PUMATRONIX

WeGate

WeGate SYSTEM

VERSATILITY FOR VEHICLE RECOGNITION IN LOGISTICS AND PORT ENVIRONMENTS

Product

Pumatronix Equipamentos Eletrônicos Ltda.

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Change History

Date	Revision	Updated content
11/28/2019	1.0	Update of the initial edition layout for version 1.3.12 of the software
06/05/2025	1.1	General review of the document; Updates for versions 1.3.13 to 1.7.4 (SAD-419)

Overview

The WeGate system is a solution that works integrated with the port management system. It is responsible for capturing and consolidating all information from a port entry/exit transaction and forwarding it to the system that manages it. Monitoring occurs through the automatic reading of vehicle license plates, as well as container identification codes and wagon identification codes. This automation uses OCR (Optical Character Recognition) algorithms to infer the letters and numbers contained in the images. Among the license plate models that the WeGate system can recognize are those of the following countries: Brazil (current standard and Mercosur), Argentina, Chile, Colombia, Conesul, Ecuador, France, Holland, Mexico, Paraguay, Peru, European Union, Uruguay and Others (from external libraries), for example, from Egypt.

WeGate has a flexible configuration, which allows it to adapt to the physical sensors (inductive loop and virtual sensors for image detection, optical barrier) installed in the gate, considering the reading of the status of the sensors present in the location and the activation of equipment used in the gate automation. The system stores and groups the data related to the same vehicle to compose the passage record, optimizing the traffic control process.

WeGate allows to extract reports from the records. In addition, the passage data can be sent to other systems via WebService REST. The information block consists of vehicle images, license plate readings, container images, container codes, concept images, among others.

WeGate can be used for various types of vehicles and cargo flow control automation, some examples of its use being:

- Railway stations and wagon control points;
- Ports and container control points, such as entry and exit gates;
- Airport areas;
- Monitoring and control points of cargo transportation companies.

The benefits of using the WeGate system include:

1) Support for recognizing RFFSA train wagon codes;
2) Dispenses with the use of IO (Input/Output Interfaces) boards;
3) Has a configurable state machine to adjust to any process within the logistics environment;
4) Extraction of Reports for Management.

Handling Risks

	**Distribution of information: The content generated by WeGate (captured images and information) is protected by username and password. However, it is up to the system administrator to control which users have access to the information and the dissemination of the content.**
	**User access levels: All users have the same level of access to the system, and it is possible to restrict access to devices only. The login is used to record changes made to the system.**
	**Information Discrepancies: Discrepancies may occur between the record data sent by the webservice and that stored in the database, depending on the gate's operating architecture and the time chosen to send the record.**
	**ITSCAM Inputs and Outputs (IOs): The electrical interface of the IO pins of the Pumatronix device is opto-coupled. More details on how to make a connection are available in the ITSCAM manual.**
	**Restart the Server: Restarting WeGate causes all connections with the capture devices to be interrupted during the process and there may be a loss of vehicle recognition during this period.**
	**System Restore: When restoring a database in WeGate, all information that was stored in the equipment (including images) will be overwritten.**
	**Restore Factory Defaults: When restoring a WeGate installation to the factory version, all information that was stored (including images) will be erased.**

Models

The WeGate System software is a robust system designed to operate according to the infrastructure and operating logic of the location where the product will be installed. Therefore, the distinction will only occur in relation to the license purchased.

Summary

1. Getting to Know the Product

When accessing WeGate, the main screen of the *Gate Panel* is displayed, also available when accessing the *Main* menu > *Gate Panel*, containing the list of registered gates (2) with the images of the capture devices of the selected gate (3 and 4). The right-hand portion of the screen displays the latest records on the selected gate (7), as well as the status of the registered sensors (8). Logs containing the system's operating history are displayed on the right-hand side of the screen (9), along with the logged-in user (10).

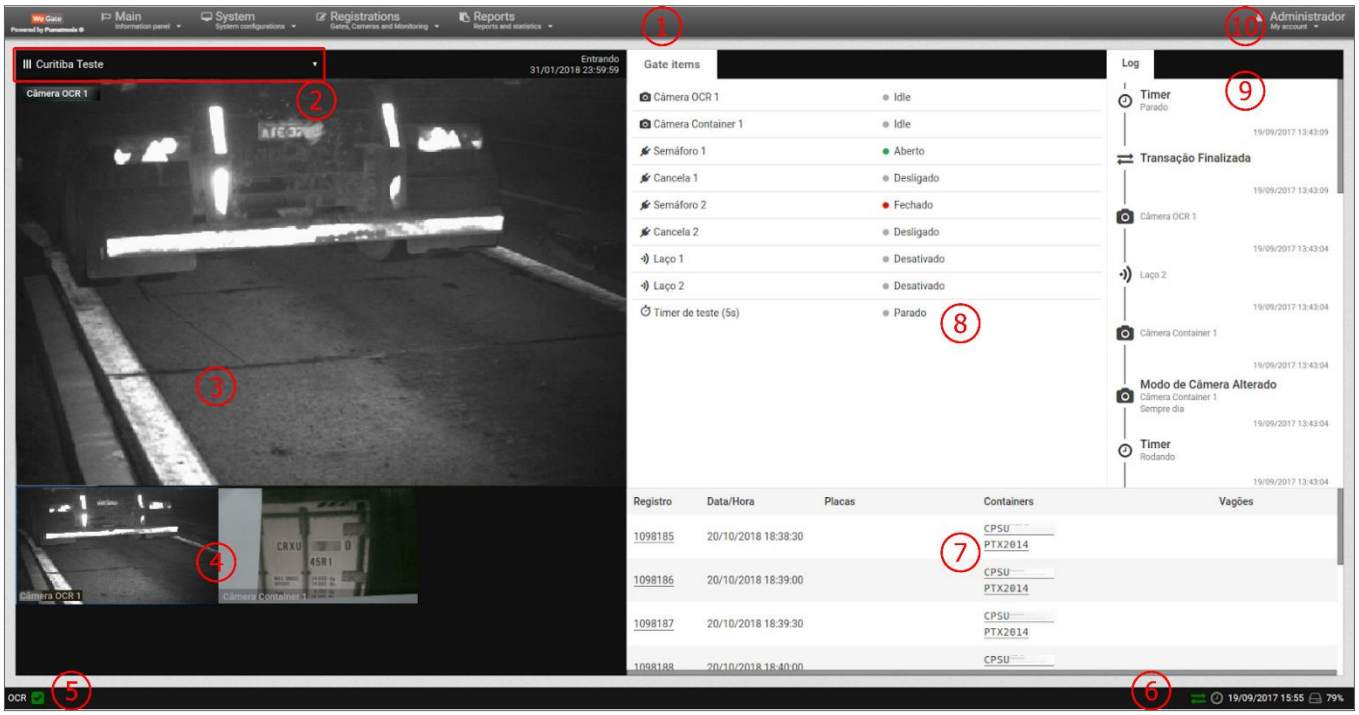


Figure 1- WeGate main screen in Gate Panel

On this and all screens, the status bar at the bottom is always visible, describing the available OCR (5) and the system status (6), in addition to the menu bar (1):

- The *Main* menu lists the ways to view records;
- The *System* menu provides access to user management, product configuration and maintenance process options;
- In *Registrations*, can add gates, their respective capture devices, sensors and actuators used, in addition to managing notifications for vehicle license plates (the system issues an alert when a monitored license plate is identified by the system's capture devices);
- The passages recorded by WeGate are stored and can be viewed as a report or in the list of system records, available in the *Reports* menu. The reports generated by the system contain the passage information filtered by location and date, and it is possible to specify the vehicle and/or the storage device code (*Container* or *Wagon*).

WeGate is available in Portuguese, English and Spanish, selected in the System Settings menu.

1.1. Help for Using WeGate

The question mark symbol available on the WeGate screens displays the help content on the left side of the screen. This content presents a brief description of the screen functionality and more details about the

parameters that can be configured. The configuration fields have an indication of the system's default value to facilitate the adjustment process.

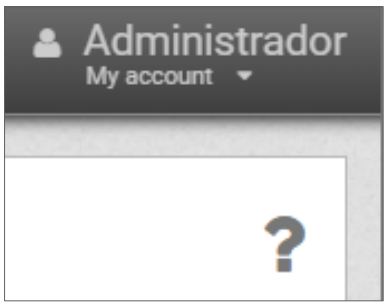


Figure 2 - Location of the Help button on the interface

1.2. Gate Panel Home Screen

The *Gate Panel allows* detailed viewing of the selected gate, and is therefore the system's home screen. This includes images of the capture devices, the status of the sensors, the history of records and the operation of the sensors and actuators (traffic lights, barriers or sirens) during a record.

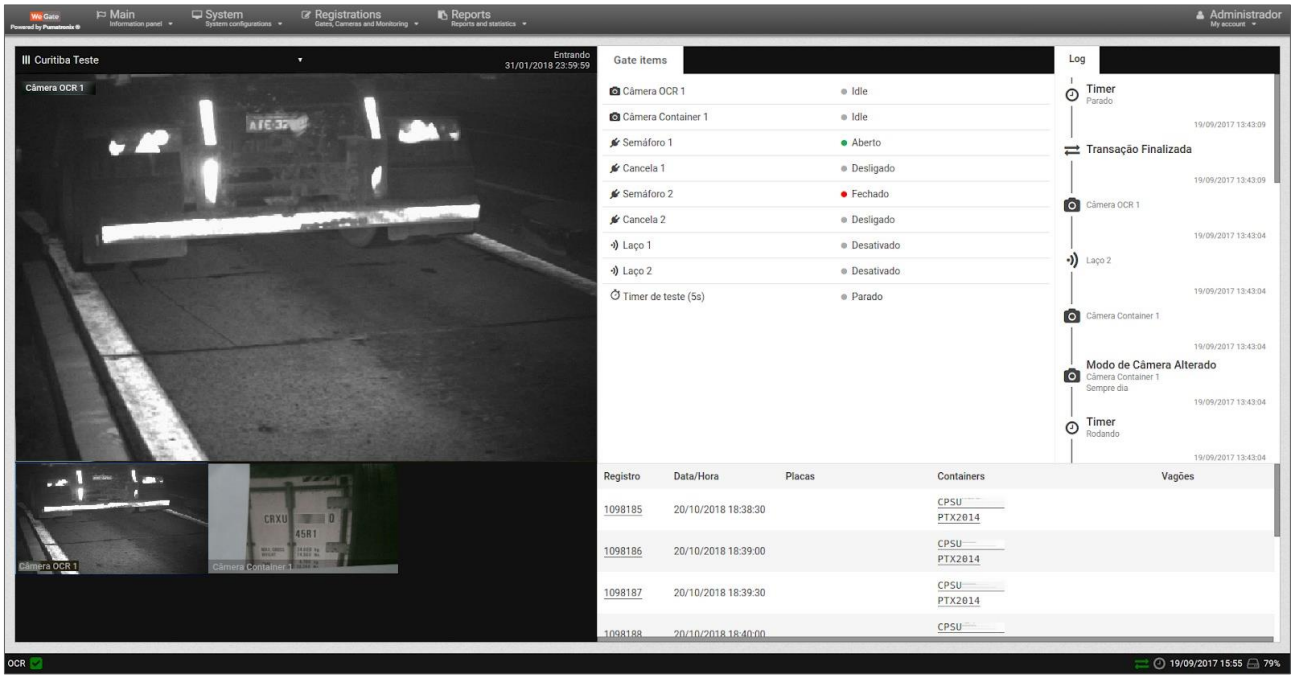


Figure 3 - Gate Panel Screen

1.3. Control Panel View

The *Control Panel* displays to the connected user the records made by the system in all registered gates and in chronological order. These records present the images of the capture devices to which the user has access. However, restricting access to equipment is a system feature, given that the information stored may require confidential disclosure.

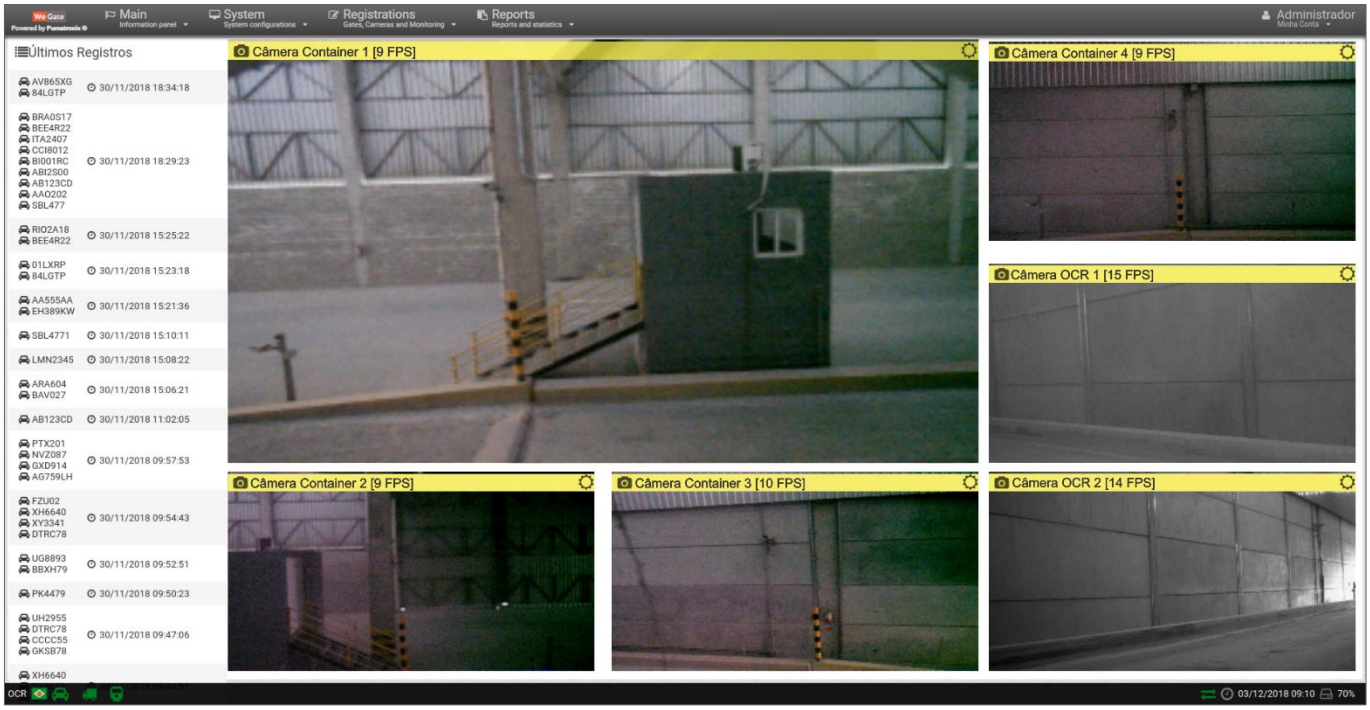


Figure 4 - Control Panel Screen

1.4. Dashboard View

In *System Status*, can check the system status in real time, displaying information regarding total CPU consumption, total RAM consumption, the amount of disk space used and the size of the queue of images to be processed by the OCR. *Uptime* displays the time the system has been operating without interruptions.

The *History* graphs show information on CPU and memory usage. These graphs are useful for performing more detailed analyses of how the license plate reading system is behaving in the long term, which makes it easier to size the hardware that should be used.

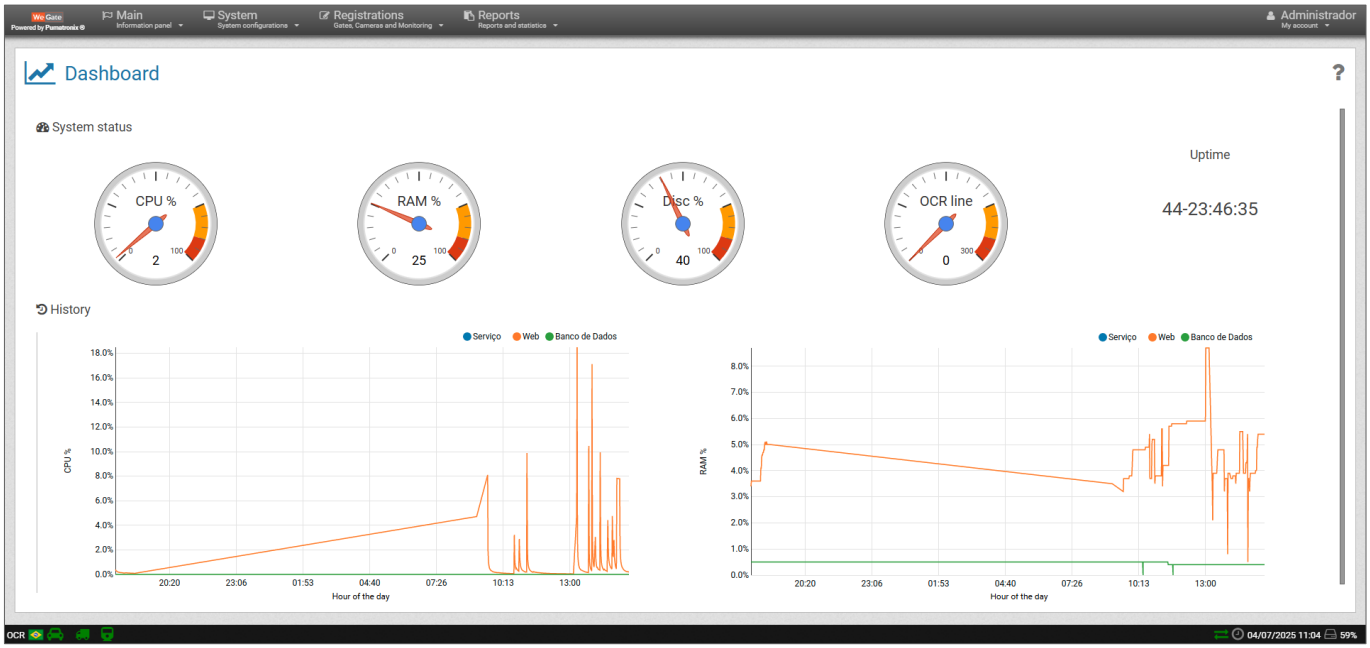


Figure 5 - Dashboard Screen

2. Information Generated

2.1. Vehicle Flow Control

Installing and configuring WeGate to operate on a gate with sensors and actuators allows for automated control of vehicle flow, as the system is capable of reading vehicle license plates, container or wagon codes in a train and then transmitting the data from the passages to management servers, such as those of inspection agencies.

2.2. Record Report

All logs made and stored in WeGate can be retrieved in report form. When accessing the *Record Report* menu, those made at the gates monitored by the system will initially be listed in descending chronological order.

The list of logs displayed can be sorted by clicking on the title of the desired field:

- ID with the identification number in the system;
- Date/Time the log was made;
- Direction of passage through the gate;
- Gate where the vehicle was detected;
- Containers, Wagons or License Plates identified on the containers;
- Sent to the server.

To select logs, it is necessary to specify the criteria for searching the database. Among these criteria, the logs can be filtered:

- by the equipment that performed the capture (can correspond to one or more equipment);
- by the period (specifying the start and end date and time);
- by search results that include only license plates automatically recognized in the OCR reading, or only those not recognized, or both.

More specific reports can be obtained by defining the container and/or wagon code or vehicle license plate as search criteria, in addition to those listed.

WeGate allows to transform the search results into a report in *csv* (comma-separated values) format, by selecting the *Export Records* option. However, the images of the records are not exported in the *csv* file. To generate a file containing the images as well, the *Export Records* and *Images* option must be selected and the file will be generated in zip format.

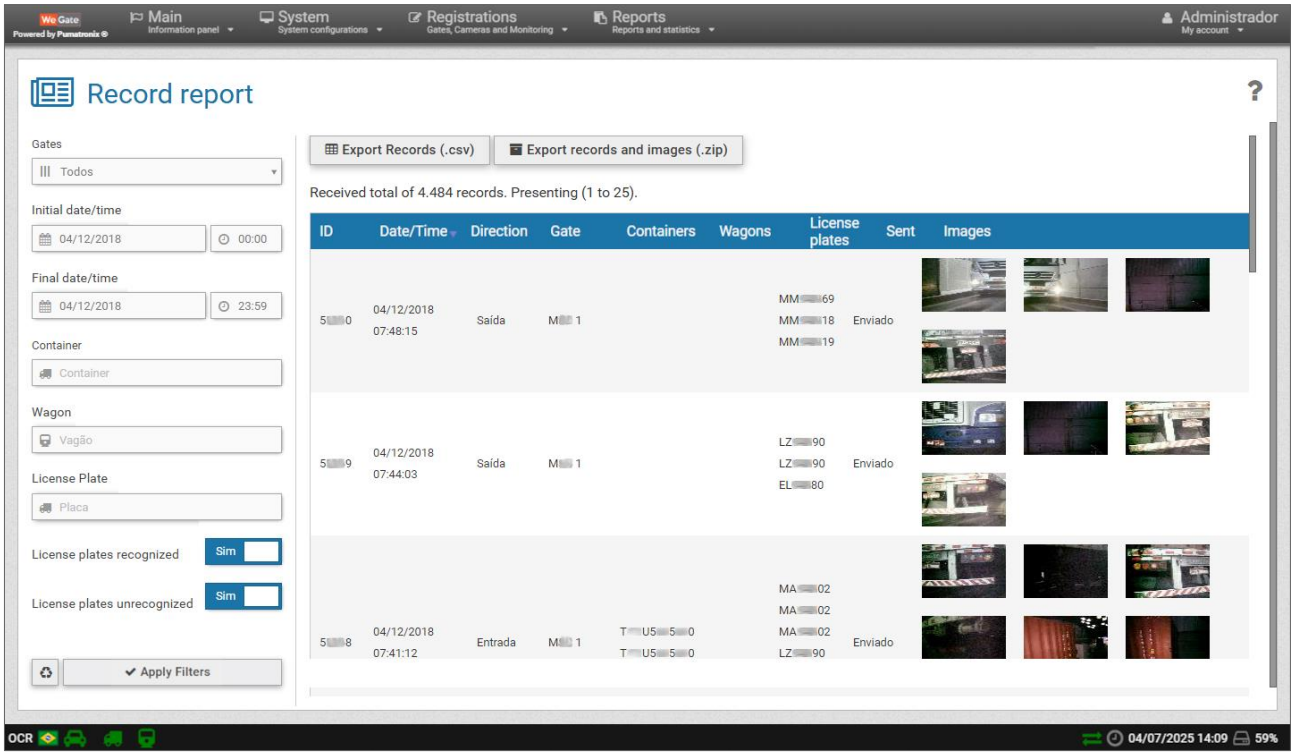


Figure 6 - Record report screen

2.2.1. Detailed View of a Record

The records made by WeGate can be viewed individually by selecting them in the record report presented. When selecting an image of a record, the record data viewing window opens. The image is displayed enlarged and, just below, the data on the percentage of confidence that the system obtained in identifying each character in the OCR reading, the date and time of the record and the device responsible for the capture, with the option to *Edit* the recognized plate.

On the right side of the window, in the *General* tab, will find the options to *Remove* the record and *Download Images*, in addition to the data from the record made, including the *Gate*, the type of ticket operation, the time the record was made and the country of the detected plate.

By accessing the *Log* tab, can check the log and history of the record in the system, which allows to audit the edits made to the recognized plate, identifying the user responsible for the edit and the data edited.

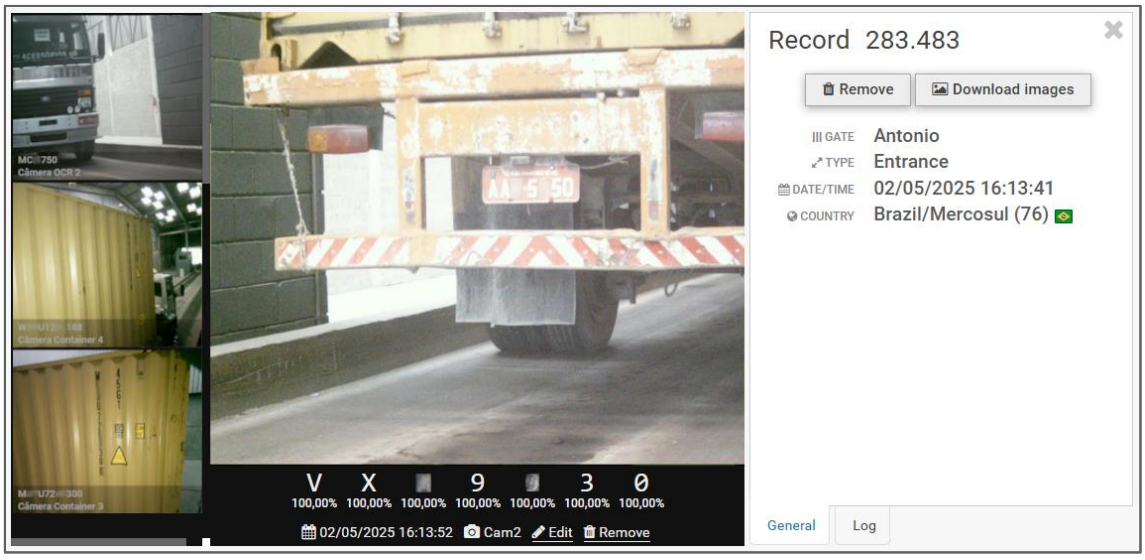


Figure 7 - Record data display screen

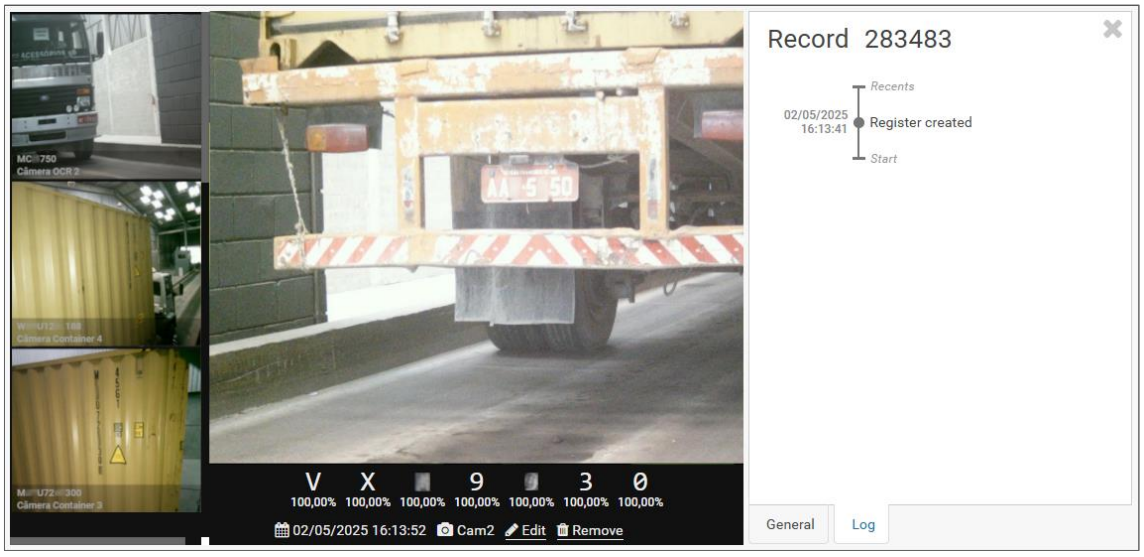


Figure 8 - Record Log tab screen

2.3. Accuracy Report

The *Accuracy Report* provides the user with a graphical view of the information that allows them to evaluate the software's performance, containing data on the number of *Recognitions* (plates, containers and wagon codes recognized) and *Inconsistencies* (plates, containers and wagon codes not recognized).

Allows customization of groupings and data composition in the graph, in addition to the standard filter option, selecting by date, time, gate, gate direction, capture devices or vehicle types (plate, container and/or wagon). To use this report, it is necessary to configure the minimum average probabilities for plates/codes to be considered recognized, in *System > System Settings > Accuracy Report*. The configuration used to generate the report can be stored in *Saved Filters*. After configuring the filter, the report is displayed in the form of vertical bar graphs. The information display layout can be reconfigured in *Change View.*

In addition to the fully customized format, the report has some standard formats such as REDEX, which is used by the Federal Revenue Service in the evaluation of REDEX-type customs environments (with separate front and rear imaging devices).

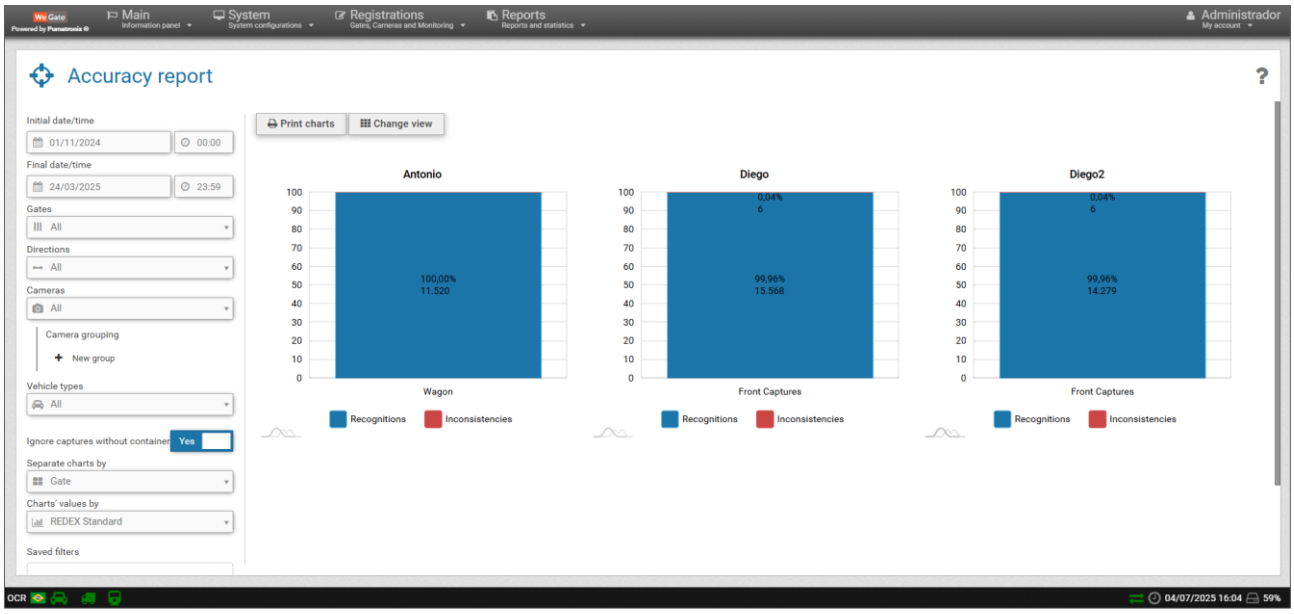


Figure 9 – Accuracy Report Screen

When customizing the graph, there is the option to *Ignore captures without a container*, which considers that only those that contain the captured image of the container from which the code was extracted will be displayed on the graph for container code records.

2.4. Log Report

WeGate allows to view the interaction of integrated sensors and actuators belonging to a registered gate in report format. This view is only possible for records of passages in gates with sensors and actuators registered in the system. The *Log* is displayed in the sequential order of occurrence of events, in the form of a list containing the actions performed by each registered sensor and actuator.

The actions performed during a passage can be searched by record number, by equipment, and by date and time. In addition to the filtered data, the search result shows the rule responsible for the action of the control mechanism (sensor or actuator)

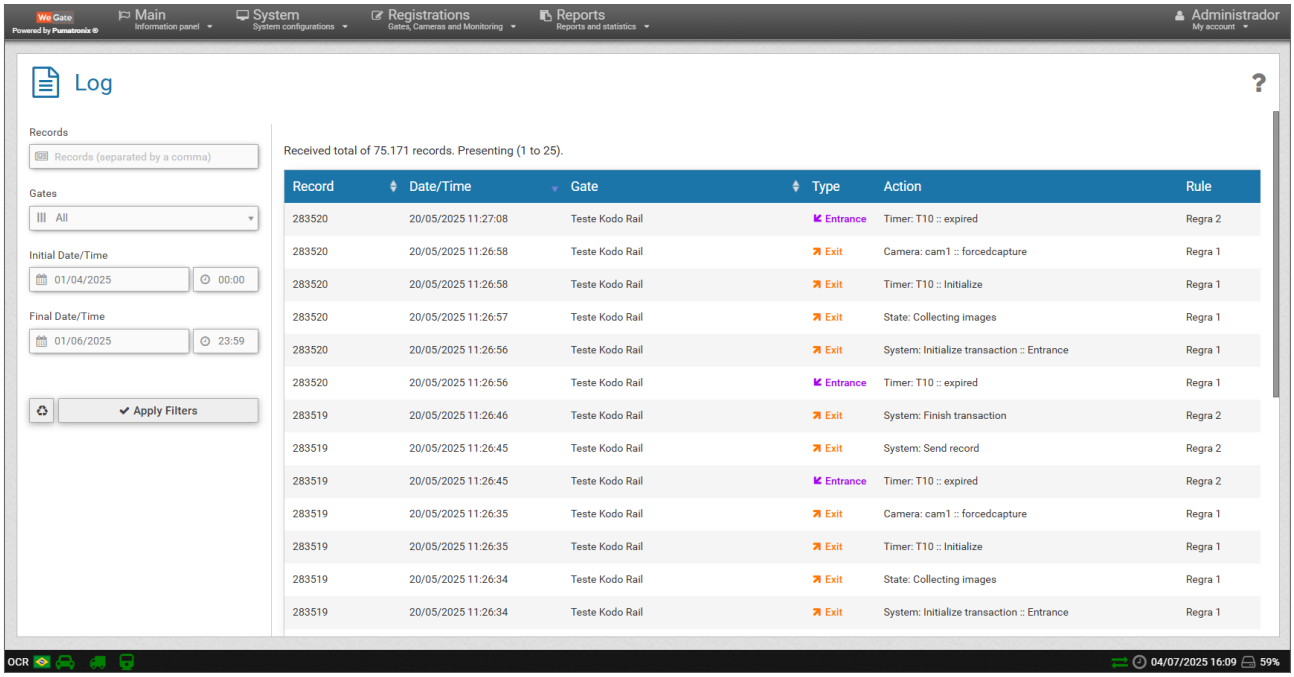


Figure 10 - Log report screen

3. Additional Documentation

Product	Link	Description
ITSCAM	Product Manual	Shows detailed information about the hardware and software, as well as step-by-step installation instructions.

4. Software Specifications

Version 1.7.4 of WeGate can be used to update any WeGate System from version 1.3.22.

WeGate can be updated using the installation package provided by Pumatronix Technical Support or using an approved update server. There is an option for automatic system updates, however this functionality is only available for servers with versions higher than 1.3.22. Older versions must be updated with the help of Pumatronix Technical Support.

The libraries for reading vehicle plates, container and wagon codes are available in the versions indicated:

Library/Module	Version
JidoshaLight	3.25.0
JidoshaContainer	2.0.3
JidoshaRail	2.0.3
JidoshaKodo	1.0.4

WeGate can be installed on computers with x86 64-bit architecture and Ubuntu Server 14.04, 18.04, 20.04 and 22.04 operating systems. New installations are compatible with Ubuntu Server 20.04 and 22.04 (amd64).

As of version 1.7.4, Ubuntu Server 14.04 and 18.04 are no longer supported for new installations. Previously installed installations are not affected.

5. Licensing

WeGate is licensed per vehicle monitoring point (gate). Regardless of the number of enabled points, capture devices, sensors, actuators and the operating logic of each gate can be registered. Passages recorded by the system are stored per registered gate.

6. Initial Configuration

In order for the ITSCAMPRO Mobile software to be used normally, some initial configurations are required, such as access control, system settings and date and time adjustment. These settings can be defined by accessing the *System* menu.

6.1. Installation Prerequisites

In order for WeGate to be accessed and operational, the physical installation of the devices on the gate and the connections between them are essential to ensure the correct functioning of the system. After installation, the factory settings for the first access allow to customize the appearance, restrict user access and activate all the functionalities that the product has.

6.2. Necessary Conditions for Installation

The configuration of a gate using the WeGate system depends on the architecture of the site and, when the record must be sent to an external server, it depends on the data transmission protocol. The architecture of a gate is replicated in the system with the inclusion of capture devices, sensors and controls, in addition to the definition and configuration of states and transition rules.

Distribution of information: The content generated by WeGate (captured images and information) is protected by a user and password. However, it is up to the system administrator to control which users have access to the information and the dissemination of the content.

6.2.1. Installation Architecture

The diagram illustrates the architecture of a gate with reversible characteristics. This gate illustrates the capture devices that perform automatic reading of vehicle license plates (OCR) and container codes, traffic lights indicating movement, inductive loops (which indicate the arrival of a vehicle at the gate) and presence sensors.

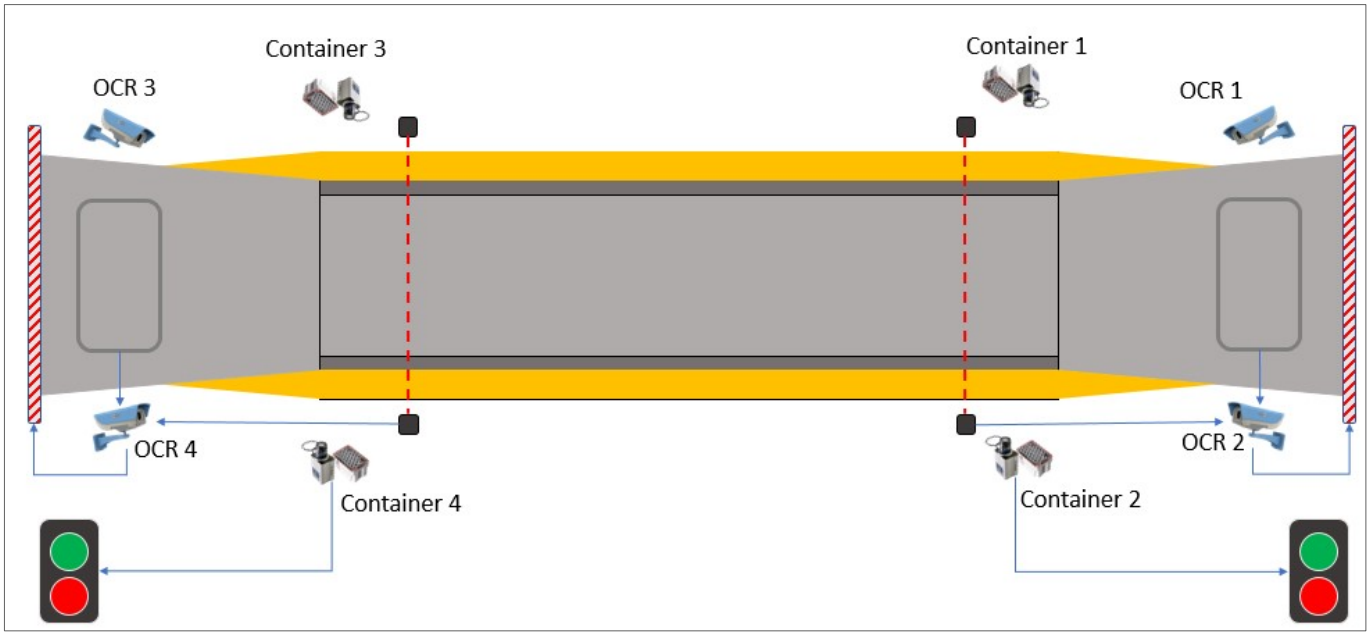


Figure 11 - WeGate System Architecture Diagram

6.2.2. Adjusting the Positioning of Capture Devices

In general, when positioning the ITSCAM equipment for gate monitoring operations, an unobstructed location should be chosen, which allows for the capture of images that do not show areas covered by architectural structures, vehicles on other lanes, among other elements.

The positioning can be corrected simply by changing the direction of the equipment on the support. To monitor the result of the new framing live, it is possible to view the image on the WeGate or ITSCAM interface. The zoom, focus and auto iris adjustments, as well as the advanced image settings, are only available through the ITSCAM device interface, detailed in the product model manual.

Another possible interaction is through the WeGate interface, which provides the settings related to the OCR algorithms (plate, container and wagon), discussed in OCR Settings, and allows to view the image displayed by the image capture device.

6.3. Network Configuration

The WeGate can operate in static IP or DHCP modes according to the needs and configuration possibilities of the location. This adjustment can be made by accessing the *Network Settings* option in the *System* menu. The image shows an example of a configuration with a static IP. The information entered will be applied as soon as the *Save Interface* button is pressed.

Figure 12 – Network Settings Screen

6.4. Date/Time Configuration

The date and time data must be entered by accessing the *System > Date/Time* menu. It is important to keep this information updated so that the records are generated with the correct time information. The system has the option of automatically synchronizing the date and time with NTP servers or using manual configuration, as exemplified in the image:

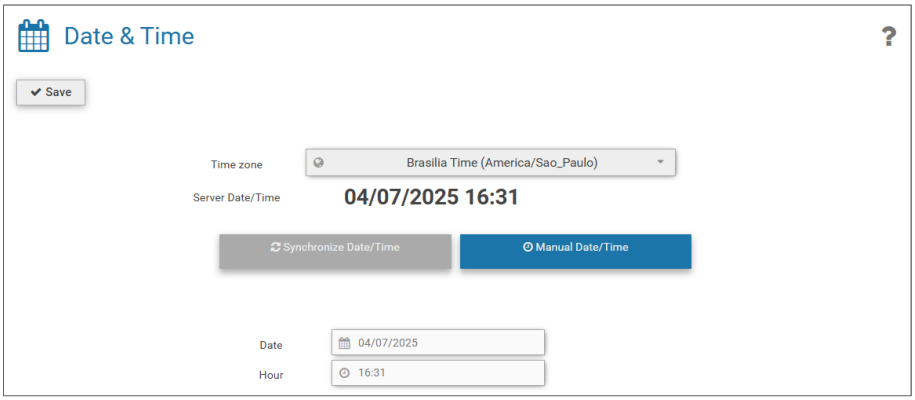


Figure 13 - Date/Time Settings Screen

6.5. User Registration

If it is necessary for different users to access the system, it is possible to create individual logins using the *System > Users* menu. When creating a new user, the *Login* and *Password* must be specified, as well as the type of *Access Profile*, whether *Administrator* or *Operator*, with the former allowing full manipulation of the system and the records made. New profiles can be created on the *Access Profiles* management screen:

User access levels: All users have the same level of access to the system, and it is possible to restrict access to devices only. The login is used to record changes made to the system.

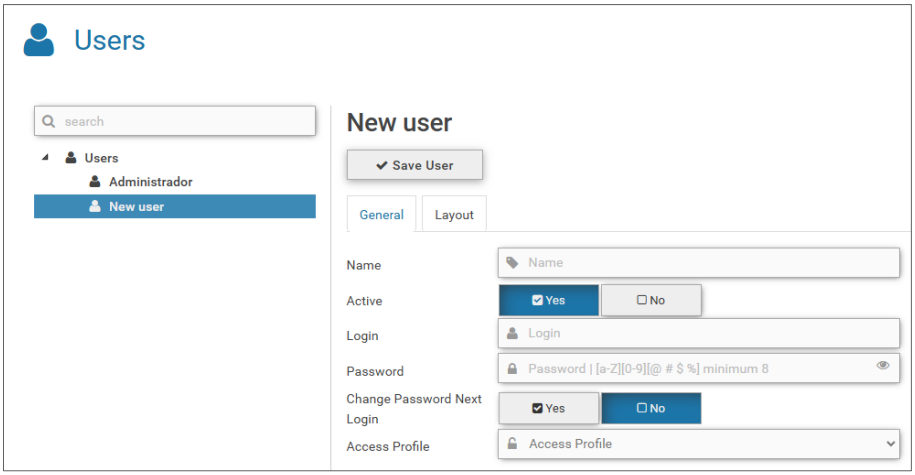


Figure 14 - New user registration screen

The user can be forced to reset the password at the next login by selecting *Yes* in *Change Password Next Login*. When selected, on the login screen the *New Password* field must be filled in immediately after entering the user name and old password:

Figure 15 - Login screen with New Password field

On the *Layout* tab, one of the layout options for displaying images from capture devices in the *Control Panel* must be selected for the user:

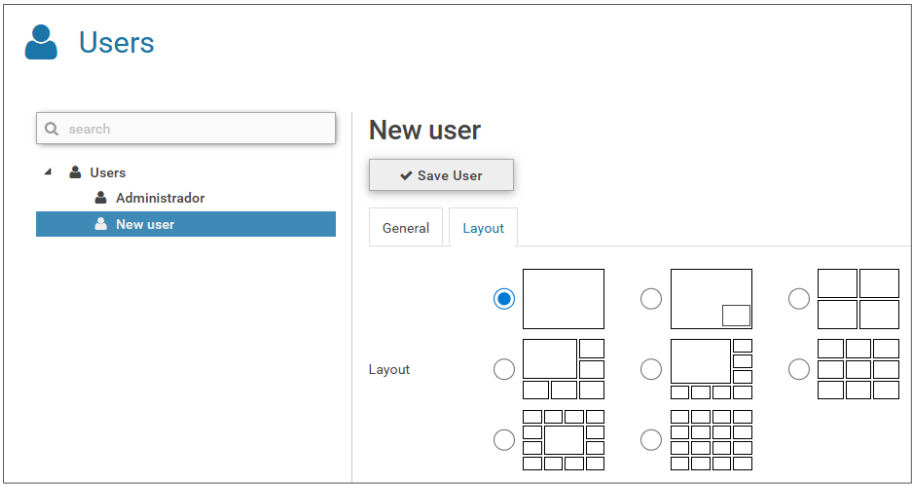


Figure 16 – User registration screen, Layout tab

6.5.1. Linking Devices to the User Account

In order for the user to be able to view the images generated during registration, the user must be assigned permission to view content. This is done by linking the desired capture devices to the user account.

To register the devices with access permission, the user must log in to the system and select the user name in the *My Account* menu. The window that opens contains the general account configuration options and the *Cameras* tab contains the list of devices registered in the system and available to the user. The devices that can be accessed by the user must be dragged to the *User Cameras* column, as shown in the screen image:

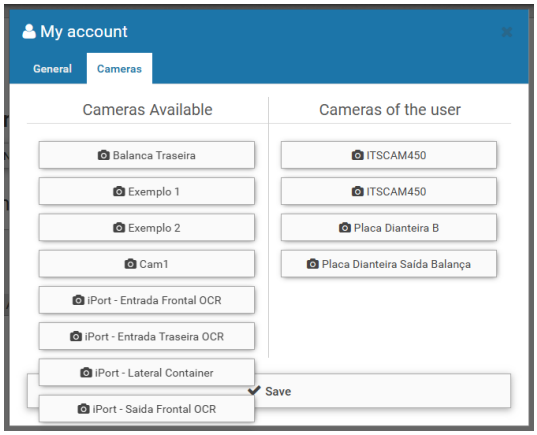


Figure 17 – Screen of the My Account menu

6.6. System Settings

When accessing the *System Settings* options in the *Systems* menu, the home screen displays the *General* System configuration options, including:

- *Language*: Selection of the language to be displayed in the interface between the options Spanish, English or Portuguese;
- *System Name*: Enter a name to be displayed on the system login screen;
- *System Description*: Enter the description to be displayed on the system login screen;
- *System Logo*: Selection of the logo image file to be displayed on the system login screen;
- *Enable Panoramic Camera*: Allows the Wegate System to accept devices for capturing the context of the infraction;
- *Enables Turn Off OCR*: When enabled, an icon is displayed on the *Control Panel* screen in the upper left corner of the section that allows to disable OCR for the device;
- *Global Detection Mechanism*: With this mechanism enabled, when two or more different capture devices share the same detection mechanism and read the same card, only the image of one of the devices will be displayed in the log;
- *Equipment Name/ID*: Allows to identify the destination directory or file name of the logs when sent to an FTP server. The tag used and which will be replaced by the value of this field is *<equipment></equipment>*;
- *Mark Read License Plates*: When enabled, WeGate indicates the position of the license plate or container/wagon code detected with a rectangle on the vehicle image, making it easier to view.

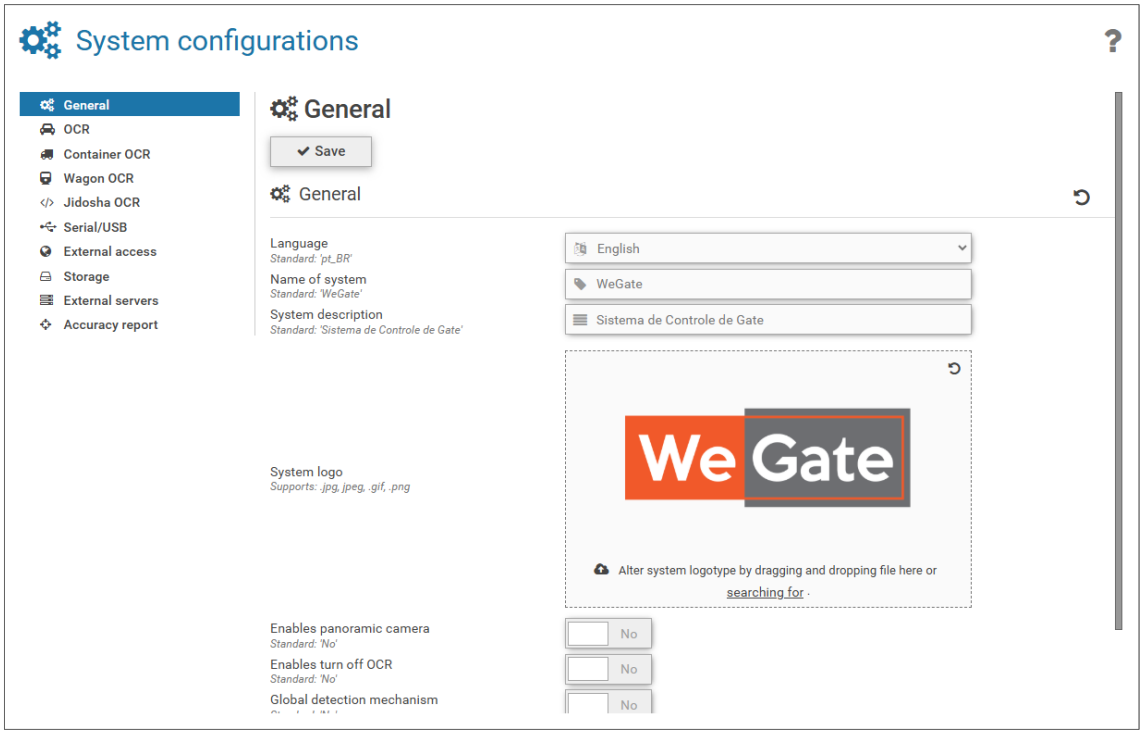


Figure 18 - System Settings Home Screen

6.6.1. OCR Settings

The recognition quality of the OCR algorithms depends on the adjustment of some parameters of the OCR library. The default values were defined in order to apply an ideal performance in most possible scenarios, and are displayed in the interface as a suggestion for adjustment. The settings are available in the *System > System Settings* menu.

1) For OCR recognition of vehicle license plates, in the OCR tab it is recommended that the following parameters be adjusted:

- *OCR Queue Size*: The queue of images to be processed by OCR will increase up to the indicated value; above this value, the images will be discarded. It is suggested to seek a balance between the queue size and the timeout to achieve adequate performance;
- *Vehicle Type*: "Others" represents vehicles with identification plates containing characters on only one line, such as cars, buses and trucks. "Motorcycle" are vehicles that have license plates with characters distributed across two lines;
- *OCR Timeout*: Maximum time that the algorithm can use to locate a license plate. Depending on the system load, image resolution and license plate quality, it may take longer for the algorithm to complete processing;
- *OCR Filter (RegExp)*: Allows the user to configure a *Regular Expression* for all readings that should be filtered (rejected). This field accepts special *RegExp characters.* Example: *'^H*$'* is a regular expression that will filter (reject) all readings made where 'H' is the first character.

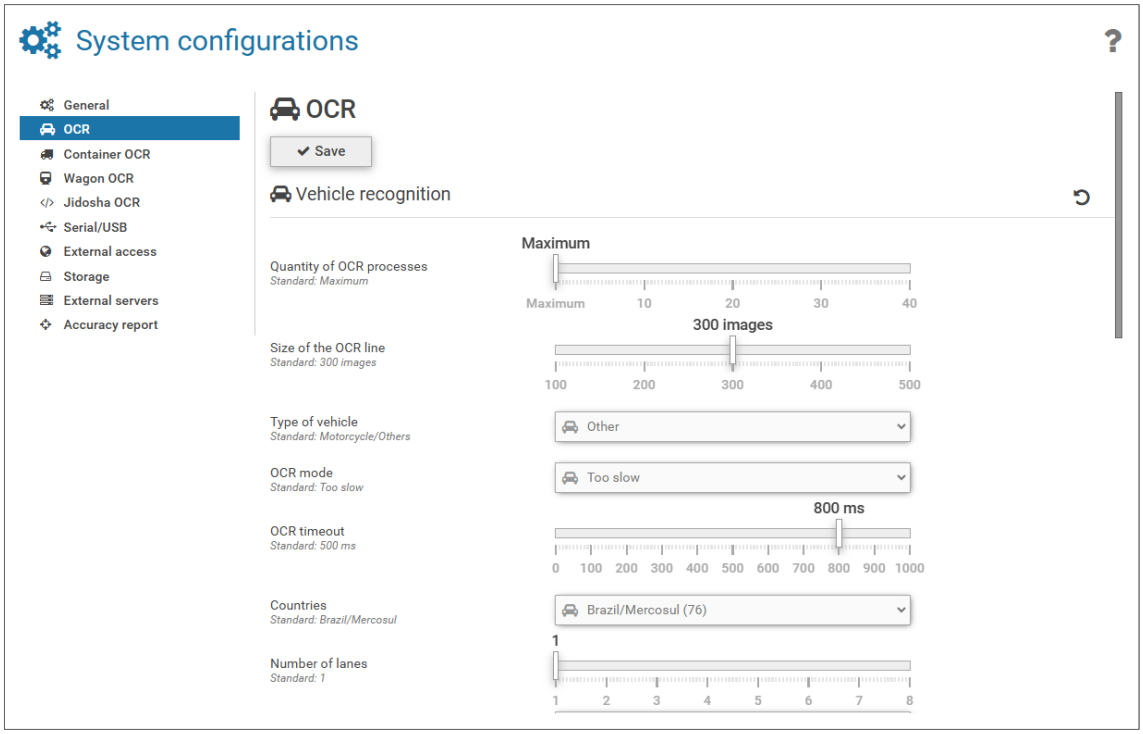


Figure 19 – Screen: System Settings > OCR

2) For OCR reading of container codes, in the *Container OCR* tab, it is suggested that the following parameters be adjusted:

- *Container library type*: Selection of the library that performs OCR reading of container codes, between the Jidosha Container or Jidosha Kodo options (from version 1.7.4);
- *OCR Timeout*: Maximum time that the algorithm can use to locate a code. Depending on the system load, image resolution and code quality, it may take longer for the algorithm to complete processing;
- *Container Rotation Angle*: This option should be used when the device is positioned with a 180° rotation, or when want to capture codes that are on top of the container and can appear in two orientations (0° or 180°);
- *OCR Filter (RegExp)*: Allows the user to configure a *Regular Expression* for all readings that should be filtered (rejected). This field accepts special *RegExp characters.* Example: *'^H*$'* is a regular expression that will filter (reject) all readings made where 'H' is the first Character.

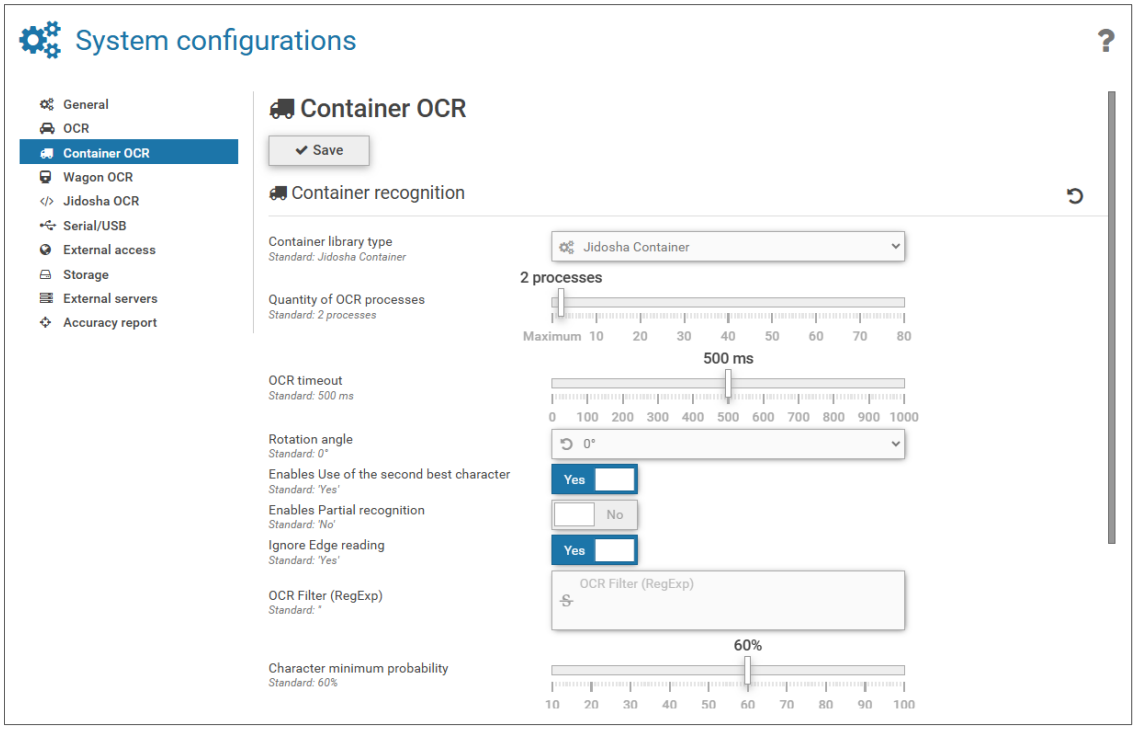


Figure 20 - Screen: System Settings > Container OCR

3) For OCR reading of wagon codes, in the Wagon OCR tab, it is suggested that the following parameters be adjusted:

- *OCR Timeout*: Maximum time that the algorithm can use to locate a license plate. This parameter depends on the system load, image resolution and code quality;
- *OCR Filter (RegExp)*: Allows the user to configure a *Regular Expression* for all readings that should be filtered (rejected). This field accepts special *RegExp characters.* Example: '^H*$' is a regular expression that will filter (reject) all readings made where 'H' is the first character.

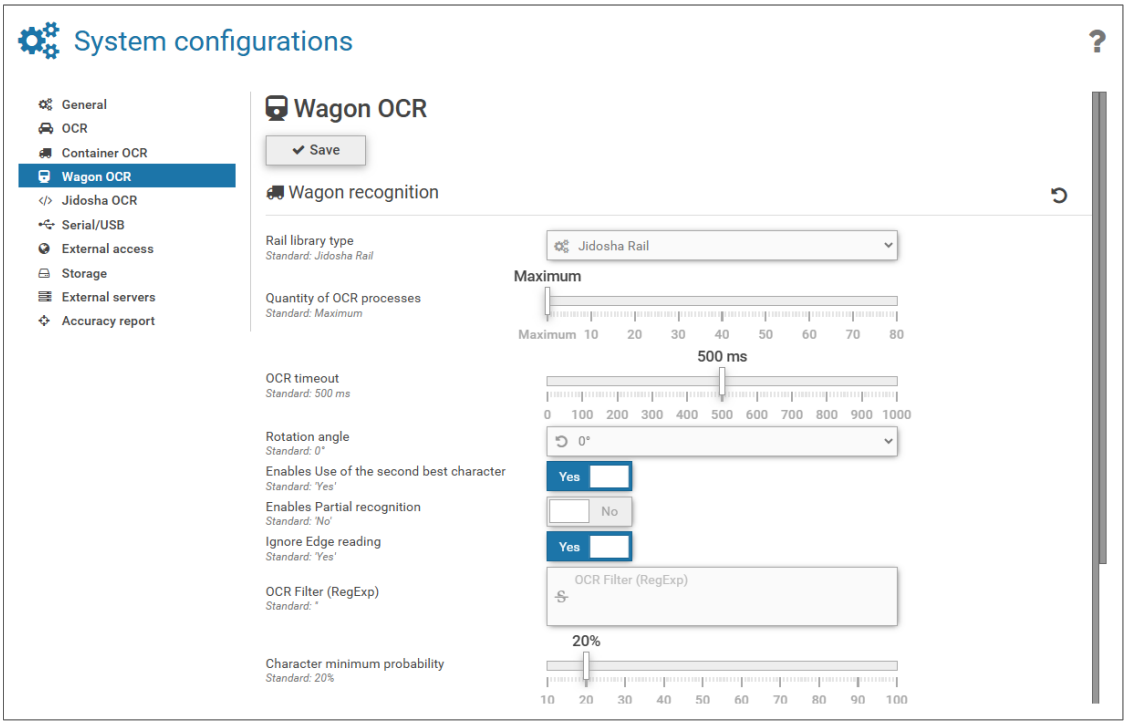


Figure 21 - Screen: System Settings > Wagon OCR

6.6.1.1 OCR Configuration for Pumatronix Equipment

When adding a Pumatronix image capture device to WeGate, the *Optical Character Recognition* (OCR) library must be configured. To do this, it is necessary to select the vehicle detection mechanism, i.e., the *motion detectors*. These detectors serve to improve the system's performance, as they avoid excessive processing of very similar images that generally do not show a vehicle. This configuration is available in WeGate in the menu *Registrations* > *Detection Mechanism*:

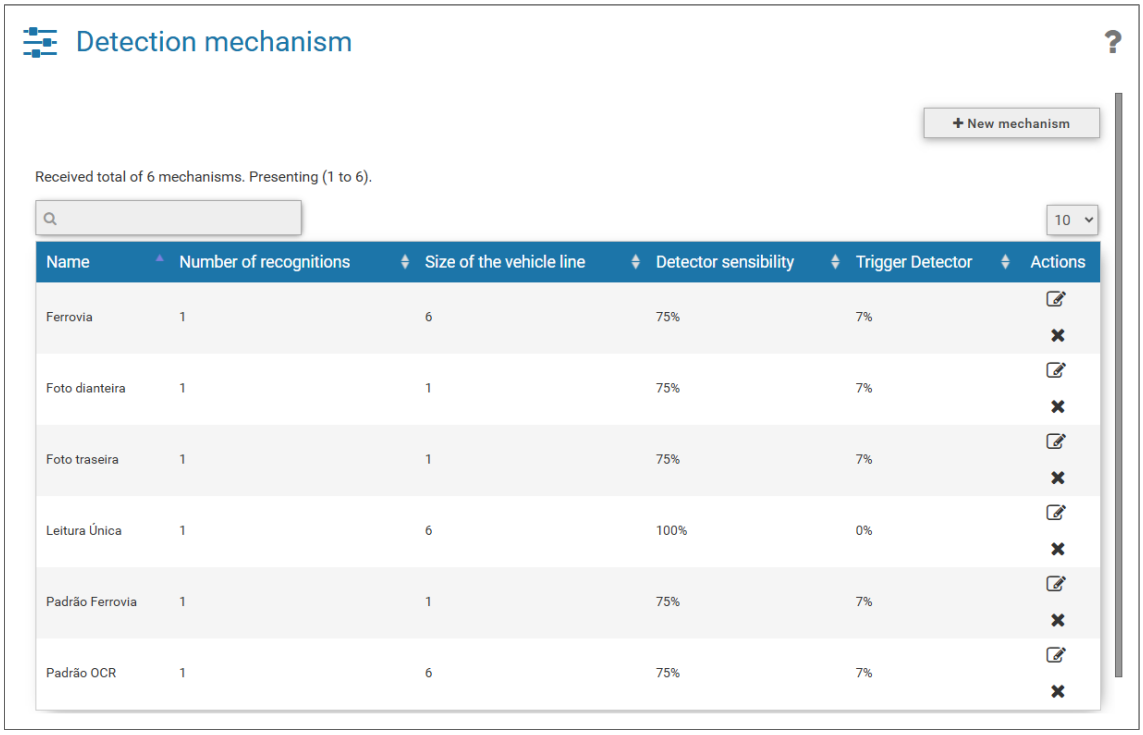


Figure 22 - Screen: Registrations > Detection Mechanism

The chosen configurations vary according to the device's function, and are available:

- *Name*: Unique identifier for the detector;
- *Detector Sensitivity*: The change between two consecutive images must be measured, excluding the noise constant in the image. The sensitivity is proportional to the chosen value;
- *Detector Trigger*: Percentage of change that an image must present in relation to the previous one, to be processed by the OCR library;
- *Number of Recognitions*: Determines the number of consecutive times that an identical identification must be made for it to be considered correct. Using more than one reading to validate a recognition minimizes character reading errors;
- *Vehicle Queue Size*: Determines the number of different license plates that must be recognized before any of them can be repeated;
- *Vehicle queue time*: Maximum time in minutes that readings will remain in the vehicle queue, in minutes;
- *Window size in ms*: Maximum waiting time for a frame of the same license plate (or empty license plate) that allows the detection of images without a license plate, with a default value of 1000 milliseconds. If a frame is not received within this period, a license plate event is generated;
- *Image Selection Mode*: applied only when a license plate or container/wagon number is not found within the window defined in *Window size in ms*. Defines which frame of the window will be used, which can be a frame from the beginning, middle or end of the window. This parameter is useful

for longer gates, where it may be necessary to choose the frame with the highest probability of containing the best image of the vehicle.

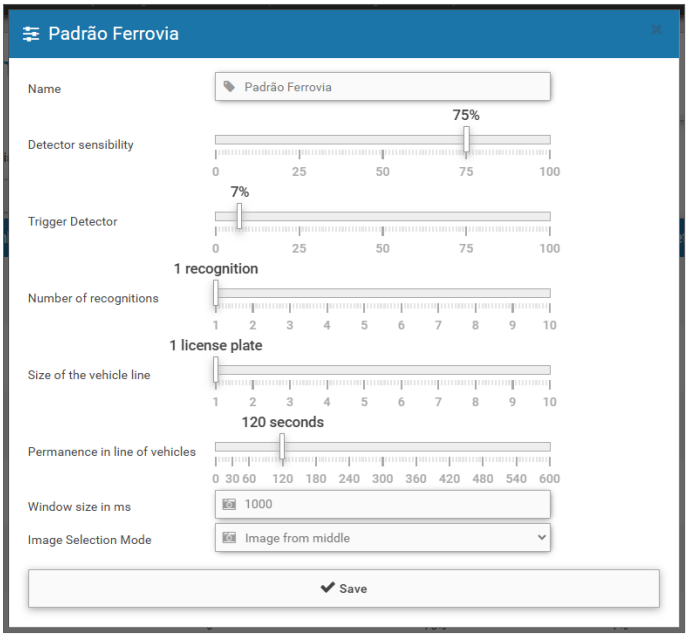


Figure 23 – Screen: Registrations > Detection Mechanisms

6.6.2. Configuring External Servers

The WeGate system can send registration data to external servers such as ITSCAMPRO, FTP and the REST Web Service.

6.6.2.1 WebService REST Configuration

Integration via the *Rest WebService*, where WeGate must post the results of operations, must be configured in the *System > System Settings* menu, in the *External Servers* option. Integration occurs by entering the WeGate External IP/Host and defining the *Number of Sending Attempts* that should be made and the write *Connection Timeout* and *Read Timeout.* There is the option to *Enable a web service per gate*, which allows for the configuration of a specific REST Web Service for each Gate. When enabled, the *URL of the Web Service* must be indicated on each gate so that it sends the data to this external server. When *No* is selected, there will be only one service for the entire WeGate system.

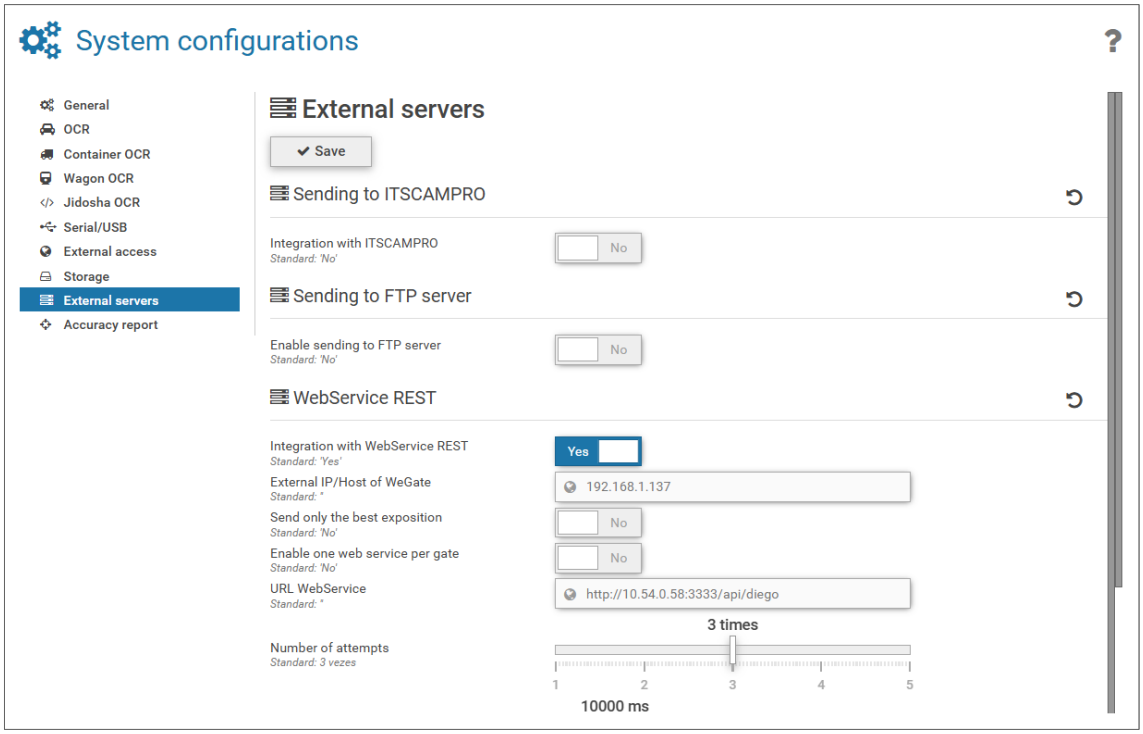


Figure 24 - Screen: System Settings > External Servers

6.6.3. Configuring External Access and HTTPS

WeGate allows to configure some of the ports used in communication with the service and the use of a secure connection, applying the HTTPS protocol when accessing the system. The new *Enable Authentication in APIs* field allows to enable authentication on the WeGate REST API, which specifies that access to the entire REST API must be done using the authorization header.

Starting with version 1.3.19 of WeGate, the REST API documentation using OpenAPI is included and Swagger-UI has been integrated into the interface. With this integration, the API documentation file via OpenAPI is available at the following address:

http://<WEGATE_IP>/rest/swagger.json

The Swagger-UI graphical interface, which allows testing endpoints, is available at the following address:

http://<WEGATE_IP>/swagger-ui/index.html

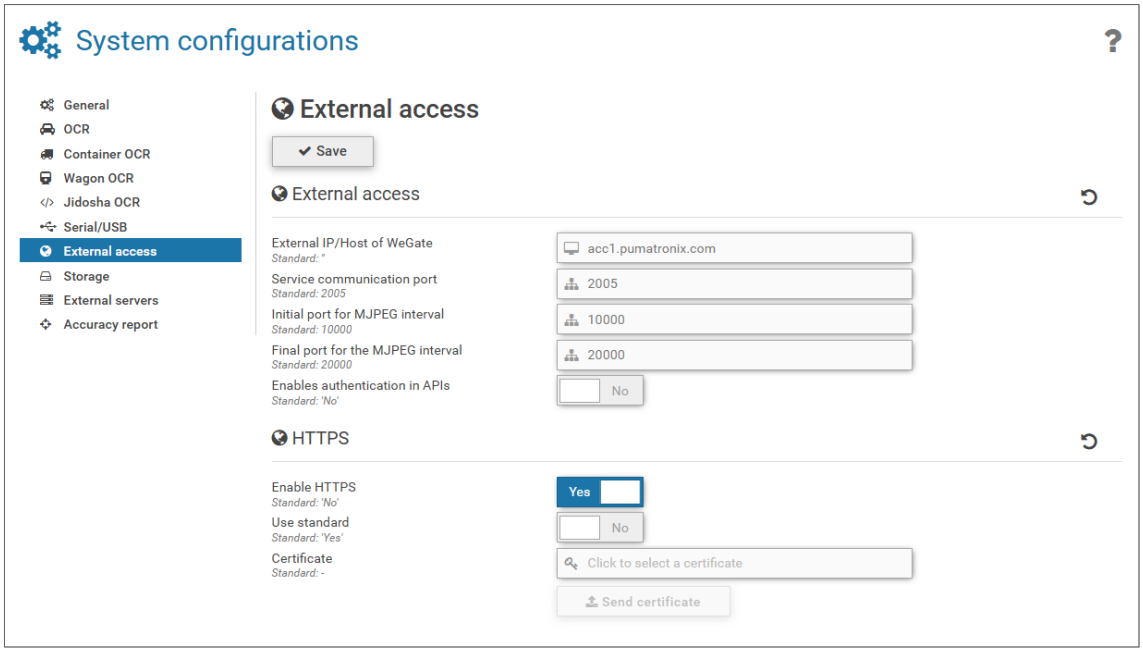


Figure 25 - Screen: System Settings > External Access

When HTTPS is enabled, all access to the WeGate system and all video streams transmitted from Wegate to the browser are encrypted. In this configuration, access must be performed with a URL starting with *https://*. When disabled, web access is performed with a URL starting with *http://*. When accessing, the indication that it is a secure connection can be viewed by clicking on the button that indicates the information of the website accessed:

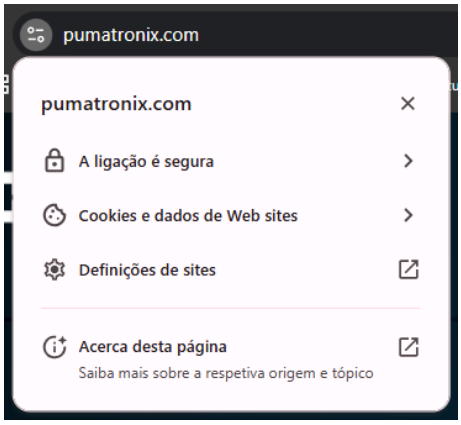


Figure 26 - Window displayed when clicking on the website information icon

6.7. Gate Registration

Vehicle passage records are associated with a gate, which must be previously registered by accessing *Registrations>Gates* and clicking on *+New Gate*. This registration requires a *Name* that identifies it within the WeGate system, as well as the *External Identifier* that allows it to be identified in operations via webservice, used so that a gate is identified equally in WeGate and in the external server that will receive the records. The *View Mode* of the records must be selected in the *Gate Panel*, either in *Video* mode, which displays the video stream of the devices at all times, or in *Record* mode, which displays only the captures of each device at the end of each record.

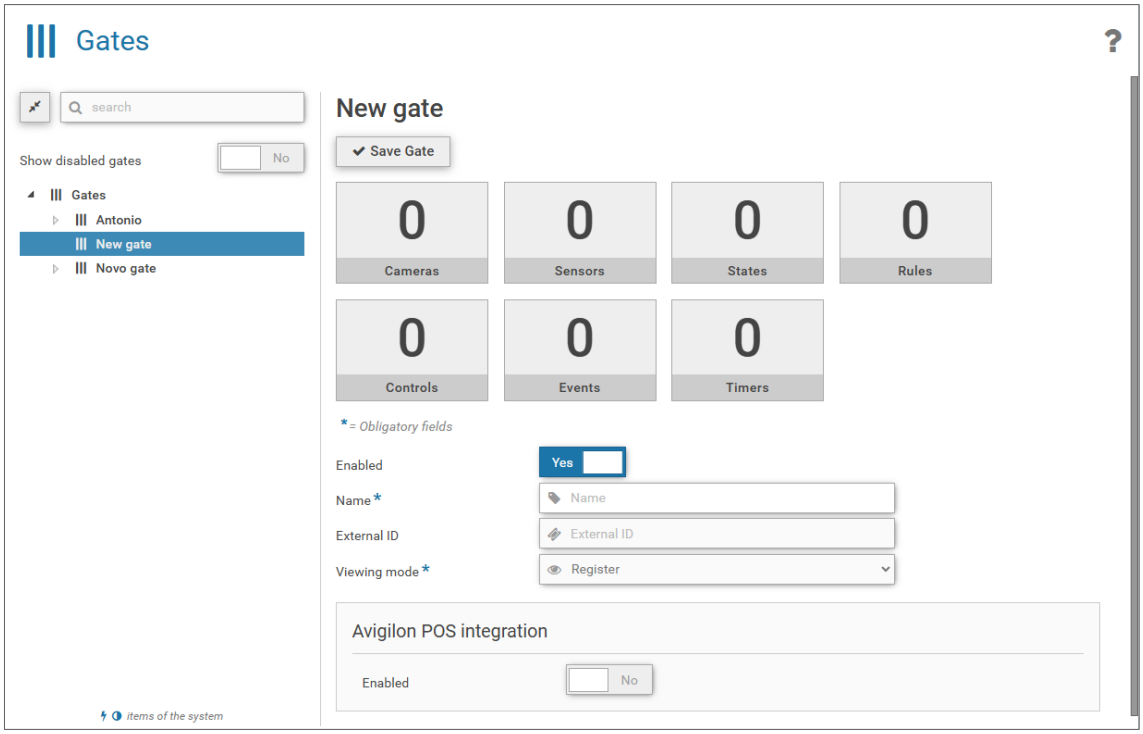


Figure 27 - Initial screen for registering a new gate

The *Avigilon POS Integration* option allows records to be sent to the Avigilon POS system, when enabled. This integration generates a JSON event for each new transaction in the Gate and sends the events via a WeGate socket server. The fields in JSON format sent by this interface can also be configured. When configuring the Gate, the *Connection Port for Avigilon* must be specified and the Gate must be restarted for it to be initialized. The JSON pattern sent by the WeGate socket server is:

```
$ telnet <IP WEGATE> 9090
Trying <IP WEGATE>...
Connected to <IP WEGATE>.
Escape character is '^]'.
{
  "plates": [
    {
      "text": "XJB35XX",
      "serialnumber": "F8-D4-62-00-5D-D7",
      "country": 76
    },
    {
      "text": "BIO41XX",
      "serialnumber": "F8-D4-62-00-5D-D7",
      "country": 76
    }
  ],
  "transaction": 3614,
  "idgate": 0,
  "datetime": "2020-04-03 18:30:33"
}
```

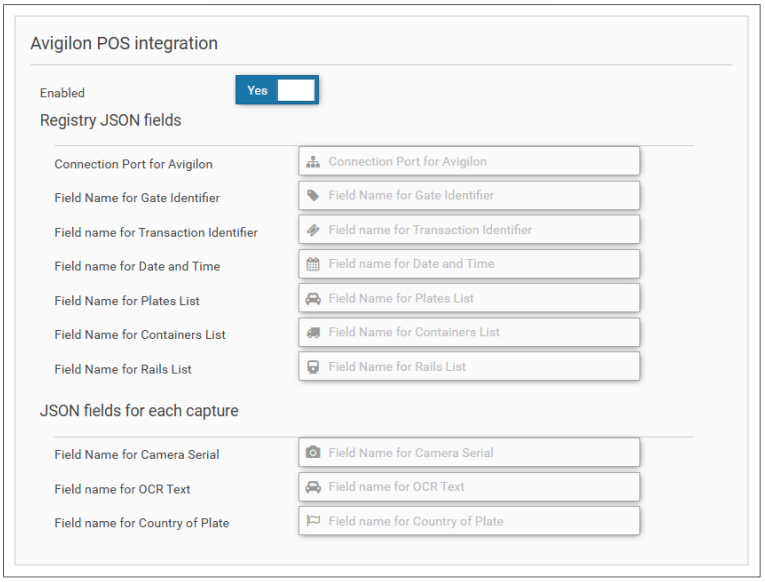


Figure 28 - Avigilon POS Integration configuration screen in Registrations>Gates

After completing the registration of the initial information for the New Gate and clicking on *Save Gate*, the Capture Devices, Controls (Traffic Light, Barrier or Siren) and Sensors (Loop or Start/End of Stroke) can be registered.

6.7.1. Registering Capture Devices

Several types of IP capture devices can be connected to the WeGate system, as long as they comply with one of the supported protocols:

- Pumatronix (ITSCAM 400 or ITSCAM 450/600);
- IP Snapshot;
- IP MJPEG;
- IP RTSP.

In all cases, it will be necessary to assign a name to the device, define the Host, link an OCR type and a *Detection Mechanism*, among those registered. It may also be necessary to specify a *username* and *password* to access the image capture device. In the *Position* field, must specify which image will be captured from the vehicle, container or wagon (Both, Front, Rear, Side or Top), used when generating an *Accuracy Report*.

When HTTPS is enabled in *External Access*, the device must be saved to view the video preview, as indicated in the interface.

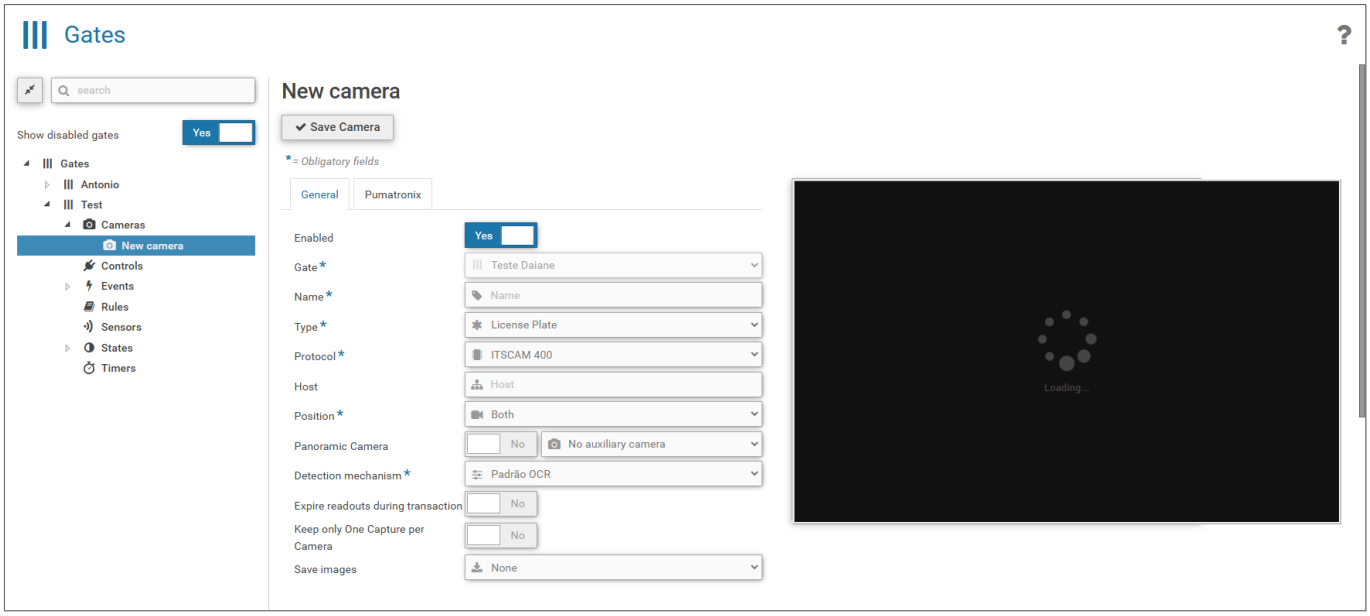


Figure 29 – Screen: Gates > Cameras > New Camera, General tab

6.7.1.1 Registering Pumatronix Equipment

Pumatronix image capture devices have a section for specific settings in the WeGate system. These settings refer to information about the physical installation of the equipment and complement the chosen *Camera Profile*.

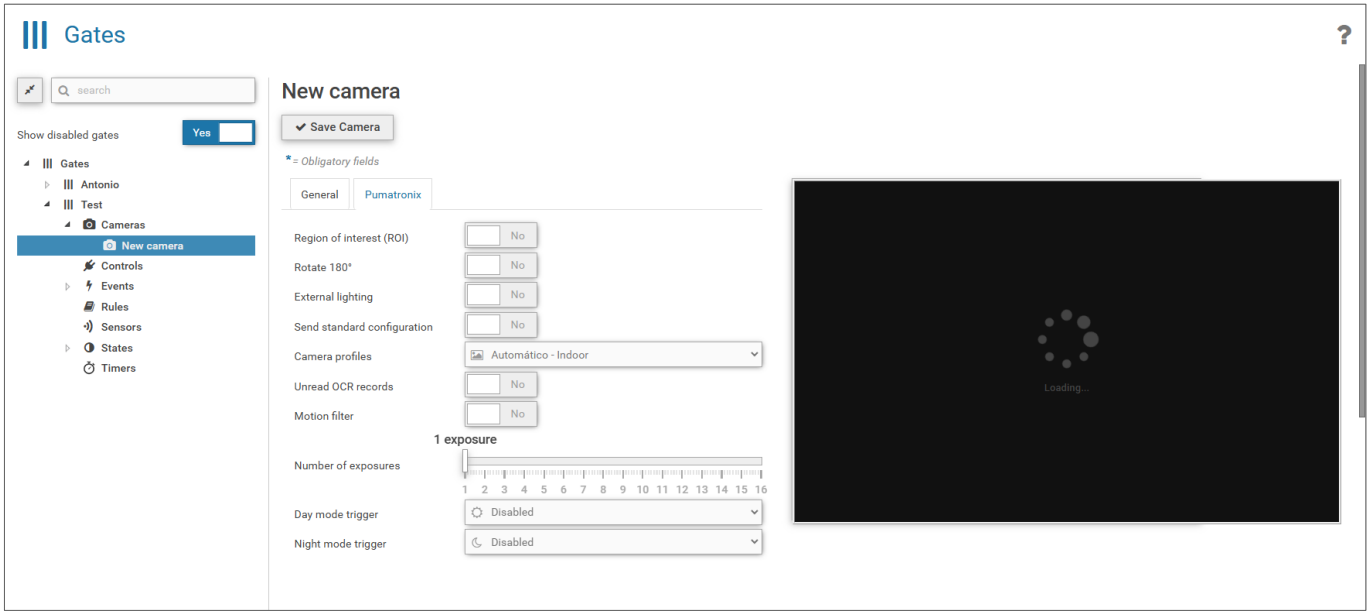


Figure 30 - Device registration home screen, Pumatronix tab

As of version 1.5.0, it is possible to define a *Region of Interest (ROI)* on the image generated by the device, reducing the region in which the search for a license plate and the OCR reading must be performed, which enables the *Motion Detector* only in the selected region, reducing image processing. This option can be defined in the tab available in the registration of devices with Pumatronix protocol.

When enabled, a polygon is superimposed on the image displayed on the right, which can be edited by clicking and dragging the vertices.

Customized configuration sets for the Pumatronix equipment can be created by accessing the *Registrations > Camera Profiles* menu. A chosen preset will only be applied when the *Send default configuration* option is selected, together with the device registration in the *Gate*. The screen image displays the settings for a Pumatronix image capture equipment usage *Profile*:

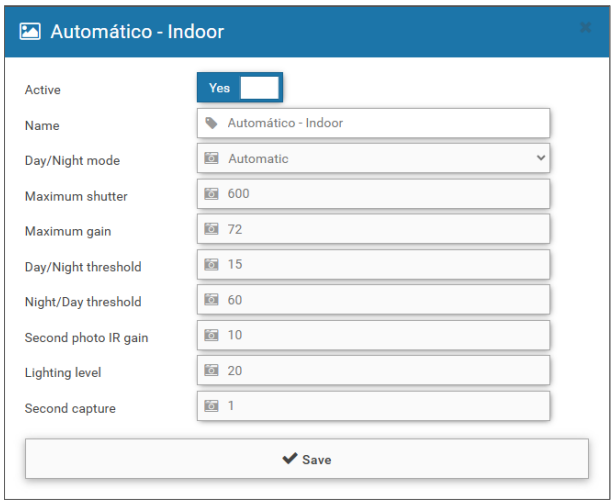


Figure 31 – Profile configuration fields in Registrations > Camera Profiles

6.7.2. Registering Sensors and Controls (Actuators)

WeGate can recognize the status of sensors and actuators in a gate by interconnecting them to the inputs and outputs (IOs) of the Pumatronix device. Examples of sensors commonly used in gates are inductive loops, optical barriers and limit switches. Controllers can be traffic lights, sirens and barriers, for example. These devices can operate by voltage edge/level or by configurable pulse.

Any device that is electrically compatible with ITSCAM's inputs and outputs can be connected to the WeGate system. However, if the device does not operate by edge/level/pulse or requires a specific protocol, customization must be done in ITSCAM to integrate the sensor/control signal.

ITSCAM Inputs and Outputs (IOs): The electrical interface of the IO pins of the Pumatronix device is opto-coupled. More details on how to make a connection are available in the ITSCAM manual.

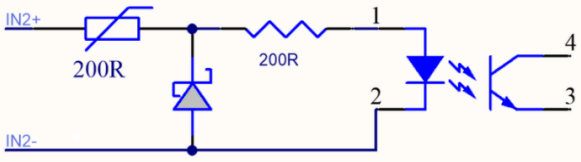
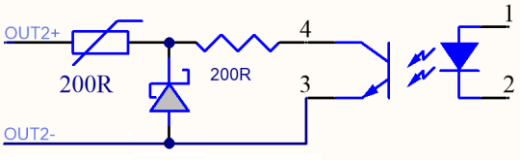
Entrada	Saída
	
Recommended current: 10mA Maximum supported current: 20mA	Maximum supported current: 30mA Maximum supported voltage: 28Vdc

Figure 32 - Circuit of isolated input/output signals of the ITSCAM 400

To configure a *sensor*, an identification must be created and then specified:

- *Gate*: Gate in which the sensor is installed;
- *Name*: Unique identifier to name the sensor;

- *Type*: Sensor operating logic;
- *Detection*: Way in which a change is detected in the sensor;
- *Edge*: Sensor edge type;
- *Input Port*: Port in ITSCAM where the connection with the sensor occurs.

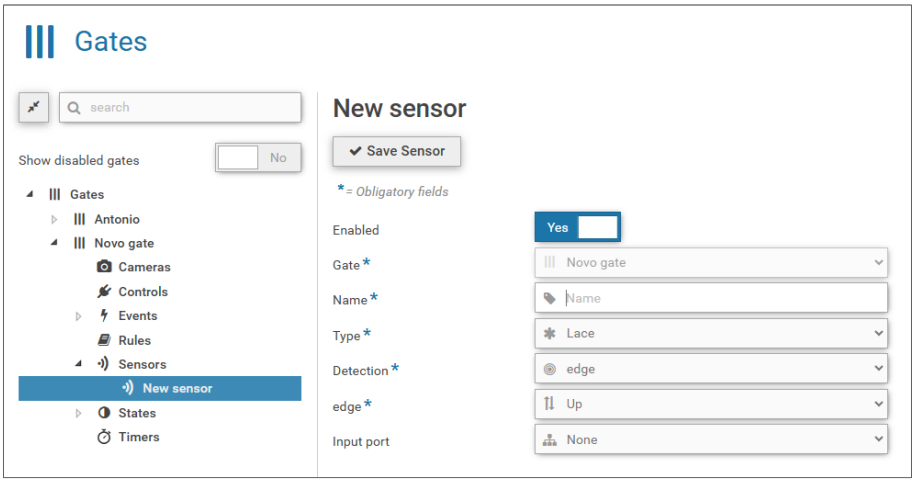


Figure 33 - Screen: Gates > New Gate > Sensors > New Sensor

Configuring a *control* (or actuator) is similar to that of a sensor, as it requires the following to be specified:

- *Gate*: Gate in which the control is installed;
- *Name*: Unique identifier for the control;
- *Type*: Actuator operating logic;
- *Activation*: How the command should be entered to activate the change in the actuator state;
- *Level*: How the control is changed;
- *Output Port*: Port in ITSCAM where the connection with the control occurs.

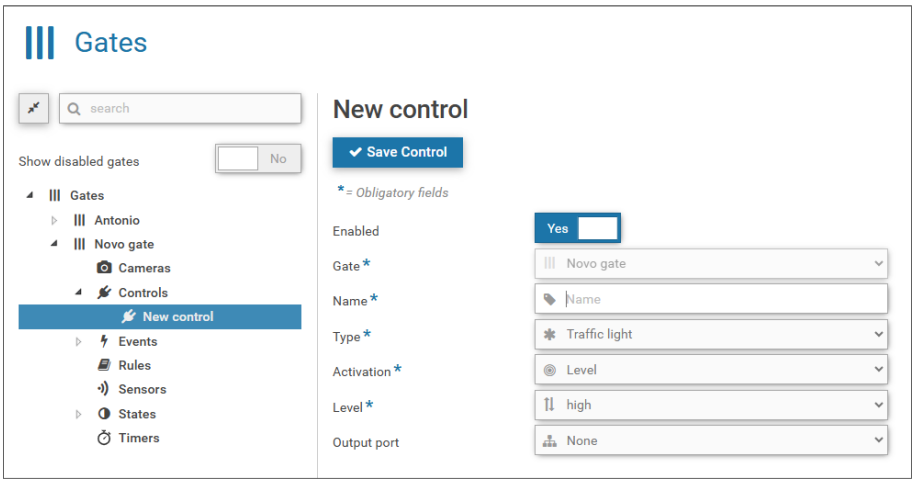


Figure 34 - Screen: Gates > New Gate > Controls > New Control

6.7.3. Viewing Gate Data

When selecting the gate, clicking on its respective name in *Registrations > Gates*, the number of capture devices, controls, sensors, states, rules, events and timers registered will be displayed for quick viewing. Also, the operating status (enabled or not), the assigned name and the external identifier used and the steps defined for Gate Initialization.

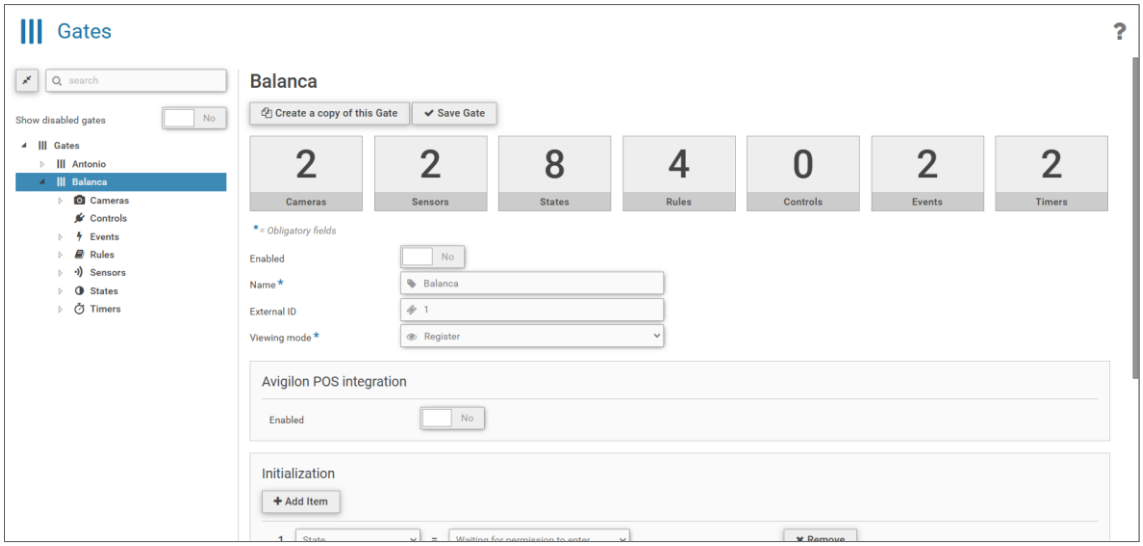


Figure 35 – Screen: Registrations > Gates

6.7.4. Creating Timers

In WeGate, timers correspond to the use of a device to make the system wait a period of time for some change, before invalidating or completing the vehicle passage. To set a timer, the desired time must be entered in seconds:

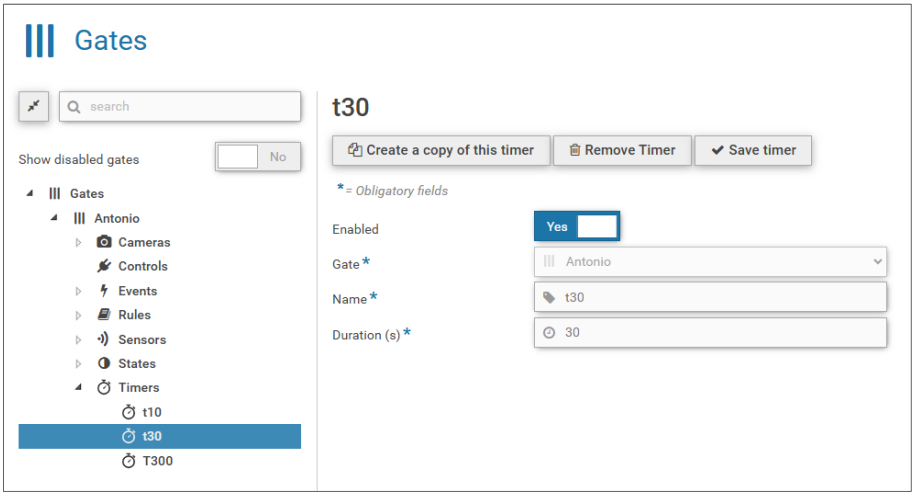


Figure 36 - Screen: Gates > New Gate > Timers

6.7.5. States and Events

The WeGate system can receive commands via webservice, which allows applications to send and receive data in XML format. The data to be communicated via webservice is registered by accessing *Registrations > Gates* and entering the possible *States* and *Events* that will be communicated during the operation of the monitored gate.

The default system *States* are used to create the rules, without the possibility of editing:

- Waiting for permission to enter;
- Collecting images;
- Disabled;

- Entering;
- Waiting to complete input;
- Waiting to complete output;
- Exiting.

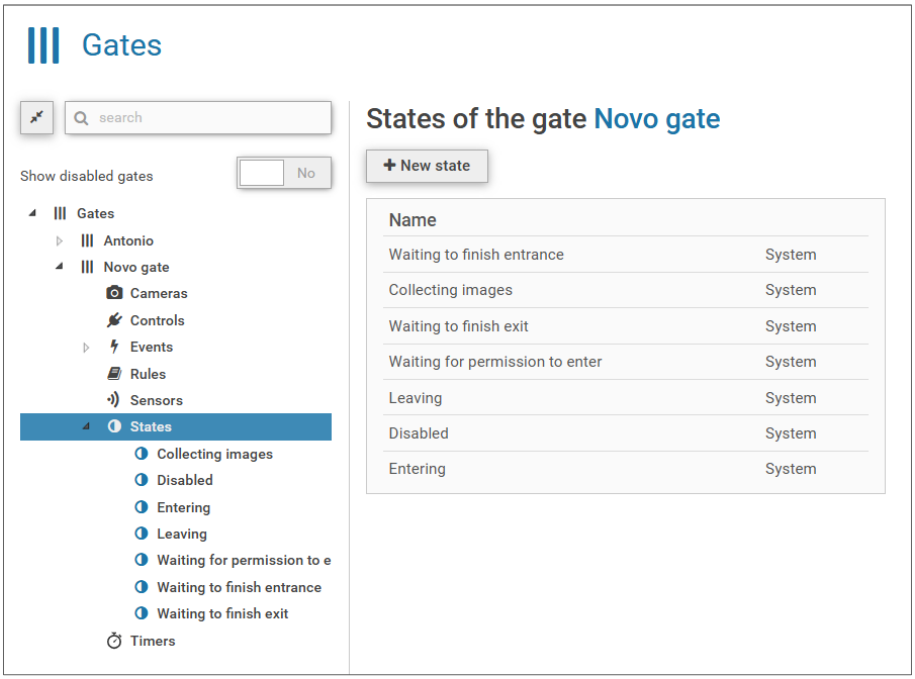


Figure 37 - Screen: Gates > New Gate > States

New events can be added according to the specific demands of the project. Only the standard system events cannot be edited:

- Ready to enter;
- Transaction result.

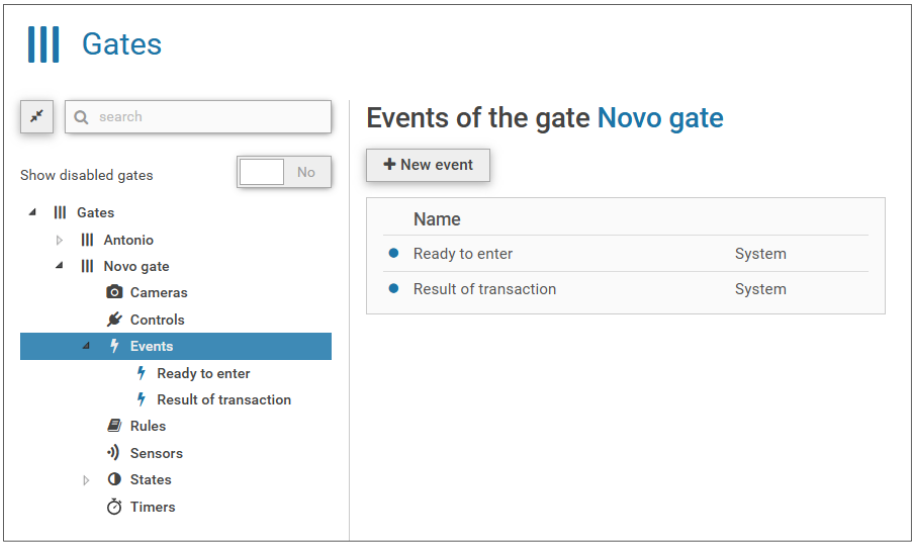


Figure 38 - Screen: Gates > New Gate > Events

6.7.6. Gate Initialization Configuration

When creating a new Gate, the correct operation of detecting a new record occurs when the sequential action steps of the sensors, actuators and capture devices are defined, which process a new record in the registered Gate together with the application of states, events, rules and timers. On the Gate data viewing screen, in the *Initialization* option of the selected gate, it is possible to configure the "initial state" of the state machine by clicking on *+Add Item*.

After registering all devices, it will be possible to select them to configure the initial state, by order of actions, indicating how they should be presented in each new registration operation in the selected gate.

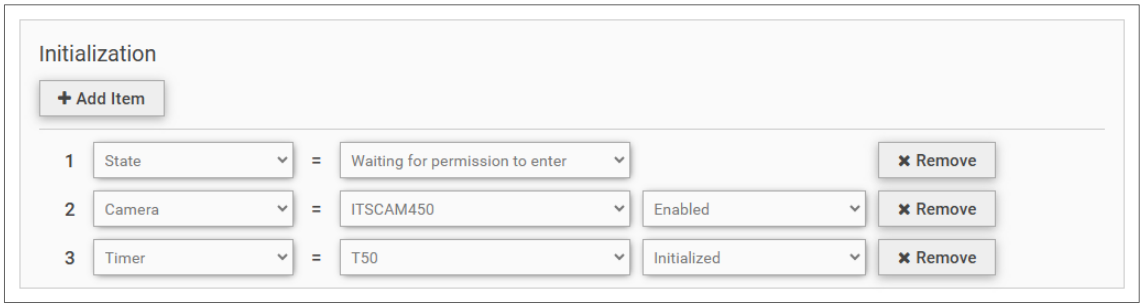


Figure 39 – Gate Initialization Screen

The sequence of actions after Gate Initialization in the processing of a new registration must be registered in the Gate *Rules*.

6.7.7. Rules Configuration

The rules are the transition commands that indicate the change between the system *States* (created for each gate) and are used to shape the behavior of WeGate. The "initial state" of the state machine of each gate can be configured as indicated in Gate Initialization. To add a rule, a *Name* and its position in the *Execution Order* must be entered.

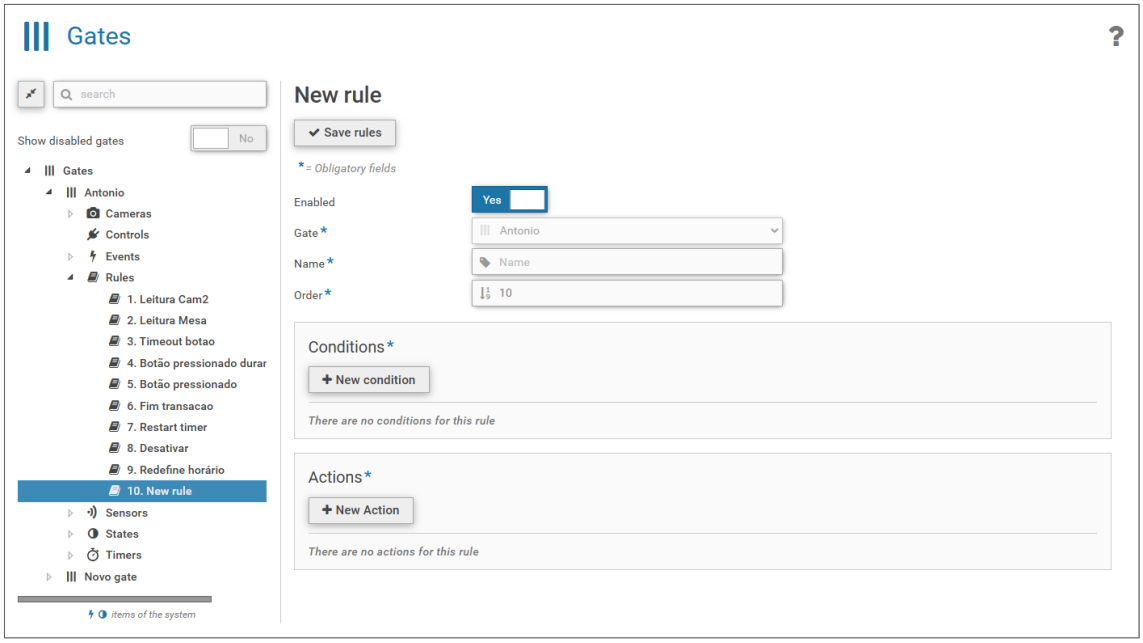


Figure 40 - Screen: Gates > New Gate > Rules

For the rules to be executed, it is necessary to configure at least one condition and one action in the vehicle passage operation, considering that each gate can only have a single passage operation occurring at a time, which means that only one vehicle (transaction) can happen at the gate at a time:

- *Conditions*: add in sequential order the conditions for the rule to be activated and execute the actions, which can be:
  - Event received
  - Active state
  - Sensor activated
  - Camera
  - Timer expired
- *Actions*: add in sequential order the actions that will be taken on the devices, based on the established conditions. The elements that can receive an action are:
  - Control
  - Status
  - Timer
  - Camera
  - Sensor
  - System

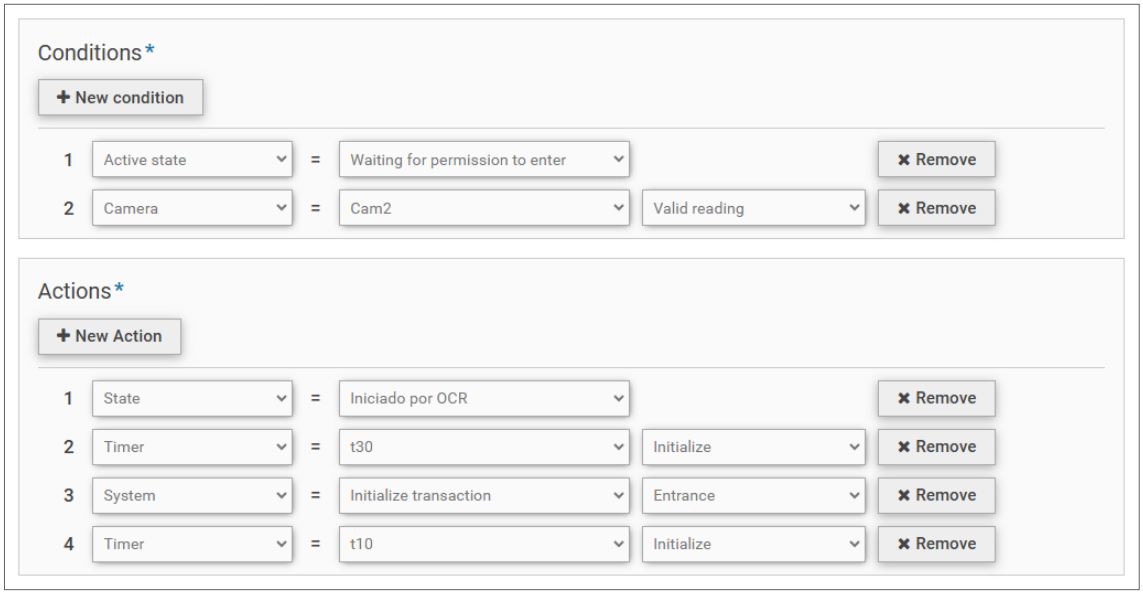


Figure 41 - Screen: Gates > New Gate > Rules

Registering a passage in WeGate has a minimum structure of actions. A passage must have an action that describes how its start is identified, when the record must be transmitted and how it is identified that a passage has ended:

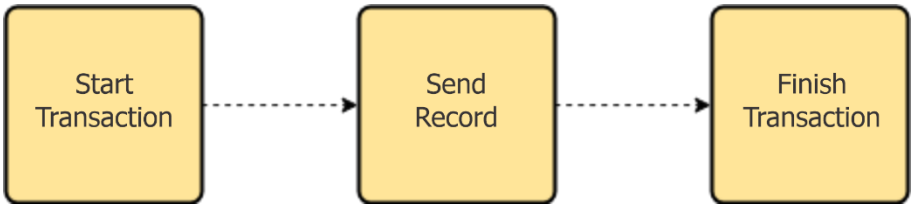


Figure 42 – Sequence of minimum procedures for detecting a passage

Information Discrepancies: Discrepancies may occur between the record data sent by the webservice and that stored in the database, depending on the gate's operating architecture and the time chosen to send the record.

6.7.8. Registering Monitored Vehicles

WeGate can inform through visual and/or audible alerts, when the system identifies a license plate, container code and/or wagon registered for monitoring, in *Registrations > Monitored Vehicles*. Visual and/or audio alerts, which indicate the existence of monitoring associated with the record, are issued when WeGate consolidates a transaction.

There is also the option of an empty monitoring record for one or more items: Unread license plate: 0000000, Unread container: 00000000000 and/or Unread wagon: 000000000000. In this case, the alerts inform when identification was not possible.

7. First Access

WeGate can be accessed in browsers from devices that are on the same data network. This access is done by typing the IP address provided in the navigation bar. Next, it must enter the user credentials on the login screen:

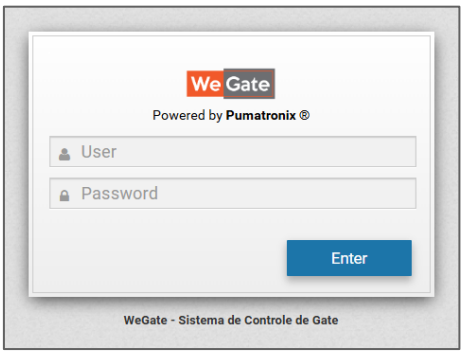


Figure 43 – Login screen in the WeGate system

If the main user of the system is not provided, use the user *admin* and password *admin*. However, when accessing the system for the first time, it is recommended to create other users and restrict access to the WeGate *administrator* account.

The first time it log in to the system, the *Gate Panel* screen is displayed. To correctly control the flow of vehicles at the gate, it is recommended to check whether the sensors and devices have been configured correctly. The screen layout can be changed in the user account.

8. Care and Maintenance

Some precautions are necessary to ensure the performance of the product and extend its useful life.

Product Risks: Using the product presents risks, which are presented in the Handling Risks section.

8.1. Preventive Maintenance

The maintenance options provided by the WeGate system are available in the *System > System Maintenance* menu:

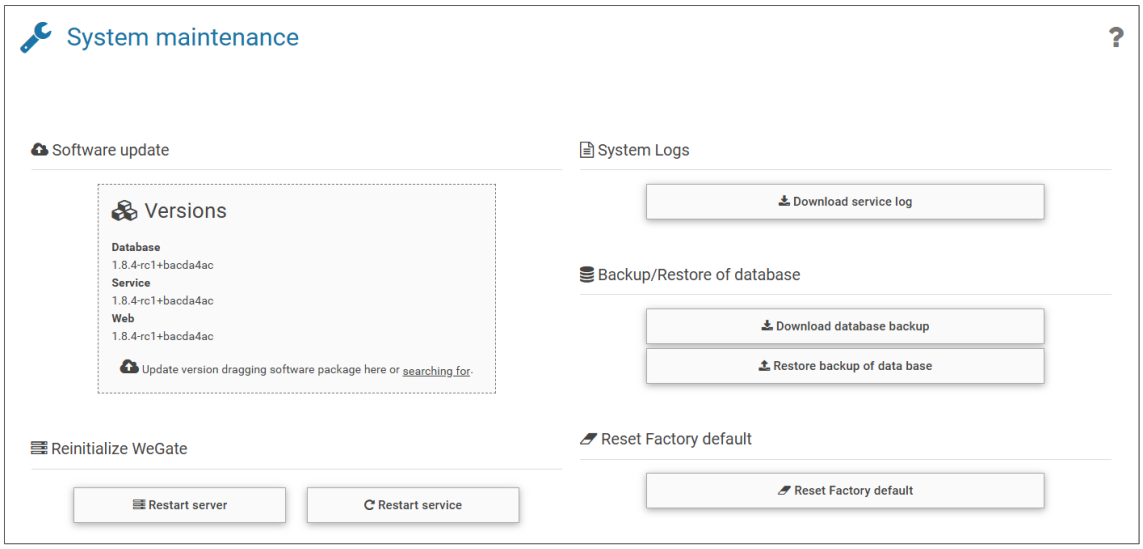


Figure 44 – Screen: System > System Maintenance

8.1.1. Software Update

WeGate has software packages that can be updated individually, with the update process being carried out entirely in the background, after the file is sent to the server.

When choosing to update to a more recent version, it is recommended to make a backup of the database before processing the update.

The option to downgrade WeGate to a previous version is not supported by the system. For this type of procedure, contact Pumatronix Technical Support.

8.1.2. System Logs

The Log displays all operations performed by WeGate in the background and allows to evaluate the system's operation. The main function of the service log is to assist the development team in analyzing anomalies that may occur in the system.

8.1.3. Restarting WeGate

Occasionally, situations may arise in which it is necessary to *Restart the server*, both to apply changes made and in the event of a crash.

When using the WeGate *Service Restart* functionality, the server does not need to be restarted.

Restart the Server: Requesting a WeGate restart causes all connections with the capture devices to be interrupted during the process and there may be a loss in vehicle recognition during this period.

8.1.4. Corrective Maintenance of the Database

WeGate allows the creation of complete system backups. The database backup files are generated in a specific format and can only be used by WeGate.

System Restore: When restoring a database in WeGate, all information that was stored in the equipment (including images) will be overwritten.

Restore Factory Defaults: When restoring a WeGate installation to the factory version, all information that was stored (including images) will be erased.

8.2. Equivalence with the Real Environment

WeGate is a generic system that can be used in a wide range of infrastructures. This is because the physically available sensors and actuators can be modeled and configured. Thus, the operating flow of a gate, which generally follows operating standards, is modeled in the system with all the steps. Since it is up to the system operator to configure WeGate to function correctly, it is recommended to follow the guidelines available in the legislation for configuring the system and to perform periodic checks on the current configurations.

8.3. Robust Network Infrastructure

The information generated by WeGate can be transmitted to other systems using a data network. For this reason, it is recommended to maintain a robust network infrastructure to avoid compromising the transfer of the generated information.

When a maintenance procedure is performed on the data network, the operation of existing gates must be regularized.

8.4. Storage Limit

It is recommended to make sufficient disk space available so that WeGate can operate without the need for storage recycling. This space can be estimated by the size of the flow of vehicles that travel through the gates monitored by the system.

8.5. Quality Images

The image capture devices used in WeGate must be inspected periodically, that is, the quality of the images provided must be assessed. If artifacts are displayed in the images or there are areas covered by dirt, the equipment lenses must be cleaned. Another situation that may impact the quality of the images provided is a change in the framing. In this case, the equipment must be repositioned, always following the guidelines indicated in Adjusting the Positioning of Capture Devices.

8.6. Sensors and Actuators Working Correctly

The equipment installed and used in the gate must be inspected periodically, as the sensors directly interfere with the behavior of WeGate. By inspecting the devices, the impact on the system's operation is prevented, since a transition may be conditioned by the signal sent by a sensor that is malfunctioning.

9. Privacy Policy

In compliance with the General Data Protection Law (LGPD) - Law No. 13,709, of August 14, 2018, this product has programmable functions for capturing and processing images that may violate the LGPD when used in conjunction with other equipment to capture personal data.

The equipment does not collect, use or store personal information, whether sensitive or not for its operation.

Pumatronix is not responsible for the purposes, use and processing of the captured images, and the control of the information and methods of operation of the product are the exclusive decision of the user or purchaser of the product.


PUMATRONIX
www.pumatronix.com