



SophyAl® Platform Features

Our patented SophyAI artificial intelligence platform can behave as a careful supervisor on what happens or could happen in an industrial context. The system is based on 3 integrated modules that allow, by means of normal cameras, even existing ones, or IOT already present, to interpret the scenario in an intelligent way, conspicuously integrating the function of human observation but with the peculiarity of being able to interpret the scene continuously over 24 hours.



Machine Learning

Localization

Workflow

This

happens through a "classification" of the "objects" observed, their geolocation and, according to precise workflow instructions, the adoption of predetermined rules that can generate communications, alarms or actions. The system is scalable and can be modulated in relation to the purposes to be achieved. The infrastructural commitment is minimal, as the system can use components already present and operates in full compliance with GDPR regulations. The very fact that the artificial intelligence does not need to record images but only performs a neural interpretation and releases only metadata to the workflow component, inhibits the possibility of releasing personal information about those observed. Of course, whoever is in charge and authorized to the visual supervision can access the images in accordance with the methods and rules already used.





• Classification

The neural network processes the received images based on "intelligent" identification and interpretation codes, which allow to give interpretative meaning to the images.



In summary, the automatic processing of the detected images occurs through specific algorithms derived from the action of the neural network that classifies the observed scenario. The neural network, if trained, can recognize a variety of "dynamic" conditions of the environment under observation.

• Spatial positioning (georeferencing of observed elements) and interfacing with IOT elements

On the basis of the position of the "object" classified in the image, it is possible to transform the localization information from relative to absolute (e.g. a person in the vicinity of a specific area

detected by camera 3 who approaches a company asset). This allows the transformation into metric coordinates relative to the space in which the vision system is installed. What is detected can be observed on a synoptic map of the overall area covered by all cameras.



An extremely important aspect is the possibility to define specific areas (geofences) in which rules will be applied and managed by the workflow module. The system can integrate specific neural networks for the recognition of DPI (for example an area can be defined that is forbidden to subjects





without the appropriate DPI, (for example SophyAi notices if the individual is wearing a protective

helmet or a particular vest) The system is able to signal the condition of man down without the individual wearing any device.

The system can interface with existing sensors to increase the cognitive capacity of the system, and SophyAI can intervene autonomously to carry out actions using its own interface with actuators, setting the actions to be carried out in its own workflow module.









- The Sophy Assistance smartphone application

SophyAI interacts with its own appendix, realized through an APP (downloadable from Google Play on any Android smartphone), which is interconnected to the platform and uses implementation functions (e.g. opening of gates), receiving communications from SophyAI (alerts, alarms) and activating the Man Down function using the accelerometer of the smartphone in areas not covered by the cameras. The application is activated automatically and only in certain areas (geofences) that can be the same defined in the workflow module for the cameras or through simple and inexpensive beacons positioned in the desired points. The application is constantly interconnected (when activated) to the platform and can activate its functionality only in relation to the hierarchy of permissions attributed to the owner, already registered, of the smartphone.



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• Workflow Module

he workflow module is the one that presides over the definition of the rules to be applied to what is detected by the neural network. In this module are set the "behavioral" rules of the system in



relation to what it classifies and geolocalizes.Moreover, as we said, SophyAI can interface with any IoT present. The information received from the sensors are declined in the workflow module also to generate predefined "actions" that can be combined in the same workflow. Alerts or automatic alarms and actions can be generated (intrusion alarms, closing or opening of gates, access control, activation/deactivation machinery, of etc.). ecc.).

Analysis of the already existing camera and functional adaptation to SophyAI

It has already been mentioned earlier that SophyAI can use existing cameras. Any camera that generates an RTSP stream can be interpreted by the platform. In the case of old analog cameras, it is necessary to interface an ADC converter to the video stream, SophyAI was also able to work with old cameras with PAL resolution.





• Why SOPHYAI

in summary, the SophyAI platform allows the bar of cost-benefit analysis to be shifted toward the latter for specific reasons:

- Low infrastructure commitment:

o The platform can use existing digital as well as analog cameras (with analog-to-digital conversion interface).

o Intelligence works in centralized mode (Edge or Cloud) and does not require smart cameras for its functions.

o Direct collaboration with Nvidia and our development on their Jetson class has enabled dramatic cost reductions compared to multi-GPU configurations.

- Cutting-Edge technology

o SophyAI, in all its components, uses the most advanced technology systems.

o The platform is easily and remotely upgradable. It follows, constantly, the evolution of artificial intelligence and IOT factory at global centers of excellence.

- Modularity and scalability

o SophyAI can adapt to different scenarios and needs, without requiring substantial intervention or replacement.

o Small or large makes no difference to SophyAI. Its scalability allows different layers of action to be configured by adapting them to the customer's needs; the platform grows with them and their needs.

- It interprets visual supervision with new paradigms of efficiency and effectiveness

o It is a "real" truly interactive control and surveillance system.

o Its functionality assimilates tasks that are normally carried out by different equipment and installations, which allows a significant reduction in costs and a drastic reduction in the complexity of interfacing therefore It is an efficient system that never gets tired! SophyAI's attention to the observed environment is truly h24.

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Dynamic User Control Interface.

The new control interface makes it extremely easy to set up all configurations related to the positioning of cameras, their mapping and the definition of geofences. The interface also allows the configuration of access hierarchies to the various pages and contains synoptic displays that allow full control over the results generated by the platform. IOT objects that interact with SophyAI are also configurable in the user interface.

The system is fully configurable over the Web, which means that no specific program needs to be installed for its configuration and control.

Below is an overview of the functions usable from the interface that distinguishes the functionality of the SophyAI platform.

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System Overview

This screen summarizes the overall system configuration. It provides a concise overview of the activated features and the computational architecture of the system with the number of activated cameras.





• About the applied neural sensing system

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This screen shows the distinctive neural network elements used by the platform. Different types of networks and software operators may be employed depending on particular detection needs.

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• General camera setup page

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The cameras used by the system are configured here. Specific detection features can be set for each camera, and different neural networks can also be assigned to the same camera in relation to the type of detection to be implemented with a simple mouse click. It is also possible to activate a recording system in relation to the event triggered by a specific class of detected objects.





• Filter configuration page



Specific areas can be set, through simple mouse clicks, where detection filters can be applied. Filters are masks that allow you to define certain areas, of the overall camera shot, where the system's detection function is enabled or not. For example, in this corridor, glass walls were excluded because, by reflecting the image of the person, they would generate a false count of the object" man.





• Camera placement configuration page on the map



The system allows to display on a map the location of the cameras and the chosen shooting area. Again, with simple mouse actions, it is possible to change on the map the area, taken by the camera, on which to apply detection features.





• Digital Twin visualization on map



This page allows the exact location of the "objects" detected by the neural network to be displayed on the map. The map is dynamic and returns, in real time, the movement of the "objects" that are highlighted with particular and configurable icons, depending on their type. The page anonymizes the observed and allows, precisely, a digital view that is twin to what is actually happening within the area under observation.





• Smart Sense video recording (can only be implemented by security officer authorized by GDPR regulations)

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These pages, with their submenus, allow for logs of the Smart Sense recordings made. The Smart Sense logging system allows to record, automatically, an event that was generated over time and triggered by the detection of a particular "object" that appeared in the area under observation or by a particular event interpreted by the neural network. SophyAI recognizes the "object" or "objects" (which can be chosen based on their type) and autonomously triggers a recording of the scene from a few seconds before the detection of the "object" or interpreted event, up to a configurable duration or until the "object" or event is no longer present in the area under observation. This discriminating video recording avoids false positives and greatly speeds up the search for events that have occurred that one wants to have a view of. Specific areas can be selected and also rules can be set regarding the days and hours when recording can take place.

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• Geofences definition page



On this page you can easily configure geofences on a map. Geofences are the areas where SophyAl needs to perform "object" detection. It is a fundamental function of the system that allows, even in a complex context, to select the areas where detection is needed while excluding those where it is not. In an industrial context, for example, it may not be necessary to detect "objects" in non-hazardous areas or, as in the case of the building on the map, detection should have been carried out only in the selected room.





WORKFLOW MODULE

• Screenshot of the workflow module in which the Digital Twin contemplates the detection of people, IOTs, and smart devices



In this screen of the SophyAI workflow module, all "objects" detected by the system are displayed on the map. Not only what is detected by the cameras, but as mentioned in the explanatory pages of the platform, also collaborative "objects" such as smart devices and non-collaborative ones such as IoT sensors. Configuring the workflow module allows for complete awareness of the map area under observation and for declining specific functions in relation to each type of detected "object." The workflow module also makes it possible to assign, to specific areas (through the definition of geofences), different responsiveness attributes so that they trigger specific alarms or enable activations, when a specific "object" stations or transits the area.





• Workflow module pages related to multi-user and device management

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The workflow module pages can define users and devices, their authorization levels, attendance logs, access control, notifications, as well as, as we have seen, the definition of geofences, maps and floor plans.