Sorb Documentation

Sorb Documentation

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Contents

Getting Started

Let's discover hardware and software complex SmartRoad!

System Requirements

> **START HERE**
>
> First of all, please read these guidelines.

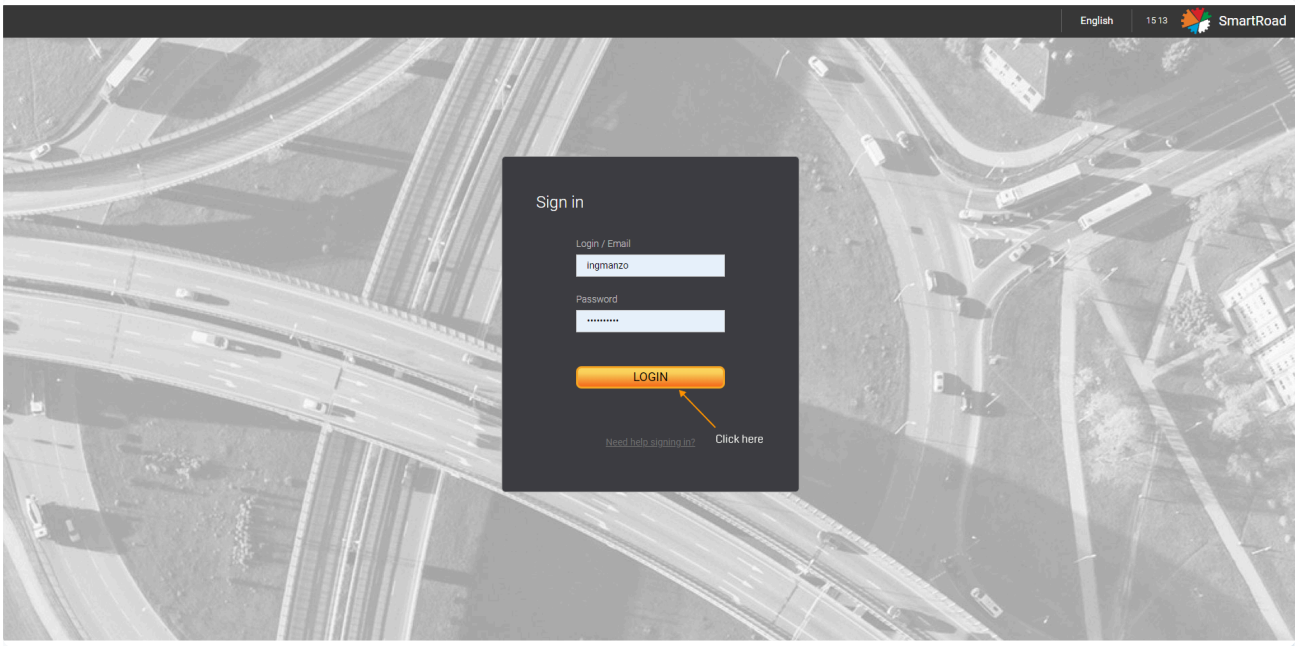
A wired broadband or wireless Internet connection (4G/LTE) is required to use the System, and the connection speed at least 300 kBit/s.

- Recommended browsers:
  - Google Chrome versions 80 and above.
  - Yandex Browser version 21 and above.
  - Microsoft Edge version 114.0.1823.37 and higher.
  - Firefox versions 74 and higher.

Login and authorization

You should first contact the `superadmin` of Sorb Engineering LLC to obtain access rights to the SmartRoad web interface. The `superadmin` will provide a web address, login and password to access the SmartRoad system.

Next, you will be able to log into the web address specified by the `superadmin`. On the page that opens, then enter the `username` and `password` and click on the *Authorization* button.



KEEP IN MIND

In case of issues, please contact the support team by e-mail: supportdt@sorb-group.ru. You should include a brief description of the problem.

SmartRoad system structure

SmartRoad System – it is a suite of software modules and hardware components which are combined into a single system designed to monitor road traffic flows and its conditions. The system web interface is a key element of the solution.

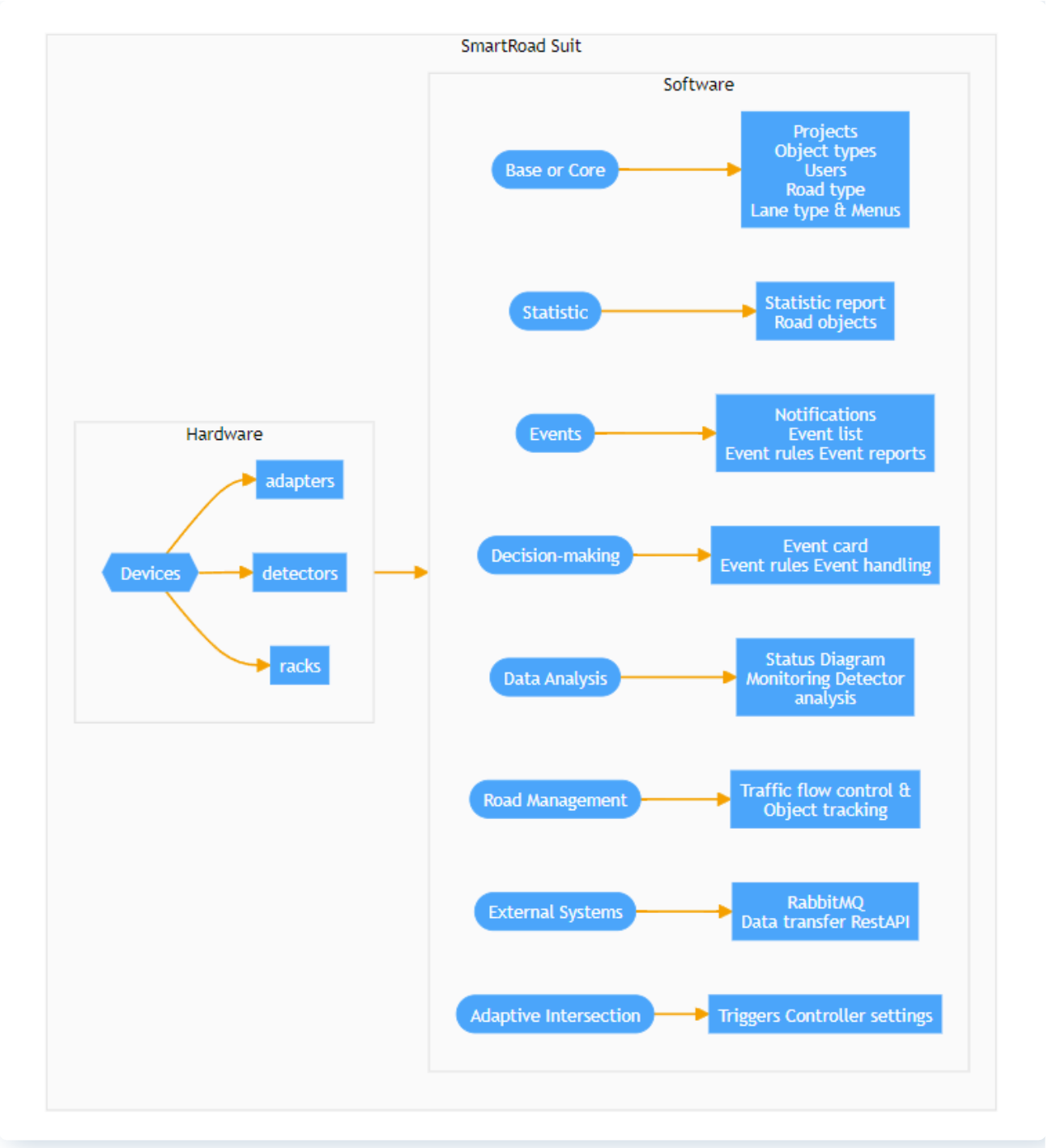
This *SmartRoad Web Interface* is a collection of web pages that provides a user interface for interacting with the System via the HTTP protocol and a web browser.

The web interface structure, like the structure of the SmartRoad system as a whole, is modular and consists of the following elements:

1. The SmartRoad web interface (Base or Core module).

2. The statistic module.
3. The event module.
4. Decision-making module (under development).
5. The module of primary data analysis.
6. The road management module.
7. The module for interaction with external systems.
8. Adaptive intersection management module (under development).

This modular structure is represented in the diagram below.


SmartRoad Suit
Software
Base or Core
Projects
Object types
Users
Road type
Lane type & Menus
Statistic
Statistic report
Road objects
Events
Notifications
Event list
Event rules Event reports
Hardware
adapters
Devices
detectors
racks
Decision-making
Event card
Event rules Event handling
Data Analysis
Status Diagram
Monitoring Detector
analysis
Road Management
Traffic flow control &
Object tracking
External Systems
RabbitMQ
Data transfer RestAPI
Adaptive Intersection
Triggers Controller settings

Getting Started / Glossary

Terms and abbreviations

In this page are described relevant terms and the list of abbreviations mostly used in this documentation.

Term or abbreviation	Definition
Adapter	The software module of the SmartRoad suit that is designed to process and transform data, received from the detector for further transmission to the system
Administrator	A user with special sets of access rights
Superadmin	Administrator of Sorb Engineering LLC, who has has a special set of access to rights to projects on the system
ACYDD	Automated traffic control system
ARM	Automated workstation
DB (PostgreSQL)	A database designed to store information and is part of the Smartroad software suit. The database can be installed either on a mini-PC, in a separate traffic control point or in a shared server that allocates the project
Detector / DT	Transport detector

Term or abbreviation	Definition
Mini-PC	Device on which the adapter is installed and analysis of data from detectors is carried out
Operator	A user who has been granted the operator role to work with recorded events
User	A user who has been granted the manager role to escalate an issue that was not closed within the specified time frame.
Rule	A set of parameters that determine the norms of characteristics of objects and/or traffic flows recorded by the detector
Picket	Distance marking point at highways in 100 m increments
PNR	Starting-up and adjustment works
PUIDD	Register point of traffic flow intensiveness
Real time mode	An information processing mode that ensures the interaction of the Information Processing System with processes external to it at a pace commensurate with the speed of these processes.
System PAK *SmartRoad*	Software and hardware complex for monitoring traffic flows.
Event	A deviation of the characteristics recorded by the detector of objects and/or traffic flows from the rules established on the

Term or abbreviation	Definition
	system. An unforeseen or undesirable situation that may disrupt the normal movement of traffic or safety on the road
TS	Transport facility or vehicle
Trigger	A set of conditions for the occurrence of an eventwhen the parameters of the traffic flow change. When a trigger event occurs, the relay is actived
Relay	Device for closing and opening an electrical circuit
ETA	The period during which a particular vehicle reaches its destination
JSON	Text-based data exchange format based on JavaScript
PVR (Per vehicle record)	The basic statistical unit of recording an object of motion. Vehicle registration
RabbitMQ	Software message broker based on the AMQP standard. Sends processed data from the adapter to a queue
SQLite	Compact embedded DBMS, installed on a mini-PC
WebSocket	Bidirectional communication protocol between the client (browser) and the server, allowing the exchange messages in real time
Resource	The program code located on the SmartRoad package server at a specific `URL` for processing `RESTfulAPI` requests, which accepts the

Term or abbreviation	Definition
	request parameters as input and returns the corresponding data processing result

Getting Started / Frequently Asked Questions

In this section you can find useful information related to frequently asked questions (FAQ)

Some possible issues

In the next table are described some issues that my occur when working through the UI

Issue	Solution
The user is not able to log in	First, check if the login and password are entered correctly. Repeat authorization. If an email address was specified in the user account during registration, the user can reset the current password and by clicking on the link and re-authorize. If authorization fails again, contact support.
The web interface displays the message `Error loading database`	Check your Internet connection, reload the page and repeat the request. If the error persists, contact support
The detector has changed its operating status	Contact support with a brief description of the problem

> **INFO**
>
> Please contact our support team (by email `supportdt@sorb-group.ru`) and send a brief description of the problem if the issue has not been listed

Help Desk

In case of problems related to hardware or Smartroad software package, the user must contact the Sorb Engineering technical support service.

Here the method for submitting inquiries:

- Inquiries must be sent by email to `supportdt@sorb-group.ru`. The applications are processed 7x24 hours.

In addition, the required information that should be remitted to contact support:

- Full name of the user and name of the customer organization.
- User's email address.
- Name of the web interface module in which the problem occurred.
- Product version number
- Description of the problem

Getting Started / Release Notes

3.7.103298

July 24, 2024

Features

- Added menu items: `System Settings`, `Classifier` and `Superadmin`.
- The parameters for adding a user have been changed.
- *Classes of road objects* has been replaced by *Classifier*.
- A new parameter has been included to the addition of a group of vehicle classes – the *Reduction coefficient*.
- The `Organizations` page has been moved to the `Superadmin` menu.
- *Detailed report* - added new settings for building the report.
- Viewing information about the detector on an interactive map - The pop-up window has been changed.
- *Road Editor* - the names of the menu items in the text section have been renamed.
- The toggle `Configuring classes by bands` on the page for adding event rules has been removed.
- The parameters of the detector list also have been changed.

Fixes

- *Export reports* – removed one of the three possible export formats.

- *Event rules* – changes have been made to the names of menu items and the `Date of change` parameter has been removed.
- Changes have been made to the *Status Chart* – now chart export is available only in Excel format.
- In the algorithm for removing double objects, the unused value of the control packet identifier for sending to the relay and the unused field have been removed.

3.7.103261

May 23, 2024

Features

- *Editing information about the detector* - descriptions of the fields for the multicast have been added.
- *Notifications about fixed events for operators* have been added to the `Top panel`.
- Improvements have been made to the description of the *display of detector groups* on the interactive map.

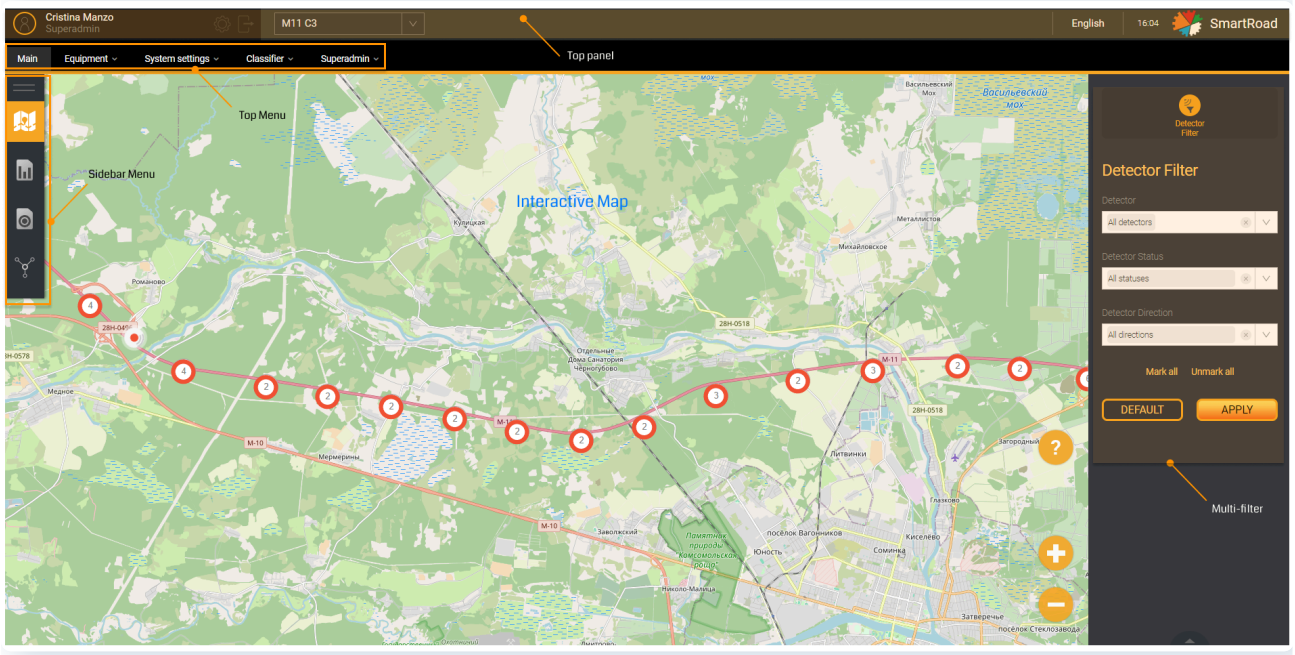
System Basics / SmartRoad Base module

The core of the web interface is the main part of the System, to which other modules are connected.

Home page

Home `page–menu` - item to return to the main page of the web interface.

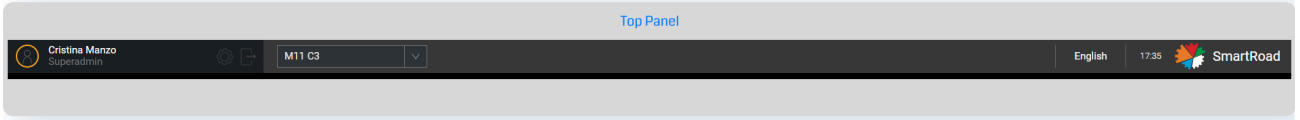
The home or main page is the main section of the web interface. It contains a top panel, a top menu, a side menu, an interactive map as well as a multi-filter (on the right).



Top panel

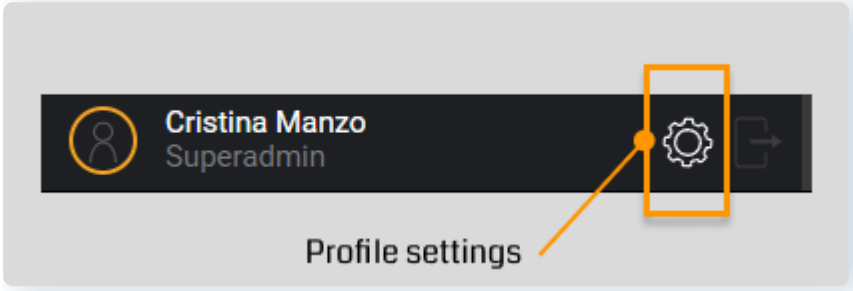
The top panel contains:

- user account information;
- information about the operational monitoring block (optional functionality if the user is an administrator or event rule operator);
- menu button "Profile Settings" to set up a user account profile;
- button to exit the web interface;
- drop-down list "Project Selection";
- drop-down list "Interface language";
- current time of the user's computer;
- Smartroad logo.



User profile

The *User profile* is designed to display information about the current account in the web interface.

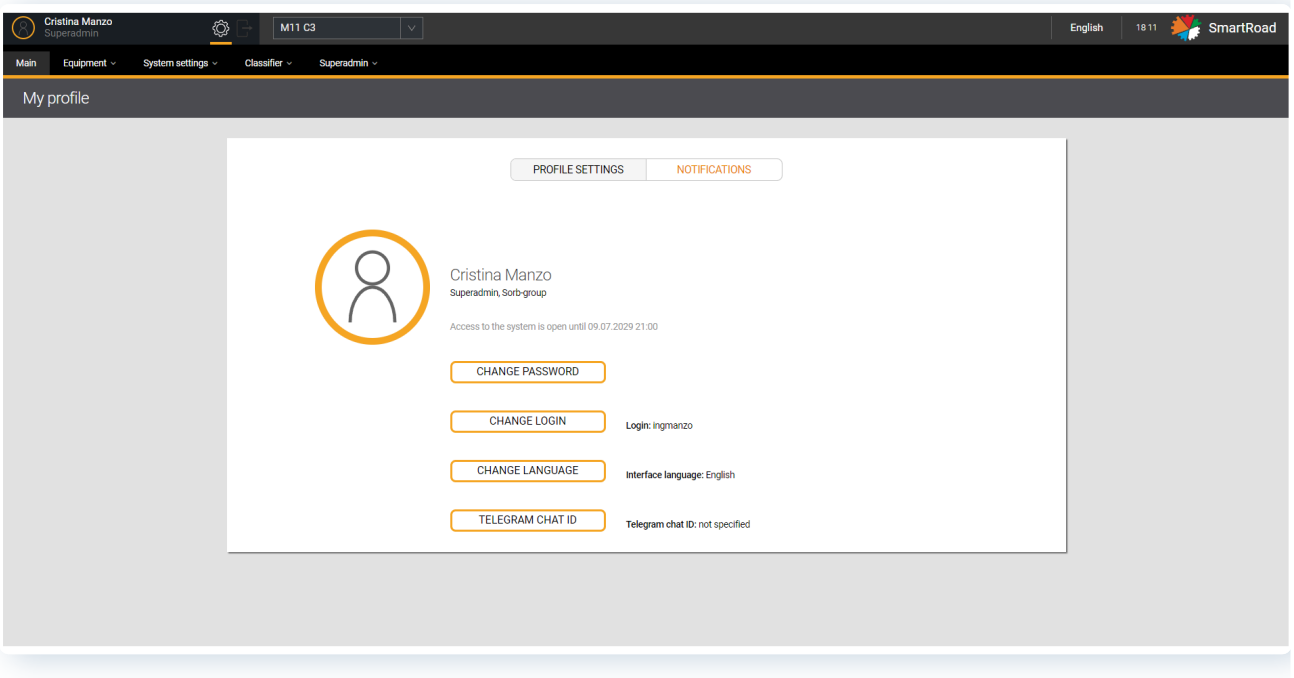


Click on `Profile settings` icon in the top panel to the right of the user's name to go to the `My Profile` menu. This menu allows you to change user account settings.

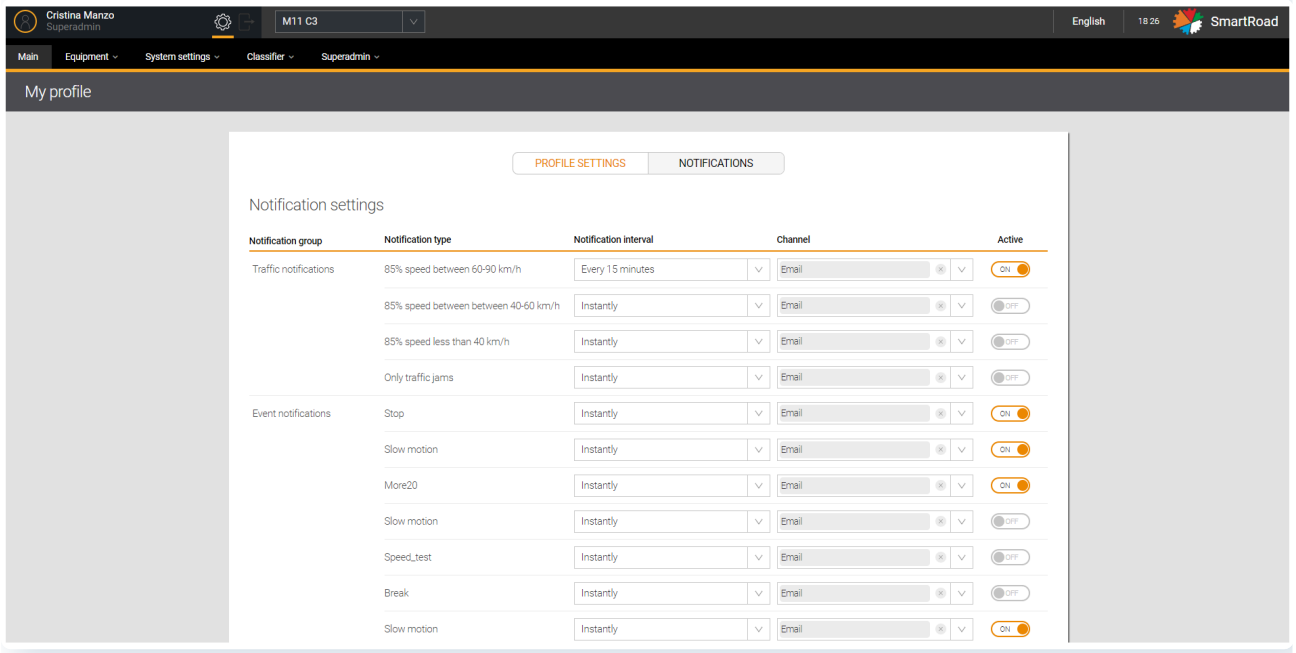
In chapter "Profile Settings" the user can:

- change avatar image;
- find out the expiration date of your account;
- change password;
- change login;
- change the language;
- indicate Telegram chat ID.

You must contact the Super administrator of the Sorb Engineering System to extend the validity period of your account.



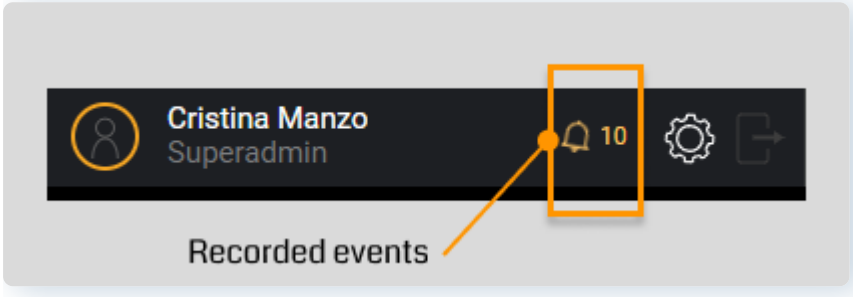
In section `Notifications` the user can configure to receive notifications about events by email or Telegram.



Click on menu item `Home page` to exit the menu `My profile`

Notifications about recorded events for operators

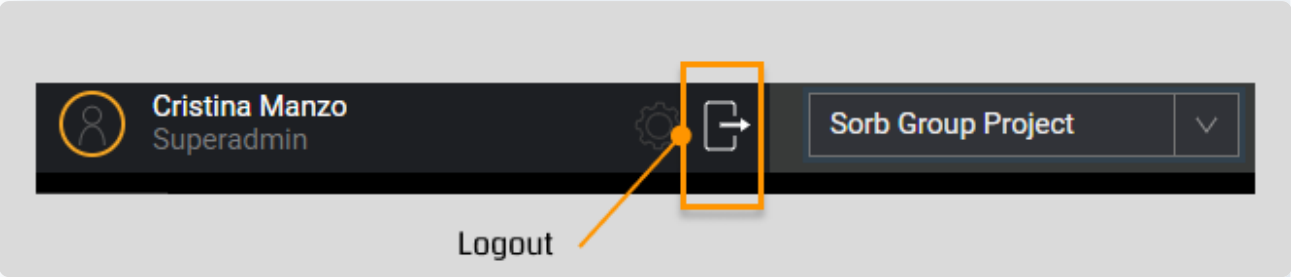
Notification area displaying the number of events that remained unprocessed before the automatic closing time expired. The number of active (unclosed) events should be displayed to the right of the icon.



Clicking the notification area icon opens a modal window "Events to process". See `Event to process` section for more details.

Change user

You should to click on the logout icon in the top block of the toolbar to the right of the icon to change the user in the web interface.



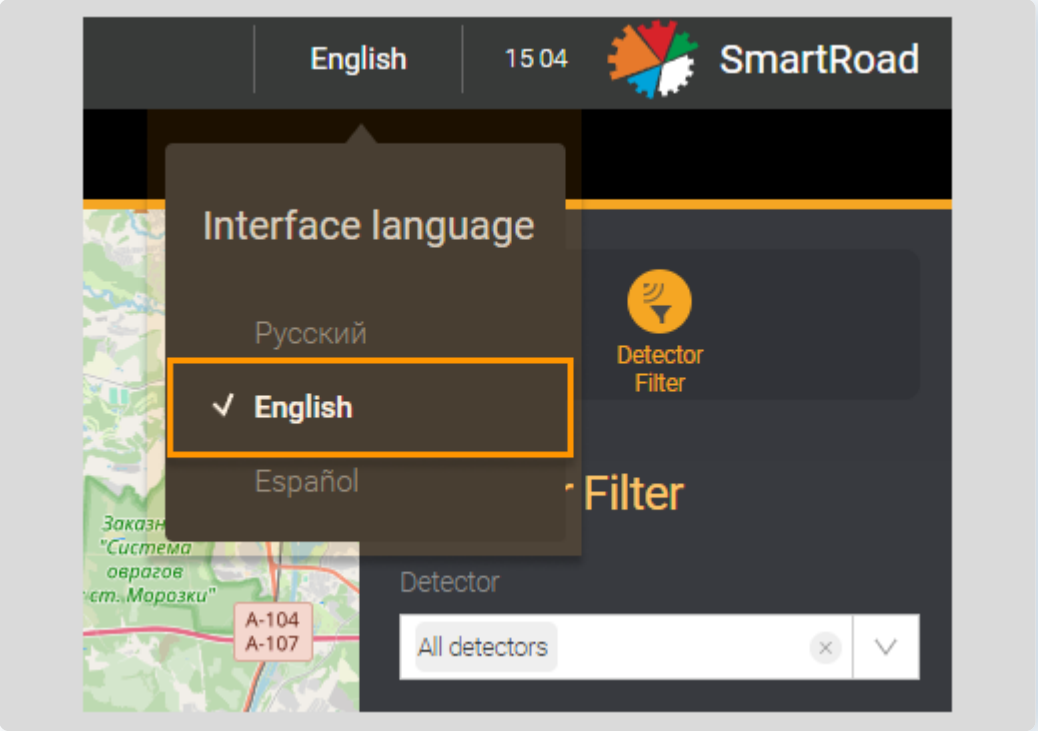
Project selection menu

Menu item `Project Selection` implemented by a drop-down list and allows you to select a project for which the user can monitor.

When clicking on the specified menu item, the user is shown a list of projects available for selection.

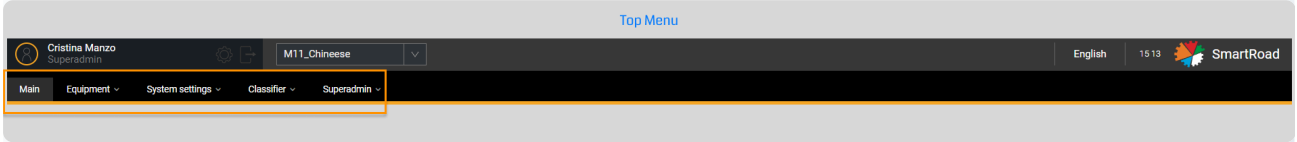
Interface language menu

The menu is implemented in the upper right corner of the top block of the page toolbar, as well as in the section `Profile Settings` to the pages `My profile`.



Top Menu

Panel `Top Menu` is intended for configuring equipment and the system as a whole. Only Administrators have access to the menu.



In the top menu, the user has access to tools for adding and configuring detectors, setting access rights to the system and its sections, setting up the classification of road objects, adding and configuring adapters, etc.

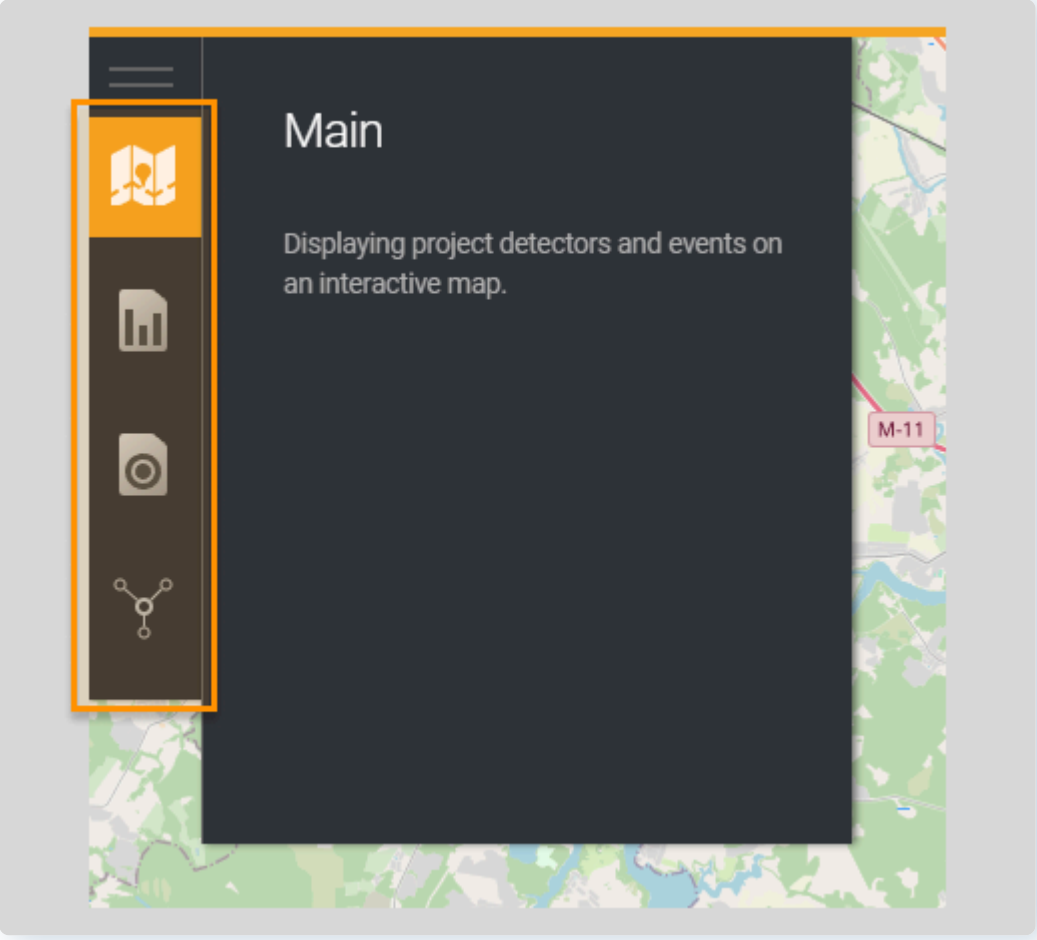
The top panel also contains a **Navigation menu** for the web interface which includes

- Home or main page

- Equipment (i.e. hardware components): Detectors, Adapters, Cabinets or racks, Logs, Road parameters.
- System settings: Event rules, Projects, Users, Roles
- Classifier: Groups of classes, Types of roads and types of lanes.
- Superadmin: Developer settings, Organizations.

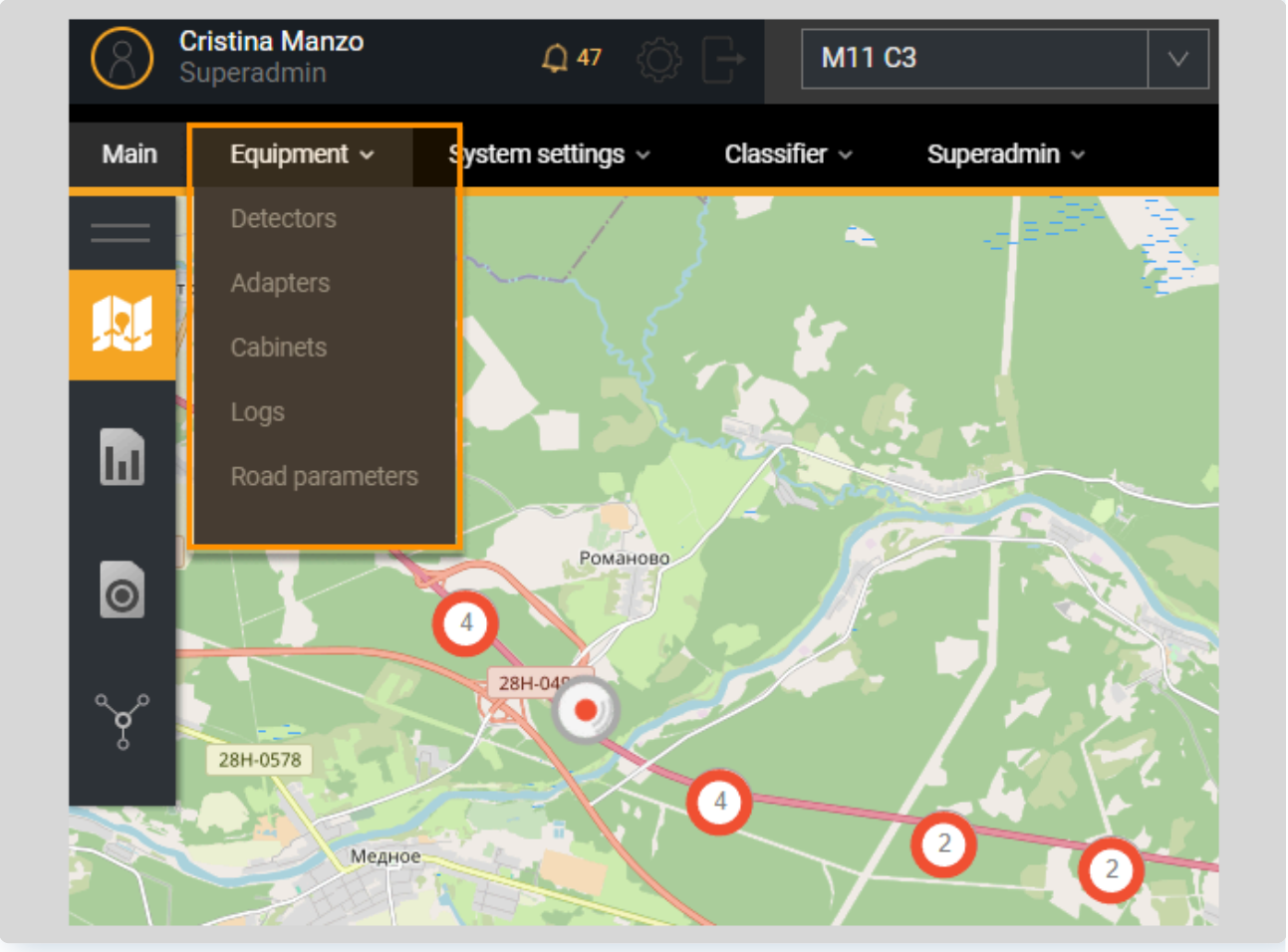
Sidebar Menu

The `sidebar menu` is intended for navigation through sections of the System. Navigation is carried out by clicking on the required section of the side menu. It provides the sections: `Home or main page`, `Statistics`, `Events`, `Primary data analysis`.



System Basics / Hardware components

The menu item `Equipment` is designed to add, configure, edit and remove devices from the System.



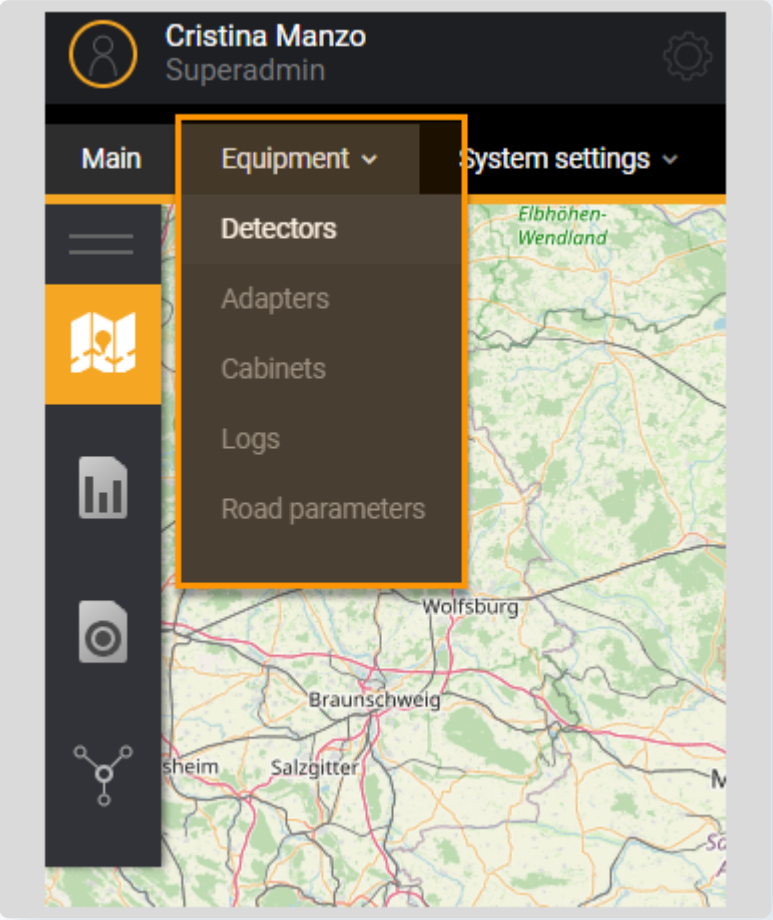
This section includes:

1. Detectors

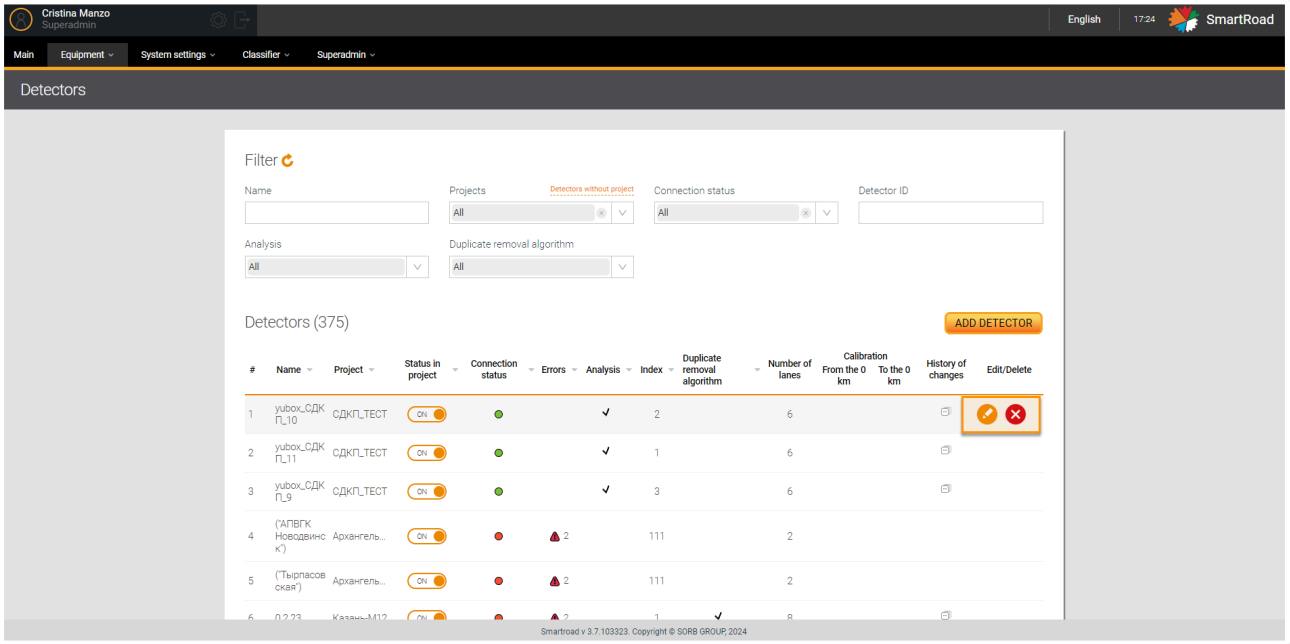
2. Adapters

System Basics / Detectors

The `Detectors` section is designed to add, edit, configure, and remove detectors from the System.



When you click on Menu item `Detectors`, you go to the detectors page which contains a filter and a list of all detectors existing in the System. The filter specifies parameters for sorting detectors by name, project, connection status, ID, state of the switch responsible for the primary data analysis, and application of the duplication algorithm.



Next to the `list name` of Detectors, information about the total number of detectors in the System is displayed.

In the table below the Filter parameters on the Detector page

Parameter	Description
Name	Field for entering the detector name
Projects	The drop-down list displays a list of projects available to the user
Detectors without project	Clicking on the button displays all detectors that are not associated with the project
Connection status	The drop-down list displays a list of available detector operating statuses. The choice is made by setting a checkbox. By default, all connection statuses are selected

Parameter	Description
Detector ID	Field for quick sorting of detectors by detector ID
Analysis	Application of primary analysis of data coming from the detector
Doubling algorithm	Applying the phantom object removal algorithm

The list allows you to sort by the parameters specified. In addition, the Detector list parameters

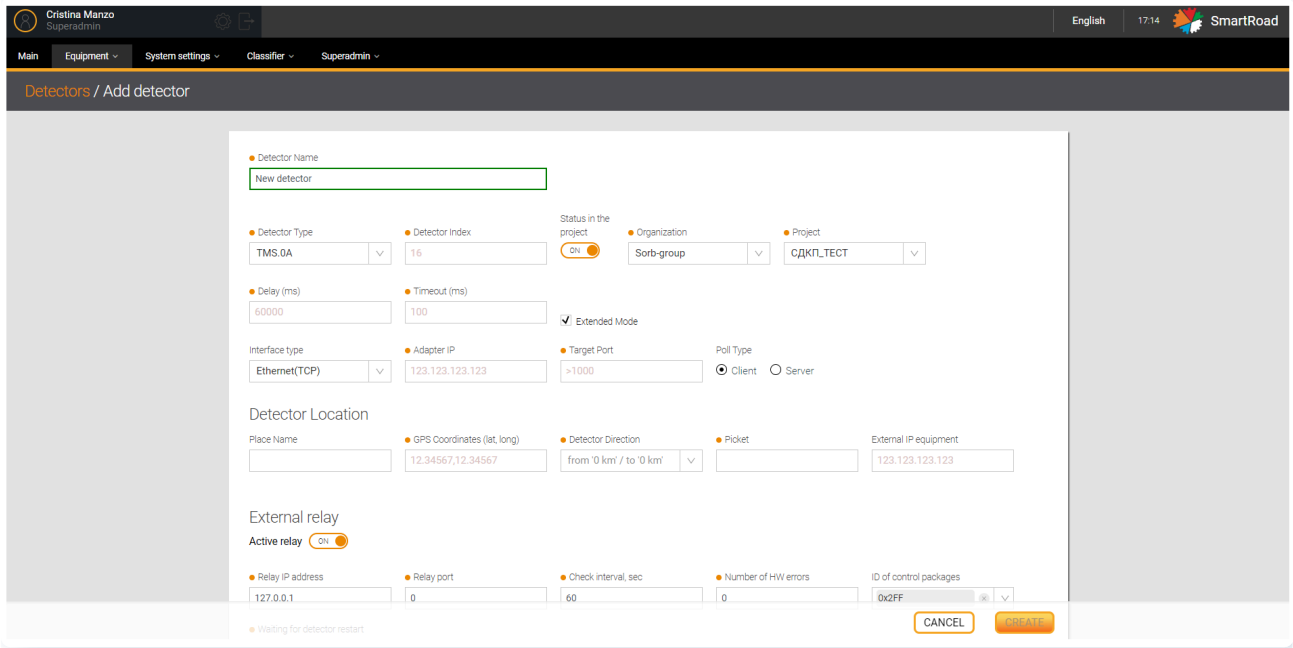
Parameter	Description
#	The serial number of the entry in the list
Name	Detector name specified when adding the detector to the system
Project	The project to which the detector belongs in the System
Project status	Status of adapter connection to the detector. The status is displayed as a switch. When you click on the icon, the detector status changes to inactive
Connection status	Detector connection indicator. The element shows the status of data exchange with the detector; detailed descriptions of detector statuses in Detector operation status section.
Errors	An exclamation mark icon is displayed if all fields are not completely filled in when adding a detector

Parameter	Description
Analysis	Application of primary data analysis for this detector
Index	The detector index is entered in the field, which is assigned depending on the number of detectors in a given project (PUIDD 1, Adaptive intersection 4)
Doubling algorithm	Whether or not a phantom object removal algorithm is used for this detector
Number of lanes	Number of lanes on the road on which the detector is installed
Calibration	% discrepancy between statistical data and actually received data for the selected time interval
History of changes	Detector movement history

Adding a detector

Adding a new detector to the System is done by clicking on the button `Add detector` to the pages `Detectors` and on the interactive map at `Home page` left click and click on the button `Create detector`.

The administrator must be sure that the detector transmits data to the System - the equipment is available and the software is configured.



In the table are described the Add detector page parameters

Field name	Field description
Detector name*	The unique name of the detector is entered in the field
Detector type*	Select the series of the custom detector from the drop-down list
Detector index*	The detector index is entered in the field, which is assigned depending on the number of detectors in a given project (PUIDD 1, Adaptive intersection 4)
Project status	The switch that is responsible for turning on detector to the list of those polled by the adapter when connecting to adapter via DB or RabbitMQ. If you configure the adapter through a config file to display the detector in the web interface the commands sources must be specified. Otherwise the detector wont be displayed on the map

Field name	Field description
Organization*	The organization to which the detector belongs in the System. It is displayed if more than one Organization is registered on the System
Project*	The drop-down list indicates the project in which the detector will be included
Data latency *, ms	The delay time for receiving data from the detector is entered in the field. By default it is recommended to specify value `= 60000`
Waiting for connection*, ms	The wait time for detector connection is entered in the field. By default, it is recommended to specify value `= 100`
Advanced Mode	Checkbox for enabling advanced mode to the detector. This mode should only be enabled for detectors with series TMS.0C
Interface type	In the field, select the type of connection to the detector

DANGER

Depending on the type of `DT created`, the set of fields for filling out will change

Interface type Ethernet (TCP), Ethernet (UDP)

Field name	Field description
Adapter/Detector IP address*	The IP address of the adapter or the IP address of the detector is entered in the field, depending on the survey type: - If "Client" is selected in the "Poll Type" field, the IP address

Field name	Field description
	of the computer on which the adapter is deployed, it is indicated. - If “Server” is selected in the “Poll Type” field, the IP address of the detector is shown
Adapter/Detector port*	The adapter port or detector port to which the detector sends information depending on the polling type
Survey type *	It is used for selecting the operating mode of the equipment: *Customer* Server

Type Ethernet (TCP), Ethernet (UDP) interface for TMS.13

Field type	Field description
Detector IP address	Detector IP address depending on the survey type.
Data port	Port through which objects and PVR are transmitted
Port for commands	The port through which commands are sent to the detector and responses to these commands are received
Survey type *	In the field the operating mode of the equipment: *Customer (inactive)* Server

Interface type RS485

Field name	Field description
Port name	Port number, for example COM1
Transmission speed	Specify the transfer rate in bits/sec
Number of bits	Standard RS connection setup
Number of stop bits	Standard RS connection setup

Ethernet interface type (Multicast)

Field name	Field description
Adapter IP address	Enter the IP address of the adapter in the field
Detector IP address	The IP address of the detector is entered in the field
Detector port	The port used to communicate with the detector
Multicast group IP address*	Enter the IP address of the multicast group in the field
Multicast group port*	Enter the port of the multicast group in the field
Survey type	In the field the operating mode of the equipment: *Customer (inactive)* Server

Detector location

Field name	Field description
Place name	Enter the name of the location in the field detector installation
GPS coordinates (lat, long) *	The field indicates the GPS coordinates of the detector installation location. When creating a detector on the interactive map, this field is filled in automatically.
Detector direction*	In the drop-down list select the viewing direction of the detector related to the beginning location (`0` kilometer) of the road on which the current detector is installed.
Picket *	The name of the detector picket is entered in the field.
External IP equipment	The name of the router IP address or the IP address of PUIDD

External relay

Field name	Field description
Active relay	This section is available for editing only when the mode is enabled. Switch to connect the detector to an external relay (it is used for sites where detectors are installed at intersections mostly)
Relay IP address*	Enter the IP of the external relay in the field
Relay port*	Enter the port number of the external relay in the field
Check interval*, sec	The value (in seconds) of the external relay check interval is entered in the field.

Field name	Field description
Number of HW errors *	Enter the number of permissible relay hardware errors
Control Packet IDs	In the drop-down list, select the control packet identifier value to be sent to the relay
Waiting for detector to reboot*	The reboot waiting time from `60 to 120 seconds` is entered here
Additional Information	A description of the detector and additional information about the detector
Road type	In the drop-down list, you can select a road type from the road type directory
Create	A detector with parameters entered by the user is added to the system
Cancel	Cancel all changes

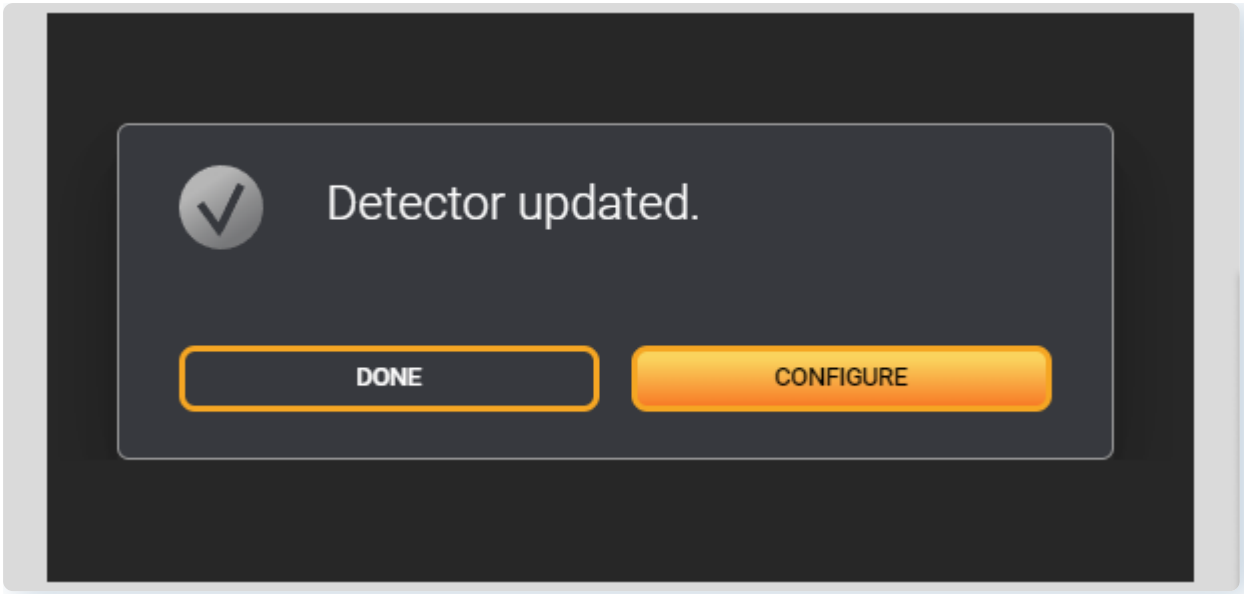
> **NOTE**
>
> (*) - It means that the field is mandatory
>
> You can determine the location of the `zero (0)` kilometer of the road on which the custom detector is installed on the website of the Road Funds Control System of the Federal Autonomous Institution *ROSDORNII* by using the following links:
>
> > Selection from a list of roads
> > Select a road on the map
>
> When installing a detector at an intersection (as part of the PUSO), the specified intersection is taken as `zero`.

Here the Control packet ID values to be sent to the relay

Control Packet IDs	Description
0X2FF	Message synchronization (for 2G model)
0X320	Fast boot/bootloader mode (for all detector models)
0X3A0	Detector setup (for 2G model)
0X3F2	Message for transmitting new parameters and initiating various commands to the detector (for 2G model)
0X400	Diagnostic message about detector setup (for model UMRR-0C)
0X430	Coprocessor status message (for TMIB model)

Control Packet IDs	Description
0X434	Coprocessor status message (for UMRR-0C model)
0X500	Sensor Control Message (all detector models)
0X501	Message about the number of transmitted objects and the number of messages for each object (for all detector models)
0X502	Message with object length according to class (for model UMRR-0C)
0X700	Message about detector parameters (for model UMRR-0C)
0X734	Coprocessor Status Message (for model UMRR-0C)
0X780	Message with statistical data (for all detector models)
0X785	Message about PVR from the detector (for all detector models)
0X786	Output queue message (for all detector models)

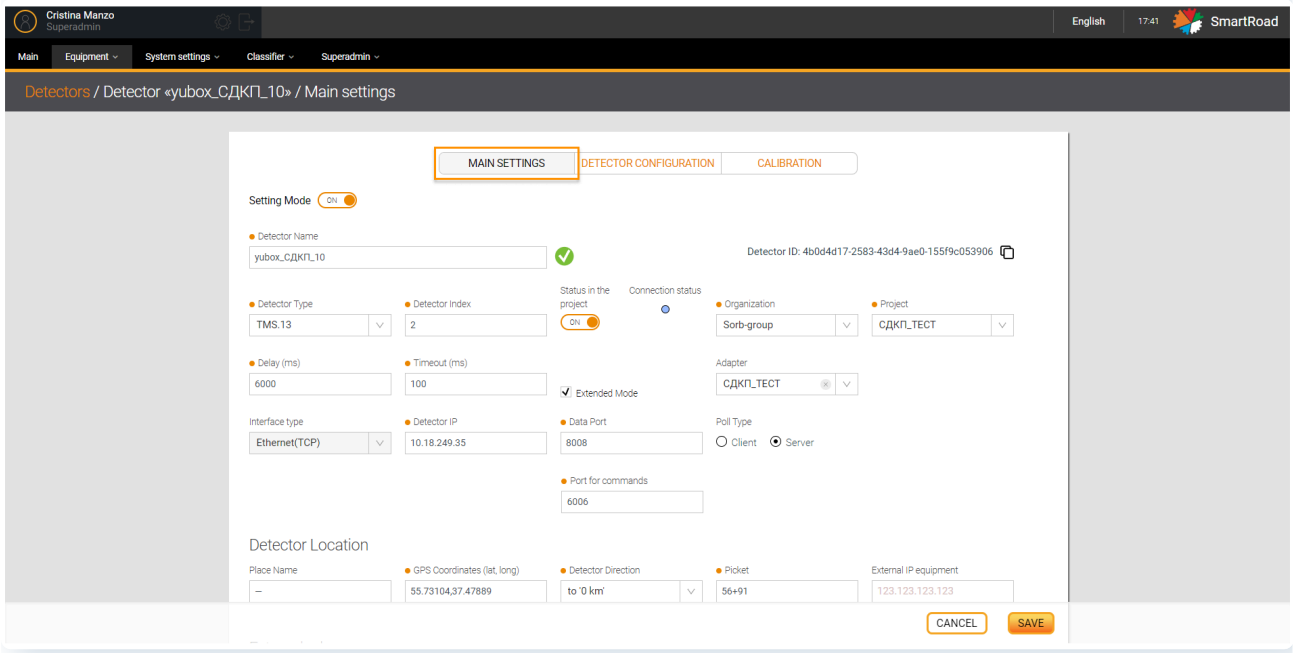
Required fields whose values are entered incorrectly will be highlighted in red. The values in them must be changed. After entering the parameters and clicking the `Create` button, the system will prompt the user to save the entered data without entering additional configuration parameters (then, click the `Finish` button) or enter additional detector configuration parameters (click the `Configuration` button to do this).



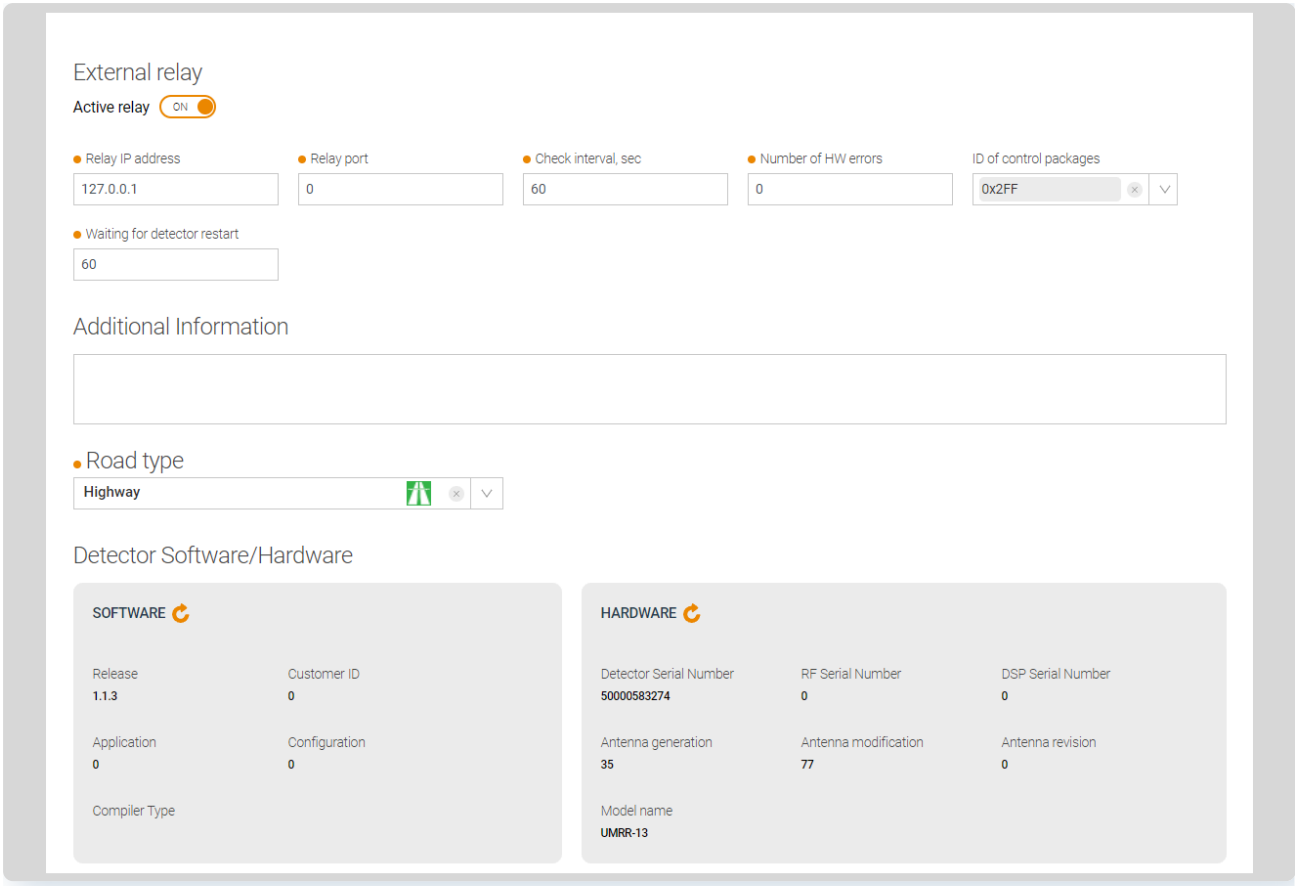
Editing detector information

The page for Editing Detectors includes sections: `Detector Configuration`, `Calibration`. This functionality is configured jointly by an engineer with `Superadmin` role.

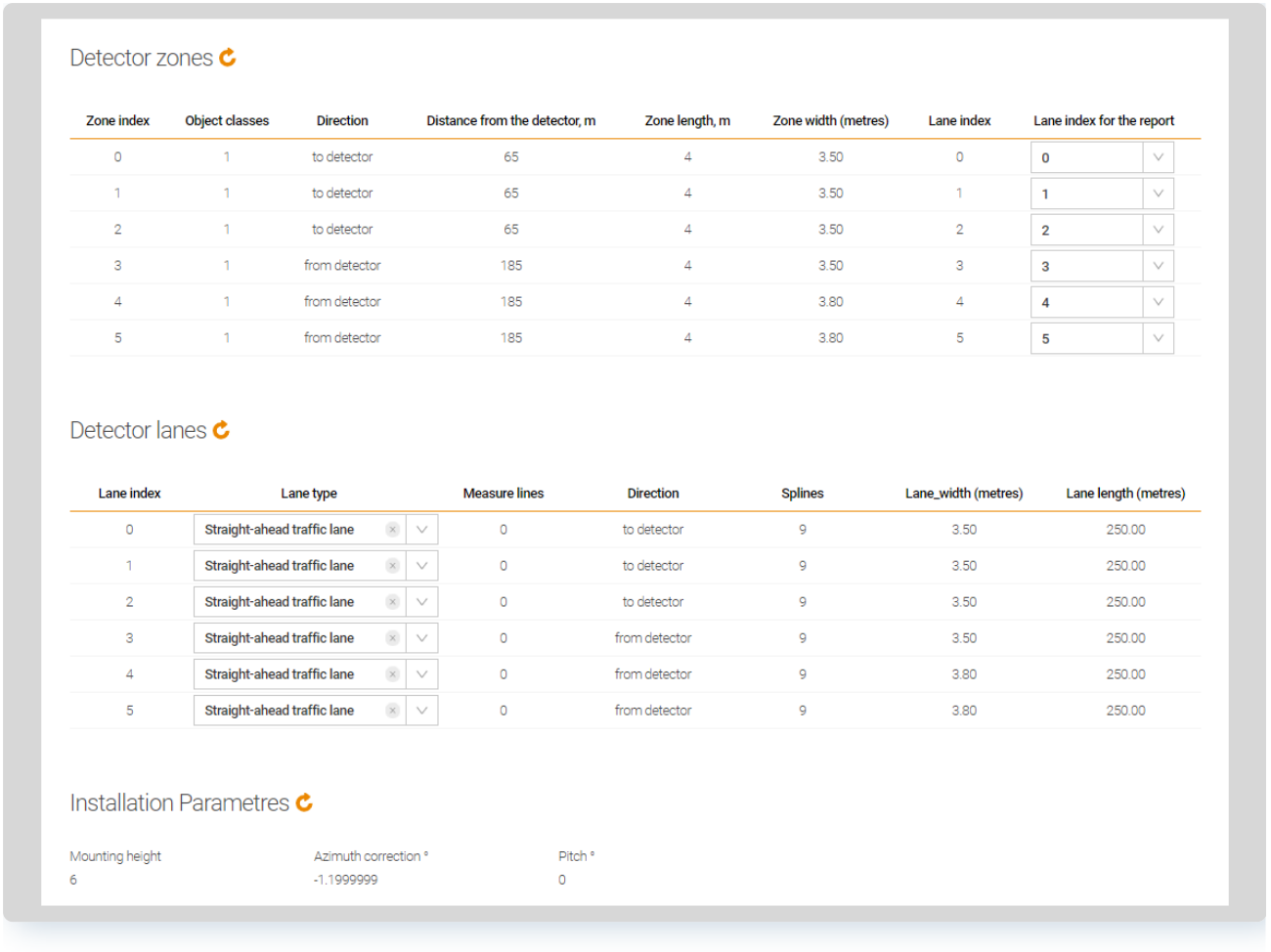
You should move the mouse cursor over the line in the list with the selected detector or click on the edit button To change the detector parameters. When you click on the specified button, the detector editing page will open.



All section parameters in `Main settings` section are the same parameters that apply when adding a detector.



Additionally, information from the detector is displayed in the form of subsections: *Detector software/hardware* - this information is transmitted from the detector, and sections `Detector zones`, `Detector stripes`, `Installation Options` — are filled in automatically when the adapter starts. The data in the sections listed above can be updated by clicking on save button.



In the table you can find the Detector Zones page parameters

Field name	Field description
Zone index	The serial number of the entry in the list
Vehicle classes	Number of vehicle classes
Direction	Direction of movement of detection zones
Distance from detector, m	Distance from DT in meters

Field name	Field description
Zone length, m	Length of the DT zone in meters
Zone width, m	DT zone width in meters
Band index	Band index
Band index for report	The index of the band that will be displayed in reports. Setting this parameter is used only if no bands are received from DT

Besides the Detector Strip page parameters

Field name	Field description
Band index	The field displays the indices of the zones associated with this DT
Band type	Changeable parameter, lane type from the road editor
Counting lines	The field displays the number of counting lines
Direction	The field displays the direction of the detector stripes
Splines	The field displays the number of points for bending the road
Bandwidth, m	The field displays the DT bandwidth in meters
Strip length, m	The field displays the length of the DT strip in meters

Here the Installation Options page options

Field name	Field description
Mounting height	The field displays the installation height of the diesel engine
Azimuth correction	The field displays the angle of installation of the DT in azimuth
Zenith	The field displays the zenith angle of the DT installation

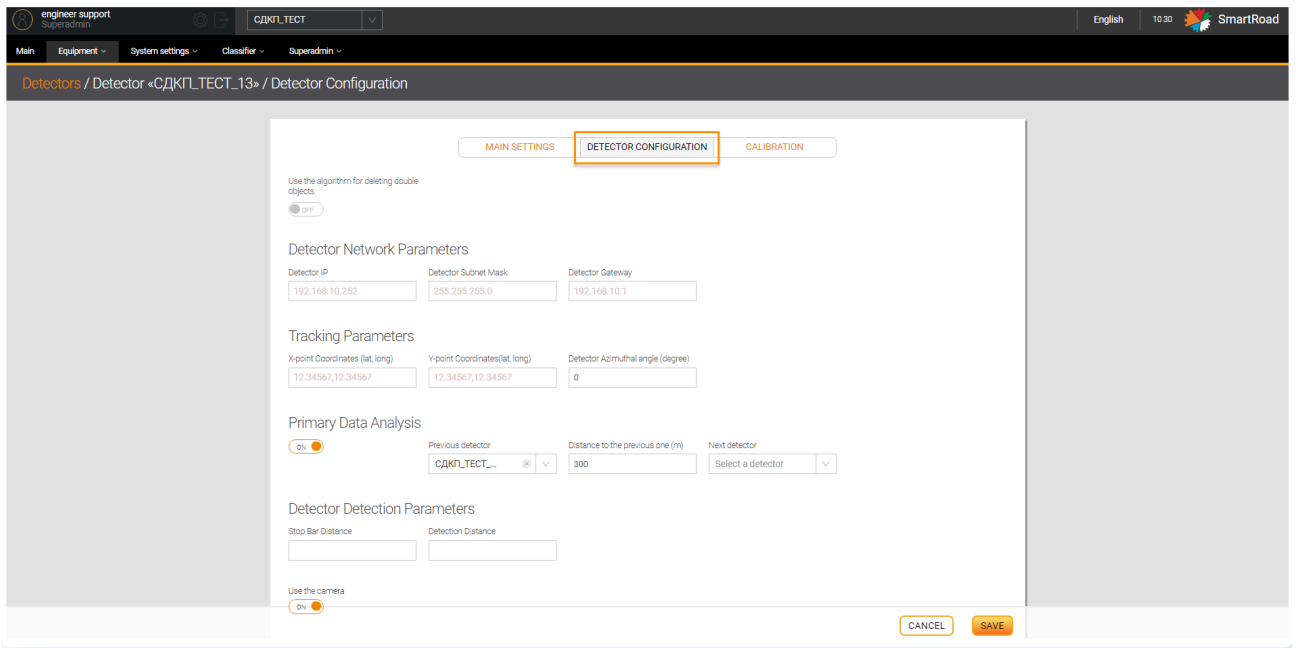
You should turn on o switch `Settings mode` to edit a section `Configuration`.

In addition, you must press the button `Save` to save the changed detector settings, and to cancel the changes made, the button `Cancel`.

Configuration

This window allows you to configure the detector configuration. The detector configuration contains:

- Algorithm for removing duplicate objects
- Additional DT configuration options - detector network parameters, tracking parameters, detector detection parameters, camera parameters.



Algorithm for removing duplicate objects

Double objects - these are cases when the same vehicle is mistakenly counted twice by the system due to the characteristics of the detectors or conditions on the road.

The algorithm for removing double objects can only be used for German radars series TMS.0 A, T.0C, TMS.0F, MS.11, MS.12 series (operating frequency = 24 GHz). This algorithm is not used for detectors series TMS.13 and TMS.14 (operating frequency = 77 GHz).

Manual calculation of vehicles is performed using video from surveillance cameras. The lanes of the road are numbered from left to right relative to the direction of the detector. In case of manual calculation, it is required to take the number of vehicles, more than 100 units in order to reduce the magnitude of the calculation error.

If there is a discrepancy between the number of objects recorded by the system and their actual number, it should be determined in which direction (greater or lesser) the discrepancy is going.

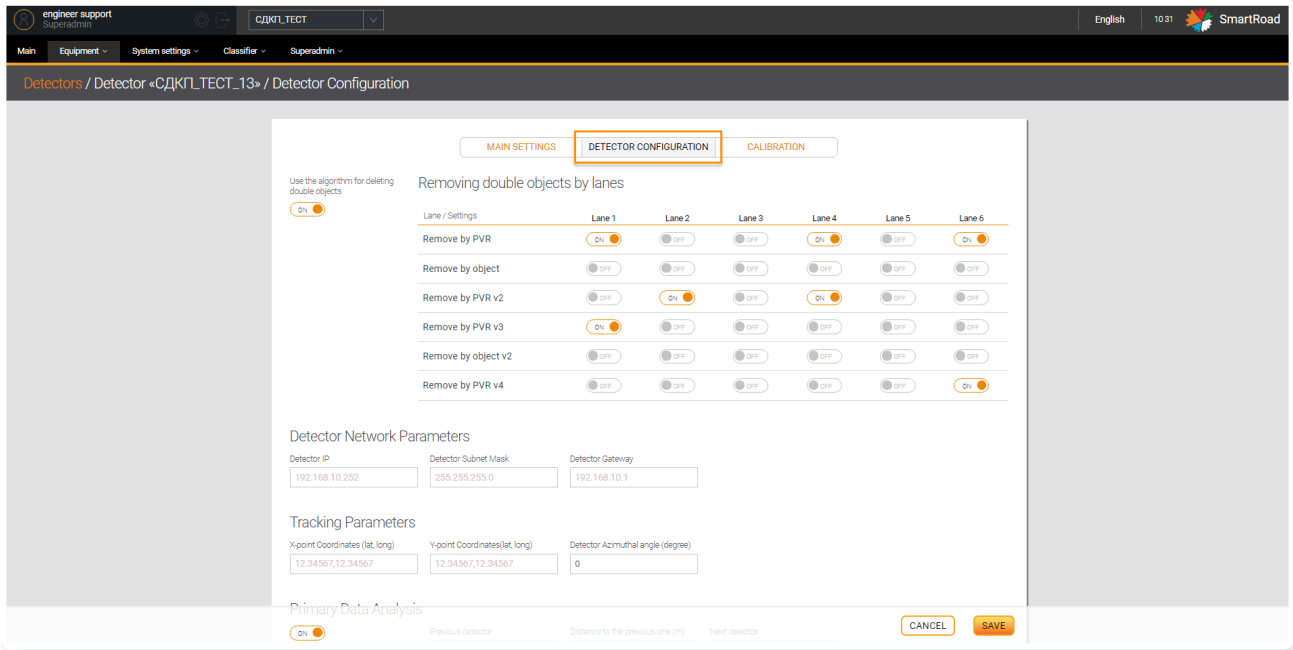
Underestimation of the number of registered vehicles may be caused by detector settings during the PNR. Check and/or reconfigure the detector to correct the issue. Furthermore, you should contact a certified support engineer.

If the vehicle statistics are *overestimated* (i.e. there is a significant difference between the data obtained as a result of manual calculation and the web interface), algorithms for removing double objects should be activated.

> **TAKE IN MIND**
>
> Double object removal algorithms should be activated only when vehicle statistics are `overestimated`.
>
> The algorithm should be applied to all lanes of the same direction at once!

In the detector editing page you can configure the algorithm for deleting double objects by the web interface. Just turn on the `Setup mode` switch to activate the `Configuration` tab, where the parameters for deleting double objects are set. The parameters of the section for removing double objects are selected iteratively until an error in the number of vehicles is `± 3-5%`, and according to their classification `± 10%`.

The results of calculating the number of vehicles that passed during the selected time interval are available on the Statistics section in Detailed reports page. Besides, there are possible options for dividing the counting period into intervals (for instance: 1, 5, 10, 15 and 30 minutes).



In the table below are described the Parameters for the Delete Double Objects section

Field name	Field description
Use duplicate object removal algorithm	The parameter activates the main mechanism for eliminating duplicate objects. It is important to ensure that the detectors are reporting data to the system and that the traffic lanes are set to them. If you try to activate without meeting these conditions, a warning will be displayed: *The detector has no stripes. The algorithm cannot be turned on. Connect the detector and configure the stripes*
Clean by PVR	The algorithm analyzes vehicle passages through counting zones and excludes double objects based on the following criteria (following each other): - Time between 2 vehicle passes `<=800 ms` - Speed difference `<5 km/h` - Difference in direction of movement in degrees `<10`

Field name	Field description
	- Length difference `<4 m` - Band difference `<2`
Clean by object	An algorithm that activates the removal of double objects by analyzing vehicle tracks in each lane: - Distance between objects `<10 m` - Speed difference `<3 km/h` - Difference in direction of movement in degrees `<5` - Length difference `<4m` - Band difference `<2`
Clean by PVR v2	The algorithm is designed to eliminate double objects (moving in parallel), providing increased accuracy in identifying unique vehicles in counting areas in the corresponding lanes: - Time between 2 vehicle passes `= 0 µs` - Band difference `= 0`
Clean by PVR v3	The algorithm is responsible for enabling duplicate removal if the PVR algorithm does not demonstrate adequate duplicate removal performance. The algorithm uses the following parameters: - Time between 2 vehicle passes `<=1 s` - Speed difference `<2.5 km/h` - Difference in direction of movement in degrees `<5` - Band difference `<2`
Clean by objects v2	The algorithm, which is responsible for enabling the removal of double objects for objects on each strip configured in the detector, tracks vehicle tracks: - Distance between objects `<15 m` - Speed difference `<2.5 km/h`

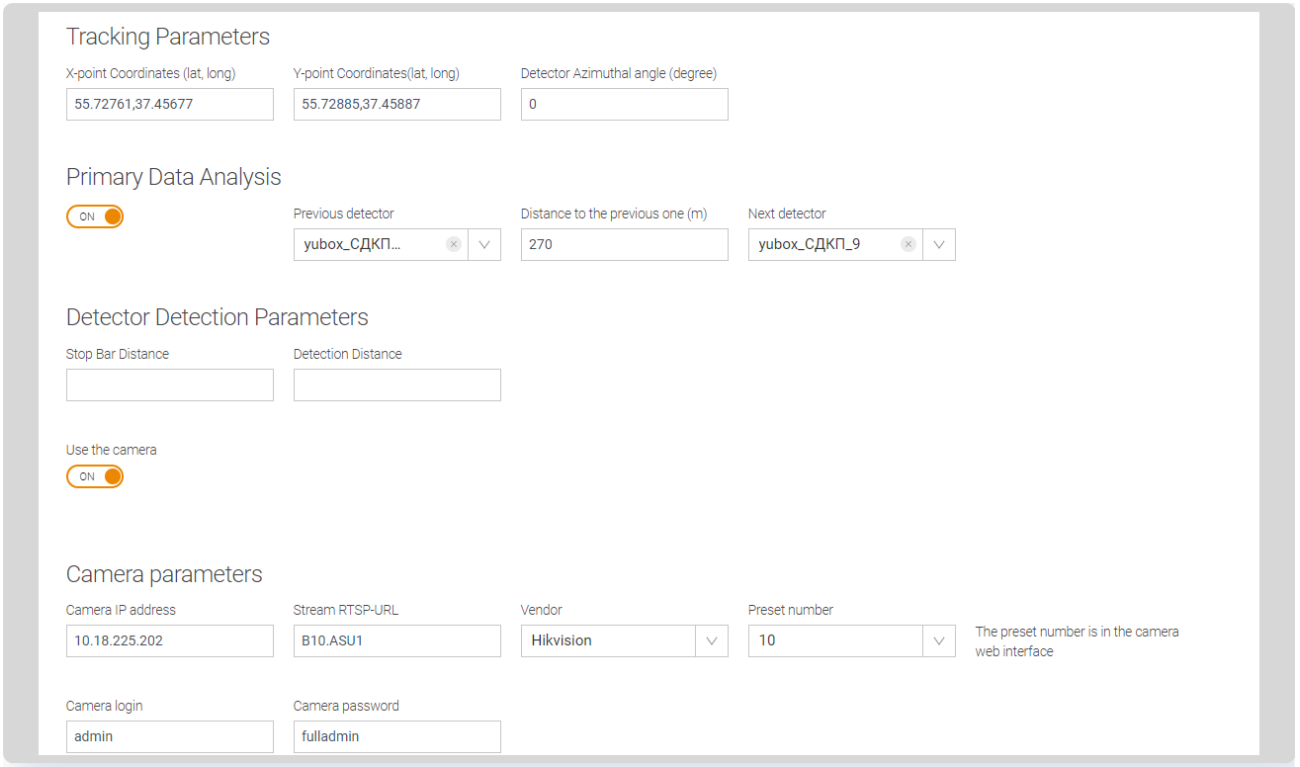
Field name	Field description
	- Difference in direction of movement in degrees `<5` - Band difference `<2`
Clean by objects v4	An algorithm that is responsible for enabling the removal of double objects by v2 objects on each band configured in the detector (recommended for experienced System users)

TAKE IN MIND

If the configured detector does not have any configured bands, the System will display a message stating that the double object algorithm cannot be used.

Additional detector configuration options

In this section you will find the Additional detector configuration parameters.



Detector network parameters

Parameter type	Description
Detector IP address	Detector IP address
Mask reminded the detector	Mask reminded the detector
Detector gateway	Detector gateway

Tracking options

Parameter type	Description
X-point coordinates (lat, long) *	The field indicates the X coordinate of a point located at a distance of about 50 meters in the direction of viewing of the detector
Y-point coordinates (lat, long) *	The field indicates the Y coordinate of a point located at a distance of about 50 meters perpendicular to the viewing direction of the detector
Detector rotation angle (degrees)	The set angle of rotation of the detector relative to the road is entered in the field.
Previous detector*	In the drop-down list, select the name of the previous network detector
Distance to previous, m *	Distance between detectors from current to previous
Next detector *	In the drop-down list, select the name of the next detector
Primary data analysis	Switch that activates primary analysis of data from the detector

Detector detection parameters

Parameter type	Description
Distance to stop line	The distance to the vehicle stop line is entered in the field.

Parameter type	Description
Detection distance	In the field, enter the distance at which the detector will perform the initial registration of objects

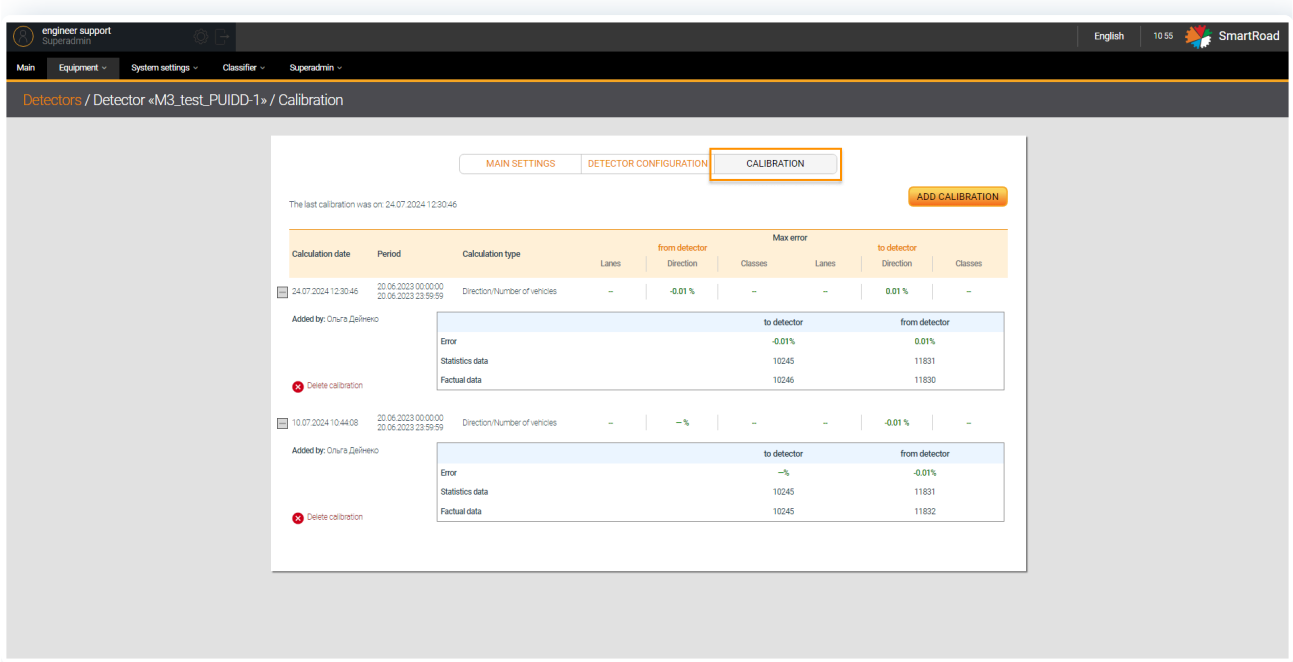
Camera options

Parameter type	Description
Use camera	Switch to configure camera settings
Camera IP address	The IP address of the camera is entered in the field
RTSP-URL of video stream	The RTSP-URL of the camera video stream is entered in the field
Manufacturer	Select the camera manufacturer from the drop-down list
Preset number	Select the camera preset number from the drop-down list.The preset number is located in the camera web interface
Camera login	The camera login is entered in the field
Camera password	Enter the camera password in the field
Save	Saving detector settings
Cancel	Cancel all changes

> **INFO**
>
> (*) - It is a required field

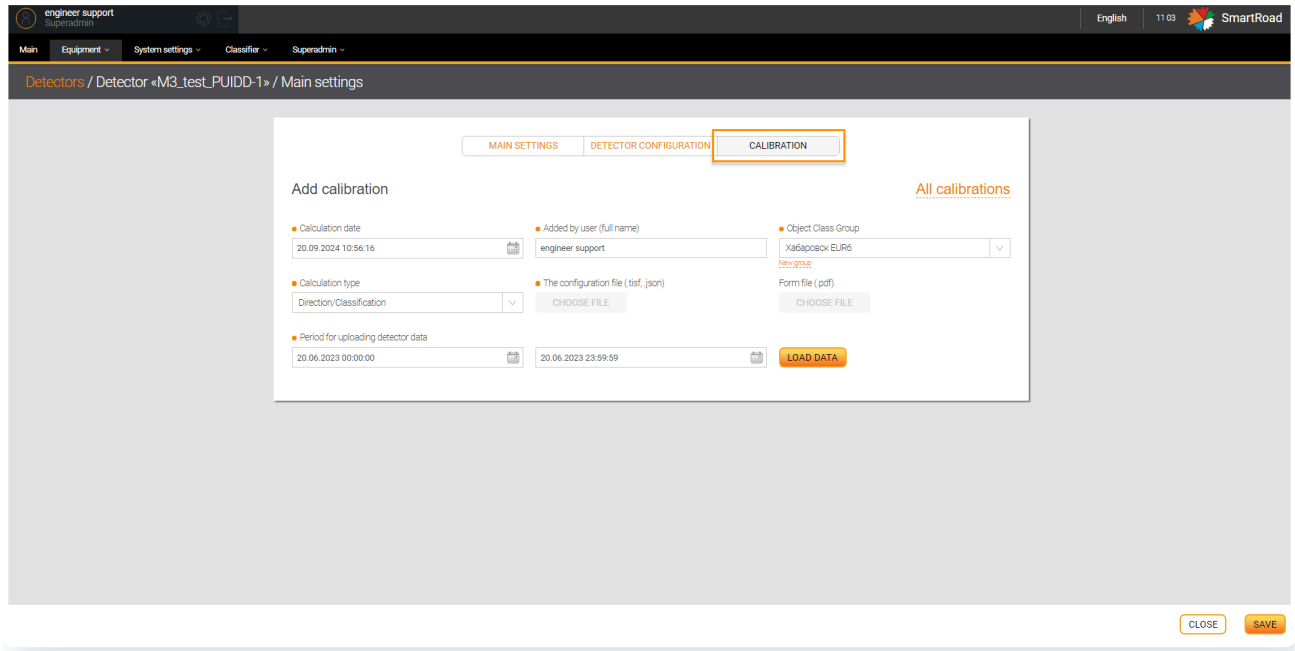
Calibration

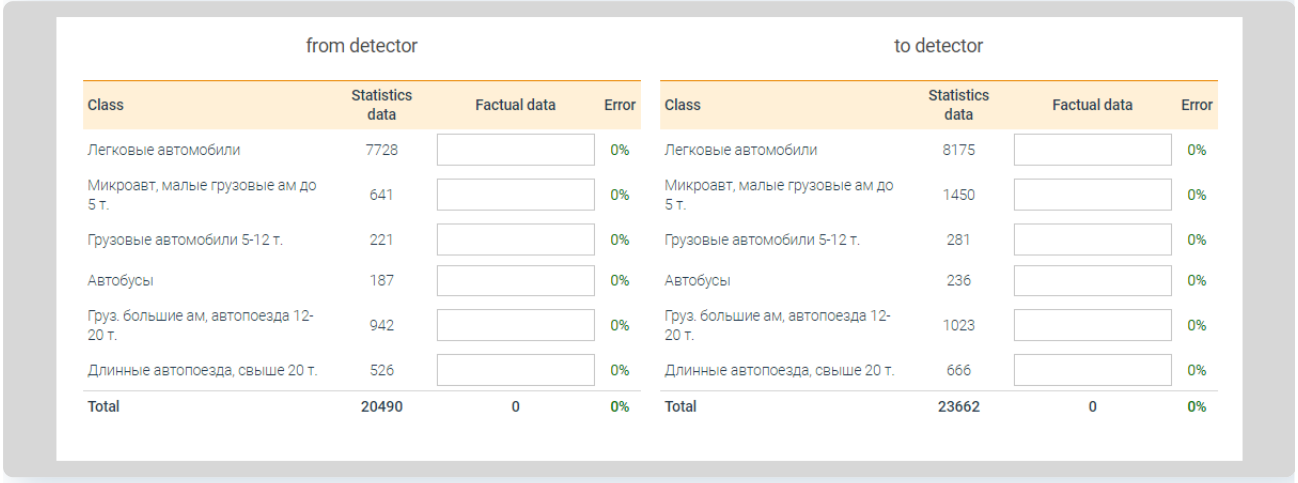
This page will display a list of all DT calibrations loaded into the System. You must click the button `Add calibration` to add a calibration to the System.



Adding a Calibration

In the Detectors page you should select the specific device. Next click on tab `Calibration`, and then on button `Add Calibration`





from detector

Class	Statistics data	Factual data	Error
Легковые автомобили	7728		0%
Микроавт, малые грузовые ам до 5 т.	641		0%
Грузовые автомобили 5-12 т.	221		0%
Автобусы	187		0%
Груз. большие ам, автопоезда 12-20 т.	942		0%
Длинные автопоезда, свыше 20 т.	526		0%
Total	**20490**	**0**	**0%**

to detector

Class	Statistics data	Factual data	Error
Легковые автомобили	8175		0%
Микроавт, малые грузовые ам до 5 т.	1450		0%
Грузовые автомобили 5-12 т.	281		0%
Автобусы	236		0%
Груз. большие ам, автопоезда 12-20 т.	1023		0%
Длинные автопоезда, свыше 20 т.	666		0%
Total	**23662**	**0**	**0%**

In the table below Add Calibration page options are described

Field name/Buttons	Field description
Count date	The calibration date is selected in the calendar. This field is required. The default is the current date

Field name/Buttons	Field description
Added by user Full name	This field indicates the full name of the engineer who configured the equipment. This field is required
Vehicle class group*	A group of vehicle classes combined into a group. This field appears only when you select the counting type by `Direction and classification`
Counting type	The system for calibration comparison is selected from the drop-down list. In this list, the user can select data for comparison with the System data - depending on the choice of calculation type, the table for entering diesel fuel calibration data will change.
The configuration file	A file in `.tisf` format is added to the field. Clicking on `Browse` opens a navigation window for selecting a file
File the form	A file in `.tisf` format is added to the field. Clicking on `Browse` opens a navigation window for selecting a file
Period for downloading detector data	The time period for which the equipment operation error is calculated is entered in the field.

In addition the Table for determining `measurement error`. Here the direction of the DT is indicated

Error type	Description
Counting type/Class	According to the selected calibration type
Statistics data	Statistics data obtained from DT
Factual data	Actual data counted by counters
Error	Change error

> **INFO**
>
> (*) - Field is required
>
> Fields whose values are entered incorrectly will be highlighted in `red`. Their values must be changed in the adding calibration section.

Removing a Calibration

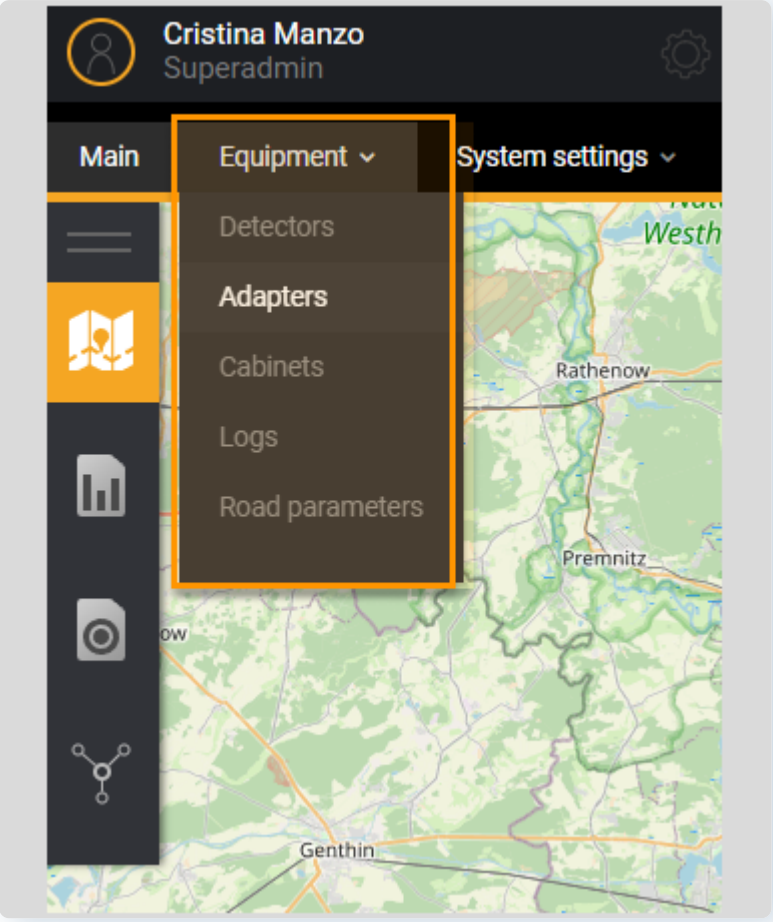
Click on the `Delete` button to remove a calibration from the System, and confirm deletion in the dialog box.

Removing a detector

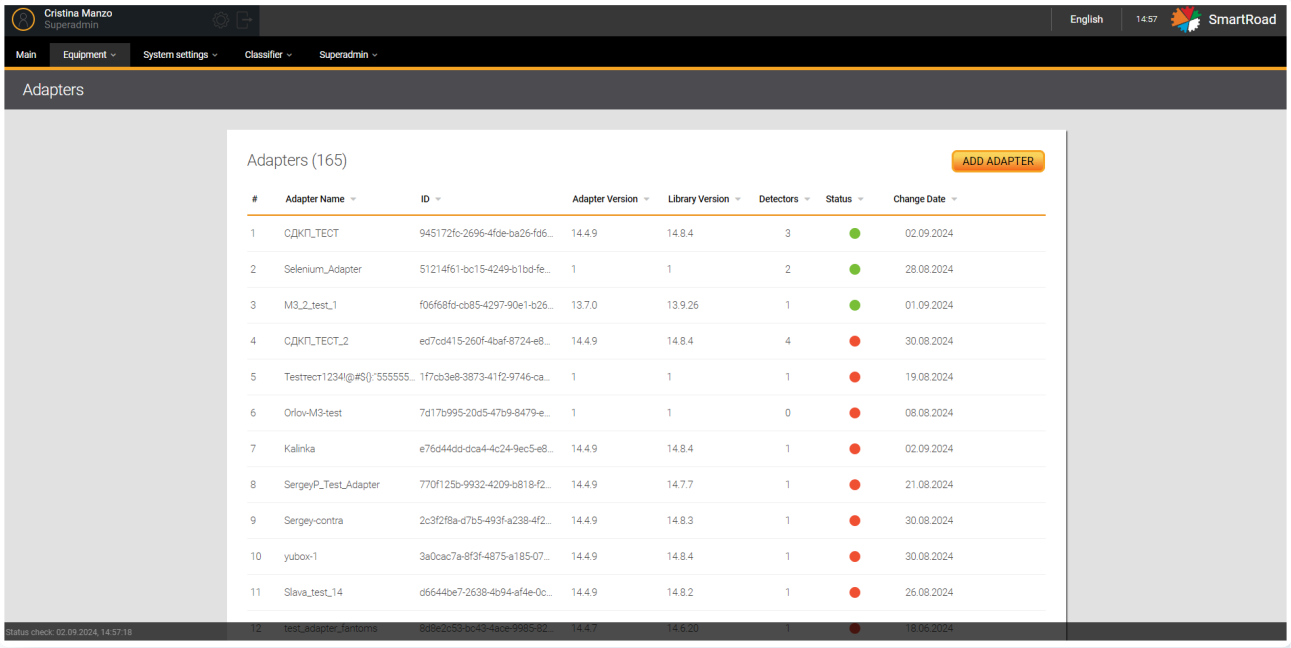
Click on the `Delete` button to remove a detector from the System. When you click on this button, you must confirm the deletion of the detector in a pop-up window by clicking the button or cancel the deleting action by pressing the button `Cancel`.

System Basics / Adapters

The `Adapters` section is intended for setting up an adapter in the System, a software module of the SmartRoad software package, which is responsible for transforming the data received from the Detectors (DT).



In this section, the user has access to a list of saved adapter settings in the System.



Next you can find the Adapter list parameters

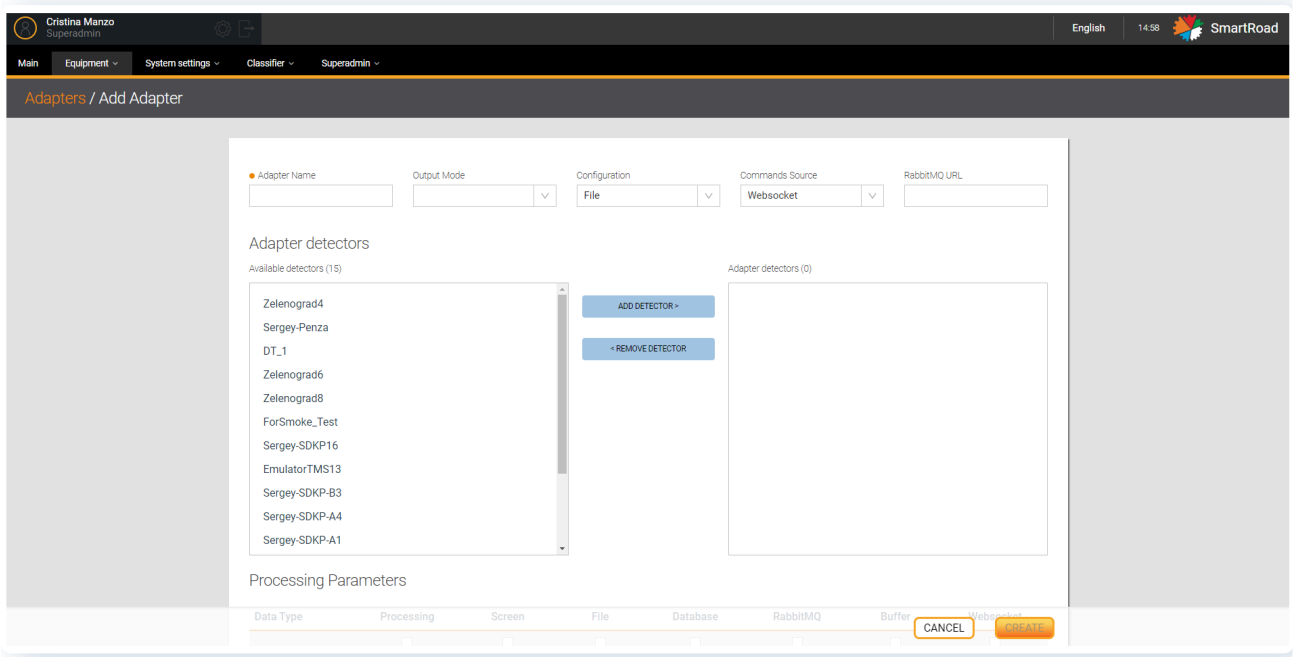
Parameter	Description
#	The serial number of the entry in the list
Adapter name	Adapter name specified when added to the System
ID	Unique adapter ID
Adapter version	Adapter version used
Version libraries	Library version used
Detectors	Number of detectors interacting with adapter
Status	Status indicator for data exchange with the adapter: * *Green* – data is coming from the adapter

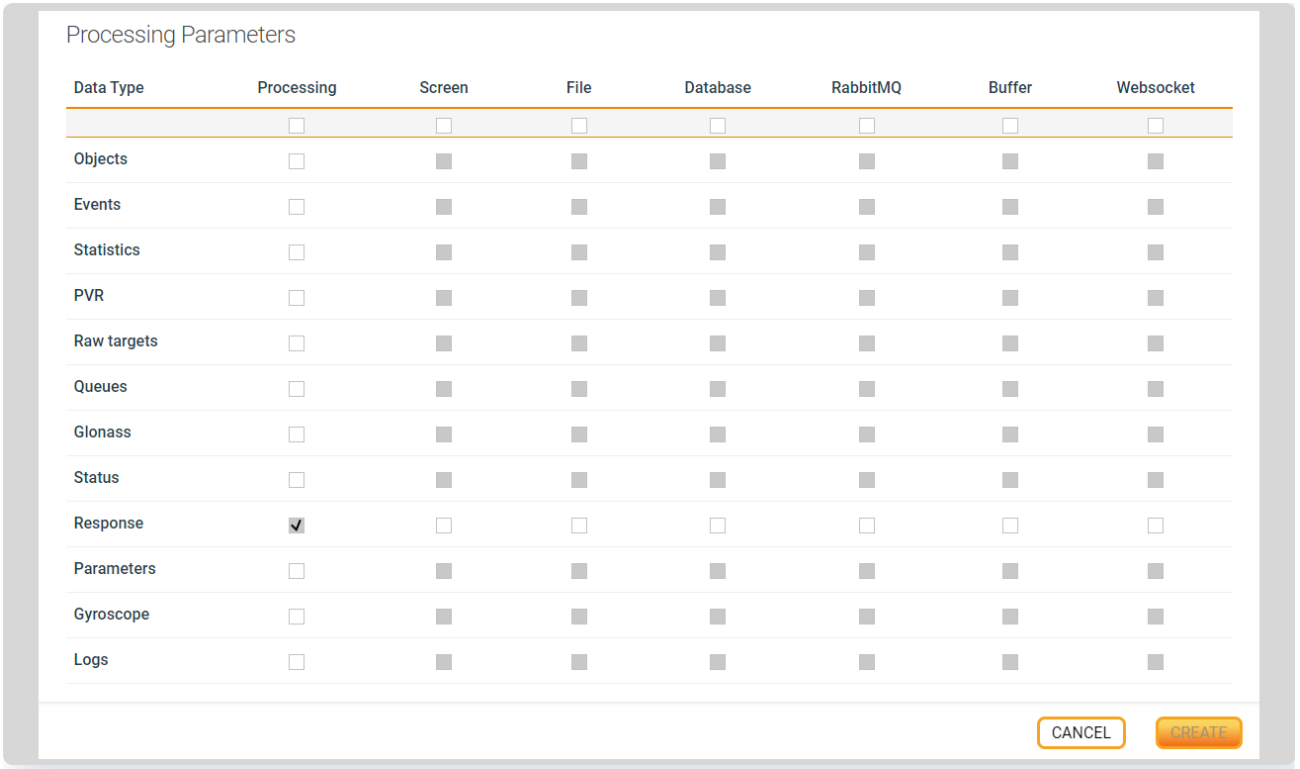
Parameter	Description
	* *Red* – data is NOT coming from the adapter
Date changes	Date the adpater information was last edited

The list allows you to sort by adapter name, ID, adapter version, library version, number of detectors, data exchange status, date of last change of information about the adapter.

Adding an adapter

Adding and configuring an adapter is done by clicking on the button `Add adapter`. When the button is clicked on, the user is shown a page for entering adapter configuration parameters.





Below the Parameters in `Add Adapter` page are described.

Parameter	Description
Adapter name*	Enter the unique name of the adapter in the field
Output mode	The drop-down list displays all available data output modes: selection is made by checking the checkbox
Configuration	The drop-down list displays available sources for obtaining configuration for the adapter
Command source	The drop-down list displays available sources for receiving commands for the adapter

Parameter	Description
RabbitMQ	The address of the RabbitMQ message broker resource is entered in the field.
Project	The project to which the cabinet belongs in the System
Detectors	Name of detectors interacting with the cabinet
Date changes	Date the information was rack last edited

Besides, those related to Adapter detectors

Parameter	Description
Available detectors	Detector selection block, which displays detectors available for adding that will interact with the adapter (detectors must be added to the system in advance). You should select and click on `Add detector` button to add a new detector
Adapter detectors	The detector selection block displays the added detectors. Detectors are removed by selecting a detector in the emerged window and clicking on the `Remove detector` button
Output Options data	The field sets data output parameters: *Processing – processed in the adapter;* On screen – displayed on the screen of a mini-PC or on a server *To file – recorded in a log file on a mini-PC or on a server* To the database – saved in the database (PostgreSQL); *RabbitMQ – to the RabbitMQ queue;* To buffer – to SQLite buffer;

Parameter	Description
	* To websocket – transfer data to the server via the websocket installed in the adapter Depending on the type of data and the type of data output, the user has the opportunity to set checkboxes. An installed checkbox indicates that a certain type of data will be output.
Save	Saving the entered parameters and creating a new adapter in the System
Cancel	Undo all previous changes

REMEMBER

(*) - It is mandatory field

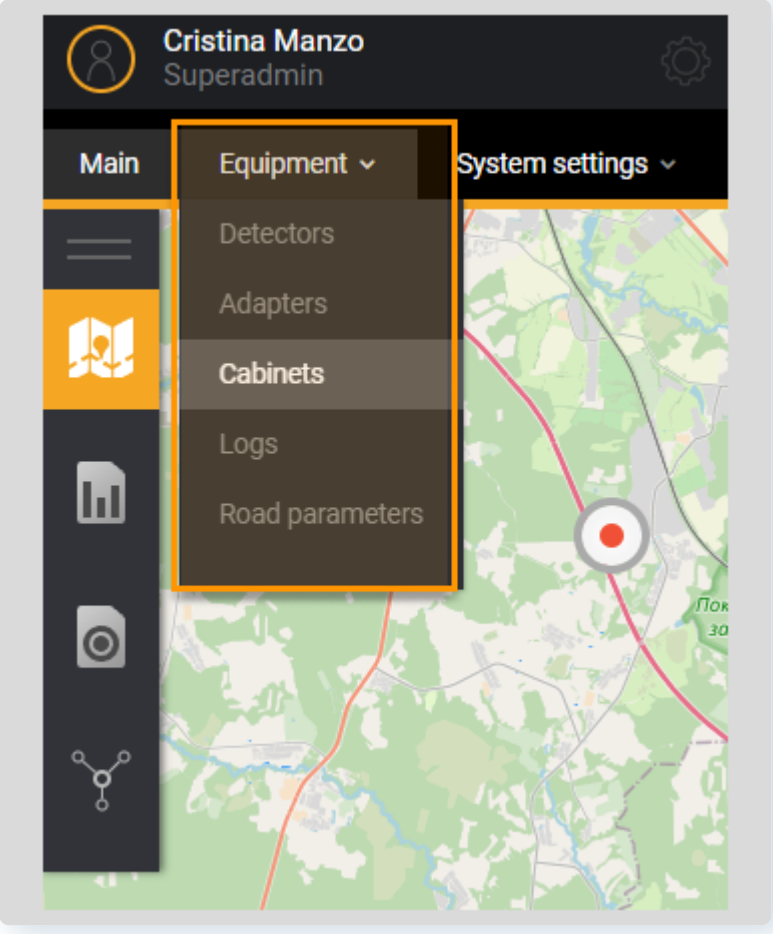
Removing and editing an adapter

You have to hover the mouse cursor over the entry in the list and click on the Edit button to change the adapter settings. When you click on the button, an editing page will open (similar to the add adapter window) with previously specified parameters.

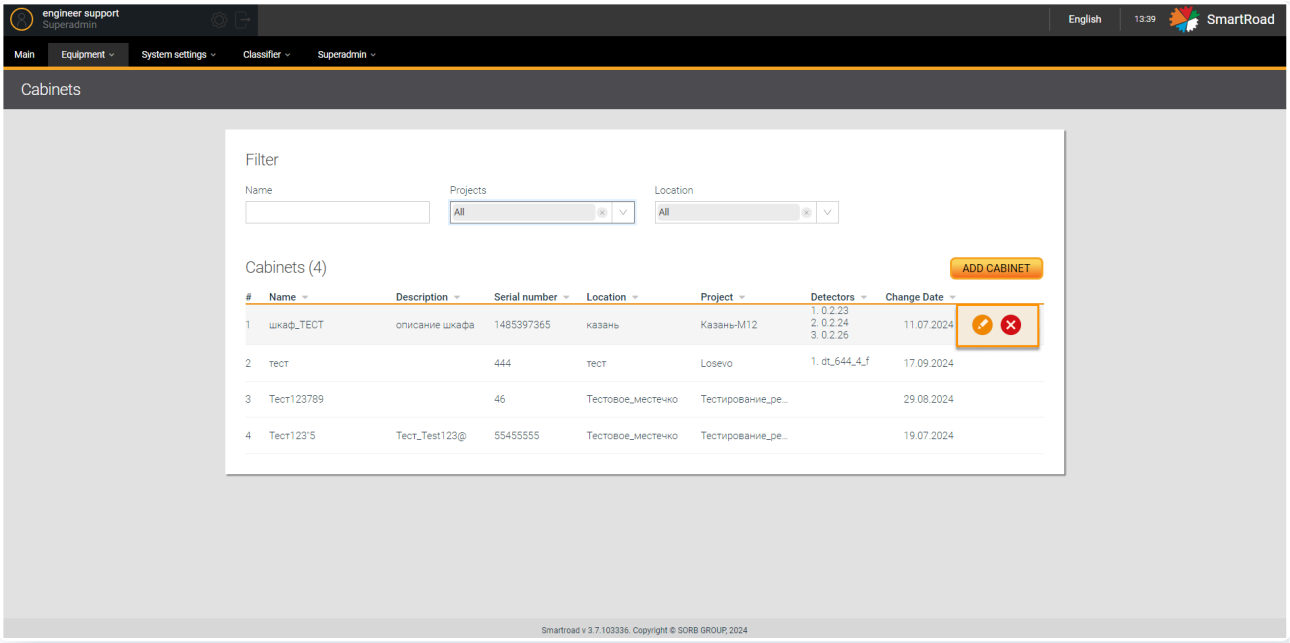
Click on the Delete button to remove adapter settings from the system. When you click on the button, you must confirm the deletion in the pop-up window by clicking the `Delete` button or cancel the deletion by clicking on the `Cancel` button.

System Basics / Cabinets or racks

The section `Cabinets` is designed for adding, editing, monitoring equipment. When you click on a menu item `Cabinets` the page is navigated *Cabinets*, which contains a filter and a list of all existing cabinets in the System.



Next to the list name *Cabinets* information about the total number of cabinets in the System is displayed.



Next you can find the Filter parameters on the Cabinets page

Parameter	Description
Name	Field for entering the name of the cabinet
Projects	The drop-down list displays a list of available projects.
Location	The drop-down list displays the list of available cabinet locations specified when adding the cabinet to the System. The choice is made by setting a checkbox. By default, all cabinet locations registered in the System are selected.

Besides the Cabinet list parameters

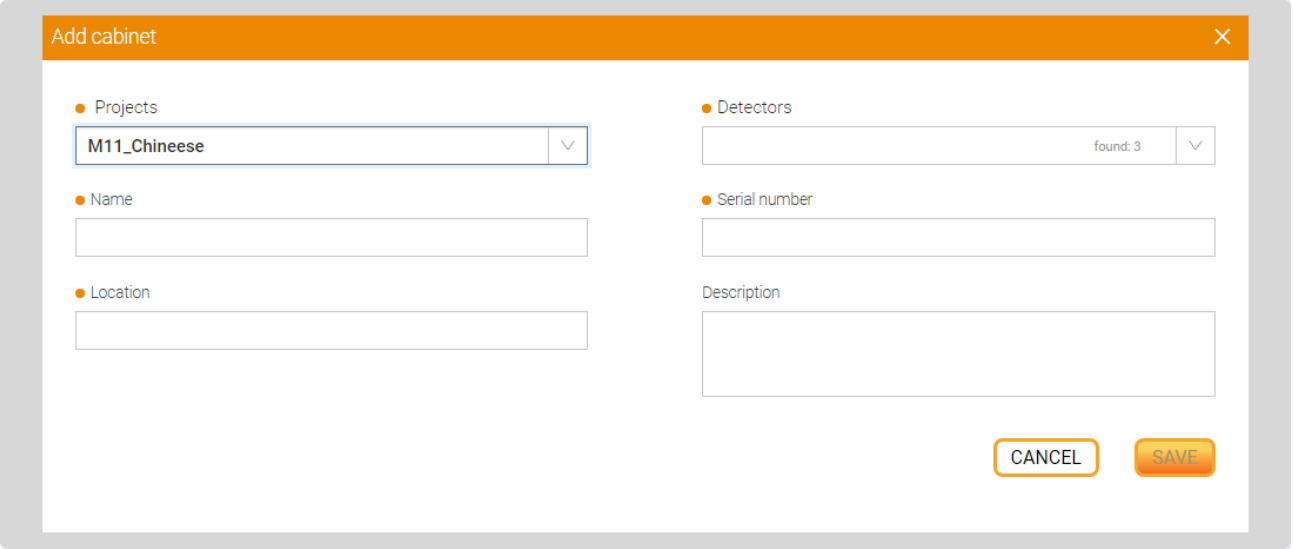
Parameter	Description
#	The serial number of the entry in the list

Parameter	Description
Name	Cabinet name specified when adding
Description	Description of the equipment located inside the cabinet
Cabinet serial number	Cabinet serial number
Location	Cabinet location specified when adding System
Project	The project to which the cabinet belongs in the System
Detectors	Name of detectors interacting with the cabinet
Date changes	Date the information was rack last edited

The list allows you to sort by name, description, serial number, project, detector, modification date, location.

Adding a cabinet

Adding and setting up a cabinet is done by clicking on the `Add a cabinet`. When you click the button, a pop-up window with a form appears *Add a rack* for data entry.



Below are described the Options for adding a cabinet.

Parameter	Description
Projects*	In the drop-down list, select the projects to which this cabinet belongs.
Name*	The name of the cabinet is entered in the field. Required field
Location*	The location of the cabinet installation is entered in the field
Detectors*	The drop-down list displays the detectors available in in the current project that the cabinet is associated with
Serial number*	Equipment serial number
Description	The field contains information about all equipment located on the cabinet

Parameter	Description
Save	A button that, by clicking on it, the system saves the entered parameters and creates a new cabinet
Cancel	Cancel changes made

> **REMEMBER**
>
> (*) - It is mandatory field

Deleting and editing a cabinet

You should hover your mouse over the entry in the list and click on the Edit button to change the cabinet description. When you click on the button, an editing window will open (similar to the window for adding a cabinet) with previously specified parameters with an additional non-editable field `Linking to detectors`.

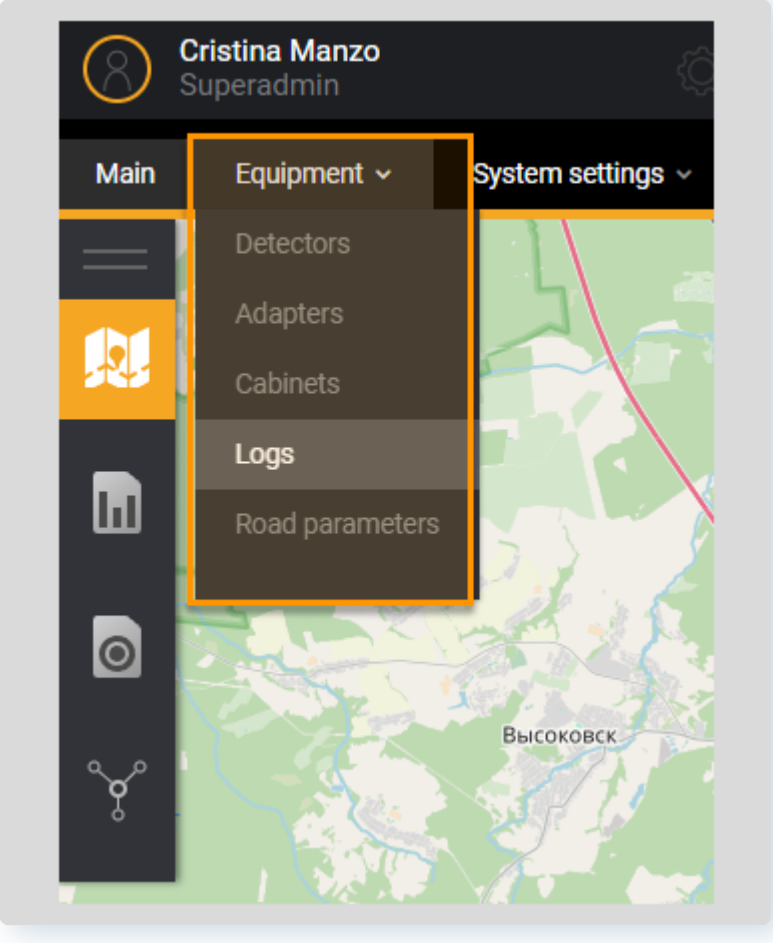
You must click on the Delete button to delete cabinet settings from the System. When you click on this button, you have to confirm the deletion in the pop-up window by clicking the `Delete` button or cancel the deletion by clicking on the `Cancel` button.

System Basics / Logs and Road parameters

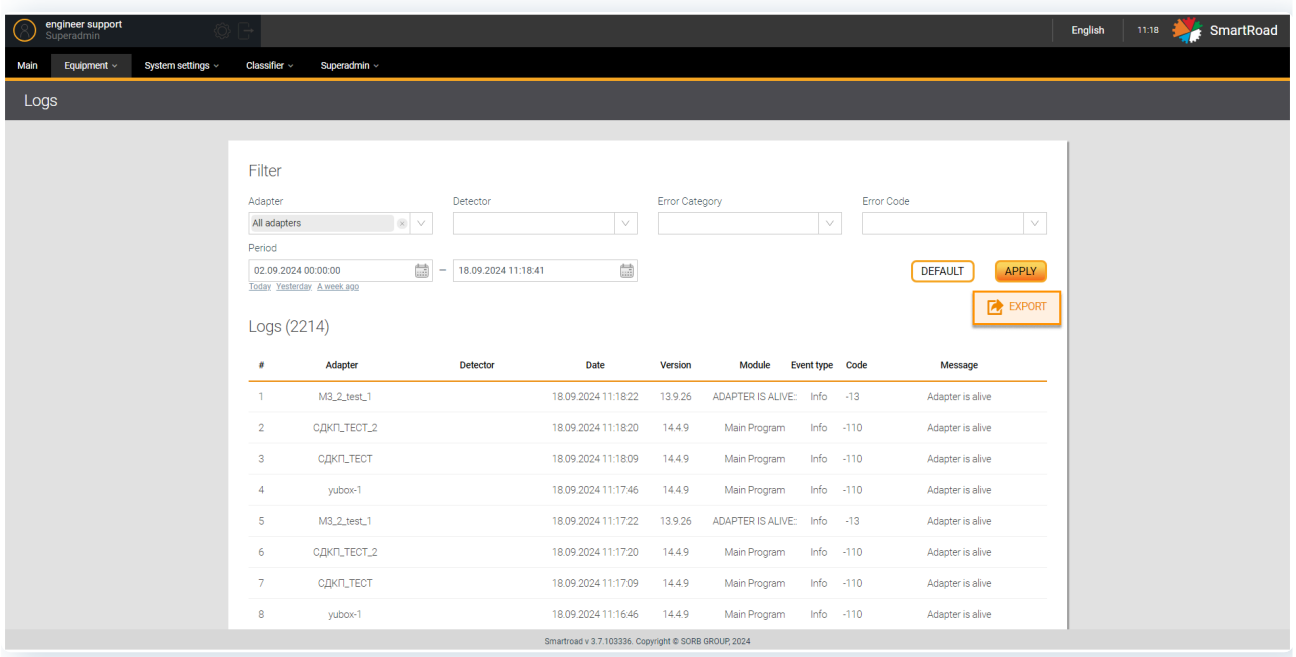
The system implements logging of equipment operation, and also the `Road parameters` menu item is intended for managing roads in the selected project.

Logs

The system implements logging of equipment operation. Menu item `Logs` is designed to view information about the operation of equipment.



The user has access to a filter for searching information and a list of logs. The filter specifies parameters for searching logs in the list. Next to the list name `Logs`, information about the total number of logs in the System is displayed.



In the next table are described the Log filter parameters.

Parameter	Description
Adapter	In the drop-down list, the user is shown a list of adapters registered in the System. The choice is made by checking the checkbox. By default, all adapters are selected
Detector	In the drop-down list the user is shown list of detectors registered in the System. The choice is made by checking the checkbox. By default, no detectors are selected.
Error category	In the drop-down list, the user is shown a list of error categories registered in the System - messages from the adapter about an error in a certain part of the System (Main program, Rabbit, DB, etc). The

Parameter	Description
	category is selected by checking the checkbox. No category selected by default.
Error code	In the drop-down list, the user is shown a list of error codes registered in the System. The choice is made by setting checkbox. No code is selected by default.
Period	In the calendar, enter the date and time to search for logs in the list with a specific date. The values `from` and `to` are indicated. Below the period entry field where are buttons for quickly selecting the period: - *Today* - *Yesterday* - *Week ago* By clicking on the quick period selection buttons, the System will automatically substitute the selected period.
Apply	Button for applying log building parameters. When clicked, the System generates a list of logs and displays it to the user
Reset	Filter parameters reset button. By clicking on the button, all filter parameters entered by the user are returned to their default values.
Export	A button for uploading the generated list of logs to an external Excel file. The file is uploaded to the user's PC

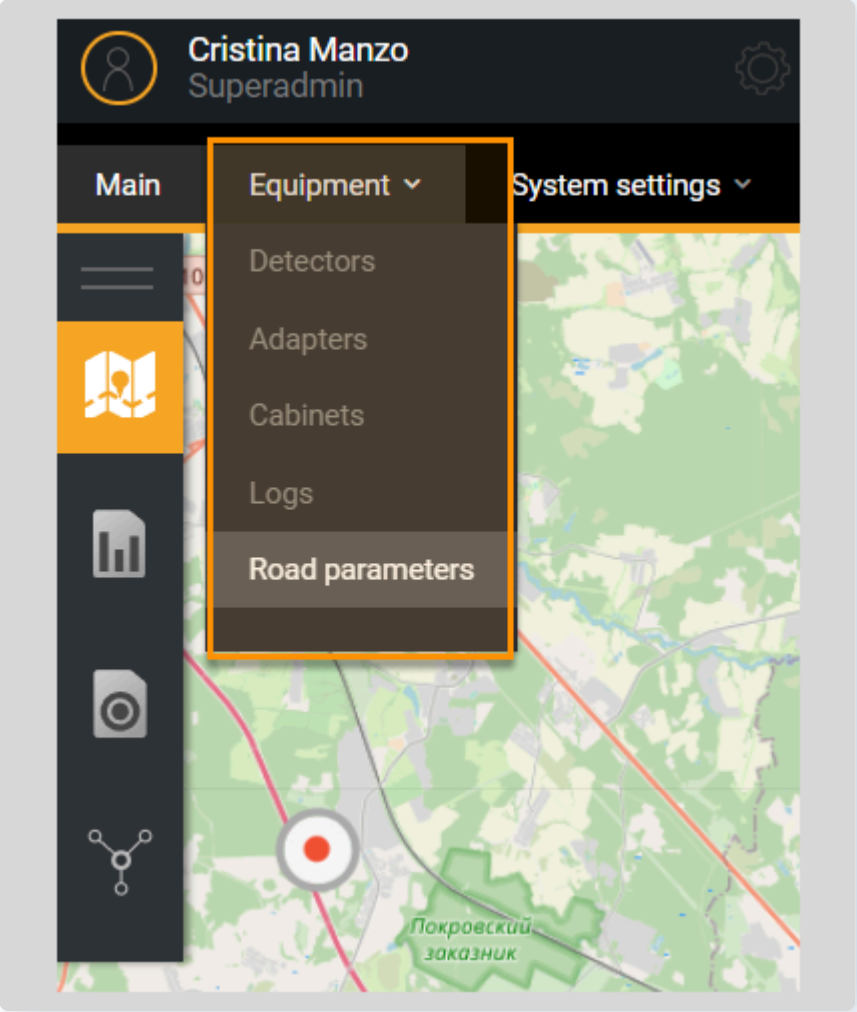
In addition, the list of logs is intended for viewing records of errors that occur during equipment operation. Next to the list name `Logs`, information about the total number of logs in the System is displayed.

Below you can find the Log list parameters.

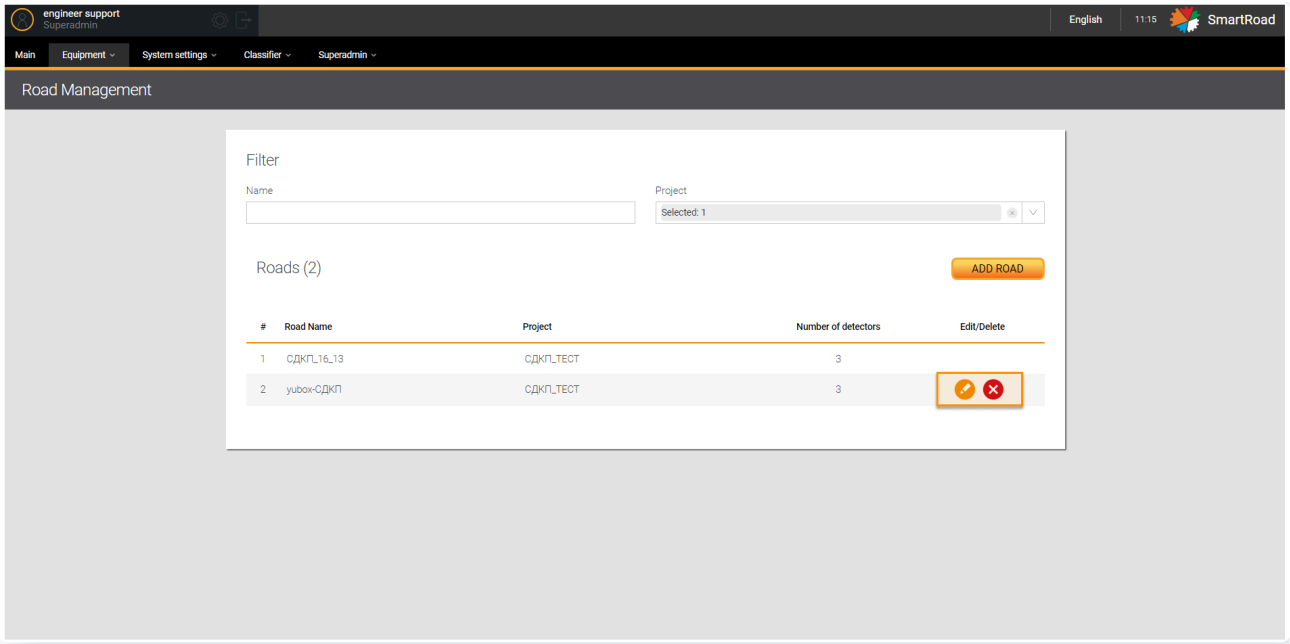
Parameter	Description
#	The serial number of the entry in the list
Adapter	The name of the adapter that interacts with detector in which an error occurred or a status change message was received
Detector	Name of the detector in whose operation the error occurred and a status change message arrived
Date	Date and time the log was recorded by the System
Version	Version of the adapter that sent the message
Module	The module from which the message came
Event type	Message type: - *Information* - *Warning* - *Error*
The code	Identification number of error categories registered in the System
Message	Message about status change according to error code

Road parameters

The `Road parameters` menu item Logs for managing roads in the selected project.



When clicking on the menu item `Road parameters` the page is goes to Road Management section, which contains a filter and a list of all roads existing in the System. Next to the list name `Roads`, information about the total number of roads in the System is displayed.



In the next tables are included the fields available in Road management page.

Filter

Parameter	Description
Road name	Field for entering the name or part of the road name
Project	Drop-down list for selecting a project. The choice is made by setting a checkbox.

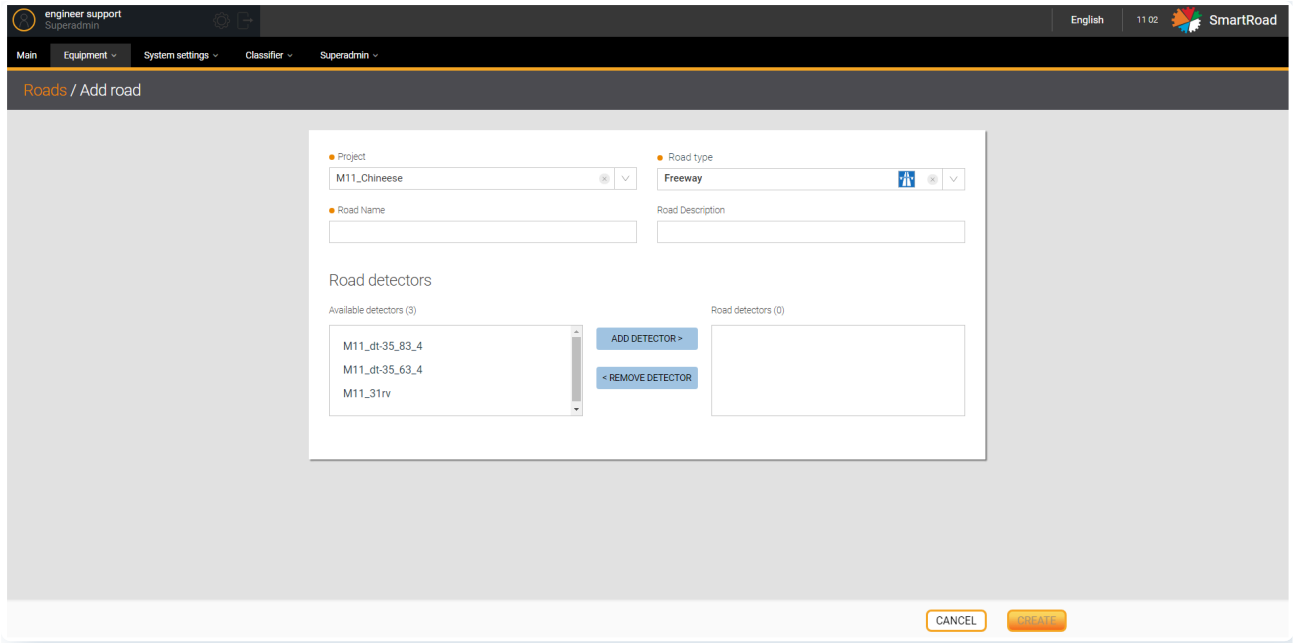
Road

Parameter	Description
#	The serial number of the entry in the list

Parameter	Description
Road name	The name of the road specified when creating or adding a road
Project	The project to which the configured road belongs
Number of detectors	Total number of installed and configured detectors on a given road section
Edit/Delete	Icons for deleting an entry in the list and changing road parameters. You just should hover your mouse over the item in the list and click on the edit icon to edit an existing entry in the list. When you click the button, an editing window will be displayed (similar to `Add road` window) with the previously specified parameters. Click the delete icon to remove a road from the list. When removing, you must confirm the deletion the pop-up window.

Add a road

Setting up the road is done by clicking on the button `Add a road` in `Road Management` page. Afterward, a window for entering road parameters is displayed.



In the table below you can find the Parameters available in *Add Road* window

Parameter	Description
Project*	Drop-down list for selecting a project in which a new road will be configured in the System The drop-down list contains all projects for the current organization.
Road type*	Field for selecting the type of road. The drop-down list contains entries from the road type directory.
Road name*	Field for entering the name of the road, which will be displayed in the road list section.
Description of the road	Field for entering a road description or user comment

Parameter	Description
Road detectors	Section for adding available detectors to the road. All available detectors within the selected project will be displayed in the Available Detectors field. You should select a detector and click on the `Add detector` button. Select an entry in the `Road detector` field and click the `Remove detector` button to remove a previously added detector.
Create/Save (in edit mode)	Button to create a new road. Once clicking on the button, a new road will be created in the System, and the user will go to the road editor window
Cancel	Button to cancel the creation of a new road. The user will be returned to the road list section.

REMEMBER

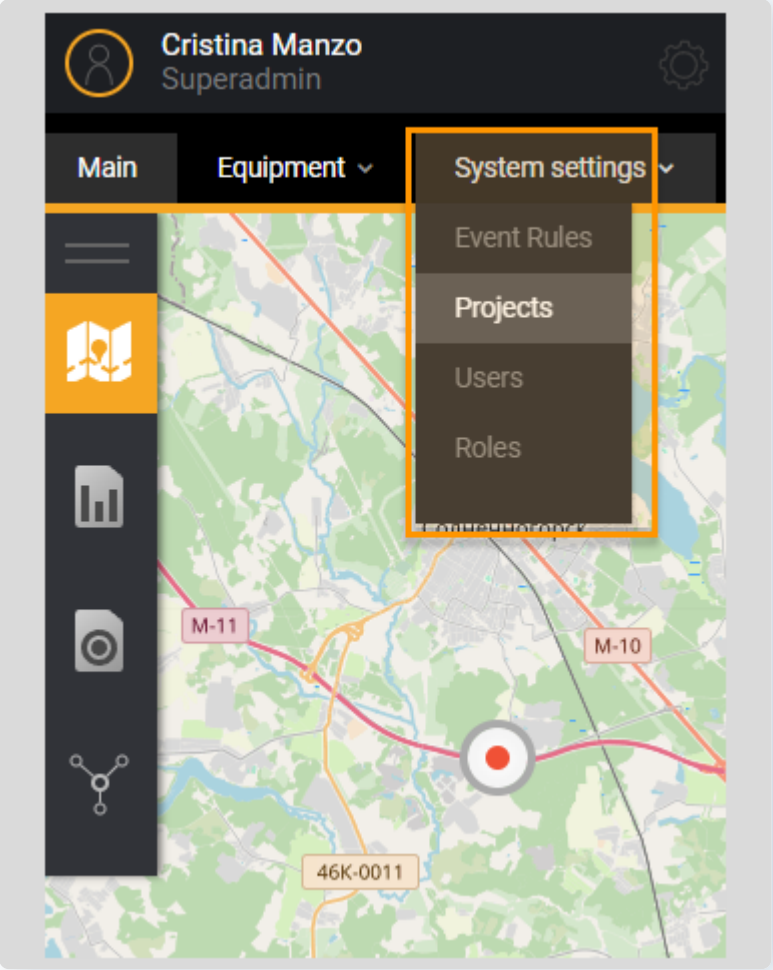
(*) - This is a `required` parameter to add a road

System Basics / System settings

Menu item `System settings` is intended for setting up and adding rules for events, projects, roles and users and their accounts to the System.

Projects

In the section `Projects` the user has access to a filter which enables to search for the necessary information and a list of added projects in the System.



In the table below you can find the Project filter parameters.

Parameter	Description
Project name	Field for entering the project name
Vehicle class group	Drop-down list of registered groups of vehicle classes that are associated with projects

Besides here the Project list parameters.

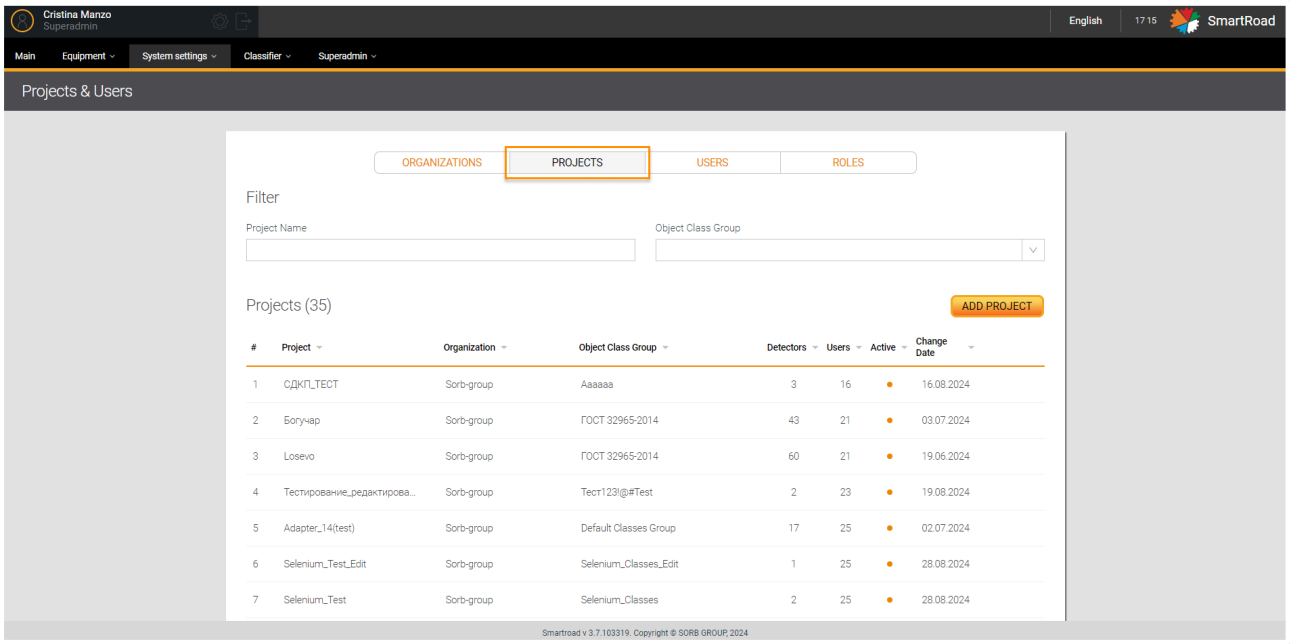
Parameter	Description
#	The serial number of the entry in the list
Project	Project name specified when adding
Organization**	Organization to which the project belongs
Vehicle class group	A group of vehicle classes that is tied to a specific project
Detectors	Number of detectors related to the project
Users	Number of users belonging to the organization
Active	The project activity status in the System depends on the start and end date of the project when it was added. The orange indicator is a sign of an active project. A gray indicator indicates an inactive project
Date changes	Date the project information was last edited

KEEP IN MIND

If a field is filled in incorrectly, it is highlighted in red and the `Save` button is inactive

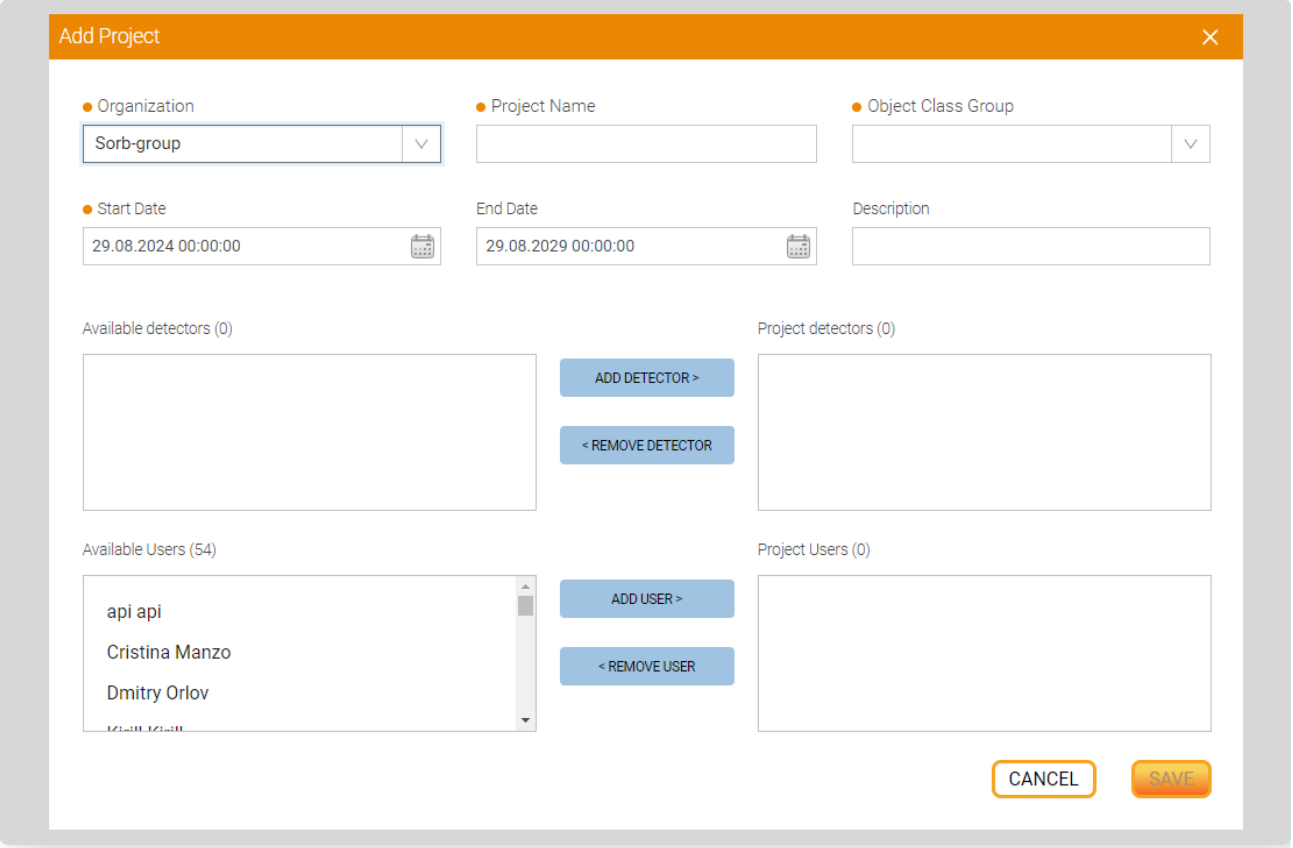
(**) - It indicates that parameter is available only for users with the `Superadmin` role

The list of projects allows you to sort by project name, organization name, vehicle class group, number of detectors, number of users, status in the project, date of last change of the project.



Adding new projects

Adding new projects is done by clicking on the button `Add project`. The user is shown a window for entering parameters.



In the table below are described the Options for adding a project.

Parameter	Description
Organization*/**	The organization to which the project belongs is selected in the field (the organization must be added to the System)
Project name*	The unique name of the project to be added is entered in the field. Required field.
Vehicle class group*	In the field, select a group of vehicle classes used to classify vehicles registered by detectors (a group of classes must be added to the System). Default Classes Group is available by default

Parameter	Description
Start date*	The start date of the project in the System is entered in the field.
End date	The end date of the project is entered in the field
Description	A description of the project is entered in the field
Available detectors	The field displays detectors available for adding to the project (detectors must be added to the system). Adding detectors to a project is done by selecting a detector in the window and clicking the button `Add detector`
Project detectors	The field displays detectors added to the project. Removing detectors from a project is done by selecting a detector in the window and pressing the button `Remove detector`.
Available users	A field for selecting users already registered in the System by the `superadmin` to add them to the project for further work with it. Adding users to the project can be done by selecting the required user and clicking the button `Add` `
Project users	The field displays the users added to the project. Removing a user from a project is done by selecting the user in the window and clicking the button `Put away`
Save	A button that, by clicking on it, the system saves the entered parameters and creates a new project
Cancel	A button that, by clicking on it, the system resets the entered parameters and cancels the creation of a new project

> **NOTE**
>
> (*) - It is a mandatory field
> (**) - It indicates that parameter is available only for users with the `Superadmin` role

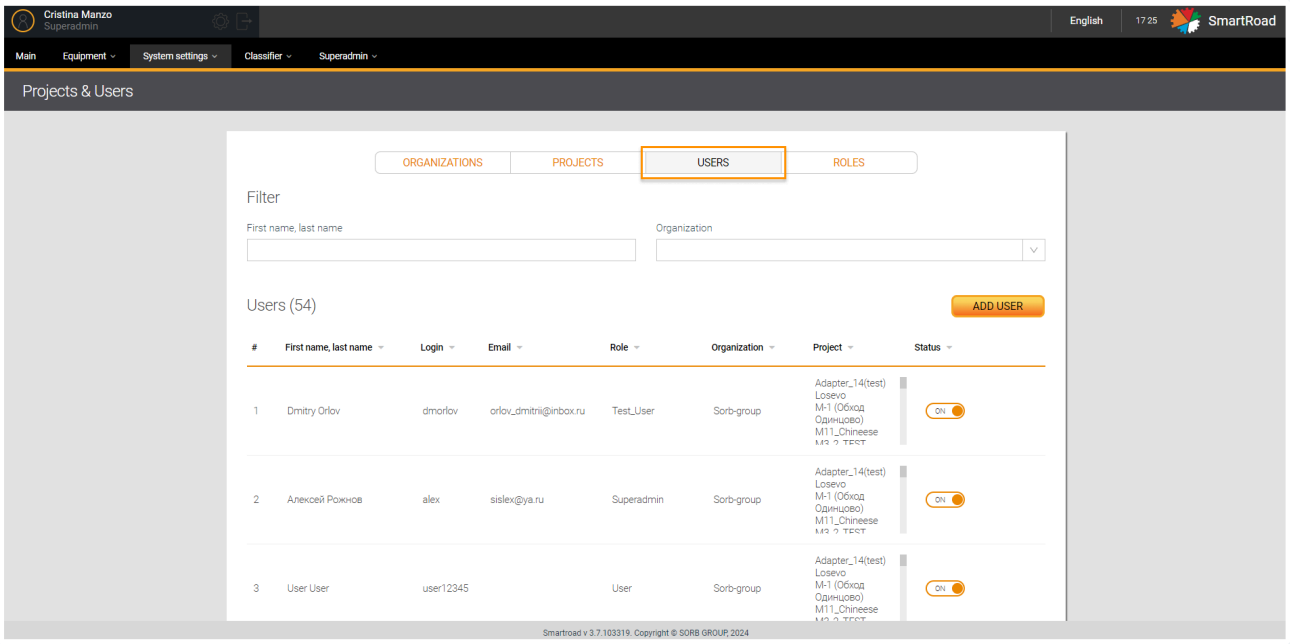
Editing and deleting a project

You have to hover the mouse cursor over an entry in the list and click on the edit button to change project parameters. When you click this button, an editing window will open (similar to the adding window) with the previously specified parameters.

Click on the button `Delete` to remove a project from the System. When you click this button, you must confirm the deletion in a pop-up window or cancel the deletion.

Users

In the page *Users* the user has access to a filter that enables to search for the necessary information and a list of users added to the System.



In the next table the User filter parameters are indicated

Parameter	Description
First Name Last Name	Field for entering the user's first and last name
Organization**	Drop-down list of organizations registered in the system to which users are linked

Here also the User list parameters.

Parameter	Description
#	The serial number of the entry in the list
First Name Last	User's first and last name specified during registration in the

Parameter	Description
Name	System
Login	User login, used to log into the System
Email	User email specified during registration in the System
Role	User role
Organization**	Organization to which the user account belongs
Project	Projects available for viewing/editing by the user (to which the user account belongs)
Status	The activity status of the user account in the system. In the `on` state, the indicator is orange - a sign of an active account. The `off` indicator is a sign of an inactive account

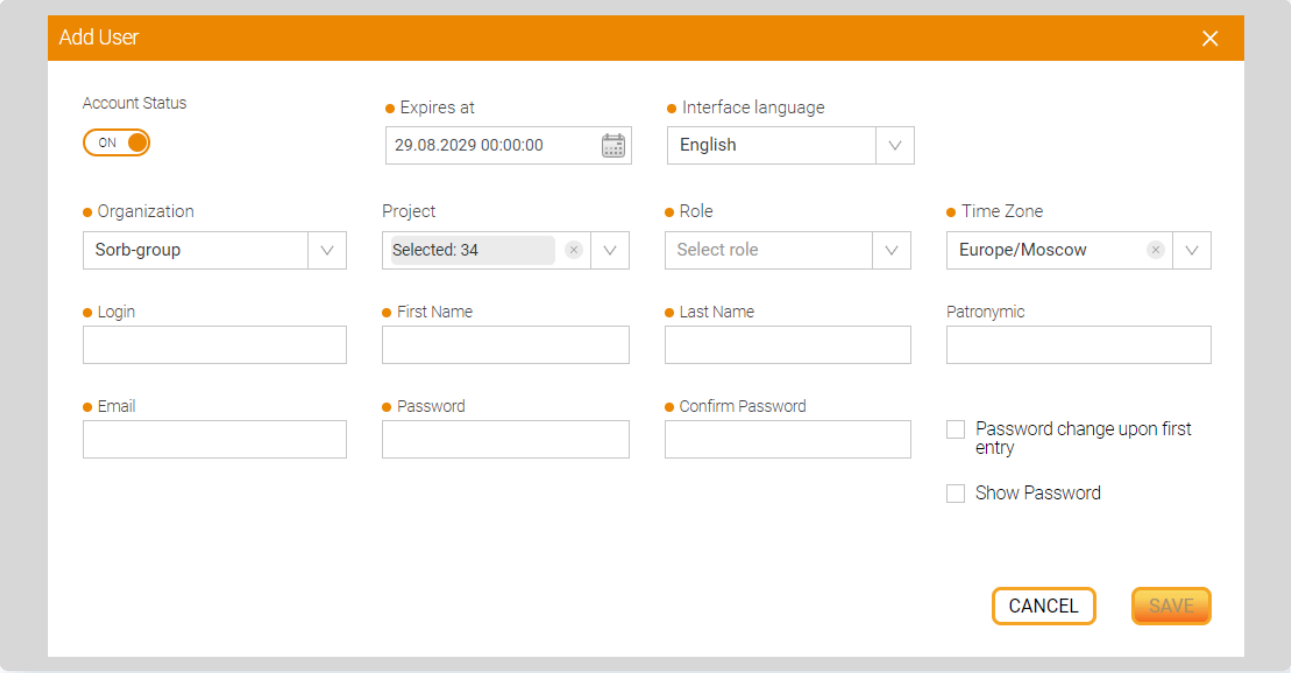
KEEP IN MIND

In the `off` state, the user will not be able to log into the System
(**) - It indicates that parameter is available only for users with the `Superadmin` role

The *list of users* allows you to sort by first name, last name of the user, login, by email, name of organization, by project name, by status in the project.

Adding new users

Adding new users is done by clicking on the button `Add user`. The user is shown a window for entering parameters.



In the next table the User addition options are described.

Field name	Field description
Account status	A switch that determines the action of the user account in the system. When the "off" status is enabled, the user is inactive
Active until*	Enter the expiration date for the user account in the calendar
Interface language*	The drop-down list displays a list of available languages for the user interface
Organization*/**	In the drop-down list, select the user's organization affiliation
Projects	The drop-down list displays a list of available projects that the user account belongs to. The choice is made by setting a checkbox

Field name	Field description
Role*	Select the role for the user account from the drop-down list
Timezone*	Select the time zone for the user account from the drop-down list
login*	The user account login is entered in the field.
Name*	The username is entered in the field
Surname*	The user's last name is entered in the field
Surname	The user's middle name is entered in the field
Email*	The user's email is entered in the field
Password*	The password for the user to log into the System is entered in the field
Repeat password*	The field repeats the password entered for the user to log into de System
Changing your	A checkbox, when activated, the user will be prompted to change the password (when logging into the System for the first time).
Show password	A checkbox that, when activated, displays the specified password
Save	A button that, by clicking on it, the system saves the entered parameters and creates a new user
Cancel	A button that, by clicking on it, the system resets the entered

Field name	Field description
	parameters and cancels the creation of a new user

> **REMEMBER**
>
> (*) - It is mandatory field
>
> (**) - It indicates that parameter is available only for users with the `Superadmin` role

Editing and deleting a user

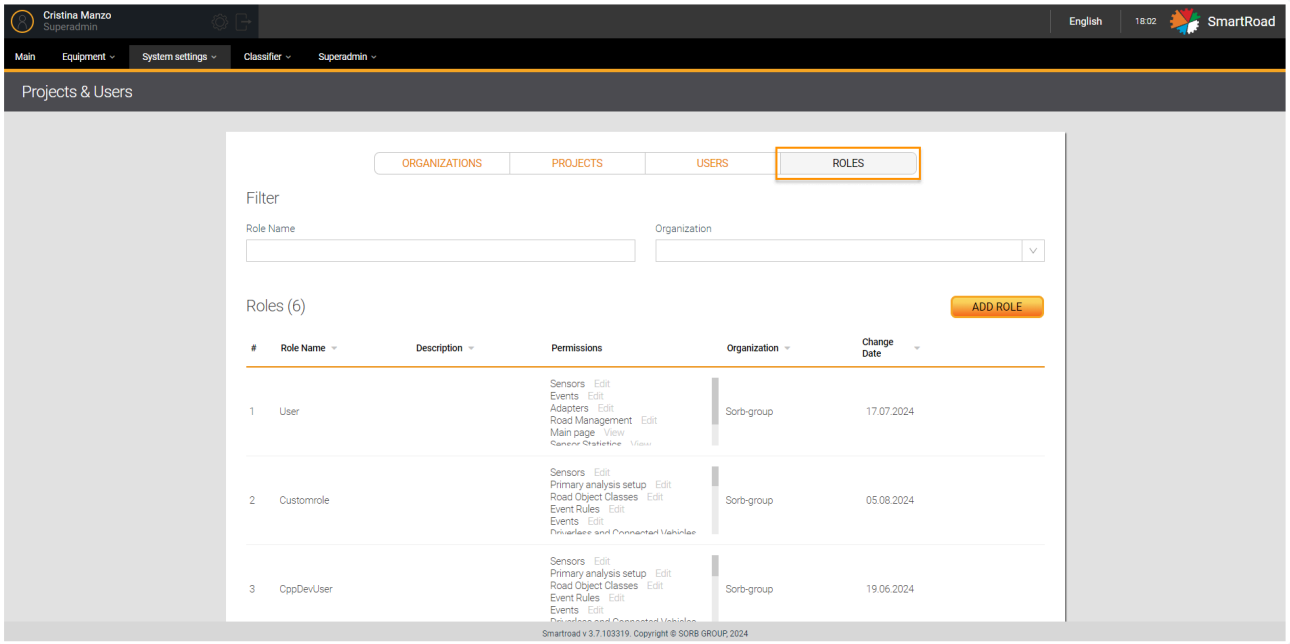
You must hover the mouse cursor over an entry in the list and click on the edit button to change user parameters. When you click the button, an editing window will open (similar to the adding window) with the previously specified parameters.

In case of removing a user from the System, click on the "Delete" button. When you click the button, you must confirm the deletion in a pop-up window or cancel the deletion.

Roles

Access rights in the System are differentiated by editing permissions in the section `Roles`.

In the section `Roles` the user has access to a filter to search for the necessary information and a list of roles added to the System.



In the table below the Role filter parameters are described.

Parameter	Description
Role name	Field for entering the user role name
Organization**	Drop-down list of organizations registered in the system to which user roles are attached

Here the Role list parameters

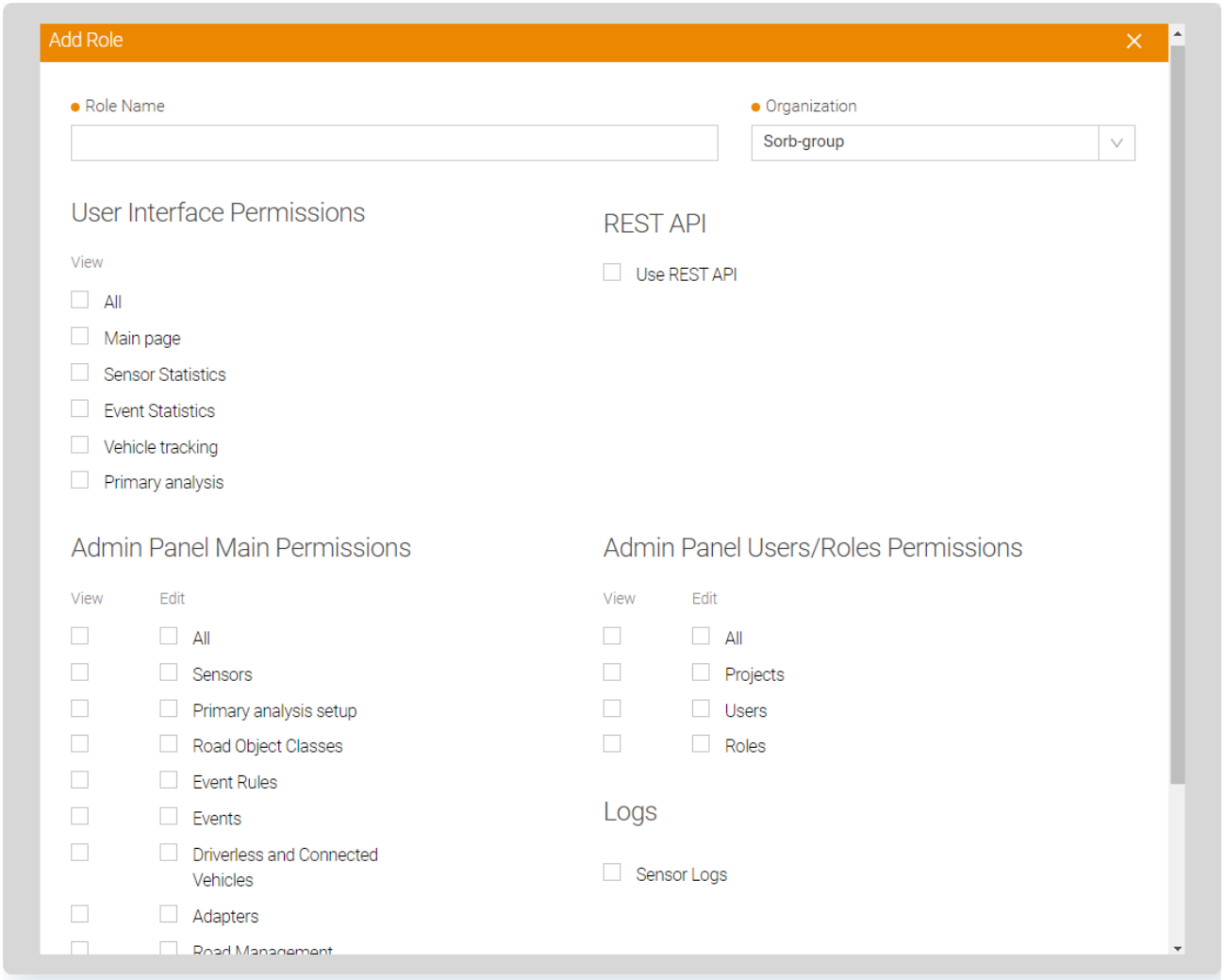
Parameter	Description
#	The serial number of the entry in the list
Role name	Role name specified when added

Parameter	Description
Description	Role description specified when added
Permissions	Set of rights (Change or View) access for a given role
Organization**	Organization to which the role belongs
Date changes	Date the role information was last edited

> **REMEMBER**
>
> (**) - It indicates that parameter is available only for users with the `Superadmin` role

Adding new roles

Adding new roles is done by clicking on the buttons `Add role`. When the button is pressed, the user is shown a window for entering parameters.



In the next table are indicated the Options for adding a role.

Field/checkbox name	Field description
Role name*	Enter the role name in the field
Organization*/**	In the drop-down list, select the user's organization affiliation

The User Interface Permissions

Permission type	Permission description
- All - Home page - Detector statistics - Event statistics - Vehicle tracking - Primary analysis	Checkboxes that, when activated, determine the rights to view sections in UI
- All - Detectors - Setting up primary analysis - Road feature classes - Events - Event Rules - Unmanned and connected vehicles - Adapters - Road management	Checkboxes, when activated, determine the rights to view and change sections in the UI

REST API

Field/checkbox name	Field description
Use REST API	A checkbox that, when activated, determines the rights to use the REST API

Permissions for Projects, Users, and Roles Interface

Permission type	Permission description
- All - Projects - Users - Roles	Checkboxes that, when activated, determine the rights to view and change sections of the web interface

Logs

Element type	Description
Detector logs	A checkbox that, when activated, determines the rights to view detector logs
Save	A button that, by clicking on it, the system saves the entered parameters and creates a new role
Cancel	A button that, by clicking on it, the system resets the entered parameters and cancels the creation of a new role

REMEMBER

(*) - It is mandatory site
(**) - It indicates that parameter is available only for users with the `Superadmin` role

Fields whose values are entered incorrectly will be highlighted in red. The values in them need to be changed.

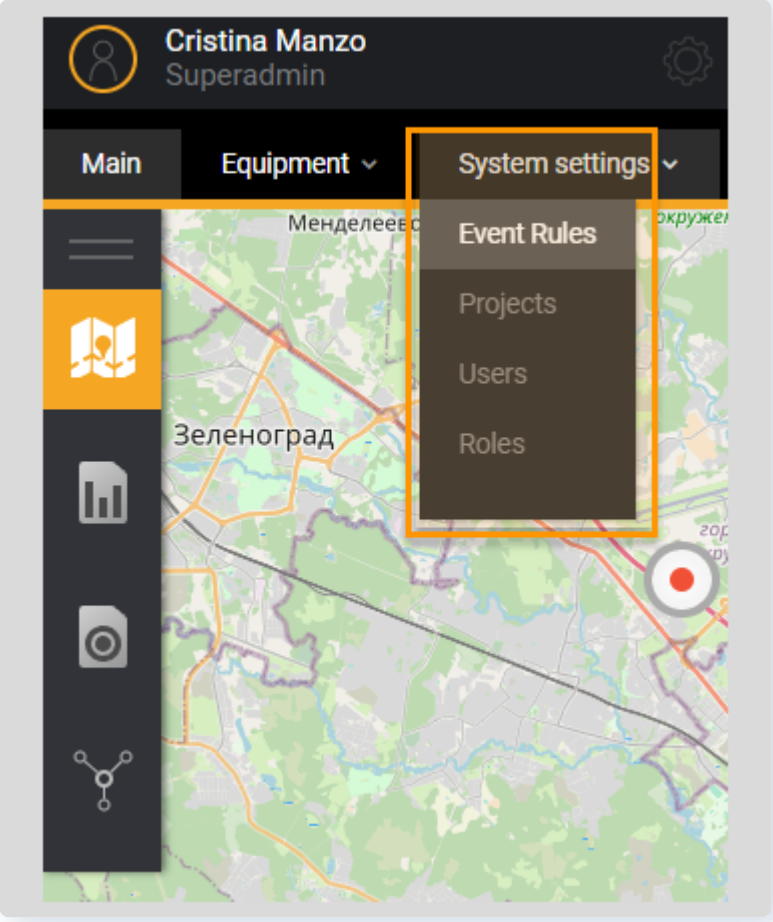
Editing and deleting a role

You should hover the mouse cursor over an entry in the list and click on the *Edit* button to change the parameters of a role. When you click the button, an editing window will open (similar to the adding window) with the previously specified parameters.

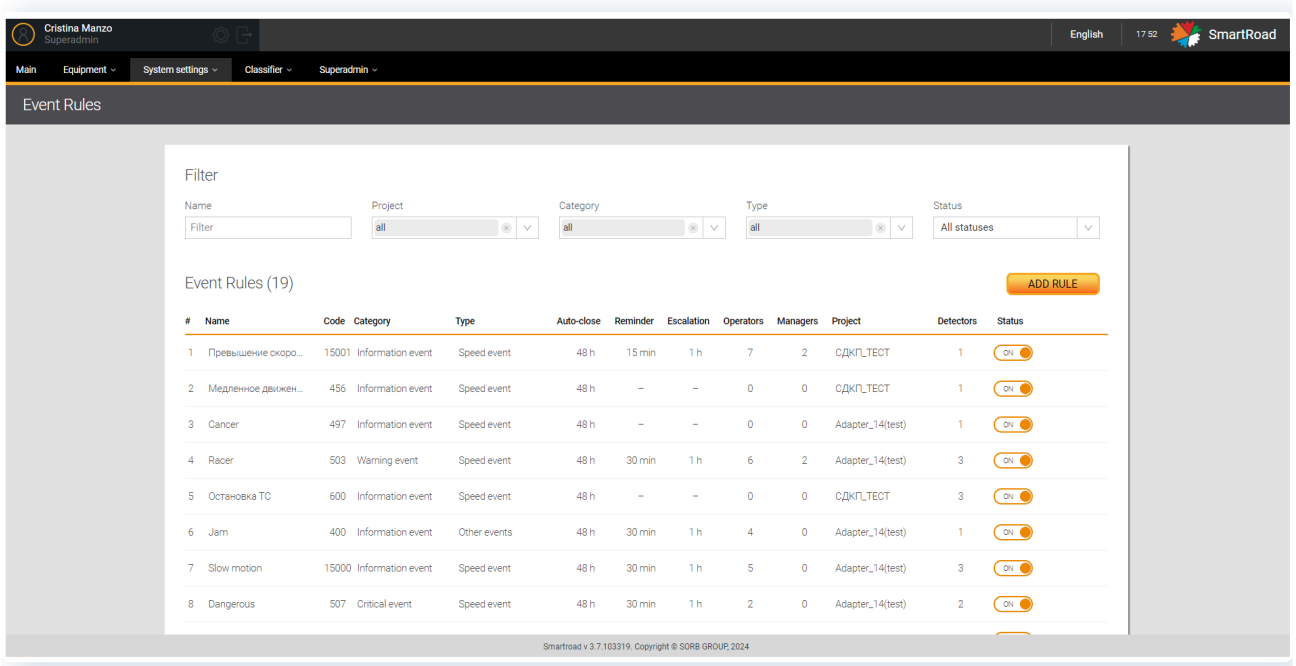
Click on the button `Delete` to remove a role from the system. When you click the button, you must confirm the deletion in a pop-up window or cancel the deletion by clicking the button `Cancel`.

Event Rules

Section *Event Rules* at the Top menu is intended for setting up rules and registering events in the System.



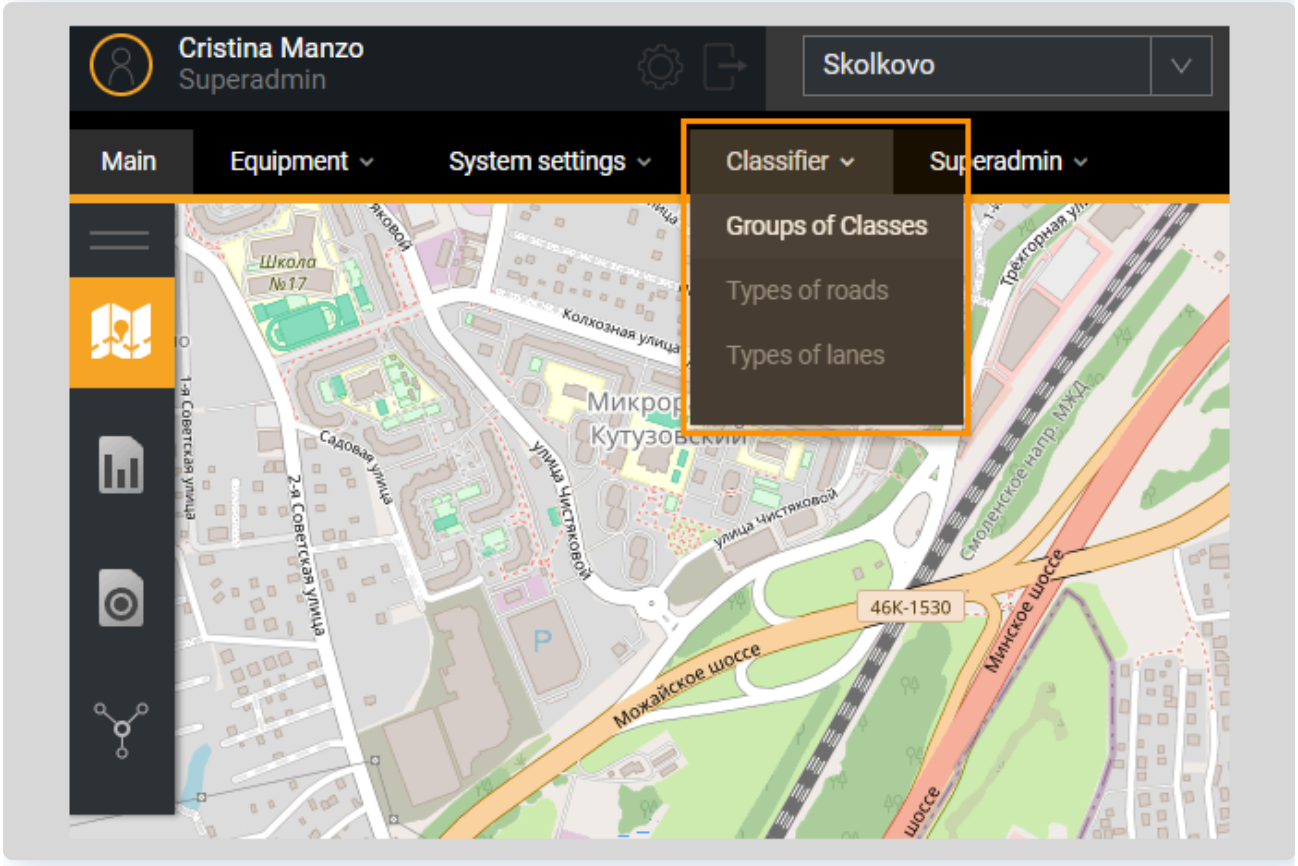
When you click on the `Event Rules` tab, you go to the `Event Rules` page, which contains a filter and a list of available event rules.



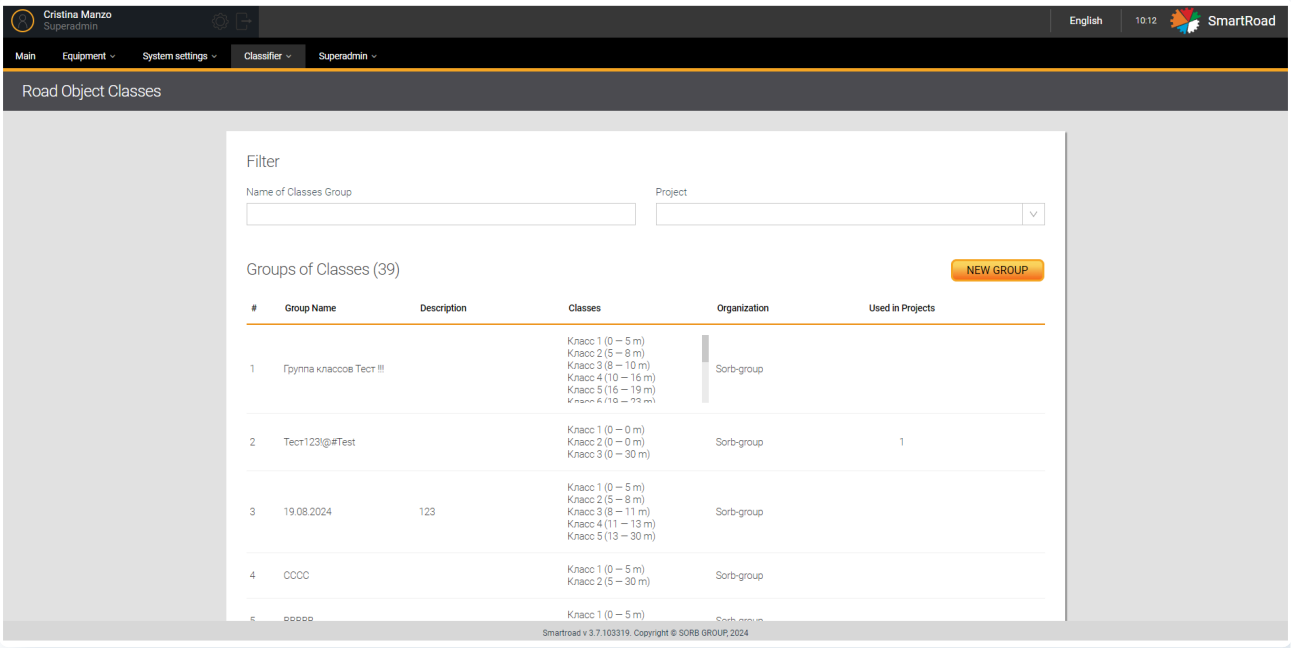
Detailed information related to `Event Rules` functionality can be found in `Decision-making module`.

System Basics / Classifier

Menu item `Classifier` is intended for determination in the classification system of registered objects. The user has access to a filter for searching information and a list of class groups already added to the System.



The filter allows you to search for groups of road feature classes in the list. Next to the list name `Class Groups` information about the total number of class groups in the System is displayed.



In the table below you can find the Class Groups filter parameters.

Parameter	Description
Class group name	The name of the road feature class group is entered in the field
Project	In the drop-down list, the user is shown a list of projects registered in the System, to which class groups are attached

Class groups created in the System are displayed in the list `Groups of classes`. The Parameters of the *Class Groups* list are indicated below.

Parameter	Description
#	The serial number of the entry in the list

Parameter	Description
Group name	The name of the class group specified when adding
Description	Description of the class group specified when adding
Classes	Object classes included in a class group
Organization**	Organization to which the class group is associated
Used in projects	Number of projects that use a group of classes

PLEASE NOTE

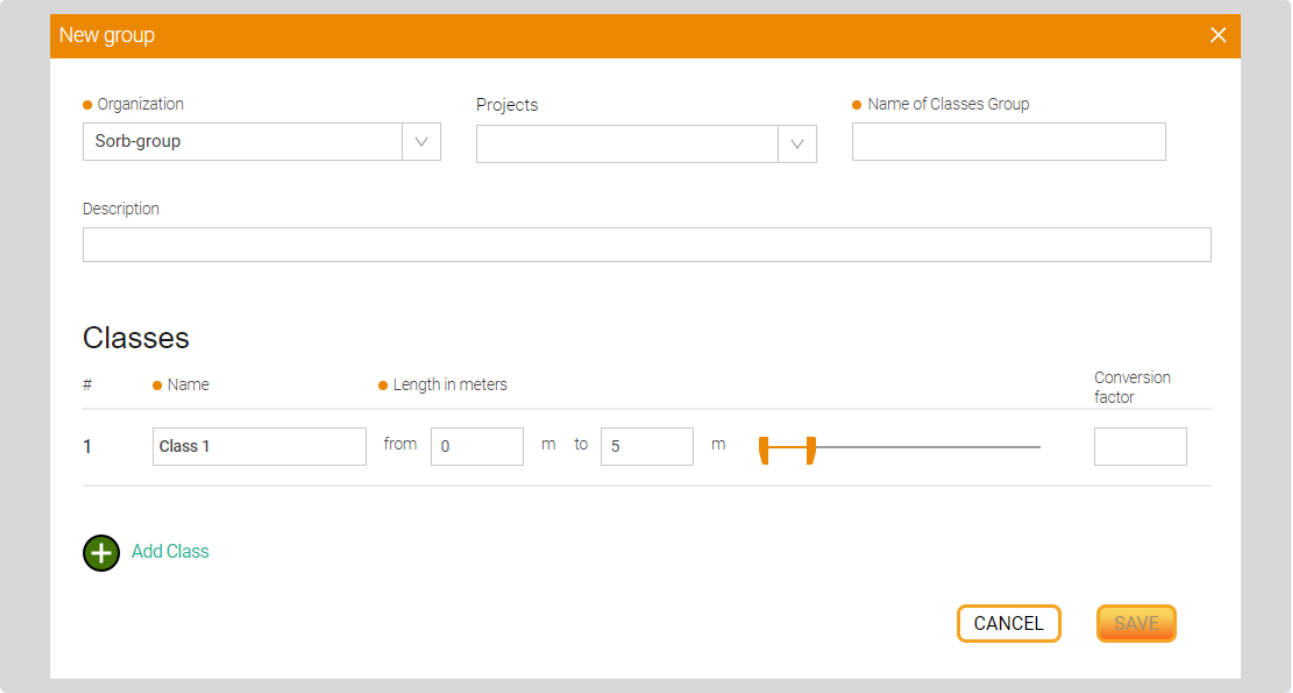
It is available only for users with the `Superadmin` role

Adding a new class group

TAKE INTO ACCOUNT

The Classes are related to `Road Object Classes`

Adding a new group of classes is done using the button `A new group`. The user is shown a window for entering parameters for creating a new group by clicking on the button.



In next table are included the options for adding a class group.

Parameter	Description
Organization*/**	In the drop-down list, the user is shown a list of organizations available for selection to which the class group will be associate
Projects	The drop-down list displays a list of available projects to which the class group will be attached. The choice is made by setting the checkbox
Class group name*	The name of the new class group is entered in the field, which will be displayed in the System
Description	A description of the class group is entered in the field.
#	Class number, the value is entered in the field automatically

Parameter	Description
Name*	The name of the class that will be displayed in the system
Length in meters*	Class length in meters. The values `from` and `to` are indicated. The user can set the length of class objects using the slider
Reduction coefficient	The number of passenger cars that corresponds to the vehicle in length
Add a class	Button to add a new class to a group
Save	A button that, by clicking on it the System saves the entered parameters and creates a new group of classes
Cancel	A button that, when clicked, resets the entered parameters

> **TAKE IN MIND**
>
> (*) - It indicates that field is mandatory
> (**) - It means that it is available only for users with the `Superadmin` role

Fields whose values are entered incorrectly will be highlighted in red. The values in them need to be changed, and the button `Save` in this case will be inactive.

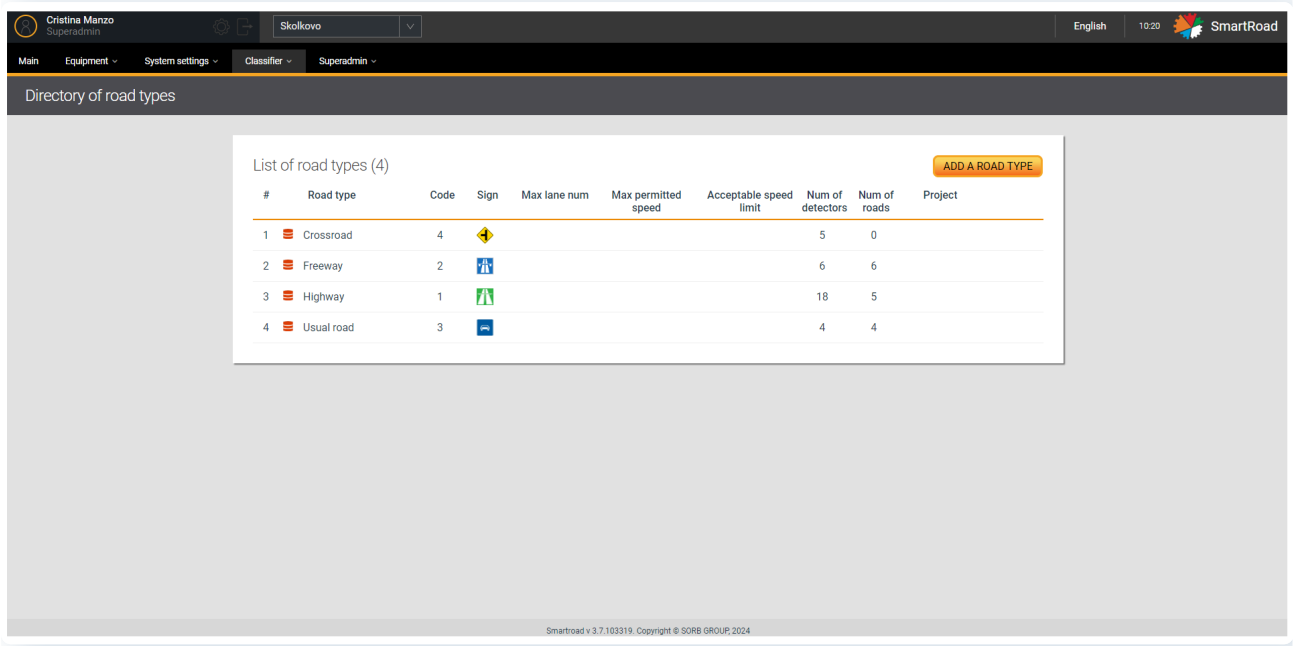
Deleting and editing a class group

You must hover the mouse cursor over the entry in the list and click on the edit button to change the parameters of a class group. When you click this button, an editing window will open (similar to the adding window) with the previously specified parameters.

In case of removing a group of classes from the system, you must just click on the delete button. When you click on this button, you should confirm the deletion in a pop-up window by clicking the button `Delete` or cancel deletion by pressing the button `Cancel`.

Types of roads

Page *Types of roads* is intended for adding, editing and removing roads from the project. When you click on a menu item `Types of roads` you go to the road management page, on which there is a filter and a list of all roads existing in the System. The filter specifies the name of the road and the project to which it belongs.



You should hover the mouse cursor over the entry in the list and click on the edit to change the strip type parameters. When you click the button, an editing window will open (similar to the adding window) with the previously specified parameters.

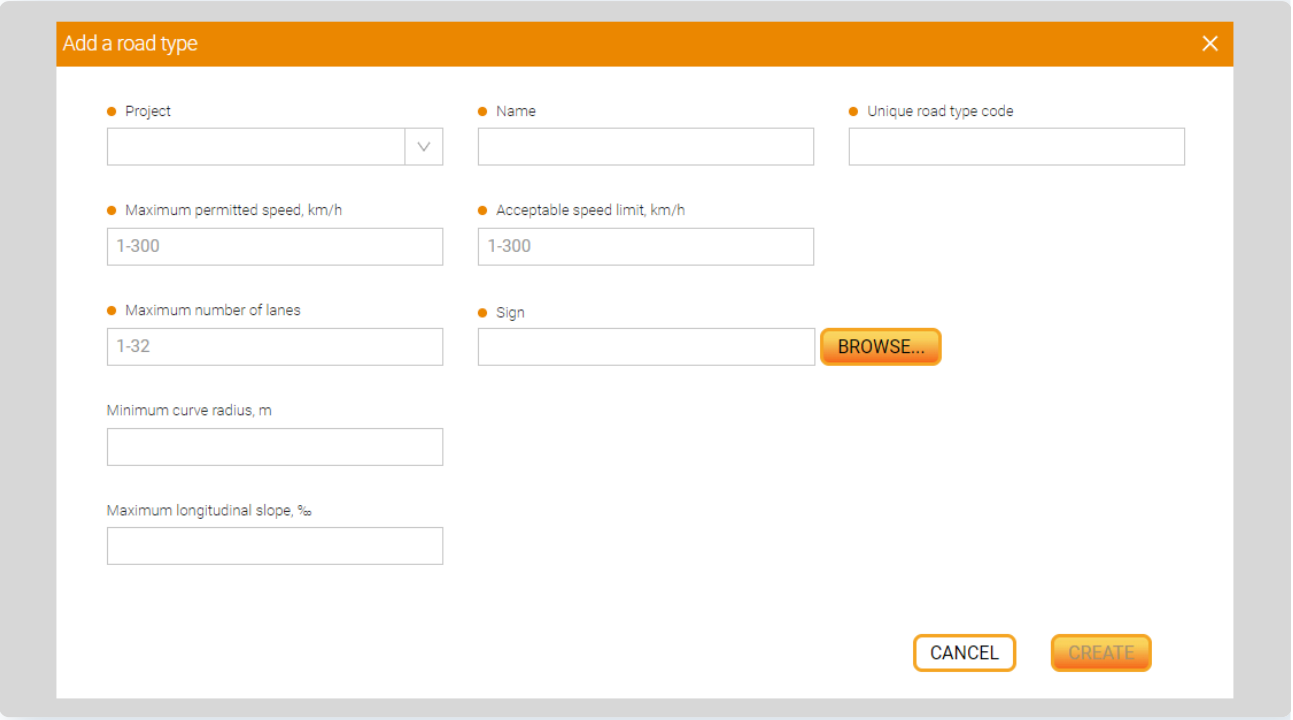
Besides, you must click on the delete button to delete a stripe type from the system. When you click on the button, you have to confirm the deletion in a pop-up window by clicking the button `Delete` or cancel deletion by pressing the button `Cancel`.

You can find the Road type list parameters in the next table

Parameter	Description
#	The serial number of the entry in the list
Road type	The name of the road type specified when adding the road to the System
The code	Road type code
A sign	Image (icon) for road type
Max. number of lanes	Maximum number of lanes for road type
Max. permitted speed	Maximum permitted speed for road type
Non-penalized speed limit	Non-penalized speed limit for road type
Number of detectors	Number of detectors in the System whose settings use this type of road
Number of roads	Number of configured roads in the System that use this road type
Project	Name of the project in which the road type is used

Adding a road type

Adding a new road type is done by clicking on the button `Add road type`. When you press this button, a window is displayed for entering parameters and adding a new road type.



Furthermore, the Parameters for adding a new road type

Parameter	Description
Project*	Drop-down list for selecting the project to which the new road type will be assigned. When you click on the field, the user is shown a list of projects available for selection
Name*	The name of the road type being created is entered in the field
Unique road code*	A unique code for the new road type is entered in the field

Parameter	Description
Maximum permitted speed, km/h*	The value of the maximum permitted speed (in `km/h`) on this type of road in km/h is entered in the field
Non-penalized speed limit, km/h *	The value of the non-penalized speed threshold (in `km/h`) on this type of road in km/h is entered in the field
Maximum number of lanes*	The value of the maximum number of lanes on this type of road is entered in the field (from 1 to 32)
Sign*	Pictogram for road type. When you click on the field, a window opens for selecting an icon file on the user's PC. Once selected, the field displays the file path and file name. When you hover your mouse over the field, a tooltip with valid file parameters is displayed: - The size should not exceed: `100 kilobytes` - File type: `gif`, `png`, `jpg`, `jpeg`, `webp` - Width and height no more than: `25px`.
Review	A button that, when clicked, opens a window for selecting an icon file on the user's PC
Minimum curve radius in plan, m	The value of the smallest curve radius in plan (in meters) for this type of road is entered in the field. This value is used in algorithms for determining events and incidents based on indirect signs in control zones where there is no direct detector coverage (between DT detection zones). The radius at which safe movement of the

Parameter	Description
	vehicle at the design speed with a clean, moistened surface, with the device of turns and widening the roadway.
Maximum longitudinal slope (%)	The value of the greatest longitudinal slope (in ppm on this type of road is entered in the field. This value is used in algorithms for determining events and incidents based on indirect signs in control zones where there is no direct detector coverage (between DT detection zones)
Create/Save()	When you click on the button, a new type of road is created in the System
Cancel	By clicking the button, the `Add road type` window closes, the System returns the user to the `List of road types` page

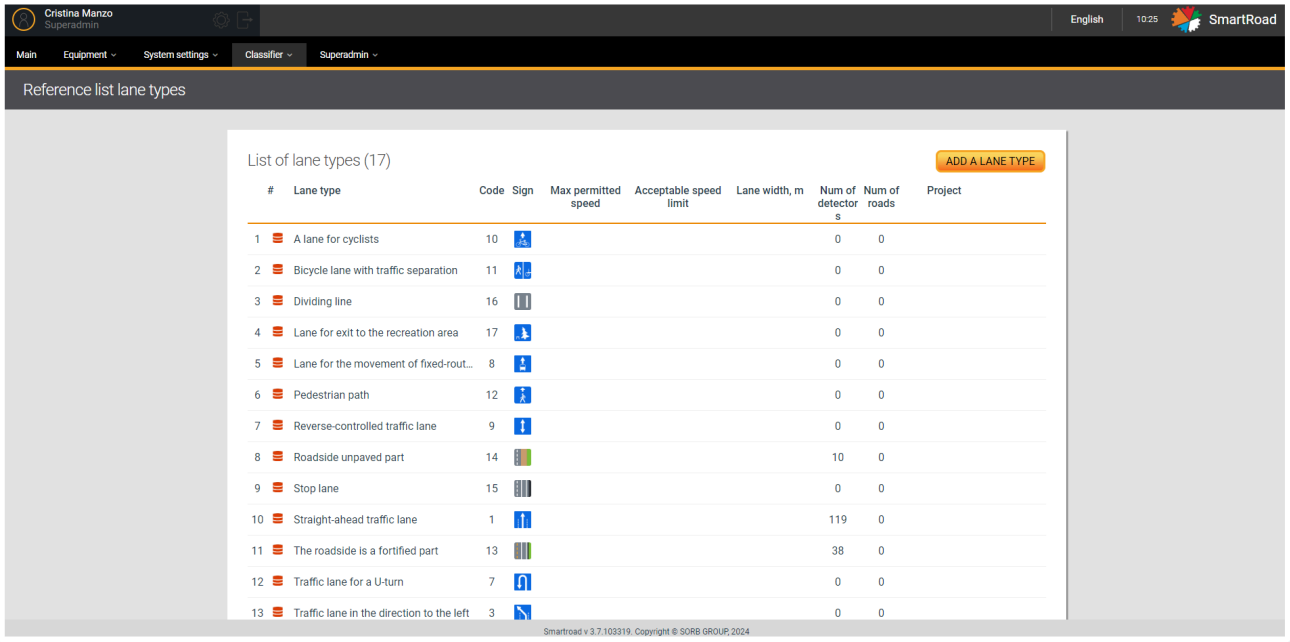
REMEMBER

(*) - These are required fields

Fields whose values are entered incorrectly will be highlighted in red. The values in them need to be changed. In this case, the button `Create` will be inactive.

Types of lanes

The user can create, edit and delete new types of lanes in the System in the pages *Types of lanes*. When you click on a menu item `Types of lanes` the page goes to `Directory of lanes types`, which contains a list of all lanes already added to the System.



The land type list parameters are described in the next table

Parameter	Description
#	The serial number of the entry in the list
Band type	Band type name
The code	Band type code
A sign	Images (icon) for stripe type
Maximum permitted speed	Maximum permitted speed for lane type
Non-penalized speed limit	Non-penalized speed threshold for lane type

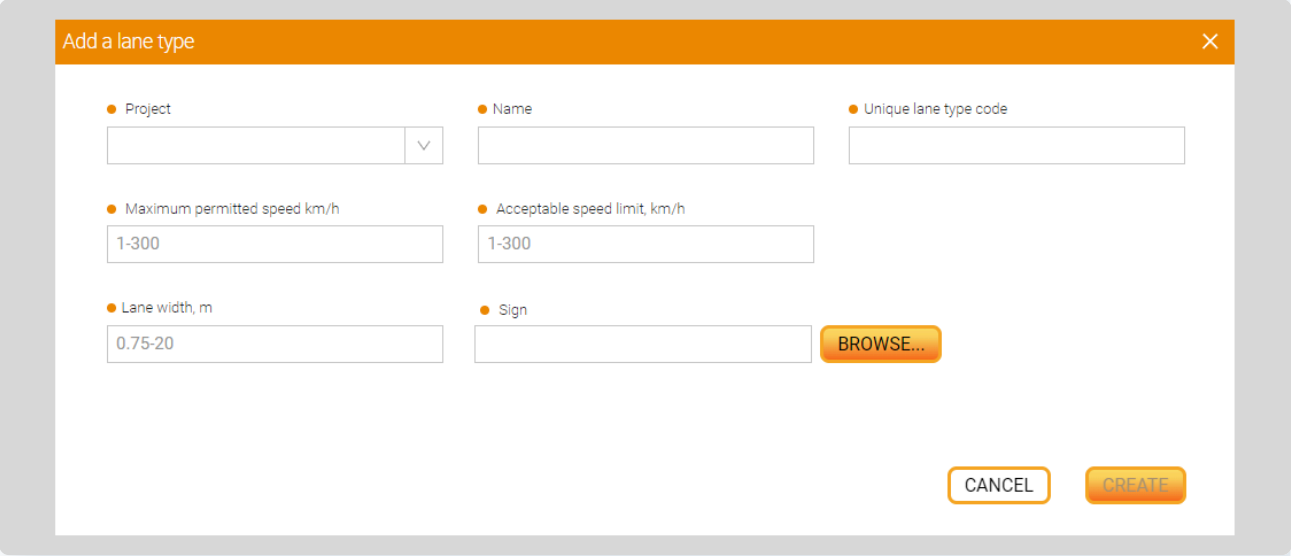
Parameter	Description
Lane width, meters	The width of this type of strip, indicated in meters
Number of detectors	Number of detectors in the System whose settings use this type of band
Number of roads	Number of configured roads in the System that use this lane type
Project	Project in which the strip type is applied

You should hover the mouse cursor over the entry in the list and click on the edit button to change the lane type parameters. When you click the button, an editing window will open (similar to the adding window) with the previously specified parameters.

You have to click on the delete button to delete a lane type from the system. When you click on this button, you must confirm the deletion in a pop-up window by clicking the button `Delete` or cancel deletion by pressing the button `Cancel`.

Adding a lane type

Adding a new lane type is done by clicking on the button `Add a lane type`. When you press the button a window is displayed for entering parameters for adding a new stripe type.



In the table below the Options for adding a new lane type

Parameter	Description
Project*	Drop-down list for selecting the project to which the new strip type will be assigned. By clicking on the field, the user is shown a list of projects available for selection.
Name*	The name of the stripe type to be created is entered in the field
Unique band code*	A unique code for the new stripe type is entered in the field
Maximum permitted speed, km/h *	The value of the maximum permitted speed (in `km/h`) for this type of lane in km/h is entered in the field
Non-penalized speed limit, km/h *	The value of the non-penalized speed threshold (in `km/h`) for this type of lane in km/h is entered in the field

Parameter	Description
Lane width, m *	Enter the width of this type of strip in meters in the field
Sign *	Icon for stripe type. When you click on the field, a window opens for selecting an icon file on the user's PC. Once selected, the field displays the file path and file name. When you hover your mouse over the field, a tooltip with valid file parameters is displayed: - The size should not exceed: `100 kilobytes` - File type: `gif`, `png`, `jpg`, `jpeg`, `webp` - Width and height no more than: `25px`
Review	A button that, when clicked, opens a window for selecting a icon file on the user's PC
Create	Clicking on the button creates a new type of strip in the System
Cancel	By clicking on the button, the `Add lane type` window closes, the System returns the user to the `List of lane types` page

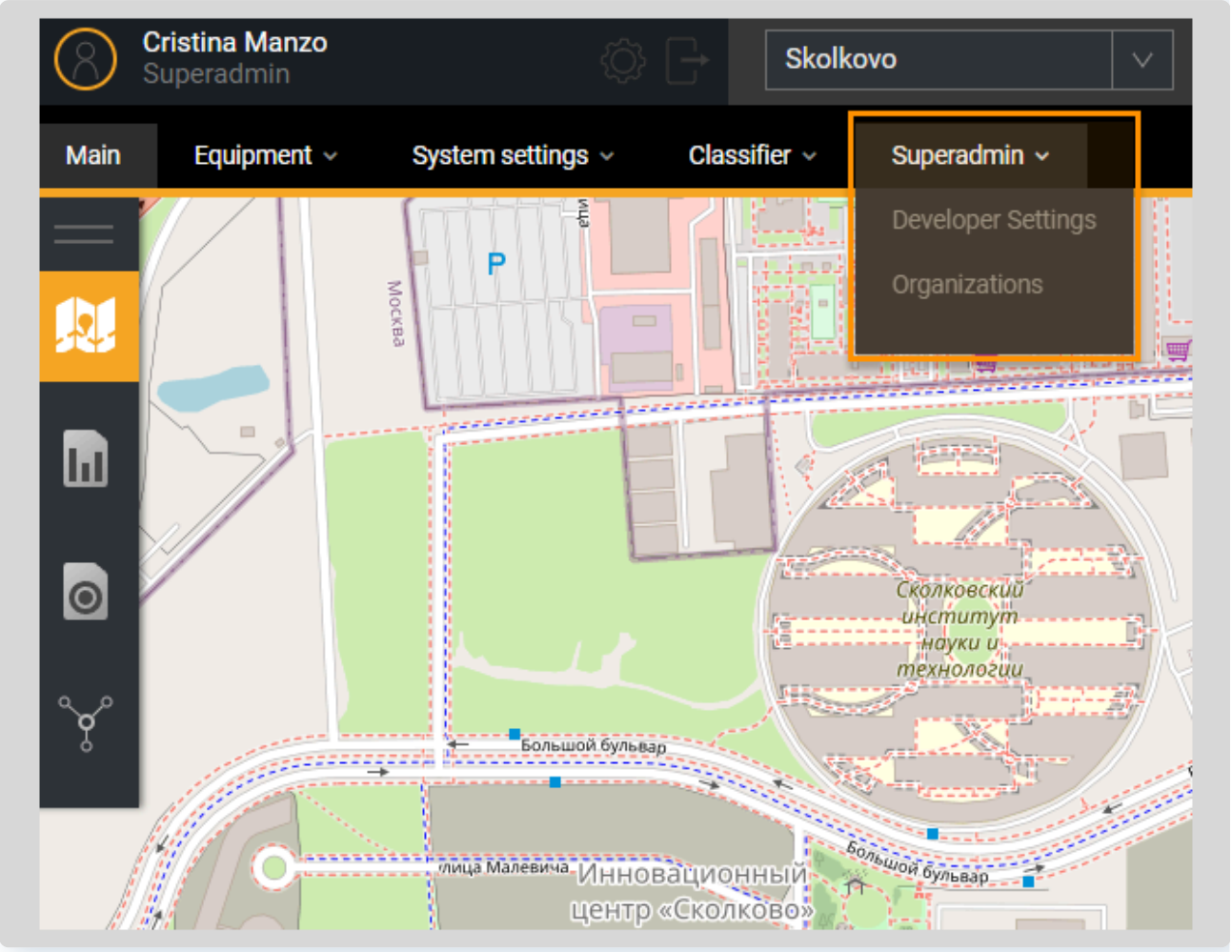
REMEMBER

(*) - These are required fields

> Required fields whose values are entered *incorrectly* will be highlighted in `red`. The values in them need to be changed. In this case, the `Create` button will be inactive.

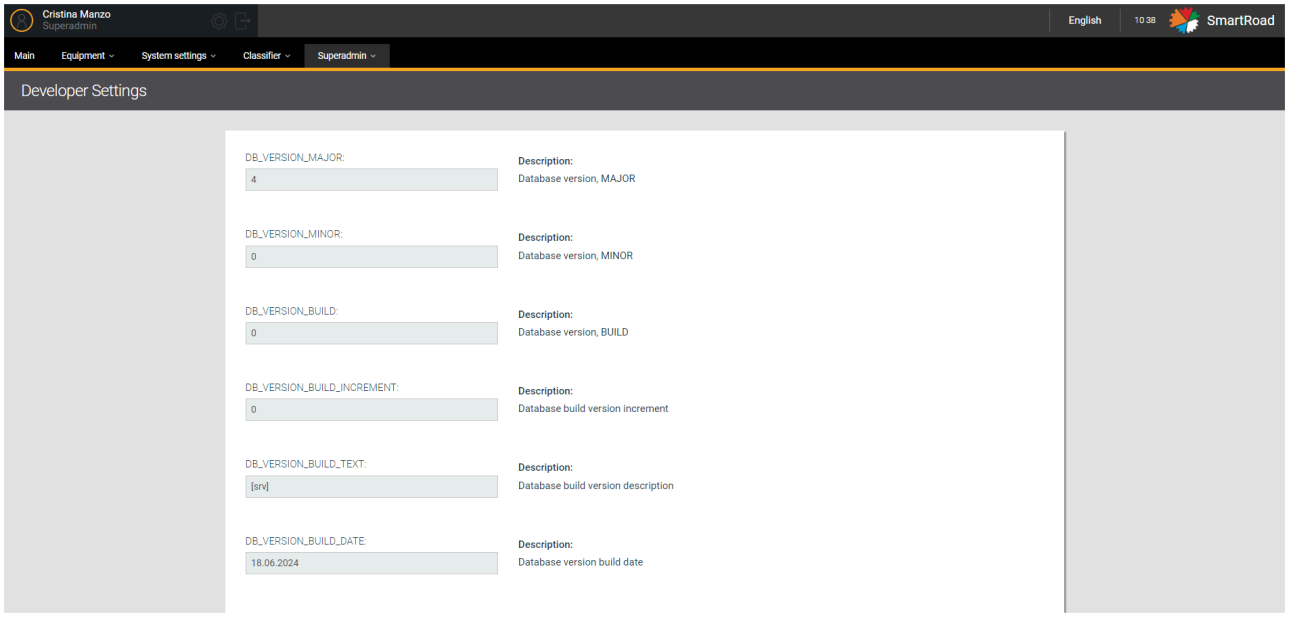
System Basics / Superadmin

In this section you can find the *Developer Settings* and *Organizations*.



Developer Settings

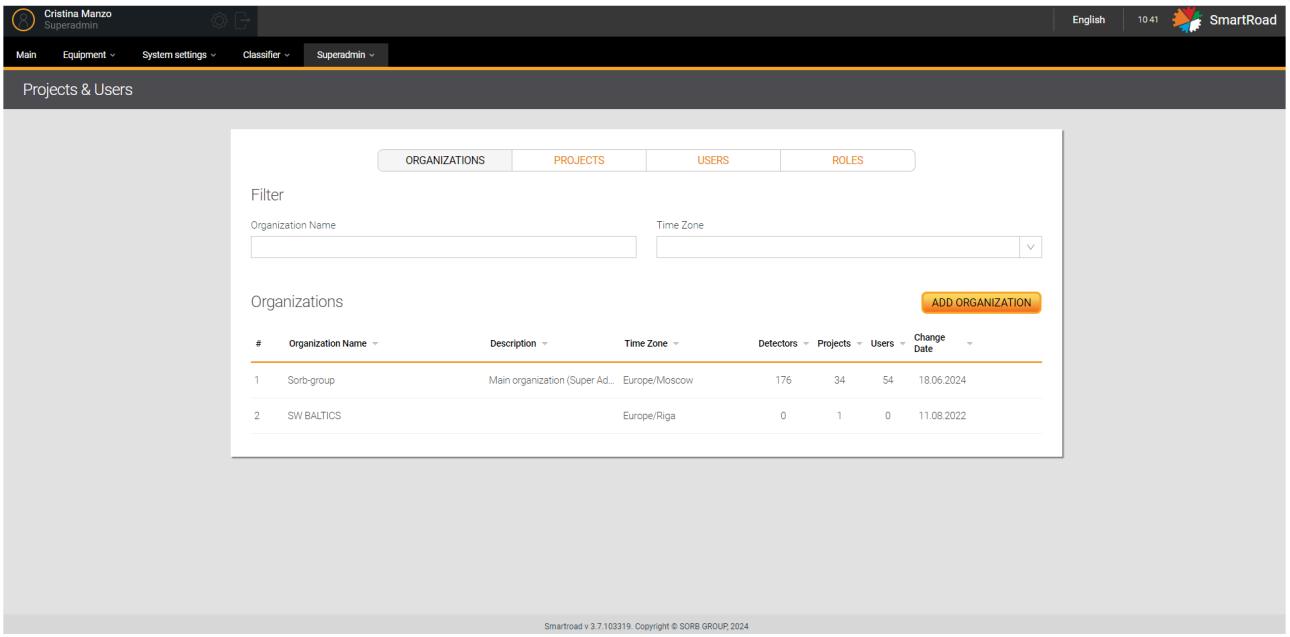
The Page *Developer Setup* is available only to users with the `Superadmin` role. This presents data on the state of the database structure with reference to a specific release of the web application. The page enables to clear the cache by clicking on the button `Reset cache`.



Organizations

In this section the user has access to a filter to search for the necessary information and a list of added organizations.

> **PLEASE NOTE**
>
> The `Organization` page is available only for users with the `Superadmin` role.



In the table below you can find the Organization filter parameters.

Parameter	Description
Name of the organization	Field for entering the name of the organization
Timezone	Drop-down list of time zones registered in the system to which organizations belong

The `superadmin` has access to lists of organizations already added to the System.

Here Organization list parameters.

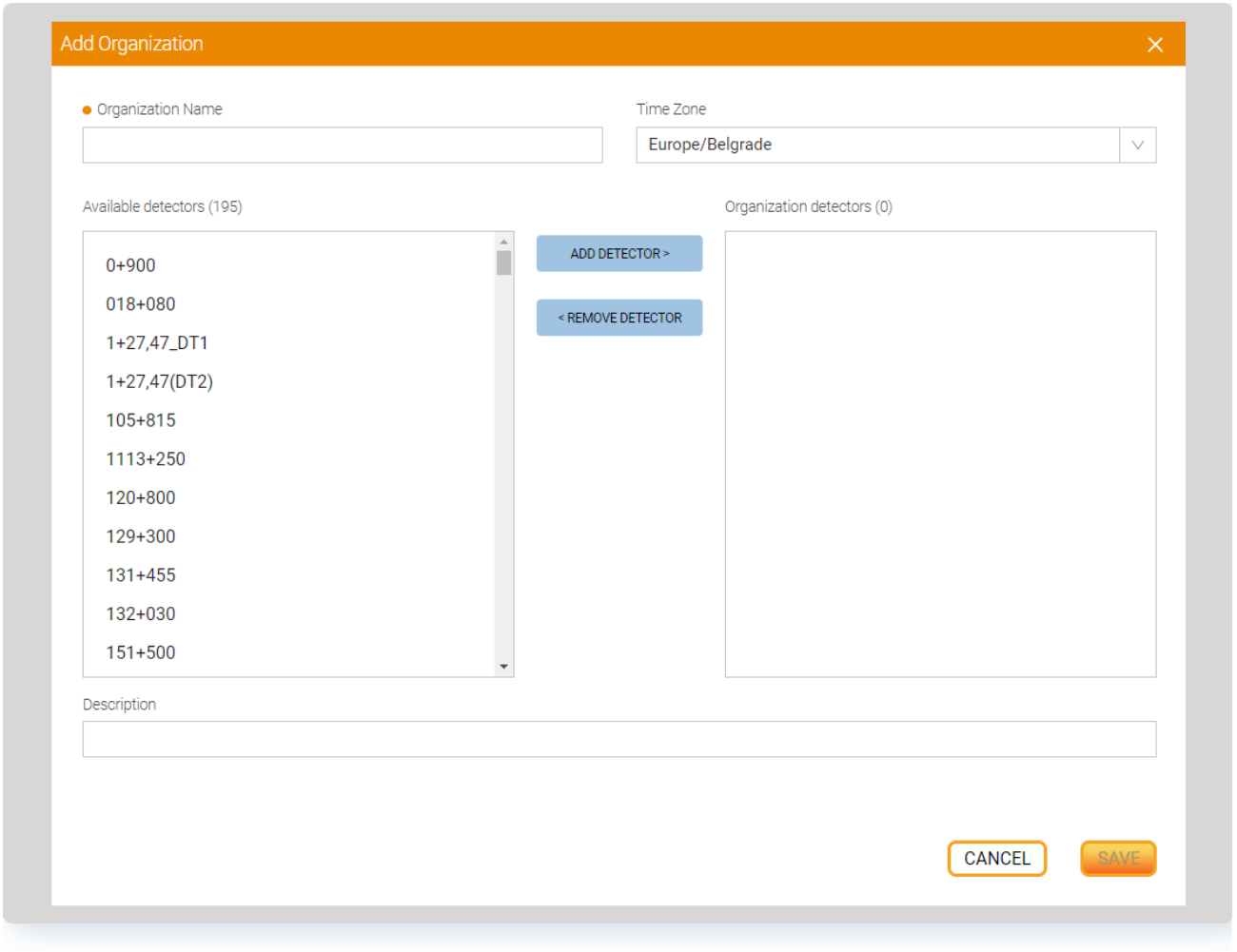
Parameter	Description
#	The serial number of the entry in the list

Parameter	Description
Name of the organization	Organization name specified when adding
Description	Description of the organization specified when adding
Timezone	Time zone to which the organization is assigned
Detectors	Number of detectors per organization
Projects	Number of projects related to the organization
Users	Number of users belonging to organizations
Date changes	Date the information was last edited organization

The list of organizations allows you to sort by organization name, description, time zone, number of detectors, number of projects, number of users, date of last change.

Adding new organizations

Adding new organizations can be done by clicking on the button `Add organization`. A window is displayed for entering parameters.



In addition, you can find the Options for adding an organization in the table below.

Field name	Field description
Name of the organization	The unique name of the organization is entered in the field
Timezone	In the drop-down list, select the time zone for the organization
Available detectors	The field displays detectors available for attachment to an organization (Adding a detector). Attaching detectors to an

Field name	Field description
	organization is done by selecting a detector in the window and clicking on the “Add detector” button
Organization detectors	The field displays detectors attached to the organization. Detectors can be detached by selecting a detector in the window and clicking the “Remove detector” button
Description	Enter a description of the organization in the field
Save	Saves the entered parameters and creates a new organization
Cancel	Resets the entered parameters and cancels the creation of a new organization

Editing and deleting an organization

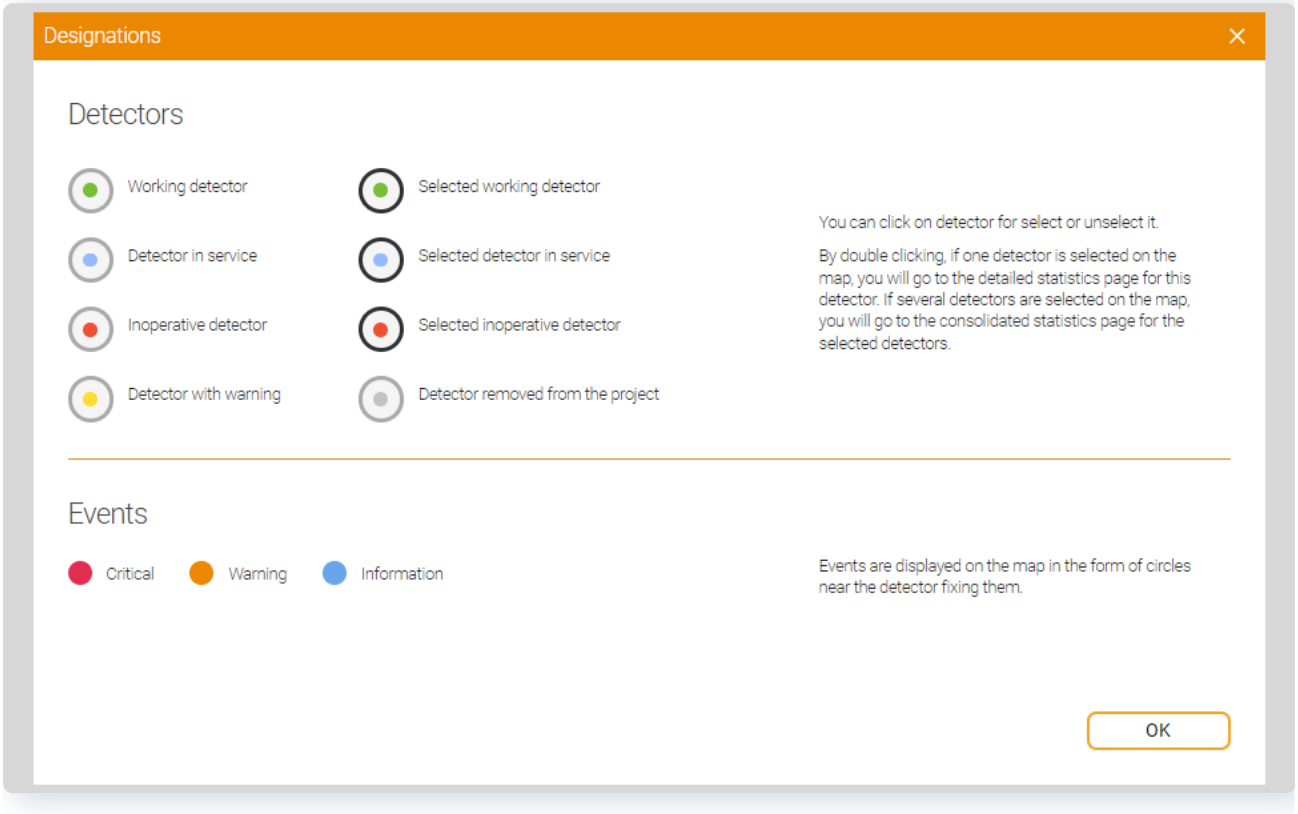
You have to hover the mouse cursor over an entry in the list and click on the edit button to change the organization's parameters. When you click the button, an editing window will open (similar to the adding window) with the previously specified parameters.

Click on the button "Delete" to remove an organization from the System. When you click the button, you must confirm the deletion in a pop-up window or cancel the deletion.

System Basics / Detector operation status

The current status of the detector is displayed on the interactive map on the main page of the web interface in the form of a detector marker of a certain color.

Detectors on the map are displayed as round icons. The marker color changes depending on the detector status.



Description of DT statuses and conditions

In the table below are described the detectors (DT) statuses and conditions for their determination in the SmartRoad System.

Marker color	Description	DT status
Green	The DT functions correctly, data flows from the DT to the adapter and then to the system	- The detector participates in adapter polling (ACTIVE) - The extended mode (EXTENDED_MODE) is activated on detector. This mode is activated only in “0C” type detectors. It is used to determinate bands and classes of tracked objects (OBJECTS) - The system receives data from the detector (data is read - READING).
Blue	DT is in maintenance mode or setup	The detector is undergoing service (in setup). The detector data is redirected to an IP address that is different from the IP address of the server where the adapter is located.
Red	The adapter does not transmit data to the system (user)	Determined by the System when one or more of the conditions below occur: - In DT the “bootloader_mode” mode is activated; error when connecting the adapter to the diesel generator (CONNECTION_ERROR); - The adapter is in the process of connecting to the DT (the adapter attempts to connect to the DT - CONNECTING); - The adapter successfully connected to the DT - CONNECTED, while data has not yet

Marker color	Description	DT status
		been transmitted to the user - No data from the adapter for more than two minutes (DEAD_ADAPTER). - Standby mode (TIMEOUT).
Yellow	Warning about a possible problem with the detector	Determined by the system when one or more of the following conditions occur: - The system does not receive PVR data from the detector within 10 minutes (NO PVR); status data is not recorded in the database (NO DATA) - Blinding the DT is blinded due to the formation of snow, ice or other obstacle blocking the DT antenna signal (BLIND); - Interference – interference is detected on the frequency channel of the detector, affecting the detection of objects (as a rule, interference occurs due to the signal of another detector located or installed nearby - INTERFERENCE); - Rain – the presence of precipitation (rain) has been detected, which can affect the efficiency of object detection (RAIN); - Hardware error – an error has been detected in the DT hardware, which may negatively affect the correct operation of the DT (HARDWARE_ERROR). - In this case, the DT can transmit PVR data, but if at least one of the above conditions is

Marker color	Description	DT status
		detected, for example *Interference* the System will still determine the DT status as `Yellow` (INTERFERENCE).
Grey	The detector has been removed from a project or moved to another project (displayed as dark gray on the map and light gray on the status chart)	The detector is removed from the project or moved to another project, and the user can receive statistical data from the detector over past time intervals.

DON'T FORGET

- A red triangle with an exclamation mark may be displayed if the detector does not have stripe types configured.
- In case of non-configured stripe types, you might see also the Detector `icon`.

System Basics / Multi-filter

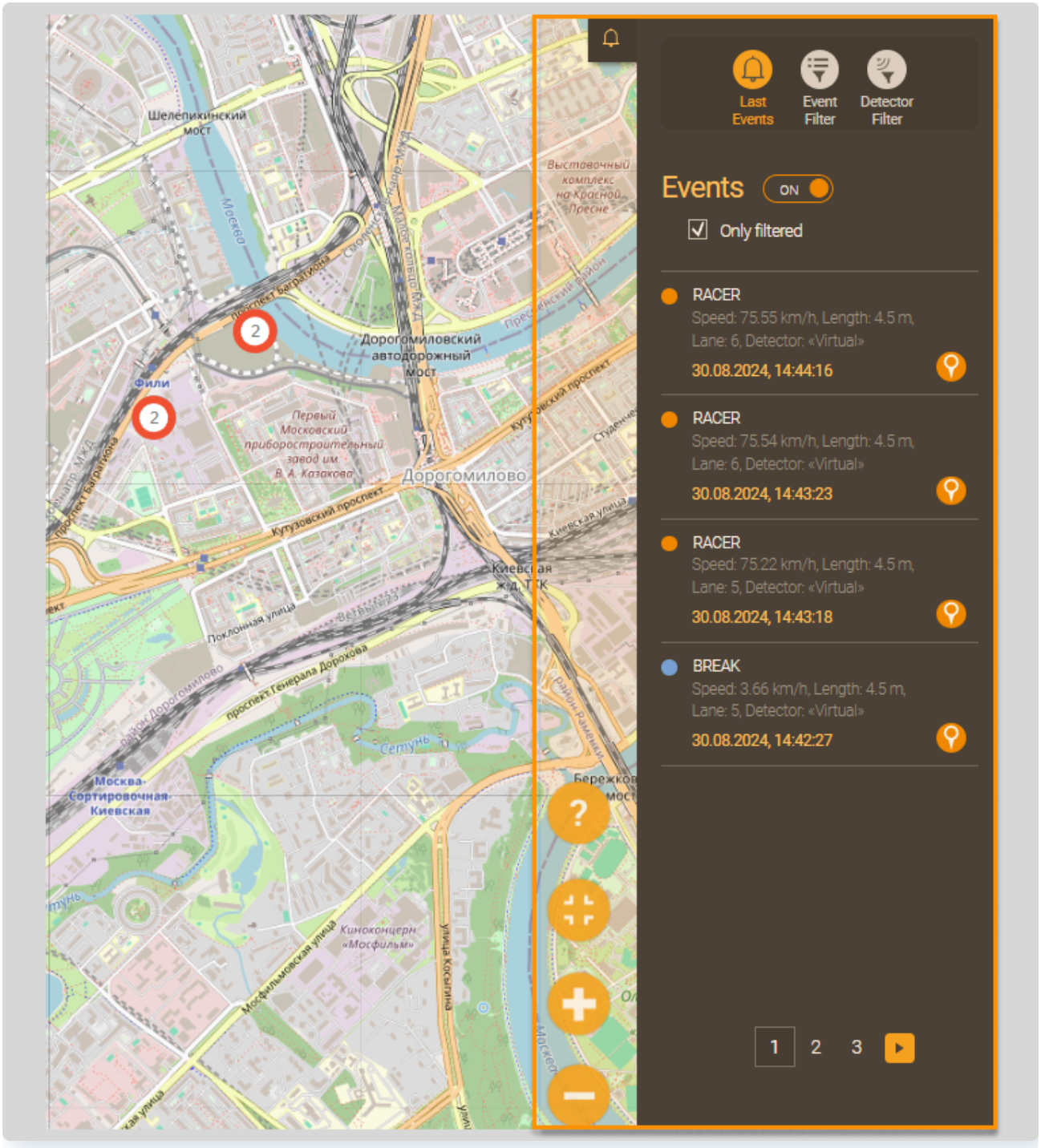
The system's UI provides a Multifilter (located on the right) to filter information on the interactive map. Multi-filter contains the following tabs: `Latest events`, `Event filter`, `Detector filter` list and `Latest Event Widget`.

Latest events

In the multi-filter there is a tab on the right called `Event filter`. Using the on/off button you can turn off the display of all events on the interactive map.

The *Latest events* – it includes the list is intended to display to the user information about the latest events registered by the System. This list displays the names of events registered in the System and the main parameters of each event.

You can turn off the display of events on the interactive map by clicking on `turn on` button. When selecting the Checkbox you also can apply sort the latest events in the filter `Event filter`.

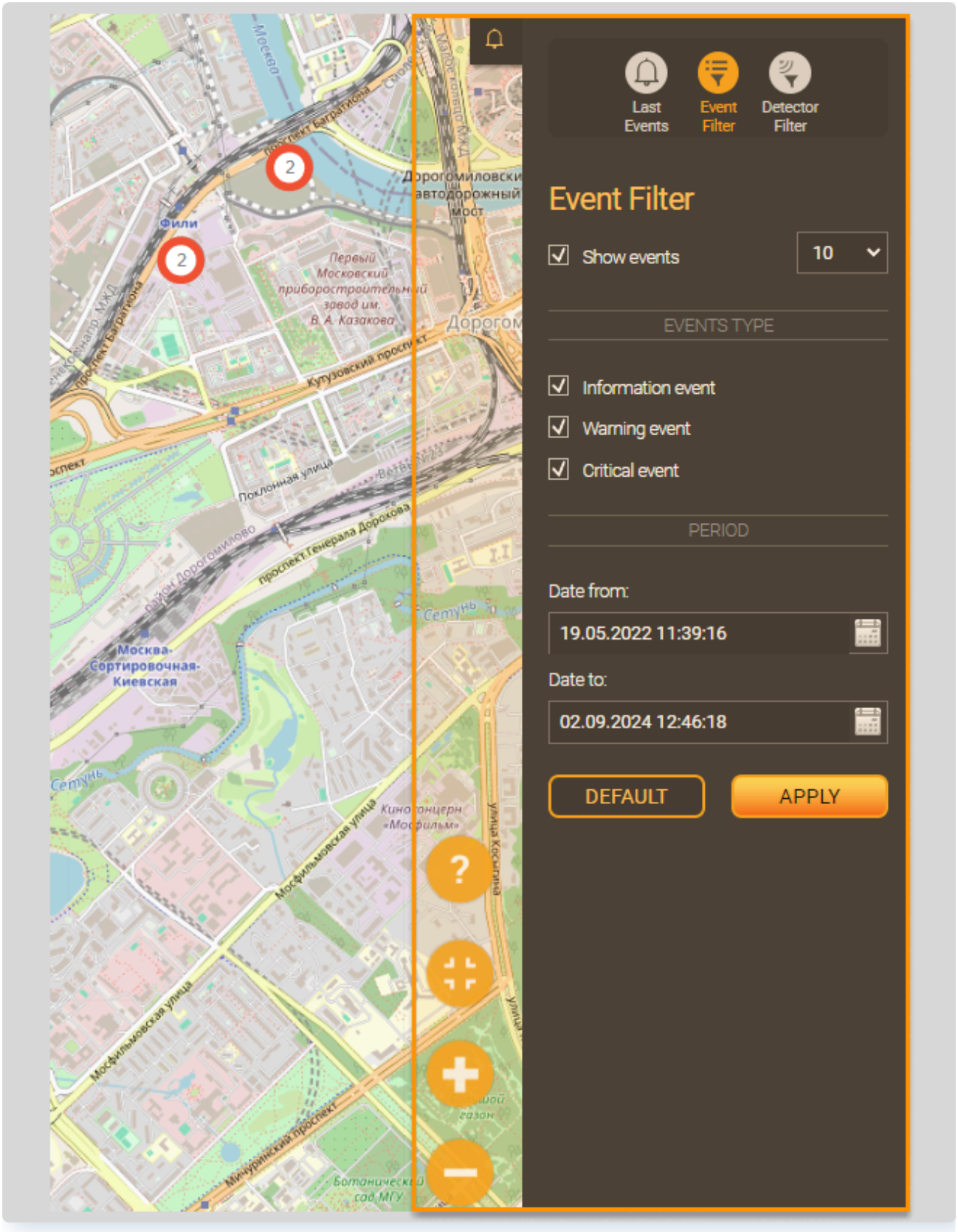


Event filter

The *Event filter* is designed to display events on the map:

- by event type (Information, Warning, Critical event); – per interval given;
- by the number of recent events that will be displayed on the interactive map and in the list `Latest events` after pressing the button `Apply`.

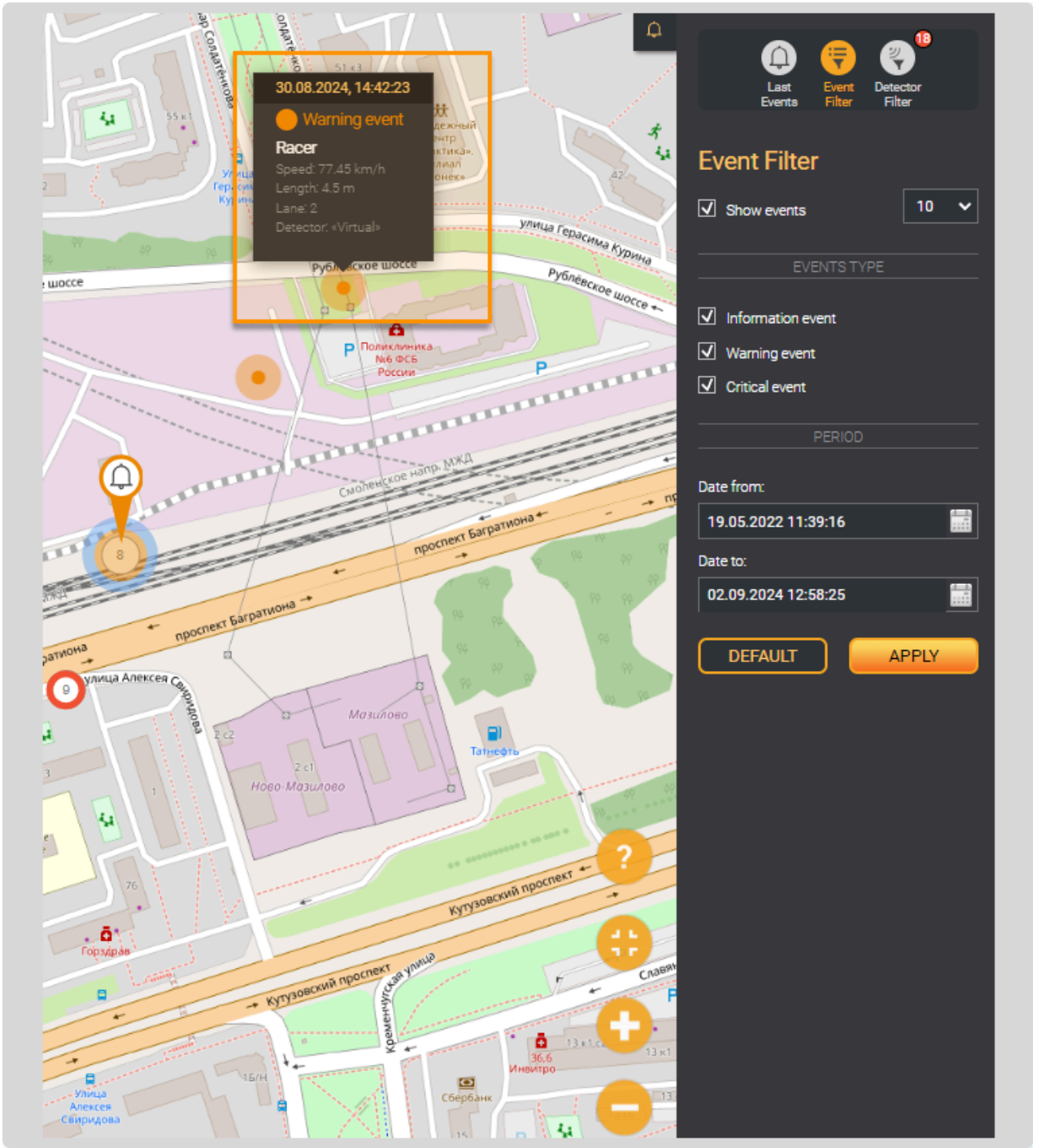
In the filter window, you can set the necessary parameters and apply the filter or reset the conditions.


Last Events
Event Filter
Detector Filter
Event Filter
Show events
10
EVENTS TYPE
Information event
Warning event
Critical event
PERIOD
Date from:
19.05.2022 11:39:16
Date to:
02.09.2024 12:46:18
DEFAULT
APPLY
Фили
Москва-Сортировочная-Киевская
Дорогомиловский автодорожный мост
Кутузовский проспект
проспект Генерала Дорохова
Поклонная улица
Мосфильмовская улица
Минский проспект

In the table below are described the Event filter parameters.

Parameter	Description
Show events	Removing and installing the checkbox shows or hides the display of events on the map. In the drop-down list to the right of the checkbox, you can select the number of events to be displayed
Event types (Information, Warning, Critical event)	By removing and installing checkboxes, you can choose to display events of certain categories on the map
Period	In the calendar, the user can enter a date for an arbitrary period to display events whose registration date and time falls within a specified interval
Apply	A button that, by clicking on it, applies the conditions entered by the user to events, displayed on the map
Reset	A button that, when clicked, resets all user-entered conditions to their default values

Once applying the filter, the location of the latest events will be displayed on the map, and when you hover the mouse over the event, a pop-up window with the characteristics of the event will appear.



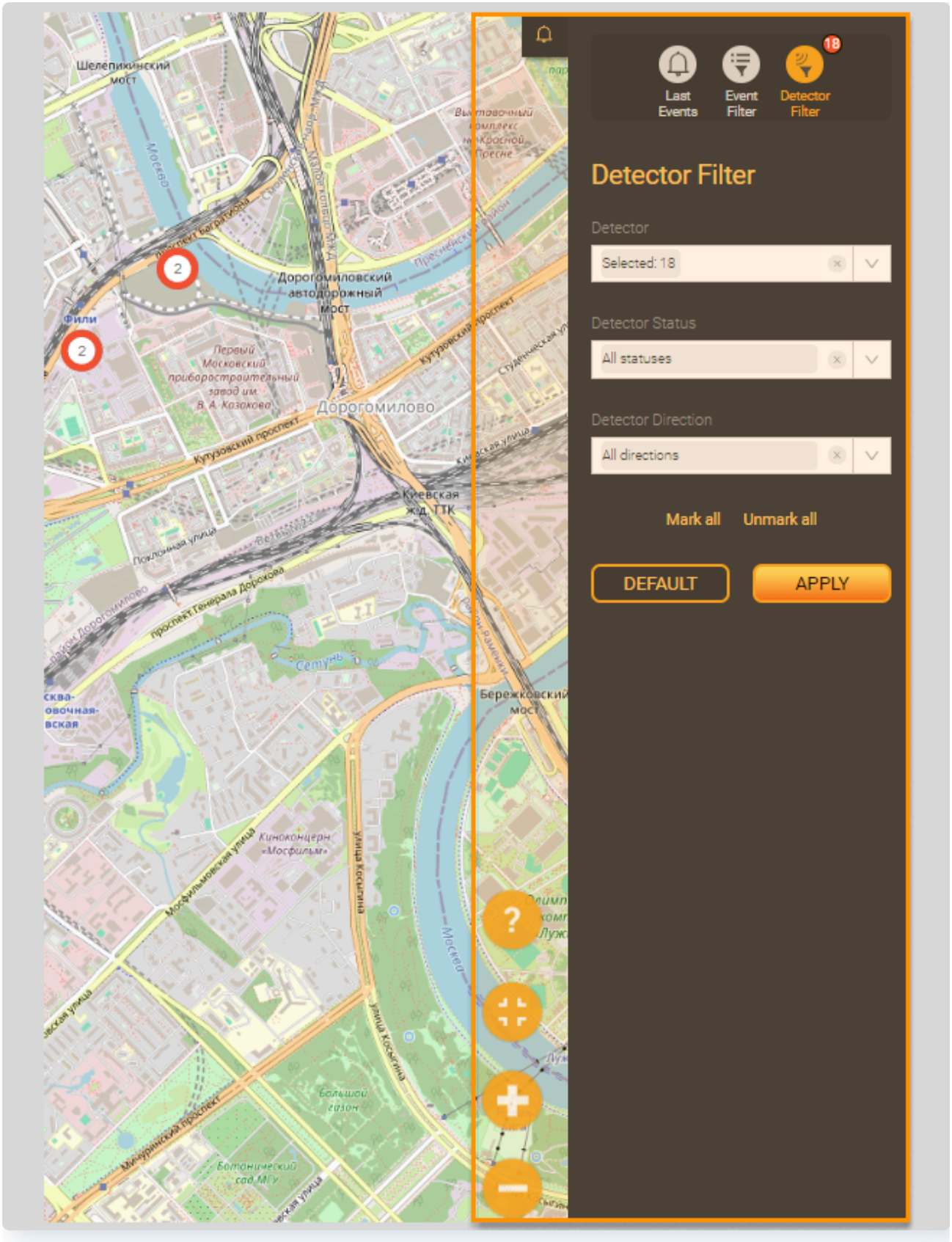
Detector filter

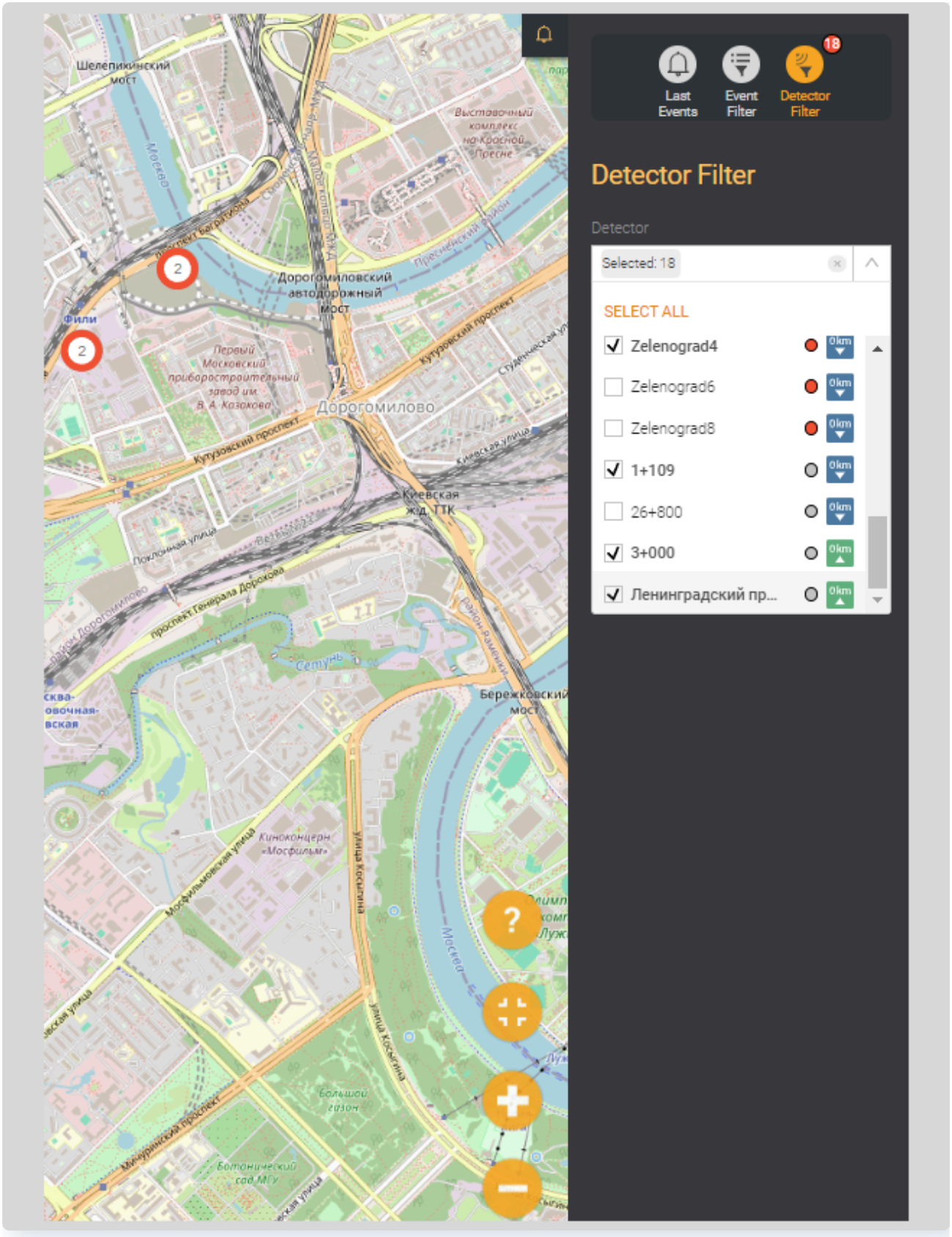
The *Detector filter* – it is designed to sort detectors on the map. The filter appears on the map if more than one detector is configured in the system.

Detectors are sorted:

- by detector name;
- by detector operation status;
- in the direction of the detector.

When entering parameters and applying a filter, only detectors that fall under the specified conditions are displayed on the map. In the filter window, the necessary parameters are set and buttons are located `Reset` or `Apply`. When you select one detector or several detectors, their number is displayed at the top of the filter; when you hover the cursor, pop-up information about the detectors appears. When you hover over the top right area of the filter, a button appears `Reset all filters`.


Last Events
Event Filter
Detector Filter
18
Detector Filter
Detector
Selected: 18
Detector Status
All statuses
Detector Direction
All directions
Mark all
Unmark all
DEFAULT
APPLY
Шелепихинский мост
Дорогомиловский автодорожный мост
Дорогомилово
Фили
Киевская ж.д. ТТК
Бережковский мост
Кутузовский проспект
проспект Генерала Дорохова
Поклонная улица
Мосфильмовская улица
улица Косыгина
Киноконцерн «Мосфильмы»
Ботанический сад МГУ
Большой газон


Last Events
Event Filter
Detector Filter
18
Detector Filter
Detector
Selected: 18
SELECT ALL
Zelenograd4
Zelenograd6
Zelenograd8
1+109
26+800
3+000
Ленинградский пр...
0km
Дорогомилово
Дорогомиловский автодорожный мост
Киевская ж.д. ТТК
Бережковский мост
Шелепихинский мост
Фили
Кутузовский проспект
проспект Генерала Дорохова
Поклонная улица
Киевская улица
Студенческая улица
Мосфильмовская улица
улица Косыгина
Мичуринский проспект
Большой газон
Ботанический сад МГУ
Киноконцерн «Мосфильм»
Выставочный комплекс на Красной Пресне
Первый Московский приборостроительный завод им. В. А. Козлова
район Дорогомилово
район Раменки
Сетунь
Москва

In the table below you can find the descriptions related to the DT filter.

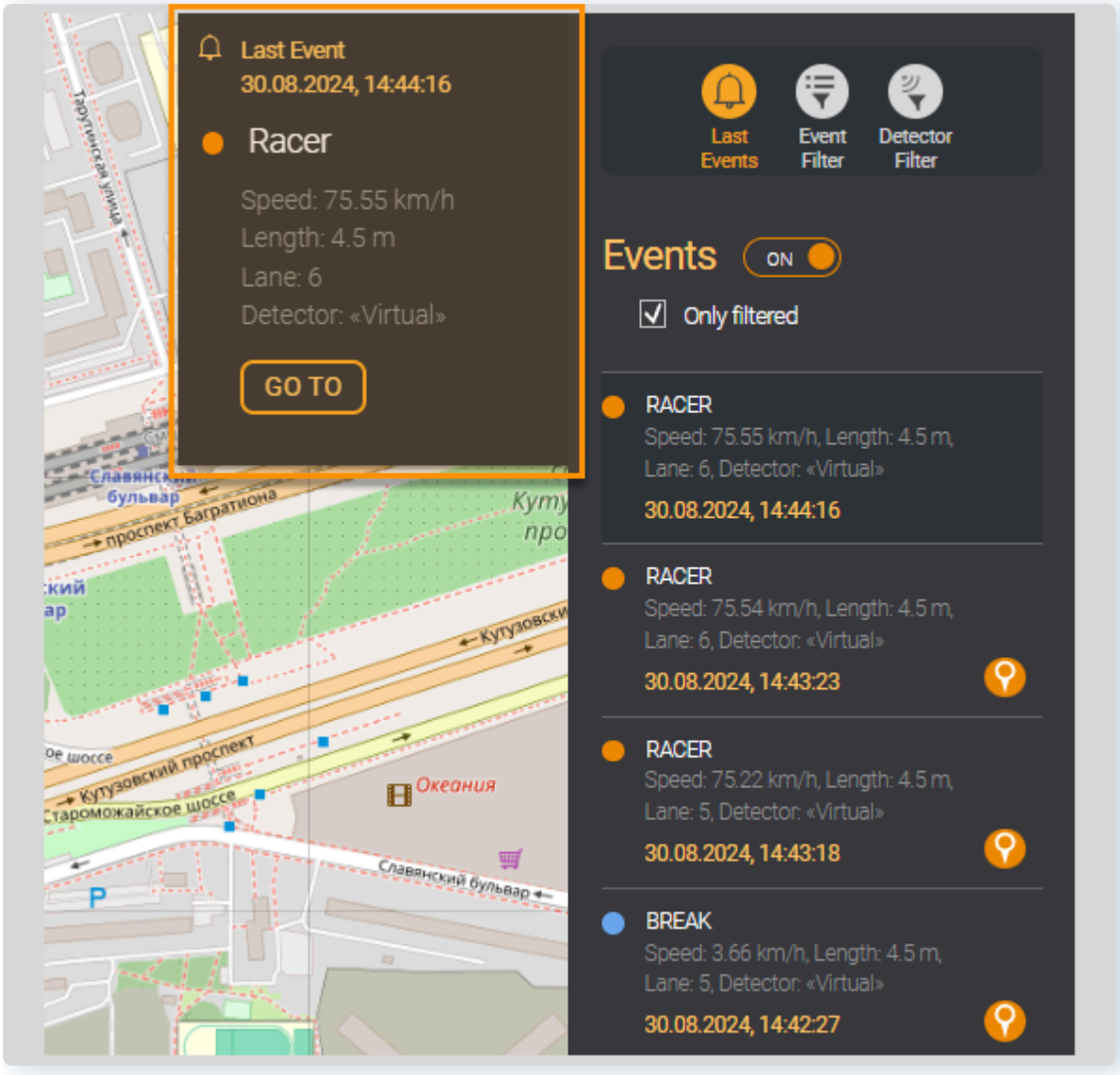
Parameter	Description
Detector	In the drop-down list, the user is shown the detectors available for selection on the map in this project. The detector is selected by installing or removing the checkbox. All detectors are selected by default
Detector status	In the drop-down list, the user can select the operating statuses of the detector in this project. The detector status is selected by installing or removing the checkbox. When the filter is activated, only detectors with the specified status are displayed on the map. All statuses are selected by default
Detector direction	Checkboxes for selecting the detector direction. Removing and installing checkboxes allows you to display detectors with specified directions. All directions are selected by default
Apply	A button that, when clicked, applies user-entered conditions to detectors displayed on the map
Reset	A button that, when clicked, resets all user-entered conditions to values `default`

REMEMBER

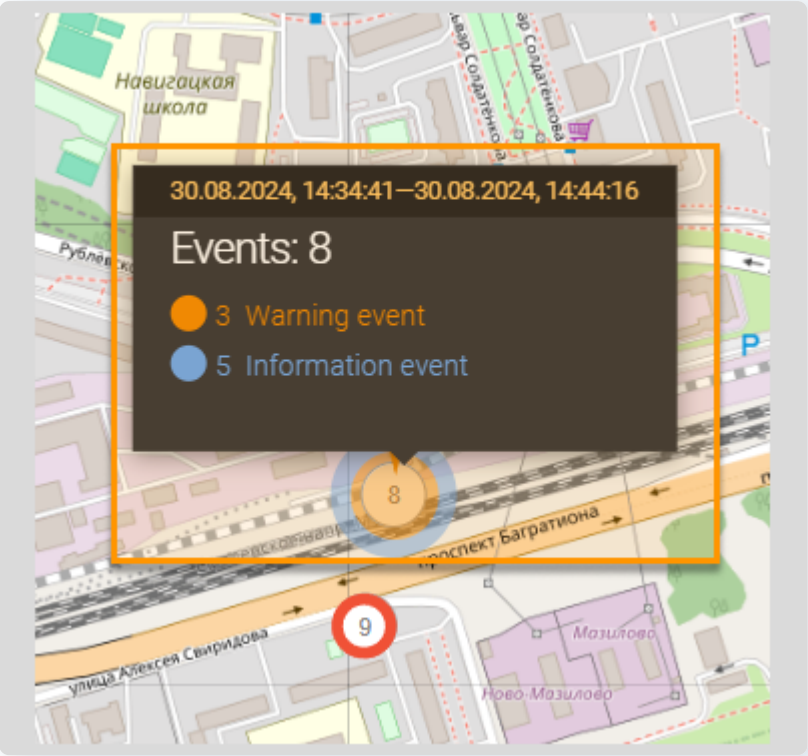
Buttons `Select all` and `Uncheck all` are used to quickly select or uncheck all detectors - this function is convenient to use when building consolidated statistical reports and consolidated event reports.

Latest Event Widget

The *Last event widget* – an information widget with a notification about the last event is located at the top left of the multi-filter and is intended to display to the user information about the last event registered by the System. The window displays the name of the registered event and the main parameters of the event. The widget opens by clicking on the bell icon.



A transition is made on the interactive map to the detector that registered this event by clicking the button `Go` in the window `The Last Event`.

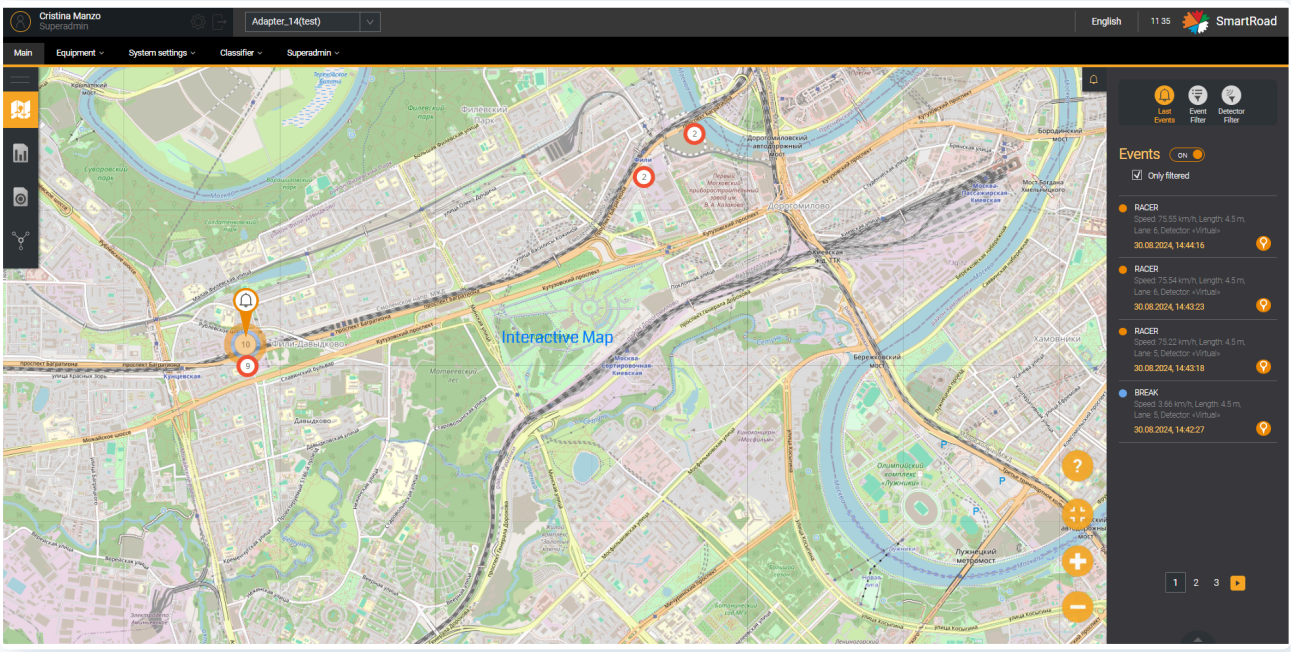


System Basics / Other features

In this section additional system features are described.

Interactive map

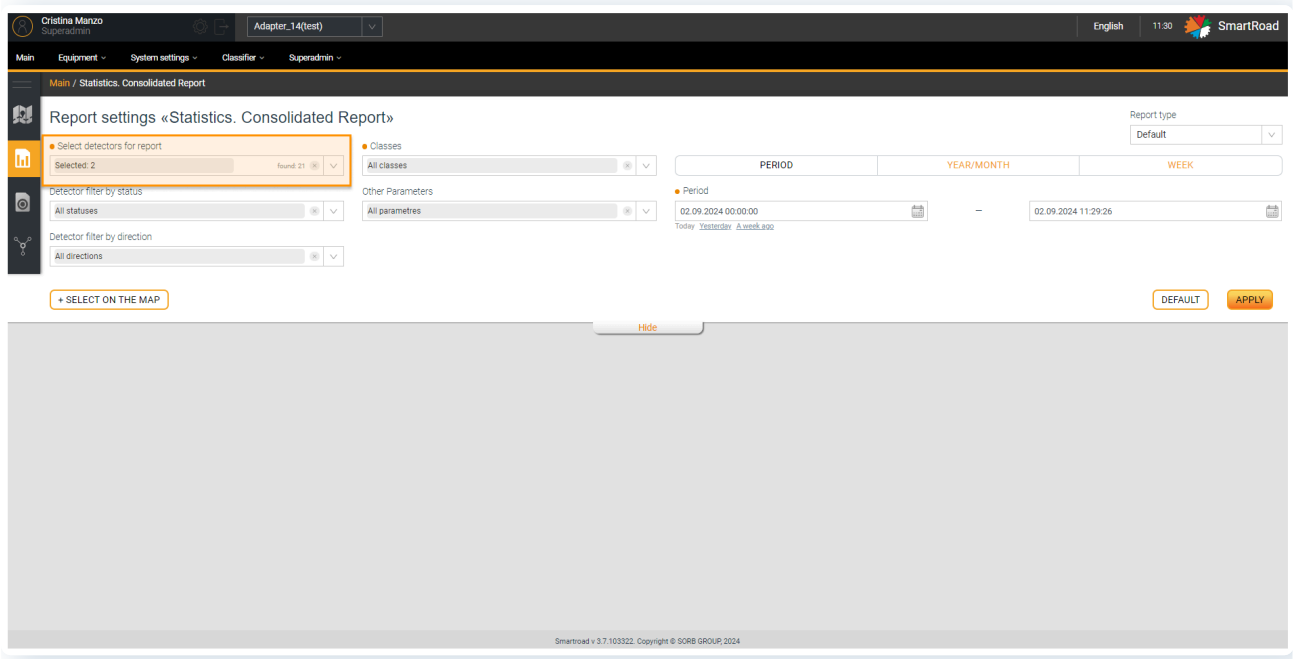
The interactive map is designed to display the installed equipment to the user. The user can change the map scale by scrolling with the mouse wheel and the “+” and “-” buttons on the keyboard or in the interface. Equipment icons are displayed to the user on the map.



Selecting detectors on the map

You can select detectors by left-clicking on a detector marker on the map. In this case, the detector marker changes to a similar icon with a white circle in the center.

When selecting a detector and going to a detailed report in the field `Selecting a detector for a report` the name of the selected detector will already be added. When selecting multiple detectors and going to a consolidated report, in the report field `Selecting detectors for the report` the selected detectors will already be added.

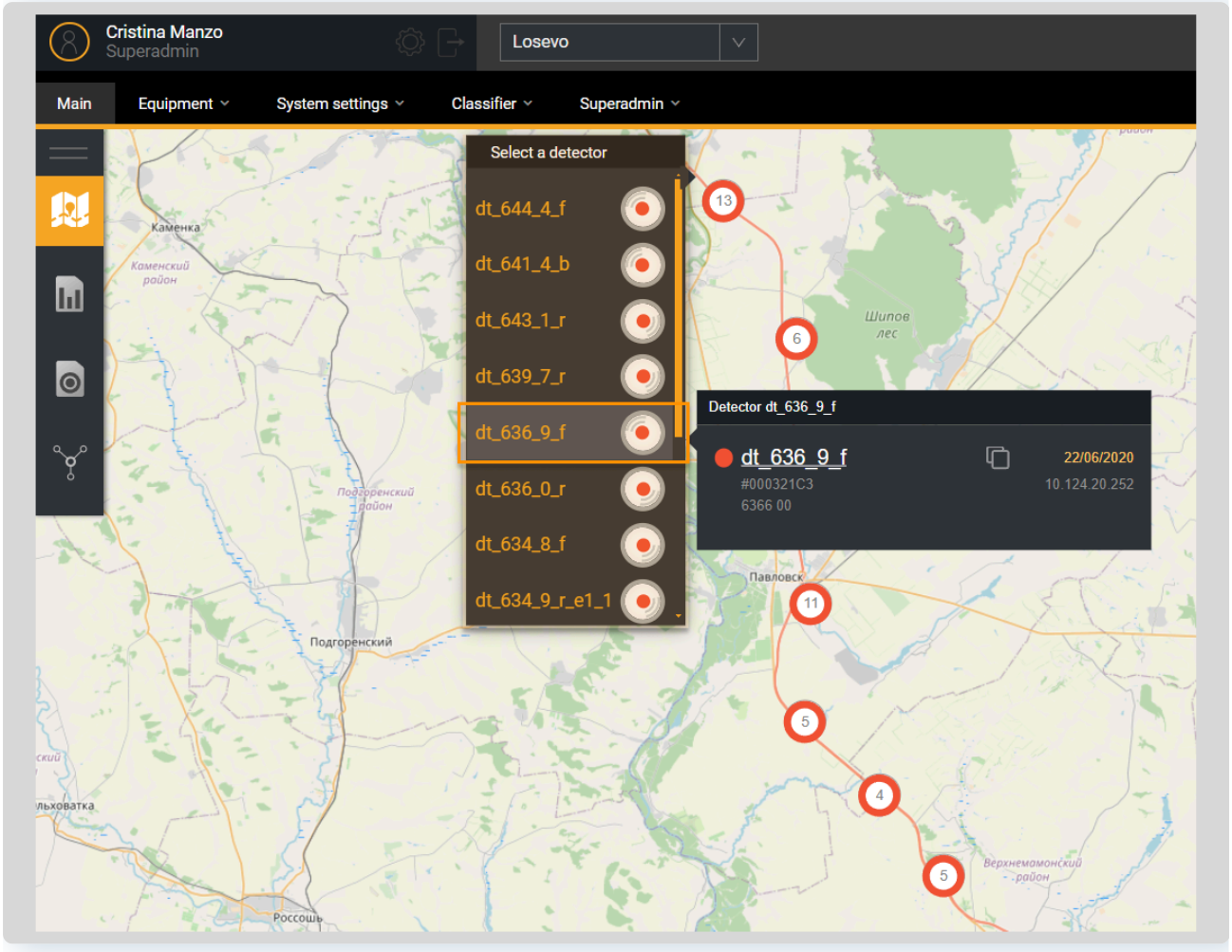


View detector information on an interactive map

The interactive map displays groups of detectors in the form of a table with the names of all detectors located at a given point on the map and their operating statuses. When the scale of the interactive map is reduced, detectors located close to each other are combined into a group. The group will be depicted on the map as a pie chart, showing the number of detectors within the circle. When you hover the cursor over a group of combined detectors, a pop-up list should appear containing a list of detectors, as well as their status in the form

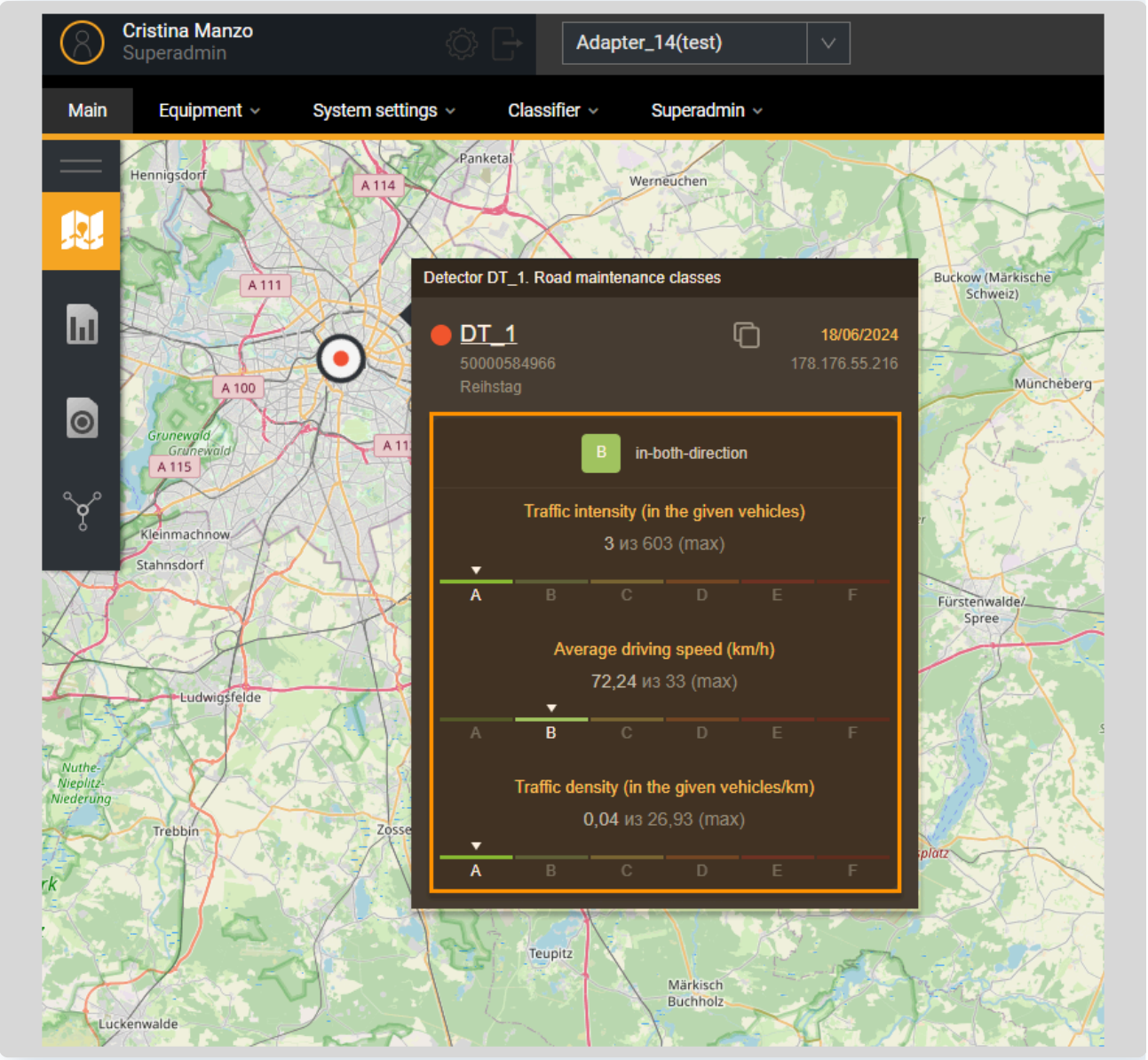
of corresponding icons. The operating statuses of the combined detectors are displayed in the different colors by the border of the pie chart. When you hover your cursor and click on one of the combined sensors, a pop-up list appears. Besides if you hover over an item, brief information about the selected detector will appear. Clicking on it will open the detector settings page.

You must select the detector name in the list and hover your mouse over it to view the information related to the selected detector. The number of detectors in this group is displayed inside the detector group marker.



When zooming into a detector in detail on the interactive map, you must hover your mouse over the detector marker to view information about the detector. This will display a

pop-up window with information about the detector.



Parameter	Description
Detector name	The name of the detector assigned to it in the System
Detector ID	Unique detector identifier

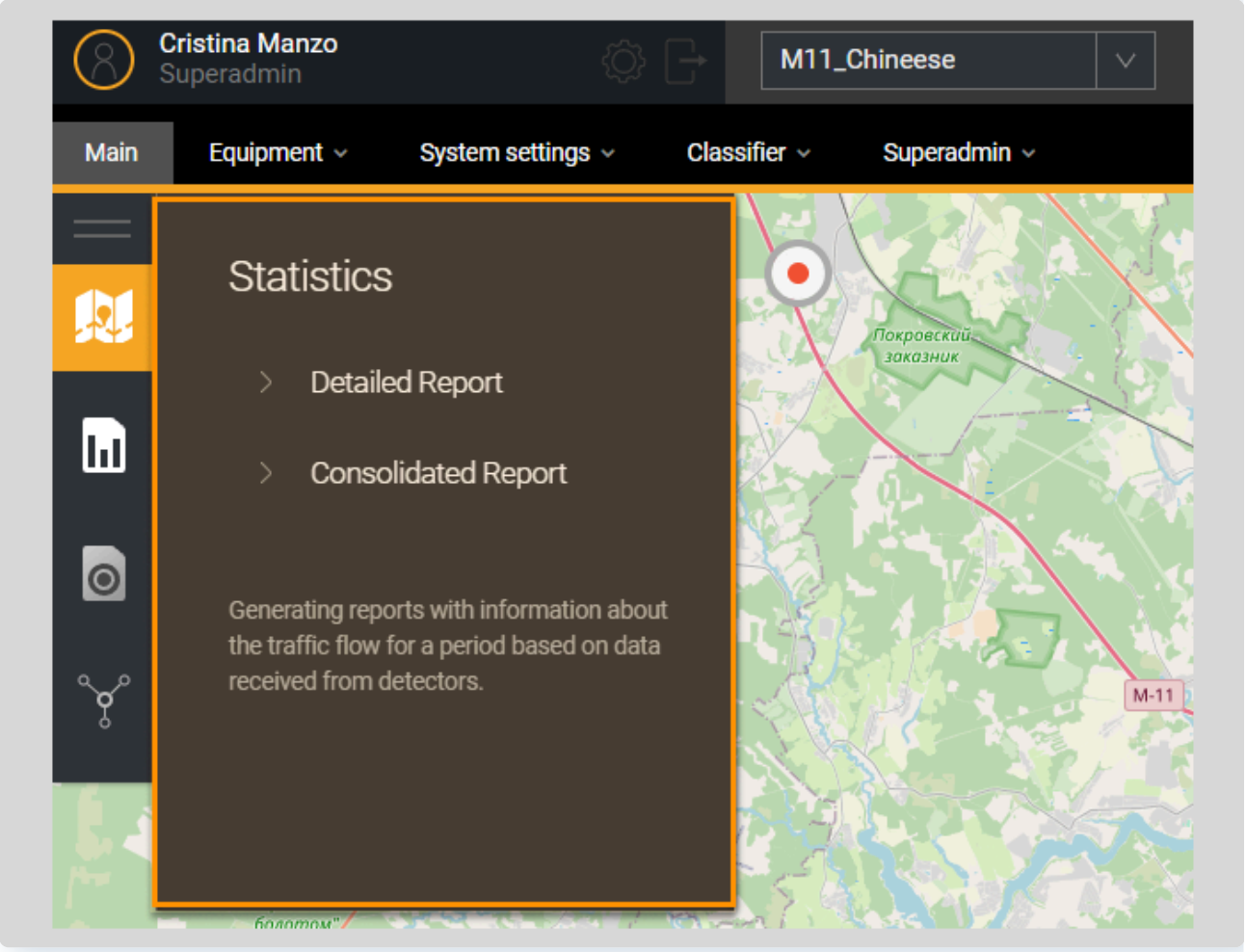
Parameter	Description
Detector IP address sds	Unique address identifying the detector
Date	Detector creation date

```
<main>
  <h3 className="blue-text">From 0 km/ To 0 km 🏍</h3>
</main>
```

Parameter	Description
Traffic intensity	The number of vehicles passing through the cross-section of a highway per unit of time (per day or one hour).
Average driving speed	The arithmetic mean of the speeds of vehicles traveling in one direction along a section of road
Traffic density	Number of vehicles per 1 km of road

SmartRoad Modules / Statistic module

The statistics module is presented in the side menu of the interface by the section `Statistics`.



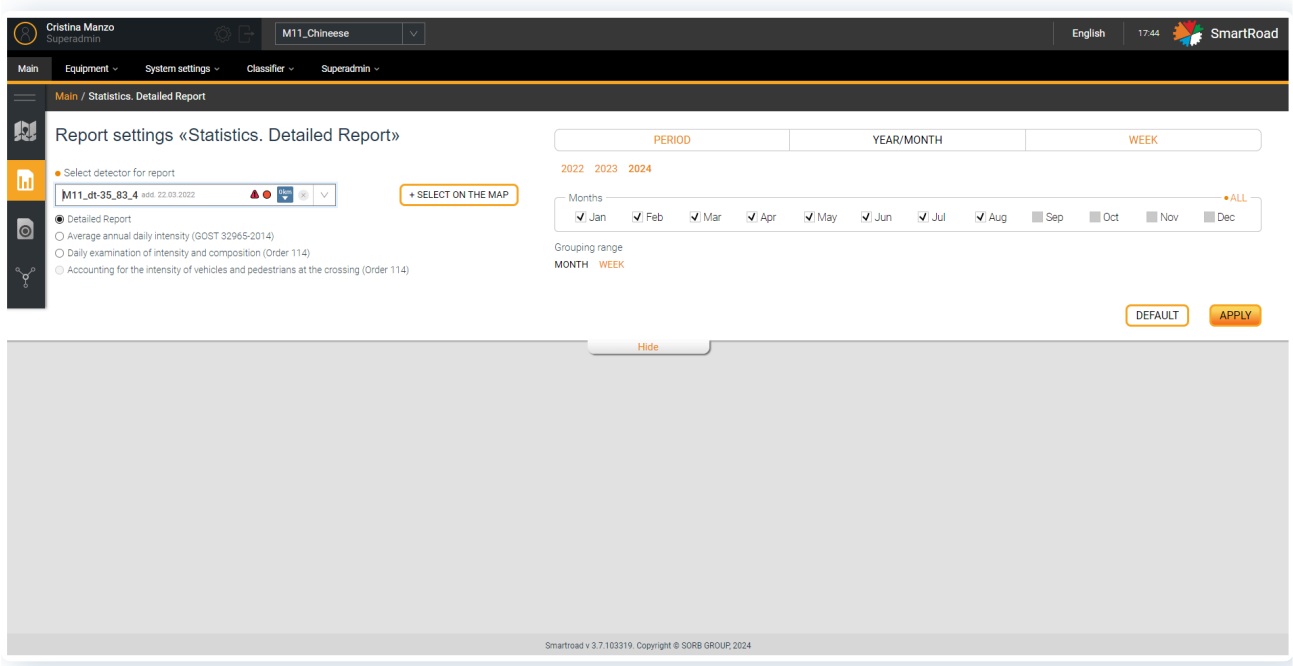
This section consists of two subsections `Detailed report` and `Consolidated Report`.

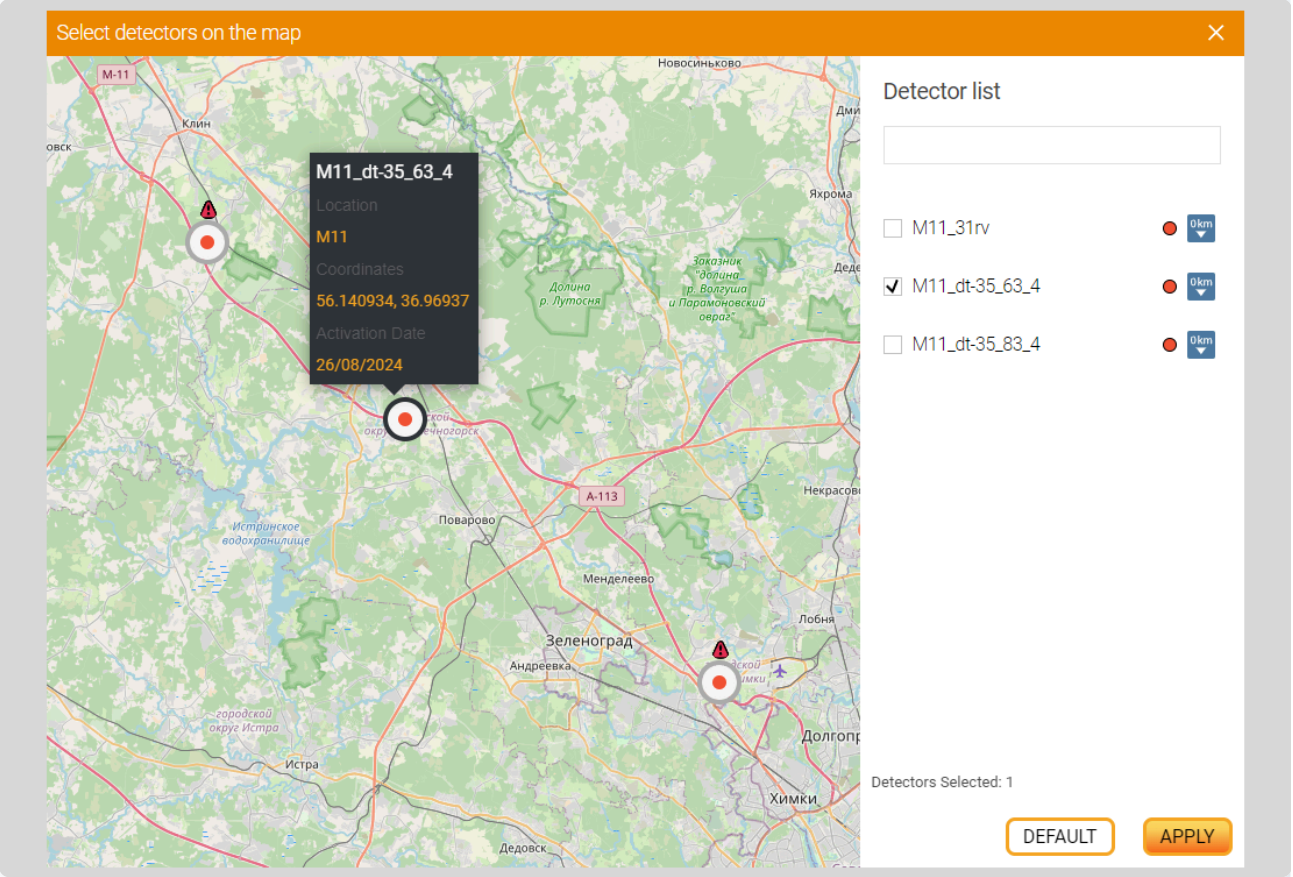
Detailed report of statistics

A detailed report provides the user with statistical information collected by a single detector over a specified period of time. The report is generated once the user enters the necessary parameters in the report filter, based on which the System selects data.

Settings for the Detailed report

The page `Report settings "Statistics. Detailed report"` is a filter for entering report parameters. The user must fill in the required filter fields to build a report.





In the table below the detailed report filter parameters

Parameter	Description
Selecting a detector to report *	In the drop-down list, select one detector, , based on the information from which the report will be generated. Detectors that relate only to the selected project are available for selection on the list. Detectors are not selected by default
Average annual daily intensity	The arithmetic average annual value of the number of vehicles passing through the cross-section of a highway

Parameter	Description
	per day in total in both directions. You will be able to select the year to build the report
Daily survey of intensity and composition	The number and types of vehicles traveling in a certain direction per day. A filter will appear to select the date and destination from zero kilometer, to zero kilometer and in both directions.
Taking into account the intensity of vehicles and and pedestrians at the crossing	This functionality is under development

Furthermore, the parameters for Selecting a reporting period

Parameter	Description
Period *	An arbitrary period for which the report will be generated. The calendar indicates the date and time in the format from “HH.MM.YYYY HH: MM: SS” to “HH.MM.YYYY HH: MM: SS”. Below the period entry field where are buttons for quickly selecting a period: `Today`, `Yesterday` and `A week ago`. The System will automatically substitute the selected period by clicking on the quick period selection buttons
Grouping interval *	Interval of temporal grouping of data by time. Using the buttons, you select the intervals into which the data will be divided within the selected period in the report (for example, if a month is selected as the period for generating the report, and a week is selected as the time interval, statistical information for each week of the selected

Parameter	Description
	month will be displayed). The following grouping intervals are available for selection: - month - Sunday - day - time - minutes (1, 5, 10, 15, 30) The selected time interval should not exceed a week. The time period should not exceed 24 hours to generate a report with 1 or 5 minute grouping intervals
YEAR/MONTH	Buttons for selecting the year and checkboxes for selecting the month/months for generating the period for which the report will be built
Grouping interval *	The following grouping intervals are available for selection: - month - Sunday
SUNDAY	In the drop-down list, select the week for which you want to build a report
Grouping interval *	The following grouping intervals are available for selection: - month - Sunday - day - time - minutes (only 30 minute interval is available)

Parameter	Description
+Select on map	Button for selecting a detector on the map. Clicking on the button displays a pop-up window with an interactive map for selecting a detector to build a report. The selection is made in the same way as selecting a detector on the main page map
Apply	Button for applying report generation parameters. When clicking on the button, the system generates a report and displays it to the user
Reset	Filter parameters reset button. By clicking, all user-entered filter parameters are returned to their default values.
Hide/Show	The button allows you to collapse and expand the filter field

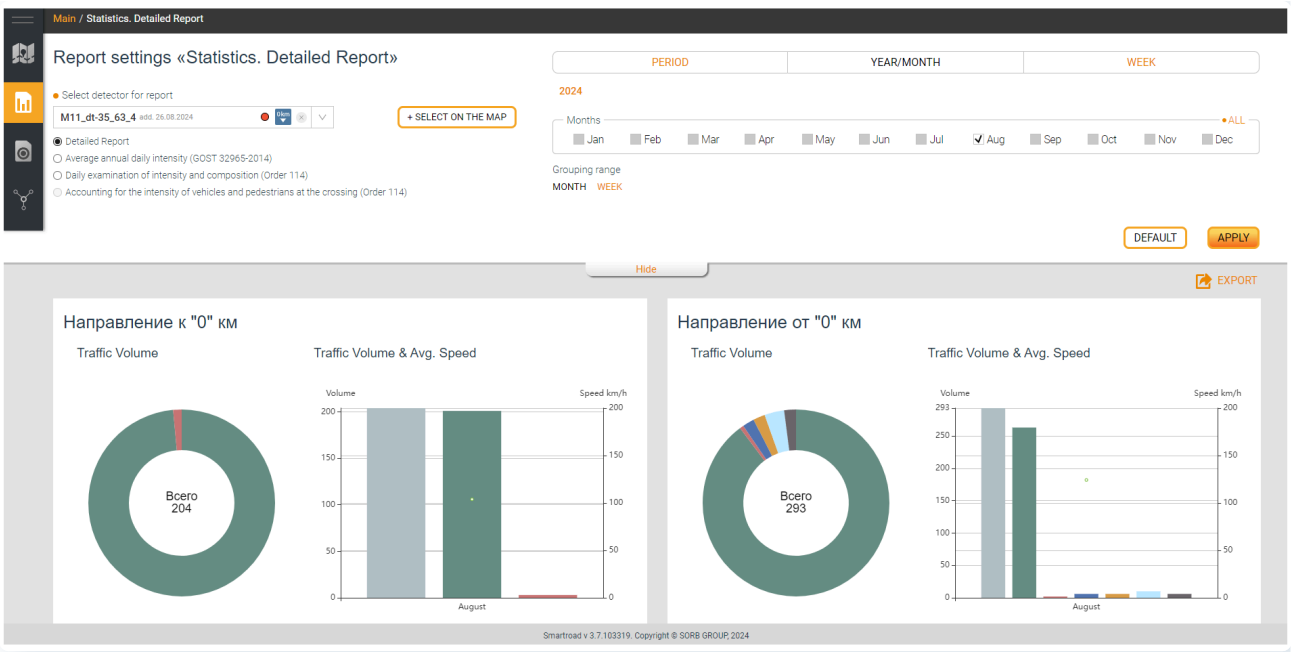
REMEMBER

(*) - It means that the field is mandatory

When building a report, an informational message about the logs found or the message `No errors found` may appear at the bottom of the screen. The appearance of this message must be reported to the administrator of Sorb Engineering.

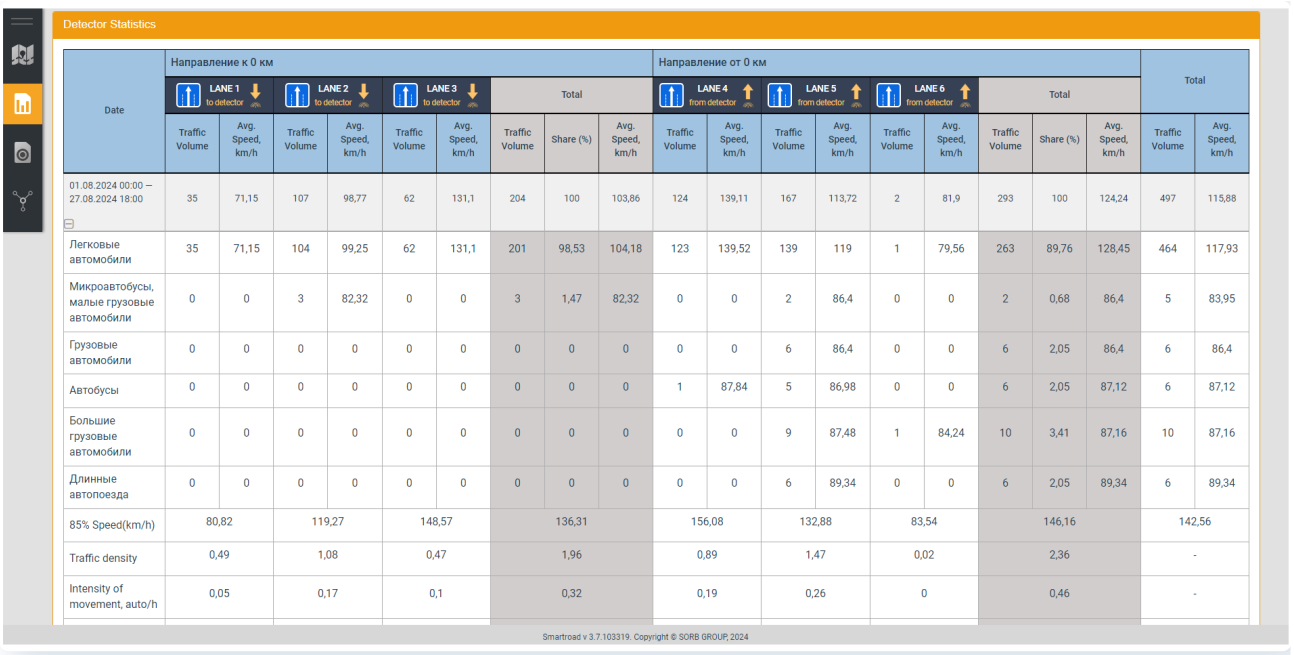
Graphic part of a detailed statistical report

Once generating the report, the user can view the information in graphical form. The graph and chart on the left are interactive elements. When hovering the mouse over interactive elements, the user is shown additional information in the form of tooltips. Additionally, you can hide and add columns and the average speed graph displayed on the diagram by clicking on the parameters of object classes under the graph.



Tabular part of a detailed statistical report

The information generated in the report is presented in a table. Information is displayed for each step of the selected time interval of data grouping. Each report time interval can be expanded by clicking on the corresponding “+” icon. In this case, the user is provided with additional information on the classes of registered objects and additional parameters.



In the next table Parameters of the tabular part of a detailed statistical report are described.

Parameter	Description
Date	Date and time interval for which data is displayed. The date can be filtered in in either descending or ascending order
Band	The lane in which the objects were detected. The signs installed on this lane and the direction `from the detector` or `to the detector` are also shown
Qty TS	Number of vehicles registered during the grouping time interval
Average speed, km/h	Average speed of registered objects
Total	Total number of vehicles in all lanes

Parameter	Description
Class	The number of registered objects of a certain class. Default classes. Default vehicles classification: - Undefined (undefined) – `0-2 m` - Passenger cars (passenger cars) – `2-6 m` - Truck short (short trucks) – `6-9 m` - Truck (trucks) – `9-13 m` - Truck long (long trucks) – `13-22 m` - Transporter (transport road trains) – `22-30 m`
Speed 85%, km/h	Average speed of 85% of traffic flow
Traffic density	The average number of vehicles in movement that comes to one (1) km of the lane
Physical movement intensity and priv., auto/h	The number of vehicles passing in one direction per unit of time on a certain section of the road
Congestion index	Proportion of time during which traffic conditions corresponding to service levels E - F are maintained on a road section during the observation period
Service level	One of six service levels (A, B, C, D, E, F).
Total detector unavailability time	The total time the detector was unavailable during the selected time interval. Displayed in days, hours, minutes format

Parameter	Description
Trouble-free operation of the detector	The value of uninterrupted operation of the detector as a percentage for the selected time interval. Percent value (%)
Data Collection Integrity	The value of uninterrupted data acquisition from the detector for the entire time of uninterrupted operation of teh detector for the period selected in the filter. Percentage value (%)

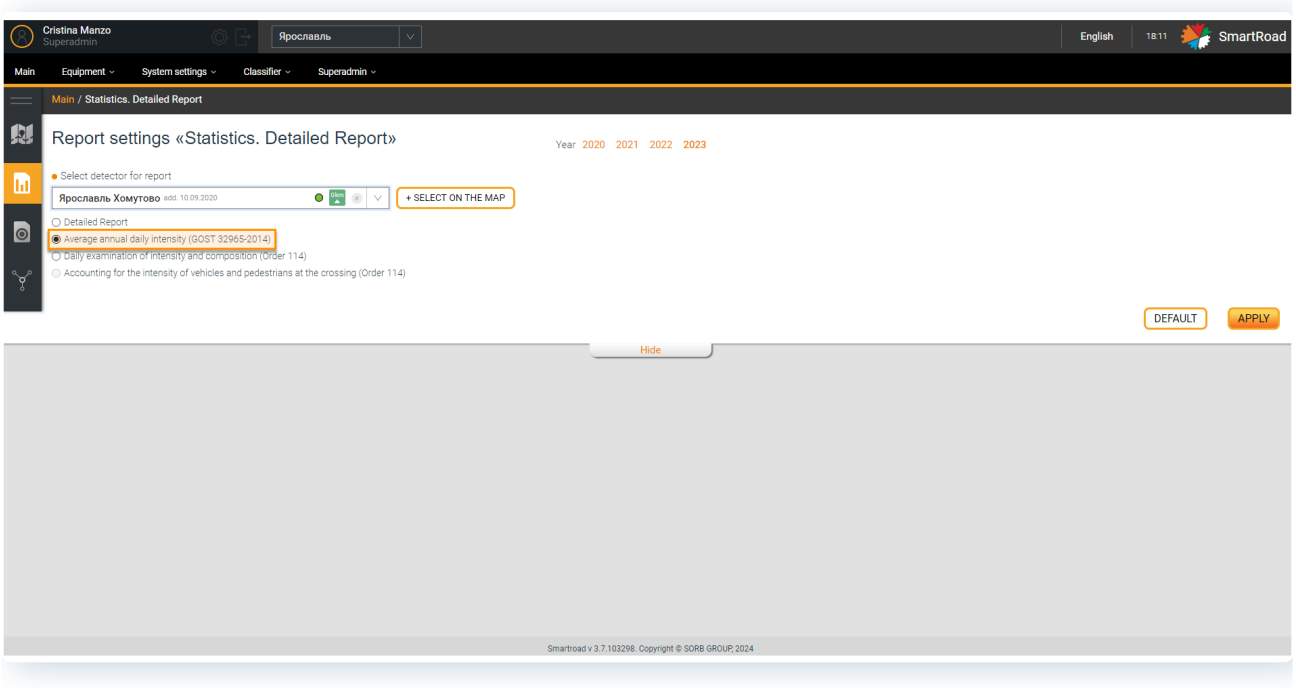
Besides, the Additional information parameters of the detailed statistical report table

Parameter	Description
Total detector unavailability time.	The total time that the detector was unavailable in the selected interval time. Displayed in days, hours, minutes.
Uninterrupted operation of the detector	The value of uninterrupted operation of the detector as a percentage (%) for the selected time interval.
Data Collection Integrity	The value of uninterrupted data acquisition from the detector for the entire time of uninterrupted operation. The period is selected in the filter. Percentage value (%)

Average annual daily intensity report settings

The report form *Average annual daily intensity* corresponds to the standard GOST 32965-2014.

In the page `Report settings Statistics. Detailed report. Average annual daily intensity`, you can see a filter for entering report parameters. The user must fill in the required filter fields to build a report.



In the table below you can find the filter parameters for the detailed report: Average annual daily intensity.

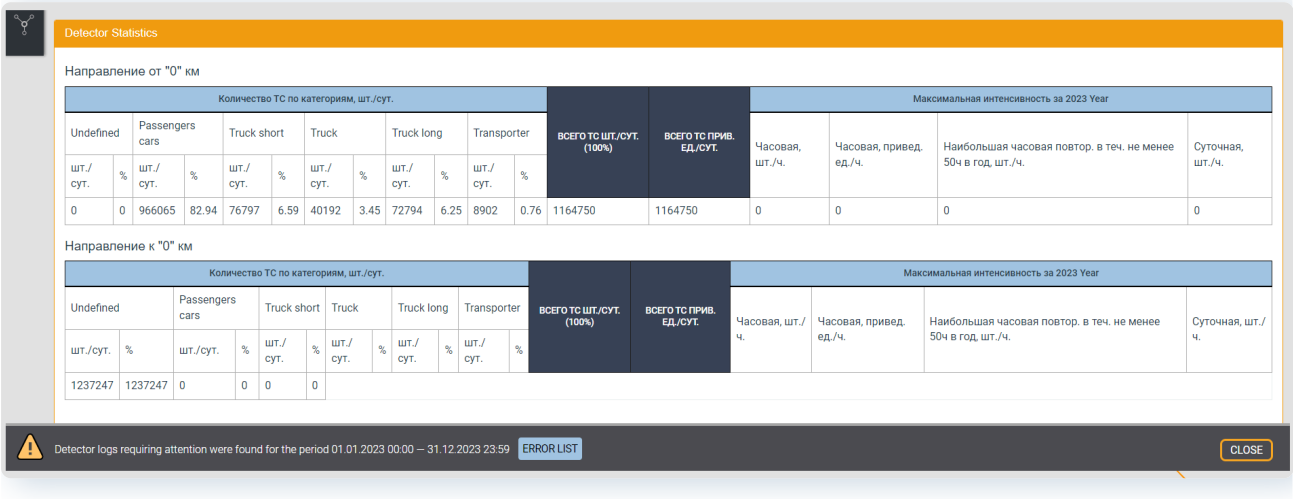
Parameter	Description
Selecting a detector to report *	In the drop-down list, select one detector, based on the information from which the report will be generated. Detectors that relate only to the selected project are available for selection in the list. By default, no detector is selected
Select on map	Button for selecting a detector on the map. Clicking on the button displays a pop-up window with an interactive map for selecting a detector to build a report. The selection is made in the same way as

Parameter	Description
	selecting a detector on the map of the main page. You can select only one detector to generate a report
Year	Year selection buttons to obtain statistical data from the selected detector

When building a report, an informational message related to `found logs` or the message `No errors found` may appear at the bottom of the screen. You should inform the Sorb Engineering administrator in case of log message.

The tabular part of the Average annual daily intensity report

The information generated in the report is displayed in a table.



Parameters of the tabular part of a detailed statistical report by considering number of vehicles by category are described below

Parameter	Description
Vehicle class, pcs./day	The number of registered objects per day of a certain class. Default classes: - Undefined (undefined) – `0-2 m` - Passenger cars (passenger cars) – `2-6 m` - Truck short (short trucks) – `6-9 m` - Truck (trucks) – `9-13 m` - Truck long (long trucks) – `13-22 m` - Transporter (transport road trains) – `22-30 m` Vehicle class values can be changed by the administrator
Vehicle class, %	Share of vehicles of a certain class per day from the total number of vehicles
Total vehicles pcs./day , %	Total number of vehicles per day in all lanes
Total number of vehicles /day	Total number of vehicles driven to a passenger car per day across all lanes

Maximum intensity for the selected year

Parameter	Description
Hourly, pcs./hour	The maximum number of vehicles passing per hour in on one direction on a certain section of road
Sentry, ad. units/hour	The maximum number of vehicles, driven by a passenger car passing in one hour in one direction on a certain road section

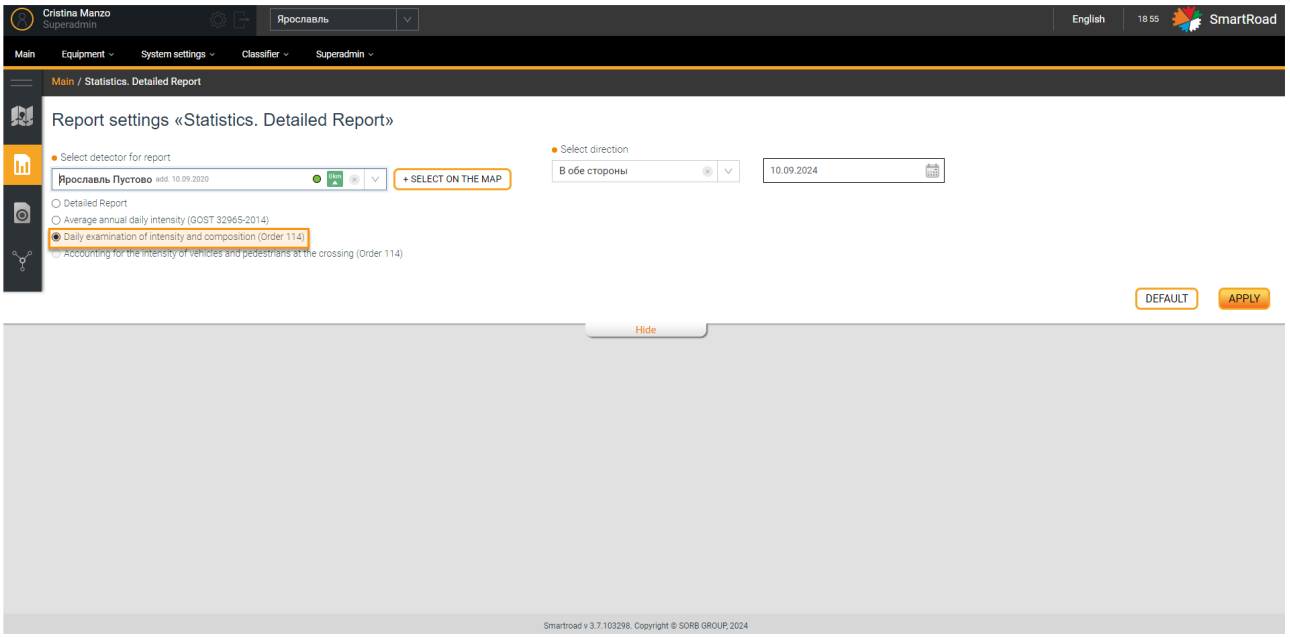
Parameter	Description
The highest hourly intensity, repeated for at least 50 hours per year pcs/hour.	The ratio of the average annual daily traffic intensity of the traffic flow to the product of the largest coefficient values of the day of the week hour and month in case of absence of long-term data on traffic intensity
Daily allowance, pcs./day	The maximum number of vehicles passing in one day in one direction on a certain road section
Daily allowance in given units, pcs./day.	maximum number of vehicles, driven by a passenger car, passing in one day in one direction on a certain road section

> **NOTE**
>
> When calculating traffic intensity in reduced units, it is necessary to enter the values of `reduction coefficients` for each category of vehicles into the System.

Daily survey of intensity and composition report settings

The report *Daily survey of intensity and composition* was developed in accordance with Order 114 of the Ministry of Transport of the Russian Federation: On approval of the Road Traffic Monitoring Procedure.

In the page `Report settings Statistics. Detailed report. Daily survey of intensity and composition`, you can find a filter for entering report parameters. The user must fill in the required filter fields to build a report.



Next the Filter parameters for the Daily survey of intensity and composition report

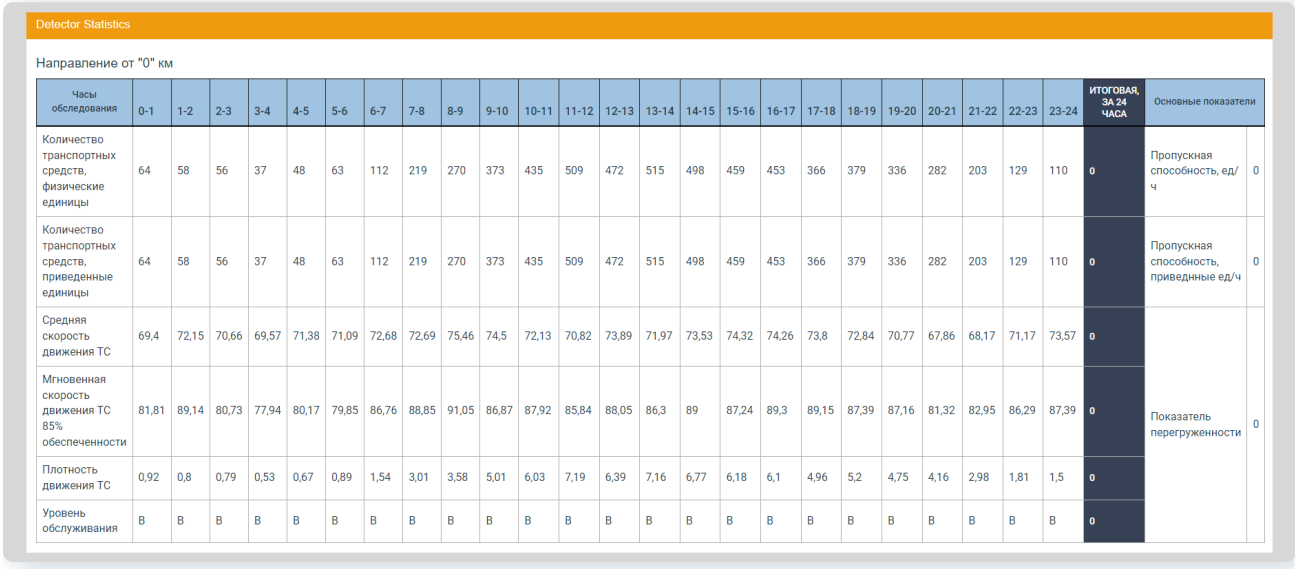
Parameter	Description
Selecting a detector to report *	In the drop-down list, select one detector, based on the information from which the report will be generated. Detectors that relate only to the selected project are available for selection in the list. By default, no detector is selected.
Select on map	Button for selecting a detector on the map. Clicking on the button displays a pop-up window with an interactive map for selecting a detector to build a report. The selection is made in the same way as selecting a detector on the map of the main page. You can select only one detector to generate a detailed report
Select direction*	Direction of vehicle movement: - to zero kilometer

Parameter	Description
	- from zero kilometer - in both directions
Select date*	The date for which the data is displayed. The default date is yesterday. You cannot select a date that has not yet arrived.

> **INFO**
>
> (*) - These are required parameters for generating the report

Tabular part for Daily survey of intensity and composition report

Once the report is generated the next page will be displayed



Detector Statistics

Направление от "0" км

Часы обследования	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	ИТОГОВАЯ, ЗА 24 ЧАСА	Основные показатели	
Количество транспортных средств, физические единицы	64	58	56	37	48	63	112	219	270	373	435	509	472	515	498	459	453	366	379	336	282	203	129	110	0	Пропускная способность, ед/ч	0
Количество транспортных средств, приведенные единицы	64	58	56	37	48	63	112	219	270	373	435	509	472	515	498	459	453	366	379	336	282	203	129	110	0	Пропускная способность, приведенные ед/ч	0
Средняя скорость движения ТС	69,4	72,15	70,66	69,57	71,38	71,09	72,68	72,69	75,46	74,5	72,13	70,82	73,89	71,97	73,53	74,32	74,26	73,8	72,84	70,77	67,86	68,17	71,17	73,57	0		
Мгновенная скорость движения ТС 85% обеспеченности	81,81	89,14	80,73	77,94	80,17	79,85	86,76	88,85	91,05	86,87	87,92	85,84	88,05	86,3	89	87,24	89,3	89,15	87,39	87,16	81,32	82,95	86,29	87,39	0	Показатель перегруженности	0
Плотность движения ТС	0,92	0,8	0,79	0,53	0,67	0,89	1,54	3,01	3,58	5,01	6,03	7,19	6,39	7,16	6,77	6,18	6,1	4,96	5,2	4,75	4,16	2,98	1,81	1,5	0		
Уровень обслуживания	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0		

In the table you can find the Parameters of the tabular part for Daily survey of intensity and composition report

Parameter	Description
Examination hours	The day in the table is presented in the form of columns for each hour.
Total in 24 hours	Total values of parameters presented in the daily report
Number of vehicles, physical units	Number of vehicles registered for the time interval selected in the report
Number of vehicles, driving units	Number of vehicles registered for the time interval selected on the report, reduced to a passenger car
Average vehicle speed (km/h)	The arithmetic mean of the speeds of vehicles traveling in one direction along a section of road
Instantaneous vehicle speed 85% probability (km/h)	Speed that most vehicles do not exceed
Vehicle traffic density	Number of cars per 1 km of road
Service level	The ratio of the average vehicle speed to the vehicle speed in free movement conditions. An indicator characterizing the state of traffic flow. There are 6 possible service levels (A, B, C, D, E, F)
Throughput (units/h)	The maximum number of vehicles that can pass a given section per hour in one or two directions in the considered road and weather conditions

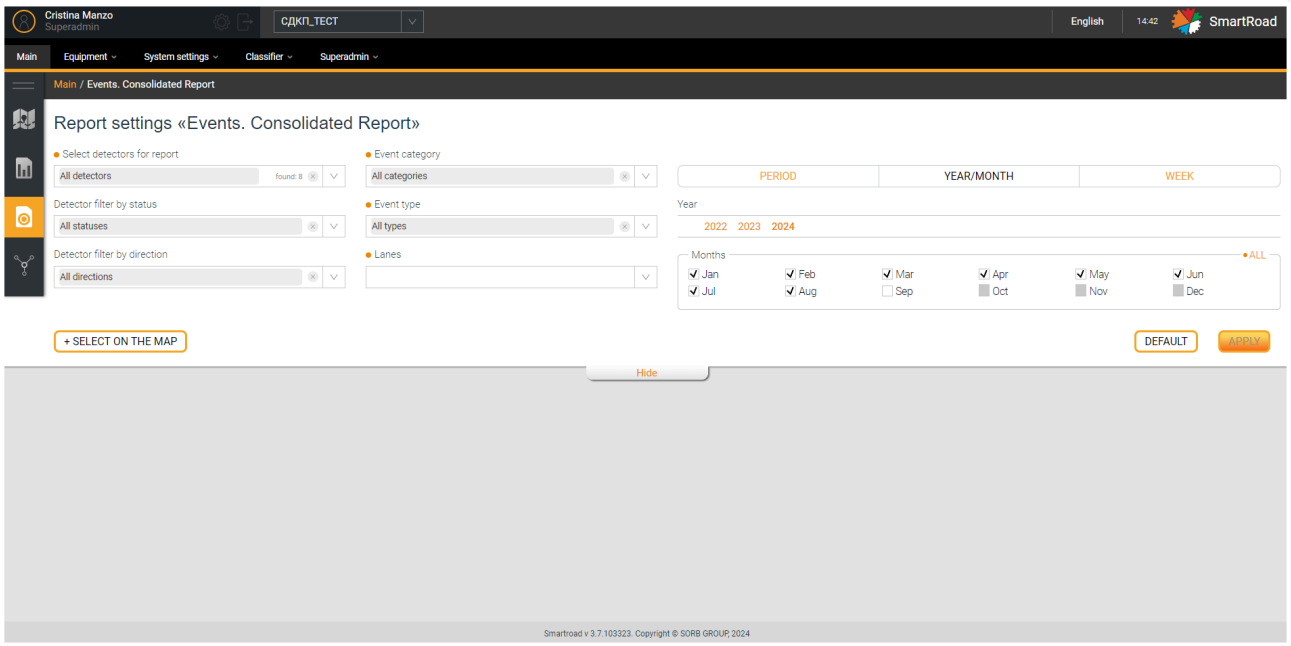
Parameter	Description
Throughput (incl. units/h)	The maximum number of vehicles, reduced to a passenger car, that can pass a given section per hour in one or two directions in the considered road and weather-climatic conditions
Congestion indicator	Proportion of time during which traffic conditions corresponding to service levels E - F are maintained on a road section during the observation period

Consolidated report of Statistics

The consolidated report provides the user with statistical information collected by several detectors over a specified period of time. The report is generated after the user enters the necessary parameters in the report filter, based on which the System selects the data. You must select a reporting form in the drop-down list (top right) to select a reporting form - default or for state-owned companies.

Settings for the Consolidated report

Page `Report settings Statistics. Consolidated report` is a filter for entering report parameters. The user must fill in the required filter fields (marked in orange) to build a report.



In the table below the Filter parameters for the *Statistics. Consolidated report* are indicated

Parameter	Description
Report type	Field for selecting the report type: - Default (standard format) - For state-owned companies (format for state-owned companies)
Selecting detectors for the report *	In the drop-down list, by setting the checkbox, you select detectors, based on the information from which the report will be generated. Detectors that relate to the project selected in the System are available for selection in the field. Multiple detectors can be selected from the drop-down list. All detectors are selected by default.
Select on map	Button for selecting a detector on the map. By clicking on the button, the user is shown a pop-up window with an interactive map for selecting a detector to build a report. The selection is

Parameter	Description
	made in the same way as selecting a detector on the interactive map of the main page
Filter detectors by status	This filter is designed to filter detectors in the field `Selecting detectors for the report` by job status. In the drop-down list, select the detector statuses by setting the checkbox. After specifying the statuses, the condition is applied to the "Select detectors for report" drop-down list. All equipment statuses are selected by default
Filter detectors by direction	This filter is designed to filter detectors in the drop-down list `Selecting detectors for the report` towards. In the drop-down list, select the direction of the detector strip by setting the checkboxes. All directions are selected by default
Classes * (multiple choice list)	Use the drop-down list to select the object classes included in the report. A checked checkbox indicates that the object class is included in the report. All classes are selected by default
Other options	In the drop-down list, you select other parameters included in the report: - speed 85% of traffic flow (km/h) - workload % - average movement interval (sec). A checked checkbox indicates that the parameter is included in the report. All options are selected by default
Period *	An arbitrary period for which the report will be generated. The calendar indicates the date and time in the format from "HH.MM.YYYY HH:MM:SS" to "HH.MM.YYYY HH:MM:SS". Below the

Parameter	Description
	period entry field there are buttons for quickly selecting a period `Today`, `Yesterday` and `A week ago`. By clicking on the quick period selection buttons, the system will be automatically substitute the selected period
YEAR/MONTH	Year selection buttons and month selection checkboxes for generating the period for which the report will be generated
SUNDAY	In the drop-down list, select the week for which you want to build a report. Minimum possible interval for building a consolidated statistical report
Apply	Button for applying report generation parameters. The system generates a report and displays it to the user by clicking on the button.
Reset	Filter parameters reset button. All user-entered filter parameters are returned to their default values by clicking on it.
Hide/Show	The button allows you to collapse and expand the filter block

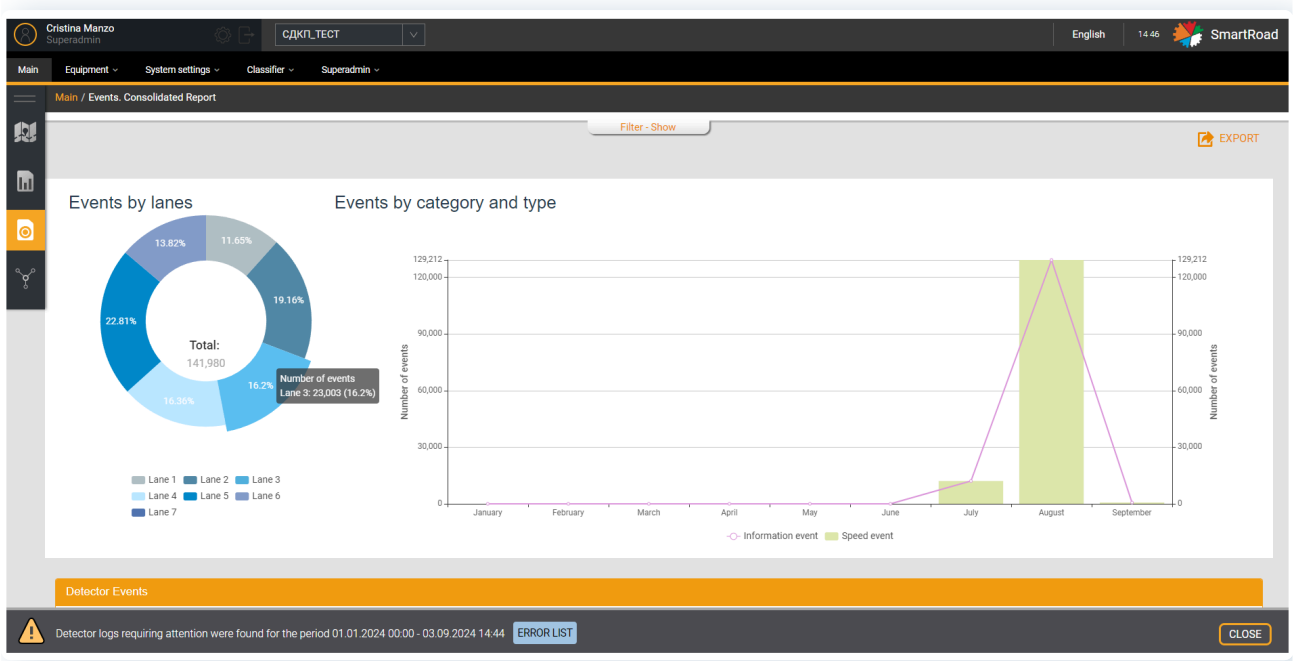
KEEP IN MIND

(*) - It is a Required parameter to build a report.

Graphic part of the consolidated statistical report

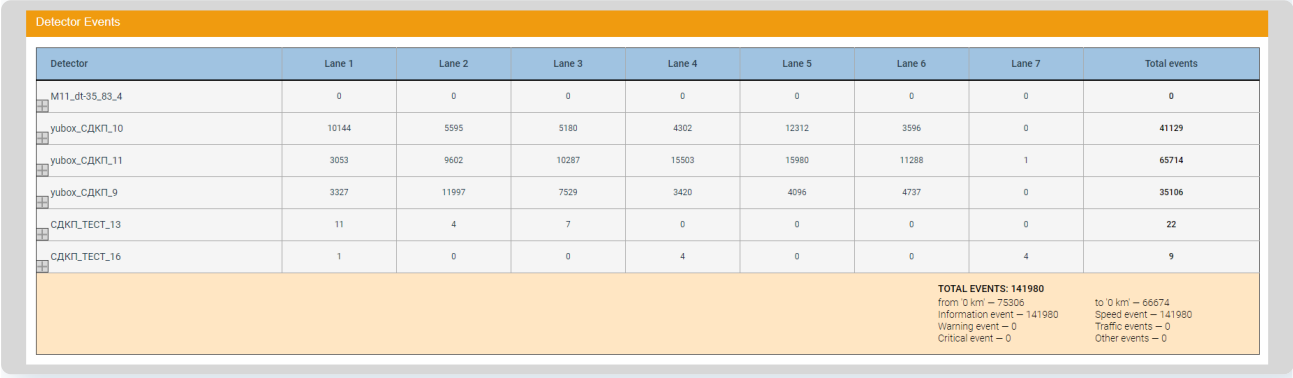
The user can view the information in graphical form after generating the report. This graph is an interactive element. When hovering the mouse over the chart elements, the user is

shown additional information in the form of tooltips. Additionally, you can hide and add columns and the average speed graph displayed in the diagram by clicking on the parameters of object classes under the graph.



Tabular part of the consolidated statistical report

In addition to the graphical part, the information collected in the report is also displayed to the user in the form of a table. Information is displayed for each detector selected in the report filter.



Detector Events

Detector	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Total events
M11_dt-35_83_4	0	0	0	0	0	0	0	**0**
yubox_СДКП_10	10144	5595	5180	4302	12312	3596	0	**41129**
yubox_СДКП_11	3053	9602	10287	15503	15980	11288	1	**65714**
yubox_СДКП_9	3327	11997	7529	3420	4096	4737	0	**35106**
СДКП_ТЕСТ_13	11	4	7	0	0	0	0	**22**
СДКП_ТЕСТ_16	1	0	0	4	0	0	4	**9**

TOTAL EVENTS: 141980
from '0 km' – 75306
Information event – 141980
Warning event – 0
Critical event – 0

to '0 km' – 66674
Speed event – 141980
Traffic events – 0
Other events – 0

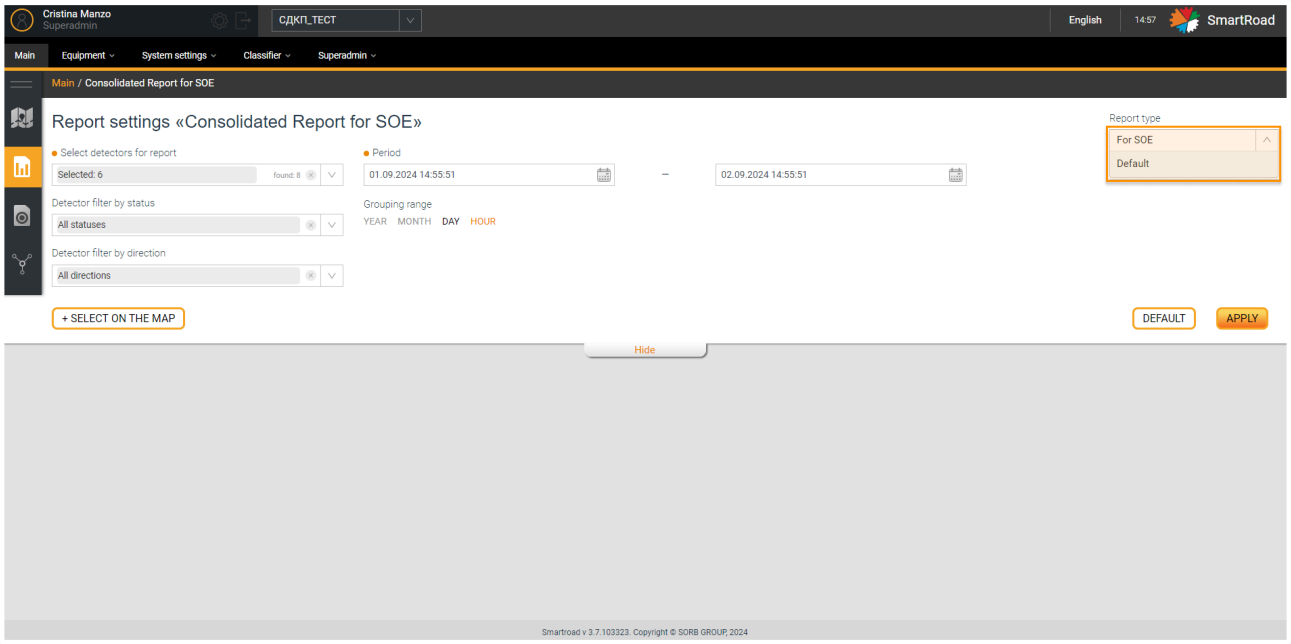
In the next table you can find the Parameters of the tabular part of the consolidated statistical report.

Parameter	Description
Detector	Name of the detector that collected the data
Qty TS	Number of the registered detectors of vehicles for the specified period of time
Vehicle classes	The number of objects of a certain class registered by each detector. Standard classification: - Undefined (undefined) – `0-2 m` - Passenger cars (passenger cars) – `2-6 m` - Truck short (short trucks) – `6-9 m` - Truck (trucks) – `9-13 m` - Truck long (long trucks) – `13-22 m` - Transporter (transport road trains) – `22-30 m` Additional classes are specified in the top menu item "Road object classes"
Speed 85%, km/h	Average speed of 85% of traffic flow recorded by each detector
Workload, %	Congestion of a road section as a percentage recorded by each detector
Movement interval, sec	Average interval of movement between objects in seconds recorded by each detector
Total detector unavailability time	The total time during which the detector was unavailable during the time interval selected by the filter. Displayed in days,

Parameter	Description
	hours, minutes format.
Trouble-free operation of the detector	The value of uninterrupted operation of the detector as a percentage for the time interval selected in the filter. Percentage value (%)
Data Collection Integrity	The value of uninterrupted data acquisition from the detector for the entire time of uninterrupted operation of the detector for the period selected in the filter. Percentage value (%)
Total	Total number of recorded data or calculated values

Settings for State-owned companies Consolidated report

You should select the `For state-owned companies` item in the side menu of the `Statistics` section of the `Consolidated Report` subsection in the `Report type` drop-down list to go to the `Consolidated Report for state-owned companies` page. This report is built after the user selects the necessary parameters in the filter.



The report settings are a form for entering report parameters, which corresponds to the Table: *Parameters of the tabular part of the consolidated statistical report*.

> **KEEP IN MIND**
>
> In the `Period` form, the selected time interval may include the last 24 hours, but the minimum period is 30 minutes. The interval must be a multiple of an hour.

Consolidated report for State-owned companies

The Report `For state-owned companies` allows the user to download statistical information collected by one or more detectors over a specified period of time in `.xls` format.

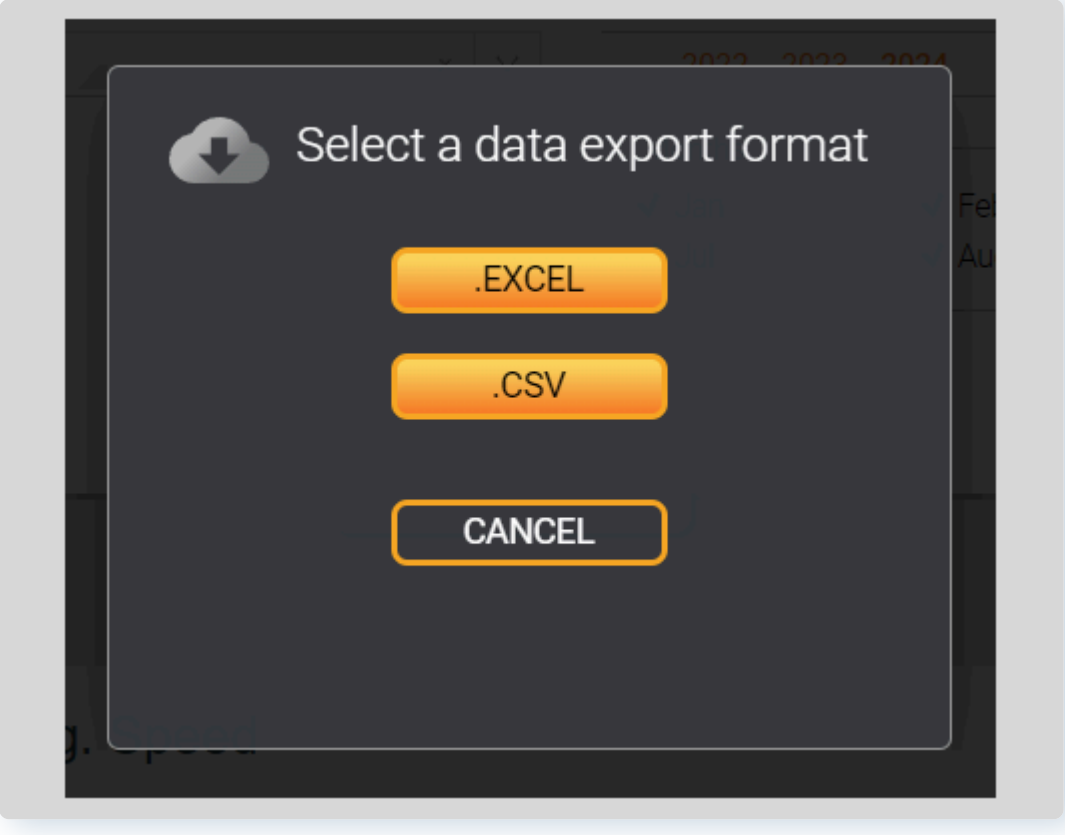
The report table in the uploaded file is built based on the requirements of the state company. The file may contain tables of several types depending on the selected period and the interval for generating the upload.

Detailed information is presented in the instructions: User's instructions for the web interface of the SmartRoad PC for state-owned companies.

Export reports

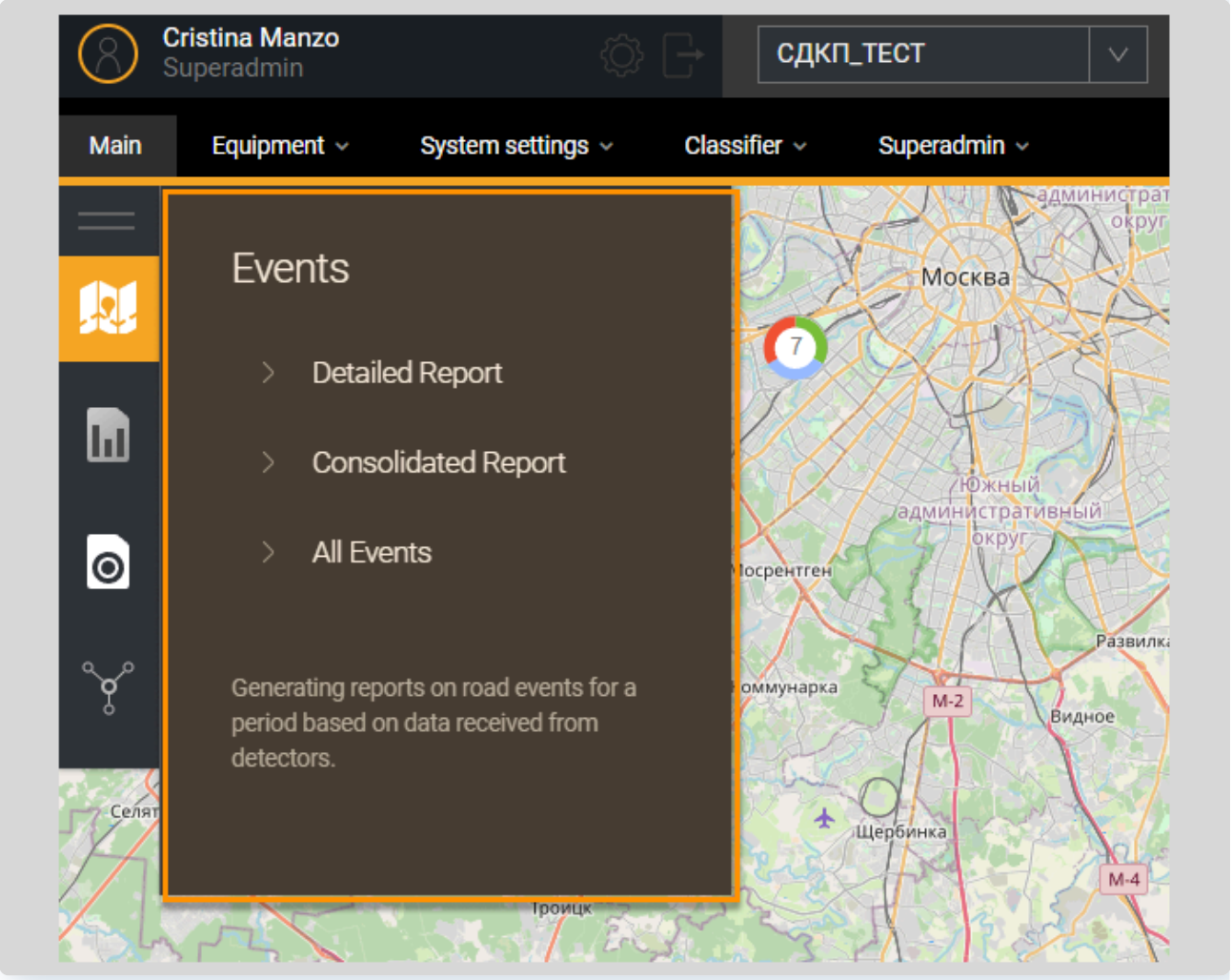
Statistical reports can be downloaded to external files of the selected format. The System must complete its generation to upload a report. Unloading is done using the button `Export`, located on the right, above the graphic part of the report. When clicked, the user can select the file format in which the information will be saved. The available formats:

- Excel
- CSV



SmartRoad Modules / Events module

The events module provides event information on an interactive map. The module includes a section `Events` in the side navigation menu and the top menu item `Event Rules`.



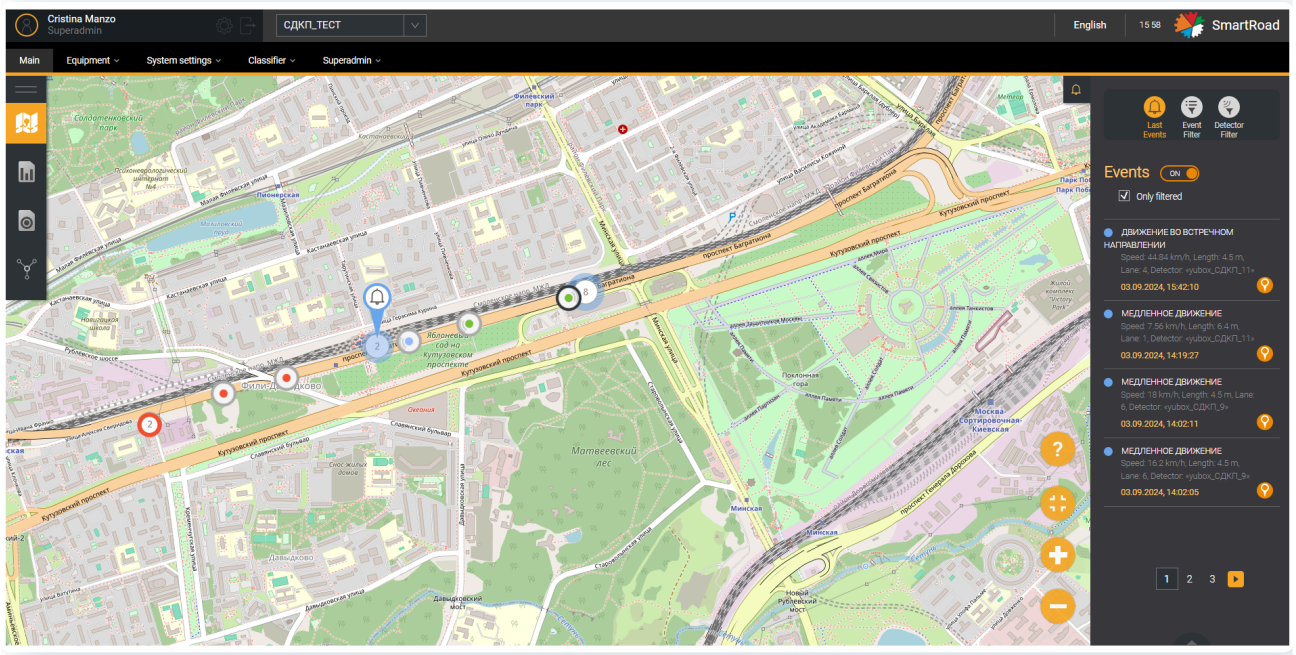
Section `Events` consists of subsections - `Detailed report`, `Consolidated report` and `All events`.

Event display

Events registered by the System are displayed on the map as icons. The color of an event indicates its category:

- Red – critical event
- Orange – event that requires attention
- Blue – information event

The web interface provides the following multi-filter functions To filter information on the map: `Last Event` widget, `Latest Events` list, `Event filter`.

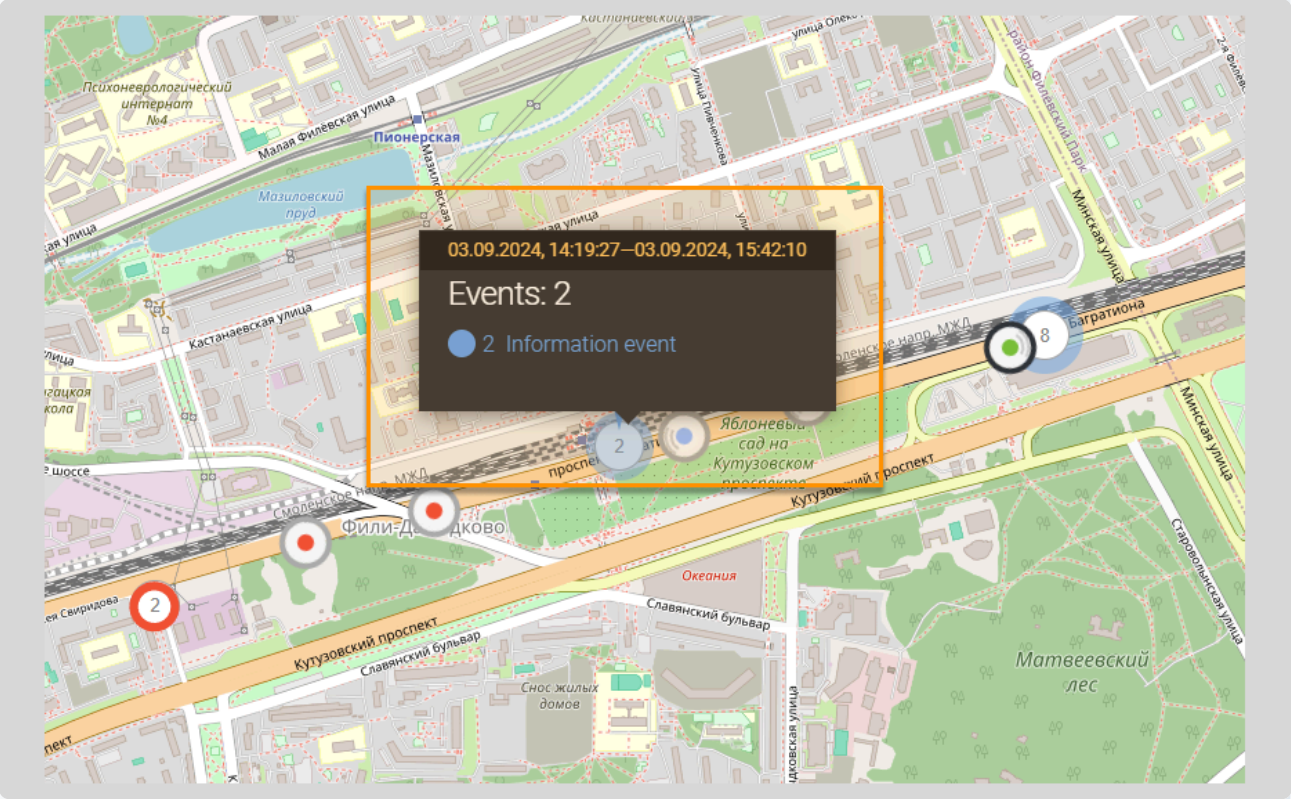


Event information view

The user must hover over the event icon with the mouse pointer to view information about an event on the map. This will display a pop-up window with information about the event.

The Event information parameters are described in the table below

Parameter	Description
Date and time in the window title	Date and time of registration of the event by the System
Event category	Event category. Possible options: - Information - Warning - Critical Event
Event Rule	The name of the event rule that captured the event
Speed	Speed of object movement during registration events
Length	Length of the object participating in the event
Band	Object movement lane during registration events by the System
Detector	Name of the detector that recorded the occurrence of the event



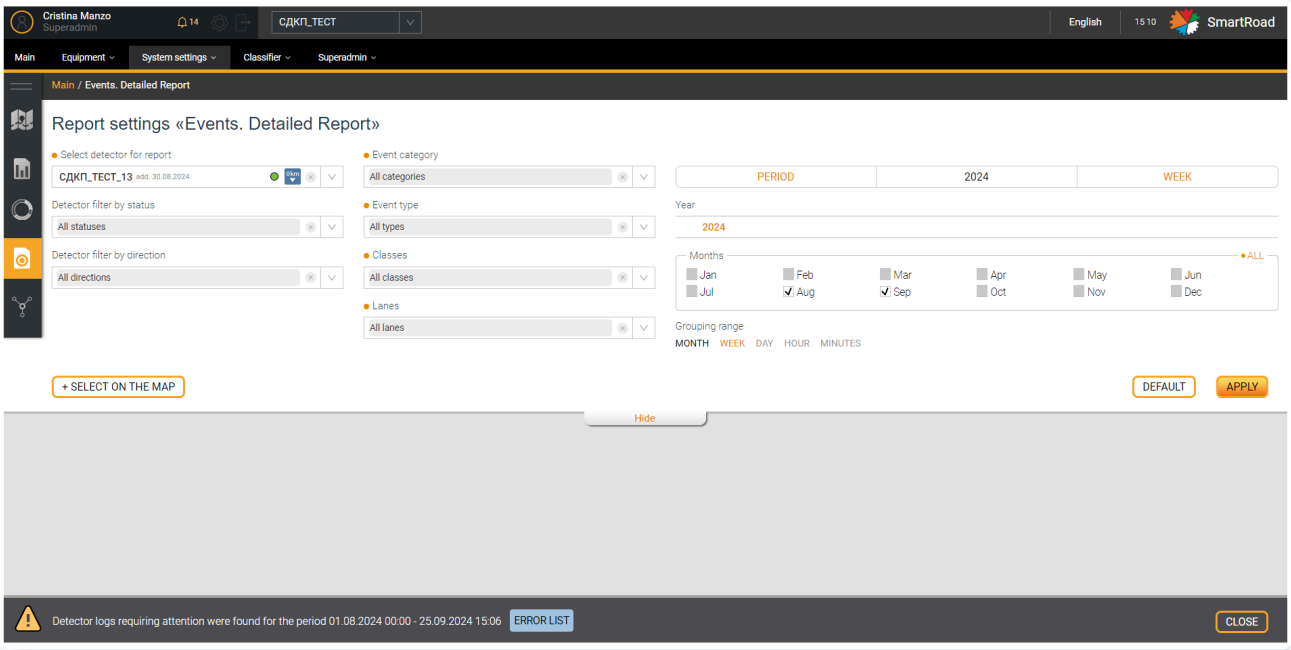
When you hover over the event group area on the map, a pop-up information window will appear with general information about all the events that occurred at that location on the interactive map.

Detailed event report

A detailed report provides the user with event information collected by one detector over a specified period of time. The report is generated after the user enters the necessary parameters in the report filter, based on which the data is selected.

Report settings for the Detailed report

The Page `Report settings for Event Detailed report` is a filter for entering report parameters. The user must fill in the required filter fields (marked in orange) to build a report.



In the table below you will find the Detailed event report filter parameters

Parameter	Description
Selecting a detector to report *	In the drop-down list, select the detector based on the information from which the report will be generated. Detectors that relate to the selected project are available for selection in the drop-down list. Only one detector can be selected. By default, no detector is selected.
Filter detectors by status	This filter is designed to filter detectors by operating status. In the drop-down list, select the operating status of the equipment by checking the checkbox. After specifying the statuses, the condition is applied to the field `Selecting a detector to report`. By default, all equipment statuses are selected
Filter detectors by direction (multiple	This filter is designed to filter detectors by direction. In the drop-down list, select the detector direction by setting checkboxes.

Parameter	Description
selection list)	After specifying the direction, the condition is applied to the field `Selecting a detector to report`. By default all directions are selected
Event Category * (Multiple choice list)	Use the drop-down list to select the categories of events included in the report. A checked checkbox indicates that the category is included in the report. Multiple values can be selected. By default, all categories are selected.
Event type * (multiple selection list)	Use the drop-down list to select the types of events included in the report. A checked checkbox indicates that the type is included in the report. By default, all event types are selected.
Classes * (multiple choice list)	In the drop-down list, you select the classes of objects registered by the System to be included in the report. A checked checkbox indicates that the object class is included in the report. By default, all classes are selected.
Stripes *	Use the multiple selection drop-down list to select which lanes to include in the report. A checked checkbox indicates that the band is included in the report
Other parameters *	In the multiple selection drop-down list, you select the parameters included in the report: - Speed 85%, km/h - Workload - Movement interval, sec
Period * (multiple choice list)	An arbitrary period for which the report will be generated. The calendar displays dates and times in the format "HH.MM.YYYY

Parameter	Description
	HH:MM:SS" to "HH.MM.YYYY HH:MM:SS". Below the period entry field there are buttons for quickly selecting the period `Today`, `Yesterday` and `Week ago`. By clicking on the quick period selection buttons, the System will automatically substitute the selected period.
YEAR/MONTH	Buttons for selecting the year and month/months (checkboxes) for selecting the period for which the report will be built.
SUNDAY	In the drop-down list, select the week for which you want to build a report.
Grouping interval *	Interval of time grouping of data. Use the buttons to select the intervals for which the data within the selected period will be broken down in the report.
+Select on map	Button for selecting a detector on the map. By clicking on the button, the user is shown a pop-up window with an interactive map for selecting a detector to build a report. The selection is made in the same way as selecting a detector on the map of the main page. You can select a detector by checking the desired checkbox on the left.
Apply	Button for applying report generation parameters. By clicking on the button, the system generates a report and provides it to the user
Reset	Filter parameters reset button. By clicking on the button, all filter parameters entered by the user are returned to their default values

Parameter	Description
Hide/Show	The button allows you to collapse and expand the filter block.

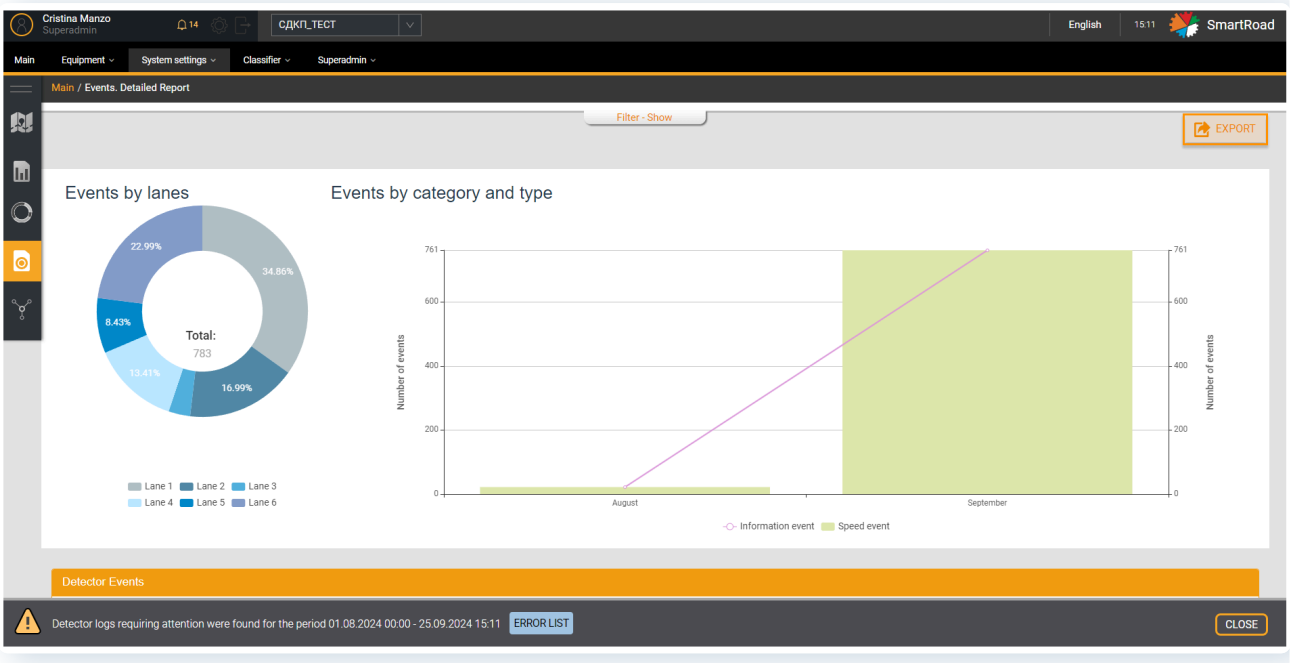
REMEMBER

(*) - It is Required parameter to build a report

> `Grouping interval` - the selected time interval should not exceed 24 hours to generate a report in hours or minutes

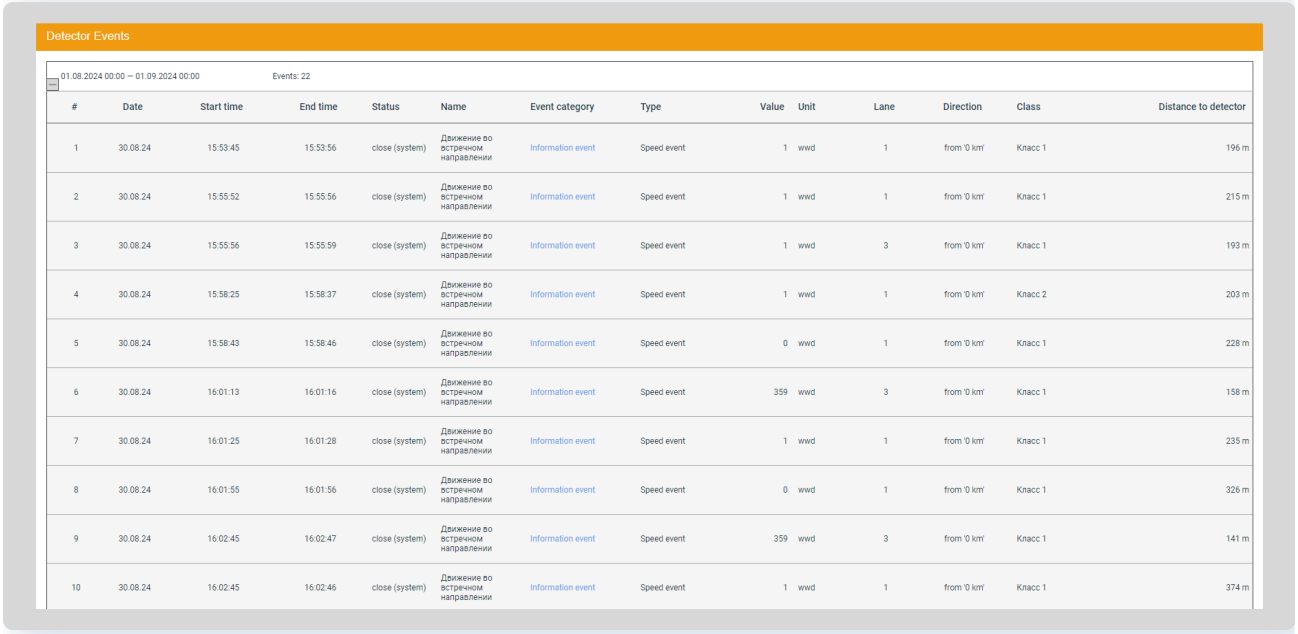
Graphic part of a detailed event report

The user can view the information in graphical form after generating the report. The graph is an interactive element. When hovering the mouse over the chart elements, the user is shown additional information in the form of tooltips.



Tabular part of a detailed event report

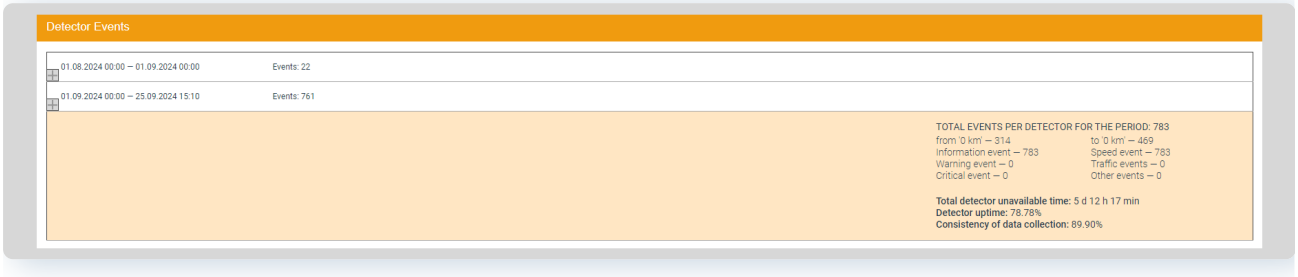
The information collected in the report is displayed to the user in the form of a table. Information is displayed for each step of the selected data grouping interval.



Detector Events

01.08.2024 00:00 — 01.09.2024 00:00 Events: 22

#	Date	Start time	End time	Status	Name	Event category	Type	Value	Unit	Lane	Direction	Class	Distance to detector
1	30.08.24	15:53:45	15:53:56	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	1	from 0 km'	Класс 1	196 m
2	30.08.24	15:55:52	15:55:56	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	1	from 0 km'	Класс 1	215 m
3	30.08.24	15:55:56	15:55:59	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	3	from 0 km'	Класс 1	193 m
4	30.08.24	15:58:25	15:58:37	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	1	from 0 km'	Класс 2	203 m
5	30.08.24	15:58:43	15:58:46	close (system)	Движение во встречном направлении	Information event	Speed event	0	wwd	1	from 0 km'	Класс 1	228 m
6	30.08.24	16:01:13	16:01:16	close (system)	Движение во встречном направлении	Information event	Speed event	359	wwd	3	from 0 km'	Класс 1	158 m
7	30.08.24	16:01:25	16:01:28	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	1	from 0 km'	Класс 1	235 m
8	30.08.24	16:01:55	16:01:56	close (system)	Движение во встречном направлении	Information event	Speed event	0	wwd	1	from 0 km'	Класс 1	326 m
9	30.08.24	16:02:45	16:02:47	close (system)	Движение во встречном направлении	Information event	Speed event	359	wwd	3	from 0 km'	Класс 1	141 m
10	30.08.24	16:02:45	16:02:46	close (system)	Движение во встречном направлении	Information event	Speed event	1	wwd	1	from 0 km'	Класс 1	374 m



Detector Events

01.08.2024 00:00 — 01.09.2024 00:00 Events: 22

01.09.2024 00:00 — 25.09.2024 15:10 Events: 761

TOTAL EVENTS PER DETECTOR FOR THE PERIOD: 783

from 0 km' — 314 to 0 km' — 469

Information event — 783 Speed event — 783

Warning event — 0 Traffic events — 0

Critical event — 0 Other events — 0

Total detector unavailable time: 5 d 12 h 17 min

Detector uptime: 78.78%

Consistency of data collection: 89.90%

In the table below you can find the Parameters of the tabular part of the detailed event report.

Parameter	Description
Date	Date and time interval for which data is displayed
Events	Total number of events for the selected time interval

Each report step can be expanded by clicking on the corresponding `+` icon. In this case, the user is provided with additional information on events registered by the System.

The additional information parameters of the detailed event report are described here

Parameter	Description
#	The serial number of the entry in the list
Date	Date of event registration by the System
Start time	Event start time recorded system
End time	Event end time recorded system
Status	Status of the event in the System when generating the report: - open - event being processed, - close – closed by the operator, - close (auto) - closed automatically
Name	Name of the rule that recorded the event. Examples: - Speed `<` 15 - Wrong direction - Stop
Event category	Event category specified in the System during setup: - Information - Warning - Critical event
Type	The event type specified in the System when setting up the event rule:

Parameter	Description
	- Speed events - Traffic Events - Other events
Meaning	The quantitative value of the indicator that was registered by the event. The value received from the detector: - at a speed event – the speed of the object; - when stopping – zero; - when moving back - one.
Unit of measurement	Unit of measurement of the indicator that was registered through the event: - CUSTOM – custom event - GAP - interval - HEADWAY – forward direction - KMH - km/h - MPS-м/с - PEDESTRIAN – pedestrian detected - PLACE - object in the definition area - STOP - stopping vehicle - WWD - wrong direction
Band	Lane where the event was registered
Direction	Lane direction
Class	The class of the object participating in the event. Classes of road objects are set in *Classes of road objects*
Detector distance	Distance to the detector where the event was recorded

Besides, the Final report parameters

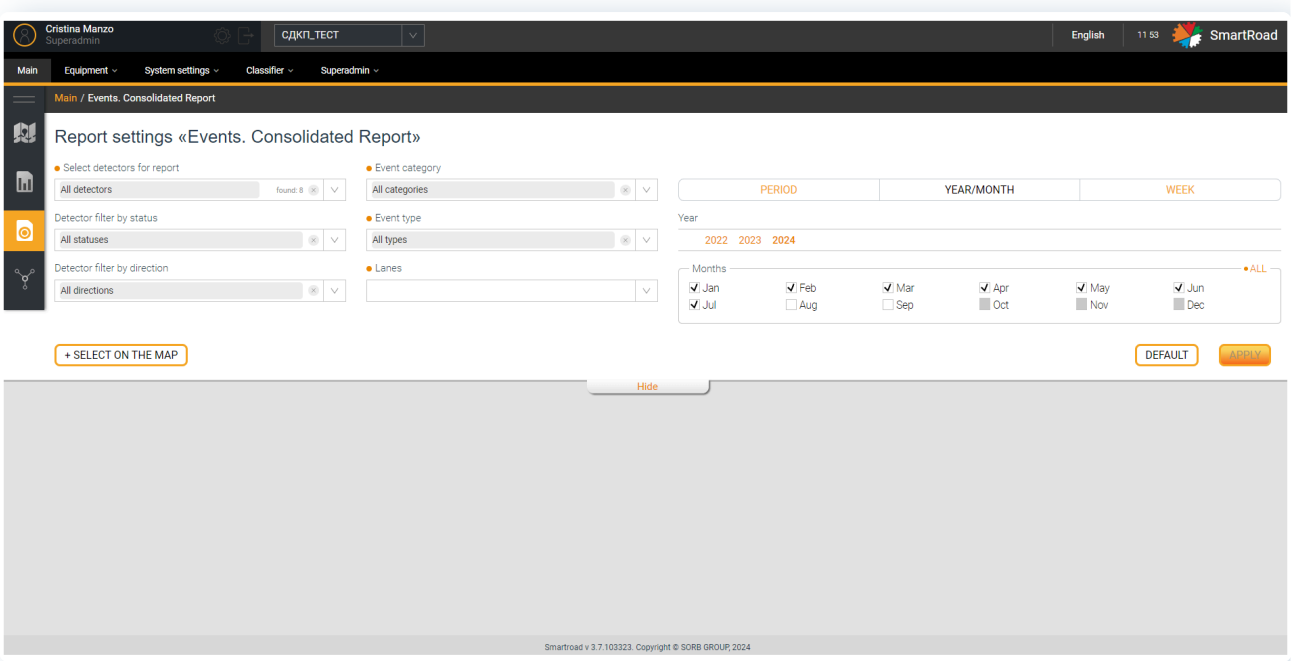
Parameter	Description
Total events per interval	Total number of events per time interval by directions of movement, categories and types of events
Total events by detector for the period	Total number of events for the time interval selected in the report filter
Total detector unavailability time	The total time during which the sensor was unavailable during the time interval selected by the filter. Displayed in days, hours, minutes format
Trouble-free operation of the detector	The value of uninterrupted operation of the sensor as a percentage for the time interval selected in the filter. Percentage value (%)
Data Collection Integrity	The value of uninterrupted data acquisition from the detector for the entire time of its uninterrupted operation for the period selected in the filter. Percentage value (%)

Consolidated event report

A consolidated report provides the user with information on events collected by several detectors over a specified period of time. The report is generated after the user enters the necessary parameters in the report filter, based on which the System selects the data.

Report settings for the Consolidated report

The Page `Events report settings. Consolidated report` is a filter for entering report parameters. The user must fill in the required filter fields (marked in orange) to build a report.



In the next table are described the Events filter parameters for the Consolidated report

Parameter	Description
Select detectors for report * (multiple selection list)	In the drop-down list, by setting the checkbox, you select detectors, based on the information from which the report will be generated. Detectors that relate to the selected project are available for selection in the field. By default, all detectors are selected.
Filter detectors by status (multiple selection list)	This filter is designed to filter detectors in the “Select detector for report” field by operation status. In the drop-down list, select equipment statuses by checking the checkbox. After specifying the statuses, the condition is applied to the field `Selecting`

Parameter	Description
	`detectors to report`. By default, all equipment statuses are selected.
Filter detectors by direction (multiple selection list)	This filter is designed to filter detectors in the `Select detector for report` field by direction. In the drop-down list, select the detector direction by setting checkboxes. After specifying the direction, the condition is applied to the `Select detectors for report` field. By default all directions are selected
Event Category* (multiple selection list)	This field allows you to select the categories of events included in the report: - Information - Warning - Critical event A checked checkbox indicates that the category is included in the report. By default, all event categories are selected.
Event type* (multiple selection list)	This field selects the types of events included in the report. A checked checkbox indicates that the type is included in the report. By default, all event types are selected.
Stripes* (multiple choice list)	The field selects the traffic lanes included in the report. A checked checkbox indicates that the band is included in the report. All bands are selected by default
Period *	An arbitrary period for which the report will be generated. The calendar indicates the date and time in the format from "HH.MM.YYYY HH:MM:SS" to "HH.MM.YYYY HH:MM:SS". Below the period entry field there are buttons for quickly selecting the period `Today`, `Yesterday` and `Week ago`. By clicking on the quick

Parameter	Description
	period selection buttons, the System will automatically select the period.
YEAR/MONTH	Buttons for selecting the year and month/months (checkboxes) for selecting the period for which the report will be built.
SUNDAY	In the drop-down list, select the week for which you want to build a report.
Grouping interval*	Interval of time grouping of data. Use the buttons to select intervals into which the data will be divided within the selected period in the report.
+Select on map	Button for selecting a detector on the map. By clicking on the button, the user is shown a pop-up window with an interactive map for selecting a detector. The selection is made in the same way as selecting a detector on the map in the main page
Apply	Button for applying report generation parameters. By clicking on the button, the system generates a report and displays it to the user
Reset	Filter parameters reset button. By clicking on the button, all filter parameters entered by the user are returned to their default values
Hide/Show	The button allows you to collapse and expand the filter field

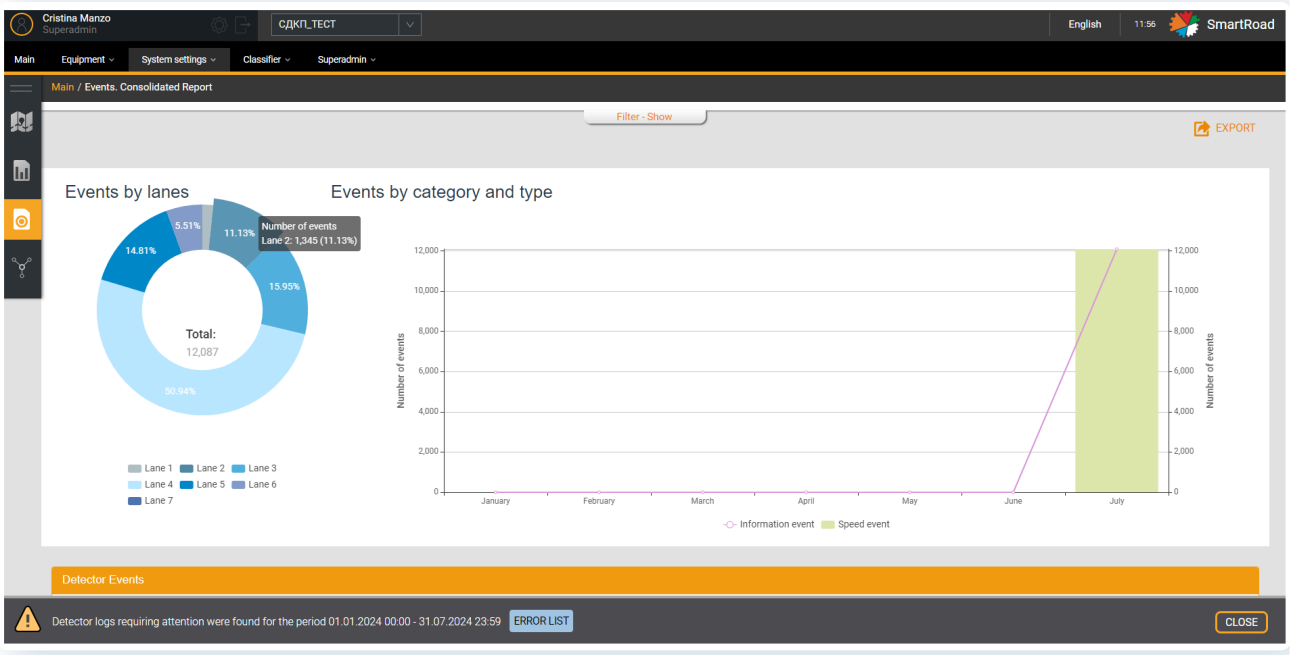
REMEMBER

(*) - It is Required parameter to build a report

> `Grouping interval` - the selected time interval should not exceed 24 hours to generate a report in hours or minutes

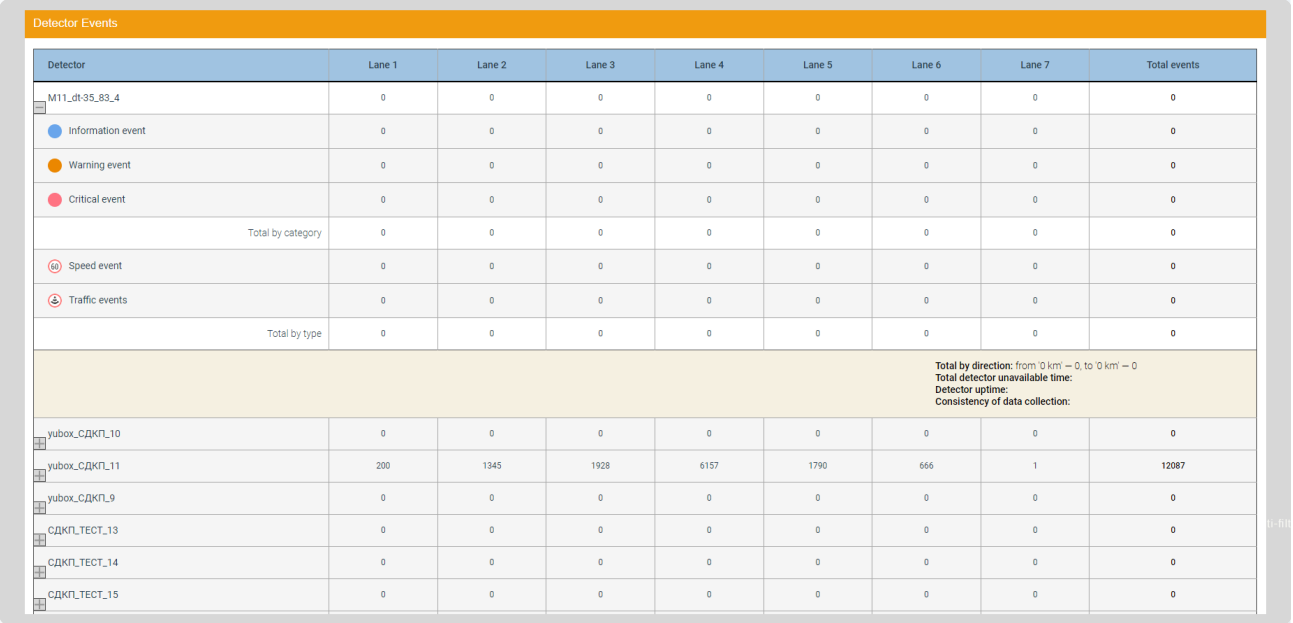
Consolidated event report chart

The user can view the information in graphical form after generating the report. This graph is an interactive element. When you hover your mouse over chart elements, additional information is displayed in the form of tooltips.



Tabular part of the consolidated event report

The graphical portion of the information collected in the report is displayed in the form of a table.


Detector Events

Detector	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Total events
M11_dt-35_83_4	0	0	0	0	0	0	0	0
Information event	0	0	0	0	0	0	0	0
Warning event	0	0	0	0	0	0	0	0
Critical event	0	0	0	0	0	0	0	0
Total by category	0	0	0	0	0	0	0	0
Speed event	0	0	0	0	0	0	0	0
Traffic events	0	0	0	0	0	0	0	0
Total by type	0	0	0	0	0	0	0	0
yubox_СДКП_10	0	0	0	0	0	0	0	0
yubox_СДКП_11	200	1345	1928	6157	1790	666	1	12087
yubox_СДКП_9	0	0	0	0	0	0	0	0
СДКП_ТЕСТ_13	0	0	0	0	0	0	0	0
СДКП_ТЕСТ_14	0	0	0	0	0	0	0	0
СДКП_ТЕСТ_15	0	0	0	0	0	0	0	0

Total by direction: from '0 km' – 0, to '0 km' – 0
Total detector unavailable time:
Detector uptime:
Consistency of data collection:

The table below indicates the Parameters of the tabular part of the consolidated event report.

Parameter	Description
Detector	Name of the detector that collected the data
Lane No. (where No. is the lane number)	Number of events recorded on the lane by the detector
Total events	Total number of events per detector
Total events (result string)	Total number of events for all detectors included in the report, broken down by direction of motion, category, and event type

Lines with information for each detector can be expanded by clicking on the corresponding + icon. In this case, the user is provided with additional information on registered events.

Furthermore, you will see the Parameters of additional information in the tabular part of the consolidated event report

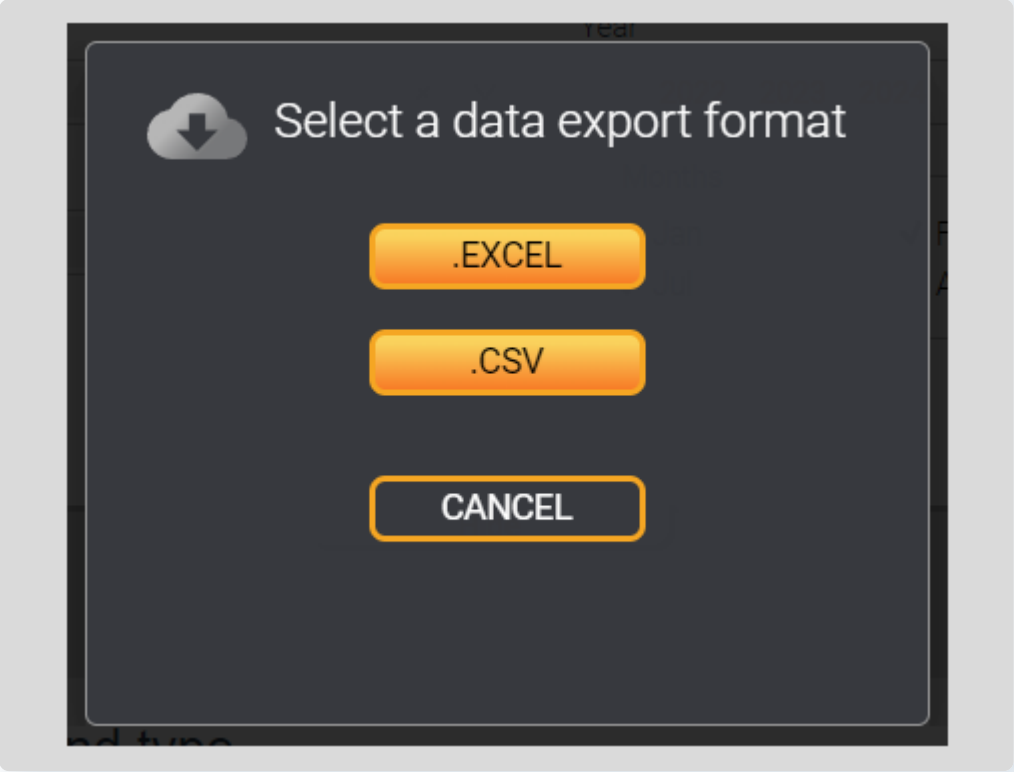
Parameter	Description
Event categories	Number of events by category, registered in each lane: - Information - Warning - Critical event
Total by category	Total number of events in all categories for each lane
Event Types	Number of events by type recorded in each lane - Speed Events - Traffic events - Other events
Total by type	Total number of events for all types for each lane
Total by directions	Total number of events by area. Movements (from `0 km` –, to `0 km` –)
Total detector unavailability time	The total time during which the detector was unavailable during the time interval selected in the filter. Displayed in days, hours, minutes format
Trouble-free operation of the detector	The value of uninterrupted operation of the detector as a percentage for the time interval selected in the filter. Percentage value (%)

Parameter	Description
Data Collection Integrity	The value of constant and uninterrupted data acquisition from the detector for the entire time of uninterrupted operation of the detector for the period selected in the filter. Percentage value (%)

Exporting event reports

Event reports can be uploaded to an external file of the selected format. The System must complete its generation to upload a report. Uploading is done using the `Export` button located on the right, above the graphic part of the report. When clicked, the user can select the file format in which the information will be saved. Available formats:

- Excel
- CSV

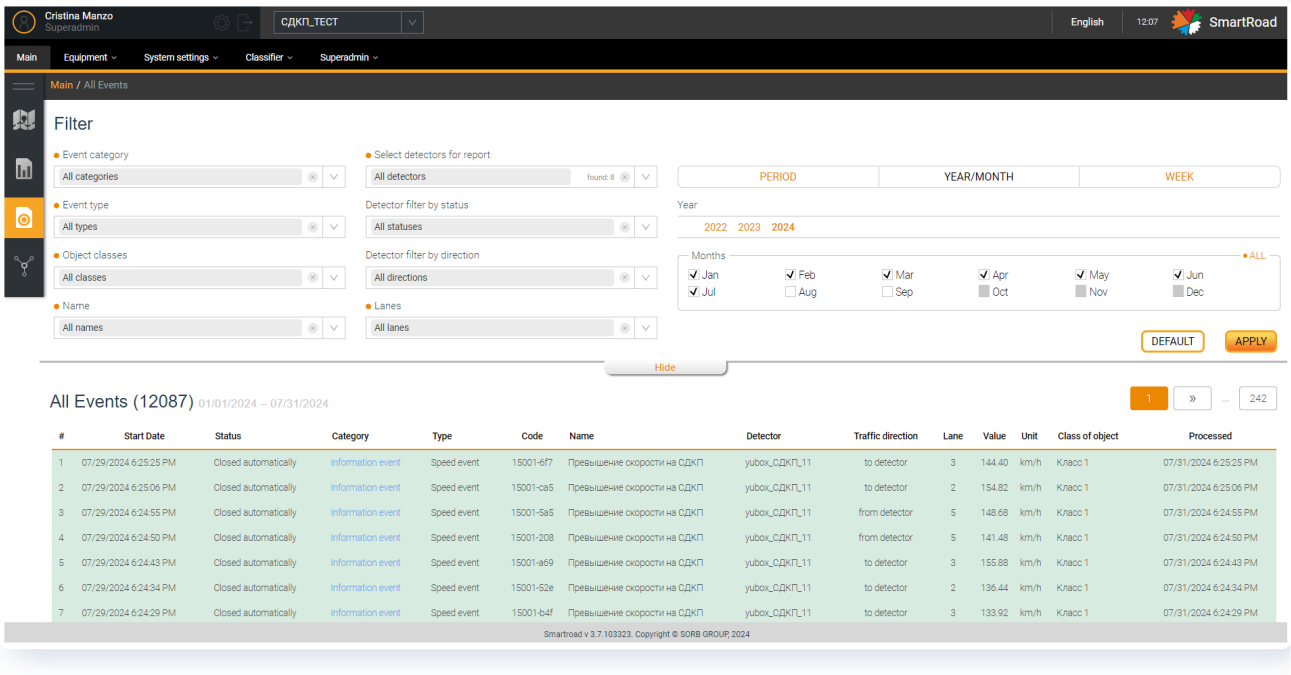


All events

TAKE INTO ACCOUNT

This `All events` functionality is being developed currently.

The page `All events` contains a list of all events registered by the system for the selected project. On the page, the user has access to a filter for searching for events in the list, as well as a list of all events registered in the System.



In the next table you will find the Event list filter parameters

Parameter	Description
Event Category* (multiple selection list)	When you click on the drop-down list, the user is shown a list of event categories registered in the System. The choice is made by setting a checkbox. All categories are selected by default
Event type* (multiple selection list)	The drop-down list displays a list of event types registered in the system. The choice is made by setting the checkbox
Vehicle classes* (list with multiple choice)	When you click on the drop-down list, the user is shown a list of vehicle classes registered by default in the System. The choice is made by setting a checkbox. All categories are selected by default
Name*	When you click on the drop-down list, the user is shown a list of event names registered in the System

Parameter	Description
Selecting detectors for the report*(multiple choice list)	In the drop-down list, detectors that registered events are selected. Detectors that relate to the selected project are available for selection in the field. By default, all detectors are selected.
Filter detectors by status (multiple choice list)	The drop-down list displays the operating status of the detector. By default, all statuses are selected.
Filter detectors by direction (multiple choice list)	The drop-down list displays the detector directions: - to `0 km`; - from `0 km`; - round trip By default, all directions are selected.
Stripes* (multiple choice list)	In the drop-down list you can select bands (band numbers) registered in the System. By default, all bands are selected.
Period* (multiple choice list)	An arbitrary period for which a list of events registered in the System will be displayed. The fields indicate dates and times in the format from “HH.MM.YYYY HH: MM: SS” to “HH.MM.YYYY HH: MM: SS”. Below the period entry field there are buttons for quickly selecting a period `Today`, `Yesterday` and `A week ago`. When you click on the quick period selection buttons the System will automatically substitute the period.

Parameter	Description
Apply	Button for applying filtering parameters. By clicking on the button, the system generates a list of events and displays it to the user
Reset	Filter parameters reset button. When you click on it all user entered filter parameters are returned to default values
Hide	The button allows you to collapse and expand the filter block

KEEP IN MIND

(*) - It is mandatory field

Besides, All Events list options

Parameter	Description
#	Record serial number
start date	Event start date
Status	The System has the following event statuses: - New - Viewed - In progress - Closed by operator - Delegated - Closed automatically

Parameter	Description
Category	The System provides the following categories of events: - Information - Warning - Critical event
Type	The registered event is displayed: - Speed events - Traffic events - Other events
The code	Unique event code assigned in the System
Name	The name of the event rule that recorded this even
Detector	Detector name
Direction of movement	Detector direction: - to the detector - from detector.
Band	Number of the band in which this event was recorded
Meaning	Event parameter value
Unit measurements	Event parameter unit
Vehicle class	The class of the object participating in the event. Road object classes are specified in the top menu in *Road object classes*

Parameter	Description
Processed	Event completion (processing) date

The card of the selected event will open by clicking on any line of the list. Detailed description in the section `Event card`.

SmartRoad Modules / Decision-making module

This module is designed to provide information to users making decisions in difficult conditions for a complete and objective analysis of the road situation. The purpose of this module is to assist users in making decisions, for example, informing external systems about an event or incident and transmitting data about the event or incident to external systems.

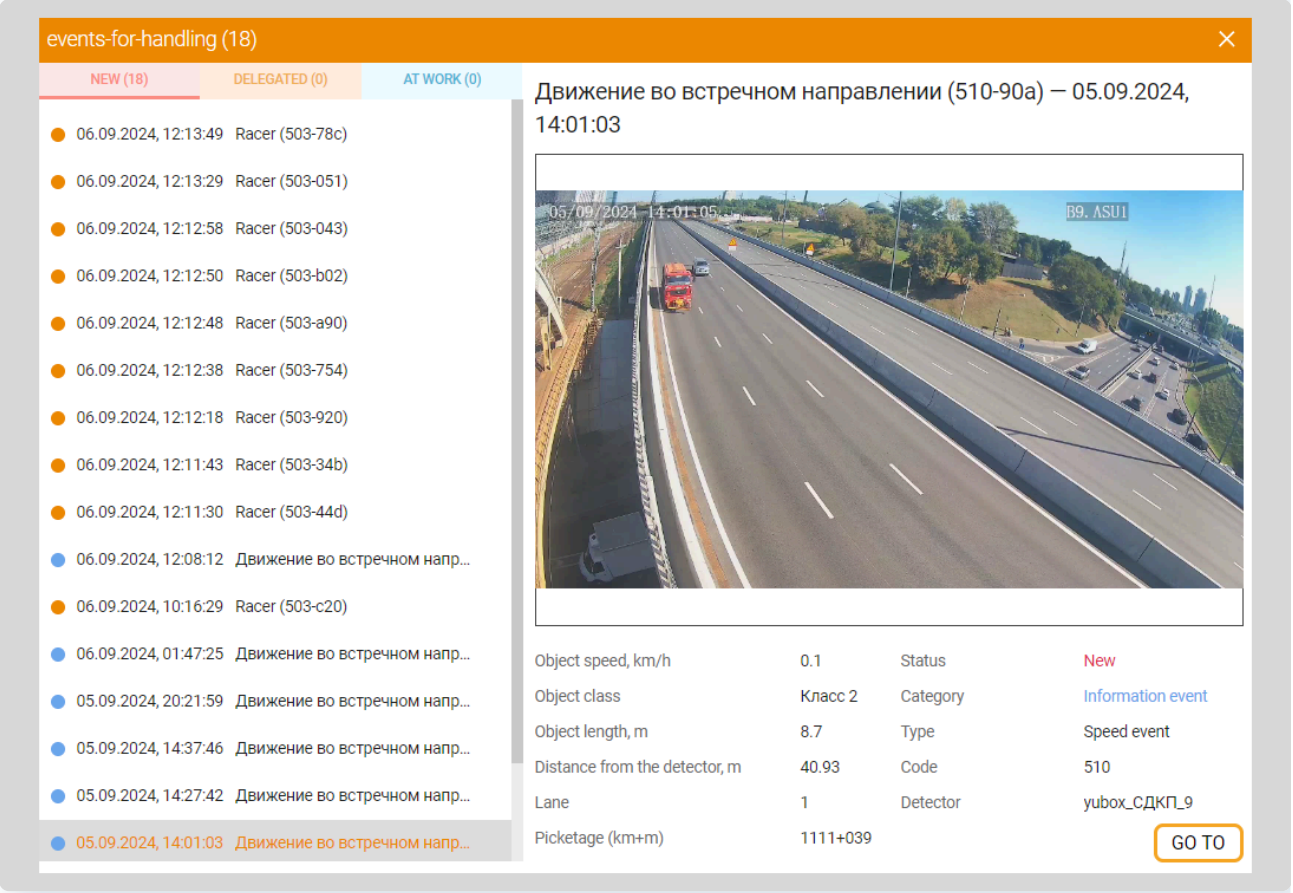
The modules provides:

- Event processing
- Information related to an event registered in the System in the event card.
- Photos and videos from a camera on the section of the road where the event occurred.
- The option for reproducing (play) an event in the graphical configurator (except for events identified by indirect evidence).

Event to process

The Modal window `Event to process` is an event processing window. It gives brief information about the event and enables the operator to change the event status and go to the `Event Card` window.

You can go to modal window `Event to process` by clicking on the icon on the top panel `Notification of a recorded event`. The number of events to process is indicated in parentheses at the top of the modal window.



In the next table the Parameters of the `Events for processing` modal window are described

Parameter	Description
New	New event for operator processing
Delegated	Delegated event for operator processing
In progress	Events that the operator is working on
Rule name	Name of the event rule, captured event

Parameter	Description
Time and date	Date and time of the recorded event
Block with media data	Photo or video file of the event
Object speed, km/h	The speed of the object at the time of the event
Object class	Class of the object participating in the event
Object length, m	Length of the object participating in the event
Distance from detector, m	Distance from the detector at the time of the event
Band	The bar on which the event was recorded
Picketage (km+m)	Picketing before the event
Status	Log status for this event
Category	The field displays the category of this event to the user: - Information - Warning - Critical Event
Type	In the drop-down list, the user is shown a list of event types registered in the system: - Speed events

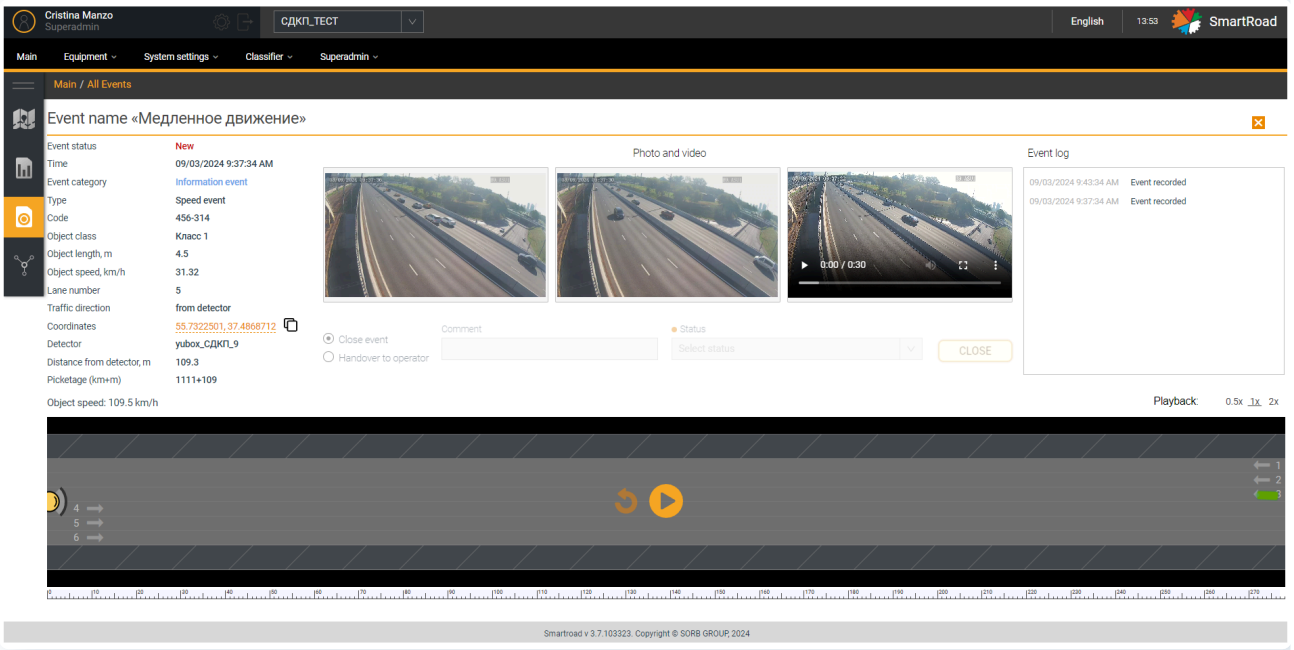
Parameter	Description
	- Traffic events - Other events
The code	Unique event code assigned in the System
Detector	Detector name
Go button	Click to go to the card of the selected event
Close button	It is used to close modal window

Event card

TAKE INTO ACCOUNT

This functionality is being developed currently

The Page `Event Card` contains information with data on the selected event in the list of all project events. When you click on an event in the list, the card of the selected event opens. The event card also contains photos and videos from the nearest camera and a link to go to the graphical configurator to play the event.



In the table below you can find the Event card parameters

Parameter	Description
Event name	Event name specified in the System
Status	Event status
Time	Event start date and time
Event category	The category of this event is displayed to the user in the field
Event type	The field displays to the user the type of this event and the last three characters of the event id
The code	Event code, which consists of the event rule code
Object class	Object class registered in the System

Parameter	Description
Object length, m	The field displays to the user the length of the object participating in the event in meters.
Object speed, km/h	Speed of the object participating in the event
Lane number	The field displays to the user the value of the lane number on which the event occurred.
Direction of movement	Direction of traffic on this lane
Coordinates	Coordinates of the registered event
Detector	Name of the detector that recorded the event
Distance from detector, m	Distance from the detector that recorded the event
Picketage (km+m)	Picketing before the event

Besides, Photo and video parameter types

Item type	Description
General panoramic photo from the camera	The field displays to the user a general panoramic photo obtained from the camera
Close-up photo from camera	In the field, the user is shown an approximate photo obtained from the camera

Item type	Description
Live camera video	The field displays video from the camera in real time to the user

The `Radio button Close` event parameters

Parameter	Description
A comment	A comment for the event is entered in the field. The user must click on the button `Close` to save a comment in the event card.
Status	The field displays to the user a drop-down list of event status: - Confirmed - False alarm - Classification error Pause in work
Close	When you click the button, the event is closed

The Radio button `Transfer to operator` parameters

Parameter	Description
A comment	A comment for the event is entered in the field. The user must click on `Submit` button to save a comment in the event card
Pass to user	The field displays a drop-down list of operator names to which the event can be passed

Parameter	Description
Hand over	When you press the button, the event is transmitted to another operator

The `Block Processing log` parameters

Parameter	Description
date and time	Date and time of log status change
Status Log (First Name, Last Name)	List of statuses of all logs for a given event indicating operators

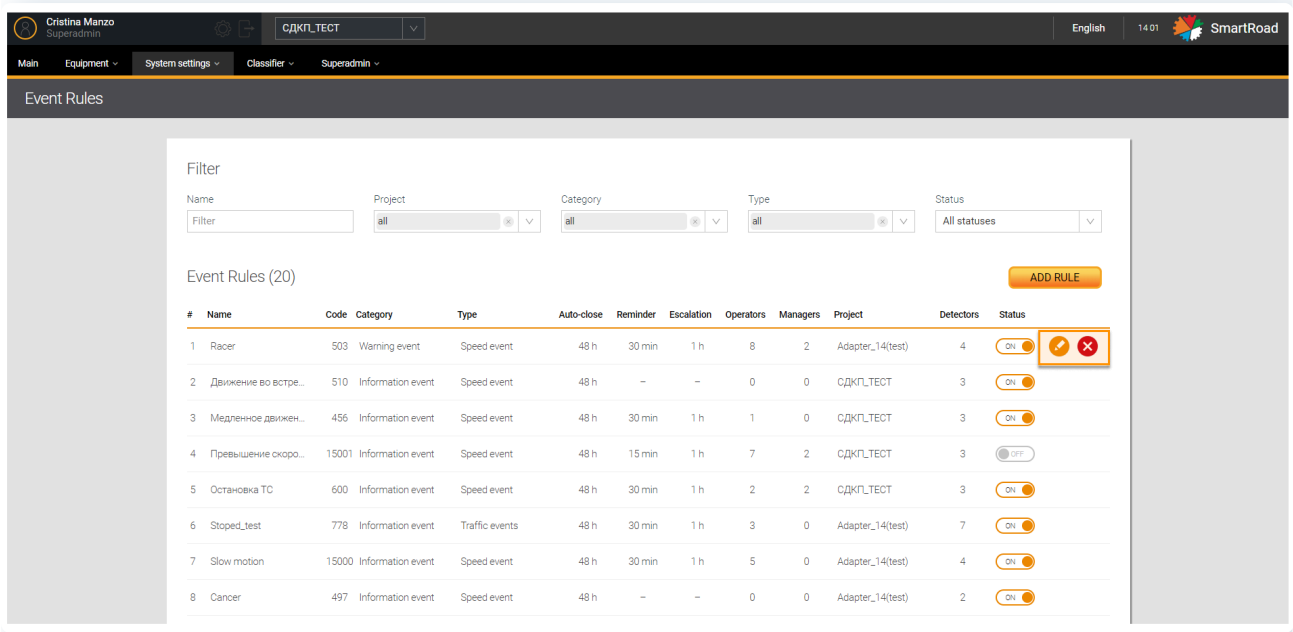
Finally, the Multiplayer to replay the event parameters

Parameter	Description
Playback 0.5x,1x,2x	The field displays to the user the name of the lane type where the event occurred
Play events in the graphical configurator	In multiplayer, the event is played back.
Close card	Clicking the button closes the event card window

Event Rules

Sub-item of the top menu of the `System Settings` section `Event Rules` is intended for setting up rules for registering events in the System. On the page `Event Rules` the user has

access to a filter for searching rules and a list of rules created in the System.



In the table below you can find the Event rule filter parameters

Parameter	Description
Name	The field indicates the name of the event rule specified when registering the rule
Project (multiple choice list)	In the drop-down list the projects registered in the System are displayed to the user. The choice is made by checking the checkbox. By default, all list items are selected.
Category (multiple choice list)	In the drop-down list, a list of event categories registered in the system is shown to the user: - Information - Warning - Critical event

Parameter	Description
Type (multiple choice list)	In the drop-down list, a list of event types registered in the System is shown to the user: - Speed events - Traffic event - Other events The choice is made by checking the checkbox. By default, all list items are selected.
Status	In the drop-down list, a list of event statuses is displayed: - All statuses - Active - Inactive.

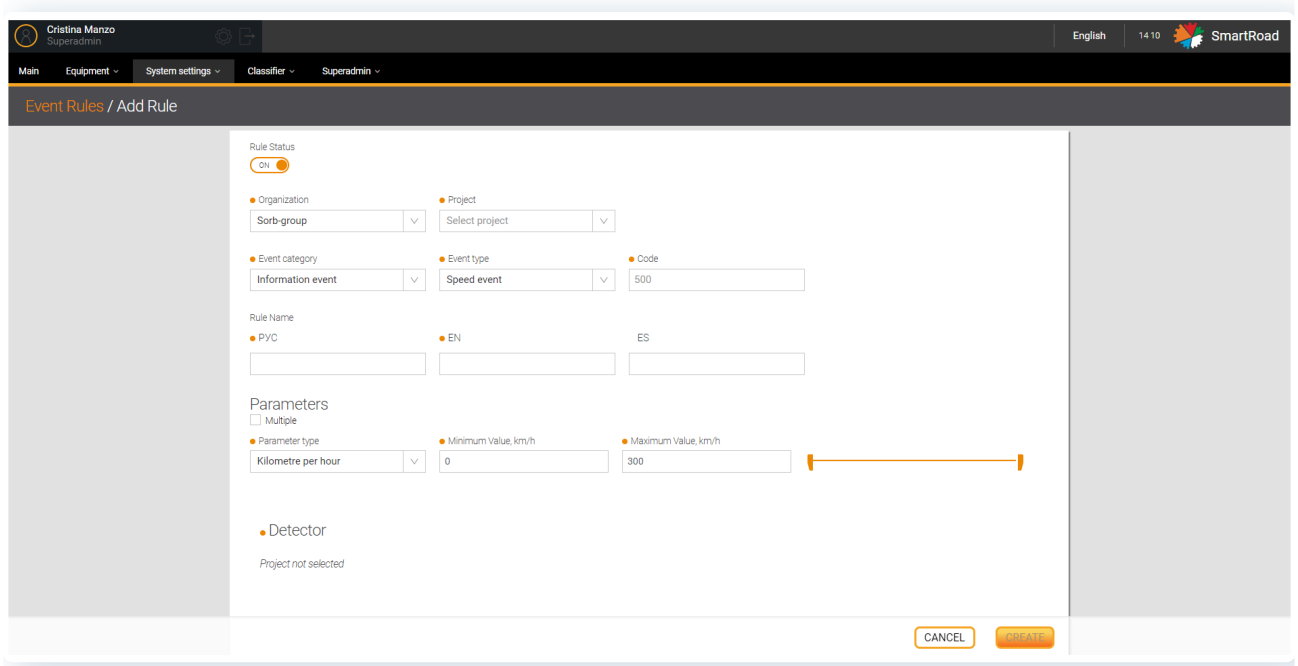
Furthermore, Parameters of the `Event Rules` list

Parameter	Description
#	The serial number of the entry in the list
Name	Event rule name specified when adding the rule
The Code	Unique event rule code specified when registering the rule in the System
Event category	Event category: - Information - Warning - Critical event

Parameter	Description
Event type	Event types: - Speed events - Traffic events - Other events
Auto close	The period of time after which the event will automatically close
Reminder	The period of time after which a notification is sent to the operator reminding about the event.
Escalation	If an event is not completed (unclosed) by the time of execution, an escalation notification is sent to the project manager after a specified period of time.
Operator	A user who has been granted the operator role to work with recorded events
Managers	A user who has been granted the manager role to escalate an issue that was not closed within the specified time frame
Project	Name of the project in which the rule is applied
Detectors	Number of detectors for which it is valid this rule
Status	A list of event statuses is displayed. The status is displayed as a switch. When you click the button, the status of the event rule changes to “inactive”.

Adding an Event Rule

Adding a new rule to the System is done on the page `Events` by clicking the button `Add rule`. This will take you to the page `Add Rule` that enables to create a new rule in the System.



In the next table you can find the Options for adding a rule

Field / button	Description
Rule status	The status is displayed as a button - switch. When you click on the icon, the status of the rule changes to “inactive” and the created rule is not applied in the System
Organization*/**	The drop-down list displays a list of organizations available for selection for which the rule will be created. This field is available only for Superadmin (i.e users with role Superadmin)
Project*	The drop-down list displays a list of projects available for selection within rule will be applied. This field is available only for Superadmin
Event category*	The drop-down list displays a list of selectable event categories for the rule: - Information - Warning - Critical event
Event type	The drop-down list displays the list of types available for selection: - Speed events - Traffic events - Other events
Code*	A unique rule code, which is independently specified by the user when registering the rule. If you try to create a code with an already registered number, a notification message will appear
Name of the rule	The name of the rule in Russian, which will be displayed in the

Field / button	Description
(RUS)*	System
Name of the rule (EN)*	The name of the rule in English, which will be displayed in the System
Rule Name (ES)	Custom rule name in Spanish language that will be displayed in the System

Furthermore, you will have the following Options

Item type	Description
Checkbox `Multiple`	A checked checkbox indicates that several parameters have been selected for the rule. You can add a maximum of 5 types of parameters.
Parameter type	In the drop-down list, select the type of parameter that will be used to determine which parameter or unit of measure for event registration will be used in the rule: - Object in scope Kilometers per hour - - Meters per second - GAP - Headway - Wrong direction - Vehicle stop - Pedestrian detected - Custom Event

Item type	Description
Minimum value	Minimum unit value (if available). The user can also specify the minimum value using a slider, located to the right of the field.
Maximum value	Maximum unit value (if available). The user can also specify the maximum value using the slider that is located to the right of the field.

Besides, the fields and buttons

Field / button	Description
Slider	It enables to change the minimum and maximum value of a quantity (It is available)
Close	Remove parameter type
Addition	Add an additional parameter type

In case of detectors

Item type	Description
Choose all	By checking the checkbox, you can select all detectors in the project to which the rule will be applied.
Checkboxes with detector names	The selection of detectors is carried out by installing or removing checkboxes. The checked checkbox is a sign of application of the rule for the detector

Finally, the Classes for each band

Item type	Description
Stripes	Select a band or all bands using the `All` button
Classes	According to the classes registered in this project, by default: - Undefined (undefined) – 0-2 m - Passenger cars (passenger cars) – 2-6 m - Truck short (short trucks) – 6-9 m - Truck (trucks) – 9-13 m - Truck long (long trucks) – 13-22m - Transporter (transport road trains) – 22-30 m
Save	A button that, when pressed, the system saves entered parameters and and creates a new rule
Cancel	A button that, when clicked, resets all entered parameters and cancels the creation of a new rule

PLEASE NOTE

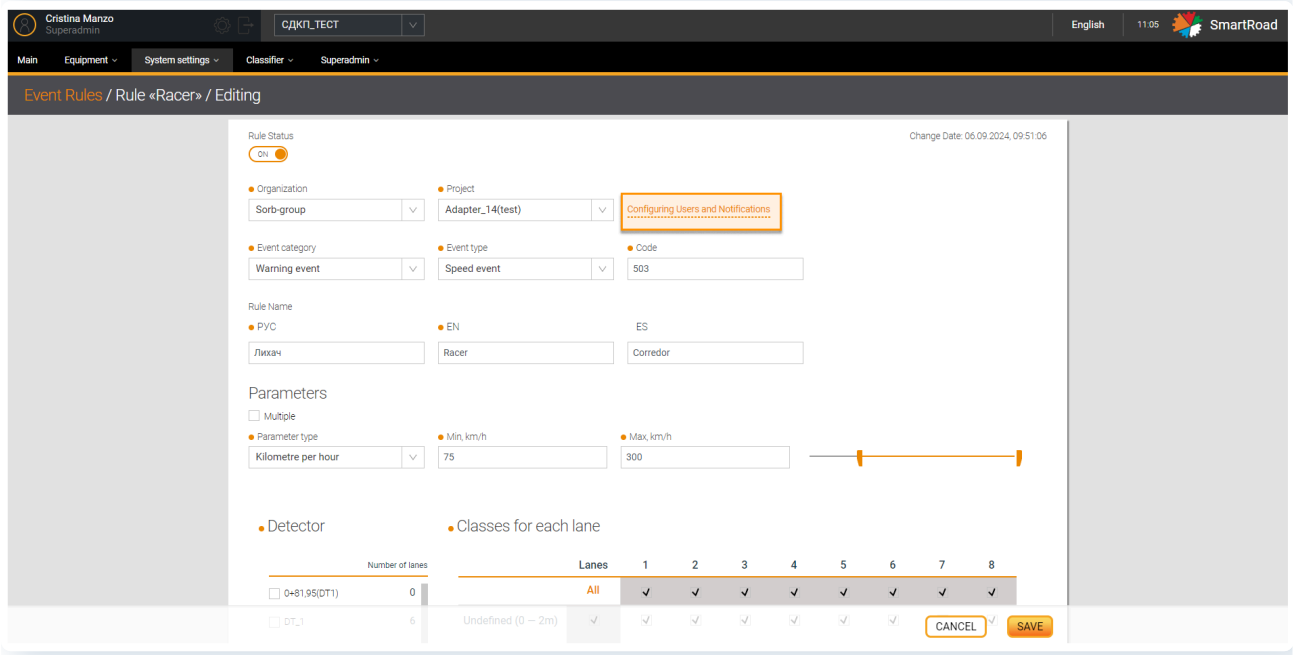
(*) - It is a mandatory field

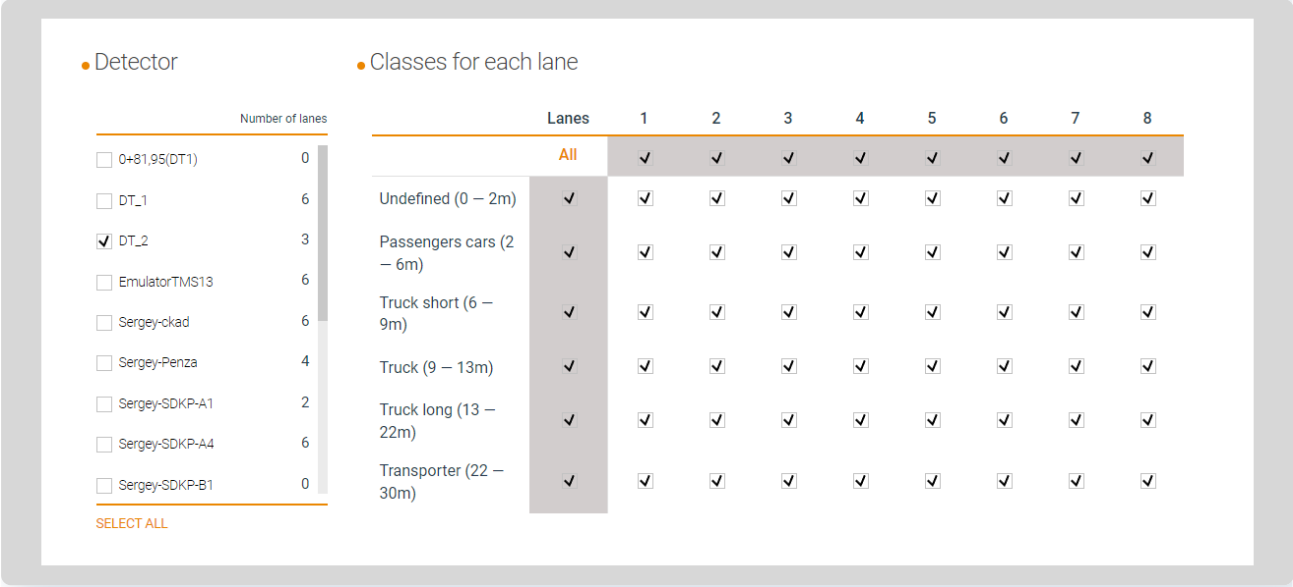
(**) - It is available only for users with the `Superadmin` role

Fields whose values are entered incorrectly will be highlighted in red. The values in them need to be changed.

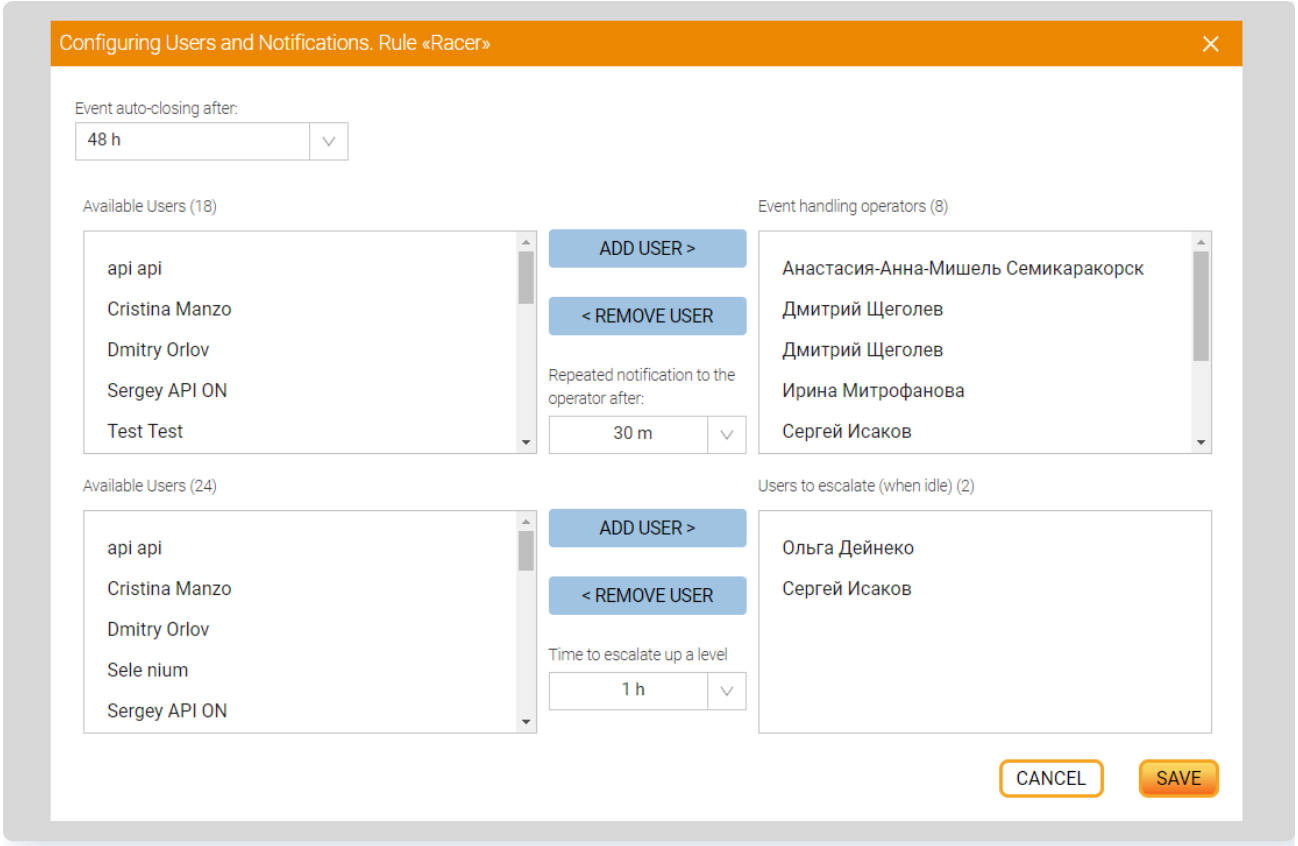
Setting up roles in the decision module

You should click on `Add new rule` and then in the list of rules press the edit button to configure or change roles in the event module.





In the Rules editing window that opens, click on the button `Setting up users and notifications`. Afterward a pop-up window will appear with additional rule settings.



In the table below the options for Configuring users and Notifications are described.

Field / button	Description
Auto-close via event	In the drop-down list, you can configure the time period for notifying about the closure of an event.
Available users	A field for selecting users already registered in the System by the `superadmin` to add them to the project for further work with it. Adding users to the project can be done by selecting the required user and clicking the button `Add`
Event Operators/Supervisors	The field displays the users (operators/managers) added to the rule

Field / button	Description
Add	Add an operator or manager to a rule
Put away	Removing users from a rule is done by selecting `Event Processing Operators/Managers` in the window and clicking the `Remove` button
Repeated notification (through operator)	In the drop-down list you can configure the period for re-notifying the operator
Notifying (through manager)	In the drop-down list you can configure the manager's notification period
Cancel	Cancel changes made
Save	Save changes

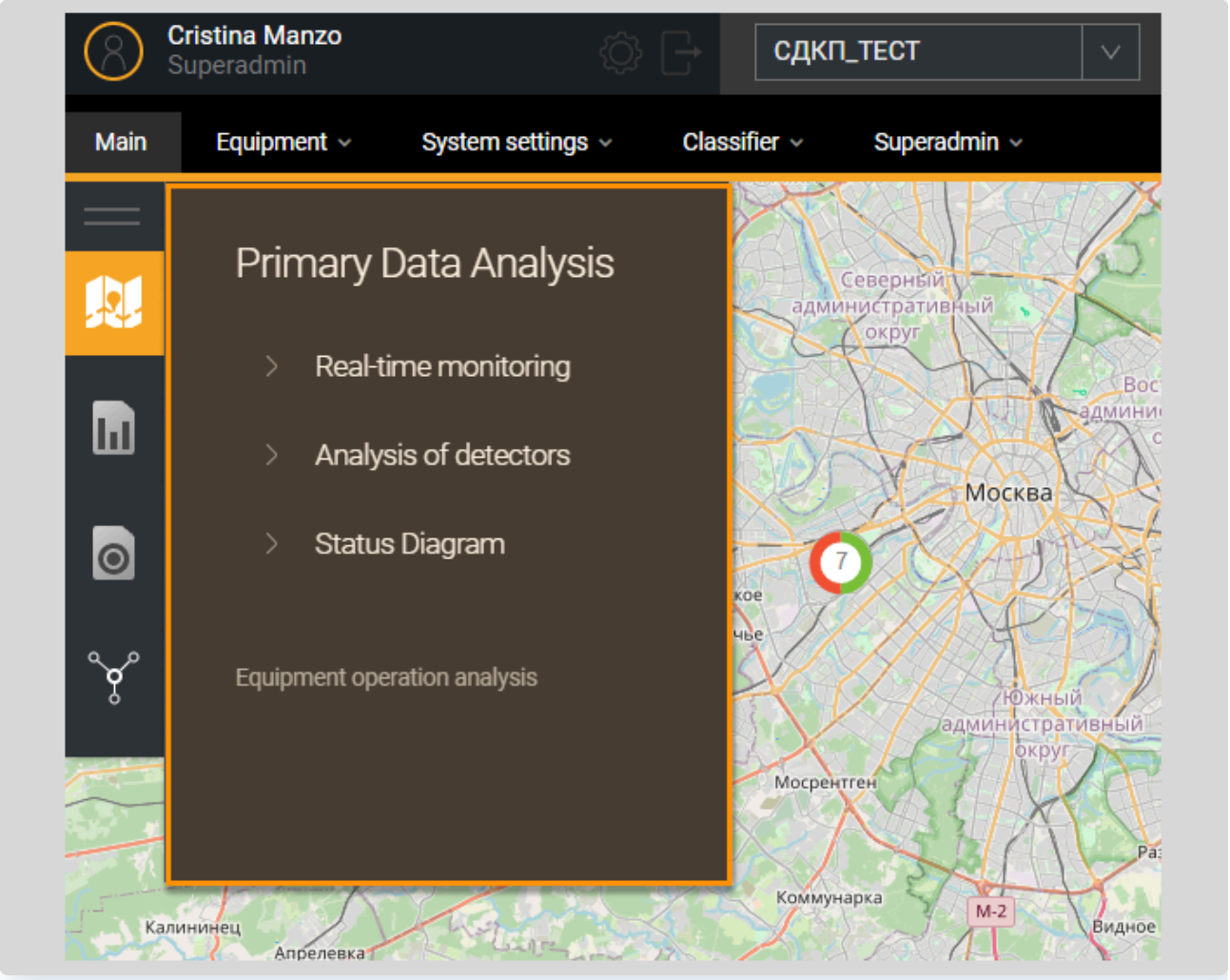
Delete and edit an event rule

You should hover the mouse cursor over the entry in the list and click on the edit button to change the rule parameters. When you click the button, the event rule editing page will open (similar to the rule adding window) with the previously specified parameters.

In case of removing a rule from the system, you must click on the delete button. When you click on this button, you must confirm the deletion in a pop-up window by clicking `Delete` or cancel deletion by pressing the button `Cancel`.

SmartRoad Modules / Data analysis module

The `Primary data analysis Module` is designed to monitor the operating status of installed equipment, identify errors and failures in its operation, and monitor the status of equipment in near real time. The module includes a side menu section `Primary data analysis` and subsections `Real Time Monitoring`, `Detector Analysis` and `Status Diagram`.



Real-time monitoring

Side menu subsection `Real Time Monitoring` is designed to monitor the status of detectors in real time. The tab is accessed from the side navigation menu by selecting a subsection of the side menu `Real Time Monitoring` in section `Primary data analysis`.

On the right in the drop-down list `Detectors`, you can select the required detectors to sort the list. By default, all detectors in the project are selected.

At the top of the `Real Time Monitoring` page there is: information field `Last update time` (left) and field `Update Interval` (on right). When you select an update interval, a time counter from the last update appears in the last update field.

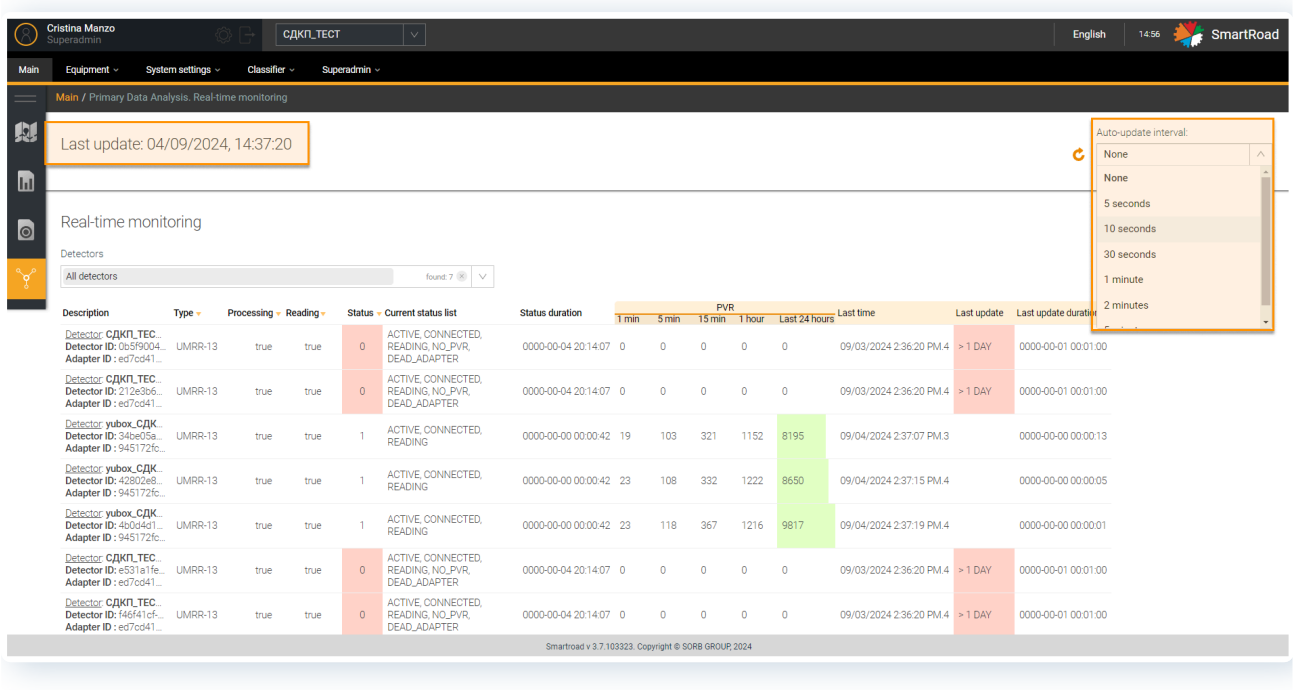
Drop-down list `Update Interval` to select the period for automatically updating the detector operating status data, it is a standard field with a drop-down list. When you select a value from the drop-down list, the real-time monitoring information will be automatically updated once during the selected period.

The field is set to `No` by default, i.e. automatic updating is not performed. The following periods are available for selection in the list:

- No
- 5 second
- 10 Seconds
- 30 seconds
- 1 minute
- 2 minutes
- 5 minutes

There is a page refresh button near the field `Update Interval`.

In the center of the page there is a list of detectors (all detectors included in the selected project in the System are displayed).



You can find the Description of real-time monitoring list fields in the table

Parameter	Description
Description	The field displays: - detector name - Detector ID - Adapter ID
Type	Detector type
Processing	Status of data processing from the detector adapter. Possible status: - true – data from DT is being processed - false – data from DT is not processed

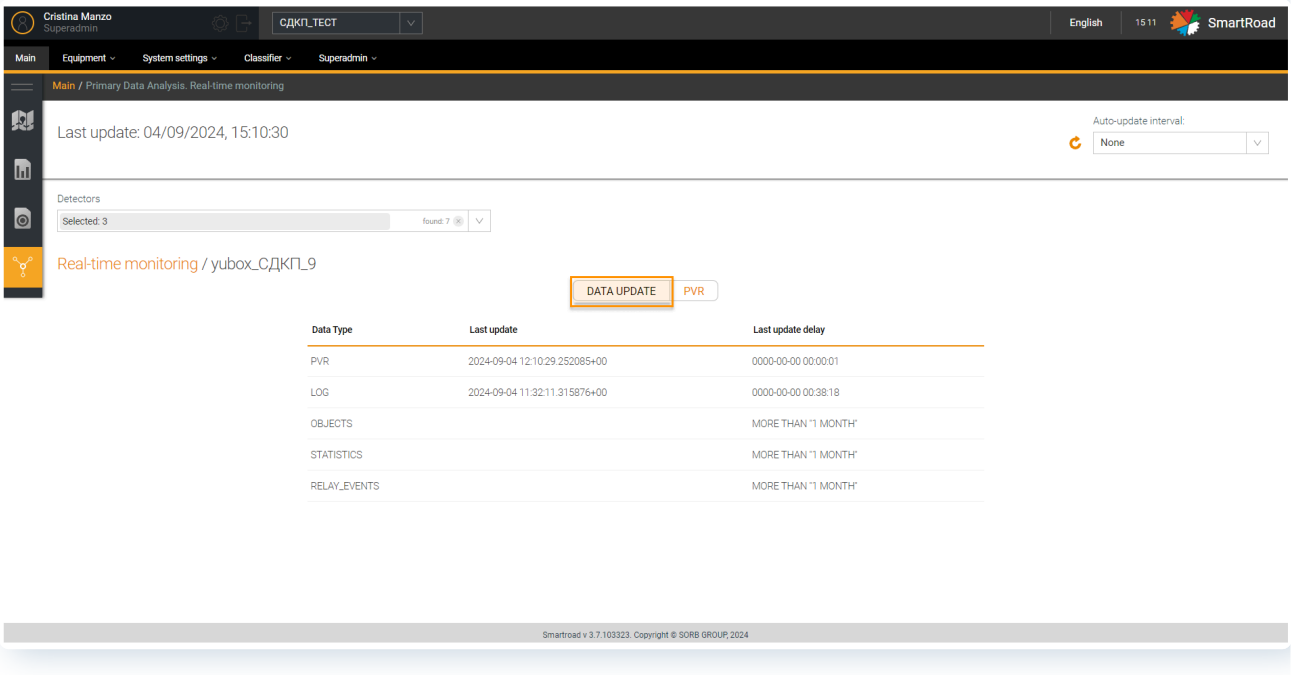
Parameter	Description
Reading	Status of reading data from the detector by the adapter. Possible values: - true – data from DT is read - false – data from DT is not read
Status	Description of DT statuses and conditions for their determination in the System. These detector status can be: 0 – red 1 – green 2 – yellow 3 - gray (not displayed in this module) 4- blue
Current status list	The list of detector statuses at the time of updating the information on the page corresponds to the status of detectors on the interactive map.
Duration of status	Time since the last change in the detector status
PVR	Section where PVR data is displayed
1 min	Number of PVRs in the last minute since the information on the page was updated
5 min	Number of PVRs in the last 5 minutes since the information on the page was updated
15 min	Number of PVRs for the last 15 minutes since the information on

Parameter	Description
	the page was updated
1 time	Number of PVRs in the last hour since the information on the page was updated
Last 24 hours	Number of PVRs in the last 24 hours since the information on the page was updated
Last time	Time of last data received from the detector (maximum displayed time - Last time)
Updated	The period from the last time data was received from the detector
Duration of last update	Time since last PVR received

The user can view additional information for each detector by clicking on the detector line.

The additional information page on DT includes two sections:

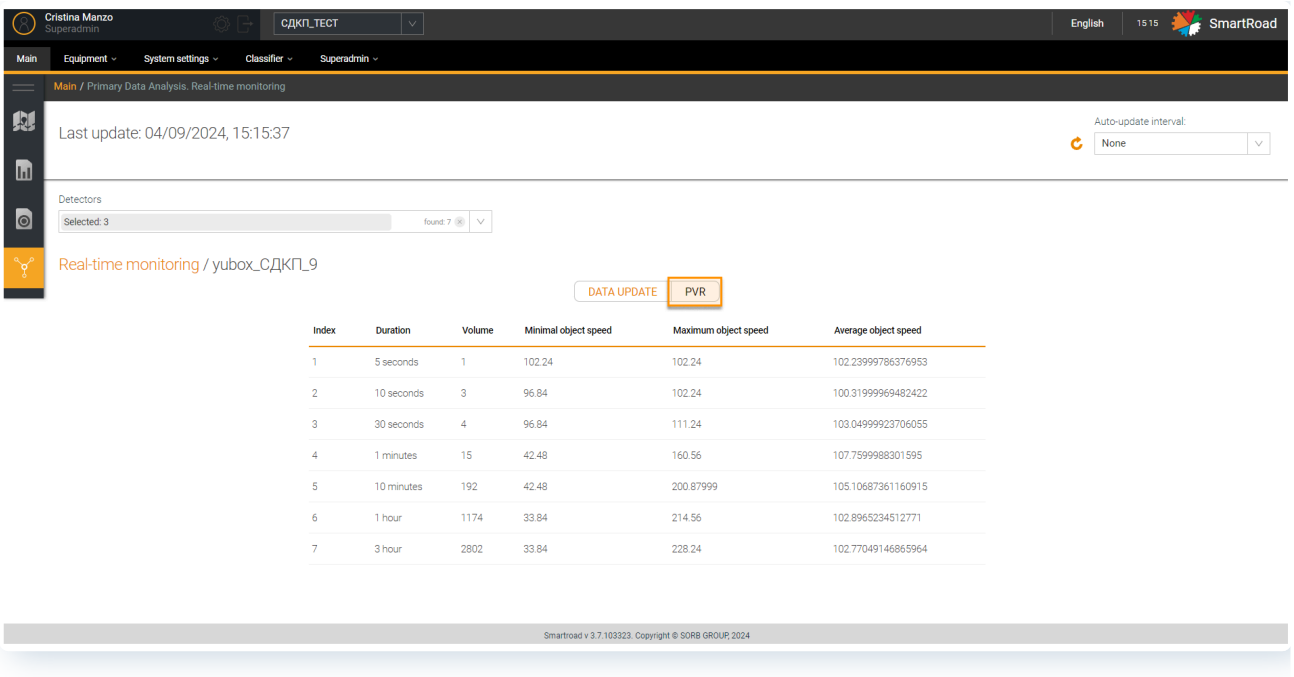
- Data update – the section displays information about the latest receipt of data from DT.
- PVR – this section displays information about the latest PVR received from the DT.



Next table includes the Description of the `Data Update` section.

Parameter	Description
Data type	Type of data received from DT: - OBJECTS (objects) - PVR (vehicle recording) - LOG - STATISTIC (statistics) - RELAY_EVENTS (triggers)
Updated	Time of last receipt of data from DT
Latest update delay	Time period since the last receipt of data from the DT

In the figure below the `PVR` section in `Real-time monitoring` page



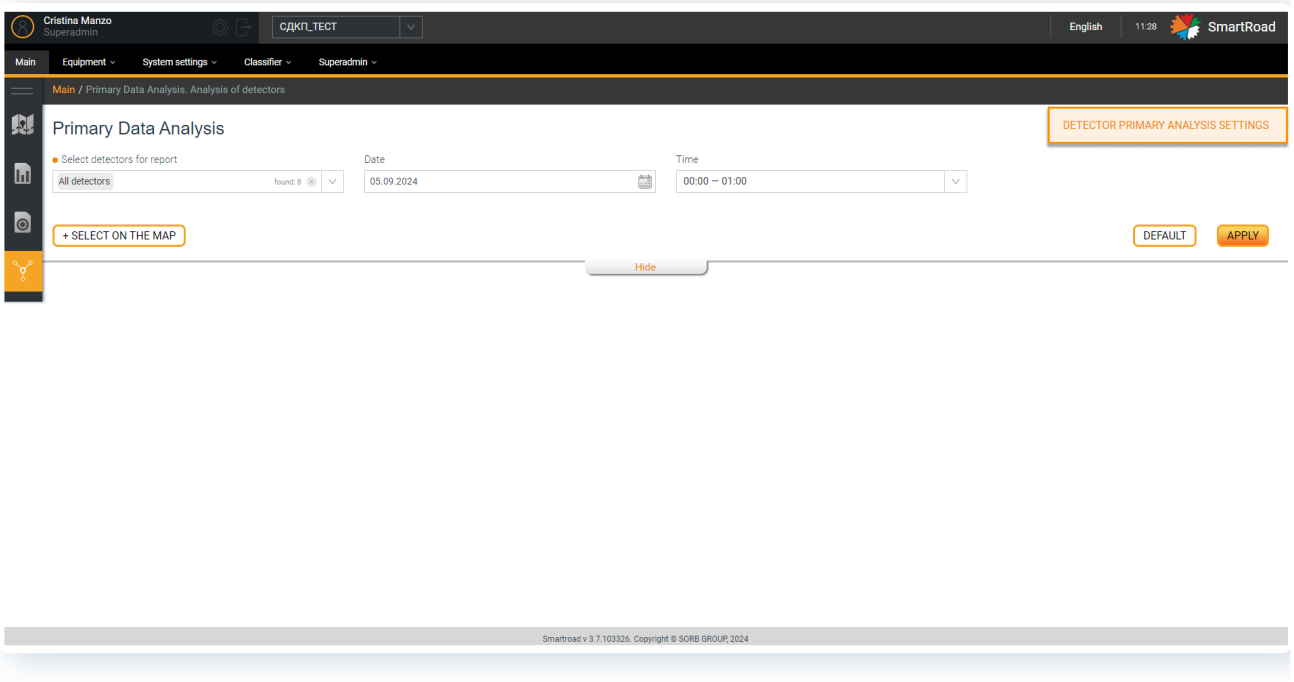
Besides the parameters Description in `PVR` section

Parameter	Description
Index	PVR serial number
Duration	Time period for which the data was obtained
Quantity	Number of PVRs received during the time period
Minimum object speed	Minimum object speed
Maximum object speed	Maximum object speed
Average object speed	Average object speed

Detector analysis

The side menu subsection `Detector Analysis` is designed to generate reports on equipment operation for further analysis. The tab is accessed from this menu by selecting a subsection `Detector Analysis` in section `Primary data analysis`.

At the top of the page there is a data selection filter in which parameters for generating a report are entered into the appropriate fields.



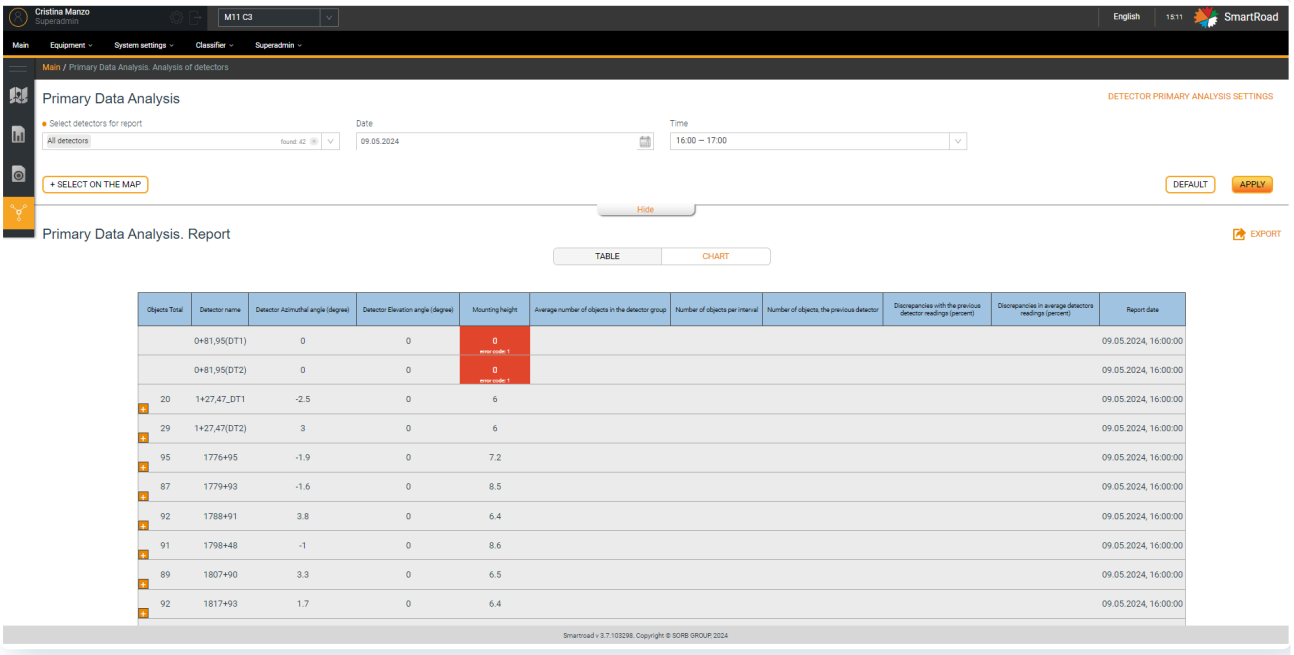
The following Report filter options are available

Parameter	Description
Selecting detectors for report	In the drop-down list, detectors are selected, based on the data from which the report will be generated. The field is a drop-down list with the ability to select several detectors. The selection of detectors is carried out by checking the checkbox in the list. By default, all detectors are selected.
Date	In the calendar, select the date for generating the report in the

Parameter	Description
	format “DD.MM.YYYY”.
Time	In the drop-down list, select the hourly interval for generating the report in the `from` - `to` format.
Select on map	Button for selecting detectors on the map. By clicking on the button, the user is shown a pop-up window with an interactive map for selecting detectors. The selection is made in the same way as selecting detectors on the main map
Apply	Button for applying report generation parameters. By clicking on this button, the system generates a report and displays it to the user
Reset	Filter parameters reset button. When user clicks on it, all filter entered parameters are set to default values
Hide/Show	The button allows you to collapse and expand the filter section
Setting up primary data	Link to go to the `Setting up primary data analysis` tab. A description of the tab is presented in the next section `Setting up primary analysis`.

Once completing the report generation, the System displays to the user the report in two ways (the corresponding tabs are located below the filter):

- As a Table;
- Diagram

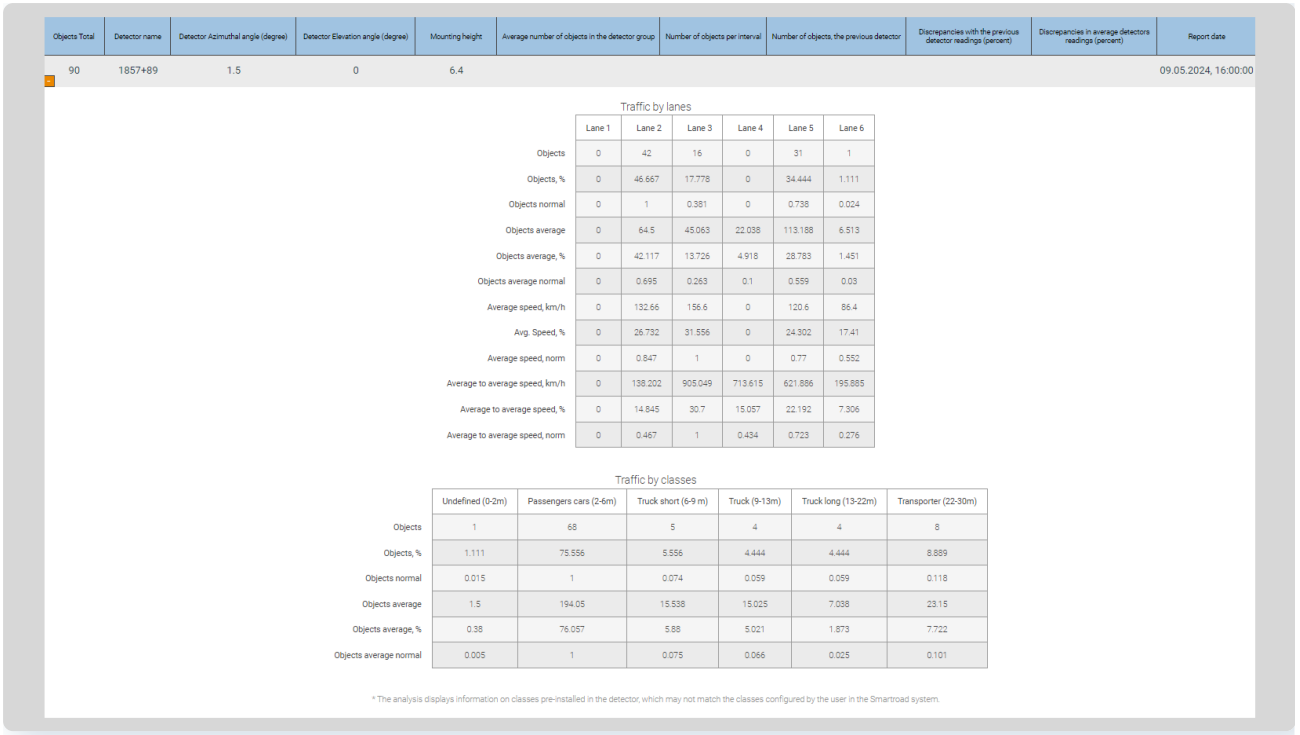


Below you can find the Parameters Description of the table in the `Primary data analysis` report

Parameter	Description
Total objects	Number of objects registered for the selected period
Detector name	The detector name
Detector rotation angle (degrees)	Detector rotation angle set during installation
Detector tilt angle (degrees)	Detector tilt angle set during installation
Installation height (m)	Detector mounting height
Average number of objects in a group of detectors	Average number of objects in a detector group (the detector is included in the DT group)

Parameter	Description
Number of objects per interval	Number of objects per time interval
Number of objects previous detector	Number of objects registered by the previous detector in the group (the detector is included in the DT group)
Differences with the readings of the previous detector (%)	Percentage of discrepancies between the readings of one detector and the readings of the previous detector for the selected period
Differences in average detector readings (%)	Percentage of discrepancies between detector readings for the selected period and average DT readings
Report date	Report generation date

Regarding the Tabular part of the report, on each line there is a button for detailed information (in the form of a plus sign). When you press the button, detailed information on the selected detector is opened.



Objects Total	Detector name	Detector Azimuthal angle (degree)	Detector Elevation angle (degree)	Mounting height	Average number of objects in the detector group	Number of objects per interval	Number of objects, the previous detector	Discrepancies with the previous detector readings (percent)	Discrepancies in average detectors readings (percent)	Report date
90	1857+89	1.5	0	6.4						09.05.2024, 16:00:00

Traffic by lanes

	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
Objects	0	42	16	0	31	1
Objects, %	0	46.667	17.778	0	34.444	1.111
Objects normal	0	1	0.381	0	0.738	0.024
Objects average	0	64.5	45.063	22.038	113.188	6.513
Objects average, %	0	42.117	13.726	4.918	28.783	1.451
Objects average normal	0	0.695	0.263	0.1	0.559	0.03
Average speed, km/h	0	132.66	156.6	0	120.6	86.4
Avg. Speed, %	0	26.732	31.556	0	24.302	17.41
Average speed, norm	0	0.847	1	0	0.77	0.552
Average to average speed, km/h	0	138.202	905.049	713.615	621.886	195.885
Average to average speed, %	0	14.845	30.7	15.057	22.192	7.306
Average to average speed, norm	0	0.467	1	0.434	0.723	0.276

Traffic by classes

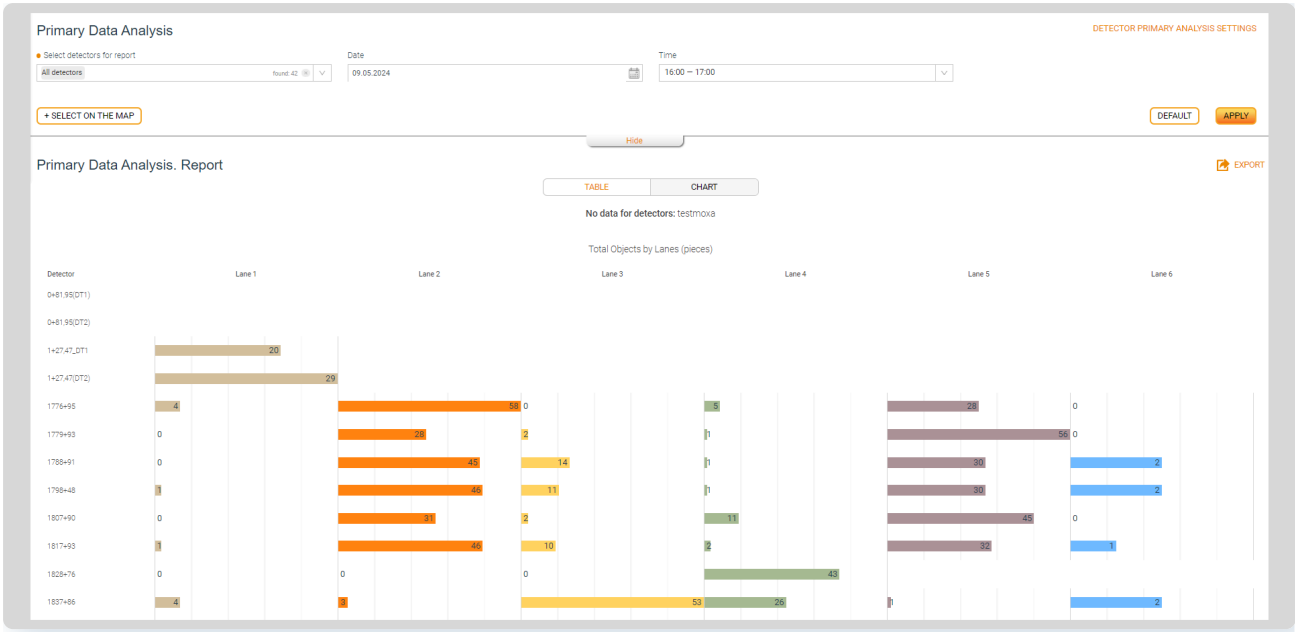
	Undefined (0-2m)	Passengers cars (2-6m)	Truck short (6-9 m)	Truck (9-13m)	Truck long (13-22m)	Transporter (22-30m)
Objects	1	68	5	4	4	8
Objects, %	1.111	75.556	5.556	4.444	4.444	8.889
Objects normal	0.015	1	0.074	0.059	0.059	0.118
Objects average	1.5	194.05	15.538	15.025	7.038	23.15
Objects average, %	0.38	76.057	5.88	5.021	1.873	7.722
Objects average normal	0.005	1	0.075	0.066	0.025	0.101

* The analysis displays information on classes pre-installed in the detector, which may not match the classes configured by the user in the Smartroad system.

In addition, you will have the `Equipment operation report` diagram

The diagram of the equipment operation report shows in graphical form:

- Number of objects by lane;



- Average speed by lane;

- Number of objects by classes;

- Identified anomalies in the operation of the detector.

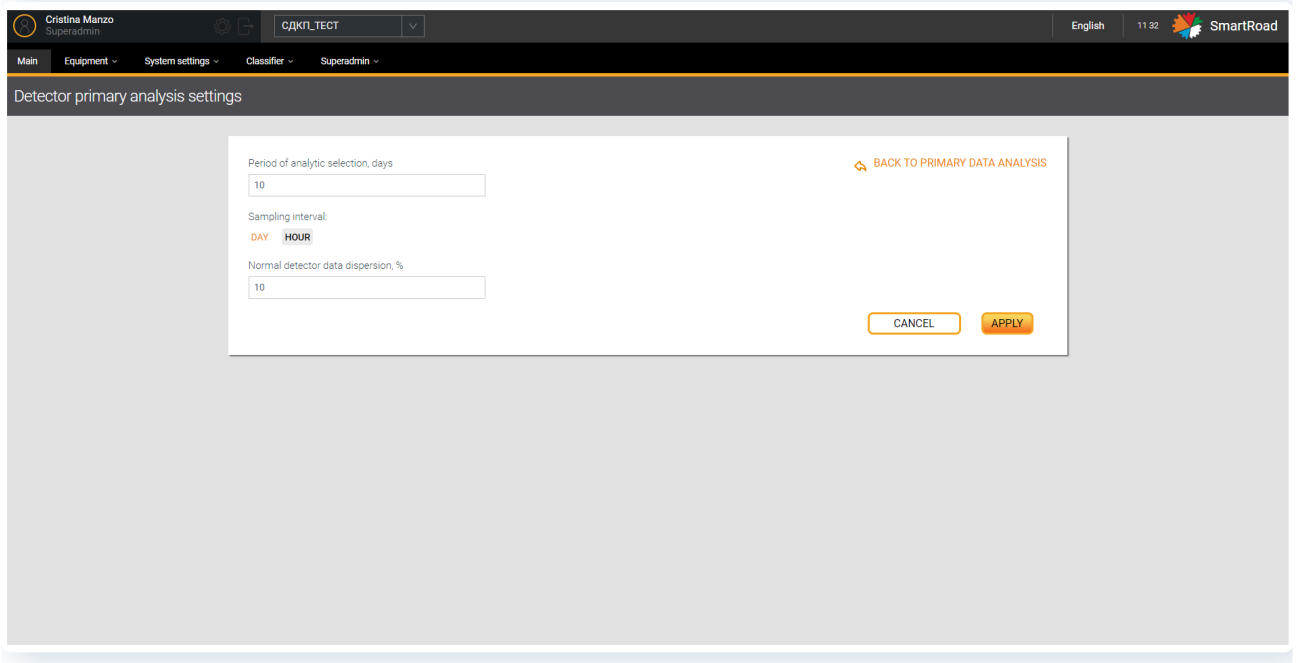
Each generated report with detailed information can be exported to an external file in Excel format. You can click on the button `Export` that is located at the top right of the table to export the report.

Setting up primary data analysis

This Tab is designed to set analytical parameters for generating reports on equipment operation. Go to the tab by clicking on the button `Setting up primary data analysis`, it is located in the upper right part of the primary data analysis page.

The following parameters are set on this section:

- Analytical sampling period – period for analyzing detector operating data;
- Analytical sampling interval – time interval of data breakdown for analyzing detector operating data (day, hour);
- Norm of discrepancies in detector readings – percentage threshold of discrepancies in detector readings, values above which the System recognizes as unacceptable.

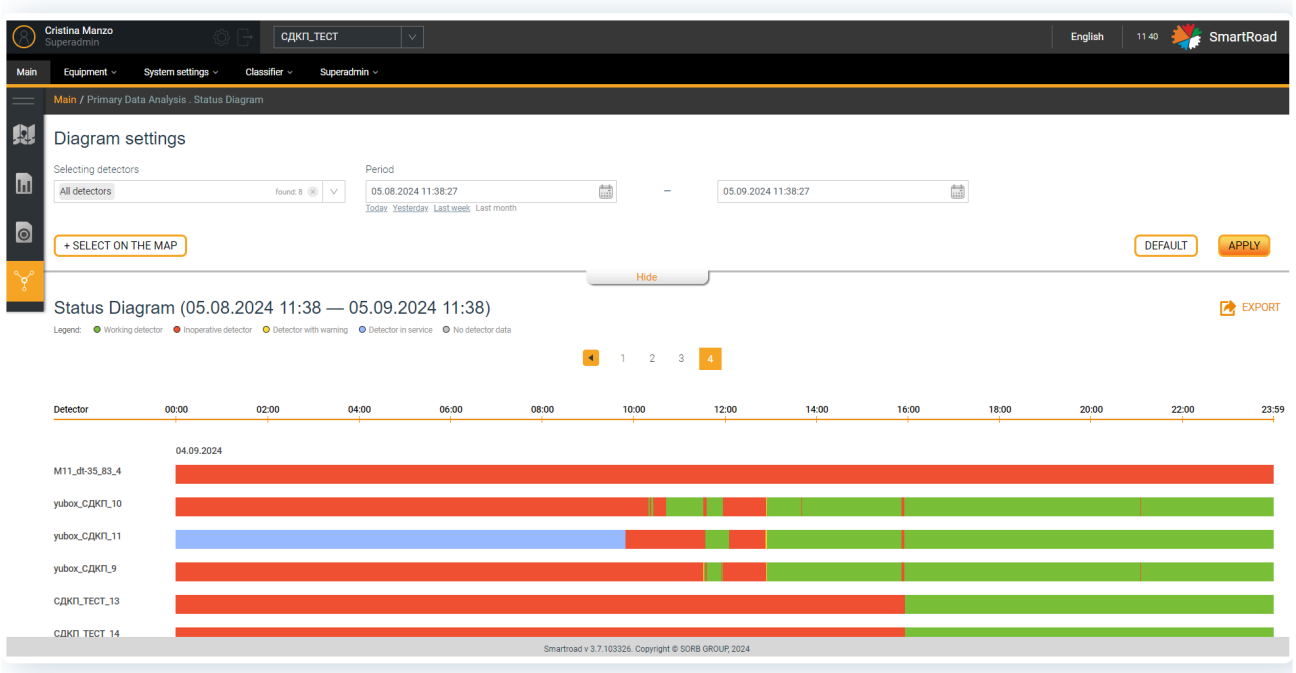


Click on the `Back to primary data analysis` button to exit the `Primary data analysis settings` subsection.

Status diagram

The tab is accessed from the side navigation menu when selecting a subsection `Status Chart` in section `Primary data analysis`. Besides, the Subsection `Status Chart` is designed to monitor equipment operating time.

At the top of the page there is a data selection filter in which parameters for generating a chart are entered into the appropriate fields.



In the next table the parameters Description of the `Status chart settings` filter are indicated

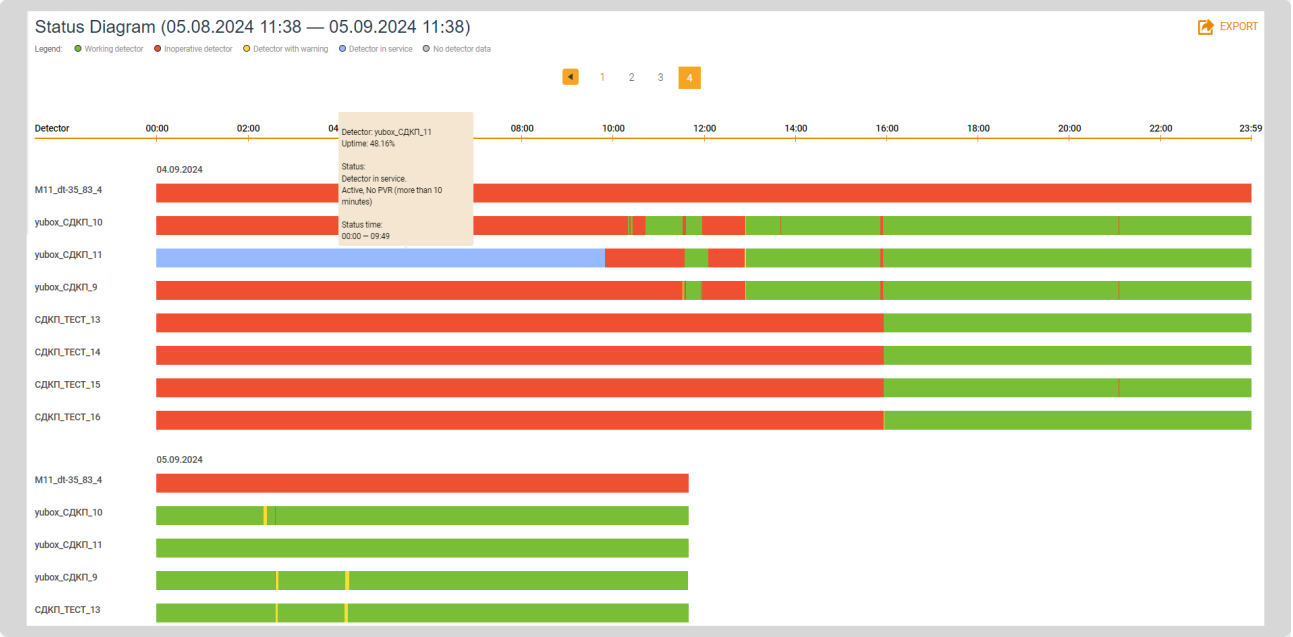
Parameter	Description
Selection of detectors	In the drop-down list, detectors are selected, based on the data from which a report will be generated. The field is a drop-down list with the ability to select several DTs. The choice of DT is carried out by checking the checkbox in the list. By default, all DTs are selected.

Parameter	Description
Period	The calendar indicates the date and time in the format from "HH.MM.YYYY HH: MM: SS" to "HH.MM.YYYY HH: MM: SS". Below the period entry field there are buttons for quickly selecting a period: `Today`, `Yesterday`, `The last week` and `Last month`. When you click on the quick period selection buttons, the System will automatically insert the selected period into the fields.
Select on map	Button for selecting detectors on the map. When the button is clicked, a pop-up window is shown with an interactive map for selecting detectors in the project. The selection is made in the same way as selecting detectors on the interactive map of the main page
Apply	Button for applying report generation parameters. When clicking on it, the system generates a report and displays it to the user
Reset	Filter parameters reset button. All filter parameters entered by the user are set to default values by clicking this button
Hide/Show	The button allows you to collapse and expand the filter section.

Once completing the report generation, the System displays to the user report in two ways

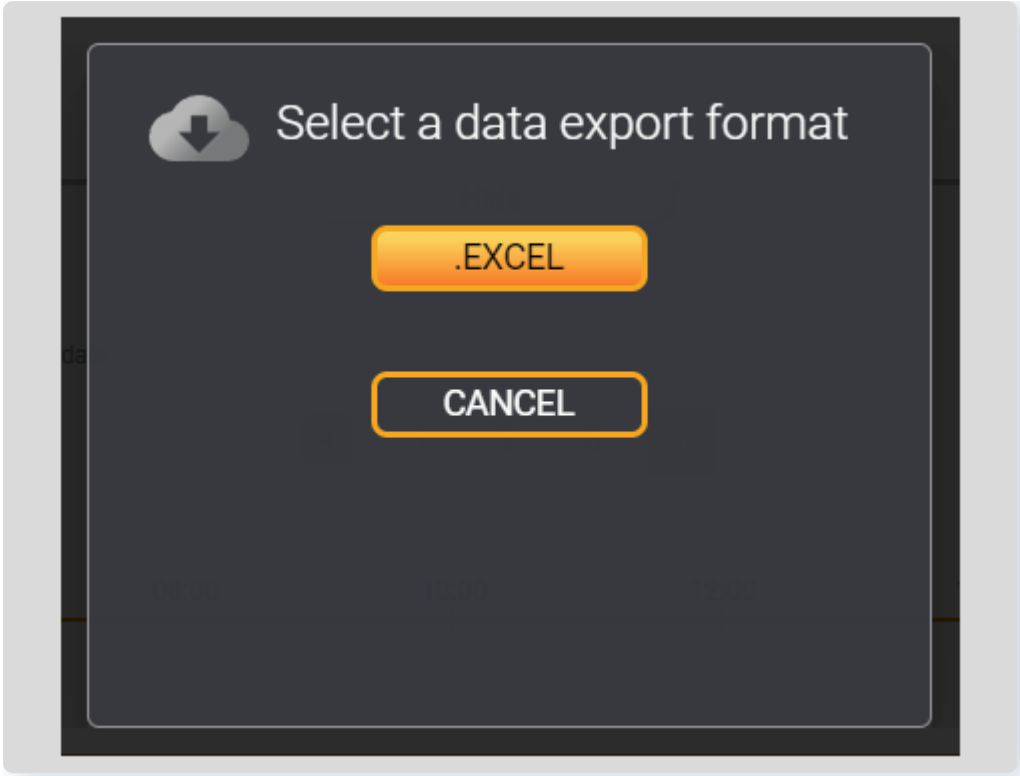
- As a chart (located under the filter);
- And table (downloaded by clicking on the button `Export` in format Excel).

When user hovers the mouse over a line in the diagram, information about the detector pops up (% uptime, detector operating status and status time).



Green color indicates time intervals during which the detector operated without errors, yellow indicates time intervals during which the detector operated with minor errors, red indicates intervals during which the detector did not operate, blue indicates intervals when the detector was in adjustment, and light gray indicates the detector was removed from the project or moved to another project. When hovering over sections of the diagram, the operating statuses of the equipment recorded during operation of the detector are displayed to the user.

A window opens to select the format for exporting the Status chart data by clicking on the button `Export`.


Select a data export format
.EXCEL
CANCEL

SmartRoad Modules / Road management module

This module is designed for setting up and managing roads. It includes a side menu item `Object Tracking` and section `Road Management`.

Object tracking

> **TAKE INTO ACCOUNT**
>
> This functionality is being developed currently

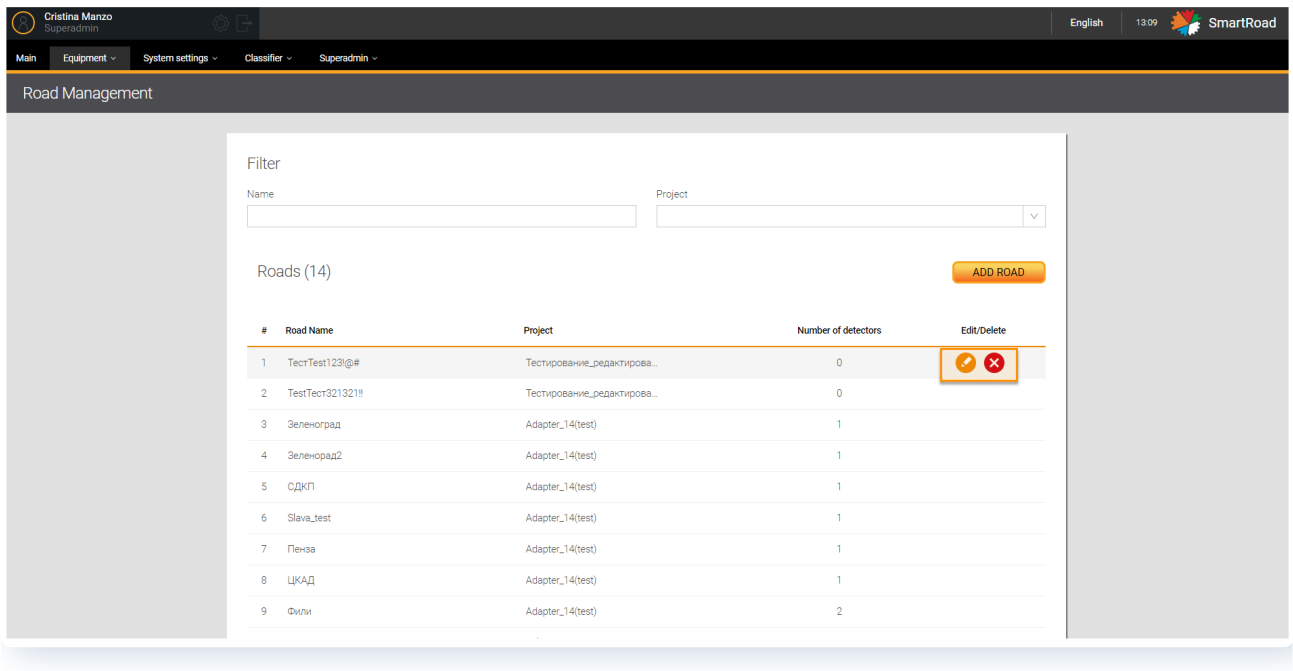
This section of the side menu is designed to select a detector that will track the location of objects and obtain object parameters in a mode close to real time.

Road management section

Section `Road Management` includes additional functionality for setting up the road and equipment, which allows you to configure the parameters of the detector, traffic lanes, detection zones, detector triggers, using a graphical interface. All detector settings can be written to the memory of the selected detector and read from it for reconfiguration.

You should click on the option `Road parameters` in the menu `Equipment` for going to `Road Management` page, and then select the required road.

The `Road Management` page contains a list of roads that have already been configured and includes improved options for configuring roads and equipment.

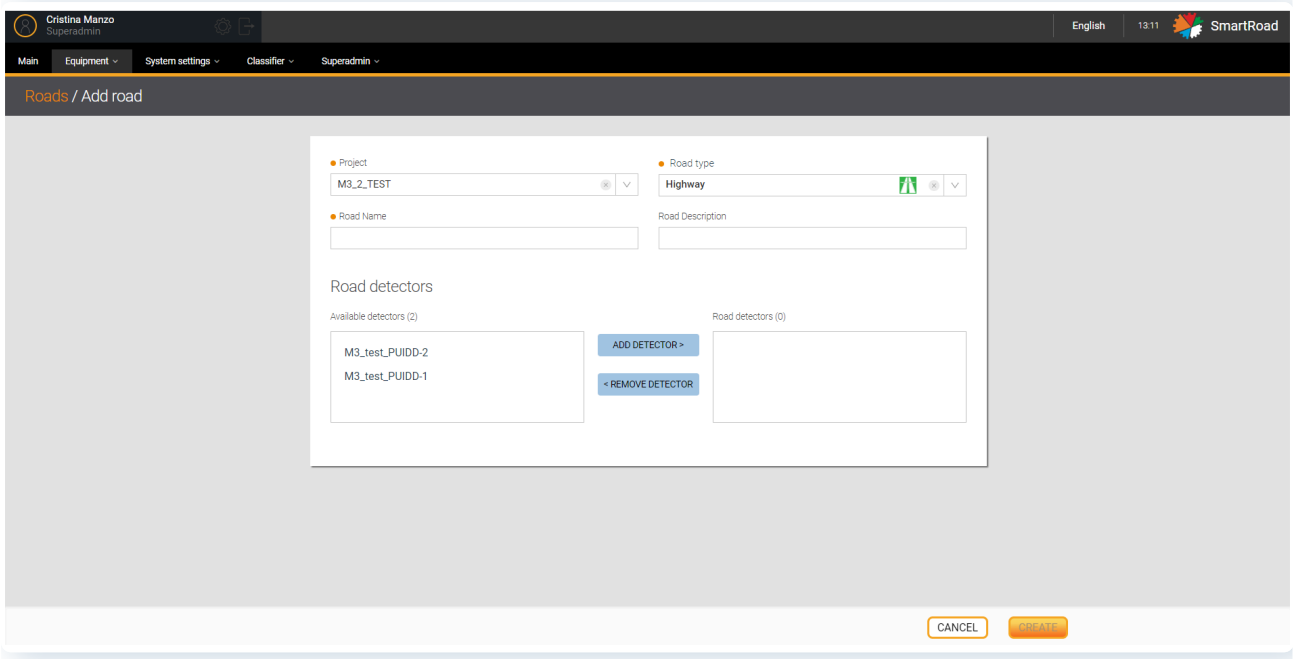


The Description of fields in the `Road Management` submenu in the tables below

Field	Description
Road name filter	Field for entering the name or part of the road name
Project filter	Drop-down list for selecting a project. The choice is made by setting a checkbox.
#	The serial number of the entry in the list
Road name	The name of the road specified when creating/adding the road
Project	The project to which the configured road belongs

Field	Description
Number of detectors	Total number of installed and configured detectors on a
Edit Delete	Icons for deleting an entry in the list and changing road parameters. To edit an existing entry in the list, you need to hover your mouse over the item in the list and click on the edit icon. When you click the button, an editing window will open with the previously specified parameters. To remove a road from the list, click the delete icon and confirm the deletion in the pop-up window.

Setting up the road is done by clicking on the button `Add a road` to the pages `Road Management`. When pressed, a window for entering road parameters is displayed.



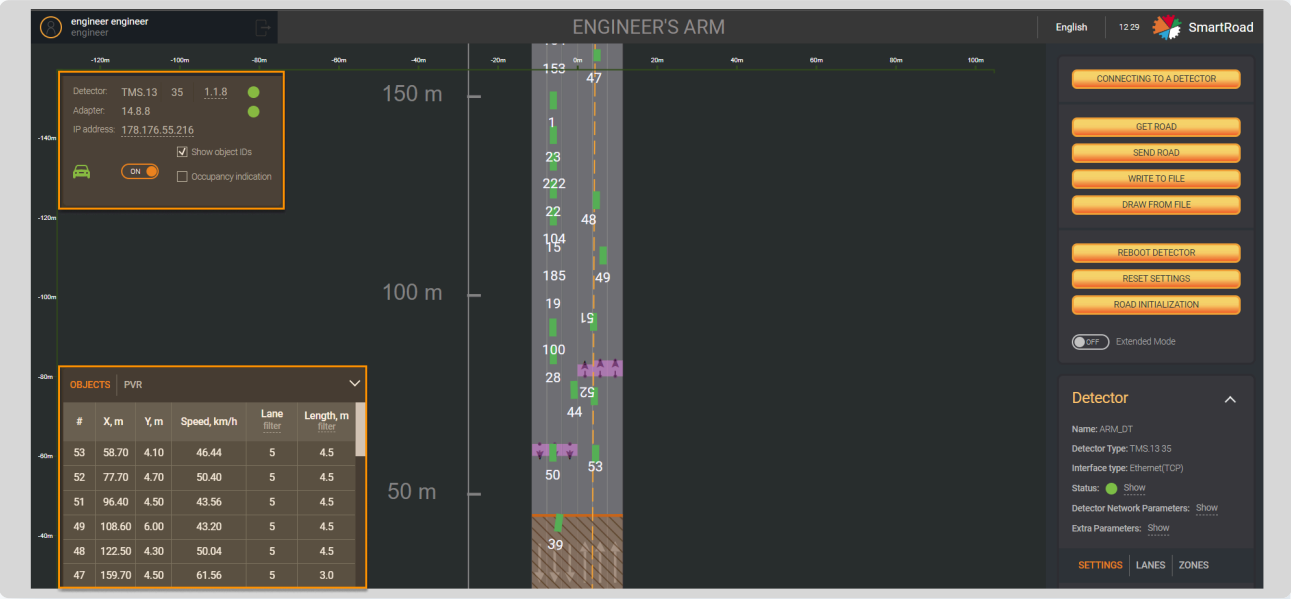
In addition, the parameters Description of the `Add Road` window

Parameter	Description
Project*	Drop-down list for selecting a project in which a new road will be configured in the System. The drop-down list contains all projects for the current organization.
Road type*	Field for selecting the type of road. The drop-down list contains entries from the road type directory.
Road name*	Field for entering the name of the road, which will be displayed in the road list section.
Description of the road	Field for entering a road description or user comment
Road detectors	Section for adding available detectors to the road. All available detectors within the selected project will be displayed in the available Detectors field. To add a detector, you have to select a detector and click on the `Add detector` button. To remove a previously added detector, select an entry in the `Road detector` field and click on the `Remove detector` button .
Create/Save (in edit mode)	Button to create a new road. After clicking on the button, a new road will be created in the System, and the user will go to the road editor window
Cancel	Button to cancel the creation of a new road. The user will be returned to the road list section.

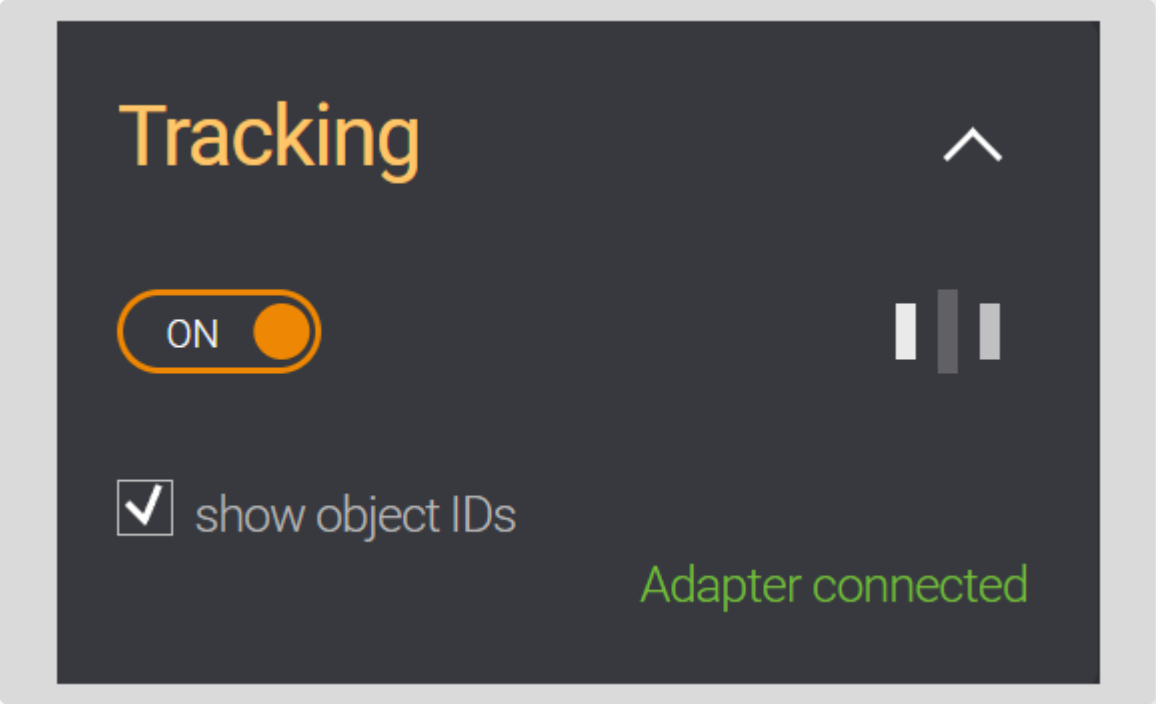
> **REMEMBER**
>
> (*) - It is a required parameter to add a road

Tracking

The Mode `Tracking` enables to display objects registered by the detector in real time in a graphic editor. This mode helps adjust the settings of traffic lanes and detection zones in accordance with the movement of real traffic flow.



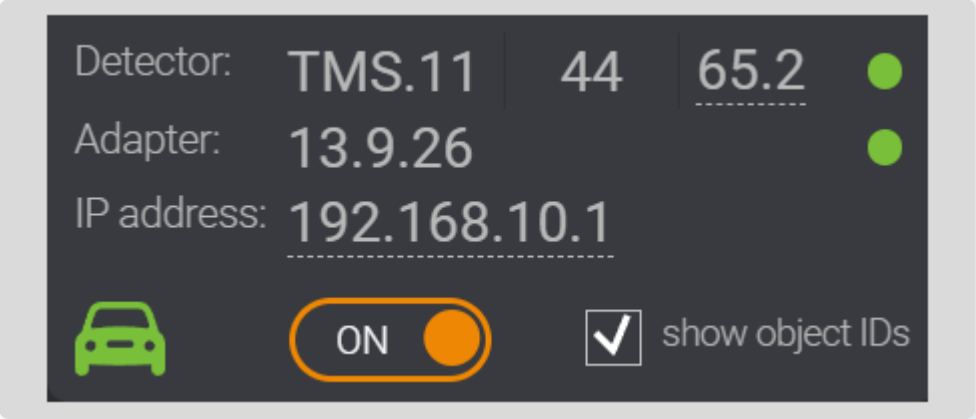
This mode can be enabled in the right panel.



In the table below the Tracking block parameters are described

Parameters	Description
Tracking	Tracking mode switch
Show object IDs	Checkbox that enables to display object ID numbers

In addition, tracking mode can be enabled on the information panel on the left by clicking the mode switch `Tracking`. Green rectangles in movement will appear in the graphic editor, indicating objects in the DT detection zone.

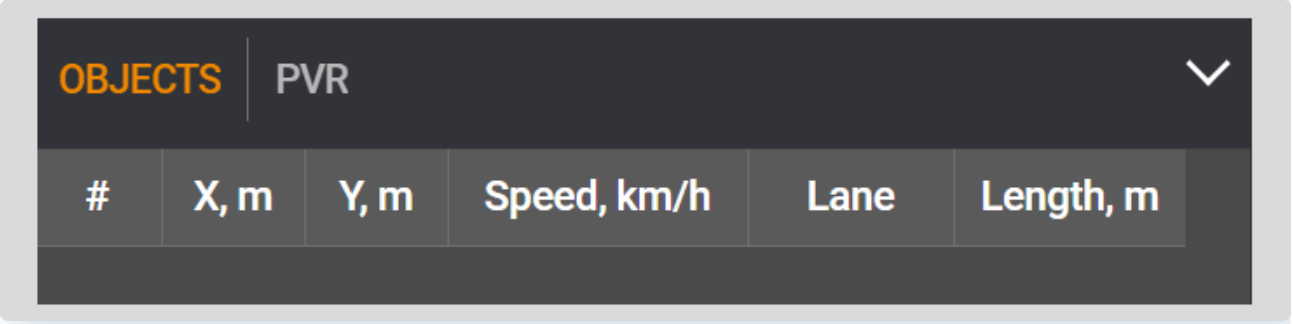


Data monitoring

The data monitoring block is a table that displays real-time data realted to objects registered by the System. This block table will be filled with data when the function `Tracking` is enabled. The block can be expanded or collapsed by clicking on it. Besides, this block has two tabs `Objects` and `PVR`.

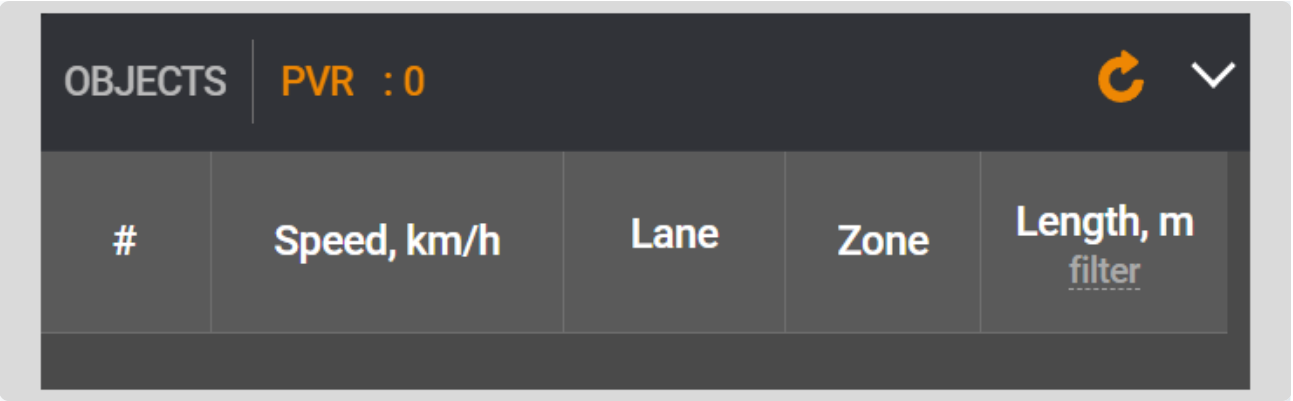
Below you can find the parameters available in the Object tab

Parameters	Description
#	ID number assigned to the object by the System
X, m	Positioning the drawn object on the canvas along the X axis
Y, m	Positioning a drawn object on the canvas along the Y axis
Speed, km/h	Object speed
Lane	The band index in the detector
Length, m	Object length



Besides the parameters in PVR tab

Parameters	Description
PVR	Amount of PVR data collected by the detector
Refresh icon	Button to reset all recorded PVRs
#	ID number assigned to the object by the System
Speed, km/h	Object speed
Lane	Band index in the detector
Filter	Sorting registered objects by the band or bands selected in the filter
Zone	Zone index in the detector
Length, m	Object length recorded by the System
Filter	Sorting objects by length (from and to)



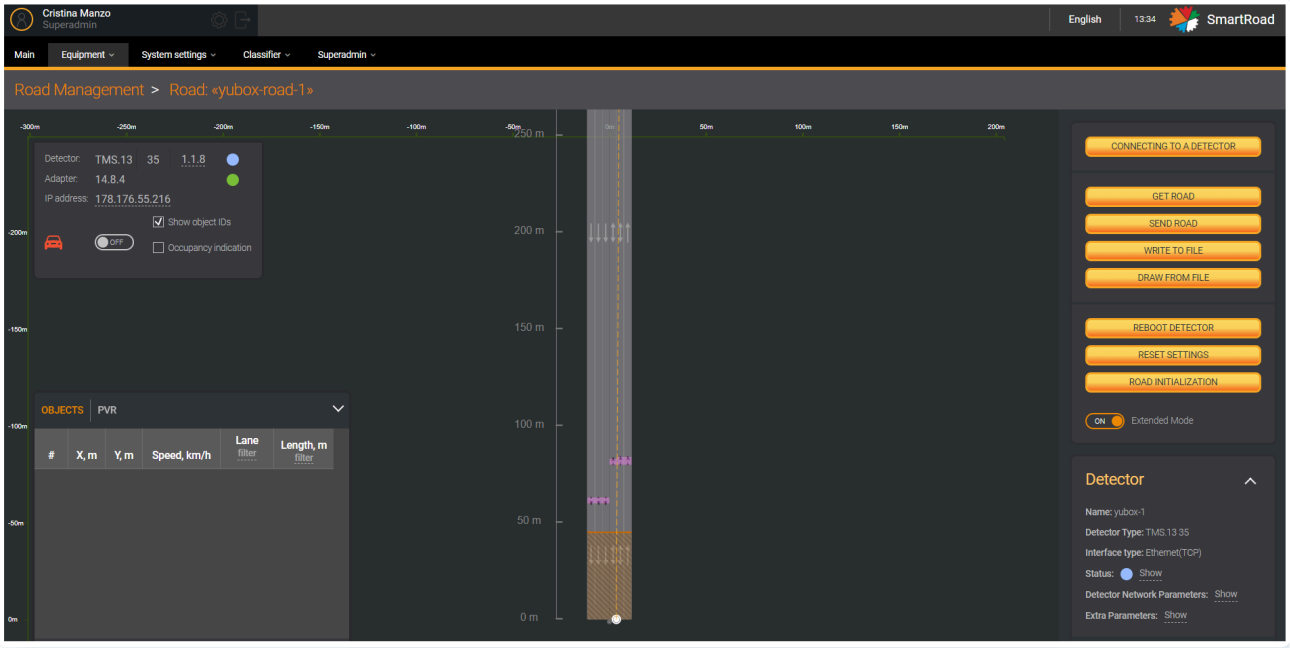
PLEASE NOTE

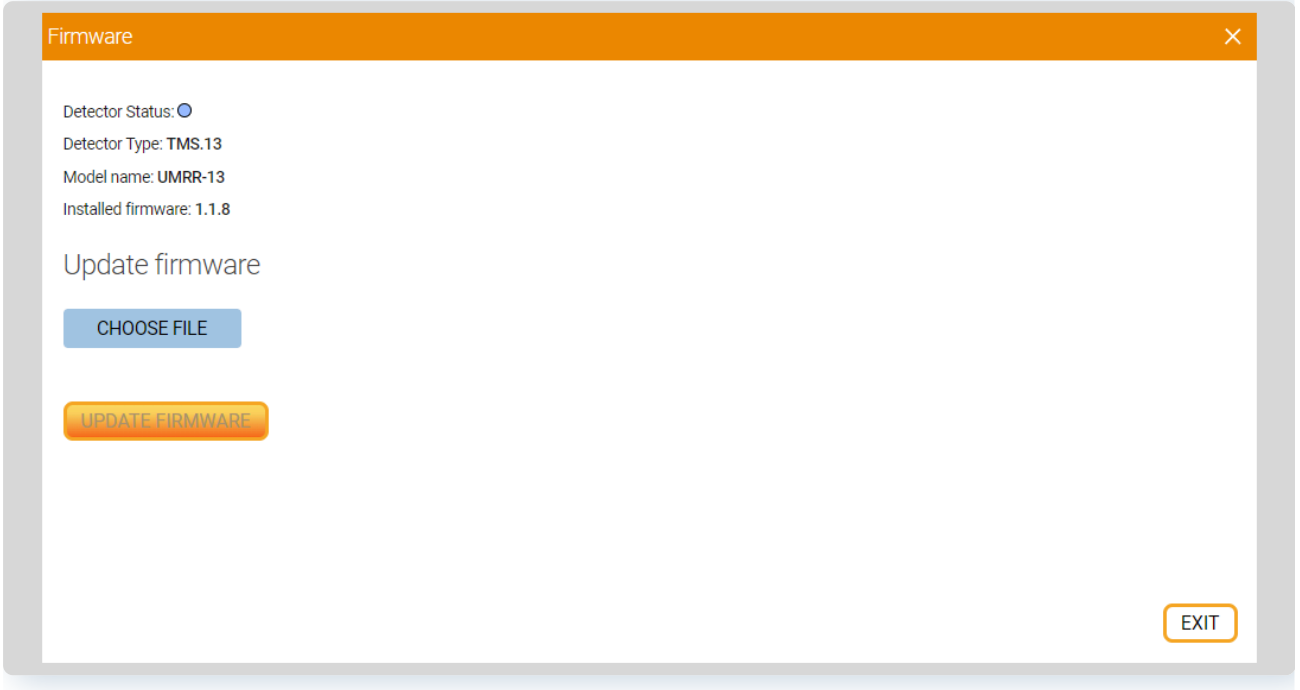
In the field `From, m` you can enter a value from `0` to `45 m`, and in the `To, m` field from `0` to `45 m`

Firmware

You can go to the `Firmware` section through the `Equipment` menu and `Road Management` option when clicking on a row in the road table of the project.

The management page for the selected road will appear. If you click on the underlined number in front of the detector status in the table located in the upper-left corner, a window with firmware parameters will appear.





The Detector firmware parameters are described in the next table

Field name	Description
Detector status	Displays the operating status of the detector
Detector type	The series of the detector selected for firmware is displayed
Detector model name	Detector model is displayed
Installed software (Firmware)	The installed software version is displayed
Select a file	When you click the button, a window opens for selecting a file on the user's PC. After selecting, the field displays the path to the file and the file name: File type: `.app`
Update firmware	When you press the button, the firmware in the detector is updated.

KEEP IN MIND

Fields whose values are entered *incorrectly* will be highlighted in `red`. The values in them need to be changed.

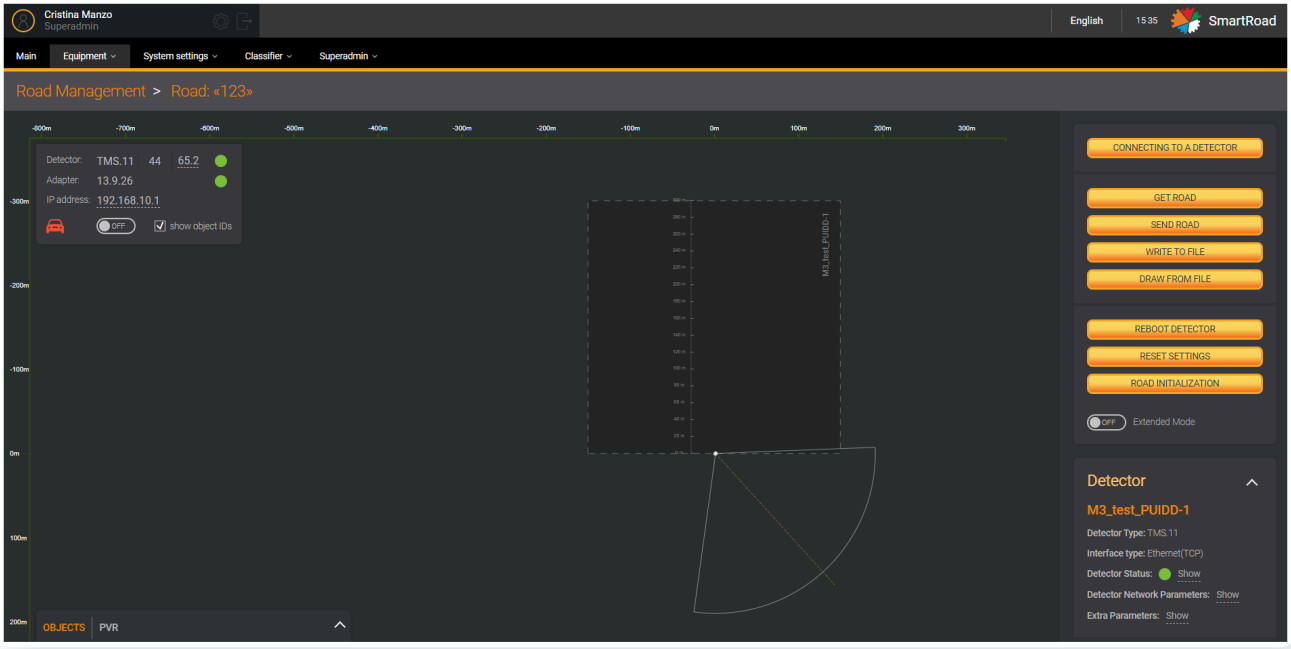
Traffic monitoring

TAKE INTO ACCOUNT

This functionality is being developed currently.

> It is available through `Road Management` section.

This functionality is designed to configure transport detectors in relation to the selected project and road. Allows you to configure detector parameters, traffic lanes, detection zones, detector triggers, using a graphical interface. All detector settings can be written to the memory of the selected detector and read from it for reconfiguration. The configuration of this module is done in a complementary software (The engineer's ARM) by Sorb Engineering specialists.



SmartRoad Modules / External systems module

This module is designed for interacting with external systems, and it enables data exchange between the SmartRoad system and external clients. The processed data can be transmitted as well as data directly from the DT.

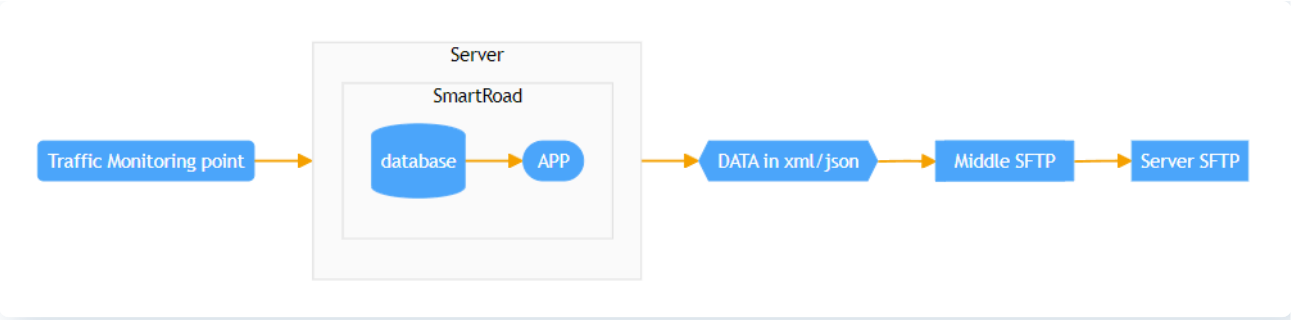
The SmartRoad software allows to transfer data in several ways:

1. Transmission through Rabbit MQ message broker in JSON format. There are two types of data transfer:

- The system sends data to the queue, after which the external system connects to the queue and receives data from it.
- The system sends the data to the queue, after which the `RaDirect` service processes the data and transfers it to the `Postgres SQL` database. From the database, data in JSON format is transferred to external systems via microservices (Zogger or Elistat).

2. Transfer via REST API web service in JSON format. Data can be requested from external sources - by sending a request, which is processed by the API web interface and sends a response to the request from the `Postgres SQL` database via the REST API:

- Sending data directly from the adapter via `SQLite` to an external database in JSON format.
- Transmitting data via `Web Socket`.



INFO

Detailed information related to API reference can be found in section `RESTful API`

API / SmartRoad RESTful API

SmartRoad system provides a RESTful API for developers to interact with external systems.

In general, a request to an external system to obtain a type of information using unified HTTP methods looks like this:

```
URL_smartroad/api/integration/function?
login=user_login&password=user_password
```

In the table below the request parameters are described

Parameter	Parameter type	Description
URL_smartroad	string	Address of the web server being accessed
Function	string	Part of a URL that points to a specific resource or API function
login	string	User credentials in the System. User login is indicated
email	string	Alternative authorization method. It can be used instead of the login parameter. The value can contain both the user's email address specified in the profile during registration and the login in the System
password	string	User password

PLEASE NOTE

`Function`, `login` and `password` are mandatory parameters

Besides, Description of the parameters of the `Functions` request

Function	Function description
stat	Statistics data
events	Receiving Events
status	Equipment status information
pvr	Information about objects registered in counting zones
sensors	Detector Information

TIP

You can interact with our `API` here.

Content Types

SmartRoad uses the JSON format for all the API requests and responses. The content type of the request and response is `application/json`.

Authentication

The system supports the JWT authentication. You can get the token by calling the API. This token will be used for all the subsequent API calls. The API endpoints require authentication.

HTTP requests

The SmartRoad REST API strives to use appropriate HTTP requests for each action.

- The method `GET` is used for retrieving resources.

> **TAKE INTO ACCOUNT**
>
> The methods `POST`, `PATCH`, `DELETE`, `UPDATE`, for now are not used, but they may be implemented considering client requirements.

Error Handling

SmartRoad uses the HTTP status codes to indicate the status of the API calls. The HTTP status code is returned in the response header.

List of the HTTP status codes:

- 200: Successfully
- 400: The request failed
- 401: Unauthorized
- 403: Forbidden
- 404: Resource Not Found
- 429: Too many requests
- 500: Internal Server Error

Some possible errors when accessing RESTful API methods are describe in the table below.

Error code	Error type	Description
400	The request failed. - Missing parameter: `parameter_name` – when a required parameter is missing in the request - Syntax error – if there is a syntax error in the request - Unknown parameter: `parameter_name` – if the parameter is specified incorrectly or a non-existent parameter is specified	The request could not be processed because it is not in the correct format or is invalid. Request syntax error, incorrect indication or absence of a required parameter.
401	Unauthorized	Required authentication information is missing or is not valid for the resource. Incorrect value in request authorization parameters
403	Forbidden	Access to the requested resource is denied: - The user does not have the required permissions. - Invalid value specified: `sensor_id`, `project_id`
429	Too many requests	Less than a certain amount of time has passed between requests. The client

Error code	Error type	Description
		application has been throttled and should not attempt to retry the request until a certain amount of time has passed
500	Internal server error	An internal server error occurred while processing the request. The server encountered an internal unexpected error or crash

Error Response

If the API call was failed, the response body will contain the error message. The error message is a JSON object with the following structure:

```
{
  "error": {
    "status": 500,
    "message": "Internal server error"
  }
}
```

API / Equipment status parameters

Use this method for getting different statuses of the equipment.

Getting equipment status

A request to obtain data related to current status of the detector is formed as follows:

```
Url_Smartroad/api/integration/status?login=user_login&password=user_password
```

Without specifying the `sensor_id` parameter, the resource will return the status of all project detectors available to the user.

Description of additional parameters for requesting equipment status

Parameter	Parameter type	Description
sensor_id	string	Unique detector identifier. One or more UUIDs are specified, separated by commas. Restriction: all detectors must belong to user-accessible projects
project_id	string	A unique identifier of the project for whose detectors information about statuses is requested. One or more UUIDs are specified, separated by commas. Restriction:

Parameter	Parameter type	Description
		The user must have access to the projects specified in the query string.
from	string	Optional parameter. Defines the beginning of the time period from which data is requested in ISO 8601 format (YYYY-MM-DD HH:MM:SS). An input period that is a multiple of one minute is allowed. Entering seconds is not allowed. Only used in conjunction with the `to` parameter
to	string	Optional parameter. `to` – date and time of the end of the interval (inclusive) in ISO 8601 format (YYYY-MM-DD HH:MM: SS). An input period that is a multiple of one minute is allowed. Entering seconds is not allowed. Only used in conjunction with the `from` parameter.
time_zone	string	Optional parameter. Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore `“_”`. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`. Used only in conjunction with the `from` and `to` parameters .

The detail of the response, depending on the set of parameters in the request, is as follows:

Parameter / Availability	Specified	Absent
from..to..	A binary status of equipment operation for a specified period of time is generated	A binary work status is generated at the time of the request

POSSIBLE STATUSES

`0` – DT does not work;
`1` – DT is working.

Receiving data

When a valid request is received, the Resource generates a response message in `JSON` format.

An example of a response message when requesting status at the current time (without specifying `from`, `to`):

```
[
  {
    "name"  : "P-297 км 773+980", "sensor_id": "399f9315-b7b4-439a-83c3-
f81988d29761",
    "status": {"sensor_id": "399f9315-b7b4-439a-83c3-f81988d29761",
"current_status_code": 0, "current_status_list": "ACTIVE, READING, NO_PVR,
DEAD_ADAPTER"}
  },
  {
    "name"  : "Av_DT_3_388FA", "sensor_id": "e9a722ce-1a96-459d-b25a-
01cc15cdf1ca",
    "status": {"sensor_id": "e9a722ce-1a96-459d-b25a-01cc15cdf1ca",
"current_status_code": 1, "current_status_list": "ACTIVE, READING, NO_PVR,
DEAD_ADAPTER"}
  },
  {
    "name" : "Kaluga 2", "sensor_id": "ecafc593-871b-46dc-b58c-79d3f11fd77b",
    "status": {"sensor_id": "ecafc593-871b-46dc-b58c-79d3f11fd77b",
"current_status_code": 1, "current_status_list": "ACTIVE, NO_PVR,
DEAD_ADAPTER"}
  }
]
```


If the `from` and `to` parameters are additionally specified, the response structure changes to the following:

```
{
  "message_id": "1e1050a2-138c-cd8c-69e7-5d3b0979f7c5",
  "time_zone": "Europe/Moscow",
  "message_data": {
    "range_start": "2024-10-28T08:00:00+03:00",
    "range_end": "2024-10-28T09:00:00+03:00",
    "sensors": [
      {
        "sensor_id": "2ca11ec8-ef1f-4eac-89e8-18ee8b64680b",
        "name": "Virtual",
        "statuses": [
          {
            "status_code": 0,
            "status_list": [
              "ACTIVE",
              "CONNECTED",
              "DEAD_ADAPTER",
              "NO_PVR",
              "READING"
            ],
            "status_duration": "0000-00-00 01:00:00",
            "status_duration_percent": 100.00
          }
        ]
      },
      {
        "sensor_id": "516b294e-4435-4aed-9c8f-be4b5bae9c38",
        "name": "Virtual2",
        "statuses": [
          {
            "status_code": 0,
            "status_list": [
              "ACTIVE",
              "CONNECTED",
              "DEAD_ADAPTER",
              "NO_PVR",
              "READING"
            ],
            "status_duration": "0000-00-00 01:00:00",
```

```
            "status_duration_percent": 100.00
          }
        ]
      }
    ]
  }
}
```

Description of response message parameters

Parameter	Description
name	Detector name specified in the System
sensor_id	Unique detector identifier
status, statuses	Information block containing the answer
status_code current_status_code	Current equipment status code. Possible values: - `0` - equipment is not working; - `1` - equipment is working
status_list current_status_list	List of statuses. Combinations of the following statuses are possible: - ACTIVE - READING - HARDWARE_ERROR - BLIND - INTERFERENCE - RAIN - CONNECTING - CONNECTION_ERROR - CONNECTED

Parameter	Description
	- TIMEOUT - EXTENDED_MODE - BOOTLOADER_MODE - NO_PVR - DEAD_ADAPTER - NO DATA
message_id	Unique response identifier
time_zone	Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore `"_"`. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`. Only used in conjunction with the `from` parameters, `to`
message_data	Information block containing the answer
range_start	The initial value of a time period with date, time and time offset
range_end	The end value of a time interval with date, time and time offset
status_duration	Duration of the time period during which the DT was in the specified status (for the selected period between `from` and `to`)
status_duration_percent	Duration of the time period during which the DT was in the specified status (in relative units)

DT statuses coming from DT and adapter

Status	Description
ACTIVE	Indicates that the detector is included in the survey. Set when configuring the adapter in the `multiadapter.json` file, in the `SENSORS[].active` parameter
BLIND	Blinding due to the formation of snow or ice deposits on the DT antenna, possible obstruction of the DT by foreign objects
BOOTLOADER_MODE	Bootloader mode. In this mode, the detector does not send objects and PVR
CONNECTED	The adapter successfully connected to the DT, but the data has not yet begun to be transmitted to the System
CONNECTING	The adapter attempts to connect to the DT
CONNECTION_ERROR	Error when connecting adapter to DT
DEAD_ADAPTER	The adapter does not receive data about the vehicle for a certain interval, by default 2 minutes
EXTENDED_MODE	DT operates in extended mode, the adapter receives data from it. From the user's point of view, this status is similar to the ACTIVE status
HARDWARE_ERROR	An error has been detected in the DT hardware, which may negatively affect the correct operation of the DT.

Status	Description
INTERFERENCE	Interference was detected on the frequency channel of the DT, affecting the detection of objects (as a rule, interference occurs due to the signal of another DT located or installed nearby)
NO DATA	The status is not related to the state of the DT and means the absence of data in the database for the selected period
NO_PVR	The detector does not receive data about the vehicle for a certain interval, by default 10 minutes
RAIN	The presence of precipitation (rain) has been detected, which may affect the effectiveness of object detection
READING	Receiving data from the detector
TIMEOUT	The time for connecting the adapter to the DT has expired. The connection time is set when configuring the Adapter in the `multiadapter.json` file, in the `SENSORS[].timeout` parameter by default it is `100 ms`

API / Statistical data

This function is used for getting information related to statistics

Request information

The external system must initiate a request to the `API_SENSOR_STATISTICS` database function to obtain statistics data. A request for data must be made as follows:

```
url_smartroad/api/integration/stat?
login=user_login&password=user_password&project_id=project_id
```

To ensure data filtering, it is allowed to use the additional query parameters listed in next table, which are indicated after writing the `&` symbol.

Description of additional request address parameters

Parameter	Parameter type	Description
from to interval	string string int	Defines the time period and grouping interval for which the data is requested: - `from` – interval start date (inclusive) in ISO 8601 format (YYYY-MM-DD HH:MM: SS) - `to` – interval end date (inclusive) in ISO 8601 format (YYYY-MM-DD HH:MM: SS) - `interval` – time interval for data grouping, c. If the "interval" parameter is passed in the request, then the value will be used in the calculation. For example, if the

Parameter	Parameter type	Description
		value of the `interval` parameter is 60, then a statistical calculation will be performed for each minute minute of the time range
interval (without `from` and `to`)	int	The time interval (in seconds) for which historical data is requested, starting from the time of request. The default is 30 seconds.
name	string	The name of the detector from which data is requested. It is allowed to specify multiple names separated by commas. DEPRECATED - undesired parameter
sensor_id	string	Unique detector identifier. It is allowed to specify multiple identifiers separated by commas
project_id	string	Required parameter. ID of the project for whose detectors you want to obtain statistics.
time_zone	string	Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore `“_”`. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`

Receiving data

When a correct request is received, the System generates a response message in `JSON` format.

Example of a response message:

```
{
  "message_id": "3e3d1708-d6dd-3742-d8c3-c179b99c758f",
  "time_zone": "Europe/Moscow",
  "excluded_sensors": [
        "vr346hdb-fge5-ntsh-vege-dsgvg5467rfh",
        "4kgk69vr-nlor-mldy-d4ib-gjypdjmldrtd",
        "fwefw56v-f36v-v34l-adqc-dgg536bjk754"
    ],
  "message_data": [
    {
      "sensor_id": "2ca11ec8-ef1f-4eac-89e8-18ee8b64680b",
      "name": "Virtual",
      "connected": false,
      "lane_direction": [
        0,
        0

      ],
      "direction": 1,
      "data": [
        {
          "lanes": [
            {
              "lane": 0,
              "volume": 0,
              "class_0": 0,
              "class_1": 0,
              "class_2": 0,
              "class_3": 0,
              "class_4": 0,
              "class_5": 0,
              "gap_avg": 0,
              "gap_sum": 0,
              "speed_avg": 0,
              "headway_avg": 0,
              "headway_sum": 0,
              "speed85_avg": 0,
              "occupancy_per": "0000-00-00 00:00:00",
              "occupancy_prc": 0,
```

```
            "occupancy_sum": 0
          },
          {
            "lane": 1,
            "volume": 0,
            "class_0": 0,
            "class_1": 0,
            "class_2": 0,
            "class_3": 0,
            "class_4": 0,
            "class_5": 0,
            "gap_avg": 0,
            "gap_sum": 0,
            "speed_avg": 0,
            "headway_avg": 0,
            "headway_sum": 0,
            "speed85_avg": 0,
            "occupancy_per": "0000-00-00 00:00:00",
            "occupancy_prc": 0,
            "occupancy_sum": 0
          }
        ],
        "range_end": "2024-10-02T11:37:16+03:00",
        "range_start": "2024-10-02T11:36:46+03:00",
        "range_value": 1
      }
    ]
  }
]
}
```


Description of response message parameters

Parameter	Parameter type	Description
message_id	string	Message ID

Parameter	Parameter type	Description
time_zone	string	Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore “_”. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`
message_data	array	Nested data array
sensor_id	string	Detector identifier
excluded_sensors	string	Identifiers of detectors for which data cannot be obtained due to incorrect configuration
name	string	Detector name
connected	boolean	Detector connection status, possible values: `true` / `false`
lane_direction	array of integers	Lane direction: - `0` – moving to the zero kilometer of the road; - `1` – movement from the zero kilometer of the road; - `2` – two-way traffic.
direction	int	Detector installation direction: - `0` - to the zero kilometer of the road - `1` - from the zero kilometer of the road

Parameter	Parameter type	Description
data	array	Nested array of elements
lanes	array	Nested array of elements
lane	int	Lane number. The stripes are counted starting from zero, from left to right. For TMS.11 series detectors, the band number is not transmitted. Meaning `-1` means no parameter value
volume	int	Number of recorded vehicles
class_X	int	The number of recorded vehicles of a certain class depending on the length of the vehicle. The number of classes and vehicle length parameters for each class are determined in the System settings
gap_avg	int	Average traffic interval for the period, measured between the front bumper of the first vehicle and the rear bumper of the second vehicle, p.
gap_sum	int	The final driving interval for the period, measured between the front bumper of the first vehicle and the rear bumper of the second vehicle, p
speed_avg	int	Average speed, `km/h`
headway_avg	int	Average traffic interval, measured between the rear bumper of the first vehicle and the rear bumper of

Parameter	Parameter type	Description
		the second vehicle, p
headway_sum	int	The final driving interval, measured between the rear bumper of the first vehicle and the rear bumper of the second vehicle, p.
speed85_avg	int	Average speed of 85% of traffic flow, `km/h`.
occupancy_per	string	Lane congestion in a given period, total time
occupancy_prc	int	Lane congestion in a given period, percentage
occupancy_sum	int	Traffic lane congestion in a given period, s
range_end	string	End of the interval, in the format 2023-01-26T00:30:00+00:00
range_start	string	Beginning of the statistics selection period, in format 2023-01-26T00:30:00+00:00
range_value	int	Interval number in range

API / Receiving Events

Use this method to interact with SmartRoad events.

Request information

The external client must initiate a request to the `API_GLOSAV_EVENTS` database function to receive events. A request for data must be made as follows:

```
url_smartroad/api/integration/events?
login=user_login&password=user_password&project_id= project_id
```

Description of additional (optional) request address parameters

Parameter	Parameter type	Description
name	string	Detector name. You can specify multiple names, separated by commas without spaces: "name_1", "name 5", "name-9". DEPRECATED - undesired parameter
time_zone	string	Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore “_”. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`
from to	string	Defines the time period and grouping interval for which the data is requested: - `from` – interval start date (inclusive) in ISO 8601 format

Parameter	Parameter type	Description
		(YYYY-MM-DD HH:MM: SS) - `to` – interval end date (inclusive) in ISO 8601 format (YYYY-MM-DD HH:MM: SS)
interval	int	How many last seconds to select events for? The default value is 300 seconds. It does not matter if the from and to parameters are specified.
project_id	string	Required parameter. ID of the project for whose detectors you want to obtain statistics.
sensor_id	string	Unique detector identifier. It is allowed to specify multiple identifiers separated by commas.

RECOMMENDED

- Request data every `N` seconds, since the event coordinates may change (the `X` and `Y` coordinates of the event may change if the object moves while the event is being recorded);
- View already registered events, since after the event expires, its `end_time` parameter – the end time of the event – can be updated.

Receiving data

When a correct request is received, the System generates a response message in `JSON` format. By default, (if additional parameters are not specified in the request address), the

generated message contains data on events for the last 300 seconds.

Examples of response messages:

1. Example 1: Object in scope

```
{
  "message_id": "839jfd70-f4kb-0be2-7l1f-1n6y1t3eb7e5",
  "time_zone": "Europe/Moscow",
  "message_data": [
    {
      "sensor_id": "2cg1gec8-rf1t-4eqc-8re8-18eg8a6g68h0",
      "name": "Test",
      "connected": "false",
      "lane_direction": [
        0,
        0,
        0,
        1,
        1,
        1
      ],
      "data": [
        {
          "row": 1,
          "events_id": "962635c9-12ad-4e8e-ae9b-860df642733d",
          "sensor_id": "2cg1gec8-rf1t-4eqc-8re8-18eg8a6g68h0680b",
          "projects_id": "fcff27v4-cqe4-4gdm-8eg1-na1a1d0sdav1",
          "start_time": "2024-10-28T10:37:38.639383+03:00",
          "end_time": "2024-10-28T10:37:38.639383+03:00",
          "type": 1,
          "level": 0,
          "code": 509,
          "description": [
            {
              "lang": "ru",
              "name": "Мд"
            },
            {
              "lang": "en",
              "name": "Snail"
            },
            {
              "lang": "es",
              "name": "Caracol"
```

```
            }
          ],
          "unit": "LOW_SPEED",
          "val": "24.30",
          "measure_line": null,
          "lane": 0,
          "zone": 0,
          "direction": -1,
          "obj_id": 102,
          "obj_class": 1,
          "obj_length": 4.5,
          "obj_speed": 24.3,
          "heading": 179.39,
          "point_x": 56.88,
          "point_y": -9.12,
          "close_type": 0,
          "param_data": null
        }
      ]
    }
  ]
}
```


2. Example 2: Misdirection

```
{
  "row": 23,
  "events_id": "09ca6b2b-1824-4d3b-8ec8-d3f2f63b72ba",
  "sensor_id": "37d9eb0c-0b8c-4af8-90c7-f95a0355a903",
  "projects_id": "9d2ce49d-eea9-4210-ad65-49d1ee62d6ca",
  "start_time": "2024-03-06T13:08:49.9+00:00",
  "end_time": "2024-03-06T13:08:49.9+00:00",
  "type": 2,
  "level": 0,
  "code": 2001,
  "description": [
    {
      "lang": "ru",
      "name": "Wrong direction"
    },
    {
      "long": "and",
      "name": "wrong direction"
    },
    {
      "long": "it",
      "name": "wrong direction"
    }
  ],
  "unit": "WWD",
  "val": "-3.222486",
  "measure_line": null,
  "lane": 3,
  "zone": 0,
  "direction": 0,
  "obj_id": 35,
  "obj_class": 1,
  "obj_length": 4.5,
  "obj_speed": 7.96,
  "heading": -3.22,
  "point_x": 78.27,
  "point_y": 0.08,
  "close_type": 0
}
```

Description of response message parameters

Parameter	Parameter Type	Description
message_id	string	Message ID
time_zone	string	Time zone. The recording format is `TZ identifiers`. Instead of the slash character, you can use the underscore “_”. By default, the parameter value from the user profile is substituted. Example: `Europe/Moscow`
message_data	array	Nested data array
sensor_id	string	Detector identifier
name	string	Detector name
connected	boolean	Detector connection status, possible values: `true` / `false`
lane_direction	Array of integers	Lane direction: - `0` – moving to the zero kilometer of the road; - `1` – movement from the zero kilometer of the road; - `2` – two-way traffic. The numbers in the array are transmitted in the order of the stripes, counting from the leftmost one
data	array	Nested data array

Parameter	Parameter Type	Description
row	int	Response line number
events_id	string	Event ID
sensor_id	string	Detector identifier
projects_id	string	The project identifier
start_time	string	Event start time and date, in ISO 8601 format (0000-00-00T00:00:00+00:00)
end_time	string	Event end time and date, in ISO 8601 format format (0000-00-00T00:00:00+00:00)
type	int	Event type. Possible values: - `1` – Speed events - `2` – Traffic events - `9` – Others events Corresponds to the event rule settings in the System
level	int	Event category. Possible values: - `0` – Information event - `1` – Warning event - `2` – Critical event Corresponds to the event rule settings in the System
code	int	Event code. Event codes are specified by the user when creating events. Changing the event code on

Parameter	Parameter Type	Description
		the System does not affect events recorded before the change
description	array	A nested array containing the event name in Russian, English and Spanish. Parameters passed in the array: - `lang` – language - `name` – event name
unit	string	A unit of measurement. Possible values: - `KMH` – Kilometers per hour - `MPS` - Meters per second - `PEDESTRIAN` – Pedestrian detected - `PLACE` – Object in the area of definition - `STOP` – Stopping the vehicle - `WWD` - Wrong Direction
val	floating point number	Event parameter value. For logical events `- 1`, for measurable events - the corresponding numerical value. For example, for speeding, the first measured numeric value that satisfies the event rule
measure_line	string	Always null
lane	int	Lane number, counted starting from zero, from left to right
zone	int	Index of the zone through which an object becomes a PVR. Zones are created in `Road Management` section

Parameter	Parameter Type	Description
direction	int	Lane direction: - `-1`: to detector - `1`: from detector - `0`: both ways
obj_id	int	Object ID. Detectors track objects by assigning numbers to them from the moment the object is identified in the visibility area until it leaves it. The pool of numbers is rotated cyclically
obj_class	int	Object class number, according to user-specified classification. Class numbering starts from `0`. If the detector could not determine the vehicle class, then the value is set to `-1`
obj_length	int	Length of the object in meters. The value is used to determine the class of the object
obj_speed	int	Object speed in `km/h`
heading	int	Direction of movement (angle of movement to the detector in °)
point_x	int	Distance in meters along the `X` axis
point_y	int	`Y` axis distance in meters
close_type	int	Closure type: - `0` – Automatic

Parameter	Parameter Type	Description
		- `1` – Manual - `NULL` – Not closed

API / Detector settings

Use this method for interacting with the settings of Detectors.

Requesting data

If you want to obtain information about the basic settings of the DT, the external client must initiate a request as follows:

```
url_smartroad/api/integration/sensors?login=user_login&password=user_password
```

Additional parameters can be entered `sensor_id` And `project_id`, where `sensor_id`– unique detector identifiers (one or more), and `project_id`–the ID of the project whose detectors you want to get settings for.

Description of additional (optional) request address parameters

Parameter	Parameter type	Description
sensor_id	string	Unique detector identifiers (one or more).
project_id	string	ID of the project for whose detectors you want to get settings.

Receiving data

When a correct request is received, the System generates a response message in `JSON` format.

Example of a response message:

```
[
{
  "sensor_id": "dcd11dc8-dfdf-dedc-8de8-1deadb646a0b",
  "name": "Test_sensor",
  "ip": "127.0.0.1",
  "place_name": "Test",
  "picket_name": "15+453",
  "gps_latitude": 55.72767,
  "gps_longitude": 37.45782,
  "gps_latitude_x": 56.10927,
  "gps_longitude_x": 37.95879,
  "serial_number": "test01",
  "lanes_count": 2,
  "lanes": [
    {
      "lane_index": 0,
      "lane_width": 3.5,
      "lane_direction_sensor": -1,
      "lane_direction_zkm": 0,
      "zones": [
        {
          "zone_index": 0,
          "zone_width": 3.5,
          "zone_direction_sensor": -1,
          "zone_classes": 15,
          "zone_segments_count": 2,
          "zone_segments": [
            {
              "x": 80,
              "and": 4,
              "index": 0
            },
            {
              "x": 84,
              "and": 4,
              "index": 1
            }
          ]
        }
```

```
        ]
      },
      {
        "lane_index": 1,
        "lane_width": 3.5,
        "lane_direction_sensor": -1,
        "lane_direction_zkm": 0,
        "zones": [
          {
            "zone_index": 1,
            "zone_width": 3.5,
            "zone_direction_sensor": -1,
            "zone_classes": 15,
            "zone_segments_count": 2,
            "zone_segments": [
              {
                "x": 80,
                "and": 4,
                "index": 0
              },
              {
                "x": 84,
                "and": 4,
                "index": 1
              }
            ]
          }
        ]
      }
    ]
  }
]
```


Description of `JSON` message parameters regarding events

Parameter	Data type	Description
name	string	Detector name on the System
ip	string	Detector IP address
place	string	Site name (detector location)
gps_latitude	string	Geographic coordinate of the detector (latitude)
gps_longitude	string	Geographic coordinate of the detector (longitude)
gps_latitude_x	string	X-point coordinates (latitude)
gps_longitude_x	string	X-point coordinates (longitude)
lanes_count	int	Number of lanes
lanes	group	Stripes
lane_index	int	Lane number
lane_width	int	Bandwidth
zone	group	Zone
zone_index	int	Zone number
length	int	Zone length
width	int	Zone width

Parameter	Data type	Description
direction	int	Zone direction
zone_offset	int	Distance from detector