VideoCAD for professional design of CCTV systems

Author **Article - VideoCAD for professional design of CCTV systems**

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During the design of CCTV systems much time is spent on estimating lens focal length and the right location of video cameras to get the necessary image on the screen.

Estimating person identification areas and license plate reading-out areas causes additional difficulties for a designer. The task becomes more complicated when it is necessary to choose optimal relative positions of several cameras or when it is necessary to make one camera solve several tasks (for example identification of entering people and surveillance over the perimeter). You can also add the necessity to calculate how this or that object will be displayed, where the motion detector will detect a person for an instance with enough light and contrast ratio, and where it will not. Not only lens focal length but also the height of the camera installation, maximum distance and the height of surveillance have an influence on the screen image. Choosing the wrong camera location and the wrong height of camera installation, even with the replacement of the lens, wouldn't be able to provide you with the desired image!
If we also remember obstacles that distort the viewing areas and dead space under the camera, then we can see the difficulty of the problem. The more difficult the task is the more likely that a mistake will occur. The result of which at best can be a project cost increase.

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These tasks can be solved in different ways.
Someone accurately calculates the viewing areas for several heights and lens focal length of each camera using self deducted formulas or formulas taken from guide books and then transfers or combines obtained templates.
Someone makes the calculation easier and having introduced reserves gets approximate results with the help of a Lens calculator.
Someone draws on the plans only the horizontal angles from lens specifications thus confusing himself and the customer even more.
And many people ignore such calculations because of their complexity and labour-intensiveness and place wide-angle lenses or the most expensive ones (from the price list of the producer).

A CCTV project that doesn't show the viewing areas of each camera and their functions in different regions of space cannot be considered a professional one.

Wide-angle lenses (very often they remain the same even after acceptance of work) as a rule satisfy the needs of a customer only up to the first emergency. After an emergency it comes out that there is practically no use for the installed CCTV system. Criminal is not identified, license plate is not read out, motion detector did not detect any movement. It becomes obvious that there should be

more cameras, their locations should be different and lenses should have other focal lengths.

The situation looks different if professionally (well) executed CCTV projects participate in a tender. Using a professional CCTV project it is possible to discuss with a customer a task for each camera, and to choose and substantiate the necessary number. After doing the calculations more video cameras may not be needed as one camera can fulfill several tasks. Such solutions are more time consuming but create effective and at the same time economical projects. After each discussion and transference and when camera parameters change one has to recalculate and compare several variants of cameras placement. Thus professional designing of a television system is a very difficult task that demands much time.
Not all customers understand this and they give preference not to the best project, but to the one that was quickly rendered or to the cheapest one.
All dependences of camera viewing areas obey the laws of geometrical optics and can be described mathematically.

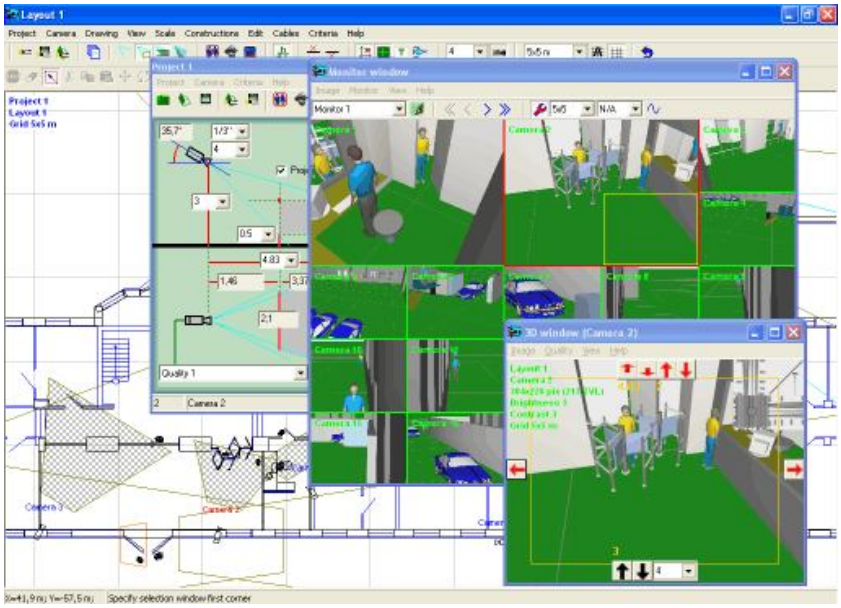
Widely spread are Lens Calculators that can be used on many security web sites on-line. They can be in the form of small programs or a plastic circle. Viewing areas are viewed as a rule in the two-dimensional aspect which allows the use of relatively easy calculations.
Calculators' resources are approximately the same but they are insufficient for professional designing. The most convenient is the plastic circle which can be easily used in field conditions. Calculators are convenient for rapid calculations of viewing field width and height, but they don't allow calculating even the dead space under the video camera let alone full-fledged calculation of viewing areas' projections to draw them on the plan. This makes calculation of person identification areas and license plate reading out areas out of the question.

Moving to a three dimension coordinate system the complexity of calculations increases many times, and it is practically impossible to find a good three-dimensional free calculator. But it is still inconvenient to work with a specialized three-dimensional calculator especially when it is necessary to calculate several connected video cameras. One has to simultaneously use a program-calculator and CAD program, that locates video cameras on the plan, while recalculating and redrawing viewing areas projections in order to get the necessary result.

The next step is the integration of a three-dimension calculator and CAD program. The calculator acquires a graphical interface and its calculation results are presented in graphic form. Obtained graphical calculation results are represented directly on the plan of an object in horizontal and vertical projections.
Graphical interface that allows locating video cameras by one mouse click, to raise or lower a video camera only by one turn of a mouse wheel, change its angle of inclination and lens focal length and see the result there and then, makes CCTV systems designing easy and exciting work. Completed projects have the maximum of exactness, are quick to implement and correct and don't demand from a CCTV systems designer mathematical knowledge and understanding of peculiarities of objects' representation in different parts of viewing areas (although such understanding remains rather useful).

These and very many other ideas are realized in full measure in a new program intended for CCTV systems designing. This program is called VideoCAD. The latest version of VideoCAD 5.0 is a full value CAD program integrated with a special three-dimension calculator for calculating cameras' viewing areas' parameters. With the help of VideoCAD one can design a CCTV project of any difficulty in a short period of time. Specialized calculations of video surveillance (viewing areas, person identification areas, license reading-out areas, detailed representation of objects in different parts of a viewing area, calculation of length and electrical parameters of cables) are tightly integrated

with traditional CAD interface.



Let's look briefly at an example of designing a CCTV system with the help of VideoCAD.

Examining an object, discussing and formulating the list of tasks stated before the CCTV system. Getting of an object plan (better in electronic version, but also acceptable on paper).

Object plan drawn on paper can be scanned and used in VideoCAD as a background for cameras location. Electronic object plan can be also used in VideoCAD (*.bmp, *.jpg, *.jpeg, *.emf, *.wmf, *.dxf, *.dwg are supported).

Direct on the background with the help of VideoCAD one can create preliminary camera locations.

During the next visit on the object preliminary cameras location is corrected taking into account possible camera locations, light, different obstacles, possibilities of cables lay out, etc. Corrections of location are simple and convenient in VideoCAD. All necessary actions are conducted with several clicks of a mouse.

With the help of VideoCAD length and necessary parameters of coaxial and power cables can be calculated. File containing text with detailed descriptions of all video cameras and cables is produced. On basis of obtained location with marked viewing areas and also with the help of the text file a business proposal is made.

Business proposal is sent to the customer for discussion and concordance. During the discussion camera tasks and their locations are specified after which with joint efforts requirements specification is made. While making requirements specification one can also use the text file. Especially efficient is the discussion of a project in front of the computer, as then it is easy to choose and total the required number of cameras. It is obvious that after such a dialog a competent customer will hardly move to a competitor.

In the process of designing all that is left, if necessary, is to draw out the planning in VideoCAD, to make specifications, explanatory notes, estimate calculations, etc. Your professional project is ready!

While installing and adjusting, installers won't have to think about how to turn and to incline each camera. In the project everything they need will be mentioned; lens focal length, place and height of each camera, viewing area. An installer will only need to turn the camera in order to get the designated project viewing area.

While accepting the CCTV system, the customer makes sure that all viewing areas agree with those marked in the project. After estimating the quality of image and installation work, he signs acceptance report.

After having accepted the system, all changes to viewing areas should be charged extra.

Of course the real sequence of actions can differ, but in general one can see, that the process of designing a CCTV system is getting clearer for both the designer and the customer. The most important is the result one gets; an efficient CCTV system that fulfills its functions in full measure. Who knows how many crimes can be prevented and uncovered with the help of it.

With VideoCAD you can:

Choose the most suitable lenses, heights and locations for camera installation to provide the required parameters of view areas, detect and identify a person, read license plates out and obtain an object image of required size on a display using the known actual sizes and location of an object.

Choose visually a relative location of cameras using the graphics window with CAD interface.

Calculate the horizontal projection sizes of viewing, person detecting, identifying and license plate reading-out areas to draw them on the object plan.

Measure the view area distortions, arising from natural obstacles.

Calculate the image size on a display of any object in camera view area in the percentage of display size, pixels, TV lines and millimeters (inches in case of Imperial format).

Obtain a drawing containing two projections of object layout with the camera images, calculated view areas and cables, and with coordinate grid and titles to be pasted into explanatory notes as an illustration as well.

Locate cameras and cables on the prepared layouts in *.bmp, *.jpg, *.emf, *.wmf, *.dwg, *.dxf formats.

Print out the obtained drawing on one or several pages.

Obtain a text file with full description of all the cameras in project, view areas and cables to be pasted into a project explanatory note or used as an instruction on installation.

Study the influence of the criteria of person detection, identification and license plate reading-out on the sizes and location of the correspondent areas by changing the criteria according to the video image quality obtained.

Study the principles of object representation in different view area parts

using test object and graphics window.

Calculate the length and electric parameters of cables.

Spare the means and win tenders due to the reduction of cameras' quantity in projects and the increase of their efficiency.

Reduce the time expended and boost the design quality.

Cut down the amount of controversial situations with customers and accelerate their solution.

All the calculations are real-time allowing to view the influence of each parameter specified upon the final result.

VideoCAD does not use any simplified formulas and techniques, in non-typical situations giving out considerable errors.

VideoCAD operates with any correct parameters, both selected from the list or typed.

VideoCAD can be used for the prompt, but exact calculations of the view area projections to draw an object plan when performing a graphical part of project. It can be also used to perform a view area scrupulous analysis to choose the most suitable camera location and lens parameters.

VideoCAD can be effective at CCTV designer training.

Despite its reach of opportunities VideoCAD is an inexpensive program, available even for the general public. At present VideoCAD is successfully used in many CCTV projects of different scales.

http://cctvcad.com

Rating: 0.00/5.00 [0]

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