41 Series Video Screen Development Guide

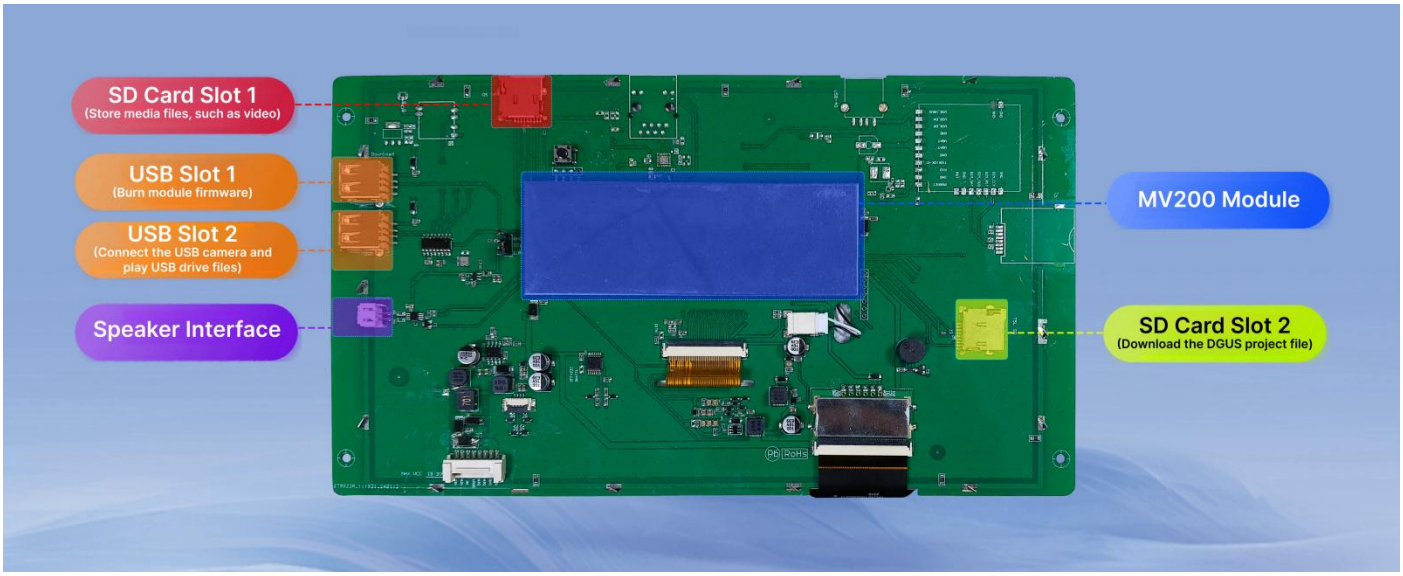
This application is used for the new 41 series video screens (MV200). For the development of old 41 series video screens (MV100), please refer to the "41 Series Video Screen Manual V2.5".

Contents

1. Product Overview

1.1 Application Introduction

The 41 series video screen from DWIN, a multimedia-oriented solution belonging to their video screen lineup, incorporates the MV200 module as its main driver board. The T5L ASIC integrated within the MV200, coupled with the standard DGUS software, facilitates fluid playback of high-definition video content.



Hardware interface diagram

1.2 Product Features

(1) Supports 2K high-definition display, with a maximum resolution of 1920*1080.

(2) supports YUV cameras at a resolution of 640x480. With a customized kernel, MJPG cameras with resolutions up to 1080p are available.

(3) Supports network camera interfaces. Network cameras can be connected via Ethernet, 4G, or WIFI.

(4) Supports playback of diverse media formats, including images, audio, and video; supports the capture and saving of camera screenshots; supports the customized function of recording camera visual output in MP4 format.

(5) Supports remote software updates and video storage, simplifying maintenance and data management.

2. Data Communication Protocol

2.1 Universal Function Address

Some functional addresses of 41 series video screen (MV200) are the same as those of 41 series video screen (MV100). For details, see the following table.

Variable space first address	Definition	Length (word)	Command type	Description
0x0500	Set the display location for videos, pictures, and cameras	8	Control	D15-D14: Feature value, 0x01 represents small image page, 0x02 represents large image. Note: If you need to use “Data transmit” control for development, you need to place the small image page on the first page and the large image page on the second page. D13-D12: Displayed X coordinate D11-D10: Displayed Y coordinate D9-D8: Displayed X coordinate plus width D7-D6: Displayed Y coordinate plus height D5-D4: 0x5AA5, represents triggering the operation once D3-D0: Reserved The coordinate modification does not take effect on the already displayed image, and it applies to the display of the next image. At present, the maximum resolution of the camera only supports 800*480.
0x0508-0x050B	Reserved	4	-	Undefined
0x050C	Camera control	1	Control	D1: Camera channel number, starting from 0. D0: 1, Turn on camera; 2, Turn off camera; 3, Return and exit
0x050D	Multimedia setting	1	Control	D1: 0x01: USB drive playback 0x02: SD card playback D0: 0x00: Play video 0x01: Play audio 0xFF: Turn off the player
0x050E	Reserved	1	-	Undefined
0x050F	select a video by its number for playback	1	Control	D1: the value 0x5A triggers an action or operation. D0: represents the video's sequential number within the playlist, with a valid range from 0x00 to 0xFF. Suggested Naming Convention: For video files, it

				is recommended to use the format "sequence number + file name".
0x0510	Multimedia control	1	Control	D1: 0x5A, triggers the control operation once, all others are invalid D0: Control command type 0x00: Normal playback 0x01: Pause playback 0x02: Stop playback 0x03: Fast forward 0x04: Fast rewind 0x05: Reserved 0x06: Previous file 0x07: Next file 0x08: Sequential video playback 0x09: Loop playback of the current file 0x0A: Close loop playback
0x0511-0x052F	Reserved	31	-	Undefined
0x0530	Picture playback	1	Control	D1: 0x5A: SD card playback; 0xA5: USB drive playback D0: 0x01: Play the first picture 0x02: Play the previous picture 0x03: Play the next picture 0x04: Play in four grid 0x05: Page up 0x06: Page down 0xFF: Turn off playback
0x0531	Reserved	1	-	Undefined
0x0532	Camera video recording	1	Control	0x5AA5, determines the recording status. If recording is in progress, stop recording; If recording is stopped, start recording. Must be used in pairs
0x0533	Reserved	1	-	Undefined
0x0534	Full-screen playback of Selected four-grid	1	Control	0x0001: Select the first one 0x0002: Select the second one 0x0003: Select the third one 0x0004: Select the fourth one 0x00FF: Exit current playback
0x0535	Delete current file	1	Control	D1: 0x5A, triggers the operation once D0: 0x01, deletes the currently playing video, audio, or image file
0x0536	Recording status	1	Display	0x01: Recording successful 0x02: Recording in progress 0x03: Recording failed

0x0537	Rotate the playing video	1	Control	D1: 0x5A: Start a rotation D0: 0x00: Rotate 0° 0x01: Rotate 90° 0x02: Rotate 180° 0x03: Rotate 270°
0x0538	Reserved	1	Control	Undefined
0x0539-0x053D	Reserved	5	-	Undefined
0x053E	Reserved	1	Control	Undefined
0x054F	Query the total number of pictures	1	Control	0x5A01: Query the total number of pictures in the “PICTURE” directory of the SD card once. 0xA501: Query the total number of pictures in the “PICTURE” directory on the USB drive once.
0x0550-0x0551	Reserved	2	-	Undefined
0x0552	The return result of the total number of pictures	1	Display	The total number of pictures in the “PICTURE” directory
0x0553	One-click intelligent screenshot	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01, 0x01 performs a screenshot operation, and the image is saved to the SD card. The path in 0xE110 first will be examined first. If it is empty, the screenshot will be saved to the root directory. If a path is present, the screenshot will be saved to that directory. For screens with RTC (Real-Time Clock), screenshots are saved in the format xxxx_xx_xx_xx_xx_xx.jpg (Year_Month_Day_Hour_Minute_Second). For screens without RTC, screenshots are saved as XX_cap.jpg, with numbering up to 99. The numbering restarts from 1 after each reboot.

0x0554	“Before” code screenshot	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01-0x04: If address E110 does not contain a directory path, screenshots will be saved to "Before/". Should E110 contain a directory path, screenshots will be stored in the specified subdirectory under "Before/". 0x11-0x14: Save in “Before/” directory. Note: It’s necessary to create the target folder in advance. The screenshot should be named according to the number associated with the corresponding key value. (For example, if the address 0xE110 contains "PICURE/", the screenshot will be saved in the ”/Before/PICTURE” directory. If the address 0xE110 is empty, the screenshots will be saved in the “Before/” path.)
0x0555	“After” code screenshot	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01-0x04: If the address E110 does not contain a directory path, the screenshot will be saved under the path “After/”. Should E110 contain a directory path, screenshots will be stored in the specified subdirectory under "After/". 0x11-0x14: Save in “After/” directory. Note: It’s necessary to create the target folder in advance. The screenshot should be named according to the number associated with the corresponding key value. (For example, if the address 0xE110 contains "PICURE/", the screenshot will be saved in the ”/After/PICTURE” directory. If the address 0xE110 is empty, the screenshots will be saved in the “After/” path.)
0x0556	Play “Before” code screenshot	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01-0x04: If there is not a directory path in the the address E110, play the screenshot corresponding to the key value in the path “Before/” directory. If there is a directory path, play the screenshot in the corresponding directory under “Before/”. 0x05: Delete the currently playing screenshot

0x0557	Play “After” code screenshot	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01-0x04: If there is not a directory path in the the address E110, play the screenshot corresponding to the key value in the path “After/” directory. If there is a directory path, play the screenshot in the corresponding directory under “After/”. 0x05: Delete the currently playing screenshot
0x0558-0x055D	Reserved	6	-	Undefined
0x055E	Query SD card or USB drive status	1	Control	0x5A: Start the operation once 0x01: Query SD card 0x02: Query USB drive
0x055F	Return the status of the SD card or USB drive	1	Display	D1: Query type 0x01: SD card 0x02: USB drive D0: Status 0x00: Not inserted 0x01: Inserted 0x02: The USB drive is full
0x0560-0x0562	Reserved	3	-	Undefined
0x0563	Clear display	1	Control	D1: 0x5A, triggers the operation once. D0: 0x01, starts clearing once. Clear all interface image or video displays.
0x0564	Reserved	1	-	Undefined
0x0565	Turn on or off the webcam	1	Control	D1: 0x5A D0: Switch status 0x00: Close 0x01: Open (needs to be used in conjunction with E190, E1A0, E140) 0x02: Customize the RTSP address to turn on the camera, which needs to be used in conjunction with E1B0.
……	……	……	……	……
0xE110	Specify the file path	16	Input display	Enter the specified file path, and use "/" to separate multi-level menus. The default path is empty.
0xE120-0xE13F	Reserved	32	-	Undefined
0xE140	Webcam IP address	16	Input display	
0xE150-0xE18F	Reserved	64	-	Undefined
0xE190	Username	16	Input	

			display	
0xE1A0	Password	16	Input display	
0xE1B0	RTSP address information	40	Input display	Enter in ASCII to display RTSP address information

2.2 New Function Address

The new function address for the 41 series video screen (MV200). Please refer to the table below.

Variable space first address	Definition	Length (word)	Command type	Description
0x0600	Other settings	1	Control	1. Volume control 0x000B: Increase volume 0x000C: Reduce volume 0x000A: Mute The maximum volume is 40, the minimum volume is 0, and each volume adjustment size is 1. 2. Select the file for playback 0x0021: Select the first file 0x0022: Select the second file 0x0023: Select the third file 0x0024: Select the fourth file 0x0025: Select the fifth file After being selected, the file will be played, and the file name will be written to the default file display address (0x3400). 3. Page flipping control 0x0001: Next Page 0x0002: Previous Page 5 results are displayed each time. 4. Full screen playback control 0x0026: Full screen playback 0x0027: Restore normal display “Restore the normal display” means return to the original page.
0x0601-0x069F	Reserved	159	-	Undefined
0x06A0	Set the display position for the grid 1 of the four-grid	8	Control	D15-D14: Reserved D13-D12: Displayed X coordinate D11-D10: Displayed Y coordinates D9-D8: Displayed X coordinate plus width D7-D6: Displayed Y coordinate plus height D5-D4: 0x5AA5, triggers the operation once D3-D0: Reserved The coordinate modification does not take effect on the already displayed image, and it only applies to the display of the next image.

Variable space first address	Definition	Length (word)	Command type	Description
0x06A8	Set the display position for the grid 2 of the four-grid	8	Control	D15-D14: Reserved D13-D12: Displayed X coordinate D11-D10: Displayed Y coordinates D9-D8: Displayed X coordinate plus width D7-D6: Displayed Y coordinate plus height D5-D4: 0x5AA5 represents triggering the operation once D3-D0: Reserved The coordinate modification does not take effect on the already displayed image ,and it only applies to the display of the next image.
0x06B0	Set the display position for grid 3 of the four-grid	8	Control	D15-D14: Reserved D13-D12: Displayed X coordinate D11-D10: Displayed Y coordinates D9-D8: Displayed X coordinate plus width D7-D6: Displayed Y coordinate plus height D5-D4: 0x5AA5 represents triggering the operation once D3-D0: Reserved The coordinate modification does not take effect on the already displayed image, and it only applies to the display of the next image.
0x06B8	Set the display position of grid 4 of the four-grid	8	Control	D15-D14: Reserved D13-D12: Displayed X coordinate D11-D10: Displayed Y coordinates D9-D8: Displayed X coordinate plus width D7-D6: Displayed Y coordinate plus height D5-D4: 0x5AA5 represents triggering the operation once D3-D0: Reserved The coordinate modification does not take effect on the already displayed image, and it only applies to the display of the next image.
0x06B9-0x06CF	Reserved	23	-	Undefined
0x06D0	Current volume	1	Display	The maximum volume is 40, and the minimum volume is 0.
0x06D1	Play status	1	Display	-
0x06D2	Reserved	1	Reserved	Undefined

Variable space first address	Definition	Length (word)	Command type	Description
0x06D3	Current playback status	1	Display	D1: 0x00 D0: 0x01: Playing 0x03: End of playback 0x04: Pause playback 0x05: Stop playing
0x06D4	Encoding quality setting	1	Operate	D1: 0x5A, start once D0: 0x00~0x64, encoding quality setting Note: This only applies to image playback, video playback, and camera display
……	……	……	……	……
0x3400	Current playback file name	16	Display	-

Note: Chinese characters are not supported in filenames.

3. Serial Port Communication Description

3.1 Serial Port Setting

The serial port baud rate is set to 115200bps (which can be set by modifying the CFG configuration file), and the communication mode is 8N1, which means there are 8 data points, 1 stop bit, and no checksum bit.

3.2 Communication Data Frame

Address	0x00	0x02	0x03	0x04
Definition	0x5AA5	LEN	CMD	DATA_Pack
Description	Frame header	Subsequent data length, including command and data command	0x82/0x83	Data

3.3 Interface Command Description

Command	**Data**	**Description**	**Response**
0x82	Variable space first address (0x0000-0xFFFF) + the written data	Write data to variable space at the specified address	None
0x83	Variable space first address (0x0000-0xFFFF) + read data in byte length (0x01-0x7D)	Read the specified length data from the address specified in the variable space	Variable space first address + variable data in word length + read variable data

3.4 Application Instance

(1). Stop playing

Sending the serial command to the system variable address 0x0510 can stop video playback.

82 command: 5A A5 05 82 0510 5A02

Command meaning: Frame header Command length 82 (write variable space) System variable address Command content

(2). Query USB drive status

Firstly, send the serial command to the the system variable address 0x055E to read the SD card/USB drive status, and the returned result will be saved in 0x055F; Then read the variable values in 0x055F.

82 command: 5A A5 05 82 055E 5A02

Command meaning: Frame header Command length 82 (write variable space) System variable address Command content

83 command: 5A A5 04 83 055F 01

Command meaning: Frame header Command length 83 (read variable space) System variable address Read 1-word length data

Returned command: 5A A5 06 83 055F 01 0201

Command meaning: Frame header Command length 83 (read variable space) System variable address Return 1-word length data 0201 represents that the USB drive has been inserted

4. Instructions for Using Web Camera

4.1 View camera IP address

(1) Before obtaining the camera IP, please confirm that the local area network is available.

You can use the ping command on the Windows terminal to verify: win+R, open 'Run' ➔ enter 'cmd' and press enter ➔ enter 'ping 192.168.1.1'. The result shown in Figure 4.1 indicates that the local area network is normally available.

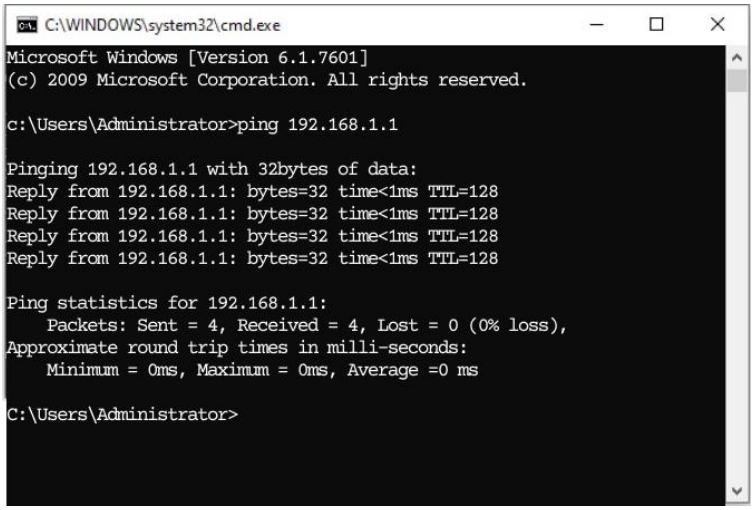


Figure 4.1

(2) As shown in Figure 4.2, for wired connection, please connect the PC, web camera, and 41W screen to the same LAN through a router. WLAN connection can refer to Part 5 of this guide, "2. How to connect to the WIFI network?". If the web camera is used for the first time, please register and activate it according to the method provided by the supplier.

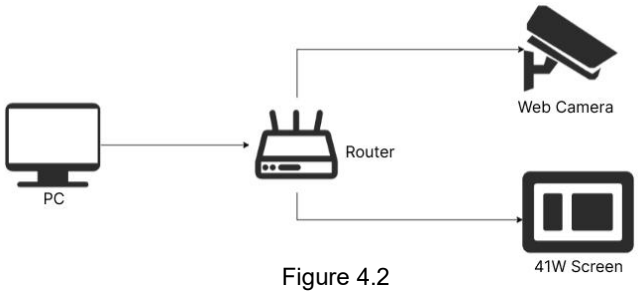


Figure 4.2

(3) Power the web camera and 41W video screen and view the camera IP information through software on the PC. Through the supplier's supporting software to view the IP address of the camera, such as Hikvision's SADP, Dahua's Config Tool, SmartPSS Plus.

Taking Hikvision as an example, the camera IP can be viewed through SADP software (the download webpage can be found by searching for "SADP" on browser).

Open the SADP software and click the “Refresh” button in the upper right corner to view the IP address of the online device(Figure 4.3). If the device cannot be found, please check if the IP is available first. If using WLAN connection, please confirm that the network bandwidth is 2.4G.

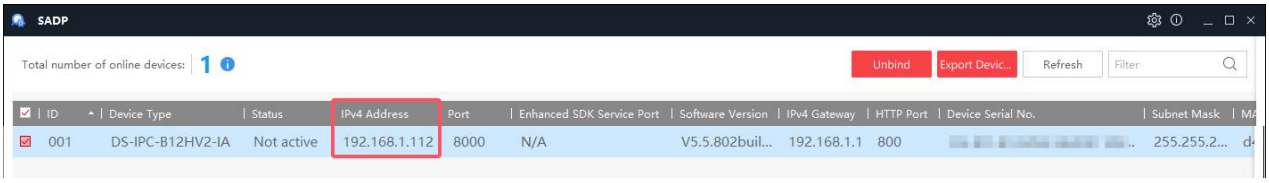


Figure 4.3

4.2 Camera Parameter Settings

After connecting the web camera and computer through the local area network, the camera can be configured.

(1) Open a web browser and enter its IP address in the address bar (i.e, 192.168.1.112 – each camera has a unique IP address; consult section 4.1, "View Camera Address," for instructions on obtaining it). You will then be directed to the login page, as illustrated in Figure 4.4, upon pressing Enter. Next, input the username and password, and then click "Login." For forgotten usernames or passwords, contact the supplier of the relevant camera brand.

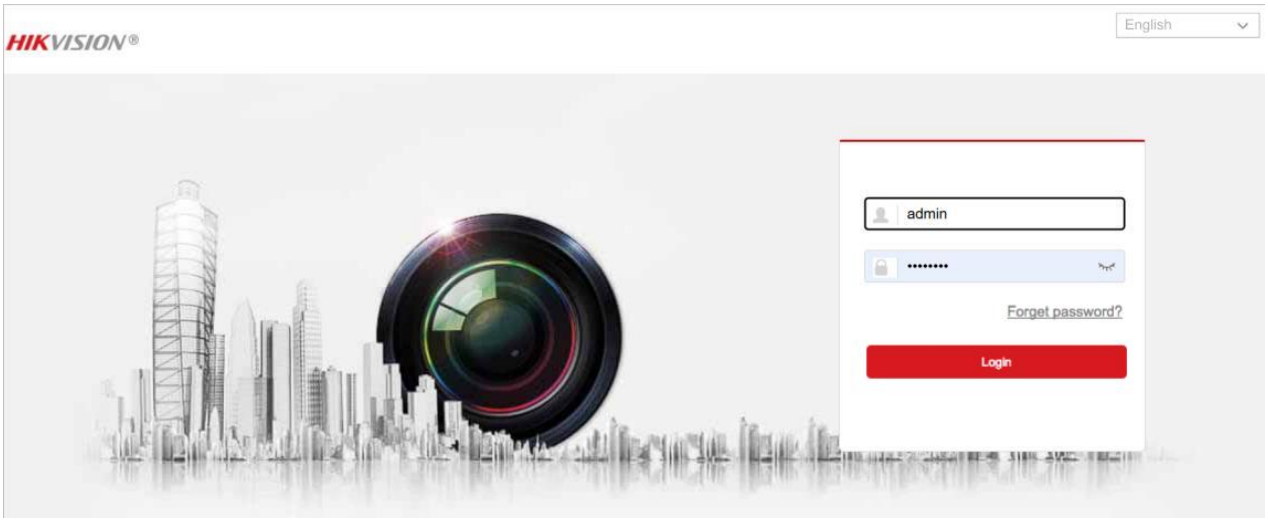


Figure 4.4

(2) After successful login, it will switch to the main interface as shown in Figure 4.5, and configure the camera in the video and audio interface. The parameters that need to be configured are as follows:

Stream type: Sub stream/Secondary stream

Resolution: Try to choose a resolution close to the 41W screen resolution

Video frame rate: 25FPS

Video encoding: H264

Leave the rest as default, click save to preview, and after successful preview, you can proceed with 41W screen configuration.

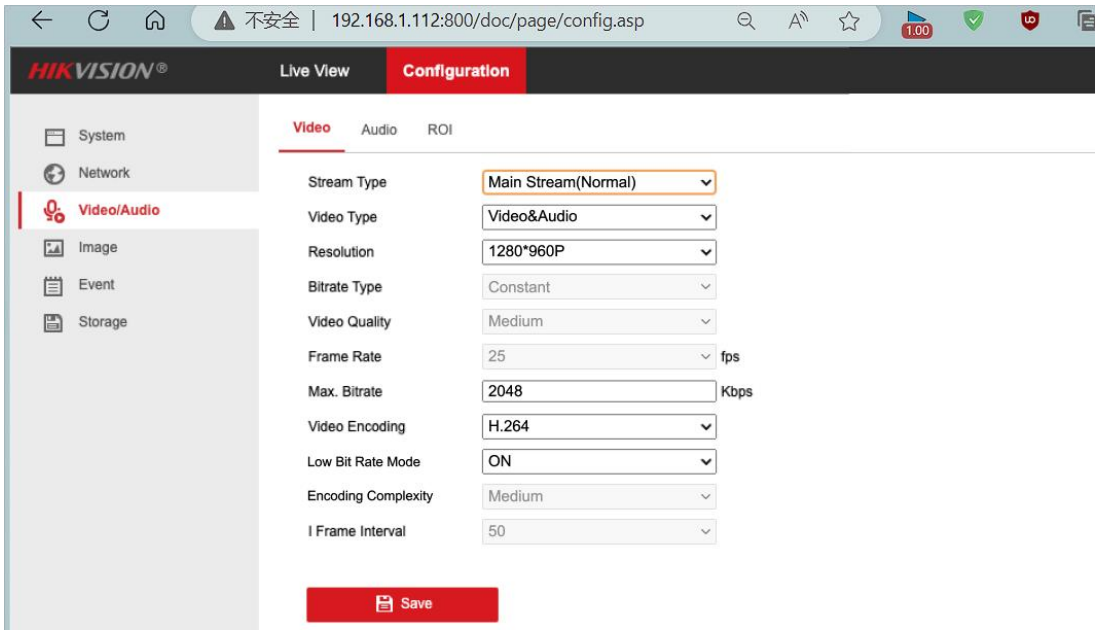


Figure 4.5

4.3 Camera Display

As shown in Figure 4.6, connect the 41W screen to the web camera through the router, and power the screen and camera separately.

Figure 4.6

After hearing the beep sound of the screen buzzer, it indicates that the function module has been successfully initialized. At this time, you can open the web camera interface, enter your username and password, as well as the IP address of the camera (the parameters in Figure 4.7 are for reference only, please enter the username and password of the camera in actual use), and click [Open]. You can also enter the RTSP address and click on [Custom Open].

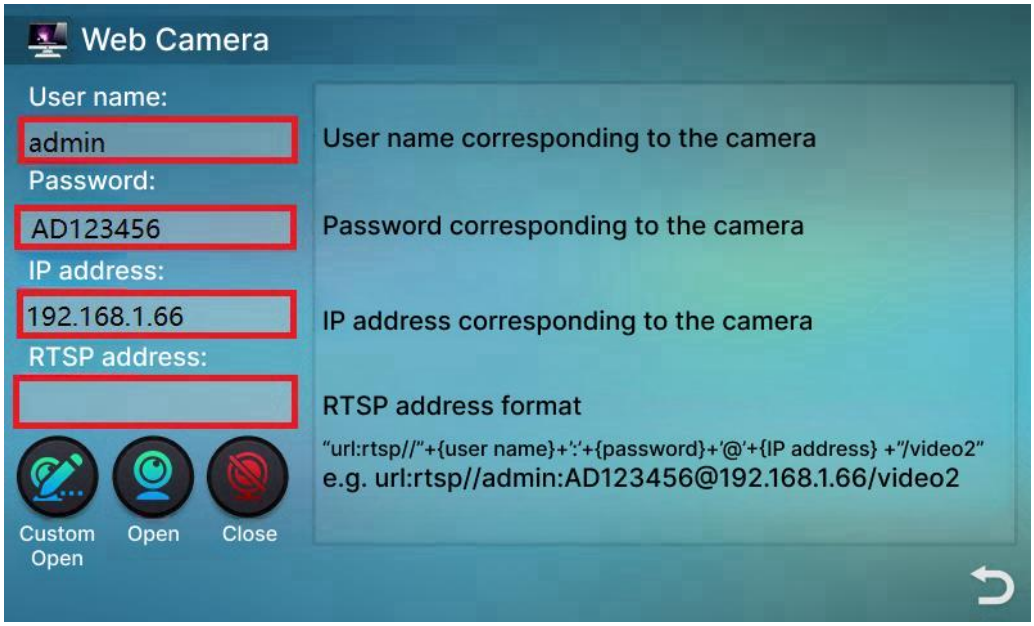


Figure 4.7

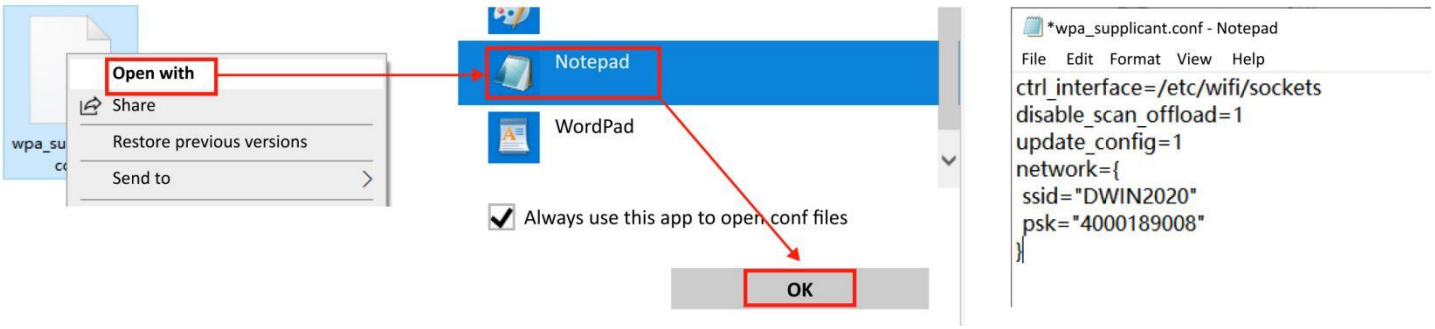
5. Common Questions

1. After clicking on the control, the video list does not appear?

When the module powers on, a "beep" sound from the buzzer signifies that the startup process is finished. Subsequently, the command "AA 55 00 04 82 01+CRC (2 bytes)" must be transmitted. Successful execution of this command enables standard video playback operation for the user.

2. How to connect to the WIFI network?

Method 1: Use Notepad to open the "wpa_supplicant. conf" file on the USB disk, fill in your written WIFI name (SSID) and password in the following format, save the file, and make sure to place it in the root directory of the USB disk. After the screen is powered on, the file parameters will be automatically read and WIFI configuration will be performed.




```
ctrl_interface=/etc/wifi/sockets
disable_scan_offload=1
update_config=1
network={
  ssid="WIFI name"
  psk="WIFI password"
}
```

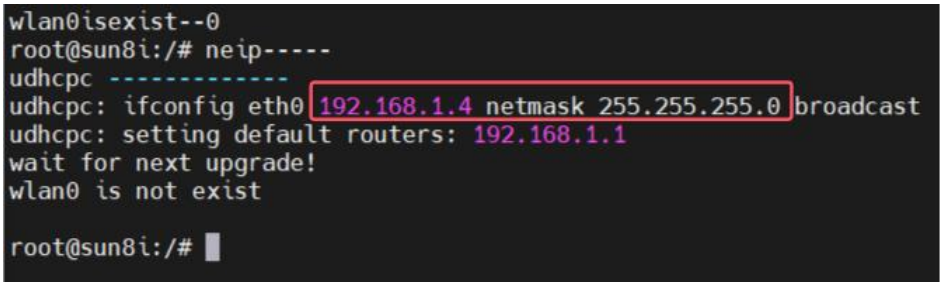
Method 2: Manually search and connect to WIFI through the 41 series video screen interface, enter the WIFI password, and then connect to the network.

3. According to the guide, the web camera, router, and 41W screen were connected, and there were no issues with the project control settings, but the camera screen was not displayed?

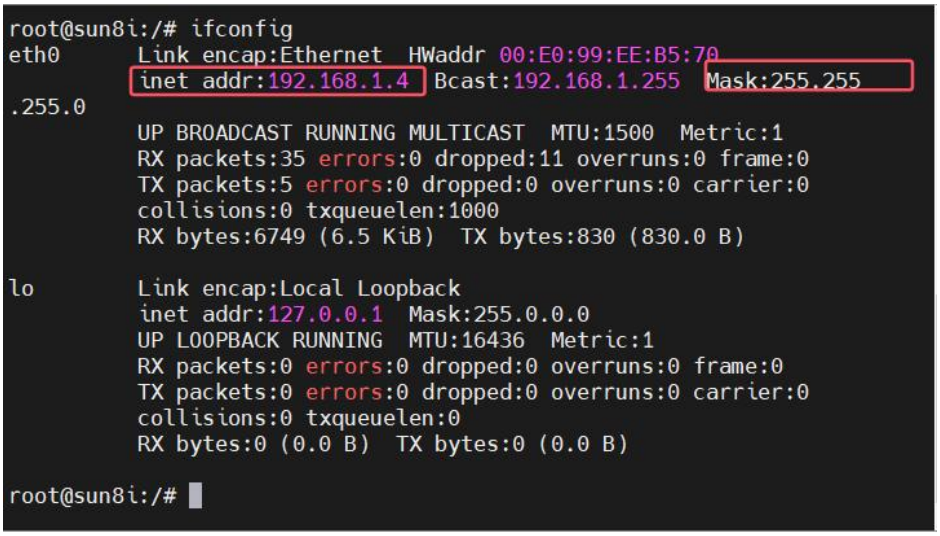
This may be caused by the IP addresses of the camera and screen not being in the same network segment, usually due to misconnecting to different routers or not being in the same hotspot. The IP address of the camera can be obtained through "4.1 View camera IP address", and the IP address of the 41W screen needs to be obtained through the following methods.

(1) Establish serial communication between the 41W screen function module and the PC, as shown in the figure below. Connect TX, RX, GND to the serial port adapter, and then connect the serial port adapter to the PC.

(2) Open MobaXterm Serial Assistant, select the correct serial port number, set the Baud Rate to 921600, and click [OK]. Power on the screen and you can see the information printed by the serial port, as shown in the red box below, which is the screen IP address.



(3) If the IP address isn't displayed, use the "ifconfig" command in the command entry field to get it. As the image illustrates, the current screen's IP address is "192.168.1.4" with a subnet mask of "255.255.255.0". We previously found the network camera's IP address to be "192.168.1.112", also with a subnet mask of "255.255.255.0". Because both IP addresses share the same subnet mask and their first three numbers are identical, it can be determined that they are on the same network segment



4. What should be noted when storing audio and video files?

When audio and video files are saved in USB flash drive or SD card, they should be placed in the folders of the root directory (it is recommended to name them in numerical order for easy sorting), and the format should be MP3/MP4. As shown in the following figure, video files are saved in the "VIDEO" folder, and audio files are saved in the "MUSIC" folder.

5. Why can't the audio/video be played after inserting the USB flash drive?

Firstly, check whether the audio and video files have been stored correctly according to the content in Point 4. If there is no problem, it may be that an invalid USB port has been inserted. You can change the USB port and try again or operate according to the following content:

There are two types of jumper cap designs in the product. In Figure 1, the jumper is 2PIN. When the jumper cap is inserted, the USB port marked "USB" is valid, and when the jumper cap is removed, the USB port marked "R11_USB_BRUN" is available. In Figure 2, the jumper is 3PIN. When it is jumpered to "1.8V", both USB ports are available, and when it is jumpered to "GND", only the upper USB port is available.

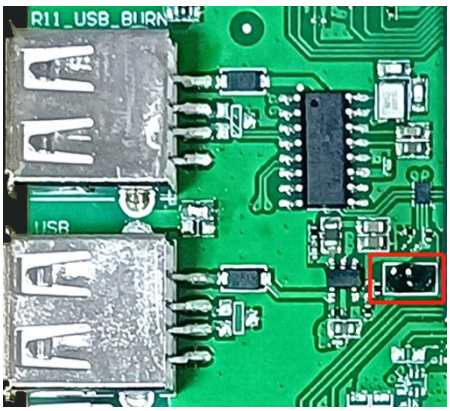


Figure 1

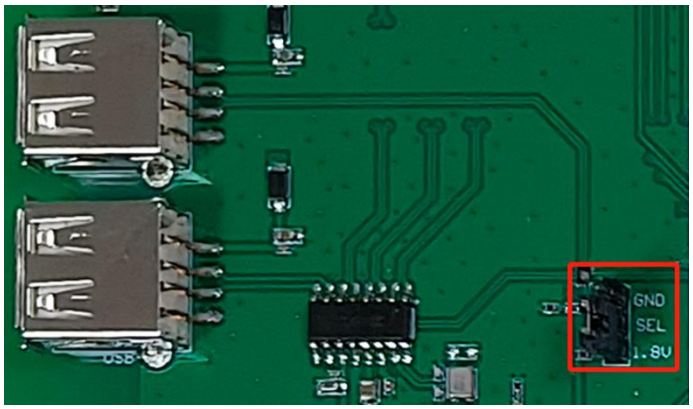


Figure 2

6. Why can't the audio/video be played after inserting the SD Card?

First, confirm that that audio/video files are correctly stored as specified in point 4. If file storage is not the issue, examine the DGUS project and see if the right playback command has been sent.

If the preceding checks revealed no issues, the playback failure could be caused by storing video files on an SD card that was previously used for flashing video IC kernels, potentially corrupting the R11 kernel file.

6. Revision Records

Version	Revise Date	Content	Editor
1.0	2024-07-02	First Edition	Xu Ying
1.1	2024-12-09	Added instructions for using the web camera	Xu Ying
1.2	2024-12-25	Added USB port usage instructions, audio and video file storage methods	Xu Ying
1.7	2025-05-27	Updated description of new interface features. Added instructions for serial port upload commands after module startup.	Joyce Jiang

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- DWIN Developer Forum: https://forums.dwin-global.com/

Thank you all for continuous support of DWIN, and your approval is the driving force of our progress!