# ARS – Augmented Reality System

The ARS (Augmented Reality System) allows the users to visualize on standard displays an Augmented Reality visualization, (that is, to super impose in real time and in a fully 3D way) any information (video or still images) to a given video stream: this Augmented Reality visualization is performed in a georeferenced way, that is maintaining the geographic information.

The ARS can be used in parallel as a stand alone solution, as well as integrated with the existing Video Surveillance System.

You can see in real time a video stream coming from IR, Thermal or Visible cameras with any contextualized graphic element coming from a database of georeferenced digital contents. So you can see, precisely superimposed to the video images of a lake or of a dam, information related to the mechanical stress of the dam walls or the avatar of a human presence hidden to the camera view but identified by local sensors.
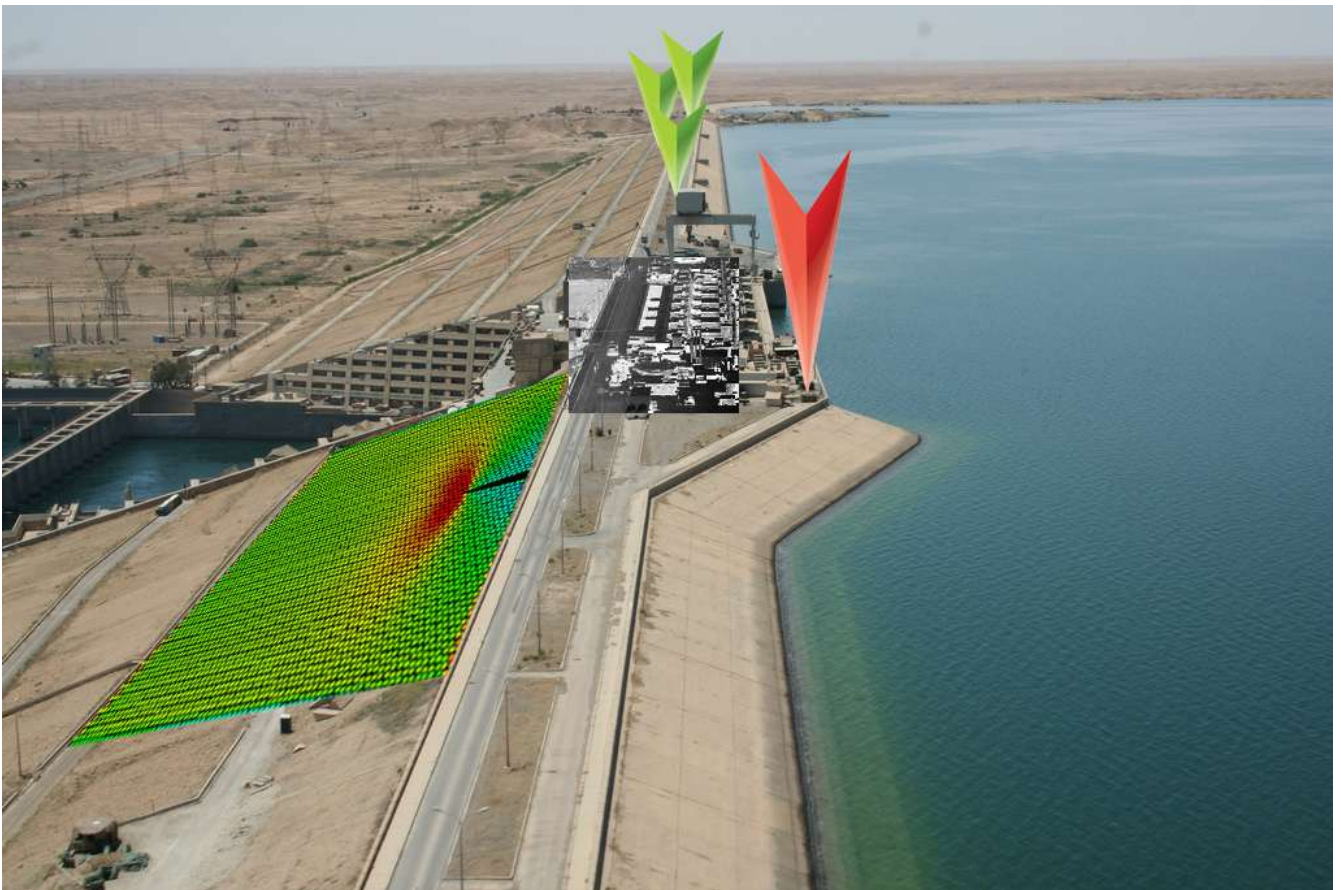
Example of ARS Application in Dam Monitoring

ARS is a real time data fusion system capable to handle and merge different georeferenced data sources (video streams, Images, Data sensors, ..) in order to allow the user to benefit from an integrated, multispectral, multisensorial view of the scenario under control. ARS interacts directly with Long Range Surveillance Systems by means of a control unit and PTZ controls.

User can move in PTZ the reference video channel and get automatically Augmented Reality information on the acquired images and videos by means of standard controls and display the results on standard displays in both local or remoted operating mode.
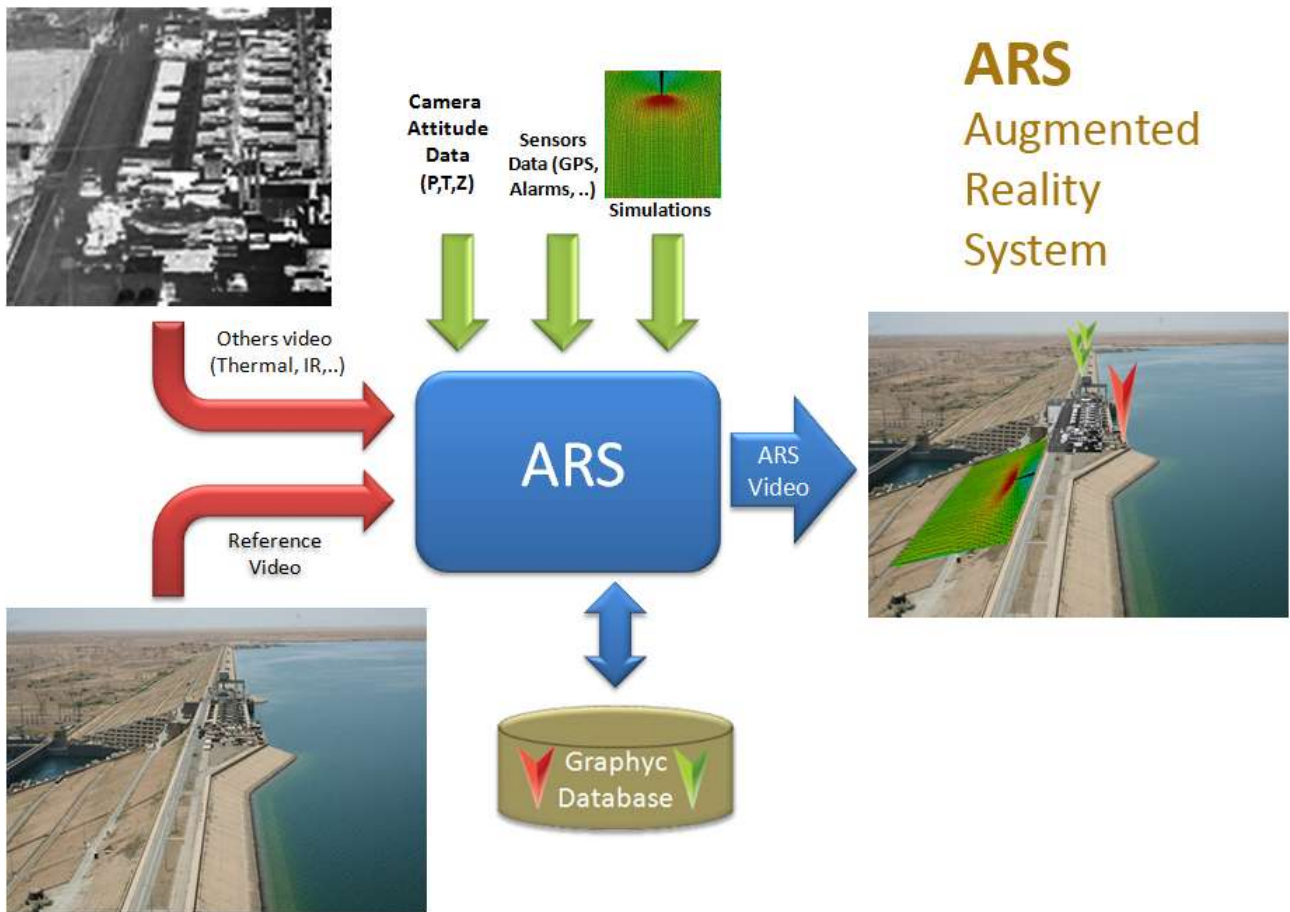
The ARS Workflow

From a functional point of view the ARS system can be used in two operating configurations:

1) **Stand Alone configuration**, where the ARS system uses the native low cost AXIS 233D PTZ dome as the reference camera. In this configuration the system only need to be interfaced with existing sensors data coming from the field or simulation data coming from dedicated numerical processors. A version with fix 360° camera system is also available (see Image 1); in this configuration there are no moving parts, and the PTZ controls are simulated by SW in real time over a 25 Mpixels colour image.

ARS Standalone architecture
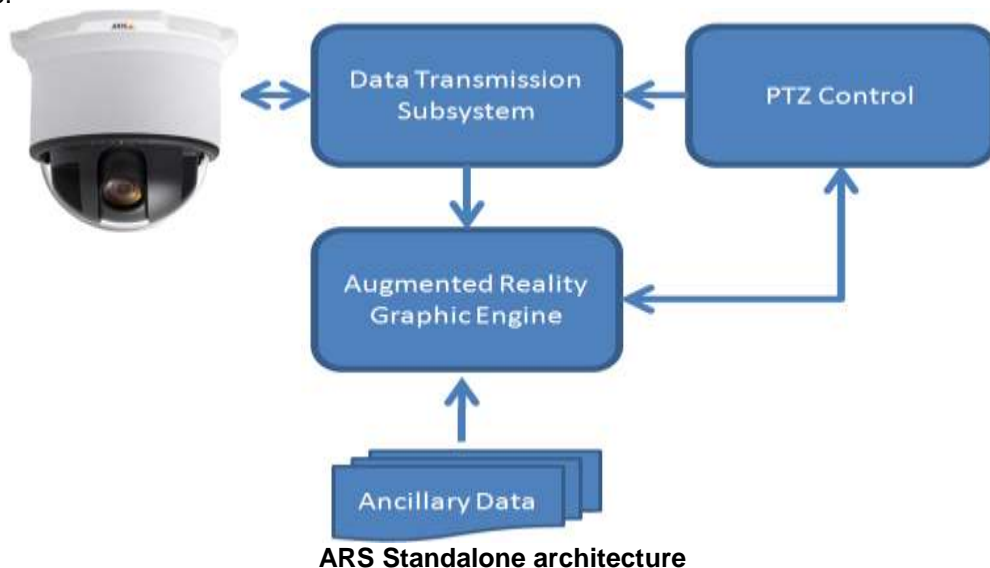
Attitude angles and Zoom value (PTZ) will be specific sensors capable to provide a final **angular resolution of about 0,001 deg**: this resolution it is necessary in order to create a perfect match between real images and the digital augmented reality contents.

2) **Integrated Configuration,** where only the Control unit it is used for the data fusion and real time graphics processing, while the reference images are acquired by the surveillance cameras selected by the client. In this configuration it is necessary to get the PTZ values from the surveillance cameras in order to generate the synchronization between images and graphics.
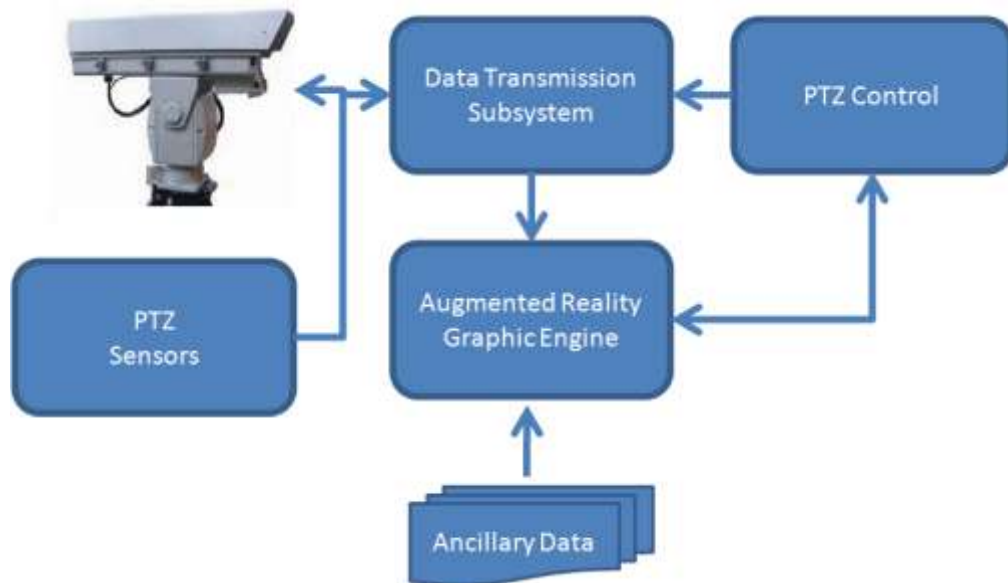
ARS Integrated architecture

In both cases, PTZ commands are provided by dedicated controls (Joystick or separated rugged angle controls and from an integrated control platform that acts as Data Hub and Graphic Processor.

PTZ Controls

CONTROL AND PROCESSING UNIT:

ARS Control and Processing Unit

The Control and Processing Unit :
1) Process the graphics rendering in real time and perform the data fusion tasks ;
2) Manages the digital contents database
3) Manages the authoring environment.

Description	Specification
OS	Windows Vista
CPU	Intel Core Duo or higher
RAM	4 Gig of RAM
HD	500 GB HD
Graphyc Card	Nvidia Geforce 9000 series or equivalent
Network	Gigabit Ethernet
Dimensions	400 x 400 x 200 mm
Weight	8 Kg
Power consumption	100W @12 VDC

Control and Processing Unit HW Specifications

The Control and Processing Unit manages the entire process: from data acquisition to the data fusion phase. The SW provided with ARS includes also a specific Authoring environment where it is possible to define the matching between the real world acquired by the surveillance sensors and the multimedia contents where they can be georeferenced or simply associated to specific POI (Point of Interest)

SW SUITE:

The SW environment of the ARS is composed of an application that interfaces with the whole system of physical sensors and with the User's display. This application also manages:
1) the production of integrated video stream with Augmented Reality multimedia contribution, by managing the multimedia contributions from the database of its dedicated content management system;
2) the calibration phase, where digital contents and POI are associated to the FOW ad different PT angles.