

IPX ANALYTICS

| A&E Software Specification EN
| v1.0

Software Architecture and Engineering (A&E) Document – Summary

System: IPXAnalytics

Version: 1.0

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1. Software Architecture

- The system is based on a client/server architecture, where the server is responsible for processing the incoming images and dispatching events as configured by the user.
- Support image analysis in Motion-JPEG, MPEG-4, H.263, H.264, and H.265.
- The server shall process images using convolutional neural networks.
- Client authentication with the server shall utilize SSL/TLS protocols.
- The client software shall allow the registration of multiple servers for management.
- The client software shall enable the user to view real-time detection via a Preview feature for either a local or remote server.
- The client software shall provide options for the server's data processing service to be Installed, Started, or Restarted, both locally and remotely via the client.
- The client shall display CPU and Memory usage information for the registered servers, either locally or remotely.
- The client software shall allow the user to change the server's HTTP and TCP access ports.
- The client software shall allow the user to change the user password.

2. Notification and Integration Settings

The system shall allow native integrations with authorized third-party systems via TCP and HTTP APIs. The system shall also support Generic notifications such as HTTP commands (GET, POST), TCP (format, IP/port, content) and save snapshots in user-defined directories.

3. Camera Option

The system shall allow the addition of cameras with name, description, video driver, stream URL (e.g., RTSP), authentication (username/password), scheduling, and the ability to enable or disable the camera for processing.

4. Processing

The system shall allow the selection of Nvidia GPU, CPU, VPU, FPGA, or Intel GPU for processing, in accordance with the compatibility of the selected library. The system shall allow the definition of the video channel and adjustment of detection sensitivity within a range of 0.1 (low) to 0.9 (high).

Should an additional video card be installed on the server, the system shall allow the user to select a specific card for processing that camera's feed.

5. General Detection Configuration

The system shall allow activation of object tracking analysis. It shall allow the configuration of detection sensitivity and the minimum tracking distance in pixels. Tracking shall be stopped after an object has been counted along the predefined counting lines for the configured duration. The system shall allow recognition of the same object for an adjustable period following occlusion. It shall enhance detection precision and enforce minimum/maximum object size limits (in pixels or percentage).

6. Heatmap

The system shall allow enabling/disabling heatmap generation for zones defined within the system. It shall generate a comparative motion percentage per area. The cooling rate of the heatmap shall be adjustable at intervals of X seconds within a range from 0 to 0.9. The system shall store update histories as snapshots.

7. Camera Tampering

The system shall allow enabling/disabling detection of camera scene alterations (tampering) with adjustable sensitivity expressed as a percentage. It shall also allow the user to register a reference image for comparison and send events via HTTP POST and TCP.

8. Communication Error

The system shall allow enabling/disabling detection of communication failures. It shall permit the configuration of a timeout interval and integrate notifications as defined in Section 2.

9. Preset

The system shall allow enabling/disabling camera processing based on its current preset. This functionality shall only operate for integrated manufacturers.

10. Schedule

The system shall allow the creation of scheduling rules for the processing operation of the desired camera, including day/time configurations and exceptions by date/time. The system shall also allow sending a GET command when the schedule starts and ends.

11. IPXAnalytics Settings

The system shall allow the creation of processing configurations with a name and textual description. It shall allow the selection of alert rules that are linked to regions or lines.

12. Types of Analytics

12.1 Exclusion

The system shall allow creating an exclusion region to prevent processing in specified areas of the image.

12.2 Stopped/Loitering

The system shall allow the creation of a Stopped/Loitering rule aimed at detecting objects that are stationary or moving within a region for a configurable duration.

It shall also allow the following configurations: rearm time after an alarm is triggered, object class filter, adjustable alarm trigger delay post-detection, maximum distance traveled in pixels, trajectory limit (Max Tail), minimum/maximum object size limits (in percentage), and integration with notifications (see Section 2).

12.3 Colour Filter

The system shall allow the creation of a detection region for objects containing a specified percentage of a particular color.

It shall also allow the following configurations: color tolerance adjustment (0–100%) for event triggering, configuration of rearm time after an alarm trigger, object class/name to be detected, delay before event trigger after detection, maximum distance in pixels, minimum/maximum size limits (in percentage), detection point (TOP/BOTTOM), color selection (red, blue, yellow, orange, black, white, pink, gray, green, and white with gray), event trigger settings, event merging within a time window, and integration with notifications (see Section 2).

12.4 Moving Object

The system shall allow creating a region for detecting moving objects. It shall also allow the following configurations: rearm time after an alarm is triggered, object class/name to be detected, alarm trigger delay after object detection, maximum movement distance, filtering out small movements, trajectory limit (Max Tail), minimum/maximum size limits (in percentage), event merging within a time window, and integration with notifications (see Section 2).

12.5 NonPresence

The system shall allow creating a region where the absence of a specific object is detected. It shall also allow the following configurations: rearm time after an alarm is triggered, number of absent objects required to trigger an alert, sensitivity adjustment, object type filter, detection point (TOP/BOTTOM), enabling/disabling repeated alarms, event merging within a time window, and integration with notifications (see Section 2).

12.6 Consecutive Directions

The system shall allow creating a region to detect objects moving in a desired direction. It shall also allow the following configurations: rearm time after an alarm is triggered, object class/name to be detected, minimum/maximum size limits (in percentage), counting consecutive directional movements, angle measurement (0°–315° in 45° increments), analysis of up to 10 trajectory points, ignoring stationary objects, event merging within a time window, and integration with notifications (see Section 2).

12.7 Distance

The system shall allow creating a rule to detect when the distance between two or more identified objects is greater or less than a predetermined value. It shall also allow the following configurations: rearm time after an alarm is triggered, sensitivity adjustment, distance specification in pixels with a multiplier, unit and rule selection (Smaller/Bigger), selection of two objects (in either Stopped or Moving states, with sizes in percentage), detection point (TOP/BOTTOM), event merging within a time window, and integration with notifications (see Section 2).

12.8 Contains

The system shall allow the creation of a region to detect if a primary object contains a secondary object. It shall also allow the following configurations: rearm time, sensitivity adjustment, selection of primary and secondary objects (with sizes in percentage), containment determination (yes/no), detection points (TOP/BOTTOM), event merging within a time window, and integration with notifications (see Section 2).

12.9 Detection

The system shall allow configuring a region to detect an object. It shall also allow the following configurations: rearm time after an alarm is triggered, setting the number of objects (exact or approximate), sensitivity adjustment, object selection and logic (OR/AND), detection point (TOP/BOTTOM), minimum/maximum size limits (in percentage), event merging within a time window, and integration with notifications (see Section 2).

12.10 Pose Estimation

The system shall allow creating a region for detecting one of three pose options: hands at shoulder height, hands at ear level, or seated pose. It shall also allow the following configurations: rearm time after an alarm is triggered, sensitivity adjustment, detection point (TOP/BOTTOM), enabling/disabling repeated alarms, event merging within a time window, and integration with notifications (see Section 2).

12.11 IPXCopilot

The system shall allow integration with an LLM network to generate alerts via prompt. It shall also allow the following configurations: rearm time after an alarm is triggered, sensitivity adjustment, specification of the IPXCopilot address, username, and password, configuration of query/response intervals, selection of logic (AND/OR) and keywords, and integration with notifications (see Section 2).

12.12 LPR

The system shall allow creating a region for vehicle license plate recognition. It shall also allow the following configurations: rearm time after an alarm is triggered, setting the number of plates per line, selection of trigger mode (Always/API/Object), country-specific license plate format selection, configuration of a key for data substitution, event merging within a time window, and integration with notifications (see Section 2).

12.13 QRCode/Barcode

The system shall allow configuring a region for the detection of barcodes and QR codes. It shall also allow the following configurations: rearm time after an alarm is triggered, enabling/disabling repeated alarms, choice of binarization method (None/Local/Global/Fixed/Degree), definition of the format/minimum characters/string to be searched for, configuration of a key for data substitution, and integration with notifications (see Section 2).

12.14 OCR

The system shall allow integration with an OCR reading service.

It shall also allow the following configurations: rearm time after an alarm is triggered, specification of the OCR server address, listing of keywords (one per line), configuration of a key for data substitution, and integration with notifications.

Features and specifications are subject to change without notice.