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STUDY OF IDENTIFICATION METHODS FOR ACCESS OF VEHICLES TO CLOSED OBJECTS

The tension of the situation in the east of our country and in the world in general requires the discovery of new information technologies for protection and defence of objects from unauthorized access. Particularly urgent is the need to protect critical infrastructure objects.

The protection of territories perimeter is impossible without the use of computerized control systems and automation. However, with the development of information technologies, the equipment of malefactors, who are finding new ways to overcome obstacles in their path, is increasing. Therefore, it is important to improve the computerized access systems on the closed objects in order to increase their stability and reliability of functioning.

It is impossible to achieve the appropriate level of perimeter protection of closed objects without using a combination of methods of vehicle and person identification, integrated into the computerized access control systems to an object.

As a result of the research it was discovered that it is necessary to use multifactorial identification of both vehicles and persons in modern computerized object access systems for protection against counterfeiting. However, the presence of a large number of identification methods requires a thorough analysis and selection for cumulative use by integrating into a single computerized access control system for a closed object.

The aim of the study is to increase the level of protection of perimeter of the closed objects from unauthorized access. The main task is to research and optimize the methods for identifying vehicles for integration into computerized access control systems for an object.

Access control system (ACS) is a complex of combined electronic, mechanical, electrical, hardware-software and other means, which provide the access of certain persons to separate zones or to certain equipment, technical means and objects. And that restricts access to people who do not have this right.

The protection of any object includes several boundaries, the number of which depends on the level of the mode of the object. An access control system (ACS) will be an important milestone in all cases.

Well organized and with the use of modern technical means, ACS will solve a number of tasks. Among the most important are the following: counteracting against industrial espionage, theft, sabotage, intentional damage to property; accounting of working time; control of timeliness of arrival and departure of employees; protection of information confidentiality; regulating the flow of visitors; control of entry and exit of transport.

The most commonly used ACSs include the following: ordinary and wall turnstiles; turnstiles for passage in corridors; cabins; automatic shutters; rotary turnstiles; rotary doors; road blockers; barriers; parking systems; round sliding doors; three-stroke turnstiles; full-height turnstiles; sliding turnstiles.

In our case, the identification of vehicles for access to a closed object is considered. For the entry /exit of transport, checkpoints are organized. The transport checkpoint includes an observation deck and offices.

Checkpoints for motor vehicles passing are equipped with:

– sliding gates and barriers with mechanical, electromechanical and hydraulic actuators, as well as devices for emergency stopping of the gate and opening them manually;

– control sites with platforms for car inspection;

– traffic lights, warning signs and light-emitting diode such as "Beware of traffic";

– telephone and alarm communication and lighting for the inspection of transport. [1]

Access control system (ACS) is the oldest component of the security system. At the moment, there are many varieties of ACSs from different manufacturers, as well as its components.

Despite the uniqueness of each particular access control system, it contains 4 main elements: user ID (card-pass, key), identification device, microcontroller and actuators. The general scheme of ACS is shown in Fig. 1

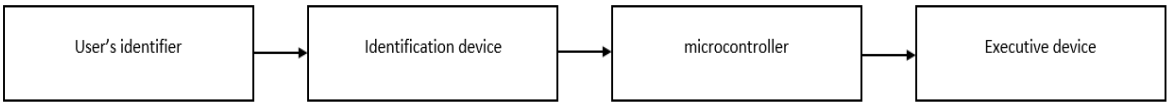

Figure 1. The general scheme of ACS

The work of the access control system can be described as follows. Each employee or regular visitor of an organization receives an identifier (electronic key) - a plastic card or ibutton tablet with the individual code. Electronic keys are issued as a result of registration of the listed persons by the means of the system. Passport data, photos (video images) and other information about the owner of the electronic key are recorded in the personal electronic card. The personal electronic card of the owner and the code of his electronic key are connected with each other and entered in specially organized computer databases. [2]

So, let's turn to the analysis of the vehicle identification methods, namely, to the analysis of the method and technology of identification of vehicles by their license plate.

Currently, there are not so many systems for identifying license plates, few of which are truly high-quality products. However, simultaneously with writing of algorithms, hardware is being developed for these purposes. Systems with high speed and accuracy of recognition are usually very expensive. The high cost of existing products does not allow for their mass implementation.

The task of identifying a car can be divided into two parts: localization the plate number and character recognition.

The license plate recognition algorithm consists of the following steps:

1. Beginning.
2. Incoming image.
3. Recording in the processing conveyor.
4. Equalization (alignment of the histogram).
5. Filtering.
6. Search for lines.
7. Binariation.

8. Screening of redundancy.
9. Search for an area of interest.
10. Search of numbers and letters (9 characters with letters).
11. Comparison with the image (correlation).
12. Output of license plate values.
13. Output of the recognized image.
14. End.

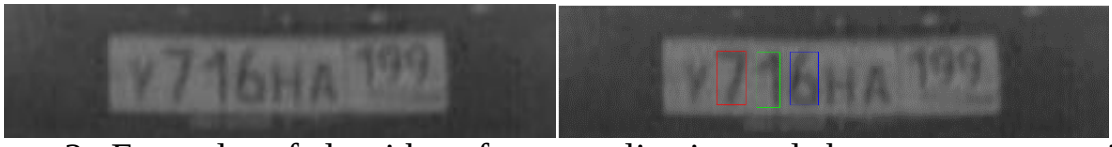

Figure 2. Examples of algorithms for normalization and character segmentation

These digits are generated in advance. Next we choose the best coincidence, and if it is more than a certain threshold, we accept it as a good result.

Areas are moved from left to right, so that the required digits will come in the right order. In this case, the simplest algorithm for outputting digits by parameters is the comparison with the template. There are several options, each one has its own pros and cons. This method, which is implemented, is quite simple and has acceptable reliability and stability.

Consequently, methods of vehicle identification for integration into computerized access control systems for an object were investigated. For the organization of entry/exit of transport on the closed object, checkpoints are created. The transport checkpoint includes an observation deck and offices. In turn, at the checkpoint, the access system is integrated into the ACS. One of the components of ACS is the vehicle identification system. To develop an efficient camera image processing system, it is necessary to have the appropriate software that allows to carry out, correctly and efficiently, the operations of the vehicles movement control, intended for the entry / exit of automotive equipment. It is suggested to use the simplest algorithm for identifying the number of digits according to the parameters - comparison with the template.

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