ARMATURA

User Manual

AMT-PVR-50

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Version: 1.0

About This Manual

- This manual introduces the operation of user interfaces and menu functions of **AMT-PVR-50.**
- The pictures in this manual may not be exactly consistent with those of your product; the actual product's display shall prevail.
- Not all the devices have the function with ★, which the real product prevails.

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1 Product Introduction

1.1 Overview

The AMT-PVR-50 is a standalone dual-camera palm module, expertly designed with high-performance heterogeneous processor architecture. This innovative module seamlessly integrates multiple palm recognition functionalities into one unit including image acquisition, quality evaluation, image transmission, palm liveness detection, template extraction, matching, and management operations. It stands out for its lightweight, compact size, excellent adaptability to varying lighting conditions, contactless authentication operation, and its ability to recognize both palmprints and palm veins.

The module's design is based on a dual-camera imaging architecture, combined with a high-performance Image Signal Processor (ISP). It excels in both dark night (as low as 0.01 Lux) and direct sunshine (up to 100000 Lux) outdoor environments, ensuring the capture of high quality palm images. A built-in AI module enhances its capabilities, enabling accurate palm detection with the assistant of Auto Exposure on Region of Interest (AE on ROI) feature, resulting in the production of high-quality true-color and infrared-light palm print and palm vein images. Furthermore, this AI module is equipped with an advanced palm liveness algorithm, allowing for highly secured anti-spoofing protection.

The dual-camera palm module is versatile, thanks to its built-in algorithm and flexible architecture, making it well-suited for a variety of scenarios. It offers three distinct application modes to cater to different deployment scenarios. These deployment modes include:

- Capturing palm video streams and transmitting to the 3rd party system with UVC protocol serving as a biometric collection module;
- Capturing palm video streams and extracting palm features within the module, and completing palm matching on the host device;

The choice of deployment method can be tailored to suit specific business requirements and platform configurations, leveraging the full potential of the dual-camera palm module. The module is provided with rich interfaces for software integration development, facilitating rapid integration of palm recognition capabilities into various application platforms, suitable for time attendance, access control, entrance management, identity authentication, and many other application fields where personal identity authentication is required in an efficient and secured way.

1.2 Product Features

- Dual-core Cortex-A53 up to 800MHz, offering computing power up to 1.5TOPs.
- Palm recognition distance: 5cm - 15cm.
- The palm recognition algorithm is adaptable to varying lighting conditions ranging from 0.01Lux to 100,000Lux.
- Supports Auto Exposure on Region of Interest (AE on ROI), ensuring high quality palm image captured in low, strong or adversary lighting conditions.

- Supports pixel-to-pixel level alignment between captured RGB image and infrared-light image.
- Supports low-latency time synchronization between captured RGB image and infrared-light image.
- The palm recognition algorithm supports palm detection, liveness detection, template extraction and palm matching operations.
- Provides feature-rich and full-function SDK, supporting mainstream platforms: Windows, Android, and Linux (on request).
- Supports UVC protocol for image transmission and HID protocol for data transmission of palm template.
- The software architecture is flexible and open for deployment, suitable for various application integration scenarios.
- Integrated USB interface for both data communication and power supply.

2 Product Specifications

2.1 Technical Specifications

Name	Specification
Processor	800MHZ Dual Core Cortex A53 Processor, 1.5 TOPs NPU
Image Sensor	Dual 1/5' Global shutter CMOS with 1.3MP
Memory	256MB RAM and 256MB Flash
Comm Interface	USB 2.0
Comm Protocol	UVC + HID
Power Supply	DC 5V/1A
Power Consumption	< 1.8W (standby); < 3.5W (operation)
Dimension	85mm*28.65mm (Radius*Height)
Supported OS	Android 7, 8, 9, 10; Windows 7, 10, 11; Linux (on request)

2.2 Optical and Image Specifications

Type	Visible Palm Print	Infrared Palm Vein
Native Resolution @ Frame Rate	960*1280@30fps	
Output Resolution @ Frame Rate	720*1280@30fps	
Pixel Size	2.2um	
Shutter Type	Global Shutter	
Focus	Fixed Focus	
Default Output Format	MJPEG	
Minimum Illuminance	0.01 Lux	
Maximum Illuminance	100,000 Lux	
Image Distortion Rate	⩽2%	
FOV (Field of View)	Horizontal: 116°, Vertical 95°, Diagonal: 145°	
Auto Exposure	Support Palm AE	
Image Time Alignment	Maximum delay between frames: 10ms	
Image Spatial Alignment	±5 pixel	
Supplementary Light Wavelength	440 nm to 650 nm	850nm
Filter (or Light Filter)	Infrared cut-off filter	Infrared band-pass filter

3 Algorithm Parameters

3.1 Palm Recognition Algorithm

The palm recognition technology integrates multimodal recognition of palm prints and palm veins, designed for varying lighting environments, wide posture tolerance, and large-capacity recognition needs. This highly effective multimodal palm recognition algorithm significantly enhances the robustness and pass rate of palm recognition by focusing on wide adaptability to deployed environments and friendly user experience while ensuring an extremely low false acceptance rate.

3.1.1 Palm Recognition Parameters

Algorithm Version	Palm
Recognition Distance	5cm-15cm
Recognition Mode	1:1, 1:N
1:N Capacity	30,000
Liveness Detection	Infrared-visible light mode; Infrared light mode
Palm Liveness Detection Time	<20ms
Feature Template Extraction Time	<25ms
Comparison Time	<30ms
Posture Adaptability	Yaw ⩽ 30°, Pitch ⩽ 45°, Roll ⩽ 180°, Bend ⩽ 20°
Accuracy	FRR = 0.17% when FAR = 0.001%

3.1.2 Requirements for Palm Registration Image Quality

Palm images for image-based enrollment must be in JPG format, with a resolution between 300*300 Pixels and 720*1280 Pixels. The images should clearly separate the palm from the background and prominently show the palm vein patterns. The palm should be complete and in its entirety with the correct proportions on the image taken under even lighting. The pitch angle, yaw angle, roll angle, and bending should not exceed ±5 degrees. The adjusted palm images should include every joint from the palm base to each finger, as illustrated in Fig 3-1.

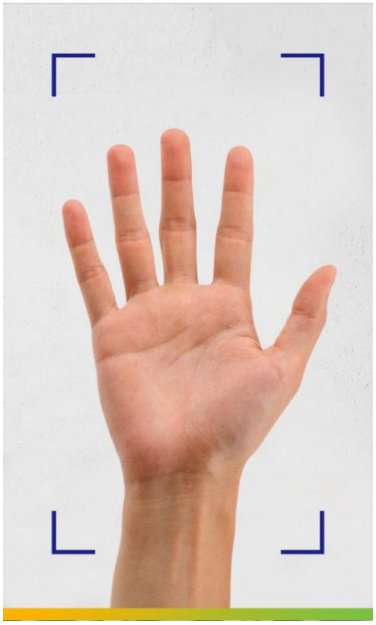


Figure 3-1 Palm Image for Registration

4 Structure Dimension

The overall structural dimensions of the dual-camera palm module are shown in Figure 5-1.

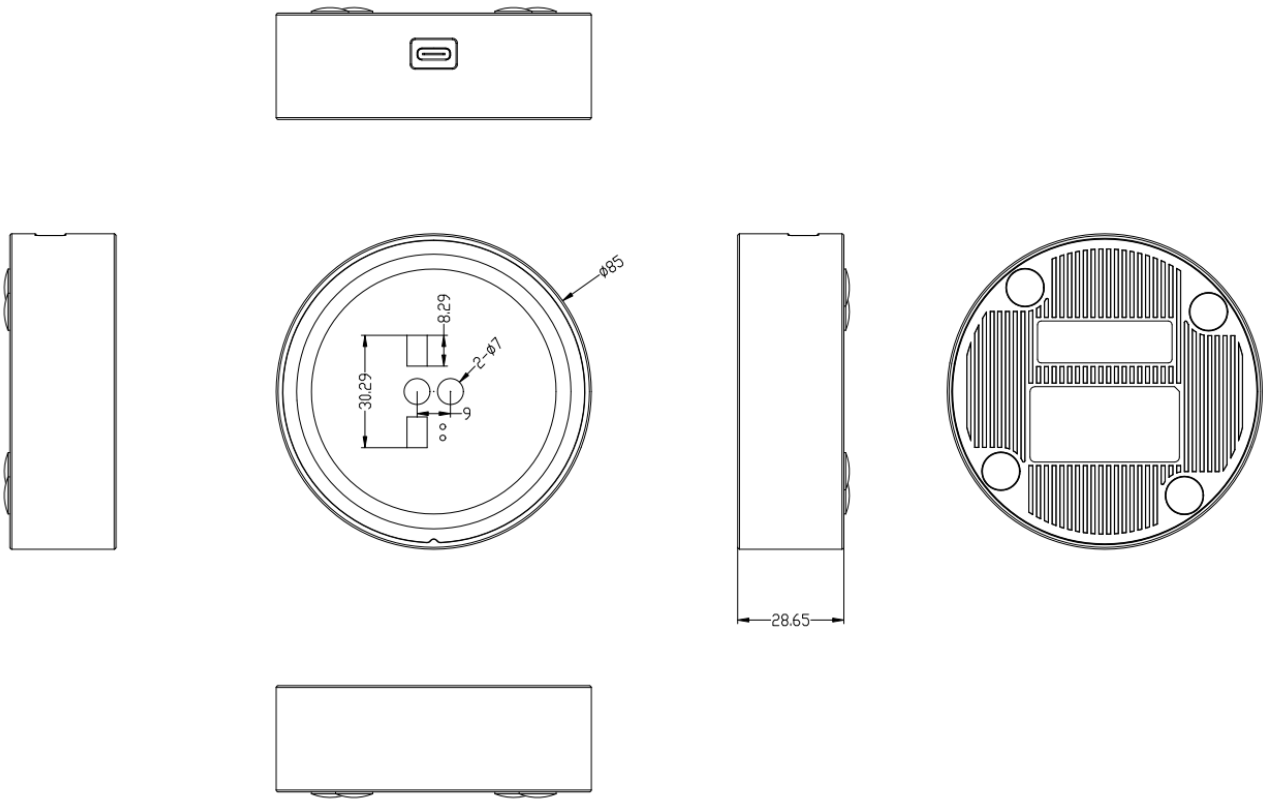


Figure 4-1 Structural Dimensions of Dual-Camera Palm Module

5 Indicator Light Description

White breathing light: indicates standby mode;

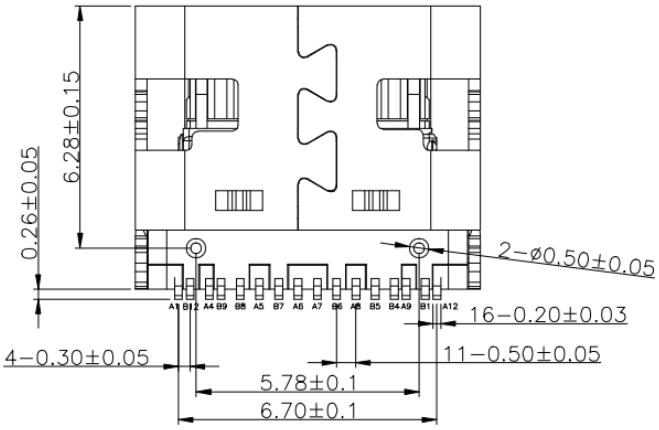
White light constantly on: indicates detection registration/comparison in progress;

Orange flashing light: indicates the recognition of the palm as a prosthetic;

According to the prompt, move your palm back and forth until it is within the sensing area, until the registration/comparison is successful.

6 Product Interface

The AMT-PVR-50 collector provides the following communication interfaces, and the pin line sequence of its TYPE-C interface is shown in the figure:



7 Wire Requirements

The dual-camera palm module is powered and communicated through the USB interface, with a reserved GHR-9Pin-1.25mm socket for wiring. It is recommended to use the same specification socket and terminal connectors for the upper machine interface. It is recommended to use at least 26AWG cable for power supply. For optimal USB signal transmission, it's recommended to use at least 28AWG twisted pair cables for D+/D- signals. The total length of the cable with dual plugs should not exceed 1.2 meters. To enhance the USB cable anti-interference capability, it should have an aluminum foil shielding layer inside with a braiding density of 64 or higher.

8 Power and Consumption

It's advised to design the AP motherboard to supply power to the USB palm module up to 5V/2A, to ensure compatibility and product lifecycle stability.

A table of power consumption is as follows:

Operating Conditions	Power Consumption W	Voltage V	Average Current A	Peak Current A
Standby Mode	1.4~1.65	5.0	0.28~0.33	
Operation Mode	3.1	5.0	0.61	＜1.2A

Notes:

- *The motherboard of host device must ensure that the voltage range supplied to the Palm Module input port is 4.5V~6V.*
- *The above power consumption data from the product sample is for design reference.*

9 Module ESD Protection

When there is no cable connection between the main board and the palm module, the metal enclosure of the palm module conducts with the GND of the host device, and the impedance is <2Ω.

10 Environment and Reliability

Item		Specs
Operation Environment	Operating Temperature	－20℃ to 55℃
	Humidity	Relative Humidity: 0% to 95%, non-condensing
	Illumination	0.01 to 100000Lux
	Altitude During Operation	<5000m
Storage Environment	Temperature	－40℃ to 85℃
	Humidity	Relative humidity: 10% to 95%, non-condensing
ESD Rating		Contact discharge ±4KV, Air discharge ±8KV
RE Rating		Comply with GB 9254 CLASS B specification
Operating Life		3+ Years
Certifications		CE, FCC, RoHS, WHQL

11 Notes for Swiping Card

1. Supports card orientation in horizontal, vertical, and oblique directions.

2. The card should be placed parallel to the device.

3. Ensure that the card is at the center of the card reading area.

Frequency	Protocols	Card Types	Max Range
125KHz	/	EM4x02/CASI-RUSCO	2cm
	/	EM4x02/CASI-RUSCO	2.5cm
13.56MHz	ISO18092/ECMA-340	FeliCa	1.5cm
	ISO14443A	S50	5.5cm
	ISO14443A	S70	5cm
	ISO14443A	ART10276 ISO Card Mifare Ultralight	3.5cm
	ISO14443A	Desfire	2cm
	ISO14443A	HID Seos IP	1cm
	ISO15693	ISO15693	2.5cm
	ISO14443A	CPU	4cm
	ISO14443A	Desfire Light	3cm
	ISO14443A	Desfire EV1	2cm
	ISO14443B	14443B	1.5cm
125KHz/13.56MHz	ISO14443A	HID Mifare PxM48Y	4cm
	ISO14443A	HID Mifare PxM49Y	3.5cm

APPENDIX

Supplier's Declaration of Conformity Compliance Information

Unique Identifier	
Product Description	Standalone Dual-Camera Palm Reader
Model Number	AMT-PVR-50
Trade Name	Armatura
FCC Compliance Statement	
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.	
Responsible Party – U.S. Contact Information	
Company:	Armatura LLC
Address:	190 Bluegrass Valley Parkway Alpharetta, GA 30005, USA
Telephone or internet contact information:	sales@armatura.us

FCC INFORMATION (for US Customers)

Warning:

Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

EU Declaration of Conformity

Hereby, Armatura LLC declares that the radio equipment type AMT-PVR-50 is in compliance with Directive 2014/53/EU.

This device offers the following frequency bands in EU areas only and with the following maximum radio-frequency power:

RFID(125kHz): < 42dBμA/m at 10m

RFID(13.56MHz): < 42dBμA/m at 10m

The full text of the EU declaration of conformity is available at the following internet address: http://armatura.us.

Armatura LLC

190 Bluegrass Valley Parkway, Alpharetta, GA, 30005, USA

WEEE Notice

Correctly dispose of this product. This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle responsibly to promote the sustainable reuse of material resources. To safely recycle your device, please use return and collection systems or contact the retailer where the device was originally purchased.

For more information, contact us at the following contact information.

Armatura LLC

190 Bluegrass Valley Parkway, Alpharetta, GA, 30005, USA

Accessories Included

- Type-C Data Cable, x1.

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