

AFS 510

FINGERPRINT SCANNER



USER'S MANUAL

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Document version: 2016-12-09

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DEVICE OVERVIEW

The AFS 510 is a sturdy yet compact, easy-to-use, professional ten-print live scan solution that captures flat and rolled fingerprints. It provides fast, forensic quality fingerprint capturing. The enrolled fingerprint images comply with U.S. strict biometric standards: the FBI IAFIS IQS Appendix F. Auto-capture function and real-time NIST quality check with sequence verification ensures the capture of high-quality prints. The AFS 510 comes with an SDK package that ensures easy integration into any IT environment.

KEY BENEFITS OF THE AFS 510 LIVE SCANNER

- High quality fingerprints (comply to FBI App. F)
- Auto finger detection
- Auto segmentation
- Automatic image quality check
- User guide system: intelligent indication of proper finger position
- Dual power system (powered by USB, or by external power supply)
- BioAPI compatibility

1. PACKAGE CONTENTS

- AFS510 Fingerprint Scanner Device
- Power Supply: GM-050200 switching power adaptor
 - Input: 100-240V ~ 50/60Hz
 - Input Current: 0.50A
 - Output: 5V – 2.0A
 - Output Power: 10W
- USB 2.0 Hi-speed cable
- Glass cleaning wipes

! Important

Do not use the device with a different power supply.

2. PARTS AND COMPONENTS

1. Platen
2. Indicator LEDs
3. Kensington® security slot
4. USB connector
5. DC power in
6. ON/OFF switch
7. Easy carrying handle



3. SYSTEM REQUIREMENTS

Recommended minimum system requirements:

- 1 GB of RAM or more (depending on application),
- Intel Pentium 2 GHz CPU or higher (or other fast x86 compatible CPU),
- 32 or 64-bit Microsoft Windows 7/8.1/10 operating system or Linux operating system,
- Integrated USB 2.0 port (on the motherboard).

Note

The speed of image processing greatly depends on the performance of the PC. Generally speaking if you want to achieve shorter processing times, you will need to use a more powerful PC.

HARDWARE INSTALLATION

To install the device itself you only need to connect it to a suitable power supply and a PC. The device can be powered by either an external power supply or by a USB cable.

EXTERNAL POWER SUPPLY

- Connect the power supply to the AFS 510 unit and switch the device on.
- Connect the Main Type A end of the USB cable to one of the USB 2.0 ports of the PC.
- Connect the Type B end to the AFS 510 device.

USB

- Connect both Type A ends of the USB cable to the USB 2.0 ports of the PC (Two free USB ports are necessary)
- Connect the Type B end to the AFS 510 device.

! Important

Use the USB cable that was shipped with the device in both cases.



It is strongly recommended to use the USB ports found on the motherboard of the computer. When connecting the USB cable to a front panel USB port, make sure that the cable connecting the front panel and the motherboard is shielded. If the device is used with a laptop, make sure that the output voltage of the USB ports is not less than 5V. For this reason, it is highly recommended that you use the laptop on AC power (with the power cord connected).

SOFTWARE INSTALLATION

1. INSTALLATION ON 32-BIT AND 64-BIT WINDOWS OPERATING SYSTEMS

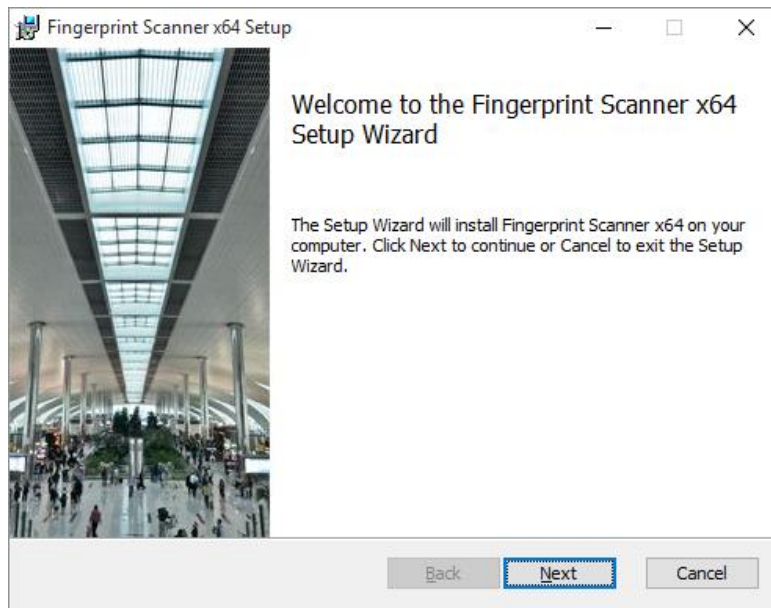
Administrator rights are required for installation.

! Important

Upon installation of the 32-bit version to a 64-bit PC, the 64-bit device drivers will be installed automatically. For 32-bit application development on 64-bit PCs, install the 32-bit version of the Fingerprint Scanner software as well.

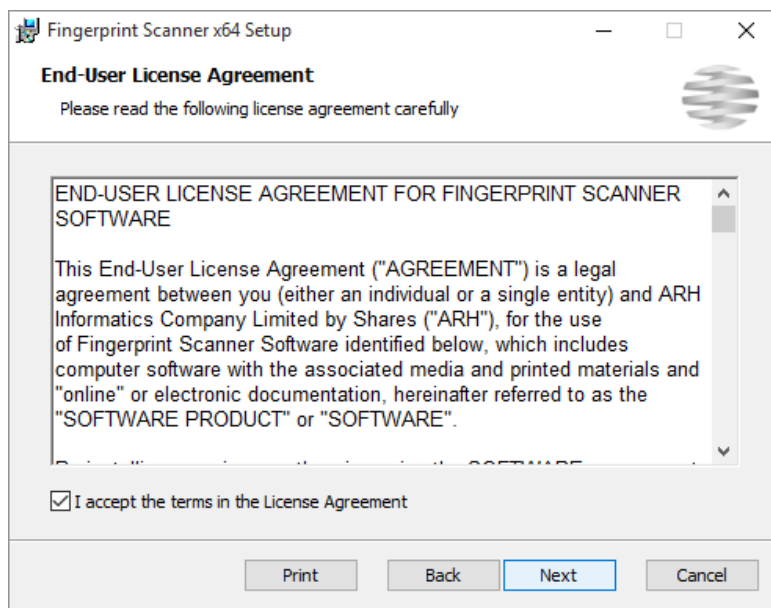
- Before installing the FPS module, all previous versions of the Fingerprint Scanner software have to be uninstalled from the system. This process differs depending on the version that is currently installed on the system.
 - For versions 1.2.1-17 or earlier, go to **Start Menu / Programs / GX / UNINSTALL** and run – **FULL UNINSTALL** – as well as **Start menu / Programs / GX / 32 bit version / - FULL UNINSTALL** – if applicable.
 - For versions 2.1.6 or later, go to **Control Panel / Add/Remove Programs** and remove all versions of the Fingerprint Scanner software.
- Once all previous versions of the software have been uninstalled, restart the computer.
- Next, locate the downloaded software package and run **fps-2.1.6.X-x86.msi** (in case of 32-bit operating systems) or **fps-2.1.6.X-x64.msi** (in case of 64-bit operating systems). These files will be located within the **win** folder of the Fingerprint Scanner package.

- The installation starts with the following window:



Start Page of Fingerprint Scanner setup

- Click on **[Next]** to start the installation.



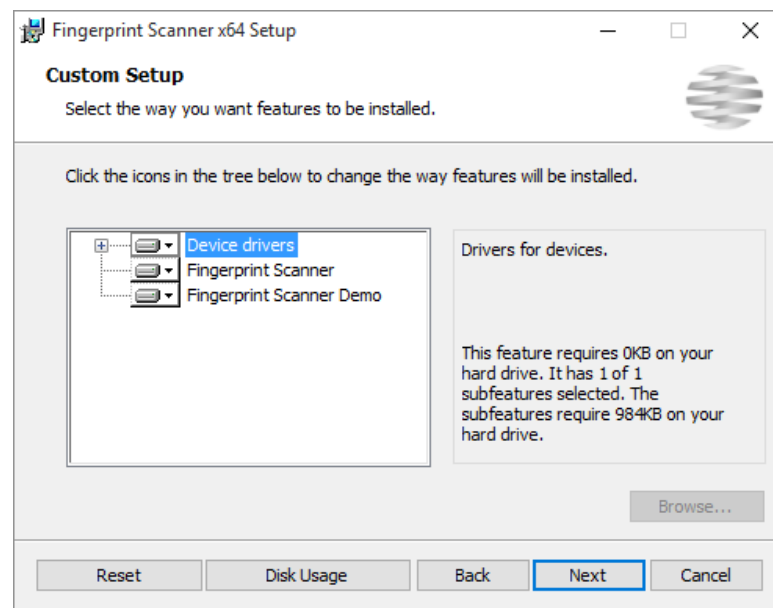
End-User License Agreement

- Accept the EULA (by ticking the checkbox above) and start the custom installation process by clicking on **[Next]**.

- In the **Custom Setup** window, select the modules you wish to install on the PC.
- Installing the **Device Drivers** and the **Fingerprint Scanner** module is necessary for operation. Installing the **Fingerprint Scanner Demo** is optional, but it is highly recommended.

Note

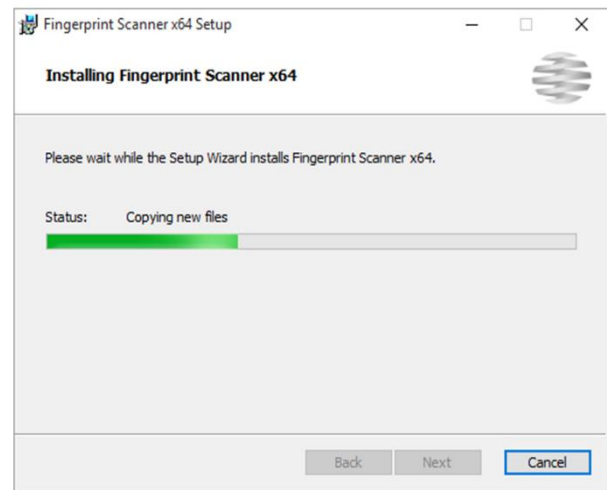
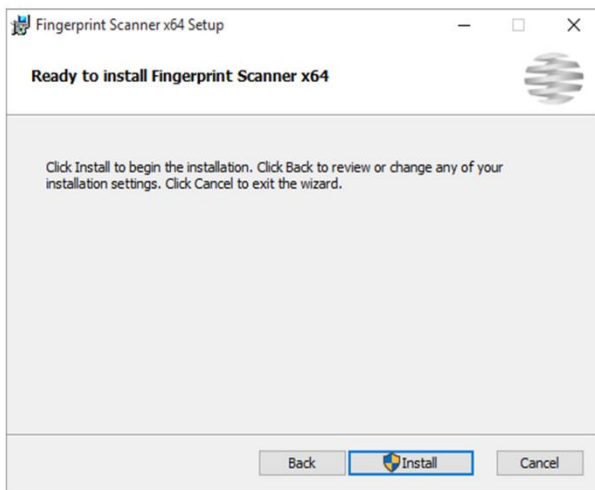
SDK and Documentation is available in the SDK folder of the FPS Software package.



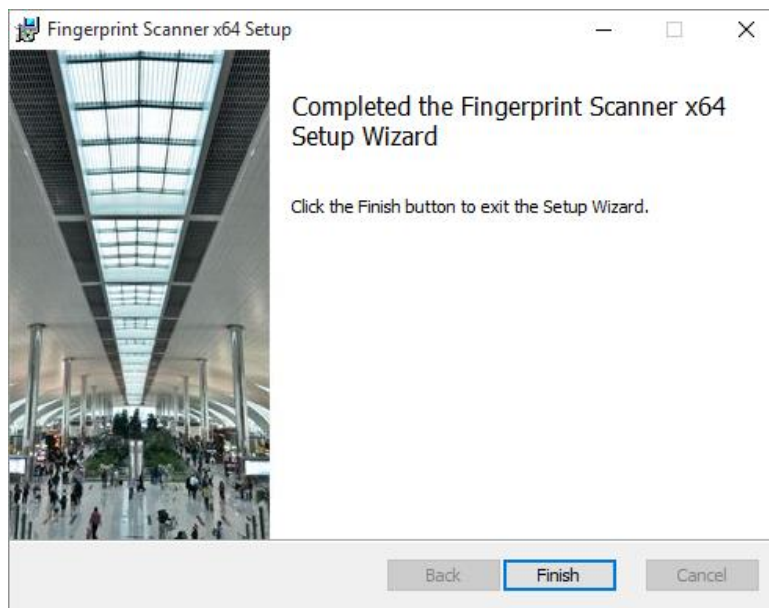
Custom Setup screen

- Click on **[Next]** to continue the installation.

- Click on **[Install]**.

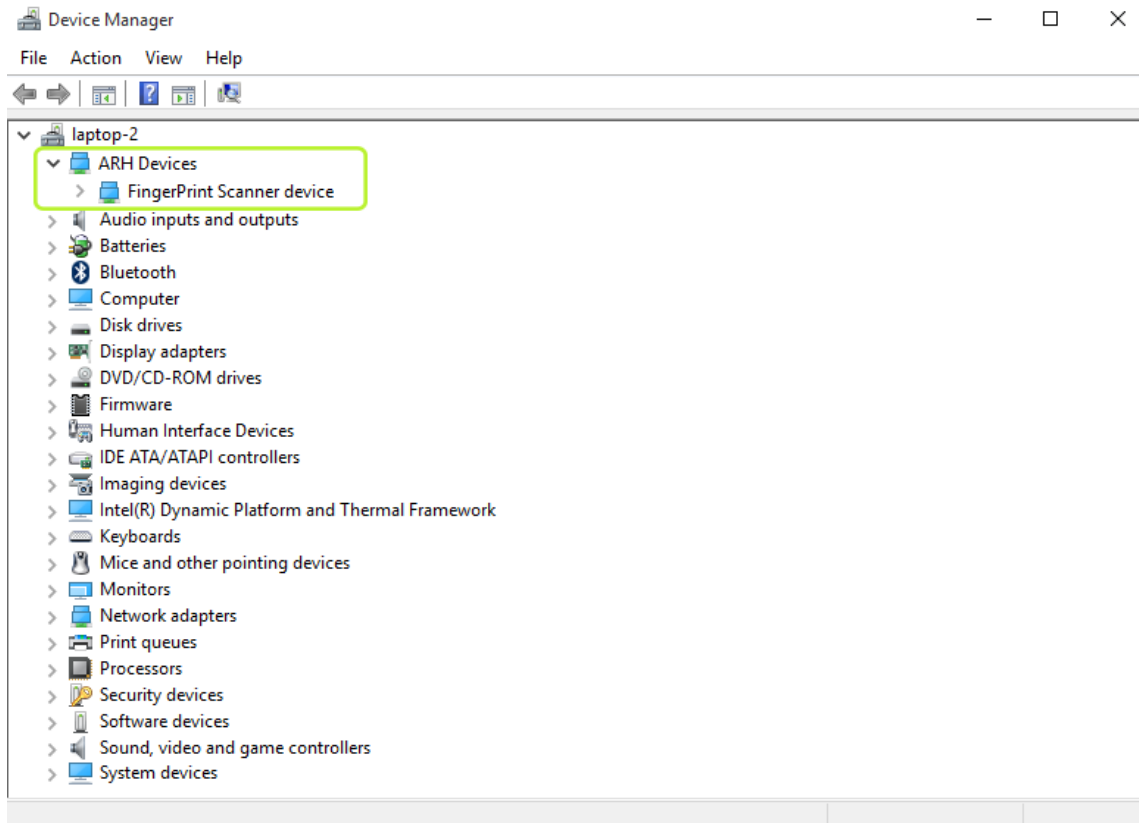


- Click on **[Finish]** to complete the installation.



Installation is complete

- Once installation is complete, and the Fingerprint Scanner is connected to the PC, open the Device Manager. If installation was successful, a group named ARH Devices together with the FingerPrint Scanner Device item should be listed.



2. SOFTWARE INSTALLATION ON LINUX OPERATING SYSTEM

2.1. INTRODUCTION

The system was built on Debian 6.06 and has been tested on:

- Debian 7
- Ubuntu 10.04
- Ubuntu 12.04
- CentOS 6.3
- OpenSUSE 12.1

Note

Please read the license agreement before installing the packages.

For the installation you need "GNU Make" (tested with "GNU Make 3.81"), "GNU C/C++" compiler (we have tested with "GNU C/C++ 4.6.3") and the corresponding GLIBC. The kernel headers and configuration files must be installed as well.

2.2. CONTENTS OF THE INSTALL PACKAGE

GX

`gx-7.2.x-x.tar.gz` GX system

Fingerprint Scanner

<code>fps-1.2.x-x.tar.gz</code>	Fingerprint Scanner system
<code>prd-2.1.x-x.tar.gz</code>	PRDDRV driver for Fingerprint Scanner devices
<code>fps-demo-1.2.x-x.tar.gz</code>	Fingerprint Scanner demo application
<code>pr-2.1.x-x.tar.gz</code>	Pr-system
<code>pr-udev-2.x.x-x.tar.gz</code>	Scripts and udev rules for automatic driver loading

2.3. THE INSTALLATION PROCEDURE

1. UNPACK AND COPY ALL FILES INTO YOUR SYSTEM:

- `use _install.sh [32|64|all]`

Note

Optional parameters enforce the installation of the binaries.

Dependencies:

Please install the following libraries with your distribution package manager or manually (these libraries are apart from services):

- SDL (A library for portable low-level access to a video framebuffer, audio output, mouse, and keyboard),
- SDL ttf (A library that enables using TrueType fonts in your SDL applications),
- SDL net,
- SDL gfx,
- SDL image,
- freetype (TrueType font rendering library).

GX: none

Passport Reader: GX

2. COMPILE KERNEL MODULES:

- Download a kernel source (e.g. 2.6.x) from <http://www.kernel.org> and unpack into the `/usr/src` directory (2.6.x series recommended).

If you have an older GX version in the kernel tree, please remove it manually by using the `_uninstall.sh` script.

You can use the kernel source package of your distribution (e.g. Ubuntu 10.04 -> linux-kernel-headers).

- Or make sure that the kernel config files are installed. Check the `/lib/modules/${(KERNEL_VERSION)}/build` directory.
- Compile the ARH drivers:

Compile the drivers with 'make' command in the following order:

- `/usr/src/gx/kernel/gxsd`
- `/usr/src/gx/kernel/prddrv`

Note

If you get a "No rule to make target..." error message by typing "make":

if the output of "uname -i" is "unknown" and your system is either i386 or x86_64:

make a symbolic link to e.g. `b_prddrv.o` by typing:

```
ln -s b_prddrv.o.i386 b_prddrv.o OR
ln -s b_prddrv.o.x86_64 b_prddrv.o
(ln -sf b_prddrv.o.i386
/usr/src/gx/kernel/prddrv/b_prddrv.o.GenuineIntel by me)
```

according to your system.

3. INSTALL NEW KERNEL MODULES:

For PRDDRV:

```
/sbin/insmod /usr/src/gx/kernel/gxsd/gxsd.ko
/sbin/insmod /usr/src/gx/kernel/prddrv/prddrv.ko
```

4. AUTOMATIC DRIVER LOADING IS ENABLED BY THE PR-UDEV MODULE.

This module enables the automatic installation of the driver modules when the reader is connected to the PC. As result, there is no need to start the driver manually. If this feature is not needed, then remove the `98-arh.rules` from the `/etc/udev/rules.d` directory.

2.4. AFTER INSTALLATION

Once installation is complete, you can find the manual for the GX and FPS systems in `/usr/share/doc/gx`. The header files can be found in `/usr/include/gx`, the library files in `/usr/lib32/gx` (and `/usr/lib64/gx` on 64 bit systems).

The basic GX library is in `/usr/lib32` and `/usr/lib64` (`libgxsd.so.7`). The file containing the property data is `/var/gx/gxsd.dat`.

After the kernel modules were started, you can check the state of the running drivers in `/proc/gx`.

Sample programs can be found in `/usr/src/gx` in the examples directory.

You can use these environment variables:

- `LD_LIBRARY_PATH:` for shared objects (*.so)
(`/usr/lib32`, `/usr/lib64`, `/usr/lib32/gx`, `/usr/lib64/gx`)
- `GX_VAR_PATH:` for properties (`gxsd.dat`) and global locks (`/var/gx`)
- `GX_SHARE_PATH:` for shared data (`demo.dat`) (`/usr/share/gx`)

2.5. UNINSTALLATION

If you want to uninstall ARH files simply type:

```
rm -Rf /usr/include/gx /usr/lib32/gx /usr/lib64/gx /var/gx /usr/src/gx
rm -Rf /usr/share/gx /usr/share/doc/gx
rm -f /usr/lib32/libgx* /usr/lib64/libgx*
```

or use `_uninstall.sh`.

2.6. DEVICE ENTRIES IN /DEV DIRECTORY

Similar entries can be found in /dev if you connect the device and load the desired driver. This entry point will be created by udev in the new 2.6.x kernel series.

```
crw-rw---- 1 root root    189,    2 2009-11-26 15:49 usbdev1.3
crw-rw---- 1 root root    252,   14 2009-11-26 15:49 usbdev1.3_ep00
crw-rw---- 1 root root    252,   13 2009-11-26 15:49 usbdev1.3_ep81
crw-rw---- 1 root root    189,    5 2009-11-26 15:49 usbdev1.6
crw-rw---- 1 root root    252,   17 2009-11-26 15:49 usbdev1.6_ep00
crw-rw---- 1 root root    252,   15 2009-11-26 15:49 usbdev1.6_ep02
crw-rw---- 1 root root    252,   16 2009-11-26 15:49 usbdev1.6_ep84
```

2.7. TROUBLESHOOTING - KNOWN BUG(S)

1. PERMISSION DENIED FAILURE

Solution:

```
/sbin/rmmod prdrv
/sbin/rmmod gxsd
/sbin/insmod /usr/src/gx/kernel/gxsd/gxsd.ko
/sbin/insmod /usr/src/gx/kernel/prdrv/prdrv.ko
```

DEVICE USAGE

The AFS 510 is distributed with an SDK; therefore, the functionalities and how the device scans fingerprints heavily depends on the features available in the applications developed for it. For this reason, the guide will now demonstrate flat and rolled fingerprint scanning with the demo software which is supplied in the SW package. This section will also describe what the different LED lights indicate.

Before using the scanner, make sure that the platen is free of dust, dirt or any residual fingerprint images. Use the included cleaning wipes to clean the platen. Alternatively, you can also use a soft cloth.

Do not use any rough materials as these can easily damage the surface of the platen.

Note

- Make sure that the fingers being scanned are clean.
- Excessively wet or sweaty hands should be dried.
- Excessively dry hands should be moistened.

1. INDICATOR LIGHTS

On the device you will find multiple LED lights. These lights indicate what state the device is in, what fingers should be placed on the platen, they also indicate the quality of the scans being taken and help the users in achieving correct finger positioning as well.

Note

If the device is switched on and not connected to the PC, or if the drivers are not installed, then all the LEDs will turn on.



1: POWER STATUS LED

The two statuses of this LED are:

- Green: ready for use,
- Yellow: standby mode for power saving.

2, 3, 5: FINGER INDICATOR LED FOR FLAT SCANNING

These LEDs guide the users through the scanning process by showing them which fingers should be placed on the platen.

4: ROLLED FINGER INDICATOR LED

This LED indicates that the rolling scanning process is on.

6: POSITION INDICATOR LED FOR FLAT SCANNING.

This LED indicates the correct position of the fingers. During the flat scanning process, the arrows show the direction in which the fingers should be moved on the platen.

7: FINGER QUALITY LED

These LEDs indicate the fingerprint quality during flat scanning.

- Green: the quality is over the quality threshold* value.
- Yellow: the quality is below the quality threshold* value.

* The threshold is user definable

2. THE DEMO SOFTWARE

Once the device has been connected to a power source, and has been connected to a PC, it is ready for use. The demo software is by default installed with the FPS software; therefore, no separate installation is needed.

You can find the demo software at the following locations:

C:\Program Files\GX\demos\FpsDemo – on 32 and 64-bit operating systems

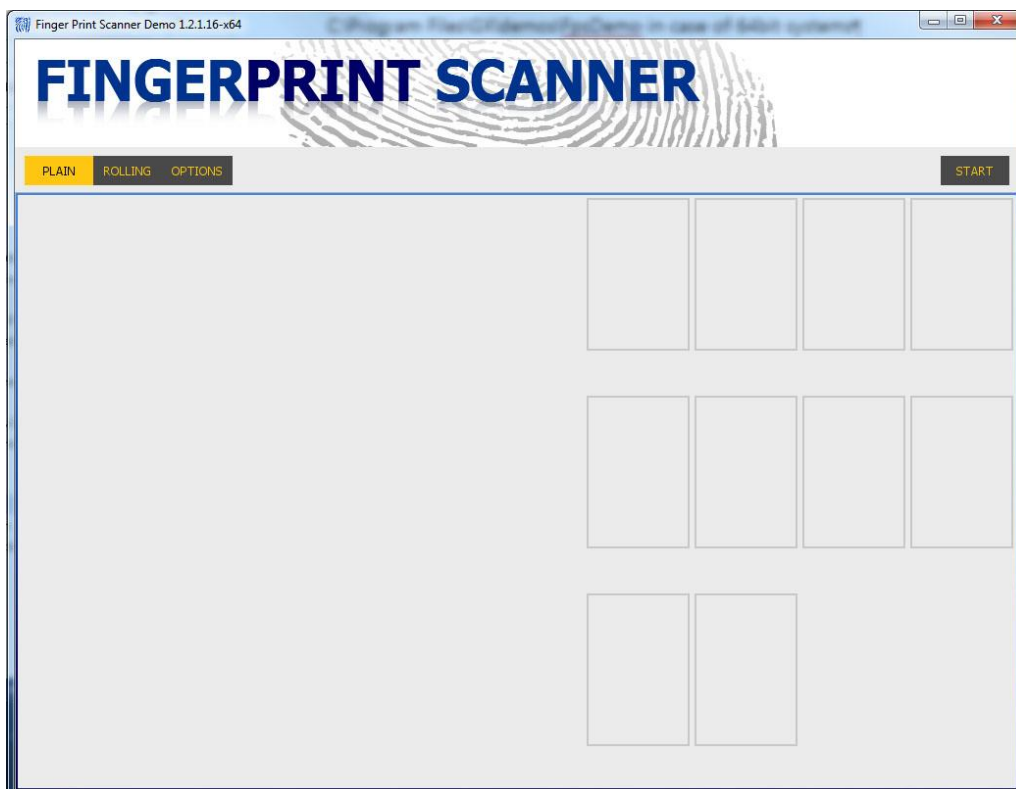
C:\Program Files (x86)\GX\demos\FpsDemo – 32-bit version on 64-bit operating systems (optional)

Within either folder locate and run the **FPSDemo.exe** to start the demo program.

Note

The demo will only start if a device is connected to the PC.

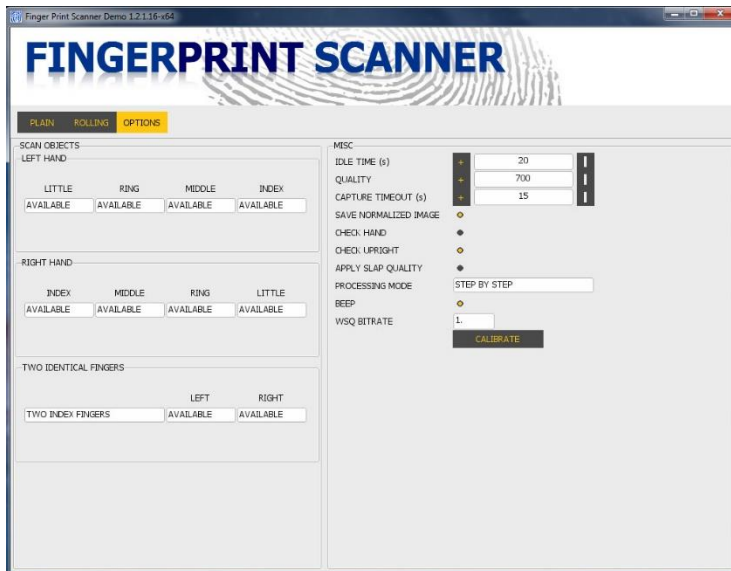
The following window will appear.



Within the demo you have the option to start a flat fingerprint scanning process, a rolled fingerprint scanning process and to configure the available options.

2.1. THE OPTIONS MENU

Click on **Options** to access the options menu of the demo software, you will be presented with the following screen:



On the left side of the screen you will find the **SCAN OBJECTS** group. Here you can configure which fingers should be scanned. By clicking on the field under any of the fingers, a drop down menu with 4 options will appear:

- No info
- Amputation
- No Print
- Available

On the right side of the screen you will find the **MISC** group with the following options:

- **IDLE TIME (s):** The time after which the device enters sleep mode to preserve power. This value is given in seconds. You can input a value manually or you can use the icons located on the two sides of the field.
- **QUALITY:** With this option it is possible to configure the quality threshold of the scans. You can input a value manually or you can use the icons located on the two sides of the field.
- **CAPTURE TIMEOUT (s):** With the capture timeout option, it is possible to configure the maximum amount of time (in seconds) that a scan should last. This option is designed to prevent endless scanning in scenarios when the fingerprint quality never reaches the set threshold. You can input a value manually or you can use the icons located on the two sides of the field.
- **SAVE NORMALIZED IMAGE:** Enables or disables image normalization.
- **CHECK HAND:** Turns the hand swap test on or off. Only works if all four fingers are available.
- **CHECK UPRIGHT:** Controls whether the software should check that the fingers are in an upright position.

- **APPLY SLAP QUALITY:** Controls whether the software should use a common quality for all fingers or individual qualities for each finger. Should be used if images of plain left and plain right four fingers are needed.
- **PROCESSING MODE:** Processing mode has two available options:
 - Automatic: If this option is selected, then the different scanning sequences will happen one after another automatically.
 - Step by step: If this option is selected, then the demo will stop scanning after each sequence and will require the user to click a button on the interface to take the next scan.
- **BEEP:** Controls whether the device should beep at the end of each sequence.
- **WSQ BITRATE:** Makes it possible to configure the WSQ bitrate.
- **CALIBRATE:** Calibration is required in special circumstances only, please contact ARH support for further information.

3. FLAT FINGERPRINT ACQUISITION

To scan flat fingerprints, first open the demo software. The landing screen of the software is the menu where you can scan flat fingerprints. To start the process, click on **Start** and follow the instructions that appear on the screen.

By default The AFS 510 scans flat finger prints in a 3 step sequence.

- Right hand small, ring, middle, and index finger
- Left hand small, ring middle and index finger
- The 2 thumbs

Once the flat acquisition process has started, the device will continuously scan and evaluate the fingerprint images. The scanning process ends once the user defined time limit or the set minimum quality threshold is reached.

When placing the 4 fingers on the platen, make sure that the fingers are parallel with the side of the platen. To achieve the best fingerprint quality, place the fingers on the middle of the platen in a vertical position and gently press the fingers against it.



The rotation of the fingers is too much.



The fingers are too near to the side of the platen.



The fingers are in the middle of the platen in vertical position.



If the position of the fingers are incorrect during acquisition, then the red LEDs will light up signaling the direction in which the fingers should be moved.

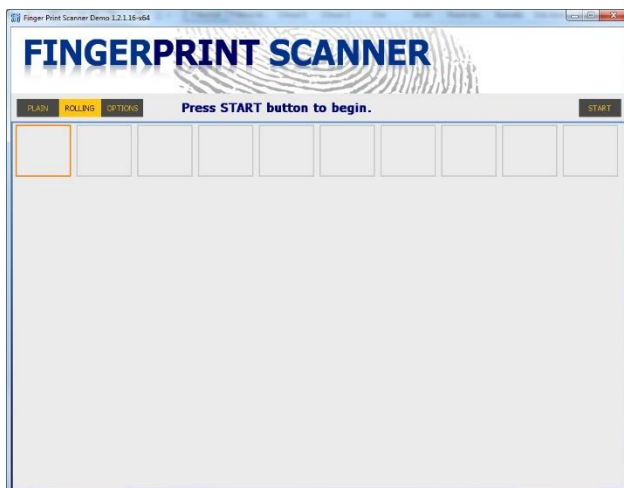
To take better quality scans, try the following during the scanning process:

- Gently move the fingertips left-right, up-down without changing the position of the fingertips on the platen.
- Ask the subject to remove the fingers for approximately half a second and then quickly reposition them on the platen. This motion should be swift and should be carried out during the scanning process.

Note

Pressing the fingers strongly against the platen does not necessarily yield better results.

4. ROLLED FINGERPRINT ACQUISITION



In addition to flat fingerprints, the device is also fully capable of scanning rolled fingerprints.

To scan rolled fingerprints, open the demo software and select the **Rolling** menu.

Clicking on **Start** will start the acquisition process. During acquisition, follow the instructions that appear on the screen.

Furthermore, please make sure that you follow the instructions below as well, otherwise the quality of the rolled fingerprint scans may not be adequate.

4.1. CORRECT POSITIONING

To capture rolled fingerprints, the finger must be placed on the rolling area of the platen. This is a square area located in the bottom center portion of the platen.



4.2. CORRECT MOVEMENT

1. Place the side of the finger on the edge of the rolling area.
2. Next, slowly roll the finger on the other side until it faces in the other direction. Roll the fingers from one edge of the nail to the other. This process on average should take approximately 5 seconds. Exercise care and make sure that the finger is evenly scanned from the tip to just below the first joint. This can be ensured if the finger is in constant contact with the platen during the process.
3. Once the rolling motion has been carried out, the subject should lift the fingers off the device.



In most cases the weight of the finger will provide enough pressure to create adequate scans. If not, ask the subject to lightly press their fingers against the glass while doing the rolling motion.

! Important

The rolling motion should only be carried out once per finger, never roll the fingertips back and forth or move them up and down.

The direction of the movement should follow the natural movement of the forearm as it is easier for the subjects to rotate the fingers in these directions. The thumbs should be rolled toward the center of the individual's body. From right to left for the right thumb, and from left to right for the left thumb.

Index, middle, ring and little fingers on the other hand should be rotated away from the center of the subject's body. From left to right for the right hand, and from right to left for the left hand.

These directions are only recommendations, you can of course roll the fingers the other way around. However, you should only use one direction and not both.

CONTACT INFORMATION

HEADQUARTERS	ARH AMERICA	INNOVATION CENTER
ARH Inc. Hungary, EU	Adaptive Recognition America Corp. Florida, USA	ARH Innovations Hungary, EU
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Phone: +36 1 201 9650 Fax: +36 1 201 9651 Web: www.arh.hu	Phone: +1 727 724 4219 Fax: +1 727 724-4290 Web: www.arh.hu	Phone: +36 1 201 9650 Fax: +36 1201 9651

The ARH Technical Support System (ATSS) is designed to provide clients with fast and proficient assistance.

Information regarding hardware, software, manuals and FAQs are easily accessible for clients who are already registered in ATSS. In addition to offering assistance, the system is also designed to provide high levels of protection while managing your business information.

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