

# MULTIMEDIA SURVEILLANCE CAMERAS AND THEIR FEATURES IN USING

Bozorov Abdumannon

Lecturer, Department of Engineering and Technical Support of Security,  
University of Public Safety of the Republic of Uzbekistan

Shoyqulov Shodmonkul Qudratovich

Senior Lecturer, Department of Applied Mathematics, Faculty of Computer Sciences,  
Karshi State University, Karshi, Republic of Uzbekistan

## Annotation

The article discusses one of the important and popular components of the modern security of human life - video surveillance systems and their choice for installation in a particular place. These systems will contribute to the control, accounting and rapid response to various kinds of events occurring in protected areas.

**Keywords:** video surveillance, camera, object, IP-technologies, IP-camera, placement, implementation

## INTRODUCTION

Modern human life cannot be imagined without surveillance cameras. Cameras will be installed everywhere - in houses, streets, shopping centers, markets, workplaces, schools, universities, parks, etc. That is, at present, video surveillance systems are used everywhere. Video surveillance systems are designed to protect a person's life, for use in protecting property, if necessary, to control what is happening, when searching for the location of a particular person, to view the archive of a person's actions. Installation of location systems and the use of calculated location data in video surveillance systems can automate the process of video recording of the required events and significantly reduce the time of working with the video archive.

Surveillance cameras are equipment that will be an excellent choice for protecting objects for various purposes. But you need to understand that the security of an object directly depends on the characteristics of the cameras themselves, so it is important to take into account a large number of factors. Savings in this case are inappropriate and can lead to even greater costs if the object is robbed. When choosing equipment, you need to take into account the quality of shooting, image detail, connection methods and, of course, the viewing angle of surveillance cameras. How much territory can you control [1].

There are many types of video surveillance systems and it is very difficult for the average person to make the right decision which one is most suitable for his case. Even, the employees of this area do not always answer correctly. Therefore, even when planning to order an installation service from a specialized company, the client needs to understand the basic things in order not to overpay for functions and options that he does not need.

For the purpose of the autonomy of the video surveillance system, the possibility of access to it from anywhere in the world, the so-called GSM video surveillance system began to be used. This will require at least a USB modem from a mobile operator. In places where Internet access is needed, which is not able to use wired ADSL, coaxial or fiber optic communication channels, for example, in country houses or cottages, 3G / 4G mobile Internet is used via USB modems with a SIM card inside. The AHD (Analog High Definition) standard is an open high-definition analog signal transmission technology that has replaced standard analog camera systems. Due to the low cost of equipment, ease of installation, configuration and

operation, high signal transmission range without any distortions and delays, the universal AHD format is one of the most popular and promising security systems on the market today.

## RESULTS and DISCUSSIONS

Some standard tasks are set for video surveillance systems. The standard tasks facing video surveillance at any facility are similar:

- Current monitoring
- Working with video archive
- Remote viewing of current image and archive
- Video image recording by motion detection, as well as when security sensors are triggered or the signal is lost

At a large facility, the following tasks are added to the standard ones[2]:

- Integration with the security and fire alarm system
- Integration with the hardware and software complex of the access control and management system (ACS)
- Scalability and modernization of the video surveillance system if necessary
- Current monitoring and management of the entire system from one point, including the organization of video surveillance via the Internet

Consider an overview of the main video surveillance systems on the market. The following video surveillance systems are most common in the security market:

- A video surveillance system built on the basis of a video recorder.
- A video surveillance system based on a personal computer and video capture cards.
- A video surveillance system based on a personal computer and IP cameras.

1. A video surveillance system based on a video recorder. The DVR is a complete device that is identical in appearance to a conventional DVD player. Internally, the DVR is similar to a PC. It has a motherboard, processor, RAM, hard drive, video input and output connectors, USB port, PTZ camera control port. All this is implemented on one board and does not have the possibility of any upgrade. Many video recorders have alarm inputs and outputs for connecting security sensors and external alerting and actuating devices, such as sirens, electromechanical locks, and a security console.

DVRs have 4, 8 or 16 video inputs for connecting surveillance cameras. The cameras used are analog. This type of camera converts the video signal into a format that can be received by a television or other receiver, such as a security monitor. The video surveillance system itself is digital, since the received data is stored on a digital medium.

The performance of the system is completely dependent on the performance of the processor. A measure of processor performance is clock speed and architecture. The DVR is connected to a regular TV through the VIDEO-IN video input, also called "tulip" or RCA, or to a computer monitor via VGA. Various Linux clones are used as the operating system, often developed specifically for this device. Users are given limited access to the software part, for example, they cannot install new programs or drivers, remove old ones - only execute those commands that are provided in the menu, as when working with any TV. This is the key to trouble-free operation and higher system reliability[1].

The DVR is controlled by means of a graphical menu displayed on the TV screen to which the system is connected. Operation in the menu is carried out using the buttons on the front panel of the DVR and the remote control, and also have the ability to control a computer mouse. The digital system is absolutely not scalable. There is no way to increase the number of video inputs or alarm inputs, add another USB port, or install a network card. The DVR is a complete, "hard-wired" device with a well-defined set of functionality.

2. Video surveillance system based on a personal computer and video capture cards. The system consists of a familiar PC with a special video capture card with a narrow specialization. Video capture cards have 4, 8 or 16 video inputs. The cameras used are analog and the video surveillance system is digital. The clock frequency of a modern computer exceeds the clock frequency of a DVR by several times. To view the image, the system is connected to a monitor or TV. The connection interface depends on the video card or motherboard of the personal computer.

The Windows operating system is considered the most popular software. For stable and convenient operation of the system, you need a separate computer that will be reliably protected. After turning on the computer, you will need to run a specialized program, in the dialog box of which all the work will take place. Control is limited to keyboard and mouse. The video surveillance system is able to integrate with the cash desk in the store, work in conjunction with the access control system, recognize license plates and people's faces, and work in conjunction with fire and security alarm systems. To increase the number of connected cameras or to connect security sensors, you need to purchase and install another board with the appropriate functionality in your computer.

3. IP video surveillance. A video surveillance system built on the basis of a personal computer and IP cameras is in many ways similar to the previous one. The system control center is also a personal computer. The main difference from the previous one is the way the signal is transmitted from the camera to the PC and the absence of video capture cards. The signal is transmitted over a network cable. It is convenient when the network structure is well organized and the operation is stable. Instead of boards, network equipment (routers, routers, bridges) and software are used here. A camera for an IP video surveillance system is more expensive than a regular one. If the resolution is several megapixels, then gigabit networks are already needed for this. System management is carried out in the dialog box of the program in the Windows operating environment. The possibilities for integration and scalability of this system are large[3].

The most significant characteristic of surveillance cameras, regardless of their type (analogue, digital, IP), is the viewing angle. That is, a surveillance camera with a large viewing angle provides the ability to simultaneously monitor a larger area than a device with a smaller indicator. The viewing angle depends on the lens of the surveillance camera, namely, on the focal length, as well as on the matrix format. With the same focal length, a matrix with a better resolution will provide a larger viewing angle, and with a similar matrix format, the angle will be inversely proportional to the focal length.

When calculating the viewing angle of a video surveillance camera, it is necessary to take into account all the main characteristics of the lens and matrix. Special online calculators are designed to obtain extremely accurate values, and the formula  $\alpha = 2\arctg(A / 2f)$  will help to obtain figures close to the true indicator, where:

- $\alpha$  – lens viewing angle in degrees;
- A – matrix size in mm;
- f – focal length in mm.

Surveillance cameras have their own viewing angle. It is this indicator that demonstrates what territory it can cover when controlling the territory. This indicator depends directly on the focal length of the lens and the size of the matrix. These are two key parameters that are ideally linked. There are special tables in which you can see the focal length and angle. For example, if the focal length is 2.8mm, then the angle of view is 86 degrees. Usually the data is given horizontally. To obtain data in the vertical plane, it is necessary to take into account the ratio of the sides of the vertical and horizontal: 16:9.

To determine the quality of the review, various options are used. For this purpose, we have developed a macro for MS Excel using the VBA tool. With this program, the distance at which there will be an ideal view is indicated. This is the distance of recognition and maximum quality during the review.



- for organization with less equipment of all-round view, a wide camera angle (70-140°) with a 2.8-3.6 mm lens is optimal;
- if it is necessary to control objects at a distance of 35-40 m or more, a camera with a viewing angle of up to 40-45° or with a varifocal lens should be preferred;
- Viewing angle of dome surveillance cameras can reach 121°, and can be extended up to 360° when using mechanized rotary models.

Here is a table of calculation data for the maximum allowable distance (meters) from the video camera to the object, taking into account the focal length of the lens and the size of the matrix (HxW). In the cells of the table, the dimensions of the rectangle in meters, depending on the size of the matrix.

Distance \ f (mm)	2,5	2,8	2,9	3,7	3,6	4,3	6,0	8,0	12,0	16,0
<b>3 m</b>	6x4,5	5,1x3,8	5x3,75	4x3	3,95x2,96	3,8x2,85	2,4x1,8	1,8x1,35	1,2x0,9	0,9x0,67
<b>5 m</b>	10x7,5	8,25x6,2	8,4x6,8	6,6x4,5	6,5x4,9	6x4,5	4x3	3x2,25	2x1,5	1,5x1,12
<b>10 m</b>	20x15	13x9,7	17x12,8	13x10	13x9,8	12x9	8x6	6x4,5	4x3	3x2,2
<b>20 m</b>	40x30	34x25,5	34x25	26x20	28x19	22x16,5	16x12	12x9	8x6	6x4,5
<b>30 m</b>	60x45	51x38	50x37	40x30	39x29	36x16,5	24x18	18x13,5	12x9	9x6,7
<b>40 m</b>	80x60	69x52	65x49	53x40	52x39	48x36	34x2,5	24x18	16x12	12x9
<b>50 m</b>					65x49	95x71	40x30	30x22	20x15	15x11,2

## CONCLUSIONS

The choice of system should be made in accordance with the requirements for it. For example, in a large business, a high level of integration and scalability of the system with existing security tools is extremely important. The management interface for all tasks solved at a large facility must be integrated into one shell so that a prompt decision can be implemented almost instantly. The result of this flexibility is the need for constant maintenance of the video surveillance system by installers due to the impossibility of installing and configuring the system by an ordinary user and, as a result, a large investment[1].

But the head of the security service of the enterprise has to spend this money. In this case, you do not have to rely on your own hands. Thus, we can conclude that for large enterprises with a developed infrastructure, PC-based video surveillance and IP video surveillance is the best solution. The main requirements for video surveillance systems for the home, as well as for places with a small radius, are the reliability of the system and ease of operation. For this segment, it is extremely important to minimize the costs associated with system maintenance. Set and forget, or, in other words, do-it-yourself video surveillance is an ideal solution when the system is serviced by a full-time system administrator or electrician. For an ordinary home or a small company, video surveillance based on a DVR is the undisputed leader, which fully justifies the money invested in it.

In addition, the development of a full-fledged apparatus, writing or purchasing software, and other labor costs - all this increases the cost of a PC-based video surveillance system by several times. And the laying of high-speed networks and their maintenance makes the IP video surveillance system practically inaccessible to the average user. Any change in settings is a call to a specialist, of course, for money. The user, accordingly, will have to wait for their visit. In order to make security even more accessible, there are kits of video surveillance systems from some companies, the installation of which can be done manually without much difficulty. To install the system, the user does not need special tools, as well as special knowledge. These kits contain everything you need to get the job done and are great for typical close-range applications as well as home or apartment installations.

## REFERENCES

1. Qudratovich, S. S. (2022). The Role and Possibilities of Multimedia Technologies in Education. *International Journal of Discoveries and Innovations in Applied Sciences*, 2(3), 72–78. Retrieved from <http://openaccessjournals.eu/index.php/ijdias/article/view/1148>
2. Qudratovich, S. S. (2022). Technical and Software Capabilities of a Computer for Working with Multimedia Resources. *International Journal of Discoveries and Innovations in Applied Sciences*, 2(3), 64–71. Retrieved from <http://openaccessjournals.eu/index.php/ijdias/article/view/1147>
3. Sh.Q. Shoyqulov. (2022). The text is of the main components of multimedia technologies. *Academicia Globe: Inderscience Research*, 3(04), 573–580. <https://doi.org/10.17605/OSF.IO/VBY8Z>
4. EditorJournals and Conferences. (2022, May 3). The graphics- is of the main components of multimedia technologies. <https://doi.org/10.17605/OSF.IO/2KAM8>  
<https://wos.academiascience.org/index.php/wos/article/view/1427>
5. Shoyqulov, S.Q. and Bozorov, A.A. 2022. The Audio- Is of the Main Components of Multimedia Technologies. *International Journal on Integrated Education*. 5, 5 (May 2022), 263-268.
6. Shoykulova Dilorom Kudratovna, & Sh.Q. Shoyqulov. (2022). PHP is one of the main tools for creating a Web page in computer science lessons. *Texas Journal of Engineering and Technology*, 9, 83–87. Retrieved from <https://zienjournals.com/index.php/tjet/article/view/2000>
7. Sh.Q. Shoyqulov. (2021). Methods for plotting function graphs in computers using backend and frontend internet technologies. *European Scholar Journal*, 2(6), 161-165. Retrieved from <https://scholarzest.com/index.php/esj/article/view/964>
8. Kudratova Himmatoy Shodmonkulovna and Shoykulov Shodmonqkul Kudratovich, “Information and communication technology in the educational process of preschool educational organization”, *IEJRD - International Multidisciplinary Journal*, vol. 5, no. 5, p. 7, Aug. 2020.
9. Sh.Q. Shoyqulov, A. M. Shukurov. Propagation of Non-Stationary Waves Of Transverse Displacement from a Spherical Cavity in an Elastic Half-Space.
10. *International Journal of Advanced Research in Science, Engineering and Technology*. 13291-13299. Vol. 7, Issue 4 , April 2020. <http://www.ijarset.com/upload/2020/april/13-shshovqulov-02-1.pdf>
11. Shoyqulov Sh. Q., Bozorov A. A. Methods for plotting function graphs in computers using modern software and programming languages. *ACADEMICIA: An International Multidisciplinary Research Journal*. 321-329. 2021, Volume : 11, Issue : 6. ISSN : 2249-7137. DOI : 10.5958/2249-7137.2021.01619.0. Online published on 22 July, 2021.