Yuanli Technology focuses on underlying algorithm software and hardware technology, providing customers with stable and reliable machine vision hardware products and algorithm platforms, supporting customized development to significantly improve user work efficiency and accuracy.

The YL383x series (as shown in Figure 1) of fixed barcode scanners comprehensively apply advanced deep learning and traditional CV technology to effectively address various challenges in barcode detection and recognition in industrial environments. They can recognize various mainstream one-dimensional barcodes and two-dimensional barcodes. Easily read barcodes and characters on various printed and displayed media such as paper and plastic, with stable performance, suitable for electronic product manufacturing and automation processes.

Specifications

Model	**YL383x Series**
Supported Barcode Formats	2D：Aztec、DataMatrix、MaxiCode、PDF417、QRCode、MicroQRCode、RMQRCode 1D：Codabar、Code39、Code93、Code128、EAN8、EAN13、ITF、DataBar、DataBarExpanded、UPCA、UPCE
Image Sensor	1920*1080 Pixel Global Shutter CMOS
Illumination System	Direct/Polarized/Uniform Lighting
Image Processing	Auto Exposure / Auto White Balance / Noise Reduction (2DNR & 3DNR) / Gamma Correction / Wide Dynamic Range
Lens	6mm Fixed Focus, Distortion-Free Lens, Optional Before Placing an Order
Focus	Manual Focus, Digital Zoom
Field of View	Horizontal 50°, Vertical 30° (as shown in Figure 2)
Recognition Distance	50 mm ~ 300 mm
Interface	USB2.0 Plug and Play
Supported Protocols	Standard UVC Protocol, RS232、EIP、PROPHINET、FTP、Modbus
Barcode Grade Verification	ISO/IEC 15415、ISO/IEC 16022、ISO/IEC TR29158(AIM DPM-1-2006)
Operating Voltage	5V
Operating Current	180-240mA
Operating Temperature	-20~60℃
Light Source	6 LEDs，White
Temperature/Humidity	Operating Temperature -20~60℃, Storage Temperature -30~70℃, 20%~80%RH without condensation.

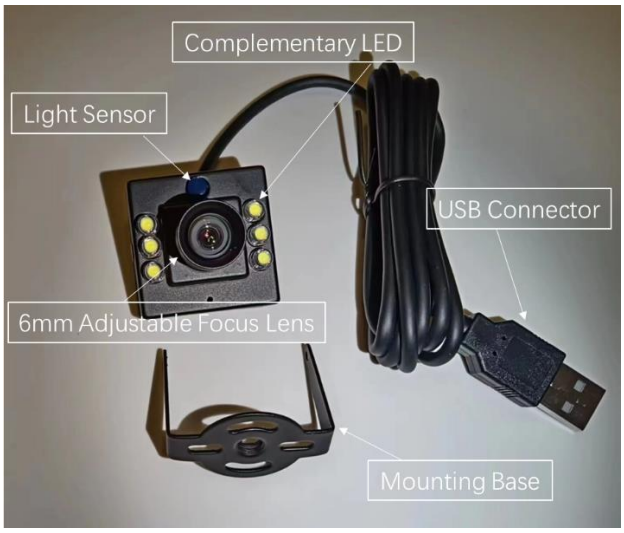


Figure (1) Scanner Overview

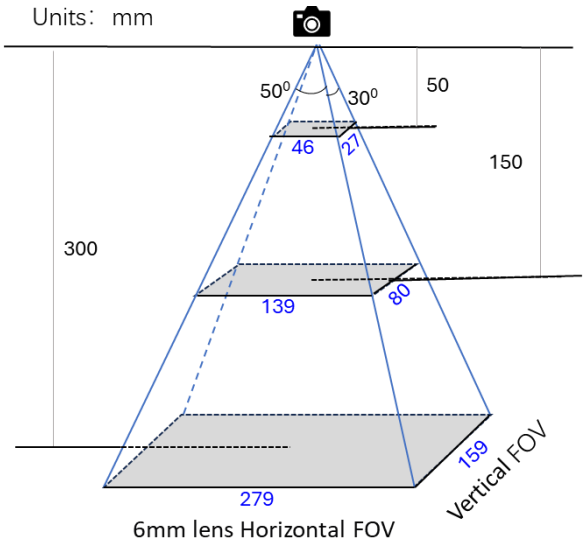


Figure (2) Field of View

MODEL

Model	Function (Both support 1D and 2D barcodes)	Remarks
YL3833	Supports single barcode recognition	LED Auto Flash
YL3839	Supports up to 8 barcode recognition and 8 character recognition areas	
YL3833M	Supports single barcode recognition	LED Manual Adjustment Flash
YL3839M	Supports up to 8 barcode recognition and 8 character recognition areas	

SIZE

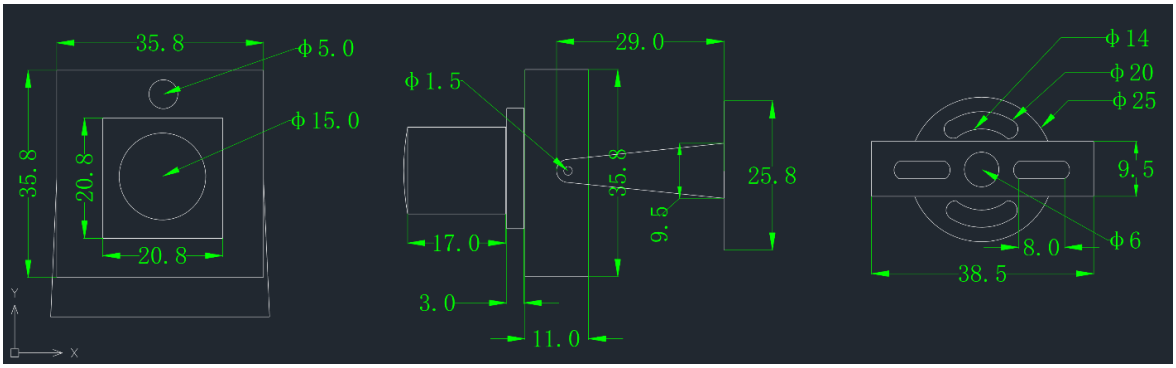


Figure (3)

Features

Barcode Recognition:

- Under uneven lighting, noise interference, and blurred images, dynamic contrast enhancement, adaptive histogram equalization, and various filtering techniques are used to effectively improve image quality.
- Advanced target detection algorithms are used to quickly and accurately locate the barcode area in the image. In addition, traditional corner detection algorithms are combined to further refine the positioning of the barcode location, reducing recognition errors caused by rotation or tilt.
- Deep learning models predict the rotation angle of the barcode, applying geometric transformations to correct the barcode. Traditional CV methods combined with positioning information extract key features of the barcode to ensure the accuracy of subsequent feature extraction and decoding.
- An efficient barcode decoding library is used, combined with precise positioning and feature information, to ensure accurate decoding of barcode content. By optimizing model structure, parameter adjustment, and data augmentation, the algorithm's robustness and generalization ability in complex environments are improved. Targeted operator optimization accelerates the system, further meeting the needs of real-time industrial detection.

Character Recognition:

- A detection model based on Convolutional Neural Networks (CNN) is used, generating text box candidate areas with anchor points, and further refining the position and shape of the text box through regression networks. Technologies such as threshold processing and Non-Maximum Suppression (NMS) improve the precision and stability of detection results.
- A sequence recognition model CRNN processes text sequences, training sequence recognition models. The model introduces attention mechanisms, and the CTC loss function automatically aligns predicted results with real labels, enhancing the recognition task of variable-length text sequences and improving recognition accuracy.

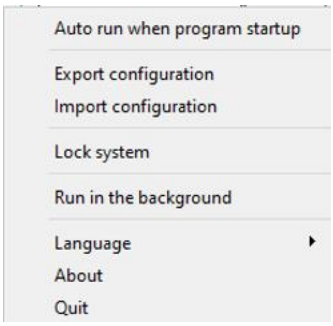
Setting

The following figure illustrates the scanning software interface and corresponding setup instructions (using YL3839 as an example). Please set according to the actual usage scenario requirements.

Figure (4)

The instructions labeled in Figure (4) are as follows:

1: Menu button, click with the mouse for the following menu list:



- ”Auto run when program startup” When selected, the scanning function will automatically run every time the software starts;
- “Export Configuration” Export product configuration files to a selected location;
- “Import configuration” Import product configuration files from a selected location, and the software will automatically restart after loading;

- “Lock system” Locked and cannot be changed, requires a password to unlock (password: Barcode);
- “Run in the background” when it’s selected, the software will not exit when it’s closed, it’s keep running at the backend;
- “Language” GUI support English and Chinese, the software will restart then active when it’s swapped;
- “About” Software information;
- “Quit” close and quit the scanning software;

2：According to the actual number of cameras connected, press "+" to add a scanning camera, default is one, port number is 6001, each additional camera increases the port number by 1 based on 6001;

3：If multiple cameras are connected, you can select the corresponding camera for configuration or operation; if there is only one camera, just as the default is fine;

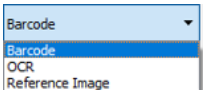
4：Start the camera scanning button, "Stop Run" is the start state, "Run" is the stop state;

5：The list of configured project names;

6：Add project name;

7：Delete the selected project name;

8：Click to select the object to be scanned or recognized



- “Barcode” The recognized object is a one-dimensional or two-dimensional barcode;
- “OCR” The recognized object is a character;
- “Reference Image” For reference positioning, if the position of the barcode and characters to be recognized is relatively fixed with the camera, this item does not need to be set. This item is required for dynamic scanning, that is, if the angle between the camera and the barcode is not fixed, but the distance between the camera and the recognition area is fixed to ensure clear imaging, otherwise recognition may fail due to changes in focal length.

9：You can set regular expressions for the barcodes or characters to be recognized, and the recognition results "PASS" or "FAIL" will be directly returned on the "Match" column on the upper right side of the software interface. This column is empty by default, and the result of the "Match" column is Empty, as shown in position "K";

A：Set digital zoom, default is 1, adjustable range: 0.25 ~ 4 (any value within this range is acceptable), if the distance is too far or too close, you can try adjusting to improve recognition effect;

B：Delete the selected recognition area;

C：Delete all recognition areas;

D：Software information;

E：The recognition box number is generated in the order set, corresponding to the number in the recognition result area "H" on the right side of the software interface;

F：The red highlight box is the currently selected editable box, which can be rotated, translated (by holding the right mouse button for translation), zoom in or out;

G：Click to capture the current picture and save it to a selected path;

H：The number of the recognition result, corresponding to the number generated when the recognition box is set;

J：The corresponding barcode recognition content as shown in the "Barcode Content" column;

K：The result of regular expression matching is displayed, if not set, it is "Empty";

L：OCR recognition result display;

M：Manual scanning by mouse click and display of recognition results;

N：Automatic scanning, which can be selected for debugging to facilitate viewing of debugging results. If controlled by the program for scanning, automatic scanning should be canceled to avoid interfering with the scanning results. Before changing this setting, you need to "Stop Run" first, set it up again, and then "Run" again；

P: Prepose Threshold, this parameter is primarily designed for barcode scanning scenarios with reflection issues. It can be adjusted through debugging and is highly helpful in improving scanning performance. The value range is 0–255, where 0 means no effect. Typically, you may try values between 160 and 200, and fine-tune according to actual conditions to achieve the desired results.

Communication Protocol

Protocol:

TCP socket, scanner software is the server side; if the upper computer software and scanner software are on the same PC, the IP is set to: 127.0.0.1, and the port can be set on the scanner software, default port: 6001

Command 1: Set the product model name or number to be scanned
Send:

```
{
        "cmd": "setProductName",
        "name": "router1"
}
```

Response

```
{
        "result": “PASS”, or “FAIL”,
        "message": ""
}
```

Command 2: Trigger Scanning

```
{

        "cmd": "scan"
}
```

Response

```
{
  "data": [
    {"num": 1, "content": "First element"},
    {"num": 2, "content": "Second element"},
    {"num": 3, "content": "Third element"}
  ],
  "result": “PASS”, or “FAIL”,
  "message": ""
}
```

Command 3: Snapshot

```
{
        "cmd": "snap"
}
```

Response

```
{
  "data": "picture_base64_string", // Base64 encoded image content
```

```
  "result":  “PASS”, or  “FAIL”,
  "message": ""
}
```

Command 4: Get USB Scanner Name

```
{
        "cmd": "getScanner"
}
```

Response

```
{
  "data": [
    {"name": "scanner1"},
    {"name": "scanner2"}
  ],
  "result":  “PASS”, or  “FAIL”,
  "message": ""
}
```

Command 5: Set Scanner to Use

Send:

```
{
        "cmd": "setScanner",
        "name": "scanner1"
}
```

Response

```
{
        "result":  “PASS”, or  “FAIL”,
        "message": ""
}
```

Command 6: Start Software "Run" Button

```
{
        "cmd": "run"
}
```

Response

```
{
  "result":  “PASS”, or  “FAIL”,
  "message": ""
}
```

Command 7: Start Software "Stop Run" Button

```
{
        "cmd": "stopRun"
}
```

Response

```
{
  "result":  “PASS”, or  “FAIL” ,
  "message": ""
}
```

In the above responses, result "PASS" means the command is executed successfully, and the message is empty; result "FAIL" is an error code; message is an error description.

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