SIYIAI TRACKING MODULE II

USER MANUAL

SIYI Technology (Shenzhen) Co., Ltd.

siyi.biz/en

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Thank you for purchasing SIYI's product.

SIYI AI Tracking Module II supports collaborative control with SIYI optical pods and gimbal cameras to achieve real-time tracking and capture of targets and can highlight the tracking target in the picture through real-time focus and zoom.

It can recognize and track any object or a specific object and can also recognize and tracking targets under both optical images and thermal images.

Integrate attitude data between SIYI optical pod (gimbal camera) and flight controller and switch the flight mode to guided mode to turn on the target follow function.

To ensure you a good experience of the product, please read this manual carefully. If you encounter any issue using the product, please consult the manual or check the online pages of this product on SIYI official website (https://siyi.biz/en). You can also write an email to SIYI official A/S center (support@siyi.biz).

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Contact Us: SIYI Official Website *(https://siyi.biz/en)*

SIYI User Group - Facebook	
Facebook	
Linkedln	
YouTube	

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User Manual Update Log

Version	Date	Updates
1.0	2024.5	Initial version.
1.1	2024.7	新增输出跟踪目标信息、框选功能

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CONTENT

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READ TIPS

Icons

Please pay more attention to content indicated with the following marks:

DANGER Dangerous manipulation probably leads to human injuries.

WARNING Warnings on manipulation possibly leads to human injuries.

CAUTION Cautions on what manipulation may lead to property loss.

Safety

SIYI AI tracking module is designed for professional application in specific scenes, users who approach to the equipment should have the basic knowledge of how to operate it. Irregular or irresponsible manipulations to the device may cause damage, property loss, or human injuries, and SIYI Technology is not obliged to any of the damage, loss, or injury. It is prohibited to use SIYI products for military purpose. Users under 14 years' old should follow an experienced trainer's guide. Disassembling or modification to the system is prohibited without permission from its manufacturer, SIYI Technology.

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Storage / Carrying / Recycling

When your SIYI product is left unused, or you are bringing it outdoors, or the product life has expired, please do read the below precautions.

⚠ DANGER

Always place your SIYI products at places where babies or kids do not reach.

SIYI products should be placed in places which are too hot (above 60℃) or too cold (under -20℃).

⚠ CAUTION

SIYI products should not be placed in places under direct sunshine or too dusty or too wet.

Carrying or transporting SIYI products should avoid vibration or shatter by which components may break.

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Chapter 1 Introduction

1.1 Product Features

10T Computing Power

SIYI AI tracking module has a computing power of up to 10Tops@INT8, has strong performance in processing big-data artificial intelligence calculations, supports real-time AI recognition, tracking control, and automatic follow in the air, and can be widely used in surveillance, agriculture, forestry and plant protection, environmental monitoring, logistics and transportation and many other popular fields.

Any Object Recognition

With the support of the second generation of SIYI AI tracking module, you can deploy recognition, tracking and flight control based on artificial intelligence technology by selecting any conspicuous object in the image.

Enhanced AI Recognition

License Plate Recognition

Based on supporting vehicle recognition, the second generation of SIYI AI tracking module supports license plate recognition. Once selected, the license plate of the target vehicle will be automatically highlighted, and different colors will be used to distinguish the license plate type.

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Insulator Recognition

Near the power tower, the second-generation AI tracking module supports automatic recognition of insulators. Once selected, the optical pod will lock on the target insulator, greatly improving inspection efficiency.

Thermal Imaging Recognition

Working together with SIYI optical pod, the second-generation AI tracking module supports the recognition of human and vehicles under thermal imaging. Once selected, the optical pod will lock onto the target, greatly improving search and rescue efficiency in complex situations.

Optical Pod Collaborative

Enhanced AI Follow

SIYI AI tracking module supports collaborative control with SIYI optical pods (gimbal cameras) to achieve real-time tracking and capture of targets and can highlight the subject in the picture through real-time focus and zoom.

During the tracking process, if the target is blocked or briefly leaves the monitoring screen, AI tracking module can automatically recognize and continue tracking when it re-enters the monitoring screen.

Integrate attitude data between SIYI optical pod (gimbal camera) and flight controller and switch the flight mode to guided mode to turn on the target follow function.

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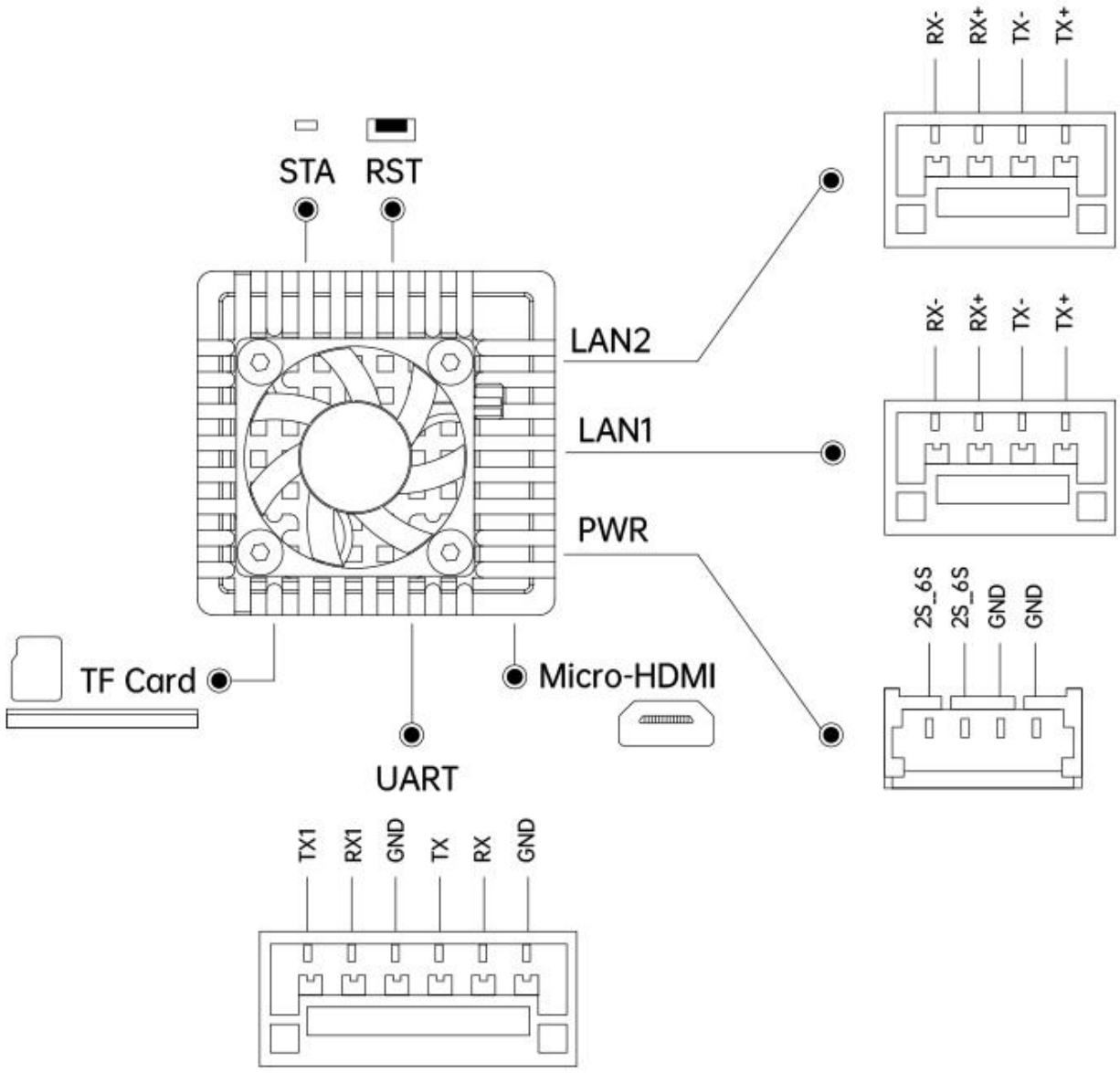
1.2 Interface & Pinouts



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1.3 Technical Specification

Compatible Optical Pods & Gimbal Cameras	ZT30 / ZT6 / ZR30 / ZR10 / A8 mini
Recognizable Object Types	Any Object Specific Object ● Insulator ● Human ● Auto Mobile (Car, Truck, Bus) ● Boat
Computing Power	10Tops @ INT8
Power Consumption	8 W
Working Voltage	11 ~ 25.2 V （3S ~ 6S）
Video Stream Codec Format	H.264 / H.265
Dynamic Target Gimbal Collaboration	Lock Target Auto Zoom Center Target AI Follow
Target Recognition / Locking Accuracy	95%
Working Temperature	-10 ~ 50 ℃
Dimension	52*52*29 mm
Weight	88 g

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Please format the SD card to FAT32 before camera firmware upgrade.

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1.4 Packing List

1 x SIYI AI Tracking Module II

1 x SIYI Gimbal Power Cable
(Power supply cable for SIYI gimbal)

1 x SIYI AI Tracking Module to SIYI Gimbal Ethernet Cable
(Connect SIYI AI tracking module's Ethernet port to SIYI gimbal's Ethernet port)

1 x SIYI AI Tracking Module to SIYI Link Cable
(Connect SIYI AI tracking module's Ethernet port to SIYI MK15 / HM30 air unit's Ethernet port)

1 x SIYI AI Tracking Module to SIYI Link Y Cable
(A Y cable which connects SIYI AI tracking module with SIYI MK15 / HM30 air unit for powering the AI tracking module, transfer video stream and control signal)

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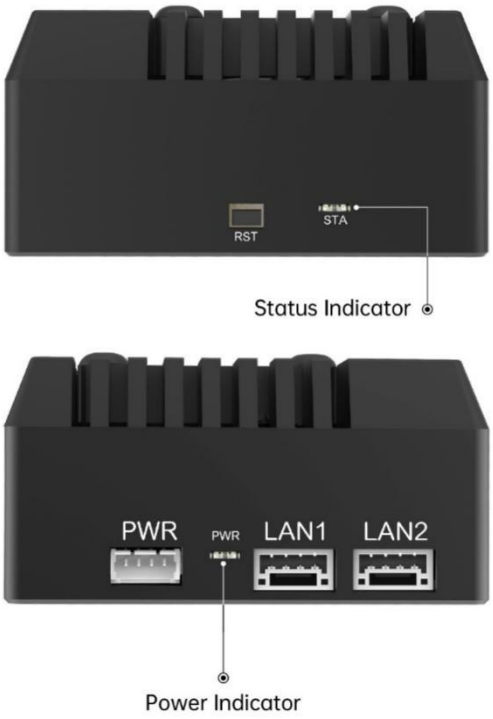
1.5 Indicator Definition

There are two indicators on SIYI AI tracking module to indicate the system's working or abnormal status: power indicator and status indicator.



1.5.1 Power Indicator

Solid Green: Module is powered normally.

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1.5.2 Status Indicator

Solid Yellow: Under firmware upgrade.

Yellow Blinks: Camera is not connected.

Solid Green: System is starting.

Green Blinks: System is running normally.

Green-Yellow Blinks: Parameter resets successfully.

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Chapter 2 Get Ready To Use SIYI AI Tracking Module

2.1 Typical Connection Diagram

2.1.1 ZT30

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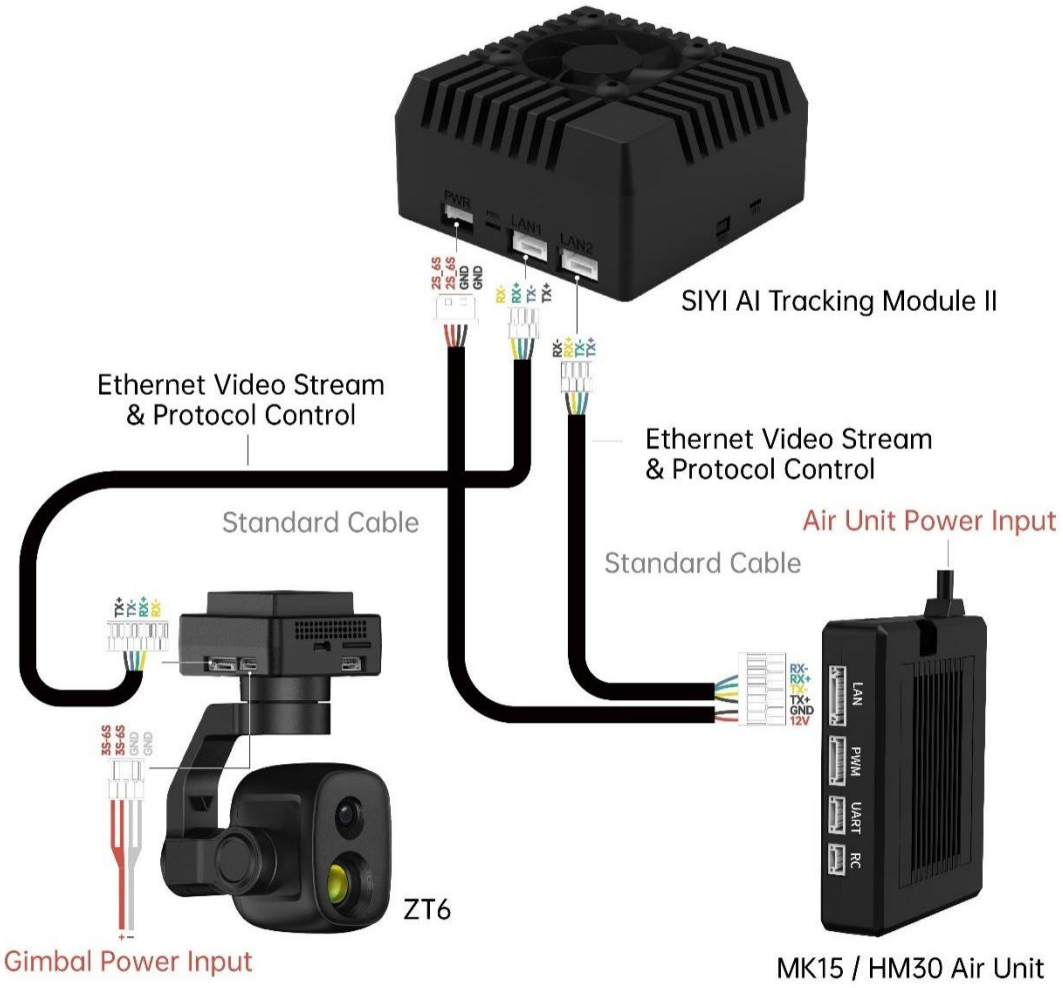
2.1.2 ZT6



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2.1.3 ZR30

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2.1.4 ZR10

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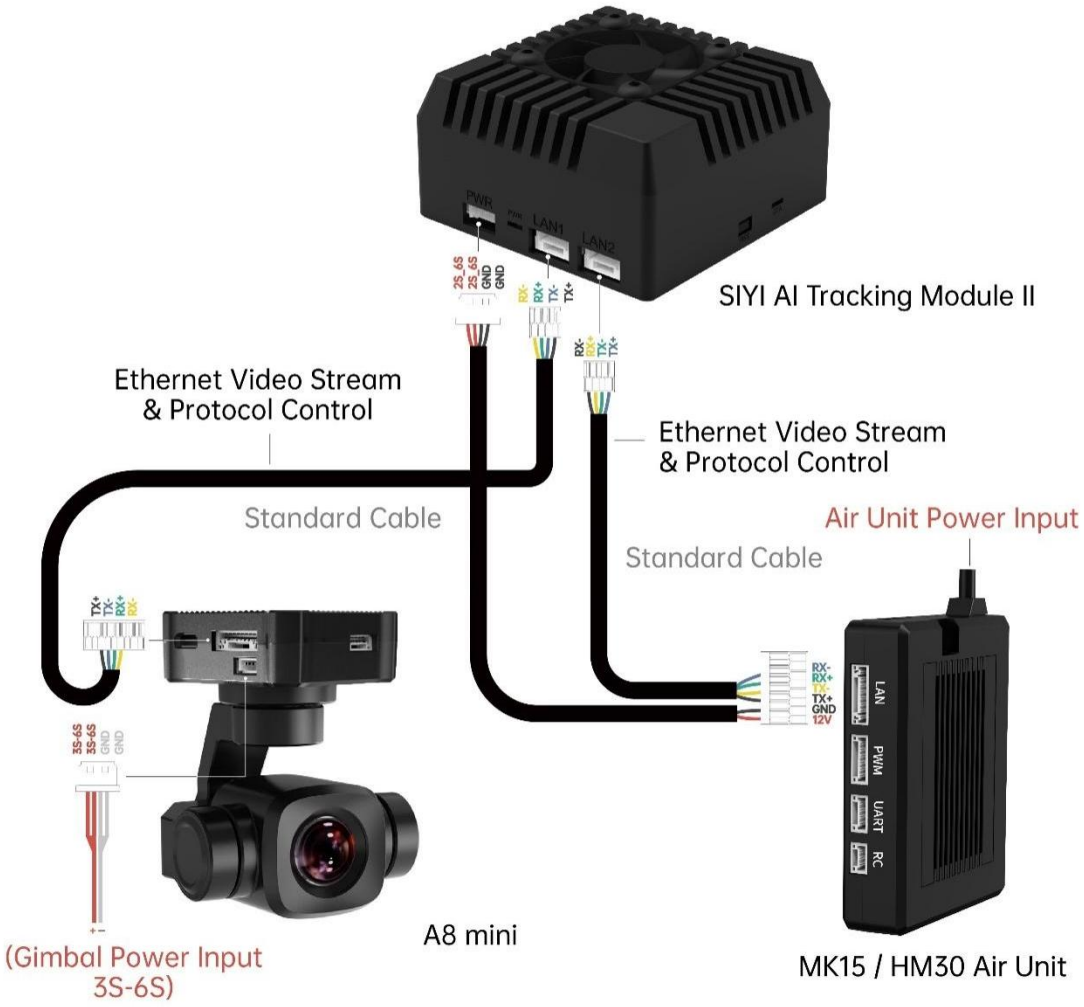
2.1.5 A8 mini



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2.2 Key Features & Pre-Cautions

SIYI AI Tracking Module II supports target recognition and tracking. Recognizable targets are:

1. Any Objects

2. Specific Objects

- Insulator
- Human
- Vehicle (Car, Truck, Bus)
- Boat

2.2.1 Function ON / OFF

1. Please refer to Chapter 2.1 in this manual to connect SIYI AI tracking module with SIYI gimbal and SIYI link.

2. Confirm if gimbal camera's firmware has been upgraded to be compatible with SIYI AI tracking module.

3. Confirm if SIYI FPV app has been upgraded to be compatible with SIYI AI Tracking Module II.

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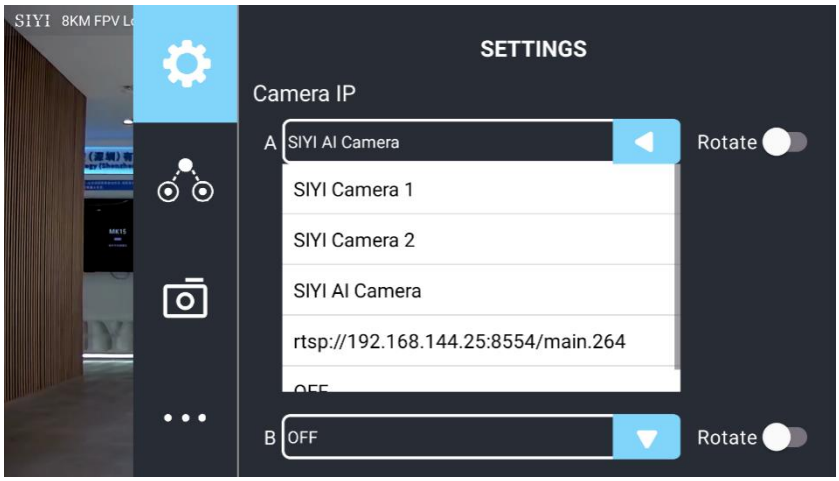
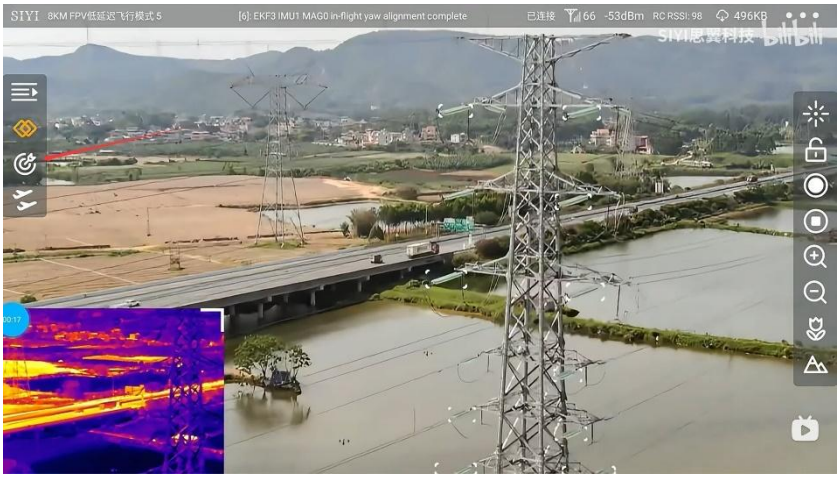
4. Run SIYI FPV app, go to “Settings - Addresses”, and select “SIYI AI Camera”.



5. Return to main image, touch the AI tracking function button to enable the function.



6. Touch the button again to disable the function.

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Using SIYI AI tracking module with multiple-sensor optical pods, in SIYI FPV app, the main stream of the optical pod should be configured as zoom camera.

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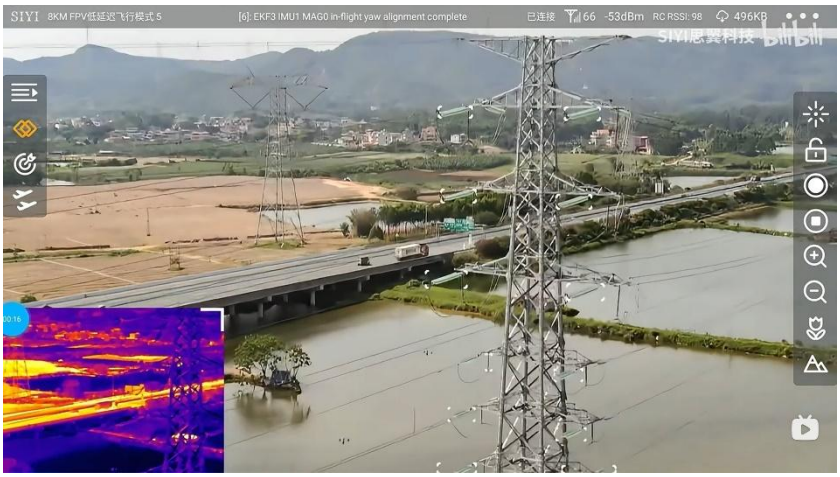
2.2.2 Target Recognition

When the AI tracking module is enabled, and recognizable targets go in the image, they will be surrounded with white recognition boxes. Function is working normally.



License Plate

Go to AI tracking settings, select AI model as “Normal”, enable “License Plate” to start recognizing license plates.

Insulator

Go to AI tracking settings, select AI model as “Insulator”, enable to start recognizing insulators.

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Any Objects

Go to AI tracking settings, lock the image, then you can box any targets for recognizing and tracking.

Thermal Imaging

Under thermal images, SIYI AI Tracking Module II will automatically enable recognition.

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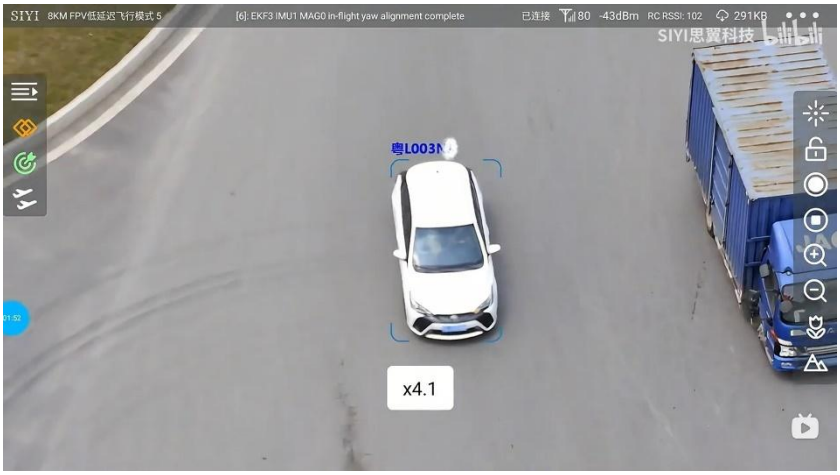
2.2.3 Target Tracking

Touch the white recognition box in the image, the box turns blue, and the AI tracking function button turns green. Gimbal camera starts to track the target.



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Zoom camera will zoom simultaneously during target tracking to keep the target displaying in the center of the image. And the zoom multiples will be displayed as well.

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2.2.4 Target Follow

When the AI tracking function is activated, integrate SIYI optical pod (gimbal camera) with flight controller of their attitude data, and switch flight controller flight mode to guided mode to turn on target follow function.

Steps

1. Please refer to the picture below to connect SIYI optical pod (gimbal camera) to flight controller and integrate attitude data.

2. Confirm if the flight controller integration button shows up (which means flight controller attitude data is integrated).

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3. Switch flight mode to “Guided” and configure the max flight speed.

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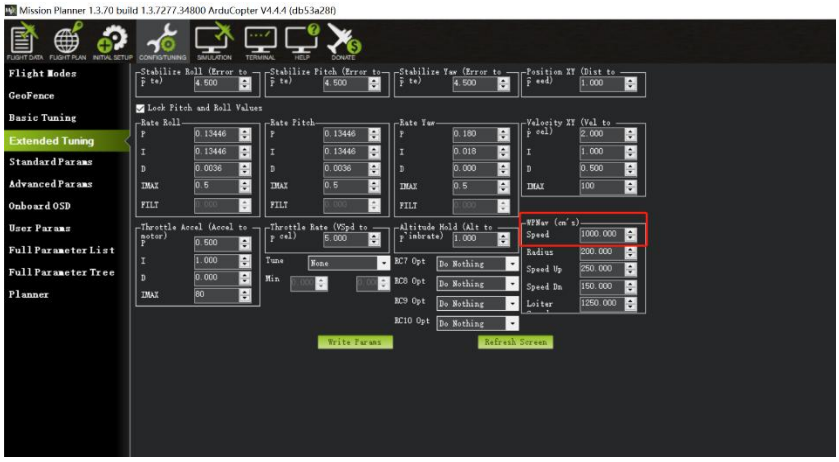

4. Touch the AI follow button to enable target follow function.

5. Touch the AI tracking / follow button again to disable the function.

DANGER

Considering flight safety, it is recommended to use the AI follow function and obstacle avoidance function together.

When the AI follow function is activated, the operator will not be able to manually control the flight, and the ground station cannot use the guided mode to control the aircraft. Switching flight mode can regain control.

When the AI follow function is activated, please ensure that the view on the follow route is clear and free of obstacles, and always pay attention to flight safety. When encountering obstacles, please immediately take over the flight manually and re-plan the route.

When the tracking target is lost, the aircraft will hover.

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When the tracked object is higher than the multi-rotor drone on the horizontal plane, AI follow function does not work; when the tracked object and the multi-rotor drone are on the same horizontal plane, AI follow function works best.

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Chapter 3 How To Configure The Module

SIYI AI tracking module can be configured through SD card, so does firmware upgrade.

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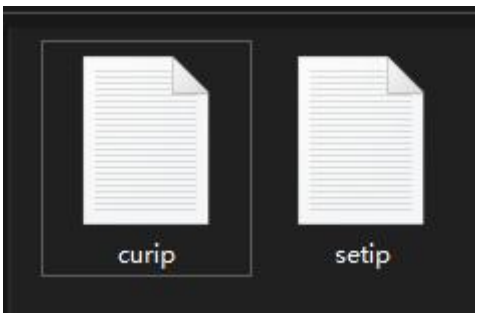
It is suggested to format the SD card to FAT32 before firmware upgrade.

It is suggested to insert the SD card to the AI tracking module and run it for a while, then you will see the files related to module configuration.

The two ".txt" files in the root category of the SD card are for checking and changing module configuration.



"curip.txt" for checking the current IP addresses.

"setip.txt" for customers to change IP addresses.

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3.1 IP Addresses

3.1.1 Check IP Addresses

Open the “curip.txt” file, you will see the current IP addresses and gateway of the AI tracking module.

“192.168.144.60” is the factory default module IP addresses.

“192.168.144.12” is the factory default module gateway.

3.1.2 Change IP Addresses

Open the “setip.txt” file, input the IP addresses you need after “IP = ”.

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Then insert the SD card to the module and power it. After three to five minutes, the new IP addresses will be flashed into module. Then we restart the module to finish changing IP addresses.

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In SIYI FPV app, the default IP addresses for “SIYI AI Camera” is “192.168.144.60”. After changing module IP addresses, it is necessary to manually input the relevant IP addresses in SIYI FPV app to acquire video & data stream from the AI tracking module.

When you are using SIYI AI tracking module with SIYI gimbals and SIYI links, please do configure its IP addresses within “192.168.144.X” and avoid conflicting with their existing IP addresses. Please refer to the “Common IP Addresses” chapter in SIYI link and SIYI gimbal manuals for detail.

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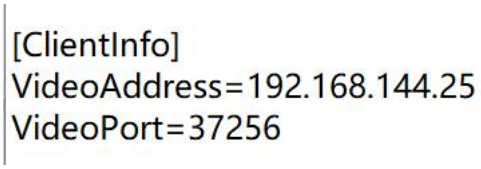
3.2 Client (Gimbal Camera) Addresses

3.2.1 Check Client Addresses

Open the “curip.txt” file, you will see the current client addresses and communication port of the AI tracking module.

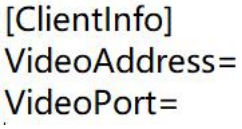


“192.168.144.25” is the current client addresses.

“37256” is the client communication port.

3.2.2 Change Client Addresses

Open the “setip.txt” file, input the client addresses you need after “VideoAddress =”, input the communication port after “VideoPort =”.



Then insert the SD card to the module and power it. After three to five minutes, the new IP addresses will be flashed into module. Then we restart the module to finish changing IP addresses.

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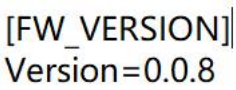
The default IP addresses for SIYI cameras is “192.168.144.25”. If you have changed camera IP addresses, it is necessary to manually input the relevant client addresses for SIYI AI tracking module to establish video & data stream between the AI tracking module and the gimbal camera.

3.3 Firmware Upgrade

3.3.1 Check Firmware Version

Open the “curip.txt” file, you will see the current firmware version of the AI tracking module.



3.3.2 Firmware Upgrade Steps

Before upgrading, it is necessary to prepare the tools, software, and firmware below.

- SD / TF card

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Customers should prepare the above tools.

- SIYI AI Tracking Module Firmware

Mark

Above tools can be downloaded from the “Downloads” page on SIYI official website (https://siyi.biz/en).

Steps

1. Save the module firmware’s “.bin” file to the SD / TF card’s root directory and do not change the file name.

2. Insert the SD card with saved firmware to SIYI AI tracking module and power it.

3. Wait for three to five minutes, camera firmware will be flashed automatically and disappear from the SD card.

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4. Restart the module to make the configuration work.

3.4 Reset Module Configuration

You can reset SIYI AI tracking module to factory configuration by pressing the RST button for five seconds.

3.5 Common IP Addresses

SIYI Air Unit IP Address: 192.168.144.11

SIYI Ground Unit IP Address: 192.168.144.12

SIYI Handheld Ground Station Android System IP Address: 192.168.144.20

SIYI Ethernet to HDMI Output Converter IP Add: 192.168.144.50

SIYI AI Camera IP Address: 192.168.144.60

SIYI Optical Pod / Gimbal Camera’s Default IP Addresses: 192.168.144.25

(NEW) SIYI Optical Pod / Gimbal Camera’s Default RTSP Addresses:

- SIYI AI Camera: rtsp://192.168.144.25:8554/video0
- Main Stream: rtsp://192.168.144.25:8554/video1

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- Sub Stream: rtsp://192.168.144.25:8554/video2

(NEW) SIYI FPV App's Private Video Stream Protocol's Addresses:

- SIYI Camera 1 Main Stream: 192.168.144.25: 37256
- SIYI Camera 1 Sub Stream: 192.168.144.25: 37255
- SIYI Camera 2 Main Stream: 192.168.144.26: 37256
- SIYI Camera 2 Sub Stream: 192.168.144.26: 37255

SIYI IP67 Camera A's IP Address: 192.168.144.25

SIYI IP67 Camera B's IP Address: 192.168.144.26

SIYI Air Unit HDMI Input Converter's IP Address: 192.168.144.25

SIYI IP67 Camera A's RTSP Address: rtsp://192.168.144.25:8554/main.264

SIYI IP67 Camera B's RTSP Address: rtsp://192.168.144.26:8554/main.264

SIYI Air Unit HDMI Input Converter's RTSP Address:

rtsp://192.168.144.25:8554/main.264

Common Video Player: SIYI FPV, QGroundControl

Network Diagnosis Tool: Ping Tools

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SIYI cameras released after ZT30 (including ZT30 and ZT6) start to use the new addresses.

SIYI cameras released before ZT30 (including ZR30, A2 mini, A8 mini, ZR10, and R1M) are stilling using the old addresses.

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3.6 Main Firmware Update Log

No update is available at this moment.

3.7 SIYI AI SDK

SIYI AI function provides control protocol for all customers. Please refer to the below guide for secondary development based on SIYI AI functions.

3.7.1SDK Protocol Format

Field	Index	Byte size	Content Description
STX	0	2	**0x 6655 is the low byte before the start flag**
CTRL	2	1	0:need_ack whether the current packet requires ack 1:ack_pack whether this package is ack package 2-7: Reserved
Data_len	3	2	**Data Field Byte Length The low byte precedes**
SEQ	5	2	**The sequence of frames, with the range (0~65535) of the low byte preceding**
CMD_ID	7	1	Command ID
DATA	8	Data_len	Data
CRC16		2	**CRC16 check- low byte precedes the entire packet**

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3.7.2SDK Communication Commands

Command Summary

Command ID	Function
0x 00	TCP heartbeat packet
0x 01	Request Firmware Version Number
0x02	Retention
0x 03	Request AI module identification status
0x 04	Set AI module identification status
0 x05	Request AI module tracking status
0 x06	Set the AI module to track the target (by coordinates)
0 x 08	Obtain the coordinate information flow state of the AI module tracking target
0 x 09	Set the coordinate information flow state of the AI module to track the target.
0 x 0a	The AI module tracks the coordinate information flow of the target.

0x 00:TCP heartbeat

CMD_ID:0x 00 ------ TCP heartbeat			
send data format			
Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
			No ack

Example:

1. Heartbeat Pack: 55 66 01 00 00 00 00 00 59 8B
2. Supported only for TCP connections

0x 01: Request firmware version number

CMD_ID:0x 01 ------ Request firmware version number			
send data format			
Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
	uint32_t	fw_version	AI Module Firmware Version Number

Eg:0x 88 000100 --> corresponding version number v0.1.0

Note: Byte 4 (high byte) ignored

0x 03: Request AI module to identify status

CMD_ID:0x 03 ------ A I module identification status requested
send data format

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Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
	uint8_t	AI_mode	0: Off 1: On

0x 04: Set AI module identification status

CMD_ID:0x 04 ------ Set AI module identification status			
send data format			
Serial Number	Data Type	Data Name	Data Description
	uint8_t	AI_mode	0: Off 1: On
ACK Data Format			
	uint8_t	AI_mode	0: Off 1: On

0x 05: Request AI module to track status

CMD_ID:0x 05 ------ Request AI module tracking status			
send data format			
Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
	uint8_t	AI_mode	0: No target 1: Tracking

0x 06: Set AI module to track target

CMD_ID:0x 06 ------ Set AI module to track target			
send data format			
Serial Number	Data Type	Data Name	Data Description
1	uint8_t	track_action	1: Track Target 0: Cancel Tracking
2	uint16_t	touch_lx	Pick: the x coordinate, in the range of the video stream resolution. Frame selection: the x coordinate of the upper left vertex of the box, and the range is the width of the video stream resolution.
3	uint16_t	touch_ly	Pick: the y coordinate, in the range of the video stream resolution. Frame selection: the y coordinate of the upper left vertex of the box, in the range of the video stream resolution.
4	uint16_t	touch_rx	Pick: 0 Frame selection: the x-coordinate of the bottom right vertex of the box, in the range of the video stream resolution.
5	uint16_t	touch_ry	Pick: 0 Frame selection: the y coordinate of the lower-right vertex of the box. The range is the size of the video stream resolution.

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1	uint8_t	sta	0 setting error 1 Set up successfully 2 Current mode is not AI tracking mode 3 The current code stream does not support AI tracking function

0x 08: Obtain the coordinate information flow state of the AI module tracking target

CMD_ID:0x 08 ------ Obtain the coordinate information flow state of the AI module tracking target			
send data format			
Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
1	uint8_t	sta	0 is not open. 1 is outputting coordinate information flow 2 AI recognition is not turned on 3 AI tracking target is not open

0x 09: Set the coordinate information flow state of the AI module to track the target

[Rate is the frame rate of the video stream, cannot be modified]

CMD_ID:0x 09 ------ Set the coordinate information flow state of the AI module tracking target			
send data format			
Serial Number	Data Type	Data Name	Data Description
	uint8_t	track_action	1: Open Output 0: Close Output
ACK Data Format			
1	uint8_t	sta	1: Open Output 0: Close Output

0x0a: Coordinate information flow of the tracking target by the AI module

[By 0x 09: set the AI module to track the coordinates of the target information flow state set to automatically send, no request]

[The origin is in the center of the recognition box, and the pixel coordinates are based on the size of the width 1280 height 720]

CMD_ID:0x 06 ------ Set AI module to track target			
send data format			
Serial Number	Data Type	Data Name	Data Description
ACK Data Format			
1	uint16_t	pos_x	Coordinates of the tracking target x
2	uint16_t	pos_y	Coordinate y of the tracking target
3	uint16_t	pos_width	Width of the tracking target recognition frame

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4	uint16_t	pos_height	Height of tracking target recognition frame
5	uint8_t	Target_ID	Target Type ID 0: People 1: The car 2: The Bus 3: The Truck 255: arbitrary object tracking
6	uint8_t	Track_Sta	Tracking Status 0: Normal Tracking (AI) 1: Intermittent loss, can continue to follow. 2: Lost. 3: User cancels tracking. 4: Normal tracking (arbitrary object)

3.7.3 SIYI Gimbal Camera SDK Communication Interface

UDP

- IP: 192.168.144.60 (default)
- Port: 37260

TCP

- IP: 192.168.144.60
- Port: 37260
- Heartbeat Packet Data: 55 66 01 01 00 00 00 00 00 59 8B

UART Serial Port

- Baud Rate: 115200
- Data Bits: 8 bits, Stop Bits: 1 bit, Parity: None

Communication Data Examples

TCP Heartbeat Packet

55 66 01 01 00 00 00 00 00 59 8B

Request AI Module Version

55 66 01 00 00 00 00 01 64 c4

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Request AI Mode Switch of AI Module
55 66 01 00 00 00 00 03 26 e4

Set AI Mode Switch of AI Module (ON)
55 66 01 01 00 00 00 04 01 bc 57

Set AI Mode Switch of AI Module (OFF)
55 66 01 01 00 00 00 04 00 9d 47

Request AI Module Tracking Status
55 66 01 00 00 00 00 05 e0 84

Set AI Module Tracking Target (640, 512)
55 66 01 05 00 00 00 06 01 80 02 00 02 e7 1a

Cancel AI Module Tracking Target
55 66 01 05 00 00 00 06 00 80 02 00 02 b6 b0

Get AI Module Tracking Target Coordinate Info Stream Status

[send]: 55 66 01 00 00 00 00 08 4d 55
[recv]: 55 66 02 01 00 02 00 08 00 1a 37
Set AI Module Tracking Target Coordinate Info Stream Status

[send]: 55 66 01 01 00 02 00 09 01 88 cc
[recv]: 55 66 02 01 00 03 00 09 01 be 62
AI Module Tracking Target Coordinate Info Stream

[recv]: 55 66 02 0a 00 bc 04 0a 80 02 75 01 01 05 b1 02 00 00 59 67

CRC16 checksum code

```
const uint16_t crc16_tab[256];
/*************************************************************
CRC16 Coding & Decoding G(X) = X^16+X^12+X^5+1
*************************************************************/
uint16_t CRC16_cal(uint8_t *ptr, uint32_t len, uint16_t crc_init)
{
   uint16_t crc,   oldcrc16;
   uint8_t  temp;
   crc = crc_init;
   while (len--!=0)
```


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```
  {
    temp=(crc>>8)&0xff;
    oldcrc16=crc16_tab[*ptr^temp];
    crc=(crc<<8)^oldcrc16;
    ptr++;

  }
  //crc=~crc;     //??
  return(crc);
}

uint8_t crc_check_16bites(uint8_t* pbuf, uint32_t len,uint32_t* p_result)
{
     uint16_t crc_result = 0;
     crc_result= CRC16_cal(pbuf,len, 0);
     *p_result = crc_result;

     return 2;
}


const uint16_t crc16_tab[256]= {0x0,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,
                        0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,
                        0x1231,0x210,0x3273,0x2252,0x52b5,0x4294,0x72f7,0x62d6,
                        0x9339,0x8318,0xb37b,0xa35a,0xd3bd,0xc39c,0xf3ff,0xe3de,
                        0x2462,0x3443,0x420,0x1401,0x64e6,0x74c7,0x44a4,0x5485,
                        0xa56a,0xb54b,0x8528,0x9509,0xe5ee,0xf5cf,0xc5ac,0xd58d,
                        0x3653,0x2672,0x1611,0x630,0x76d7,0x66f6,0x5695,0x46b4,
                        0xb75b,0xa77a,0x9719,0x8738,0xf7df,0xe7fe,0xd79d,0xc7bc,
                        0x48c4,0x58e5,0x6886,0x78a7,0x840,0x1861,0x2802,0x3823,
                        0xc9cc,0xd9ed,0xe98e,0xf9af,0x8948,0x9969,0xa90a,0xb92b,
                        0x5af5,0x4ad4,0x7ab7,0x6a96,0x1a71,0xa50,0x3a33,0x2a12,
                        0xdbfd,0xcbdc,0xfbbf,0xeb9e,0x9b79,0x8b58,0xbb3b,0xab1a,
                        0x6ca6,0x7c87,0x4ce4,0x5cc5,0x2c22,0x3c03,0xc60,0x1c41,
                        0xedae,0xfd8f,0xcdec,0xddcd,0xad2a,0xbd0b,0x8d68,0x9d49,
                        0x7e97,0x6eb6,0x5ed5,0x4ef4,0x3e13,0x2e32,0x1e51,0xe70,
                        0xff9f,0xefbe,0xdfdd,0xcffc,0xbf1b,0xaf3a,0x9f59,0x8f78,
                        0x9188,0x81a9,0xb1ca,0xa1eb,0xd10c,0xc12d,0xf14e,0xe16f,
                        0x1080,0xa1,0x30c2,0x20e3,0x5004,0x4025,0x7046,0x6067,
                        0x83b9,0x9398,0xa3fb,0xb3da,0xc33d,0xd31c,0xe37f,0xf35e,
                        0x2b1,0x1290,0x22f3,0x32d2,0x4235,0x5214,0x6277,0x7256,
                        0xb5ea,0xa5cb,0x95a8,0x8589,0xf56e,0xe54f,0xd52c,0xc50d,
                        0x34e2,0x24c3,0x14a0,0x481,0x7466,0x6447,0x5424,0x4405,
                        0xa7db,0xb7fa,0x8799,0x97b8,0xe75f,0xf77e,0xc71d,0xd73c,
```


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```
0x26d3,0x36f2,0x691,0x16b0,0x6657,0x7676,0x4615,0x5634,
0xd94c,0xc96d,0xf90e,0xe92f,0x99c8,0x89e9,0xb98a,0xa9ab,
0x5844,0x4865,0x7806,0x6827,0x18c0,0x8e1,0x3882,0x28a3,
0xcb7d,0xdb5c,0xeb3f,0xfb1e,0x8bf9,0x9bd8,0xabbb,0xbb9a,
0x4a75,0x5a54,0x6a37,0x7a16,0xaf1,0x1ad0,0x2ab3,0x3a92,
0xfd2e,0xed0f,0xdd6c,0xcd4d,0xbdaa,0xad8b,0x9de8,0x8dc9,
0x7c26,0x6c07,0x5c64,0x4c45,0x3ca2,0x2c83,0x1ce0,0xcc1,
0xef1f,0xff3e,0xcf5d,0xdf7c,0xaf9b,0xbfba,0x8fd9,0x9ff8,
0x6e17,0x7e36,0x4e55,0x5e74,0x2e93,0x3eb2,0xed1,0x1ef0
};
```


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Chapter 4 SIYI FPV APP

SIYI FPV is an Android application developed by SIYI to configure many SIYI products for video display, camera stream settings, and communication link status monitoring.

Mark

This chapter is edited based on SIYI FPV App v2.5.15.709.

SIYI FPV App can be downloaded from SIYI official website:

https://siyi.biz/en/index.php?id=downloads&asd=427

SIYI FPV App compatible SIYI devices

- SIYI AI Tracking Module II
- ZT6 Mini Dual-Sensor Optical Pod
- SIYI AI Tracking Module (Discontinued)
- ZT30 Four-Sensor Optical Pod
- ZR30 4K AI 180X Hybrid Zoom Optical Pod
- A2 mini Ultra-Wide-Angle FPV Gimbal
- MK32 / MK32E Enterprise Handheld Ground Station
- A8 mini AI Zoom Gimbal Camera
- ZR10 2K 30X Hybrid Zoom Optical Pod
- R1M HD Recording FPV Camera
- Air Unit HDMI Input Converter
- HM30 Full HD Image Transmission System
- MK15 / MK15E Mini Handheld Ground Station

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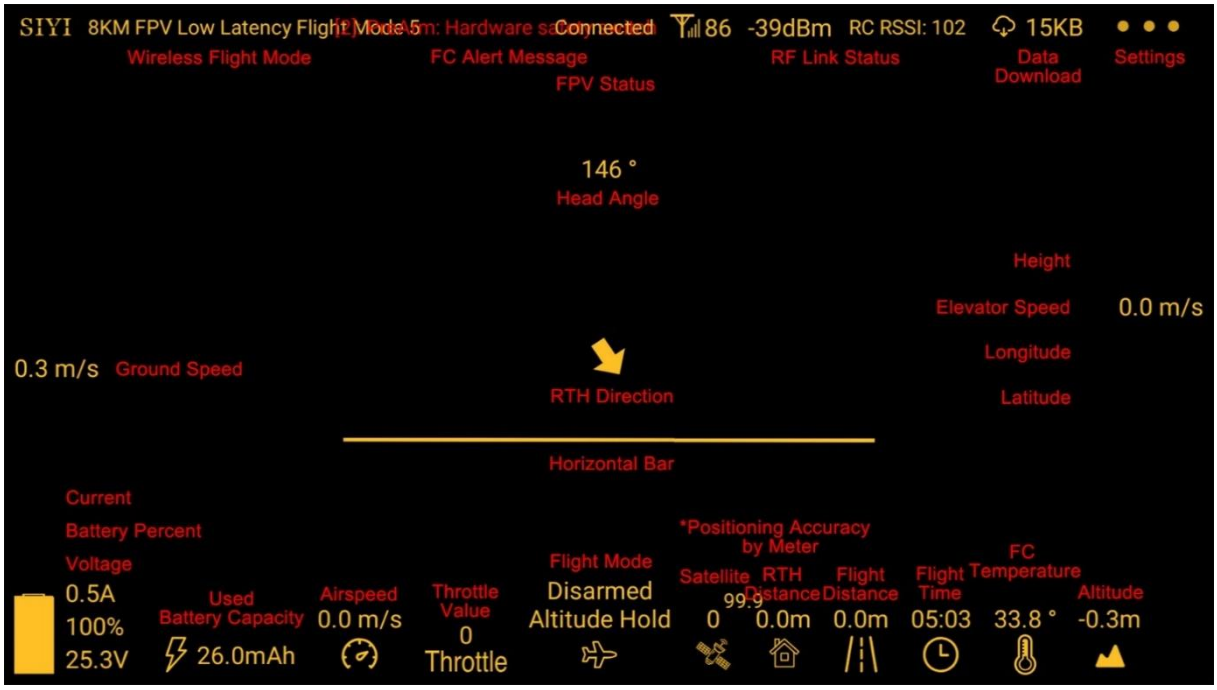
SIYI FPV App OSD Information Definition



SIYI FPV Camera Function Icon Definition

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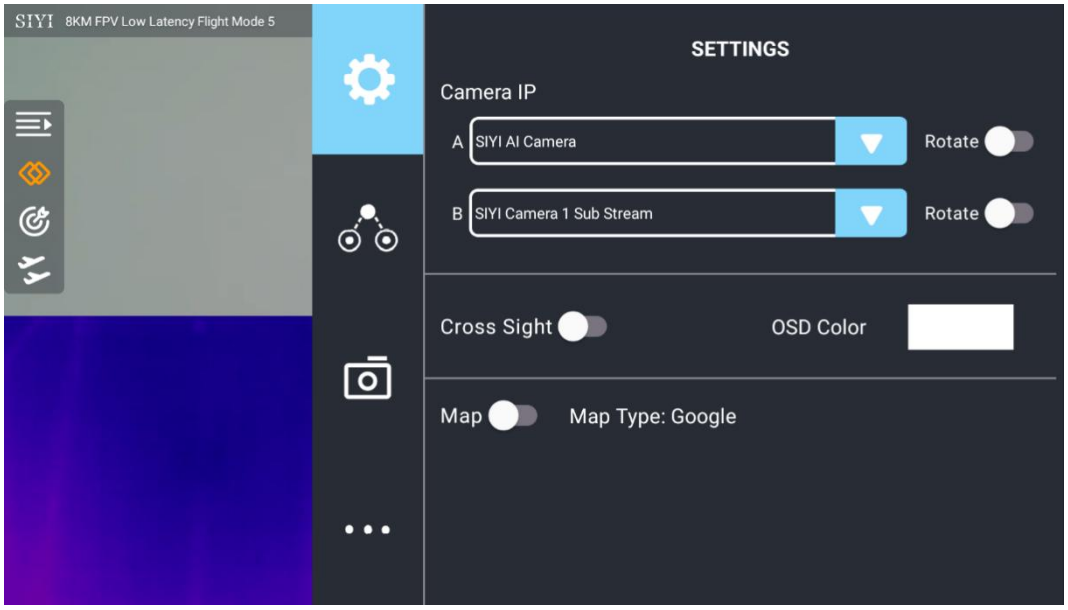
4.1 Settings

In “Settings” page, you can select camera type with stream type, select or input video stream IP addresses, custom app interface, and switch video decoding type.



About Settings

Camera IP: Select among SIYI AI Camera, SIYI Camera 1 and SIYI Camera 2, between main stream and sub stream, select or input video stream RTSP addresses, disable image, or rotate the relevant image in 180 degrees.

Cross Sight: Enable / disable a cross sight in the center of the image.

OSD Color: Custom the color of all OSD information.

Map: Enable / disable the map box over the left-bottom corner of the image.

Map Type: Switch map type (currently between Baidu and Google).

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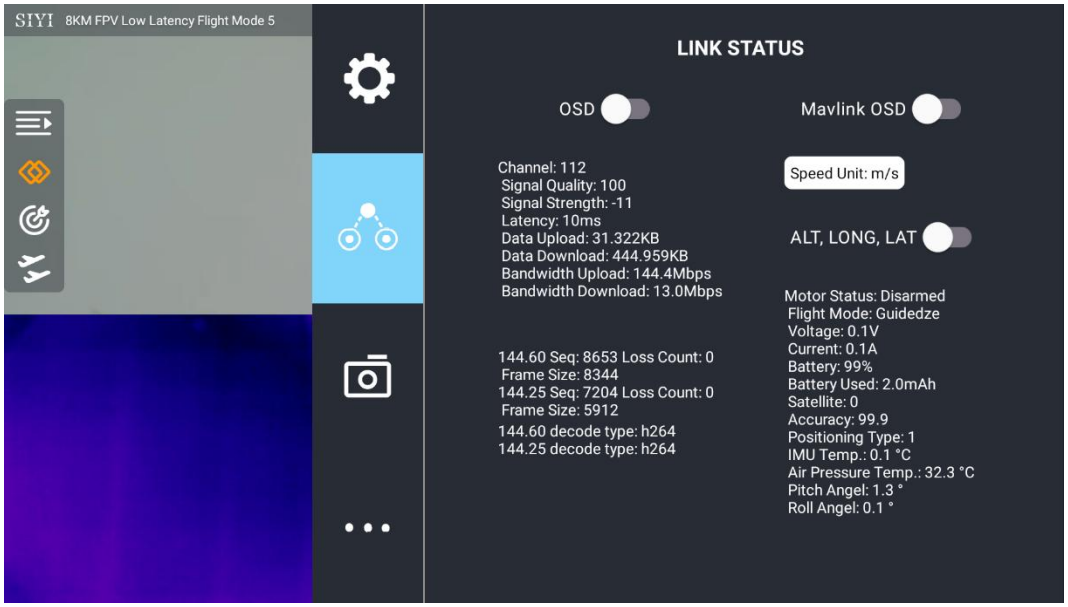
4.2 Link Status

Display the link status directly over the FPV image.



About Link Status

OSD: Enable / disable standard OSD information.

Mavlink OSD: Enable / disable Mavlink OSD information.

Speed Unit: Switch speed unit between meter per seconds and kilometer per hour.

Longitude and Latitude: Enable / disable information.

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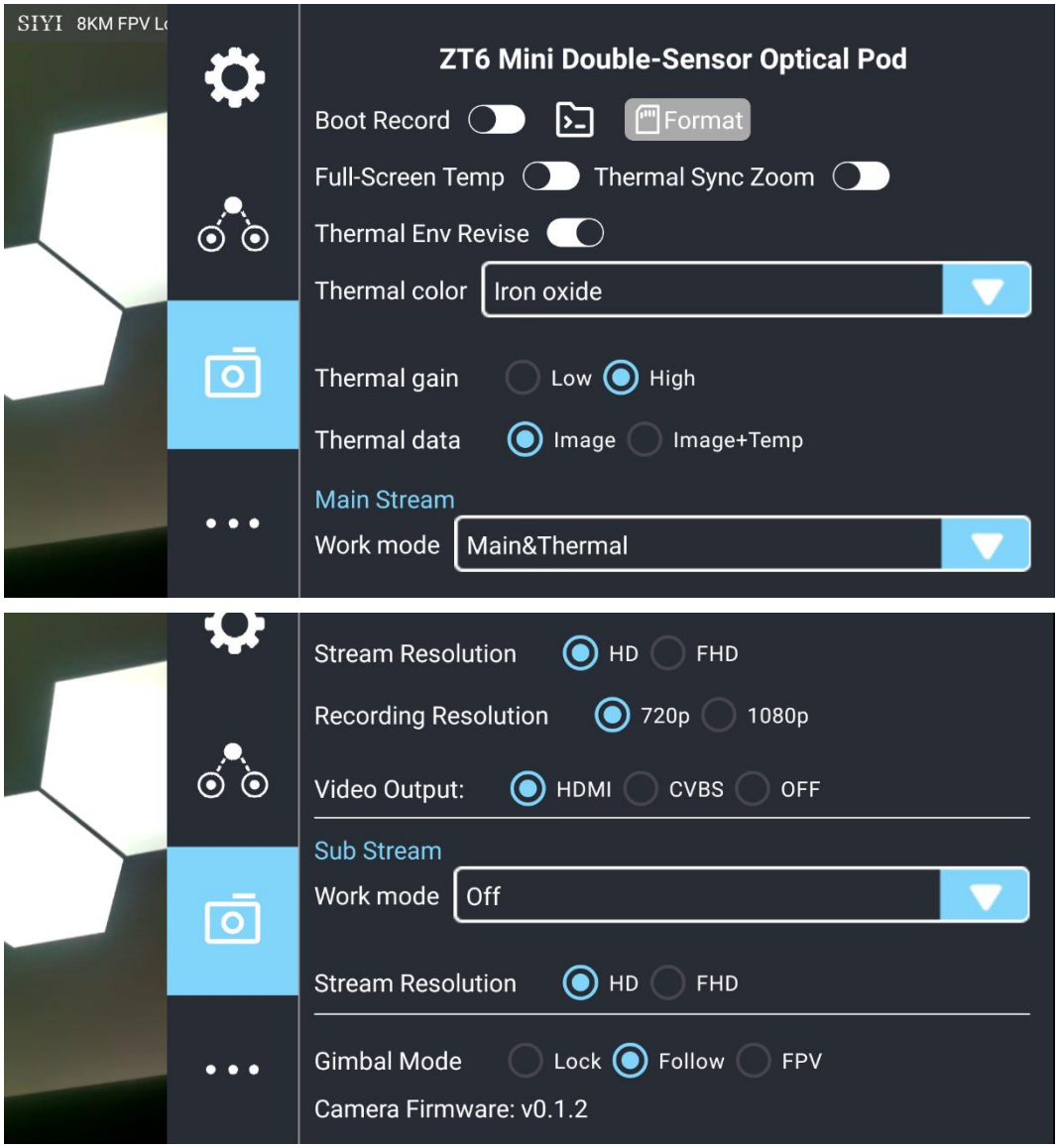
4.3 Gimbal Camera

Configure the abundant functions of SIYI optical pod and gimbal camera.



About Gimbal Camera

Boot Record: Enable / disable automatic video recording by SD card as soon as the camera is powered.

File Manager: Preview stored images in TF card. Format the TF card.

Laser Calibration: The target position in the camera image may need to be calibrated to

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match the accurate laser rangefinder orientation. (Only available for ZT30)

Full Image Thermometric: Enable / disable the full image temperature measurement feature in the thermal imaging camera.

Synchronize Zoom: Enable / disable simultaneous zooming of the thermal camera and the zoom camera.

Thermal Calibration: To calibrate the thermal camera by changing environment elements.

Thermal Palette: Assign different color solutions for the thermal imaging camera.

Thermal Gain: Switch between low gain and high gain for the thermal imaging camera.

Thermal RAW: Choose to include the RAW data in thermal images or not.

Main / Sub Stream: Configure the main stream and the sub stream separately for their camera source and parameters.

Image Mode: Select the video stream's image type and camera source. Single image or split image. Zoom camera, wide angle camera, or thermal imaging camera.

Stream Resolution: Decide to switch the output resolution of the current video stream or not according to camera source. Max output resolution is Ultra HD (1080p).

Record Resolution: Decide to switch the recording resolution or not according to camera source. Max record resolution is 4K.

Video Output Port: Switch the video outputting ports.

- HDMI: Through the gimbal camera's Micro-HDMI port.
- CVBS: Through the CVBS pin in the gimbal camera's Ethernet port to output videos in analog signal (Only available for ZT6 and A8 mini).
- OFF: Through the gimbal camera's Ethernet only.

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Gimbal Working Mode: Switch gimbal working mode among Lock Mode, Follow Mode, and FPV Mode.

- Lock Mode: Horizontally, gimbal does not follow when aircraft rotates.
- Follow Mode: Horizontally, gimbal follows when aircraft rotates.
- FPV Mode: Gimbal rotates simultaneously as aircraft rolls to get FPV view, and output images with enhanced stability.
- AI Tracking: When the gimbal is connected to the AI tracking module and the AI tracking function is activated. It will be AI tracking mode only.

Camera Firmware Version: Display current camera firmware version.

Gimbal Firmware Version: Display current gimbal firmware version.

Zoom Firmware Version: Display current gimbal firmware version (Only available for optical zoom cameras).

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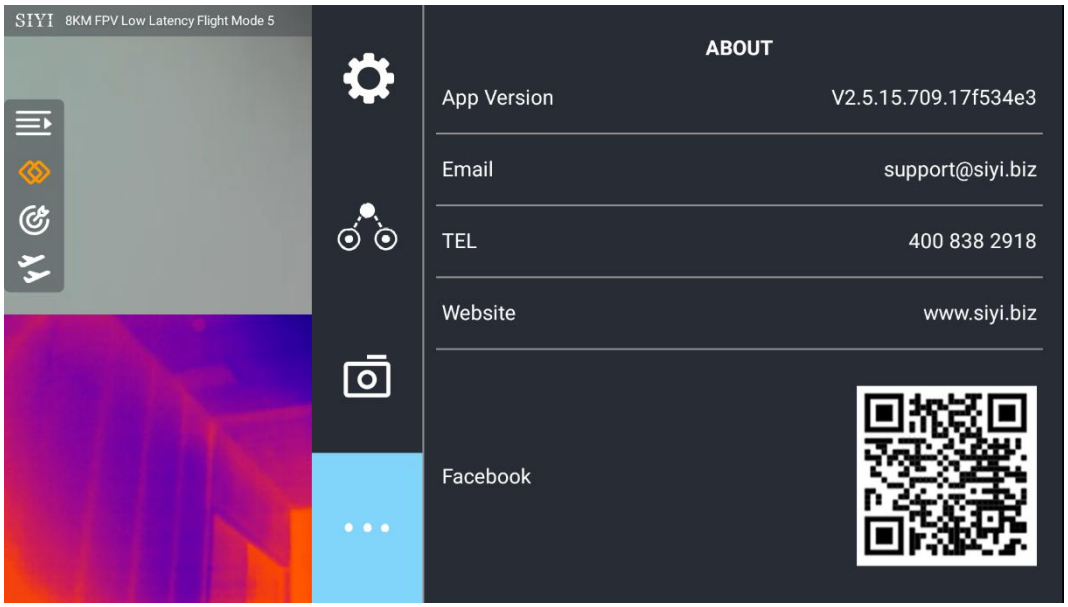
4.4 About SIYI FPV

Displays the software version of SIYI FPV and common contact information of SIYI Technology.



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4.5 SIYI FPV App Update Log

Date	2024-04-23
Version	2.5.15.708
Updates	1. New: Support the functions of SIYI AI Tracking Module Gen 2 (car plate recognition, insulator recognition, any object recognition) 2. Improve: UI for AI functions. 3. New: Support a new 4K camera. 4. Fix: AI tracking status icon does not show correctly if restarting the app under AI tracking function. 5. New: Adjust shutter speed manually. 6. New: AI recognition and tracking under thermal images.

Date	2024-01-26
Version	2.5.15.695
Updates	1. New: Support AI follow function.

Date	2023-12-18
Version	2.5.15.691
Updates	1. Fix: Temperature data still shows on image after switching to optical cameras from thermal camera. 2. New (A8 mini): Enable OSD watermark on recording images. 3. New: Both video streams can turn on / off recording. 4. New (SIYI AI Tracking Module): A switch for flight tracking. 5. New (Thermal): A switch for thermal gain. 6. New (Thermal): A switch for thermal calibration. 7. New (Thermal): A switch for thermal RAW. 8. Fix: Camera control interface bug when two different cameras are plugged.

Date	2023-10-20
Version	2.5.15.679
Updates	1. New: AI recognition and tracking function control interface. 2. New (ZT30): Zoom & thermal camera simultaneous recording function control interface. 3. New: Add the AI tracking module to IP addresses settings. 4. Improve: Occasionally video stream does not recover when the link is disconnected under SIYI camera protocol.

Date	2023-08-24
Version	2.5.15.660
Updates	1. New (ZT30): Laser calibration. Display laser ranging target's coordinates. 2. New: Support TF format. 3. New (ZT30): Thermal color palette. 4. New: File manager to preview stored pictures in TF card. 5. Improve: New icon indication for missing TF card.

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Date	2023-07-31
Version	2.5.14.644
Updates	1. New: Status indication for successfully integrated flight controller attitude data. 2. New: Google map is supported. 3. Fix: Flight controller location was no accurate. New icons for flight controller location and device location. 4. New: Status indication for missing TF card.

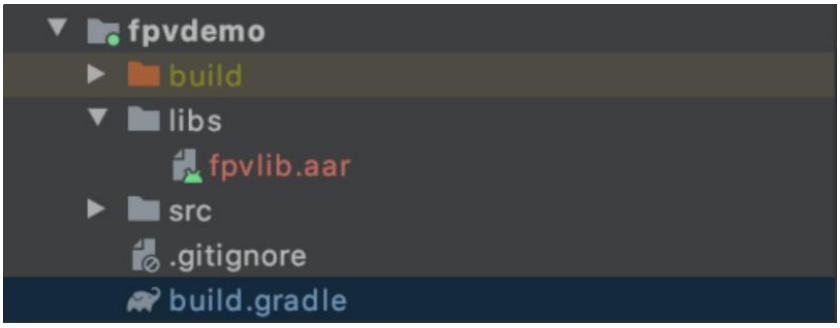
4.6 SIYI FPV SDK Guide

SIYI provides the SIYI FPV SDK to help professional Android application developers to integrate the unique features in SIYI FPV app to their own GCS.

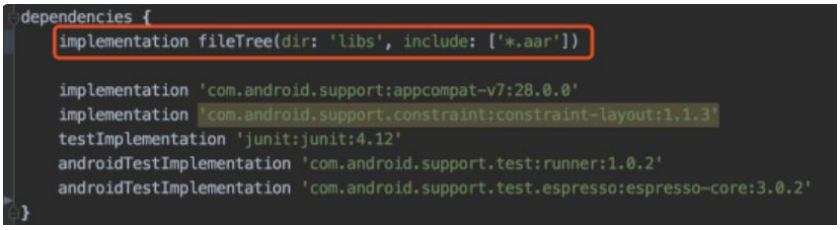
4.6.1 Access Method

a) Add “fpvlib” into Your Project

Copy the “fpvlib.aar” file to the “libs” folder in your “module” like below:



Revise the “build.gradle” file:



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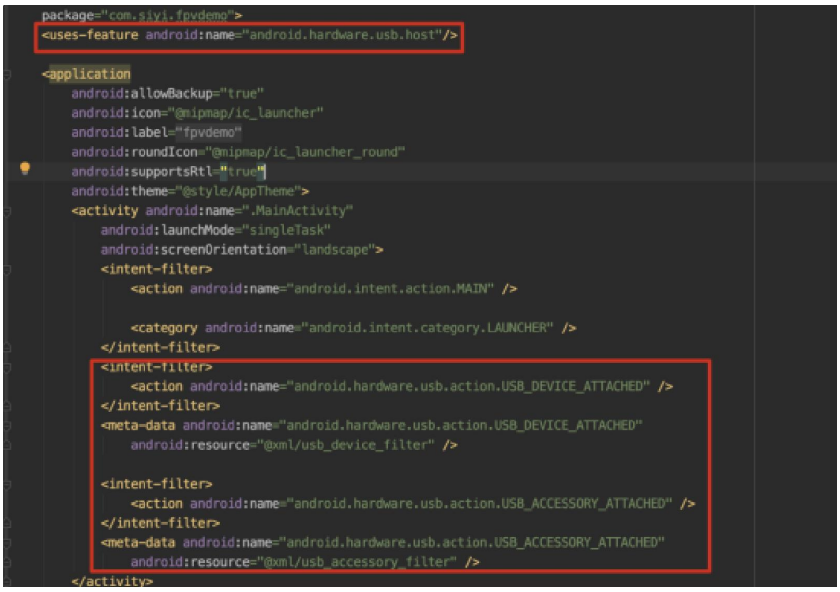
b) Configure “AndroidManifest” File

Add USB reading authorization to the “AndroidManifest” file in your “module” and configure the “intent-filter” file.

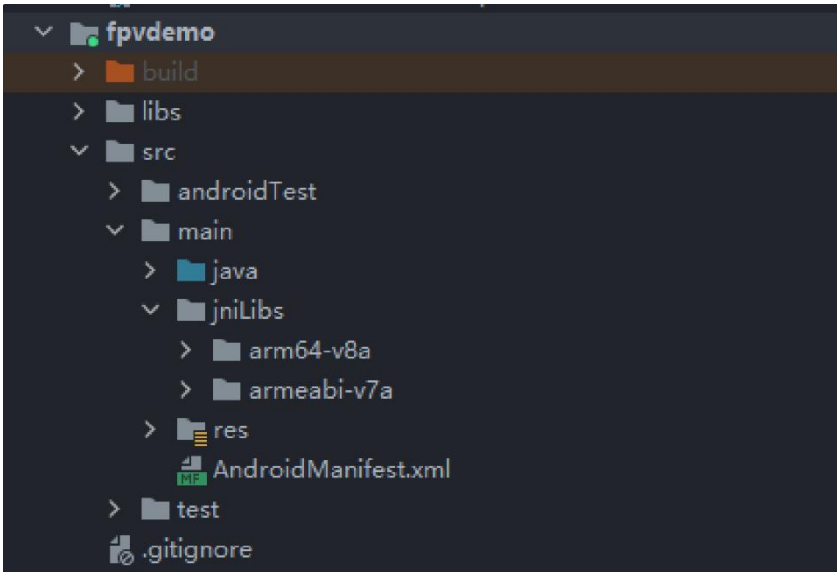


```
package="com.siyi.fpvdemo">
<uses-feature android:name="android.hardware.usb.host"/>

<application
    android:allowBackup="true"
    android:icon="@mipmap/ic_launcher"
    android:label="fpvdemo"
    android:roundIcon="@mipmap/ic_launcher_round"
    android:supportsRtl="true"
    android:theme="@style/AppTheme">
    <activity android:name=".MainActivity"
        android:launchMode="singleTask"
        android:screenOrientation="landscape">
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />

            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
        <intent-filter>
            <action android:name="android.hardware.usb.action.USB_DEVICE_ATTACHED" />
        </intent-filter>
        <meta-data android:name="android.hardware.usb.action.USB_DEVICE_ATTACHED"
            android:resource="@xml/usb_device_filter" />

        <intent-filter>
            <action android:name="android.hardware.usb.action.USB_ACCESSORY_ATTACHED" />
        </intent-filter>
        <meta-data android:name="android.hardware.usb.action.USB_ACCESSORY_ATTACHED"
            android:resource="@xml/usb_accessory_filter" />
    </activity>
```

c) Add FPV Display Function into Code

Add JNI Library

Like the example below, add JNI library file into the “main” directory, then the “so” library file can be copied from “demo” to your project directory.



Add FPV Video Display to Code

Please pay attention to the below points for your code:

- Firstly, use the static method “getInstances()” of “ConnectionManager” to get the “ConnectionManager” object. Then call the “ConnectionManager.checkConnectWithIntent()” method in the lifecycle method “onCreate()” and “onNewIntent()”.

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- Video stream should be displayed through “SurfaceView”. So, we create an “SurfaceView” object and need to call “ConntionManager.notifySurfaceCreate()” and “notifySurfaceDestroy” method from “surfaceCreated()” and “surfaceDestroy()”.

```
mSurfaceView.getHolder().addCallback(new SurfaceHolder.Callback() {
 @Override
 public void surfaceCreated(SurfaceHolder holder) {
 Logcat.d(TAG, "onSurfaceCreated...");
 mConnectionManager.notifySurfaceCreate(holder.getSurface());
 }
 @Override
 public void surfaceChanged(SurfaceHolder holder, int format, int width
, int height) {
 }
 @Override
 public void surfaceDestroyed(SurfaceHolder holder) {
 mConnectionManager.notifySurfaceDestroy(holder.getSurface());
 }
});
```

- Dual-Channel FPV Display:

Dual-channel FPV display supports Ethernet connection only. It does not support AOA or USB connection. For dual-channel FPV display, we should configure the IP addresses first, then create two “SurfaceView” for image display. Whether the second video stream is required or not can be judged by the connection type through connection status. You can refer to “demo” for detail.

- When you quit the application, please do not forget to call the “UsbConnectionManager.release()” method.

For more detail, please refer to the codes in “demo”.

4.6.2 Interface Instructions

ConnectionManager

Name	Description
getInstance(Context context)	Single case method for “ConnectionManager”
setWirelessUrl(String url1, String url2)	Set the addresses for video stream.
checkConnectWithIntent(Intent intent)	Initial the connection.
notifySurfaceCreate(Surface surface)	Notify that the first “Surface” is created, the “Surface” is for video

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	display.
notifySurfaceDestroy(Surface surface)	Notify that the first “Surface” is destroyed.
notifySecondSurfaceCreate(Surface surface)	Notify that the second “Surface” is created, the “Surface” is for video display.
notifySecondSurfaceDestroy(Surface surface)	Notify that the second “Surface” is destroyed.
setConnectionListener(ConnectionListener listener)	Set callback for the connection status.
setFrameListeners(FrameListener frameListener, FrameListener secondFrameListener)	Set callback for video stream.
getSDKVersion()	Request SDK version.
release()	Release SDK.

SettingsConfig

Name	**Description**
SettingsConfig.getInstance().initConfig(context)	**Initialize the settigns. This method must be called.**
setLogEnable(boolean)	Set if print the log in the sdk. It is suggested to disable print in the “release” version.
setDecodeType(Context context, @IDecodeListener.DecodeType int decodeType)	Set decoding type. In default it is hardware decoding.
setSupportWirelessConnection(Context context, boolean supportWireless)	Set if to support Ethernet connection method.
setRectify(Context context, boolean rectify)	Set if to activate the video stream distortion correction function. The function is disabled in default and is only for A2 mini FPV gimbal at this moment. It works only when the video stream addresses is “RtspConstants.DEFAULT_TCP_VIDEO_URL” “SUB_TCP_VIDEO_URL”. Attention： If distortion correction is activated, when you switch from SIYI camera addresses “RtspConstants.DEFAULT_TCP_VIDEO_URL” “SUB_TCP_VIDEO_URL” to RTSP addresses, new surface objects should be imported. One way to do

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	this is to remove “SurfaceView” and add a new “SurfaceView” through “addView”, then import the “Surface” object again in “SurfaceHolder.Callback”.
getCameraManager()	Request camera control objects. SYSDKCameraManager

SYSDKCameraManager

Name	Description
/** * Set Camera Resolution * @param streamType： * [CameraInfo.STREAM_MAIN], [CameraInfo.STREAM_SUB]. * @param resolution： [CAMERA_RESOLUTION_SD] 480p, [CAMERA_RESOLUTION_HD] 720p, [CAMERA_RESOLUTION_FHD] 1080p. * [CAMERA_RESOLUTION_2K] 2K, [CAMERA_RESOLUTION_4K] 4K, */ fun setResolution(cameraIndex: Int, @CameraInfo.StreamType streamType: Int, @CameraResolution resolution: Int)	Set camera resolution.

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4.7 SIYI FPV SDK Update Log

Version	2.5.15
Updates	1. Fix the issue that RTSP stream may blurr. 2. Add camera control interface. 3. Fix some other known issues. Mark: It is necessary to update the “so” and “aar” file, which can be updated frm the “aar_so” folder.

Version	2.5.14
Updates	1. Fix some issues which causes anormal in JNI library (need to update “so” library). 2. Fix some other known issues. Mark: It is necessary to update the “so” and “aar” file, which can be updated frm the “aar_so” folder.

Version	2.5.13
Updates	1. Fix the issue that the video stream of some IP65 cameras may blurr. 2. Add to support ZT30 camera video stream. Mark: It is necessary to update the “so” and “aar” file, which can be updated frm the “aar_so” folder.

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Chapter 5 After-sale Service

If there were any questions or problems using SIYI Technology's product, you can always try to send an email to SIYI Official A/S Center (support@siyi.biz) or consult your sales representative or dealer for answers or solutions.

5.1 Repair Service

If your purchased SIYI products cannot work properly, please contact SIYI Official A/S Center for consulting.

Usually there are two situations for acquiring repair service.

- Product Defect
- Product Damage

SIYI products under the two situations can be sent back to SIYI for repairing. Defect products with valid warranty can be repaired for free. Defect products without valid warranty or damaged products should be charged of repair fees after repairing. Please refer to SIYI's Official A/S Quotation for detail.

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5.2 Warranty

SIYI Technology guarantees that, subject to the following conditions, Return & Refund Service, Replacement Service, and Warranty Repair Service can be requested. Please contact SIYI directly (support@siyi.biz or your sales representative) or authorized SIYI dealer for more detail.

5.2.1 7-Day Return & Refund

You can request Return & Refund Service:

Within seven (7) days of receiving a product if the product has no manufacturing defect, has not been activated and is still in new or like-new condition.

Within seven (7) days of receiving a product if the product has a manufacturing defect.

Return & Refund Service will not be provided where:

It is requested beyond seven (7) calendar days of receiving a product.

A product sent to SIYI for Return & Refund Service does not include all original accessories, attachments or packaging, or any item is not in new or like-new condition, i.e., with cracks, dents, or scratches.

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A legal proof of purchase, receipt or invoice is not provided or is reasonably believed to have been forged or tampered with.

Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.

Product labels, serial numbers, waterproof marks, etc. show signs of tampering or alteration.

Damage is caused to the product by uncontrollable external factors, including fire, floods, high winds, or lightning strikes.

A product is not delivered to SIYI within seven (7) calendar days after Return & Refund Service confirmation is sent from SIYI.

Other circumstances stated in this policy.

5.2.2 15-Day Replacement

You can request Replacement Service:

Within fifteen (15) calendar days of receiving the product if the product has sustained a substantial damage in transit, provided always that the damage proof issued by the carrier can be provided to SIYI.

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Within fifteen (15) calendar days of receiving the product if the product does not match the original description of the product in one or more significant respects.

Within fifteen (15) calendar days of receiving the product if the product suffers performance failure.

Replacement Service will not be provided where:

Service is requested more than fifteen (15) calendars days after receiving a product.

Legal proof-of-purchase, receipts, or invoices are not provided, or are reasonably believed to have been forged or tampered with.

A product sent to SIYI for replacement does not include all original accessories, attachments, and packaging, or contains items damaged by user error.

A product is found to have no defects after all appropriate tests are conducted by SIYI.

Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.

Damage is caused by uncontrollable external factors, including fires, floods, high winds, or lightning strikes.

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Received product has not been sent back to SIYI seven (7) calendar days after replacement confirmation from SIYI.

Proof of damage during transit issued by the carrier cannot be provided.

Other circumstances stated in this policy.

5.2.3 1-Year Warranty Repair

You can request warranty repair service:

If a product does not function as warranted during the warranty period, you may obtain after-sales service by contacting SIYI's service center. You will need to provide a valid proof-of-purchase, receipt, or order number for the warranty service.

Charges may apply for services not covered by this Limited Warranty. Please contact SIYI for information specific to your location.

Please note that the warranty service is only available in the respective SIYI service regions where you purchased your SIYI product.

Warranty Repair service will not be provided where:

Crashes or fire damage caused by non-manufacturing factors, including but not limited to pilot errors.

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Damage caused by unauthorized modification, disassembly, or shell opening not in accordance with official instructions or manuals.

Damage caused by improper installation, in correct use, or operation not in accordance with official instructions or manuals.

Damage caused by non-authorized service provider.

Damage caused by unauthorized modification of circuits and mismatch or misuse of the battery and charger.

Damage caused by operation in bad weather (i.e., strong winds, rain, sand/dust storms, etc.)

Damage caused by operating the product in an environment with electromagnetic interference (i.e., in mining areas or close to radio transmission towers, high-voltage wires, substations, etc.)

Damage caused by operating the product in an environment suffering from interference from other wireless devices (i.e., transmitter, video-downlink, Wi-Fi signals, etc.)

Damage caused by reliability or compatibility issues when using unauthorized third-party parts.

Damage caused by operating the unit with a low-charged or defective battery.

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Products or parts with an altered identification label or from which the identification label has been removed.

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