Essential Points for Setting up Video Wall Facility

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Abstract

A video wall solution is being proposed to display the various types of thematic maps (flow lines maps, graduated symbol maps, choropleth maps, pie charts and bar charts). The various tasks related to geographic analysis such as creation of buffer zones, performing polygon overlay and manipulating tabular data, which are carried out using GIS tool shall also be displayed on the Video Wall. It is important to consider features like: resolution, aspect ratio, contrast ratio, viewing angle, color temperature, pixel pitch, computer's gigahertz or a stereo's wattage. Shoppers face not only the challenge of understanding new technology concepts, but also the task of figuring out which numbers or claims they should heed to. The different specification parameters used and respective values arrived at are presented in the paper.

Keywords: Geographic information systems (GIS); data exchange; e00 format; ASCII format; DXF; export; import; GISNIC

1. Introduction

National Informatics Center (NIC) is a premier Information Technology (IT) organization under Department of IT, Govt. of India. It has its Headquarters (HQ) at New Delhi. It has State Units in all the State capitals and Union Territory. NIC provides informatics support to district level administration through it District centers established in around 600 districts of India. All these offices are connected through robust network system called NICNET. Besides a large number of Application Divisions at HQ provide total Informatics Support to the Ministries and Departments of the Central Government. The spectrum of services provided by NIC comprises Consultancy, Software Design & Development, Networking, Internet Services, Web Services, Video Conferencing, Rural Informatics, Multimedia and GIS etc.

GIS division of NIC has developed low cost GIS software called GISNIC. It provides complete state-of-the-art desktop "Geographical Information System (GIS)" solution. It is based on an easy-to-use graphical user interface (GUI). GIS is becoming the key in helping Government and commercial entities for managing natural resources more efficiently and cost effectively. It helps in performing various tasks like managing urban utilities, understanding climatic change etc. The visualizations of

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geo-spatial relationships like satellite imagery also plays important role in planning process. This visualization is facilitated by a GIS tool.

The GIS division is involved in the creation, maintenance and analysis of the spatial data (raster and vector form). It is extremely helpful to analyze and discuss the data when presented on large displays. The Display solution in the GIS Hall was to be integrated in such a way that multiple images as well as one single image may be displayed. These images shall be sized as per the requirement of the team members discussing and analyzing the data. A broad requirement can be visualized from the figures 1 and 2.

The policy framework provided by IT Task Force for India expects India to emerge as Global InfoTech Superpower in this millennium. This also emphasizes the need for spatial data for GIS user community and Industries and hence the need for developing digital spatial databases from different sources including satellite imageries, aircrafts photography, digitization of maps and transactional databases. However to exploit the technology to benefit the planning process, there is need to initiate process for integration of data, based on interoperable open standards, specifications & formats. Just as the software equipped with the above features is critical for a Geographical Information System (GIS), the presentation and display of the same in a suitable manner is equally imperative.

Fig 1 : A Satellite Image

The paper is organized in four Sections. Requirement Specifications are described in Section 2. In Section 3 we have outlined design and integration of existing infrastructure with Video wall setup. The paper is summarized in the Section 6.

2 Requirement Specification

The main objectives of the GIS Department at NIC are to create/Integrate, maintain and disseminate digital spatial database at all India level over GIS server at NIC HQ. Some of the salient features are:

- Bringing together many Geo-spatial dataset sources and Dissemination through a web-based approach.
- National Geo-spatial Framework consisting of the referencing system built around standard datasets with an appropriate institutional arrangement.
- Creation and maintenance of defined common standards,
- Information up to village, the smallest unit of administration.

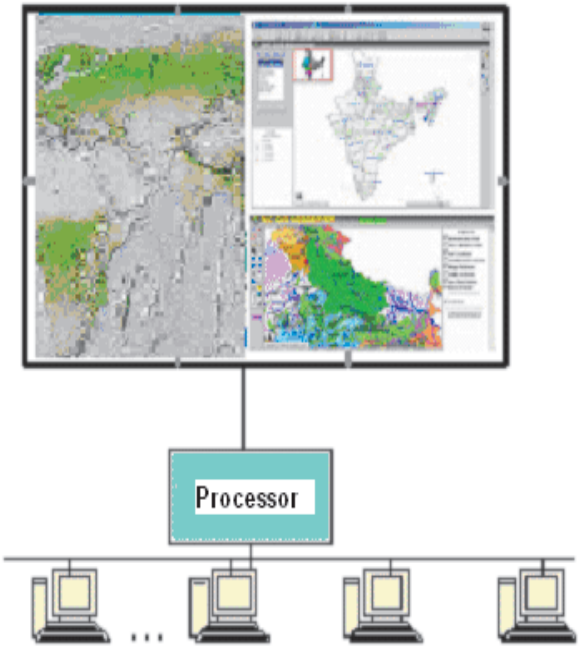

Fig 2 : Multiple images Displayed

The GIS division is involved in the creation, maintenance and analysis of the digital Geo Spatial data. It is extremely helpful to analyze and discuss the data. When such data is presented on large displays, it helps in carrying the task in more precise and accurate way. The Display solution in the GIS hall has to be integrated in such a way that multiple images as well as one single image can be displayed. These images shall be sized as per the requirement of the team members discussing and analyzing the data.

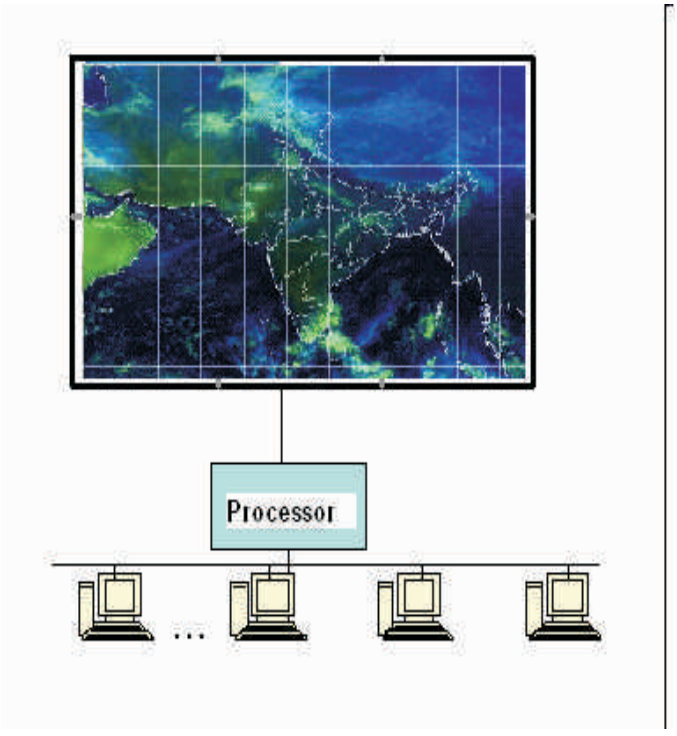

Fig 3 : Single image on the Displays

It is important to understand different features and their meanings to arrive at the decision about the suitable product required for the purpose under the constraint of available budget and space where it is planned to be placed.

3. Specification Parameters

Whether it involves a big-screen TV's resolution, its contrast ratio, viewing angle, color temperature, pixel pitch, a computer's gigahertz or a stereo's wattage; shoppers face not only the challenge of understanding new technology concepts, but also the task of figuring out which numbers or claims they should heed to. The display feature determines various characteristics like diagonal size, resolution, contrast ration, brightness etc. These are outlined one by one below.

Aspect ratio is 4:3 for standard TV. The video signal is 4 pixels wide for every 3 pixels high - the standard size box we see on TV. The 16:9 video aspect ratio is the image size we see in a movie theater, it is much wider than its height. For video wall, we asked for aspect ratio of 4:3.

Size is measured diagonally and larger is the size, better is the view ability. The finer points can be viewed clearly. A video cubes are available these days in various sizes e.g. 50", 67", 89" and 100". Keeping the space constraints in view, we have zeroed on to 50" cubes. The number of cubes will be 8 arranged in a matrix form of 4 columns and 2 rows as shown in the schematic diagram.

Resolution is simply a measure of the number of horizontal and vertical pixel line that can be displayed on the screen without scrolling. For example a resolution of 800 X 600 implies that a screen can display 800 vertical pixel lines (800 pixels in a row) and 600 horizontal pixel line (600 pixel in a column) without scrolling. While determining the resolution requirement of a video, native resolution of the graphics card is to be understood first. There are various graphics card available in the market today and are being used in computer systems. The range includes XGA, SXGA, SXGA plus, PGX, UXGA. The resolution varies from 800X600 to 1920 X 1200. Many display devices supports range of resolution. Thus we have asked for the full range of resolution so that it can be adjusted as per requirement.

Contrast ratio is a measure of the difference in brightness between the highest level of white and the deepest shade of black that a TV screen can produce. The greater the ratio, the more shading, and therefore detail, a TV can display. The standard ratio is 1000:1 and we have asked for it or better that goes currently up to 1200:1. The battle of contrast ratios is brewing in the television business.

Brightness is a relative expression of the intensity of the energy output of a visible light source. It can be expressed as a total energy value or as the amplitude at the wavelength where the intensity is greatest. In the RGB color model, the amplitudes of red, green, and blue for a particular color can each range from 0 to 100 percent of full brilliance. These levels are represented by the range of decimal numbers from 0 to 255, or hexadecimal numbers from 00 to FF. Brightness is an attribute of visual perception in which a source appears to emit a given amount of light and it should be used only for non quantitative references to physiological sensations and perceptions of light. It was formerly used as a synonym for the photometric term "luminance" and (incorrectly) for the radiometric term radiance.

Hue, saturation, and brightness are aspects of color in the red, green, and blue (RGB) scheme. These terms are most often used in reference to the color of each pixel in a cathode ray tube display. All possible colors can be specified according to hue, saturation, and brightness (also called **brilliance**), just as colors can be represented in terms of the R, G, and B components. Most sources of visible light contain energy over a band of wavelength.

Hue is the wavelength within the visible-light spectrum at which the energy output from a source is greatest.

Saturation is an expression for the relative bandwidth of the visible output from a light source. As saturation increases, colors appear more "pure." As saturation decreases, colors appear more "washed-out."

Brightness uniformity is the percentage of brightness carried from corner to corner and edge to edge of an image. A higher uniformity rating means better consistency throughout the image. For the most consistent images, look for a uniformity rating of 85% or better.

Color Temperature is a measurement in Degrees Kelvin that indicates the hue of a specific type of light source. Color Temperature is used to suggest realistic colors for the lights in a 3D scene. Visible colors are relative to the Color Balance of a film stock or video camera, with the two most common fixed settings being 3200K Indoor color balance, and 5500K Outdoor (Daylight) color balance. The color temperatures attributed to different types of lights are correlated based on visible colors matching a standard black body, and are not the actual temperature at which a filament burns. The better color combination, brightness and contrast are achieved at the value 6500K or near it. We asked for it.

Lamp Characteristic: (Ultra-High Performance (UHP)) is high intensity discharge lamp combines a point like arc with lifetimes of many years. Exceeding the brightness of the sun, the UHP lamp is the ideal light source for demanding optical applications. To convert the image of an LCD display into a large area picture, you need an optical projection system and a high intensity point light source. The UHP lamp has an extreme high luminance, higher than the sun.

Mullions are gap between two video cubes when joined to make a large screen. If this gap (or width of joining) is less, better uniformity is achieved. Thus we have decided for less than .8 mm which is available with many video wall solutions.

Pixel Pitch is the measurement of the smallest bit of data in a video image. Smaller the size of the pixels in an image greater is the resolution. A better quality video has horizontal pixel pitch less than equal to .22 mm and has diagonal pixel pitch less than equal to .25.

Viewing Angle is the direction from which the display will look the best. It is set during the manufacturing process, and cannot be

changed later by rotating the polarizer. Viewing direction is specified as positions of a clock face, see figure 4. A twelve o'clock viewing angle means that the optimum direction is above the normal to the display, while a part with a six o'clock viewing angle is best viewed from below the normal. When specifying the viewing direction, one needs to think about how the device is going to be used. For example, a calculator is usually sitting on a desktop or held in the palm of your hand and viewed from the six o'clock direction. Some instrumentation, like a wall thermostat, may be mounted below the viewer and needs to be viewed from the twelve o'clock direction. Other viewing angles are possible but not common. A car clock display, which will always be to the driver's right, may have a nine o'clock viewing angle, or possibly a ten-thirty one if the clock is low on the dashboard.

In a direct drive display, viewing angle is not critical because the display will look good from almost any direction. It becomes critical when the display is multiplexed, the higher the multiplex rates, the greater the problem. Thus the viewing angle of the device is important once the site plan is in place. The site plan is shown in figure 5 and viewing angle requirement in table 1.

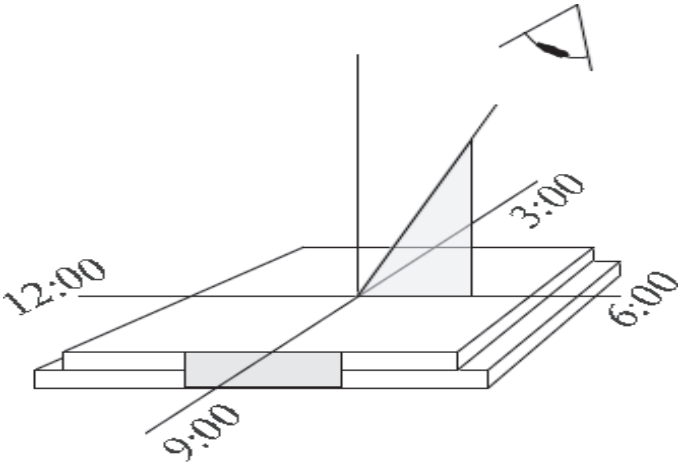

Fig 4 : Viewing Angle Illustration

4. Design and Integration

A video wall solution in GIS division is required for displaying data that comprises of: GIS vector data related to administrative boundaries, major locations, transport layers, natural resources, satellite imageries etc. The solution is to facilitate the scientists working on PRAMA system to

- Manage the GIS-NIC wall
- Launch and arrange the images on the wall
- Launch the local applications
- Launch the Remote application
- Allow retrieving the data, graphical, & video applications and positioning them any where on the wall.
- Option for multiple operators to work simultaneously

The detail of the set up facility is shown in Figure 5. GIS-NIC Wall is setup in the Lab for PARAM.

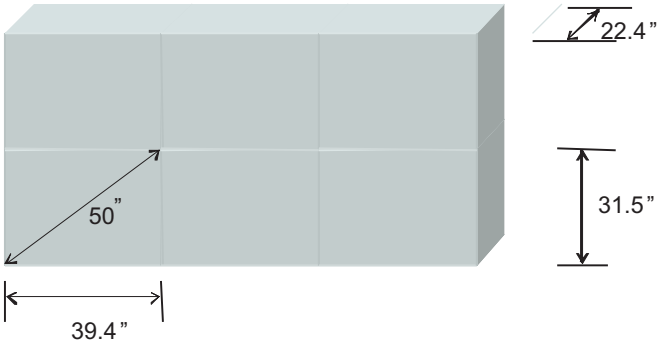

Fig 5 : Video cubes in 3 X 2 Matrix

The specifications and values determined for different display parameters identified are detailed here. The GIS-NIC wall is made of 6 Video cubes arranged in 3 X 2 matrices (3 columns x 2 rows). This is schematically shown in Figure 5 and specification is tabulated in table 1.

Table 1 : Specifications of Video Cubes for GIS-NIC Wall at GIS Hall, NIC, New Delhi.

S No	Description	Specification
A	**Display**	
1	Display Cube Size (each)	50 inch (diagonally)
2	Resolution	SXGA plus (1400 x 1050)
3	Contrast ratio	Better than 1000:1
4	Brightness (Luminous Flux)	Better than 600 lumen
5	Brightness uniformity	> 95%
6	Color Temperature	6500K or Better
7	Aspect Ratio	4:3
8	Horizontal viewing angle	+/- 90 degree (Full view angel) +/- 35 degree (Half Gain View angle)
9	Vertical viewing angle	+/- 90 degree (Full view angel) +/- 35 degree (Half Gain View angle)
10	Lamp Characteristics	100 W UHP Lamp
11	Lamp Life	15000 hours or better
12	Lamp redundancy	1:1 (Dual Lamp automatic switching)
13	Dimmer	Optical Dimmer 50 % to 100 %
S No	**Description**	**Specification**
14	Inputs	Analog inputs: BNC (RGBHV); 15 pin VGA Digital: DVI-D IN/OUT
15	Mullions	< 0.8 mm

B	Display Controller	
1	Out put resolution	Should support XGA/SXGA/UXGA
2	Integrate of multiple cubes	To suit the setup of 3x2 matrix
3	Input specifications	BNC (RGBHV); 15 pin VGA Composite Video BNC IN / OUT S-video IN / OUT NTSC 4.43, PAL, PALM, PAL N, PAL60
4	Scaling	Smooth scaling icon size to screen size
C	**Mandatory Accessories required**	
1	Wall Mounting Angles	As per site requirements
2	Signal Cables as required	
3	Cables and Power Chords as required	(To be assessed by the vendor)
4	Safety Accessories/Kits	
5	User Manuals	

The operating systems supports required is for MS windows as well as for Solaris OS under which PARAM system is operating. Other software required was Wall Management Software (WMS) to control, manage and determining window layout for applications. Beside this necessary emulation and screen scraper software is also required.

5. Summary

The GIS division is involved in the creation, maintenance and analysis of the spatial data (raster and vector form). A Display solution in the GIS Hall is essentially required to integrated in such a way that multiple images as well as one single image may be displayed. These images shall be sized as per the requirement of the themes and team engaged. The policy framework provided by IT Task Force for India has also placed responsibility on NIC to emerge as Global InfoTech leader. It emphasizes the need for developing spatial data and tools to make it in use. However to exploit the technology to benefit the planning process, there is need to initiate process for integration of data, based on interoperable open standards, specifications & formats. Just as the software equipped with the above features is critical for a Geographical Information System (GIS), the presentation and display of the same in a suitable manner is equally imperative.

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