ANPR – license plate recognition system

USER MANUAL
TABLE OF CONTENTS

1 Introduction ........................................................................................................................................3

2 ANPR SERVER administration ........................................................................................................4
  2.1 Login ...........................................................................................................................................4
  2.2 Administration window ................................................................................................................5
    2.2.1 System launch .........................................................................................................................6
    2.2.2 Permitted vehicles ...................................................................................................................7
    2.2.3 Blacklisted cars .......................................................................................................................7
    2.2.4 Car recognition results ...........................................................................................................8
    2.2.5 Reports ......................................................................................................................................8
    2.2.6 Users .........................................................................................................................................9
    2.2.7 Parking zones ..........................................................................................................................10
    2.2.8 Companies ...............................................................................................................................10
    2.2.9 Video cameras ........................................................................................................................11
    2.2.10 Mail settings ..........................................................................................................................16
    2.2.11 About ......................................................................................................................................16

3 WEB SERVER management ..........................................................................................................17
  3.1 Login ...........................................................................................................................................17
  3.2 Program use ....................................................................................................................................17
  3.3 Additional information ................................................................................................................18
1 Introduction

This manual is intended for users who will use the license plate recognition system (hereinafter referred to as ANPR). The instructions will provide information, which will help understand, manage and use the ANPR.

The ANPR system is composed of two parts: 1 - the numbers identification server (the ANPR server), 2 - WEB server (hereinafter - WEB SERVER). The system is linked to a MySQL server and runs on Windows operating system.

The ANPR SERVER is designed to configure the system and also executes a physical identification of the number using the images coming from IP video cameras as well as organizes the control of the devices (barriers, cameras, etc.). The server is for use of security personnel and administrators. An example is given in Figure No. 1

![Figure No. 1](image)

The WEB SERVER is intended for other users of the system (administrators, remote users). It provides the identification results and allows to add new data on incoming or departing motor transport. It allows you to easily provide rights of access to a protected area for any vehicle. An example is given in Figure No. 2
2 ANPR SERVER administration

2.1 Login

Working with the ANPR SERVER begins upon starting it. Upon the first run, the connection parameters for connecting to a MySQL server must be configured as well as other necessary data must be specified.
The system will start when the correct data will be entered. After the start-up, it is necessary to create a new program administrator profile with the following login information: Username - Admin, User password - Admin. Password can then be changed to another.

Subsequently, when logging in later, you must provide the correct login data. In case of ten incorrect login attempts, the program will automatically block the user.

### 2.2 Administration window

If the login to the ANPR system is successful, the main administration window will be displayed.

This window is divided into several areas: control panel with buttons, search data, number plate data, program performance register, parking occupancy and recognition photos. The control panel with buttons zone is intended for the system configuration purposes. The 'search information' area displays the last identified plate numbers and there is a possibility provided for a quick search of the identified number plates, time as well as the name of the camera that was used for it.

By clicking the buttons, the following actions can be performed in this window:

- **"Start system".** The click of the button will start the number plates' recognition process. The system, by using IP video cameras settings data, will start separate processes for each camera settings, where the used processes will recognize the vehicle data and store it in a MySQL
database as well as according control relays, that control the barriers and other devices, will be activated.

- "Permitted vehicles". The click of the button will bring up a list of vehicles that are permitted to enter the protected area.
- "Blacklisted cars". The click of the button will bring up a list of vehicles on which the user must be notified with audible alarm pop-ups and additionally by e-mail.
- "Recognition results". The click of the button will bring up a list of all (admissible/inadmissible) vehicles.
- "Reports". The click of the button will bring up a report window, in which, by selecting preferred data, a report on recorder vehicles will be compiled.
- "Users". The click of the button will open the configuration window.
- "Parking zones". The click of the button will bring up the site zones configuration window. The system is designed so that it can be configured for any type of sites. It can manage different sites with different requirements. I.e. there is a big site, where any of the identified vehicles can enter zone No. 1, but only selected vehicles can enter zone No. 2, which is in the same site.
- "Companies". The click of the button will bring up a configuration window of companies. Here you can create data of new companies, assign limits to them, thereby creating the possibility to use the system for calculating the available remaining spaces on the site.
- "Video cameras". The click of the button will bring up the configuration window for the IP cameras, license plate recognition, relays and other settings.
- "Switch user". The click of the button will stop the program and the current logged in user will be logged off, so that another user is able to login.
- "Program settings". The click of the button will bring up the main program, mail server and registration settings window.
- "Register program". The click of the button will bring up the program registration window.
- "About". The click of the button will bring up the program information window.
- "Exit". The click of the button will stop all number plates' recognition processes and the ANPR server will be shut down.

2.2.1 System launch

After clicking on "Start system", a separate window for each configured IP camera will open. It will display the live feed and basic camera settings. By opening this window, the numbers recognition process will automatically begin. I.e. the system will only then begin to recognize numbers and to continue working with them. The advanced settings window and the information register will be visible only when "Operating log" box will be checked in the "Video camera" window. The buttons "Open" and "Close" are needed for manual gate opening and closing, or automatic closing after opening but not passing the site gate barrier.
2.2.2 Permitted vehicles

In this window, new vehicle data, that are allowed to enter the protected area, can be entered as well as existing data - edited. The vehicles can be registered here and they will simply be allowed in and out automatically. The system can also register guests. For this, the "Authorization is valid" box should be checked and the date and time set accordingly. In this window you can also easily search for a specific vehicle according to any of the criteria mentioned. When registering vehicles it is important to indicate the "Action zones" - cameras that the particular vehicle can pass through. If the system uses the companies vacancies accounting - the company name must specify to which the vehicle is assigned.

2.2.3 Blacklisted cars
In this window, new vehicle data, that are blacklisted, can be entered as well as existing data - edited. The vehicles can be registered here and the user will be notified with audible alarm pop-ups and users listed in box “E. mail” will be additionally notified by e-mail.

2.2.4 Car recognition results

This window contains the details of all recorded vehicle number plates, which were caught in the field of vision of the cameras. Using this window, new vehicles can be added very easily, you just need to select the vehicle you want and press the button "Add an unidentified vehicle in the database". Using this window, you can also easily perform a search on a specific vehicle of interest using any of the criteria mentioned.

2.2.5 Reports

This window specifies the data, according to which a report will be generated on the recorded license plate numbers by the system. An example of a report is provided below. A generated report can be saved or printed.
### 2.2.6 Users

In this window, new users (not administrators) can be created or the current ones - adjusted. Administrator cannot be removed, neither can its login name be edited. You can only change the login password. The create users will be able to connect through the WEB server and register the vehicle entrances. The users can be created in the system, but they will not be able to perform any actions until the box "Activated" is checked.
2.2.7 Parking zones

This window is for creating new parking zone. The limit of spaces is provided if you want the system to calculate the free spaces in a site, and depending on that number, either to let through or not to let through a recognized vehicle.

![Parking zones window]

2.2.8 Companies

In this window, new companies can be created. However, this functionality is used only in case the program is used to calculate the available spaces by companies.

![Companies window]
2.2.9 Video cameras

This window is essential, and the overall system performance depends on how the configuration is set here.

To begin using the system first you need to add an IP video camera and other data belonging to it. This can be done by completing the required fields in the tables: camera specifications, and other settings. Below are descriptions of the fields on individual tables. The upper part of the window displays the cameras that are already included as well as their settings.

2.2.9.1 Camera data

The following table contains data about an IP video camera:

- "Camera Name". Indicate any preferred name;

- "Re-scan after (sec.)". Specifies after how many seconds the system can again use the previous car’s number. Suppose at 14:00:00 a car with the number ANR001 has arrived. It was recognized by the system, let through and recorded in the database. If this field is set to 300 seconds, then the car will be able to enter only after 5 minutes. This function is more needed for the system itself so that it would not read the same number over repeatedly. Suppose a car drove up, and then it took a little maneuvering forward and back in the field of view of the camera;
• "Barrier time delay (sec.)". This is the time after the successful identification of a number plate that the system will not search for new numbers, will not switch on the traffic lights or set the relays on or off. This parameter is set in order to allow the recognized car to cross the traffic lights;

• "Active camera". When the box is checked, the system launches the camera and the license plate recognition through it. If unchecked - the camera will be ignored;

• "Operating log". When the box is checked, additional settings and information register will appear in the camera window;

• "Camera for exit". This check box is used when entering and leaving vehicles number plates recognition is carried out in a single lane. I.e. when the camera sees both - the entering and leaving vehicles - the system will only see the vehicle and its number, and it is necessary to use the movement detector with directional identification to distinguish the movement direction. For detectors to correctly identify the direction, it is needed to specify which vehicles will be recorded using this camera. If entering - the check box should be unchecked, if leaving - then the box should be checked.

2.2.9.2 ANPR configurator

In this table, ANPR data should be entered:

![The configurator window](image)

In this window, the basic settings are set. The window is divided into two main parts: Camera/File and the ANPR settings and numbers recognition results.
"File/url". Camera's video stream address is specified. The system can handle both - RTSP and HTTP protocols to receive video stream as well as use other video processing means from other devices connected to a computer (web camera, video card, etc.);

"Login". Specifies the IP camera's login name;

"Pass". Specifies the IP camera's login password;

"(http, rtsp,..)". Specifies the IP camera's incoming video stream type. If the video is not transmitted through protocols, the field is left blank;

"Device". Video transmission unit that is connected to a computer is selected;

"Template". Selects a specially prepared template for the number search zone optimization;

"Square". These settings are entered automatically from mouse movement image area. They are needed for the system to know whether to look around for the car's license plate in the whole visible area or only in the selected boundaries. This setting helps save time and lowers the use of CPU resources;

"Sel. countries *". Country of the issued license plates that are to be recognized. This field should be arranged as follows: first, the country that is main, in other words - the one that's plates there will be the most to scan, and then other countries, separated by comma;

"ANPR time." A parameter that does not let the process take longer than the specified time. By default - 1000;

"Contrast*". This option is needed for more qualitative identification of a number and depends on the camera configuration;

"Scanner frequency (ms).". This setting determines how often the program performs an automatic search for and identification number. Size is determined depending on the way the system is used. If number recognition is carried out in an area where cars are moving at high speeds and do not stop, then this value should be less than 500. However, if the system is used to manage the entrances to the parking sites, then the parameter can be greater than 500;

"Minimum height (pix.)*". The minimum number of pixels in the frame height. Specifying this parameter, the system will ignore the car license plates that are smaller;

"Maximal height (pix.)*". The maximum number of pixels in the frame height. Specifying this parameter, the system will ignore the car license plates that are larger;

"Color scheme". Specifies what numbers will be recognized. Black letters on a white background or white letters on a black background (the latter is used by the military transport in Lithuania);

"Deflection angle*". This parameter specifies the angle for the camera to look for license plate numbers. I.e. if the license plate image is always at the same position, then the value of this parameter can be set to 0. But in most cases the cars stop at different angles and therefore numbers may differ. Therefore, it is necessary to specify what in what limits should the camera look for the license plates;

"Rotation angle (0..360)*". If the camera is fixed and cannot be adjusted while the number of the car it is not horizontal, then this parameter should be specified. (-) Sign to show a negative angle;

"100 percent. accuracy". This parameter is used when we want to immediately determine the exact number. I.e. in sites, where the arriving vehicles' numbers are not known prior. The parameter is used in conjunction with "Number," which indicates the minimum number of the same numbers to be collected in order to continue to next steps.
**2.2.9.3 Relay settings**

The following table shows the configuration of relays:

<table>
<thead>
<tr>
<th>Camera settings</th>
<th>Quick search data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera ID</td>
<td>The camera title</td>
</tr>
<tr>
<td>3</td>
<td>Kamera</td>
</tr>
</tbody>
</table>

- **Type *"**: Indicates what equipment will be used: ETH484 relay plate or IP cameras;
- **"Board number *"**: Just a number in sequence;
- **"IP address *"**: ETH484 relay panel's IP address;
- **"..... ID *"**: Specifies the identifier of the relay contacts. Otherwise - the relay number;
- **"Extr. control*"**: This setting is used then when you want the barrier to be lowered by the program when the barrier vacates, which is connected to a specific input;
- The buttons "Status" are used to check the current status of the relays. The button "Enable/Disable" is used in order to check the operational status of the relays;
- **"Communications port"**: This setting is required to be specified when the ETH484 relay panels are used.

The system is integrated and can work with ETH484 and IP camera type relays. They can be used for switching devices (traffic lights, barriers, etc.) on or off.

- "Type *". Indicates what equipment will be used: ETH484 relay plate or IP cameras;
- "Board number *". Just a number in sequence;
- "IP address *". ETH484 relay panel's IP address;
- "..... ID *". Specifies the identifier of the relay contacts. Otherwise - the relay number;
- "Extr. control*". This setting is used then when you want the barrier to be lowered by the program when the barrier vacates, which is connected to a specific input;
- The buttons "Status" are used to check the current status of the relays. The button "Enable/Disable" is used in order to check the operational status of the relays;
- "Communications port". This setting is required to be specified when the ETH484 relay panels are used.
2.2.9.4 Other properties

In this table, other properties are to be entered:

- **"Video transformation parameters"**. This refers to what video stream will be received and used in the ANPR system. If you need to use a smaller half-size frame - you need to put a check mark on the "half-size". This will contribute to saving computer resources and it will be possible to handle more IP cameras. "Number of frames" is usually left default. This means that the camera will be used for real-time video streaming. In order to save computer resources, you may indicate that the program would receive only 10 frames/sec. image.

- **"Camera zone"**. This setting is mandatory. Even is the site is not divided into separate zones, you need to specify at least one. If there are zone divisions, then all zones should be included and cameras assigned to let in the recognized vehicles in and out;

- **"Counting places"**. This feature allows the system to enter site busyness control. After setting up the data, and the activation of the system, it will automatically control the access of vehicles according to the present site parking availability and render information in the main window. The calculation is possible by zone and by companies in the zones;

- **“Allow entry / exit to all with number scanning”**. This setting allows to use the system so that it allows entry / exit to all cars just by reading the plate number. This functionality is required in cases when the parking just opened and still uncertain entering cars numbers or only when you want to find out who uses parking and when it does.
The system can operate using data output measure - a LED panel. By completing the setup fields and connecting the LED panel to a computer, information about scanned license plate numbers will be provided or a "STOP" sign will be displayed.

- "COM port ('COM3')". COM port number is entered, to which a light LED panel is connected.
- "Number of characters". This parameter indicates how many symbols are being used on the LED panel. I.e. two segments commonly use 8 symbols (2 use 4 each). This parameter is required to ensure that if the number is less than the number provided, then the text displayed on the panel will be centered.

2.2.10 Mail settings

In order for the program to work together with the WEB SERVER, it is necessary to setup the correct settings. It is for informing the customers about accounts created for them and to remind the registration information. This information will be used for user notification about blacklisted cars.

2.2.11 About

Information about the product and the copyright owner.
3 WEB SERVER management

3.1 Login

Working with the WEB server begins upon starting it (for the administrator). The server runs in the background. The user wishing to connect needs to open any browser (Internet Explorer, Firefox, Chrome) and enter http://xxx.xxx.xxx.xxx:8880 in the address line. This will open the user login window, where you need to enter the data that ANPR server administrator has registered and provided the user with.

![Login Window](image)

After entering the correct data the user will be redirected to the main program window. We remind you that the user will be automatically blocked after ten times of entering incorrect login information.

3.2 Program use

In this window, the user will be given the recognition results. It will be possible to carry out a search, enter and modify vehicle data. Each user can only view his own administered vehicles.
3.3 Additional information

- When entering and leaving, cars must stop at the white line;
- The system can be configured so that the vehicle for which the entry is allowed, will enter through an automatically raised barrier and the barrier would as well automatically lower after passing through, after a specific time period or by switching on an automatic lowering function in the barrier itself (its controller). By using the additional control function - if the car approached the line, but is not be able to continue through the barrier, it will come down automatically after 60 seconds or will be lowered by clicking the appropriate camera's button "Close" by a security officer;
- In case the security officer needs to let through an unidentified vehicle, he will need to enter its license plate number manually and the barrier will raise automatically. After the pass through the barrier, it will have to be lowered by clicking the "Close" button.