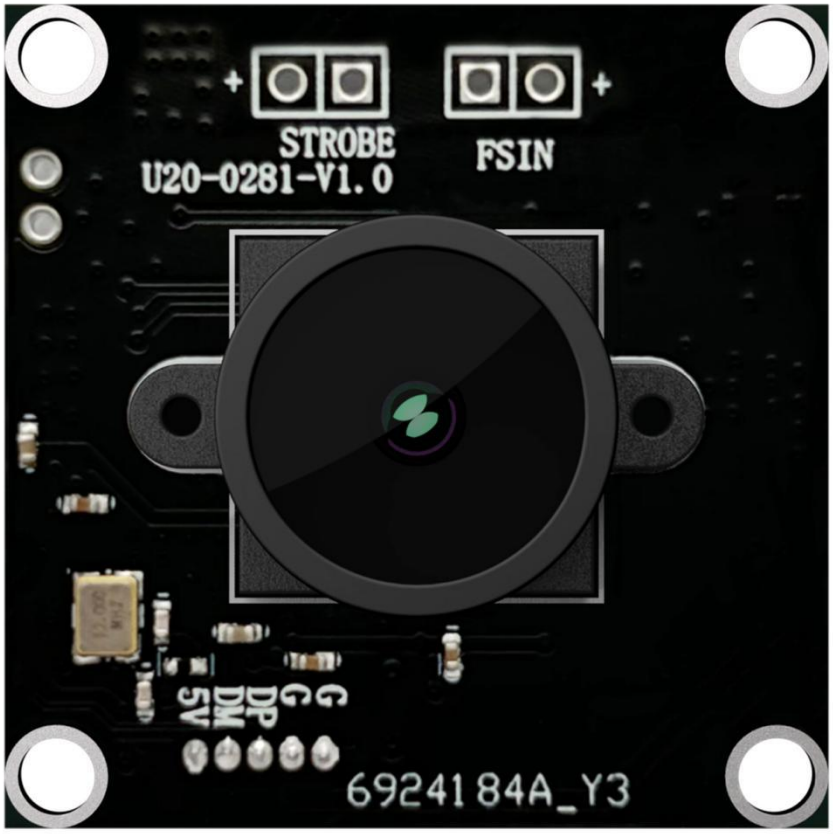
U20CAM-9281M



Normally We will update our development Mannual here

Date	Revision	Change Details
2023/10/17	1.0	First Released

1 General

1.1 Description

U20CAM-9281M is InnoMaker UVC Series Module with 1MP 1/4″ monochrome global shutter OV9281 image sensor,low distortion USB 2.0 camera.Feature with external hardware trigger and stobe function.Shoot high-speed moving objects in crisp sharp images. Avoid the rolling artifacts to get a much more accurate complete picture than the rolling shutter cameras. Reserved external trigger ports, support trigger via external signal.)

1.2 Features

- U20CAM-9281M is a 1.3M global shutter UVC camera module by mono sensor ov9281;
- Compatible with USB2.0,USB3.0 plug and play for Windows,Linux,Mac Os devices;
- Support hardware external trigger mode and live streaming mode;
- Easily wire external trigger pins and strobe pins by 2.0mm pin headers;
- Featured with wide angle fixed M12 LEN FOV Up to 148 degree;

1.3 Specification

Model Name	U20CAM-9281M
Dimension	32mmx32mm
Sensor	Monochrome global shutter OV9281
Pixel Size	3μm*3μm
Resolution	1MP 1280(H)x800(V) Frame rate MJPG Max 120fps,Default 30fps
Output Format	MJPG/YUY2
Len	FOV148°（H） M12 18mm Len Seat No IR filter, sensitive to IR
Input Voltage	Power:5V Current:86mA 0.42W
Shutter Mode	Global Shutter
Image Color	Monochrome
USB Interface	Vendor：1.25mm-5P ZZ-MS，Shouhan
Auto Parameters	White Balance（Manual Option）,Exposure（Manual Option）
Controllable Parameters	Brightness,Contrast,Hue,Saturation,Sharpness,Gamma,White Balance,Backlight Comp,Gain,Exposure,PowerLine Frequency,Low Light Compensation
Support OS	Windows, Linux, Mac Os with UVC Drivers Devices
Cable Length	1M

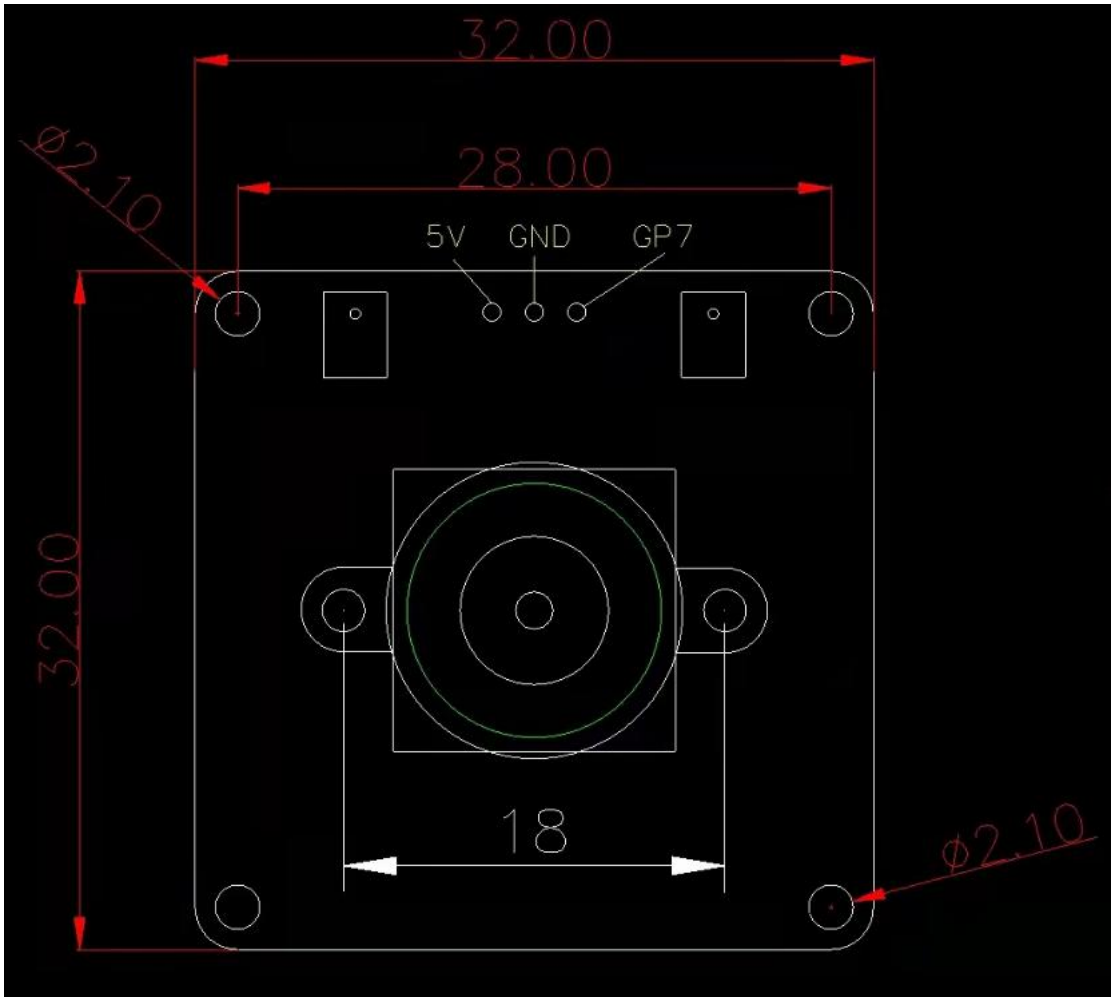
External Trigger	Support. Use UVC **Parameters** "Focus"
Working Conditions	Operating Temp: -20°C-70°C, Humidity:80-85%

1.4 Resolution Frame Rate

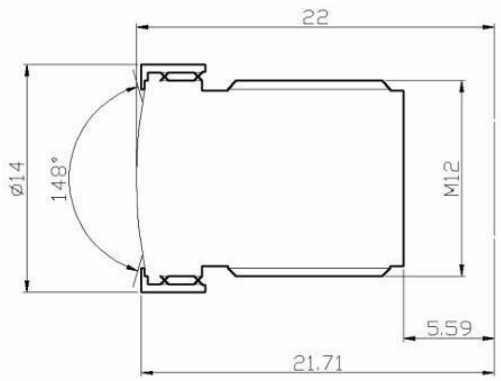
Output Resolution And Frame Rate			
Output Format	**Resolution**	**Frame rate (FPS)**	**Maximum**
MJPG	1280x800	10,15,30,120	1280x800@120fps
	1280x720(720p)	10,15,20,30,60,120	
	800x600	10,15,20,30,60,120	
	640x360(360p)	10,15,20,30,60,120	
	640x400	10,15,20,30,60,120	
	640x480	10,15,20,30,60,120	
	320x240	10,15,20,30,60,120	
	320x200	120,60,30	
YUY2	1280x800	10	1280x800@10fps 320x240@60fps
	1280x720(720p)	10	
	800x600	10	
	640x400	10,15,20,30	
	640x480	10,15,20,30	
	320x240	10,15,20,30,60	
	320x200	10,15,20,30,60	

2 Hardware

2.1 Module Size

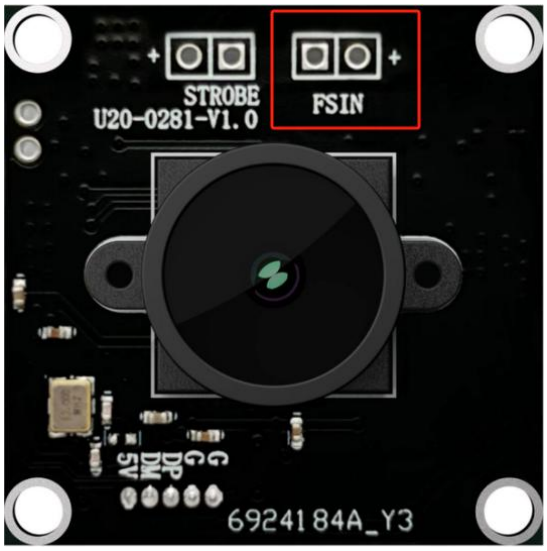


2.2 Camera LEN



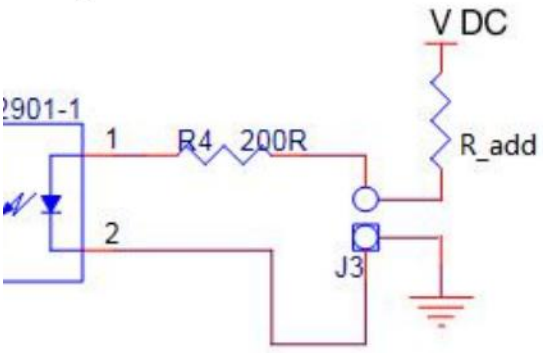
- Interface: M12
- Field of view Fov(D) = 148Degree
- Focal Length 2.8 mm
- Focal Distance Adjustable
- TV DISTORTION <-17%
- F(N) /Aperture 2.2
- Len Seat: 18mm

2.3 External Trigger Signal



PINS	Description
FSIN +	3.3v-5v External Trigger Input
FSIN -	External Ground GND

Reference Circuit



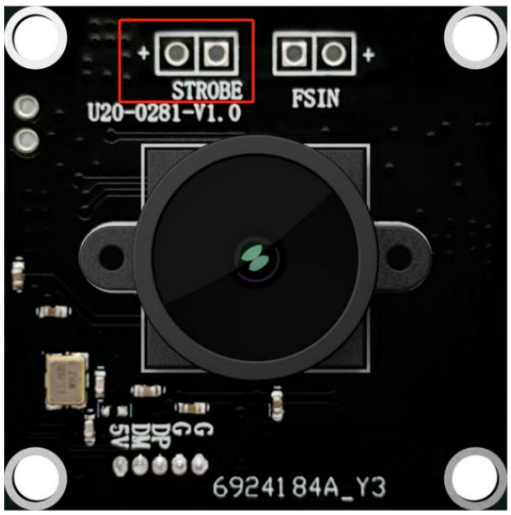
For example, VDC = 12V, Vf = 1.25V

The calculations done here are based on 12VDC. Please do follow these calculations for other voltages like 24VDC.

Let's take the current through IR LED I_f = 20mA.
Voltage drop across the IR LED = 1.25V
The value of Resistor $R_1 = (V_{cc}-V_f)/I_f = (12 – 1.25)/0.02 = 537.5\ \Omega$
Wattage of resistor $R_1 > I_f^2 * R_1 = 0.02^2*537.5 = 0.215W$
Wattage of the resistor R_1 selected should be greater than 0.215W.

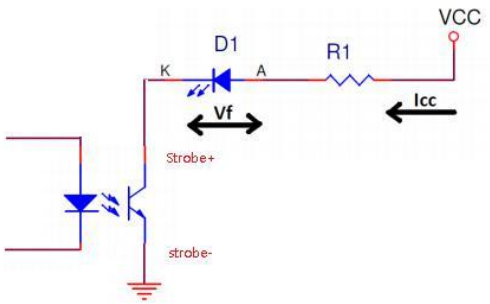
And there is a resistor on board(R4 = 200Ω), So the R_add = R1 - R4 = 537.5 - 200 = 337.5Ω

2.4 STROBE Signal



PINS	Description
STROBE +	Sensor STROB+
STROBE -	

Reference Circuit



On-board TLP281 optocoupler isolation, Notice the max collector current is 50mA.

Output Specifications

S. No	Parameter	Test Condition	Value			Unit
			Min	Typ	Max	
1	Driver Voltage (VCC)			12	24	V
2	Drive current (Icc)			10	50	mA
3	Collector Emitter Breakdown Voltage				80	V
4	Collector Emitter Saturation Voltage	Icc = 1 mA		0.1	0.2	V
5	Power Dissipation				150	mW

Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_F = 10mA, I_C = 1mA		0.1	0.2	V

So If the current required to drive the Flash LED is no more than 50mA

The value of series resistor: R1 = (VCC- Vf - VCE) / If

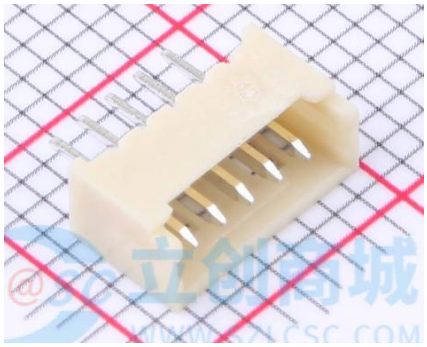
VCC: system Voltage

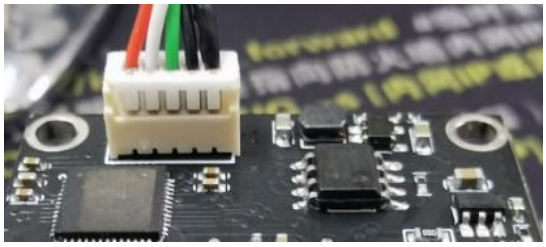
Vf: Forward voltage of Flash LED for current Icc

VCE: Collection Emitter voltage, typical:0.1V

If the current required to drive the flash exceeds 50mA, then it is required to drive it with the help of LED driver circuit, and LED driver circuit can be controlled by using the strobe output pin.

2.5 USB Connector

	Vendor: **SHOU HAN(首韩)** Name:1.25mm-5P ZZ-MS

1	5V	5V Power
2	DM	USB 2.0 Data-
3	DP	USB 2.0 Data+
4	GND	Ground
5	GND	Ground

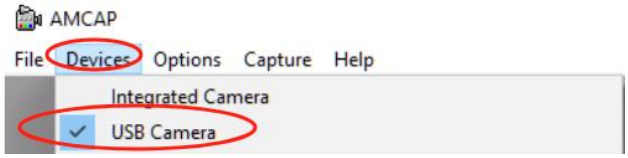
3 External Trigger Model

The external trigger mode is to accepts the external input signal to trigger the image output. When the rising edge of the external trigger signal coming, it can output an image. Therefore, it is very suitable for capturing high-speed moving objects. In addition, the sensor enables the sleep state will greatly reduce the power consumption.

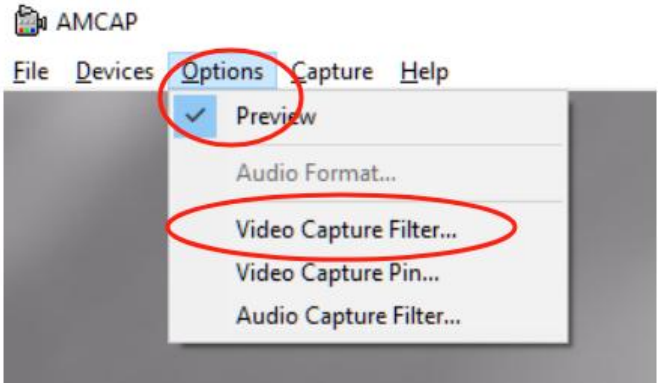
3.1 Enable Trigger Model

We set UVC Parameters **“Focus”** as the trigger Model Enable options.

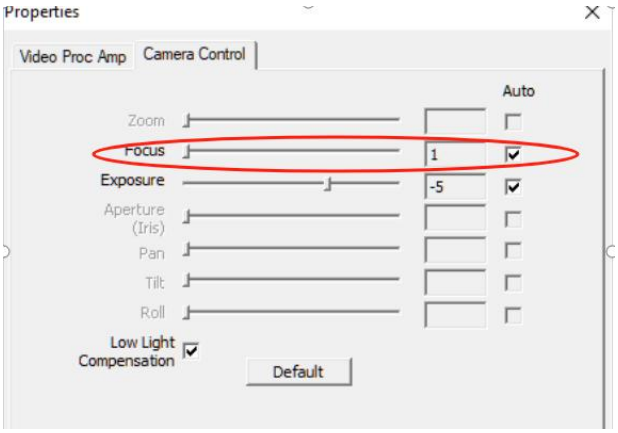
Open AMCAP.EXE, Choose **“USB Camera” from** “Devices”



From **"Options"** Choose **"Video Capture Filter"**



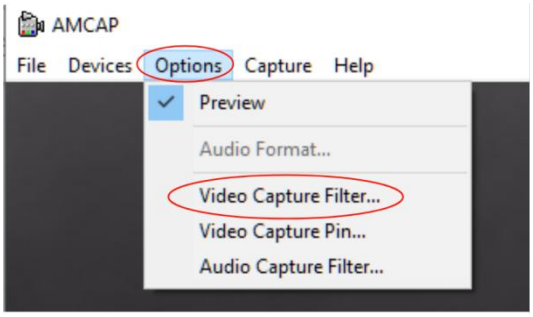
From **"Camera Control"** Find **"Focus"**, uncheck to enable it.



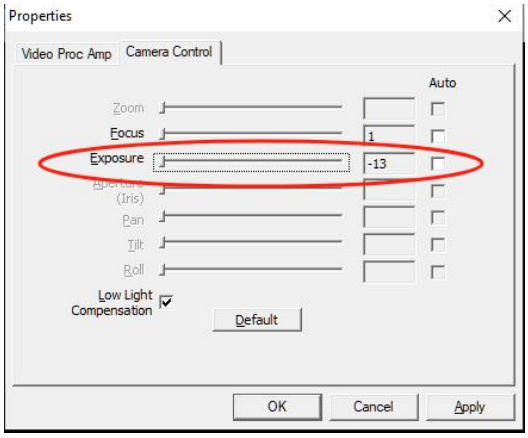
You can see the preview stop and enter

3.2 Adjust exposure Manually

This is necessary for fast move object.

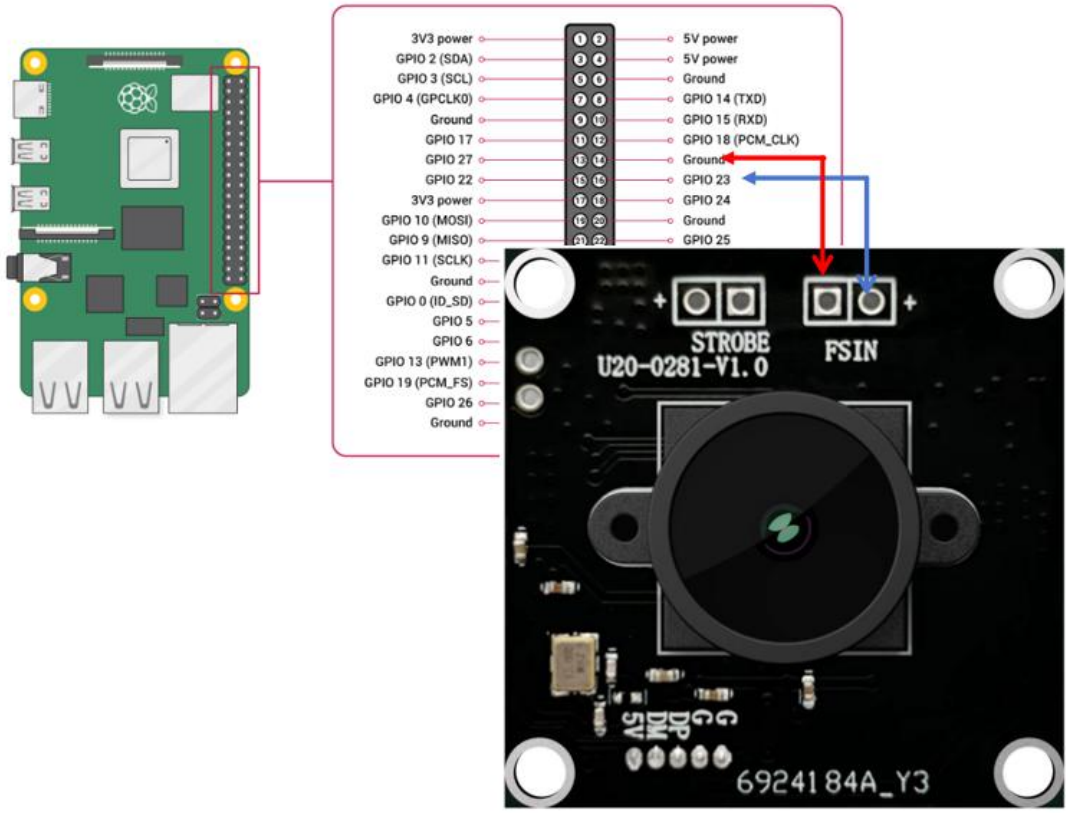


There is a switch behind the Exposure slider in the Camera Control. Select it to start manual exposure mode.



3.2 Hardware Connection And Script

Our sample use for raspberry pi, more information please refer to chapter 2.3,We use Raspberry PI GPIO 23 generate 3.3V pulse signal.Connect Raspberry PI GPIO23 to FSIN+, GND To FSIN-,Run command to start `sudo ./gpio-sysfs`



3.2 Strobe Connection

When the image is output, a flash signal output from S can drive flash to enhance exposure. The stroboscopic signal of the sensor can set the light point or time parameter. However, it can only output a fixed strobe signal because of a fixed UVC Camera configuration.