (98% recognition hits). These are automatically processed (at camera level), transmitted to the M³ platform (central database) and classified, i.e. license plate, type, make, model and color are registered by the most recent generation of Macq cameras. The **large database** (big data) only becomes a powerful tool when it is immediately accessible and easily manageable.

User friendly, but smart, the Search Vehicle feature isolates and identifies the candidate violators (criminals) by **filtering all type of information** in the complete database, e.g. license plate, type, make, model, color, location and time. Furthermore, there is the possibility to use **'wildcards'** in case the complete license plate is not known by the user.

When the license plate of a wanted vehicle (e.g. a stolen vehicle, a getaway vehicle of a crime in progress, etc.) is added to the so called '**Blacklist**' in the dedicated M³ platform, all connected cameras in the field start looking out for this vehicle. In other words, each camera permanently compares each *new* registration to the entire Blacklist within milliseconds. If such a vehicle is spotted by a camera, an **automated 'red alert'** goes out to the dispatch rooms, which allows the operators to simply follow the location of the wanted vehicle in quasi real time and direct the teams in the field to intercept the searched vehicle, if needed.

Police and law enforcement, using our Macq state-of-the-art ALPR (Automatic License Plate Recognition) cameras in combination with our dedicated and very powerful M³ modules, such as the 'Search Vehicle' and 'Blacklist Management', have abundantly proven to be highly effective in the **fight against crime**. Police detectives are extremely enthusiastic about the new high-tech tools at their fingertips, that almost automatically generate **unambiguous**, **immediate proof** in their fight against crime. Hundreds of recent successful arrests range from people that elope (drive away from) traffic accidents, over burglaries to home jackings, arson and even kidnapping, rape and murder cases. Police chiefs say that ALPR cameras (and the extremely powerful software platform M³) helped them solve over 50% of the cases in their jurisdiction area in recent years.

Environmental Quality Monitoring

Poor **air quality** and **noise** are the most serious environmental health issues globally and the primary driving force for environmental quality monitoring.

The Environmental Quality Monitoring module allows you to display in a very user friendly and graphical way all real-time data generated by environmental quality sensors, such as Macq's eQs. For instance, it can display the most important gaseous pollutants (NO_2, O_3, VOC, CO, CO_2), particulate matter ($PM_{1\,/\,2.5\,/\,10}$), the surrounding noise, or weather parameters (air pressure, temperature, humidity, rain). Showing the **real-time** and **historical exposure** thanks to all collected data enables you to better understand your environment, identify pollution and/or noise **hotspots** and **trends** at a localized level, such as busy road junctions, and thus improve your environmental **decision making**.

Our Environmental Quality Monitoring module allows you to import the locally applicable **measurement thresholds** and consequently to automatically generate decision-relevant **statistics** and **reports**. On top of that, taking into account all available data, our AI algorithm is able to generate and display highly accurate **predictions** of environmental quality. This allows inhabitants to be informed ahead of time and to adapt their behavior accordingly.

A further very popular use of the Environmental Quality Monitoring is to determine the actual impact of a low emission zone. It allows you to record the pollution level before and after the establishment of the low emission zone.

Last but not least, by combining both, the real-time data of the environmental sensor and the data of smart cameras (e.g. Macq's Cam5) at the same location, it is possible to identify harmful noise pollution in real-time and to detect the responsible noise emitter, such as small motorized scooters or tuned sports car. By sanctioning and therefore discouraging drivers of noise polluting vehicles, the Quality of Life and sleep of residents of supervised residential areas can be drastically improved.

Hint!

Don't forget to visit our **website** to learn more about all existing and future products & modules. If you become one of our business partners, **attractive discounts** are at your disposal and you can create your own order through your **personal partner** account in our shop.

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