

User Manual

AMT-FAPVS-21

Date: October 2022

Doc Version: 1.2

English

Thank you for choosing our product. Please read the instructions carefully before operation. Follow these instructions to ensure that the product is functioning properly. The images shown in this manual are for illustrative purposes only.



For further details, please visit our Company's website
www.armatura.us.

Copyright © 2022 ARMATURA LLC. All rights reserved.

Without the prior written consent of ARMATURA LLC no portion of this manual can be copied or forwarded in any way or form. All parts of this manual belong to ARMATURA and its subsidiaries (hereinafter the "Company" or "ARMATURA").

Trademark

ARMATURA is a registered trademark of ARMATURA LLC. Other trademarks involved in this manual are owned by their respective owners.

Disclaimer

This manual contains information on the operation and maintenance of the ARMATURA product. The copyright in all the documents, drawings, etc. in relation to the ARMATURA supplied product vests in and is the property of ARMATURA. The contents hereof should not be used or shared by the receiver with any third party without express written permission of ARMATURA.

The contents of this manual must be read as a whole before starting the operation and maintenance of the supplied product. If any of the content(s) of the manual seems unclear or incomplete, please contact ARMATURA before starting the operation and maintenance of the said product.

It is an essential pre-requisite for the satisfactory operation and maintenance that the operating and maintenance personnel are fully familiar with the design and that the said personnel have received thorough training in operating and maintaining the machine/unit/product. It is further essential for the safe operation of the machine/unit/product that personnel have read, understood, and followed the safety instructions contained in the manual.

In case of any conflict between terms and conditions of this manual and the contract specifications, drawings, instruction sheets or any other contract-related documents, the contract conditions/documents shall prevail. The contract specific conditions/documents shall apply in priority.

ARMATURA offers no warranty, guarantee, or representation regarding the completeness of any information contained in this manual or any of the amendments made thereto. ARMATURA does not extend the warranty of any kind, including, without limitation, any warranty of design, merchantability, or fitness for a particular purpose.

ARMATURA does not assume responsibility for any errors or omissions in the information or documents which are referenced by or linked to this manual. The entire risk as to the results and performance obtained from using the information is assumed by the user.

ARMATURA in no event shall be liable to the user or any third party for any incidental, consequential, indirect, special, or exemplary damages, including, without limitation, loss of business, loss of profits, business interruption, loss of business information or any pecuniary loss, arising out of, in connection with, or relating to the use of the information contained in or referenced by this manual, even if ARMATURA has been advised of the possibility of such damages.

This manual and the information contained therein may include technical, other inaccuracies, or typographical errors. ARMATURA periodically changes the information herein which will be incorporated into new additions/amendments to the manual. ARMATURA reserves the right to add, delete, amend, or modify the information contained in the manual from time to time in the form of circulars, letters, notes, etc. for better operation and safety of the machine/unit/product. The said additions or amendments are meant for improvement /better operations of the machine/unit/product and such amendments shall not give any right to claim any compensation or damages under any circumstances.

ARMATURA shall in no way be responsible (i) in case the machine/unit/product malfunctions due to any non-compliance of the instructions contained in this manual (ii) in case of operation of the machine/unit/product beyond the rate limits (iii) in case of operation of the machine and product in conditions different from the prescribed conditions of the manual. The product will be updated from time to time without prior notice. The latest operation procedures and relevant documents are available on <http://www.armatura.us>.

If there is any issue related to the product, please contact us.

ARMATURA Headquarters

Address 190 Bluegrass Valley Pkwy,
 Alpharetta, GA 30005.

For business-related queries, please write to us at info@armatura.us.

To know more about our global branches, visit www.armatura.us.

About the Company

ARMATURA is a leading global developer and supplier of biometric solutions which incorporate the latest advancements in biometric hardware design, algorithm research & software development.

ARMATURA holds numerous patents in the field of biometric recognition technologies. Its products are primarily used in business applications which require highly secure, accurate and fast user identification.

ARMATURA biometric hardware and software are incorporated into the product designs of some of the world's leading suppliers of workforce management (WFM) terminals, Point-of-Sale (PoS) terminals, intercoms, electronic safes, metal key lockers, dangerous machinery, and many other products which heavily rely on correctly verifying & authenticating user's identity.

About the Manual

This manual introduces the operation of AMT-FAPVS-21.

All figures displayed are for illustration purposes only. Figures in this manual may not be exactly consistent with the actual products.

Document Conventions

Conventions used in this manual are listed below:

GUI Conventions

For Software	
Convention	Description
Bold font	Used to identify software interface names e.g. OK , Confirm , Cancel .
>	Multi-level menus are separated by these brackets. For example, File > Create > Folder.
For Device	
Convention	Description
< >	Button or key names for devices. For example, press <OK>.
[]	Window names, menu items, data table, and field names are inside square brackets. For example, pop up the [New User] window.
/	Multi-level menus are separated by forwarding slashes. For example, [File/Create/Folder].

Symbols






Convention	Description
	This represents a note that needs to pay more attention to.
	The general information which helps in performing the operations faster.
	The information which is significant.
	Care taken to avoid danger or mistakes.
	The statement or event that warns of something or that serves as a cautionary example.

Table of Contents

1	PRODUCT INTRODUCTION	7
1.1	OVERVIEW	7
1.2	FEATURES.....	8
2	PRODUCT SPECIFICATIONS	8
2.1	TECHNICAL SPECIFICATIONS.....	8
2.2	ELECTRICAL FEATURES	9
2.3	OPTICAL AND IMAGE SPECIFICATIONS	9
2.4	MODEL SPECIFICATIONS.....	10
3	ALGORITHM SPECIFICATIONS.....	11
3.1	FACIAL RECOGNITION ALGORITHM.....	11
3.1.1	Face Detection	11
3.1.2	Fake Face Detection	12
3.1.3	Mask Detection	13
3.1.4	Facial Attribute Recognition.....	13
3.1.5	Facial Recognition.....	14
3.1.6	Facial Registration Image Quality Requirements	15
3.2	PALM RECOGNITION ALGORITHM.....	16
3.2.1	Palm Recognition Specifications.....	17
3.2.2	Palm Registration Image Quality Requirements.....	17
4	APPLICATION SCENARIOS	18
5	STRUCTURAL DIMENSIONS.....	21
6	PORT DEFINITION.....	22
6.1	PORT POSITION AND DEFINITION	22
6.2	PORT SOCKET DIMENSIONS	22
7	CABLE REQUIREMENTS	23
8	DESIGN GUIDE.....	23
8.1	OPTICAL DESIGN	23
8.2	HEAT DISSIPATION DESIGN	24
9	INSTALLATION GUIDE.....	25
9.1	INSTALLATION MODES	25
9.2	INSTALLATION HEIGHT AND ANGLE	26
9.2.1	Horizontal Installation Mode	27
9.2.2	Slant Installation Mode	27

1 Product Introduction

1.1 Overview

AMT-FAPVS-21 is a dual-camera multimodal standalone module for face and palm recognition empowered by high-performance processors. The multimodal standalone module includes functions such as image collection, biometric template extraction, matching, transmission, and data management. The module has compact, light-weight size and is highly adaptable to various ambient lighting and supports touchless multi-biometric recognition.

The dual-camera module is equipped with proprietary ARMATURA facial and palm recognition algorithms and supports both facial and palm recognition in different application scenarios. The facial recognition algorithm supports face detection, liveness detection, face mask detection, facial recognition, age recognition, gender recognition, and facial expression recognition. The palm recognition algorithm supports palm detection, live palm detection, and palm recognition.

The dual-camera module integrates near-infrared light and support dual-channel image collection with visible and near-infrared light. Both lenses use low light and wide dynamic range image sensors. They are excellent in adapting to ambient light with the help of powerful image processing algorithms. A visible-light lens can capture high quality face images in low illumination (0.01 lux) and bright light ($\leq 50,000$ lux) as well. A near-infrared lens can capture high-resolution, high-contrast, and distortion-free palm lines and subcutaneous vein images, considerably improving the recognition accuracy.

The dual-camera module has built-in face and palm algorithms, flexible architecture, and are suitable for various scenarios. The module provides three application modes for deployment in different scenarios. They are:

1. The USB video class (UVC) functions as a collection module to stream video.
2. The module does the video streaming and face/palm biometric extraction, while the host does the biometric comparison.
3. After completion of video streaming, extraction, and biometric comparison in the module. Select a deployment mode based on application requirements and platform features to make the best use of dual-camera collection.

The software development interfaces allow quick integration of face and palm recognition functions to an application platform. The functions apply to areas such as attendance checking, entrance control, and channel access.

1.2 Features

- Dual low light and wide dynamic range image sensors, maximum 105 dB dynamic range.
- Supports Face/Palm AE (smart brightness enhancement technologies for facial and palm recognition).
- Built-in near-infrared light supports smart switch control based on image detection algorithms.
- Captures face and palm images at 25 frames per second
- Maximum face and palm capacities are 100,000 and 10,000.
- Wide field-of-view allows its cameras to recognize individuals at wide varying heights.
- Include SDKs for major platforms (Windows, Android, and Linux).
- Support UVC (USB video device) streaming video protocol and Human Interface Device (HID) data protocol over USB 2.0.
- Compact, light-weight size with USB 2.0 interface makes for easy integration with a wide range of host hardware devices
- Provide a touchless, hygienic, and non-invasive biometric identification solution.
- Flexible and open software architecture deployment, adaptable to various application scenarios.
- Integrated communication and power supply USB interface.

2 Product Specifications

2.1 Technical Specifications

Features	Technical Specifications
Processor	Quad-core Cortex-A7@1.5 GHz, 1.2 TOPS INT8
Image Sensor	Dual 1/2.8" HDR CMOS, 2MP resolution (supports visible and near-infrared light)
Communication Interface	USB 2.0
Communications Protocol	Composite UVC device + HID protocol
Camera Type	M8, 2MP

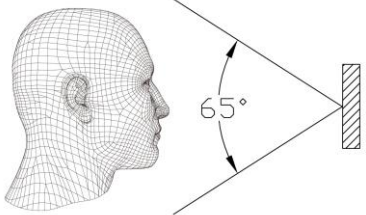
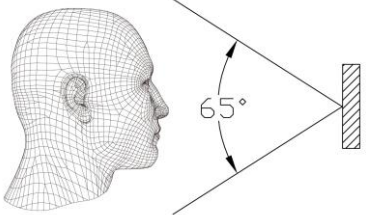
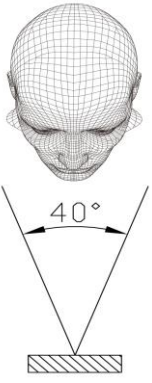
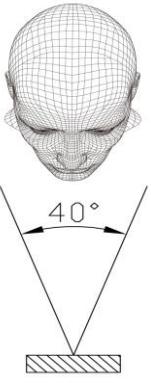
Required Power Supply	DC 5V/1.1A
Module Size	62 mm x 38 mm x 25.3 mm (Length x Width x Height)

2.2 Electrical Features

Specifications	Test Conditions	Min	Standard	Max	Unit
Operating Voltage	-	4.75	5.0	5.25	V
Operating Current	T = 25°C, VCC = 5.0 V	-	-	1.1	A
Operating Power Consumption	T = 25°C, VCC = 5.0 V	-	-	5.5	W
Standby Power	T = 25°C, VCC = 5.0 V	-	-	0.6	A
Standby Power Consumption	T = 25°C, VCC = 5.0 V	-	-	3	W
Operating Temperature	-	-10	-	45	°C
Storage Temperature	-	-40	-	85	°C

2.3 Optical and Image Specifications

Type	Visible-light Lens	Near-infrared Lens
Resolution @Frame rate	720 x 1280@25fps 480 x 640@25fps	720 x 1280@25fps 480 x 640@25fps
Default Output Format	MJPEG	NV12
Signal-to-Noise Ratio	50 dB	50 dB

Dynamic Range	105 dB	105 dB
Min Illumination	0.01 lux	0.01 lux
Max Illumination	50,000 lux	20,000 lux
Image Distortion Rate	≤ 0.5%	≤ 0.5%
Aperture	F2.0	F2.0
Vertical Viewing Angle		
Horizontal Viewing Angle		

2.4 Model Specifications

Model	AMT-FAPVS-21	
Features		
Supported Algorithm Type	Facial Recognition	Palm Recognition
Effective Image Range (Algorithm Recognition Range)	50cm - 160cm (1.5 feet – 5 feet)	15cm - 40cm (6 inch – 15 inch)

3 Algorithm Specifications

3.1 Facial Recognition Algorithm

Based on years of in-depth technological development in the biometrics industry, ARMATURA's facial recognition algorithm is able to handle multi-dimensional face attribute analysis and high-accuracy face identification from different age groups. It can detect up to 180 face landmark points within milliseconds, including the landmarks of eyes, lip edges, nose tips, contours and etc. The facial recognition algorithm supports face detection, liveness detection, face mask detection, age estimation, gender recognition, facial expression classification, and facial recognition.

The algorithm can detect the face features in a variety of postures. As shown in Figure 3.1 below:

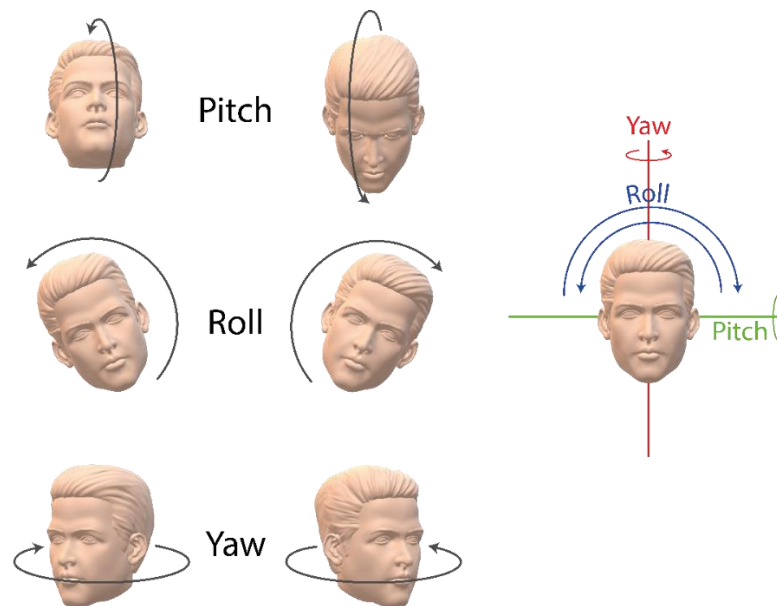


Figure 3.1 Definitions of facial postures

3.1.1 Face Detection

The algorithm can detect and identify a person by human face within a range of 5 feet in a fast and touchless way.



Maximum Range	2 m
Detection Speed	25 ms
Min. Image Size	128 x 128 pixels
Static Recognition Ratio	No more than 60% of the whole image
Posture Adaptability	Yaw $\leq 30^\circ$, Pitch $\leq 30^\circ$, Roll $\leq 45^\circ$

3.1.2 Fake Face Detection

The algorithm can distinguish whether the detected face is a real alive face or in a mask or cover concealing the real identity. It improves the security by prevention from spoofing.



Features	Dual-lens liveness detection (maximum range: 1.6 m or 5 feet) Visible-light lens detection (maximum range: 2 m or 6.5 feet)
Detection Speed	30 ms
Min. Image Size	128 x 128 pixels
Posture Adaptability	Yaw $\leq 30^\circ$, Pitch $\leq 30^\circ$, Roll $\leq 45^\circ$

Precision	TAR=99.2% when FAR=0.001%
-----------	---------------------------

3.1.3 Mask Detection

The algorithm can detect if a person has worn a mask or not. The feature is very useful to prevent the epidemic disease and protect the public health.



Function	Detection of masks on faces
Mask Color	Frequently seen masks in White, Black, Blue, Pink, and Gray
Detection Speed	30 ms
Min. Image Size	128 x 128 pixels
Posture Adaptability	Yaw $\leq 30^\circ$, Pitch $\leq 30^\circ$, Roll $\leq 45^\circ$
Precision	TAR=99.2% when FAR=0.001%

3.1.4 Facial Attribute Recognition

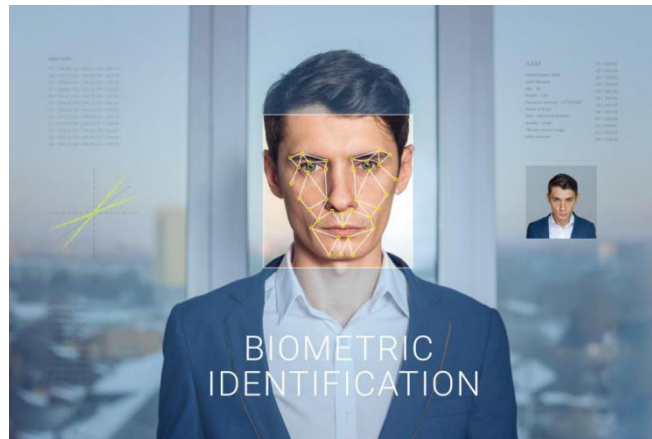
The algorithm is also capable of analyzing and understanding facial attributes such as age, gender, and facial expression. It can display all the above mentioned attributes when it detects a face, on the go.



Facial Attribute Recognition	Age, Gender, and Facial Expression
Facial Expression Types	Calm, Happy, Angry, Sad, Surprised, Afraid, and Disgusted
Maximum Range	2 m or 6.5 feet
Detection Speed	20 ms
Min. Image Size	128 x 128 pixels
Posture Adaptability	Yaw $\leq 30^\circ$, Pitch $\leq 30^\circ$, Roll $\leq 45^\circ$
Precision	Age recognition (± 5 years) > 85%, Gender recognition > 96%, Facial expression recognition > 88%

3.1.5 Facial Recognition

The algorithm can detect a face and recognise the identity of the person within fractions of second and with high accuracy rate.



Detection Speed	70 ms
Min. Image Size	128 x 128 pixels
Features	1:1, 1:N
Face Capacity	50,000-100,000
Posture Adaptability	Yaw $\leq 30^\circ$, Pitch $\leq 30^\circ$, Roll $\leq 45^\circ$
Precision	TAR=99.2% when FAR=0.001%

3.1.6 Facial Registration Image Quality Requirements

The image saved while face registration has JPG format and the minimum resolution is 128 x 128 pixels. The individual should take care of the following things while registering their face:

- They should not wear a face mask or colored glasses.
- They should ensure that the frame of the glass does not block the eyes and that the lenses are non-reflective.
- The face angle tolerance for pitch, roll, and yaw should be ± 10 degrees.
- The whole face should be in the camera frame and the aspect ratio of the face must not be distorted.
- Face contours should be clear and the light must be even.
- The facial expression should be natural without obvious exaggeration.



Figure 3.2 Example of a facial registration image

3.2 Palm Recognition Algorithm

Palm recognition technology is based on near-infrared light to capture palm surface lines and subcutaneous veins pattern images to identify or verify individual identities. The technology boosts powerful anti-spoofing functionality because the pattern image is only presented when the fresh blood is actively flowing through the veins.

AMT PalmLite 12.0 is an excellent near-infrared palm recognition algorithm developed for large-capacity palm recognition with a high tolerance of palm postures under various lighting conditions. The algorithm focuses on improving adaptability to an extensive variety of usage environments and user habits and ensuring high accuracy. In this approach, the robustness and pass rate are considerably improved.

The algorithm applies to various palm postures as shown in Figure 3.3:

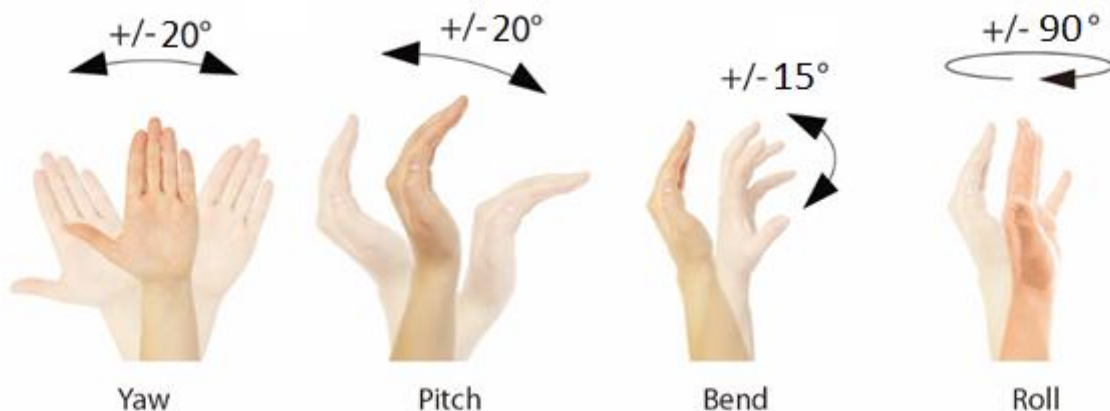


Figure 3.3 Definitions of palm postures

3.2.1 Palm Recognition Specifications

Algorithm Version	AMT PalmLite 12.0
Palm Detection Speed	< 50 ms
Biometric Template Extraction Speed	< 220 ms
Biometric Comparison Speed	< 150 ms
Palm Capacity	6,000-10,000
Posture Adaptability	Yaw $\leq 20^\circ$, Pitch $\leq 20^\circ$, Roll $\leq 90^\circ$, Bend $\leq 15^\circ$
Precision	TAR=98.2% when FAR=0.05%

3.2.2 Palm Registration Image Quality Requirements

The image saved while palm registration has JPG or BMP format, and the minimum resolution is 480 x 640 pixels. The individual should take care of the following things while registering their palm:

- The palm and background must be separated.
- The light must be even so that the veins must be visible.
- The whole palm (including the wrist) should be in the camera frame and the aspect ratio of the palm must not be distorted.
- The palm angle tolerance for pitch, roll, yaw, and bend should be ± 5 degrees.



Figure 3.4 Example of a palm registration image

4 Application Scenarios

The AMT-FAPVS-21 dual-camera modules are optimized in structure based on the design and usage of built-in modules, facilitating quick integration into the host device. Due to the profoundly integrated design, the dual-camera module can be connected to a platform device using a single USB cable. In this way, the connection between the power supply and communications device is accomplished which simplifies the design considerably. The example of an application system is shown in Figure 4.1 below:

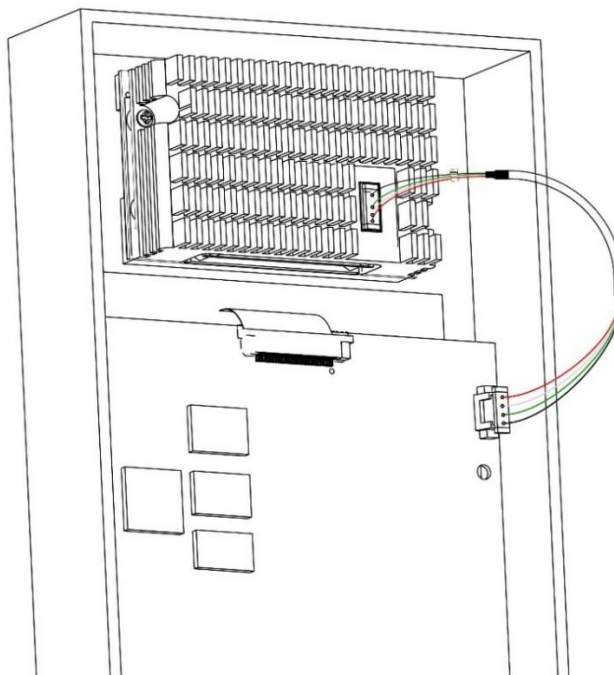


Figure 4.1 Application system of dual-camera modules

To improve platform adaptability and to lower development difficulty, the dual-camera modules integrate with all the functions in the biometric recognition application process, including image collection, image transmission, template extraction, template comparison, template management, and comparison result output. All the functions can be configured using the software. You can develop a required application program based on the SDK to achieve your desired functionality and complete application design.

- **Image Collection and Transmission**

The collection and transmission of the face and palm images are made by a collector. You can specify different resolutions for image output. For a list of supported resolutions and frame rates, see section [2.3 Optical and Image Specifications](#). Image transmission adopts the standard UVC protocol. Visible and near-infrared light images are transmitted using separate UVC ports. You can choose the ports as per with image requirements.

- **Biometric Template Extraction**

Biometric template extraction is the most tedious biometric recognition process. To reduce the impact of the dual-camera modules on platform performance and improve the module's platform adaptability, the biometric template extraction is performed in the module by default. The high-performance heterogeneous processor of the dual-camera modules helps free up the computing resources of your platform.

- **Template Comparison and Management**

Comparison and management of biometric templates can be performed in the dual-camera modules or on a platform, according to your requirements.

The modules provide three application modes for use in different scenarios:

1. The UVC functions as a collection module to stream video.
2. The video streaming and face/palm biometric extraction is achieved in the module, while the biometric comparison is performed by a host.
3. The video streaming, extraction, and biometric comparison are achieved in the module.

If you use the platform for template comparison and management, the module will push the template to the platform using the Human Interface Devices (HID) port after a biometric template is extracted. This applies to scenarios in which template storage is strictly restricted. Figure 4.2 shows some functions of a back-end comparison system.

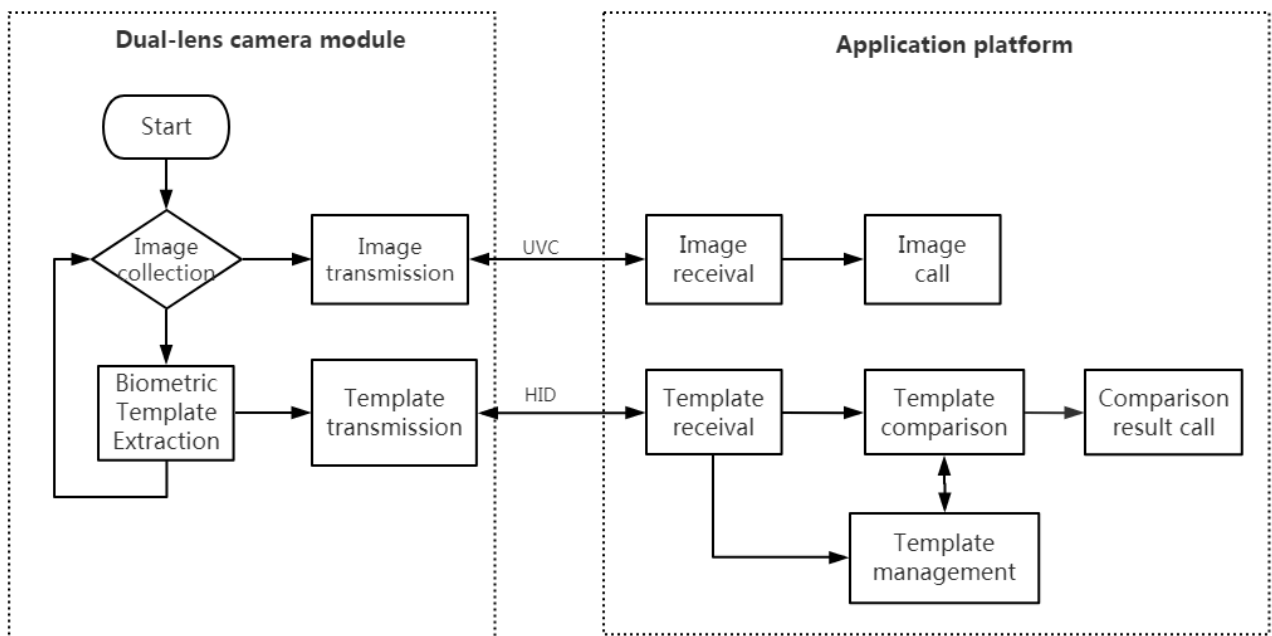


Figure 4.2 Some functions of a back-end comparison system

If you use the module for template comparison and management, the module will only send the output of the comparison result through the HID port for a client application to call. This can minimize the computing load of the platform processor. As such, it is particularly suitable for the integration of the face/palm recognition function in low-performance embedded platforms. Figure 4.3 shows some functions of a front-end comparison system.

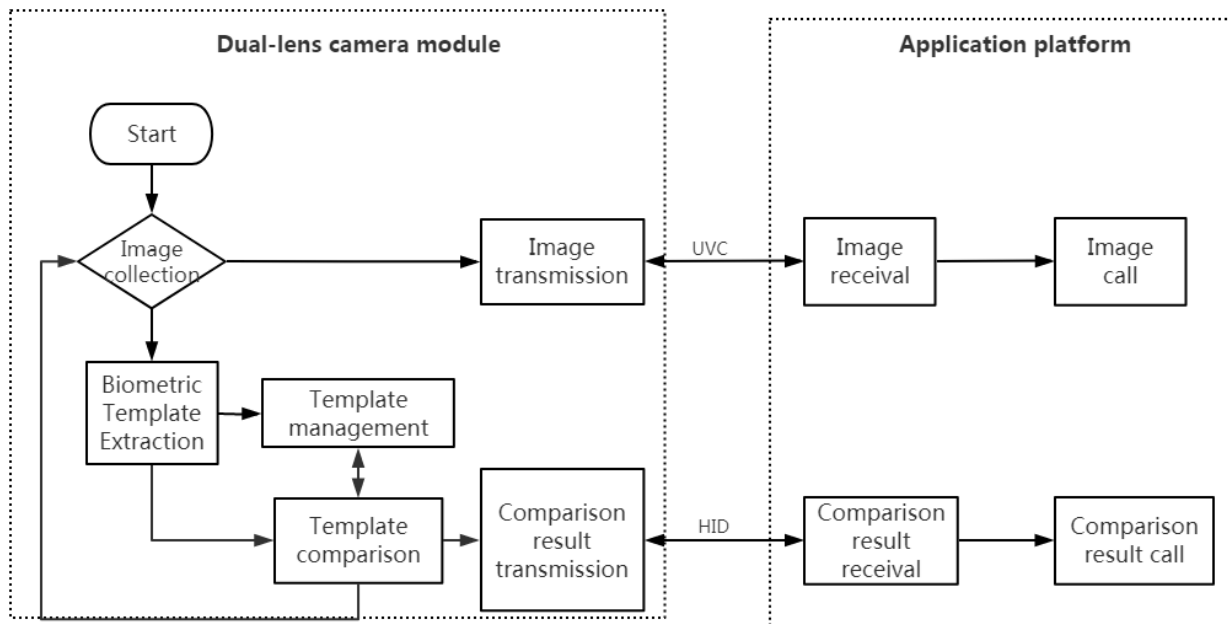


Figure 4.3 Some functions of a front-end comparison system

As the SDKs are provided, you only need to call the function interface of a configuration and write an application to integrate face/palm recognition function in your platform. It shortens the development cycle and improves product competitiveness.

5 Structural Dimensions

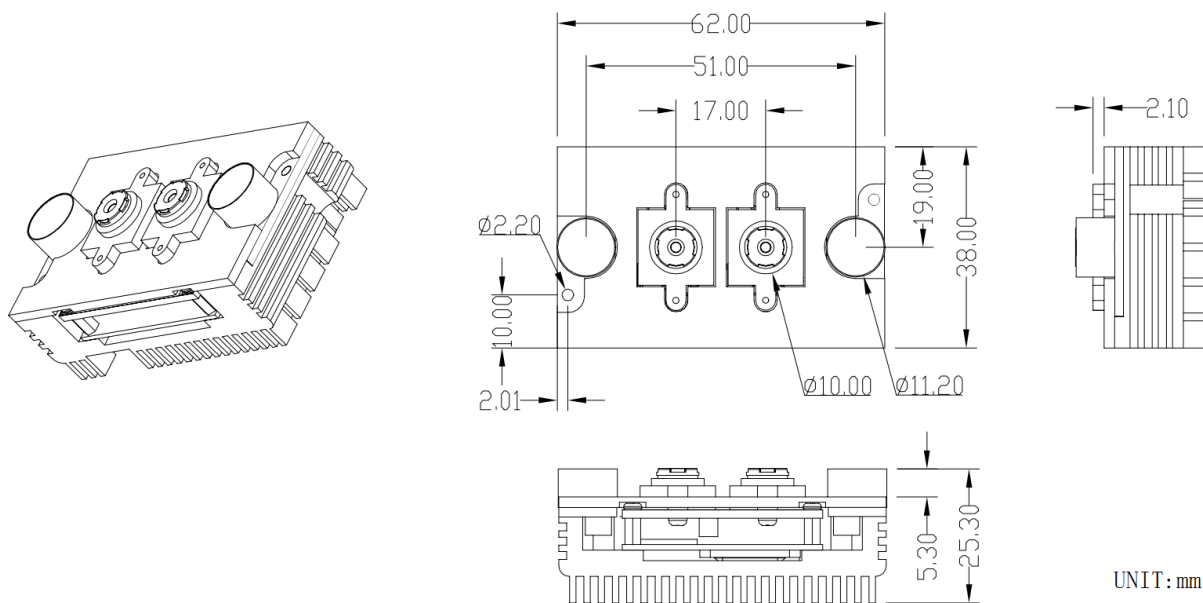


Figure 5.1 Structural dimensions of a dual-camera module

6 PIN Definition

6.1 PIN Position and Definition

The AMT-FAPVS-21 dual-camera modules use a 1.25 mm 5-pin wafer connector with lock. Figure 6.1 shows its position and pin definition below.

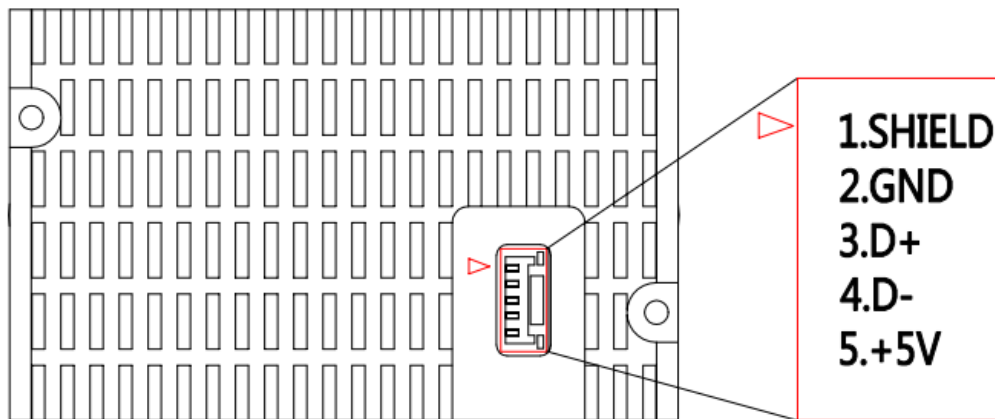


Figure 6.1 Port definition of dual-camera modules

6.2 PIN Socket Dimensions

The AMT-FAPVS-21 dual-camera modules use a 1.25 mm 5-pin wafer connector with lock. Figure 6.2 shows its dimensions.

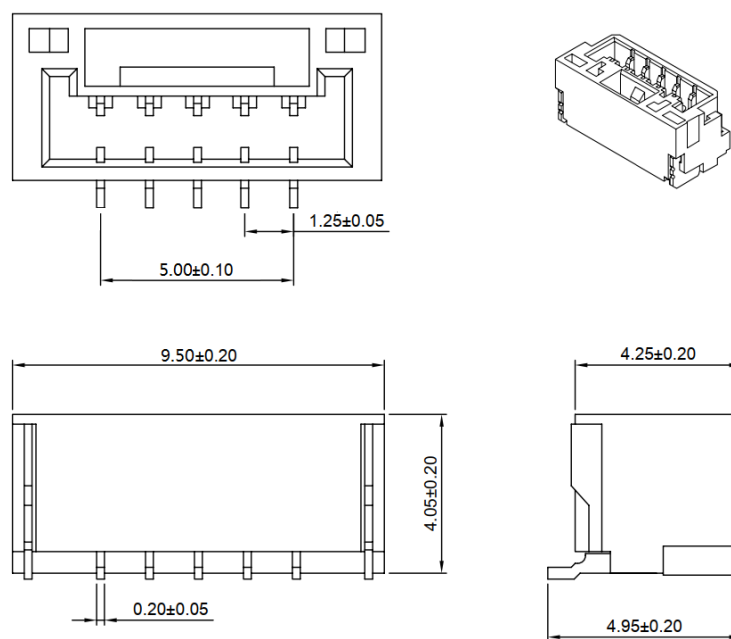


Figure 6.2 Dimensions of a 5-pin port socket

7 USB Cable Requirements

You are advised to use a D+/D- twisted pair of 26 AWG cables. The maximum length of the double-plug cable should be 15 (5.9) cm (in). A shielding layer is required, and the number of weaves should be 64 or more to ensure protection against interference. Figure 7.1 shows a design example for your reference.

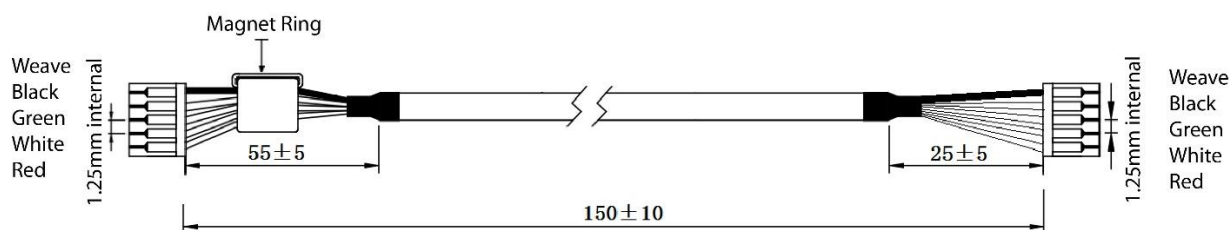


Figure 7.1 Specifications of a double-plug cable (Unit: mm)

8 Hardware Design and Integration Guide

8.1 Optical Design

AMT-FAPVS-21 are built-in dual-camera modules. The optical design is included when the modules are integrated into devices. To avoid mistakes in optical design and improve development efficiency, use the following specifications:

- 1) For the transparent material used in front of a module, such as glass and acrylic, the transmittance should be greater than 85% with a wavelength coverage of 400 nm to 900 nm.
- 2) The size of apertures of the lens ranges from 4 mm to 7 mm on the transparent material in front of the lenses. So, circular holes with a diameter of 4 mm are recommended, as shown in Figure 8.1.

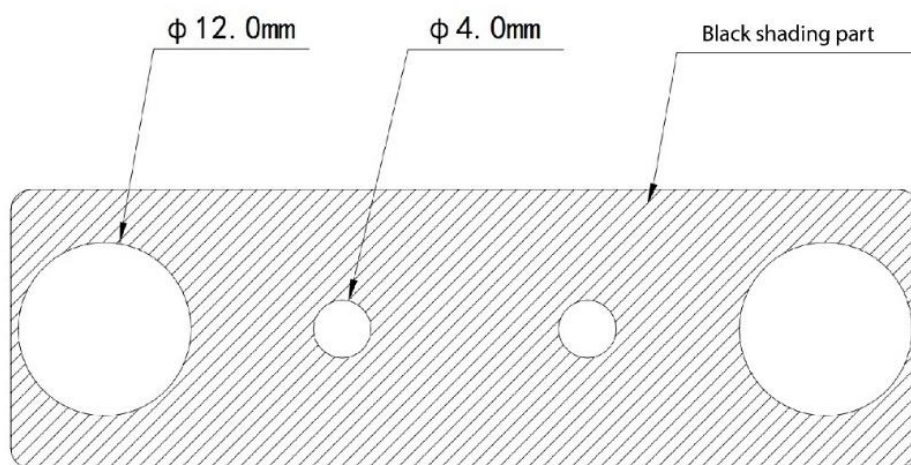


Figure 8.1 Aperture dimensions on acrylic material

- 3) The size of apertures of the near-infrared fill lights ranges from 12 mm to 15 mm on the transparent material in front of the near-infrared fill lights. So, circular holes with a diameter of 12 mm are recommended, as shown in Figure 8.1.
- 4) Excluding apertures in front of the lenses and near-infrared fill lights, shielding is necessary to reduce the influence of stray light on image collection, as shown in Figure 8.1.
- 5) We recommend you reserve 0.5 mm between the lenses and transparent material to avoid module size tolerance and lens focusing errors on assembly, as shown in Figure 8.2.

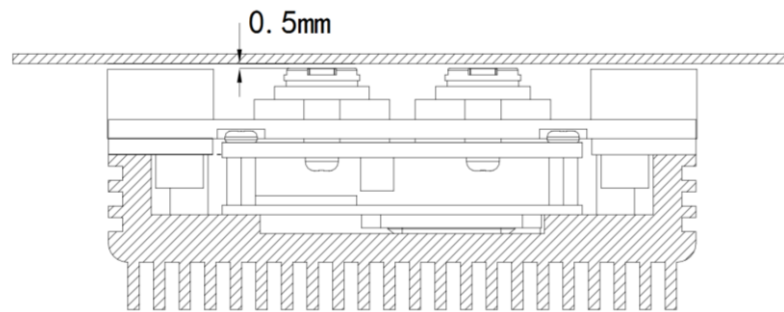


Figure 8.2 Distance between lenses and transparent material

- 6) The area around the lenses needs to be shielded. Foam can be used to cut off stray light. Place the foam in close contact with the front glass or acrylic to reduce the influence of stray light on image collection, as shown in Figure 8.3.

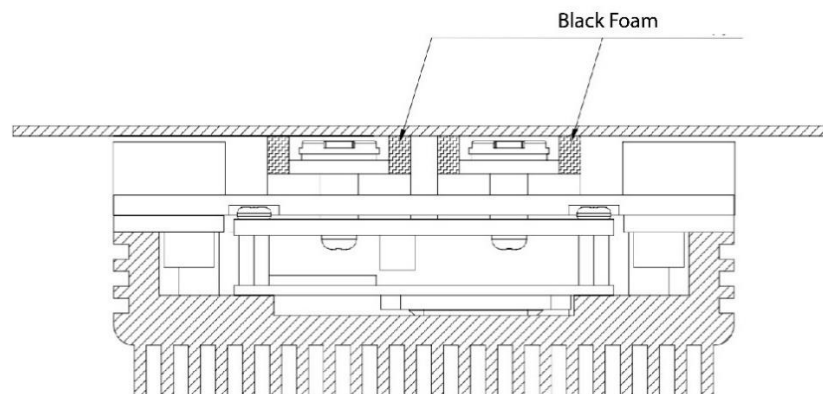


Figure 8.3 Foam shading design

8.2 Heat Dissipation Design

When a module is integrated into a device, the heat dissipation performance is improved by using a thermal conduction design. Similarly, the AMT-FAPVS-21 dual-camera modules are equipped with structural metal components capable of heat dissipation. A thermally conductive silicone pad is added to the back of the structural component. And the component is connected to the exterior of the device. In this manner, heat is conducted, and heat dissipation performance is improved. The recommended thickness of a thermally conductive silicone pad is less than 3 mm.

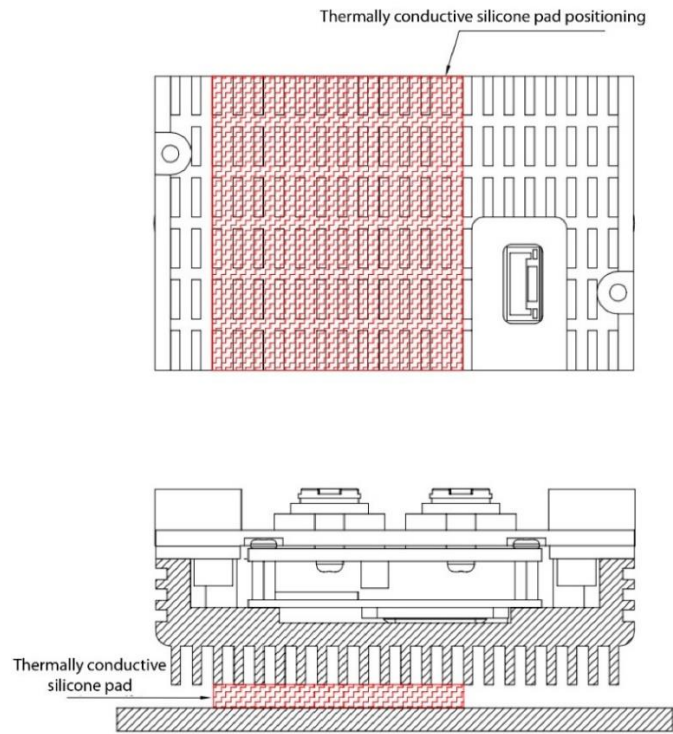


Figure 8.4 Thermal conduction design

9 Installation Guide

9.1 Installation Modes

Considering the built-in design of the AMT-FAPVS-21 dual-camera modules, it is recommended to use either rear-locking or front-locking mode to install and mount a module. Figure 9.1 shows a rear-locking mode.

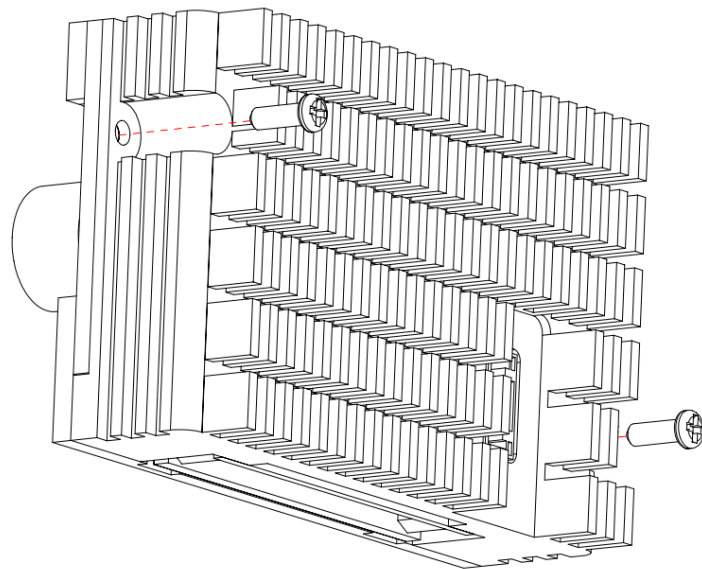


Figure 9.1 Rear-locking installation

9.2 Installation Height and Angle

When you install an AMT-FAPVS-21 dual-camera module, you need to consider the influence of the installation angle and height on the field of view for image collection. If the mixed face/palm recognition algorithm is used, you need to consider the field of view that faces can adapt to, the range requirements of palm recognition, and the convenience and speed of man-machine interaction. Therefore, selecting a proper installation angle and height is crucial to the front-end image collection and user experience of the entire system.

Figure 9.2 describes basic concepts related to installation height and angle.

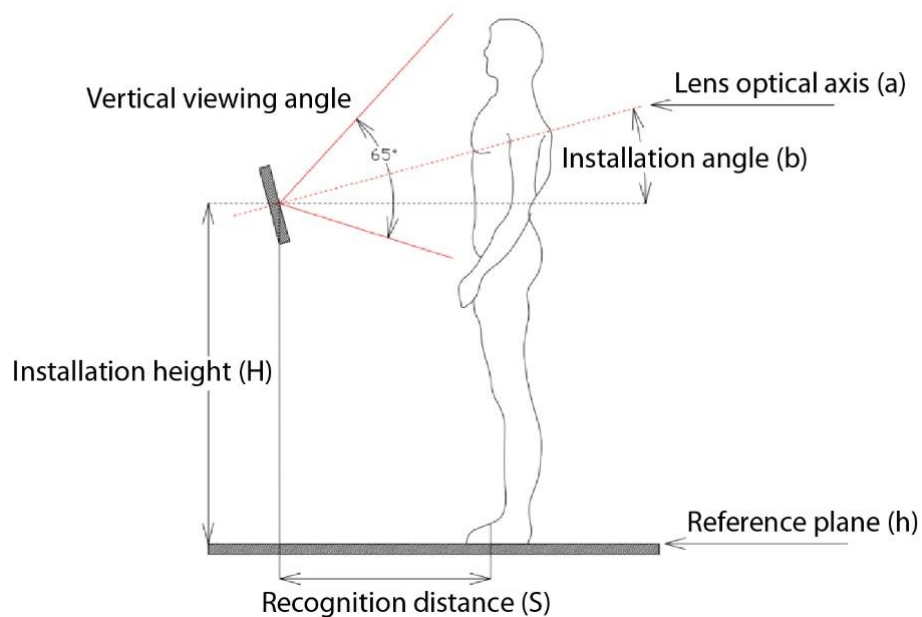


Figure 9.2 Basic installation concepts

Lens optical axis (a): a line that defines the path along which light propagates through a lens.

Reference plane (h): a plane on which a person stands when a module is used.

Installation height (H): the height above the reference plane, at which a module is installed.

Installation angle (b): the angle between the lens optical axis (a) and the reference plane (h), within a range of -90° to 90° .

Recognition distance (S): the distance between a face and a lens when a module is used

The purpose of optimizing the installation height (H) and installation angle (b) is to improve the module's adaptability to the height of a human body and user experience within the normal range of man-machine interaction. Human body height is an important reference index because it is linearly related to the height of a person's face and the length of a person's arms. Therefore, if the installation design of a module meets the requirements of adaptable body height, it also meets the requirements of facial and palm recognition.

To facilitate installation design, we recommend using a horizontal or slant installation mode.

9.2.1 Horizontal Installation Mode

In horizontal installation mode, the installation angle (β) is set to 0° , and the installation height (H) is set to 1.5 m. If a person can be recognized at a distance of 0.5 m to 0.8 m, the module can adapt to individuals with a height range between 1.38 m and 2.0 m, as shown in Figure 9.3.

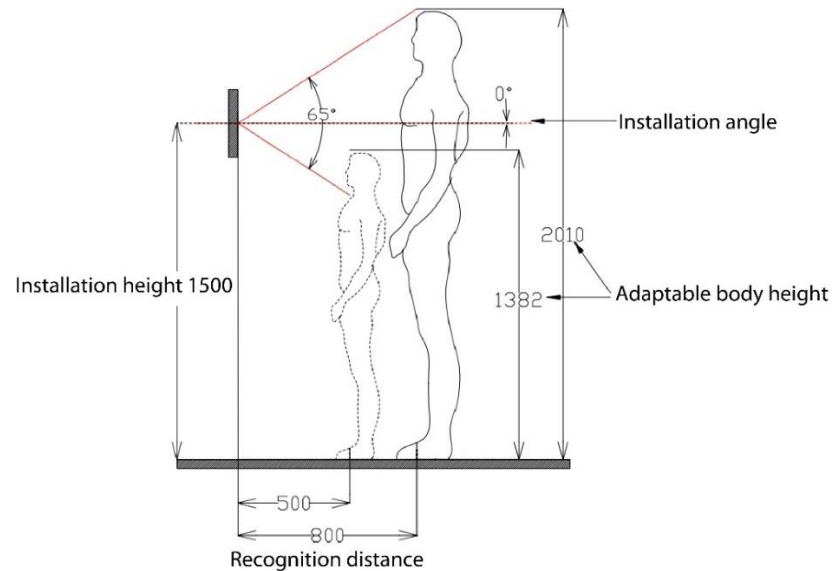


Figure 9.3 Horizontal installation (Unit: mm)

9.2.2 Slant Installation Mode

In the slant installation mode, the installation angle (β) is set to 10° , and the installation height (H) is set to 1.45 m. If a person can be recognized at a distance of 0.5 m to 0.8 m, the module can adapt to individuals with height is between 1.45 m and 2.18 m, as shown in Figure 9.4.

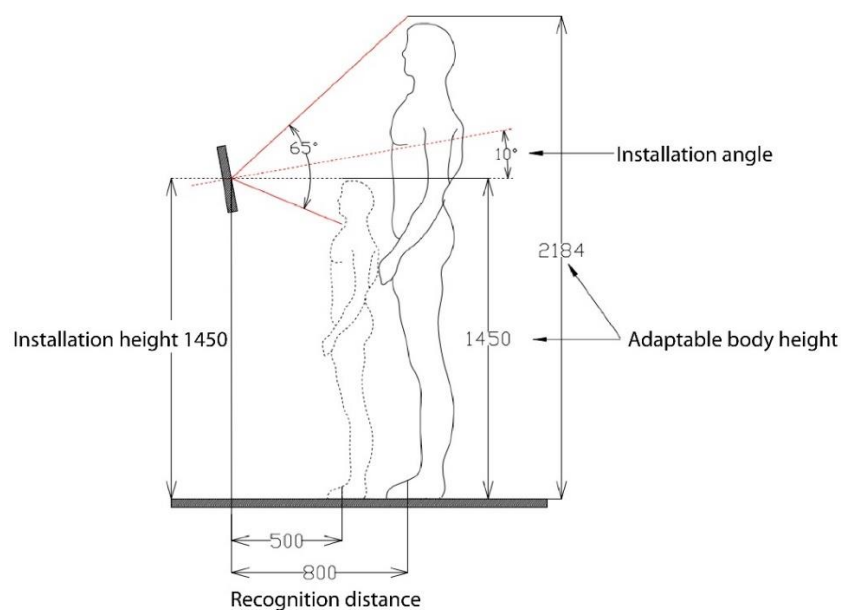


Figure 9.4 Slant installation

190 Bluegrass Valley Pkwy,
Alpharetta, GA 30005
E-mail: info@armatura.us
www.armatura.us

