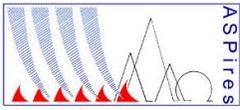


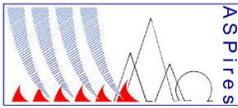
# ASPIres End-User Demo Guide



## Document History

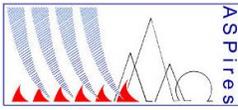
### Revision History

<i>Version</i>	<i>Date</i>	<i>Prepared by</i>	<i>Summary of changes</i>
1.0	06.11.2018	Ivelin Andreev (Interconsult Bulgaria Ltd.)	Created (Publish version)



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## About

The present document is meant to provide an overview of a sample graphical user interface and the end-user interaction with the ASPIres platform.

The demo scenario is based on a number of sensors that operate collectively in a location in Republic of Bulgaria and are registered under a single organization unit.

## Prerequisites

The graphical user interface is accessible over the Internet from a modern browser with JavaScript turned on. The interface is responsive and renders properly on both desktop and mobile devices, though with some usability variations (i.e. mouse-over tooltips). Browsers Chrome and Mozilla are preferred.

The address for read-only view of the demo dashboards and the corresponding user are presented before:

**URL:** <http://aspres.icb.bg:8080>

**User:** aspires\_bg

**Pass:** aspiresRO

## Dashboards

### Sensor Map

Upon login, the user is redirected to the default dashboard for the organization which shows a world map panel with plotted points, one for each deployed sensor. To return to this dashboard from other screens, select option "Sensor Map" from the top left menu.

The dashboard information is automatically refreshed every 10 seconds.

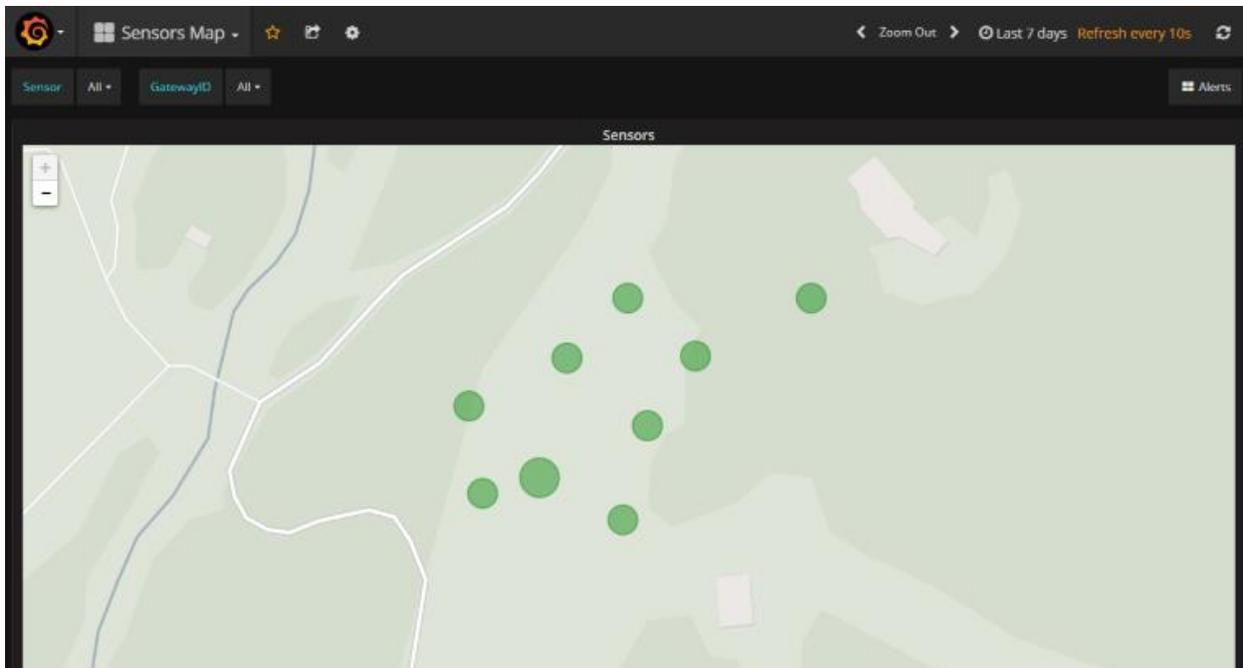


Figure 1: Sensor map

In case of alarm, the particular sensor will be coloured in red and a sound would be iteratively played by the browser to audibly indicate the alarm state and attract user attention.

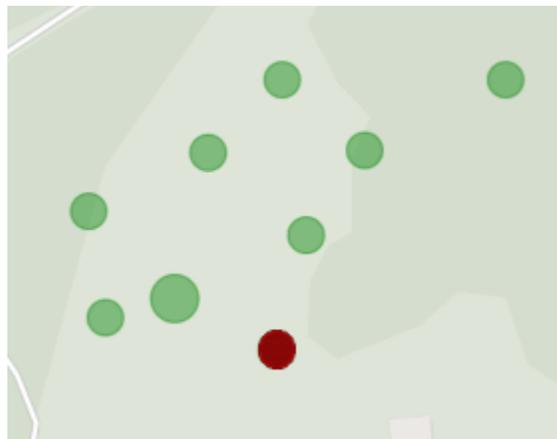


Figure 2: Alarm Indication

The user could retrieve information regarding the latest sensor measurements by putting mouse over the sensor bubble. From the sensor details it is also visible since when there have been no ASPires platform alarms on the sensor.

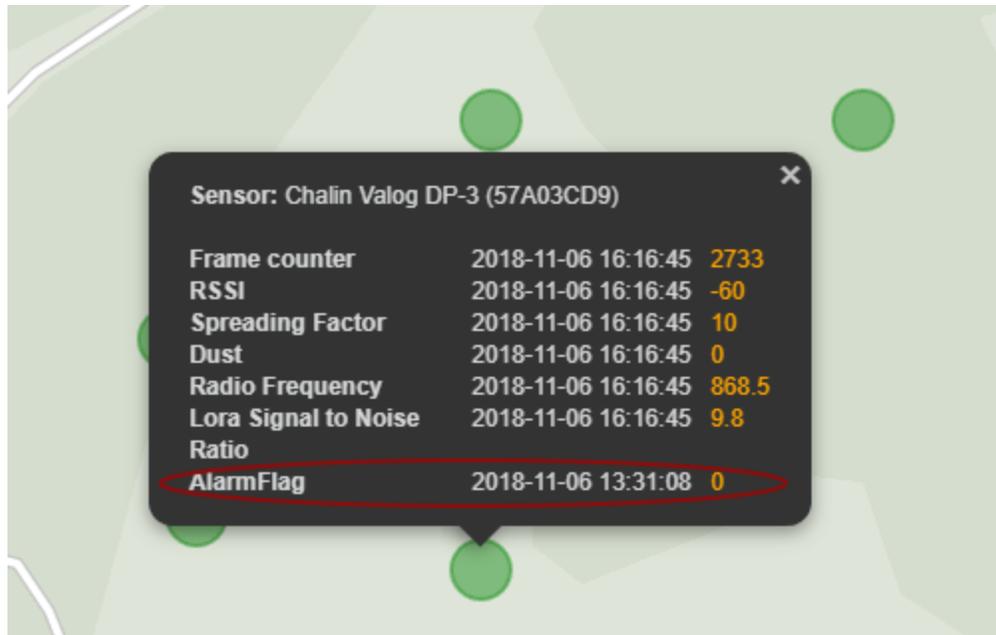


Figure 3: Sensor details and alarm flag

## Sensor Details

Clicking on a sensor navigates the user to a details screen that is customized for the particular sensor type (temperature, CO, CO2, ASPIres-Geo, etc.).

Each of the dashboards shows some metadata on the sensor (Frame counter, Radio Frequency, Signal Strength), the sensor name (top right) and key parameter graphs:

- Gauges for the current value against optimal;
- Historical charts for the last 20 days
- Live chart for the last 2 hours.

You could return to the sensor map by pressing the “Sensor Map” shortcut button on the top right.

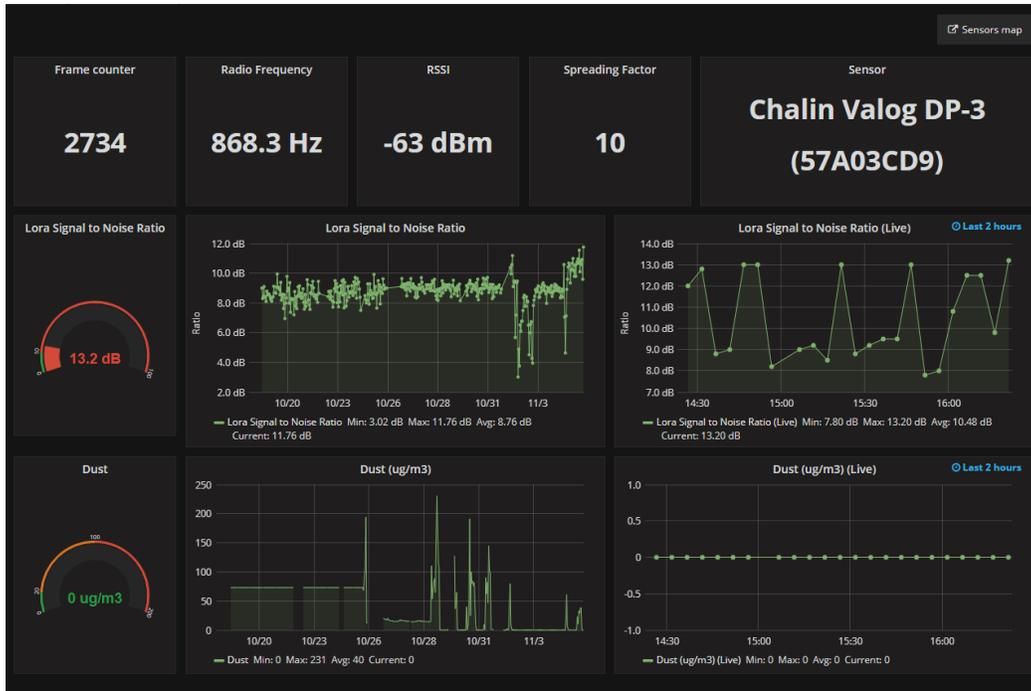


Figure 4: Sensor details CO

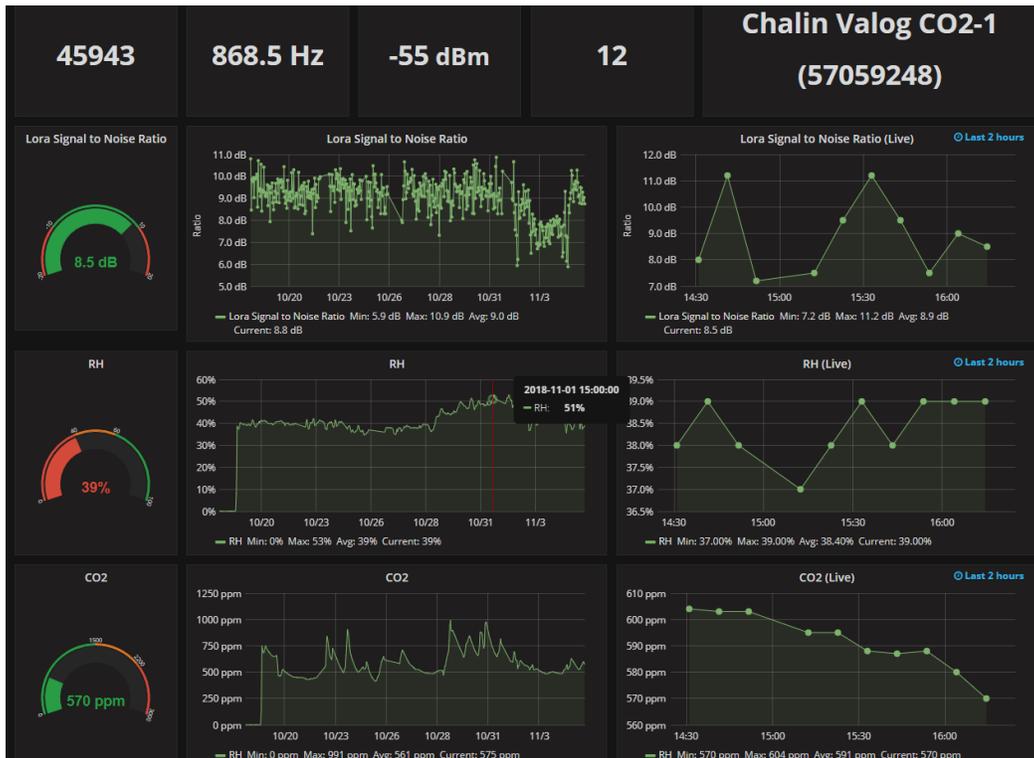


Figure 5: Sensor details - CO2

A legend below each chart shows a summary of minimum, maximum and average values of the parameter within the interval and a mouse over a point on the graph shows the exact value at the specific point of time.

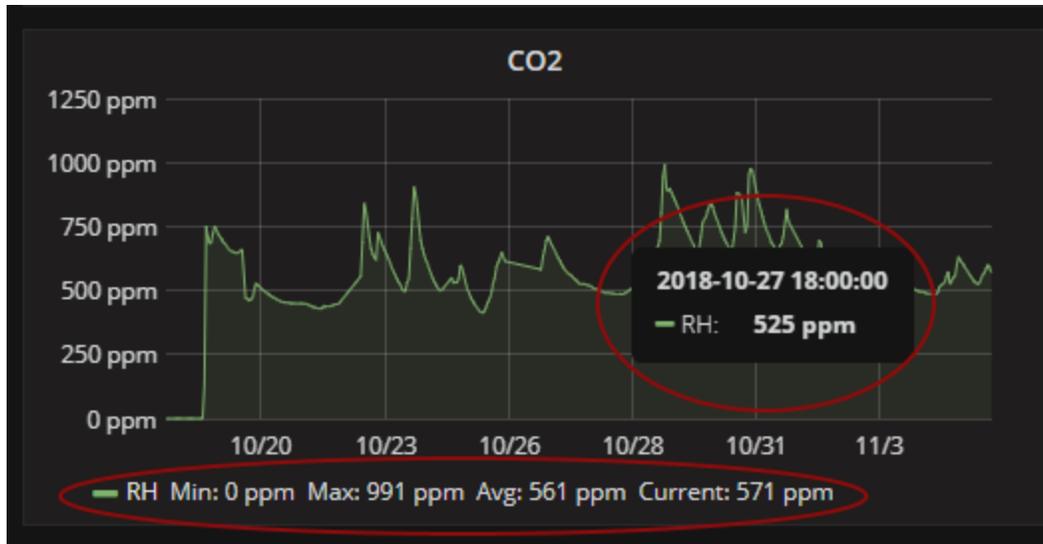


Figure 6: Legend and point details

The user could zoom an arbitrary section with the mouse by pointing at the graph and making a selection over the X-axis.

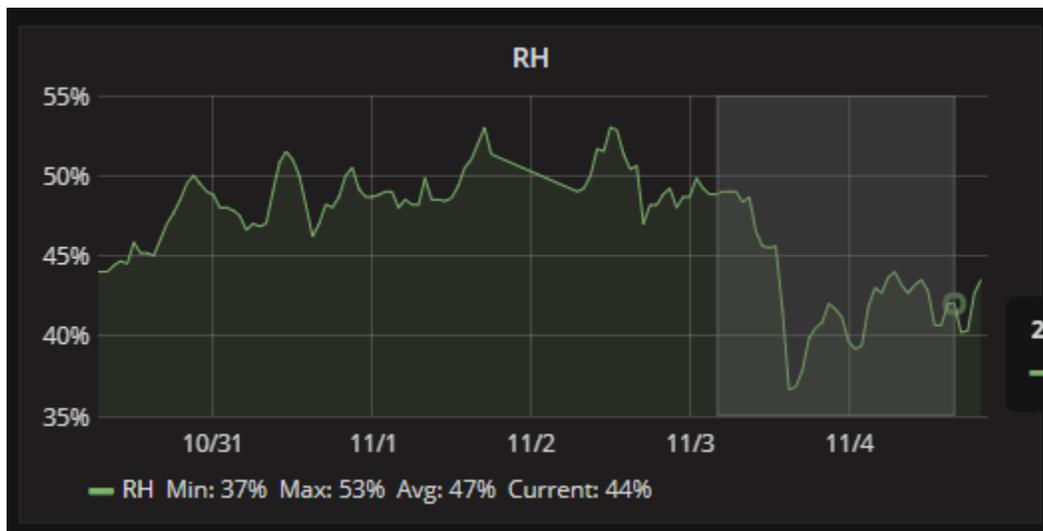


Figure 7: Zoom-in

To zoom-out the user could either press Ctrl+Z key combination or press the "Zoom Out" button at the top right.

The default time filter for each dashboard could be overridden by selection one of the shortcut options, or defining a custom range. The time range menu is available after clicking the current time interval label at the top right corner.

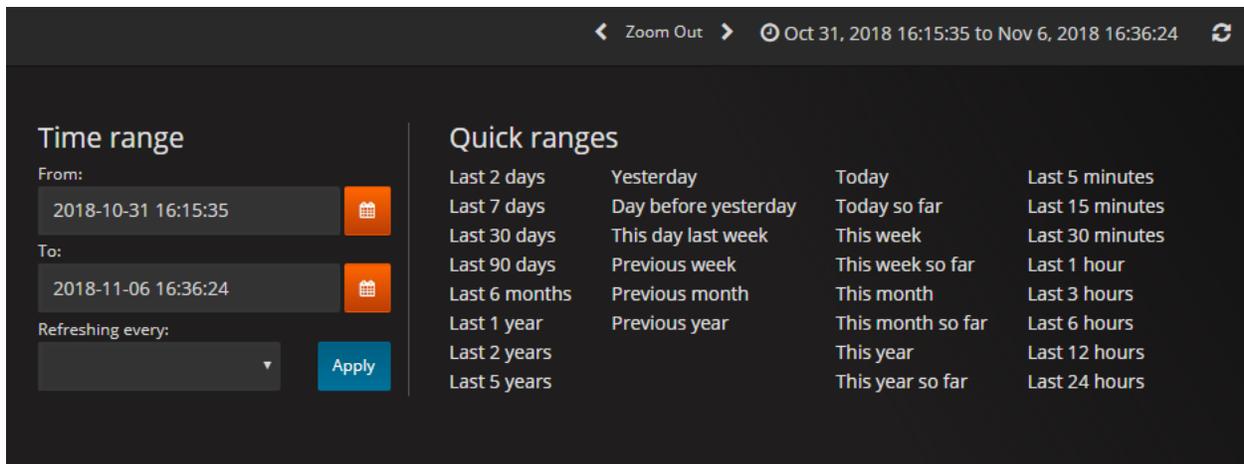


Figure 8: Time range menu

## Alerts and Notifications

Alert list is available from the dashboard list from the top left corner of the screen. It shows the current state of the alarm states, as well a history of the latest 10 changes.

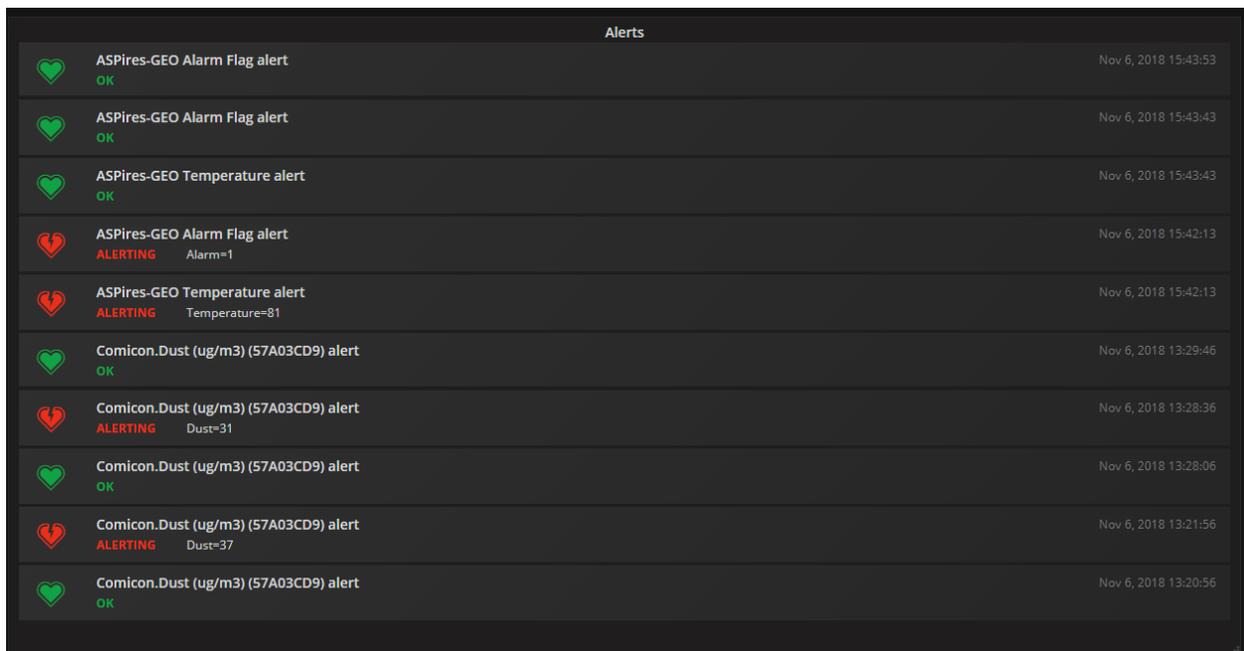


Figure 9: Alert list

A detailed information is available on the charts below the alert summary list, after clicking on the title of an alert chart.



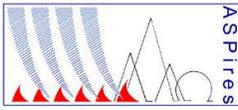
Figure 10: Alert details - Dust particles

## Available Sensors

The following sensors, grouped by type, are configured and available in the platform. These are ordered in a descending direction according to their capabilities to reliably detect fires with least level of false alarms. Sensors are configured in the administrative interface of the platform.

Tag	Description	Type	Server	Min	Max	Set Point
1128.Alarm	Auto-generated alarm tag	Alarm	My own Influx			
1128.Dust	Dust	Int	My own Influx			
1128.Frame counter	Frame counter	Int	My own Influx			
1128.Lora Signal to Noise Ratio	Lora Signal to Noise Ratio	Float	My own Influx			
1128.Radio Frequency	Radio Frequency	Float	My own Influx			
1128.RSSI	RSSI	Int	My own Influx			
1128.Spreading Factor	Spreading Factor	Int	My own Influx			

Figure 11: Platform sensor configuration



## Fine Particle Sensors

Fine particle sensors measure fine particles in air and are the most reliable sensors that allow targeting burning processes explicitly.

The sensors are:

- Chalin Valog DP-1 (5652C267)
- Chalin Valog DP-2 (56F82C77)
- Chalin Valog DP-3 (57A03CD9)

## Carbon Monoxide (CO)

Carbon monoxide is a direct product of a burning process and its detection is a synonymous sign of a fire.

The sensors are:

- Chalin Valog CO-1 (565EAA85)

## Thermal Camera

ASPIres-Geo thermal camera is an external module which demonstrates the flexibility of the platform to connect to and use data from various market available sensors. The thermal camera is paired with a daylight camera with 30x optical zoom. It is capable to detect high temperatures at a distance of kilometers, provided that there are no solid obstacles on the way towards the flame or heat source. The thermal camera is not capable to detect fire from smoke but is capable to detect even during night time.

The sensors are:

- ASPIres-Geo Camera (Optix NVIS)

## Computer Vision

ASPIres platform uses cutting edge computer vision algorithms which are able to detect fire from its smoke (i.e. fire behind a hill) even without direct sight of the flames or other types of objects, like cars or people. For the particular test environment a non-comprehensive camera is used without optical zoom. The camera could be configured to capture at arbitrary intervals.

The sensors are:

- Portable Camera (CAMERA\_DUMMY)

## Carbon Dioxide (CO<sub>2</sub>)

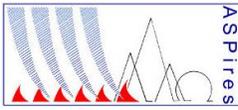
Carbon dioxide sensor measurements are not related directly towards fire detection, but allow measuring parameters of the environment which is relevant to fire weather index calculation, risk evaluation and fire prediction based on advanced machine learning algorithms. The sensor measurement is an important characteristic for the processes in the surrounding environment.

The sensors are:

- Chalin Valog CO<sub>2</sub>-1 (57059248)

## Temperature and Relative Humidity (T, RH)

The temperature and relative humidity sensors could hardly be used for forest fire detection at distance but provide important information for the surrounding environment. The sensor measurements are also used in the calculation of fire weather index, as well as predicting risk of forest fires by using advanced machine learning algorithms.



The sensors are:

- Chalin Valog T-1 (0064BF88)

## Weather Station (WS)

ASPIres-Geo weather station is an external module which demonstrates the flexibility of the platform to connect to and use data from various market available sensors. Weather station information itself is used for capturing environment parameters and using them for forest fire prediction.

The sensors are:

- ASPIres-Geo Weather Station (MWS55V)

## Alerts

### General Notes

#### *Alert Types*

There are 2 types of alerts that are currently configured in the platform to demonstrate few possible approaches. Both are having pros and cons described below.

#### *One Sensor Type, One Notification*

Alert definitions of each type of sensor could be summed up in a single alert definition, but for the purposes of demonstration and easier tracking, each sensor is having own definition and would lead to a separate notification. This may be the reason to receive multiple, seemingly duplicate, notifications are generated when multiple sensors detect signs of burning. Sensors of the same type are grouped (i.e. a single event is raised from all 3 Carbon Monoxide sensors, to demonstrate the capabilities of grouping).

#### *Alert for Normal State Restoration*

Alerts generated from Grafana send notification for normal state to indicate that the monitored state has changed.

#### *Alert Filters*

Alert notifications sent by the platform could be configured to be filtered for maximum amount of messages within a certain timeframe or configured to delay notifications for amount of time. However, these features are not used for the demo purposes as they require in-depth understanding and could significantly interfere with expectations.

### Grafana Alerts

Grafana alerts are defined on the basis of values retrieved in the realtime graphics on the Grafana dashboards. This types of alerts are simpler for configuration and are mainly based on thresholds, although combined from multiple sensor parameters.

Alert states are evaluated every 10 seconds.

The currently configured alerts and their threshold values are:

- ASPIres-Geo.Alarm > 0.9
- ASPIres-Geo.Temperature > 65
- ASPIres-Geo.FireRiskHigh (T>35&RH<35)
- Comicon.CO > 3
- Comicon.Dust > 30

- Comicon.FireRiskHigh (T>35&RH<35)
- ICB.ComputerVision Alert>0.9



Figure 12: Sample alert settings (Fire Danger)

In response to alerts Grafana could send email notifications with attached screenshots.

### [Alerting] ASPIres-GEO Temperature alert

Metric name	Value
Temperature	227.000

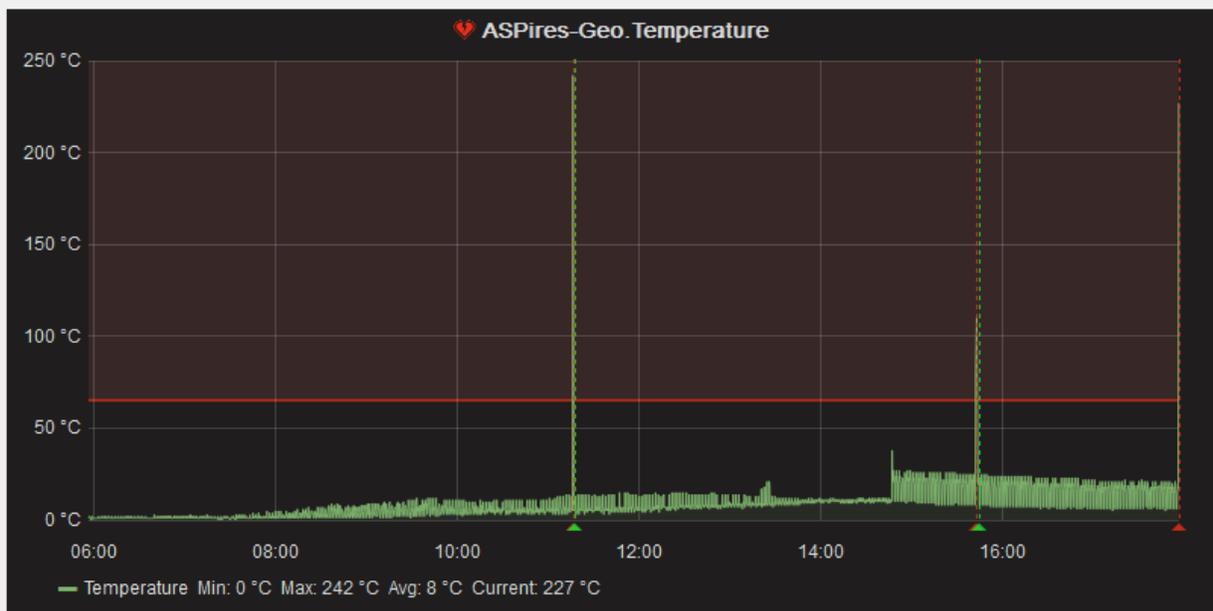


Figure 13: Sample alert overview notification attachment

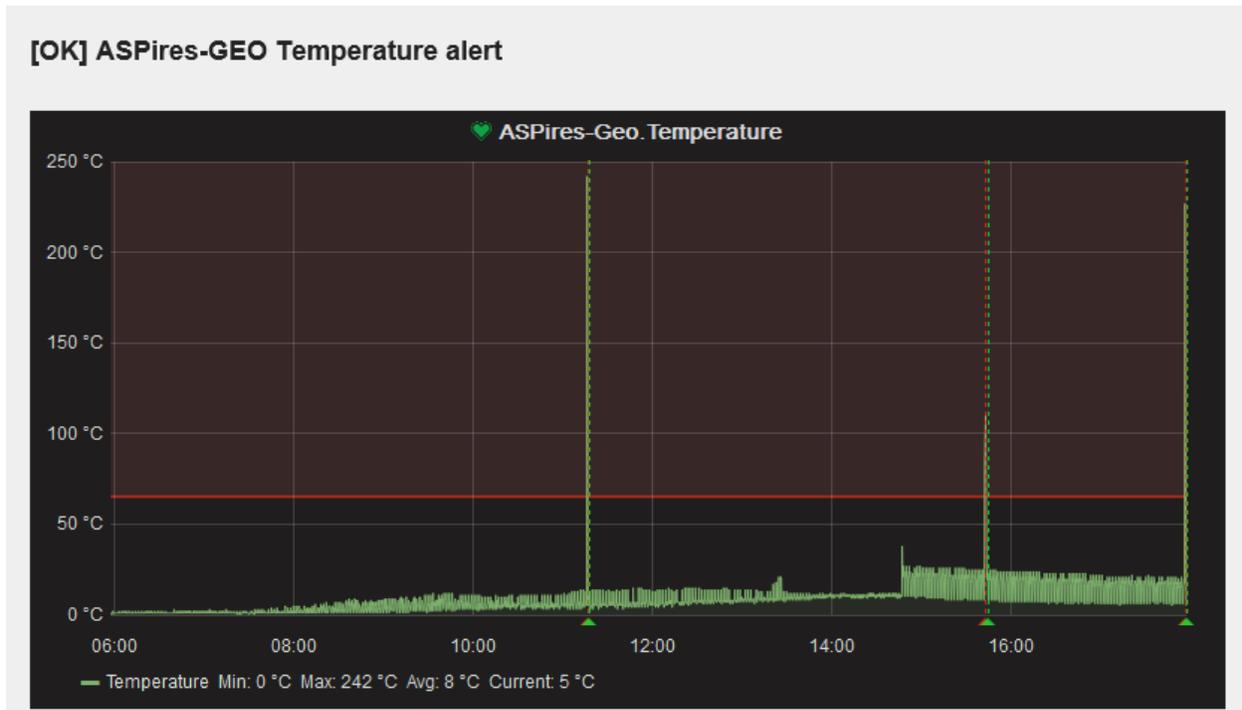


Figure 14: Sample alert state back to normal notification attachment

## Platform Alerts

Platform alerts are bound to events which could be defined in the administrative interface of the platform

The screenshot shows the 'EDIT EVENT' interface. The event name is 'Fire Danger - IR Temp (High)'. Below the name are buttons for 'ADD FUNCTION', 'ADD TAG', and 'HELP'. The expression field contains the code: `GoOverLimit('Optix NVIS.MaxTempPreset', 65)`. Below the expression is a table for 'Expression Parameters' with columns for Name, Type, and Value. The table is currently empty, displaying 'No items to display'. At the bottom of the interface are buttons for 'NEW', 'DELETE', 'SAVE', and 'CLOSE'.

Figure 15: Sample event definition

ASPIres platform alerts are extremely flexible and could cover more sophisticated scenarios. The platform notifications support both SMS and Email as channels. The messages generated could be customized significantly and are currently configured to provide following information:

- Event Time (UTC)
- Custom message
- Name of sensor from which the alert originates
- GPS coordinates of the sensor

Notification messages could be further extended with information like:

- Name of the described event
- ID of sensor
- Description of the rules that have triggered the event

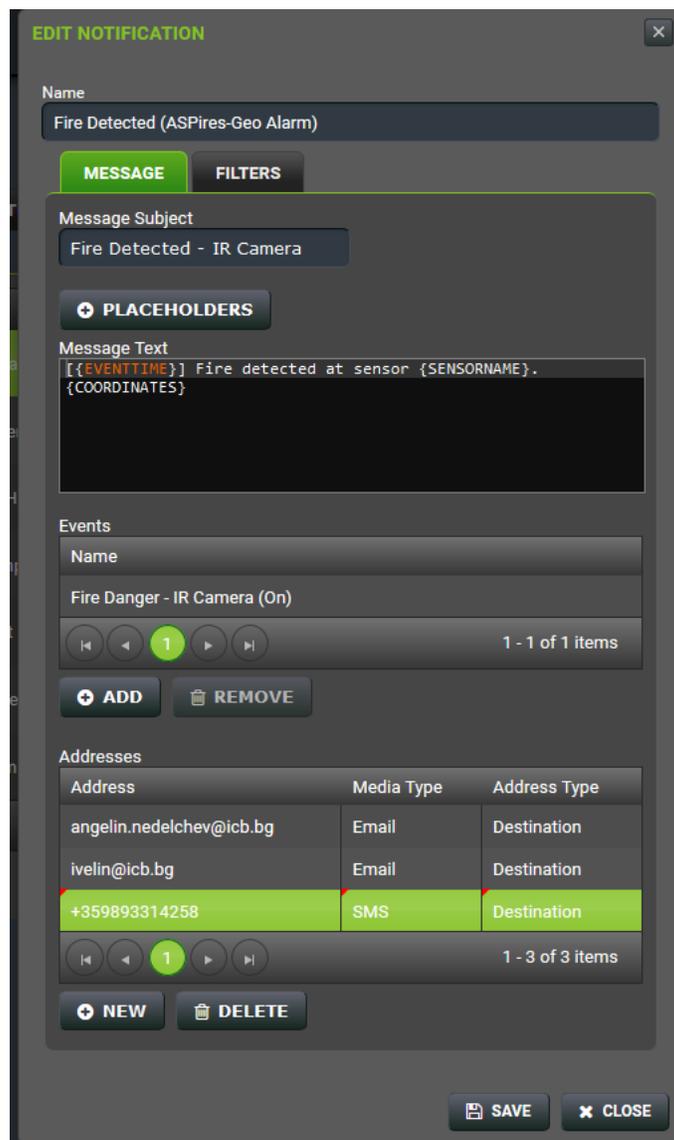
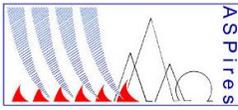


Figure 16: Platform notification configuration



Alert states are evaluated every 10 seconds.

The currently configured alerts and their threshold values are:

- Fire Detected - IR Camera
  - ASPIres-Geo.AlarmFlag > 0
- Fire Detected - IR Temp High
  - ASPIres-Geo.Temperature > 65 deg
- Fire Detected - Dust Particles High
  - FineParticles > 30 ug/m3
- Fire Detected - CO High
  - CarbonMonoxide > 3 ppm
- Fire Detected - Computer Vision
  - Confidence threshold for fire or smoke >= 0.5