Module 3

Biometric Data Capture

UIDAI

Unique Identification Authority of India

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Introduction

To overcome the deficiencies of systems introduced for identification of individuals, the entire approach of Aadhaar is based on technology.

Aadhaar avoids errors and duplications which was the bane of earlier systems, by linking an individual's identity to biometric information which is unique to the individual. Various devices and software are used to capture and store biometric information.

This module will introduce you to the devices which are used in gathering both, demographic and biometric information at an Aadhaar Enrolment Centre. Biometric data will be captured using biometric devices and the Aadhaar Enrolment Client software.

It will also introduce you to the other devices which help in storing the captured information and in generating the necessary documents to complete the enrolment process and transfer the information to the CIDR.

Most importantly this module will focus upon the need for excellent quality of biometric information and how to get the best of the devices used.

Objectives

At the end of this module, you will learn about:

- Biometric data
- Different types of Biometric devices
- Process of capturing image of face
- Steps involved in capturing fingerprint data
- Handling the iris image capturing device
- Non-biometric Devices in the enrolment process

Hardware Devices

The hardware devices used for the enrolment of resident can be classified into two categories:

1. Biometric Devices
2. Non-Biometric Devices

Biometric Devices are used to capture biometric details such as fingerprints, iris patterns and facial photograph for each Enrollee. These devices are as follows.

1. Fingerprint Scanner
2. Iris Capturing Device
3. Digital Camera

Non-Biometric Devices are used to enter, read, store, print, scan and photocopy the data. The devices such as UPS and electric generator are used to deal with power related issue. These devices are as follows.

1. Computer
2. Printer
3. Storage Devices (CD/DVD/Pen Drive/Portable hard disk)

4. Scanner
5. Photocopier
6. UPS
7. Universal Serial Bus (USB) Hub
8. Electrical Generator

You will learn about these Non-Biometric Devices later in this module.

Devices Used to Capture Biometric Data

Biometrics are used to establish the identity of an individual based on the physical, chemical or behavioral attributes of the person.

Table 1: Biometric Devices and their uses

Biometric Device	Uses
Digital Camera	Facial image capture
Iris Capturing Device	Image of the Iris
Fingerprint Scanner	Fingerprint capture

Facial Image

Photographs of face are commonly used in various types of identification cards and it is widely accepted as a biometric identifier. Face recognition systems are the least intrusive type of biometric sampling system, requiring no contact or even awareness of the subject. The facial biometric can be extracted from photographs, videotapes or other image sources.

Figure 1: Digital Photograph

A face needs to be well lit, using controlled light sources, for automated face authentication systems to work well. Facial information is not adequate for ensuring de-duplication. Even a smile can alter the features sufficiently and affect the system. Hence, neutral facial expression is required for correct verification. It is used for verification purposes but does not comply with the accuracy level required for authentication.

Figure1 shows the digital photograph captured using a digital camera for face authentication.

Digital Camera

A Digital camera is used to capture facial photographin a digital format. It is connected to a laptop/desktop computer through the USB (Universal Serial Bus) port. The digital camera consists of an auto-focus lens and the mounting base. The lens is able to focus the person's face automatically. The mounting base helps to fix the camera on the laptop/desktop. It displays images immediately after capturing them.

A Digital Camera has the following specifications:

- **Resolution** – A photograph is made up of a large number of 'dots' or 'pixels'. Resolution depends upon the number of 'pixels'. Higher number of pixel means greater detail view and therefore better quality of photographs.
- **Aperture** – It is the size of the opening which permits light to enter the camera and fall on the image sensor. The aperture size can be adjusted manually or automatically depending upon the

type of camera. The adjustment will depend upon the amount of light falling on the person or the object being photographed.

- **Shutter Speed** – It determines the time duration for which the aperture is open.
- **Focal Length** – It is the distance between the lens and the surface of the image sensor. The focal length determines the magnification or 'zoom' of the image.

Figure 2: Digital Camera

Steps to Capture Facial Image

Enrolment Operator should capture the facial image of an Enrollee or a Resident by using a digital camera.

Figure 3: Position of the Enrollment Operator and Enrollee

Exercise 1: Answer the following.

1. In Figure 3, the person on the left is the _____, while the person on the right (seated) is the ____
2. Can you identify the Camera?
3. What is the need for the light bulb suspended above the Enrolment Station?
4. The laptop has a screen, so why have another monitor?
5. What is that white screen behind the person who is standing used for?

The steps to capture Face Biometric Data are as follows:

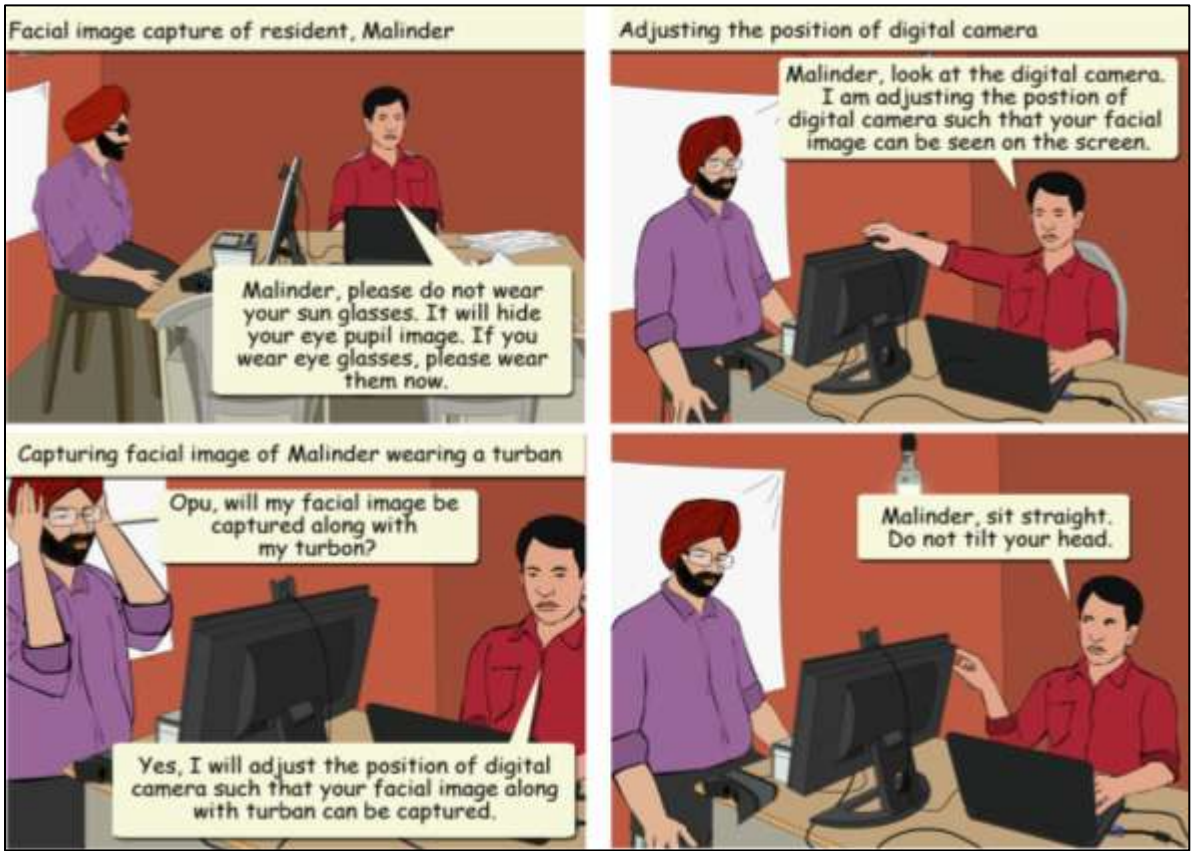
1. **Checking the Enrollee's Position:** The photograph should be taken with the resident directly facing the camera. No head rotation or tilt is acceptable.
2. **Adjusting the Camera:** It is advised that the Operator should adjust the camera instead of changing Enrollee's position for the right distance and posture.

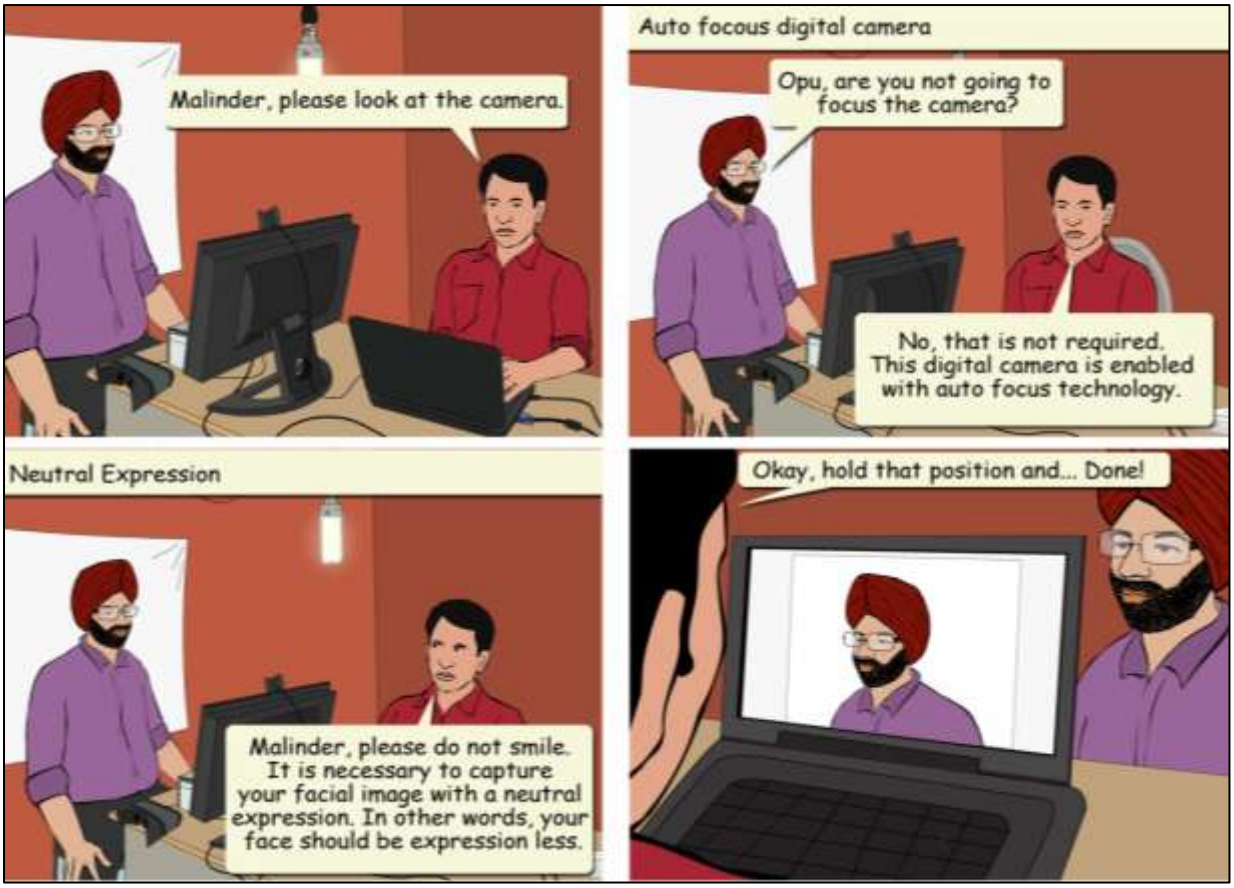
3. **Checking the Enrollee's Expression:** The Operator must ensure that theEnrollee has a neutral expression. For example, theEnrollee should not be smiling while being photographed. During the capture the resident's mouth should be closed and both the eyes must be open.
4. **Checking the shadow/reflection:** There should be sufficient light to get a proper image of the face. The Operator must ensure that there is no shadow on the Enrollee's face and no reflection in his/her eyes. Additional light source should be placed in front of the Enrollee so that there are no shadows under the eye.
5. **Checking the visibility of iris and pupil through Eye Glasses:** If the Enrollee is wearing glasses, the photograph must be taken with the glasses on. But the Operator has to ensure that the iris and the pupil are clearly visible and that Enrollee is not wearing dark/coloured sun glasses.
6. **Manually Capturing the photograph:** The Operator has to click a button in the Aadhaar Enrolment Client application software to capture the facial image. There is no auto capturing mechanism in case of photograph.

Exercise 2: Facial Image

- List the steps to capture the facial image of an Enrollee.
- Choose the correct statement.
    a) Operator should adjust the position of digital camera instead of adjusting position of Enrollee.
    b) Operator should adjust the position of Enrollee instead of adjusting position of digital camera.

Scenario 1: Capturing a facial image of a person wearing a turban





Guidelines for Capturing Facial Image

1. The digital camera used for capturing the image is enabled with auto focus technology. So it does not require any focusing adjustment by the Operator.
2. TheOperator must ensure that the output image is not blurred because of jerks or movements of the camera.The image should neither be too dark nor too bright.
3. If there is insufficient light due to low voltage, then Operator can ask the Enrolment Agency Supervisor to use generator backup.

   If the lighting condition is not sufficient in a particular room, then Operator can ask the Enrolment Agency Supervisor to shift the Enrolment Station to a different room having proper light.

   In either of the above conditions, Operator should not use flash light to capture a photograph.
4. It is preferable to place the backdrop (a white background behind the resident) against an opaque wall/partition.
5. The Operator can capture facial image of a resident wearing a turban or scarf or any other garment. He/she must ensure that the entire face of the resident is visible. The Operator has to adjust the position of the camera to get the full coverage of residents face.
6. Use of accessories that cover any region of the face is not permitted. However, accessories like eye patches due to medical conditions are allowed.
7. While enrolling a lady resident, the lady volunteer should help the resident wherever necessary
8. In case the Enrollee is a child, it may be allowed to sit on its parent's lap. But the Operator must ensure that parent's face is not captured along with the child's face. The background may get

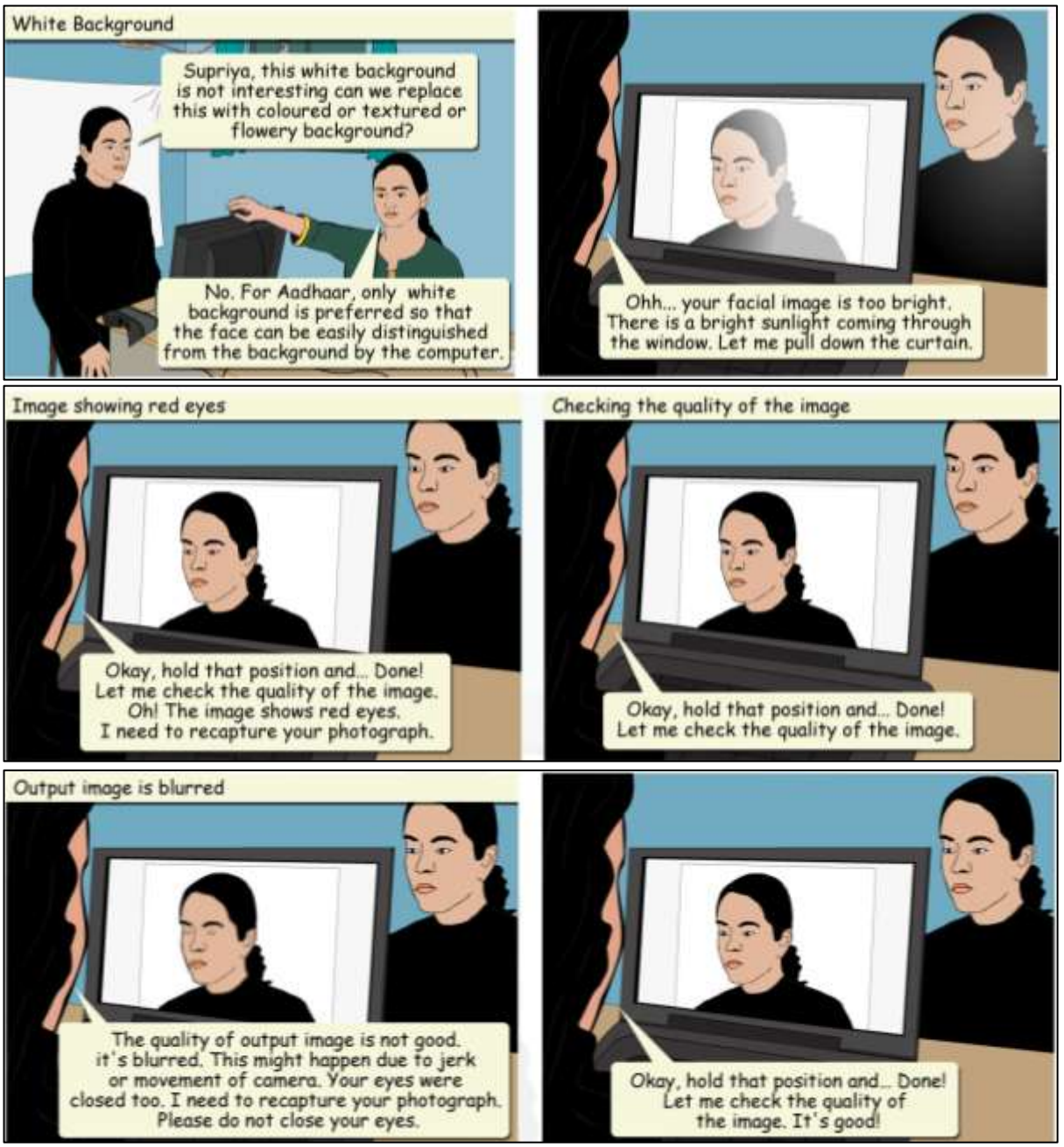
rejected due to non-white screen in this case but two faces should not get captured in one picture.

9. The Operator must ensure that the Enrollee has a neutral expression i.e., unsmiling, mouth closed and eyes open.
10. TheOperator must ensure that there is proper and equally distributed lighting and that there are no shadows on resident's face and eyes.
11. The eye glasses of resident should be clear and transparent so that both the iris and the pupil are clearly visible. If Enrollee is wearing tinted glasses then the direct and background lighting sources should be tuned accordingly.

Exercise 3: Remember...

Neha has come to Enrolment Centre to enroll herself. Kiran is a new operator at the Enrolment Centre what are the things he should keep in his mind while capturing the facial image.

Scenario 2: Burkha Clad Lady - Facial Image Capture



Exercise 4: Issues related to Photography

What are the various issues tackled by Supriya while photographing Fatima? Tick on the list given below:

- Issues related to focusing
- Issues related to light
- Issues related to resident's facial expression
- Background image problems
- Resident position problems
- Cultural issues

Scenario 3: 5 Year Old

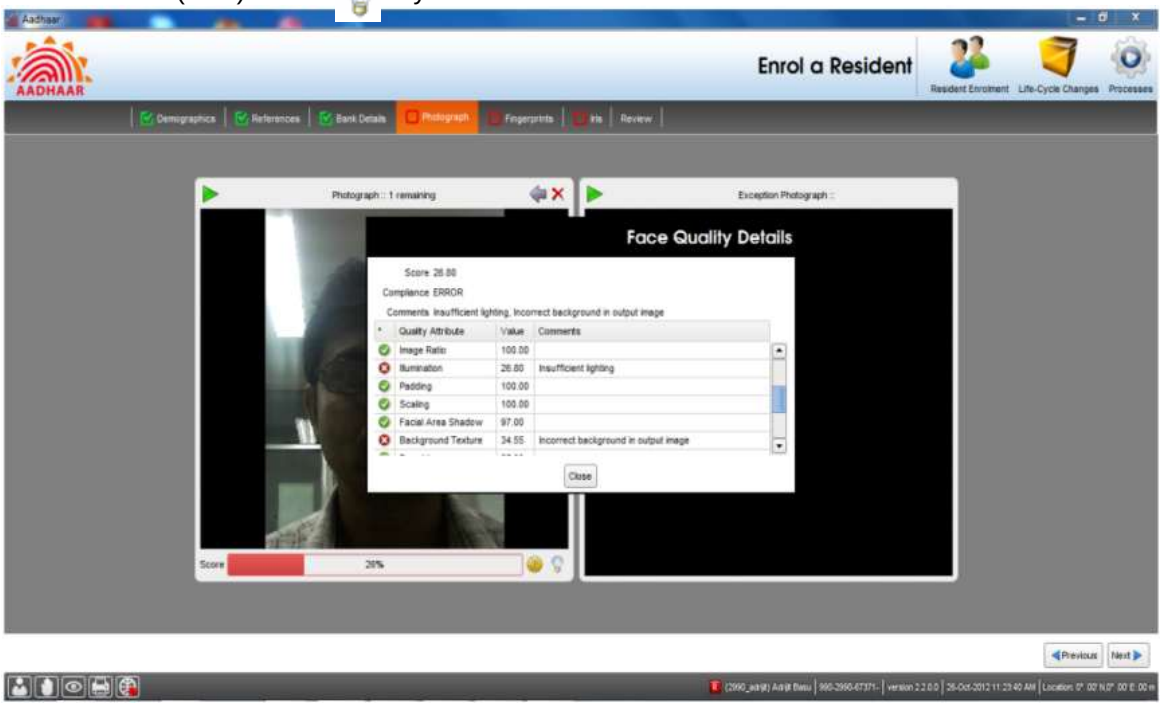
Exercise 5: Issues related to photographing a child

What are the various issues tackled by the operator while photographing Chintu? Tick on the list given below:

- Issues related to focusing
- Issues related to light
- Issues related to resident's facial expression
- Background image problems
- Resident position problems
- Cultural issues

Data Quality

Sometimes the captured image may not meet the quality expected. You must look at the different types of actionable feedback provided by the AEC. If there are one or more errors while capturing resident's photograph, **Face Quality Details** pop up window is displayed by default. Click on the **Actionable feedback** icon ( ) to view ality Details.



Face Quality Details

The **Face Quality Details** pop up window displays the Score, Compliance, and the Comments for each of attribute.

Some of the actionable feedback comments are:

- No face Found
- Enrollee too far (eye distance in input image is less than 90)
- Enrollee too close (eye distance in input image is greater than one third of image width)
- Pose (Look Straight)
- Insufficient lighting
- Very low face confidence (faceless, object not identified as human face)
- Pose (yaw angle in output image is greater than 11.5 deg)
- Non-uniform lighting (of face in output image)
- Incorrect background (in output image)
- Insufficient lighting (bad gray values in face area of output image)

Fingerprints

The lines that you see along each of your fingers, caused by raised areas of the skin, can leave their impressions on certain types of surfaces. Such an impression is called afingerprint.

Fingerprint is used as one of the most traditional methods for identifying an individual. Fingerprints can be easily scanned through digital fingerprint capturing device, also known as Fingerprint Scanner, with a low-cost and an effective method. The images of fingerprints are scanned through a transparent glass plate, called the Platen, on which the fingers are placed.The resulting image is stored in the computer.

Figure 4: Fingerprint Samples

Note

The appearance of a person's fingerprint and therefore the digitization process depends upon,

- Age - Fingerprints of a person may change as a person grows old.
- Presence of foreign matter on the fingers – like oil, dust, mud
- Cuts and wounds on the fingers
- Prominence of the patterns depending upon the occupation and the lifestyle of the person

Fingerprint Scanner

At the enrolment station the fingerprints are captured through digital slap Fingerprint Scanner which is connected to a laptop/desktop computer through the USB port. It comprises of a flat glass plate known as platen which helps to capture the fingerprints when fingers are placed on itwhile the indicators guide the user to keep the fingers in proper place.In case of Slap Fingerprint Scanner, all the four fingers of the hand are captured, at a time.The fingerprints of both the thumbs are then captured, simultaneously.

Figure 5: Slap Scanner for Fingerprint

Steps to Capture Image of Fingerprint

The Enrolment Operator should obtain the fingerprints of all five fingers of each hand i.e., ten fingers of two hands. There are certain procedures which need to be followed if the person has more or less than ten fingers.

The following steps illustrate how to capture the fingerprint image of the Enrollee (Resident):

1. **Left Hand Fingerprint:**Firstly, the fingerprints of the four fingers of the left hand except the thumb are captured simultaneously. The fingers to be scanned are illustrated in the Figure8.

   The Operator would ask the Enrollee to place the four fingers of the left hand on the platen and to apply some pressure with the right hand to have good contact with the surface.

Figure 6: Finger position on the platen

Figure 7: Figure showing the fingers to be scanned

2. **Right Hand Fingerprint:**Secondly, the fingerprints of the four fingers of the right hand except the thumb are captured simultaneously. The fingers to be scanned are illustrated in the following Figure 10.

   Then the Operator would ask the Enrollee to place the four fingers of the right hand on the platen and to apply some pressure with the left hand to have good contact with the surface.

Figure 8: Finger position on the platen

Figure 9: Figure showing the fingers to be scanned

3. **Two Thumb Prints:** Thumbprints of both the hands are captured simultaneously. The thumbs are scanned as illustrated in the following Figure12.

   The Operator asks the Enrollee to place the thumbs of both the hands on the platen and to apply some amount of pressure to have good contact with the surface.

Figure 10: Thumb position on platen

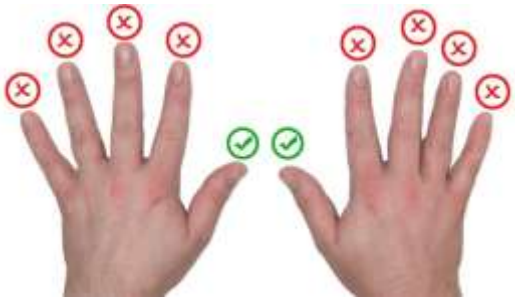


Figure 11: Scanning of Thumbs

The Operator must ensure that the Enrollee uses the maximum area of the surface to get a proper scanned fingerprint image.

4. **Auto capture:** The application software automatically captures the fingerprint when the fingers are placed on the platen. It does not require any click of the mouse or pressing of any button.

   When the scanner indicates successful grab of the image, the application software captures the image of the fingerprint. Unless the scanner shows successful indication for each finger the image is not captured by the software. If the fingerprint does not get captured automatically then the Operator has to capture fingerprint manually. The software allows forced or manual capture by clicking Force Capture button. This is possible after at least one failed attempt during automatic capture.

5. **Visual Checking:** Finally, the Operator should check the images of the fingerprints visually in the application software for quality and typical problems.

In case there are some problems,repeat the steps given above.

Exercise 6: Fingerprinting

How will you know that the quality of the captured fingerprints is good?

[Hint: Have you used the Aadhaar Enrolment Client?]

Scenario 4: Capturing the Fingerprints of a Senior Citizen

Exercise 7: Do you know the fingerprint capture sequence?

Arrange the fingerprint capture in sequence.

a. Capturing fingerprint of two thumbs.
b. Capturing fingerprint of left hand fingers.
c. Capturing fingerprint of right hand fingers.

Guidelines for Fingerprint Scanning

1. If the image of fingerprints for an Enrollee is not proper in spite of repeated attempts, the Operator should ask the Enrollee to wash his/her hands. The Operator can provide a wet sponge or towel available at the Centre.
2. The Operator must demonstrate the way to place the fingers on the platen but he should not touch the Enrollee while demonstrating the process. The following Figure 13demonstrates the procedure.

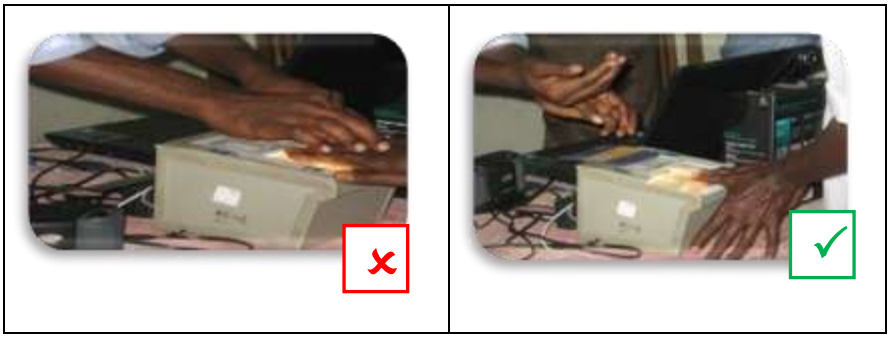


Figure12: Helping the resident during Fingerprint scanning

The proper way of placing the fingers on the platen are illustrated in Figure14.

Figure 10: Correct way of placing fingers on the fingerprint scanner platen

3. The Operator must ensure that the fingers do not touch the edge of the platen (glass surface of the fingerprint scanning device). There should be space between the fingers to capture the fingerprint image properly. No portion of the fingers should touch the edge of the platen as shown in Figure 15.

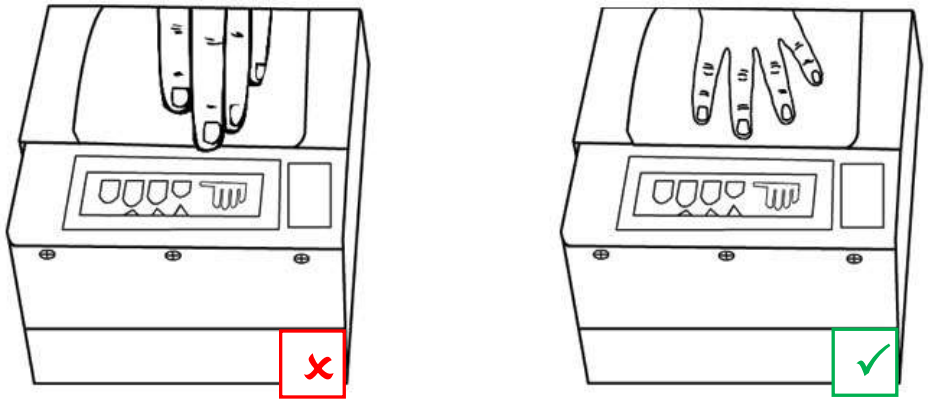


Figure14: Correct position of fingers on the platen

4. The Operator should request the Resident to apply some pressure on the platen to increase the area of contact and thereby obtain the requisite image quality.

   For applying pressure, first the Operator has to rely on the efforts of the Resident. If he is not successful, the Operator may take the permission of the Resident and then assist him. If the Operator is enrolling a lady then he has to take the assistance of a lady volunteer present in the Enrolment Centre.

5. If the Enrollee/resident is unable to flatten his/her fingers on the platen, the enroller/Operatorcan assist the resident after taking his/her permission.

   If this is not successful, the Operator may try to obtain fingerprints to the extent that the Enrollee is able to flatten and place his/her fingers on the platen.

   The Enrollee can then be made to move to the next set of fingerprints of the other hand or the two thumbs.

6. In case the enrolee has *Mehendi* on her hands, the Operator should follow the normal procedure to capture the fingerprint image. In case of worn out ridges in Enrollee's hand, the Operator may ask to rub his/her hands to get the proper image of fingerprint.

7. The Operator must ensure that the fingers are placed flat and till the top joint of the finger is placed well on the scanner. There should be no direct light shining on the platen. Use the indicators on the fingerprint device for positioning of fingers. The fingers should be placed in right direction on the device.

8. The Operator should use lint free cloth to clean the platen periodically. The procedure for cleaning the device is illustrated in Figure 16.

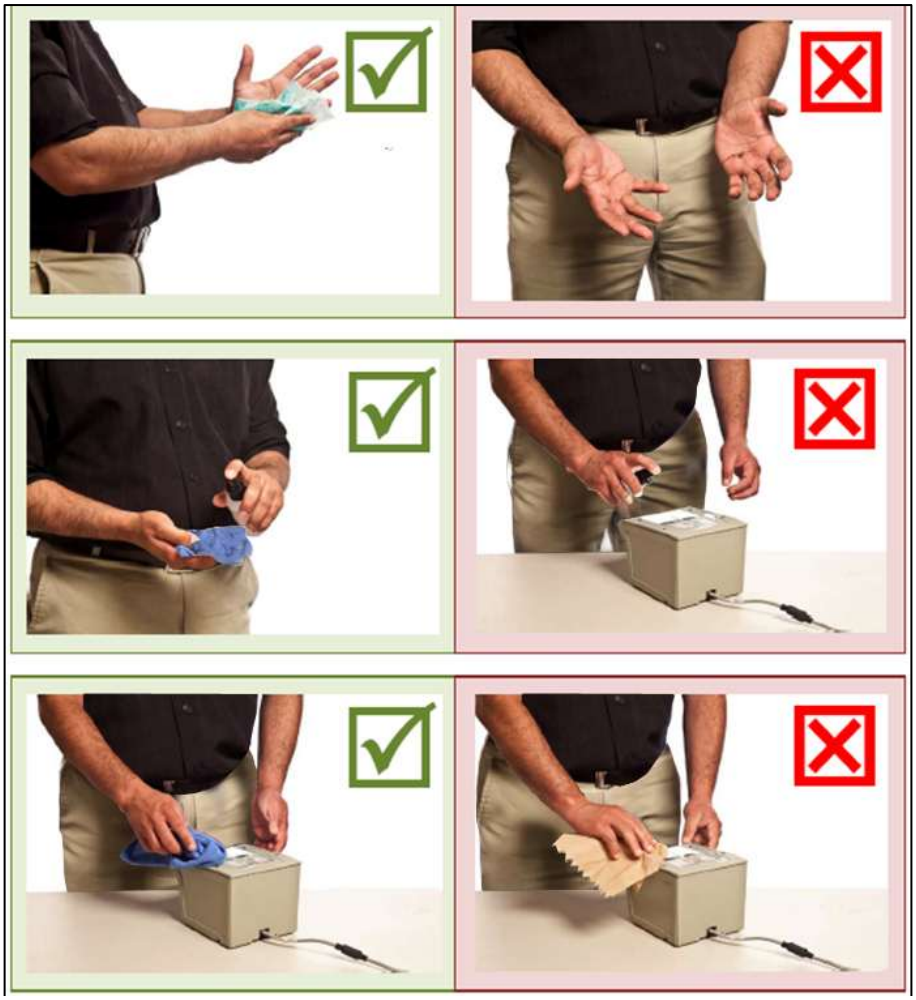


Figure 11: Cleaning the fingerprint scanner

9. The Operator should periodically check the devices for scratches on the platen. During the time of enrolment the Operator should also check for out of focus or partial images of fingerprints getting captured.
10. Fingerprints are best captured in standing position.
11. In case the resident has additional finger(s), the Operator should ignore them and capture the main five fingers of each hand during the time of fingerprint image capture.

Exercise 8: Knowledge check...

List at least 5 points to be remembered while capturing the fingerprint of an Enrollee.

Scenario 5: Capturing the fingerprint of a boy

Exercise 9: Fingerprint Issues

What are the challenges faced by the operator while fingerprinting Boman? Select from the list given below:

- Child is unable to follow the operator's instructions
- Child's fingers are unclean
- Child's hands are excessively wet
- Child is unable to apply the required amount of pressure or force
- Child's fingerprints are not well formed
- Child's fingers are covered with *Mehendi*

Data Quality

If the quality of data captured meets the quality threshold specified in the system, it will accept and save the data.

Note that, you have to get an acceptable quality to make progress from here. On clicking the **Actionable feedback** icon ( ), **Quality Details** pop up window is displayed on which the slap compliance reports are displayed.

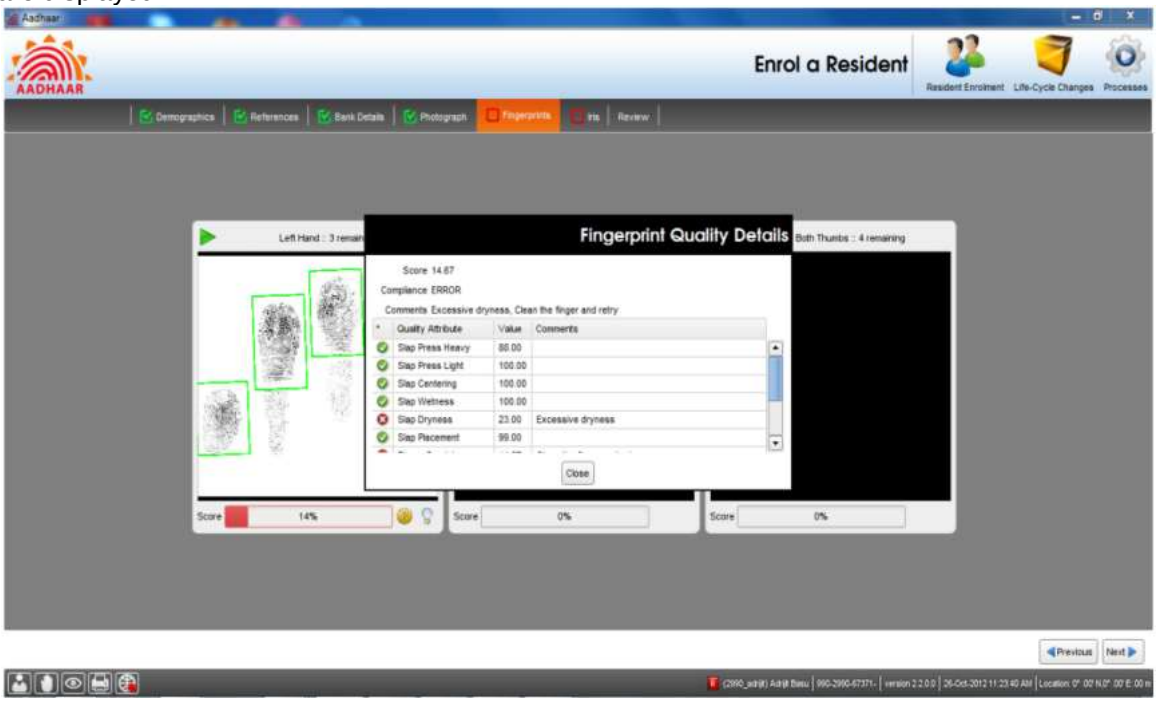


Figure 16: Fingerprint Quality Details

Some actionable feedback provided by the software are:

- Number of fingers present does not match with expected number of fingers
- Finger not positioned correctly
- Too much Pressure
- Too little pressure
- Central region missing
- Excessive moisture (wetness)
- Excessive dryness

The Iris

The iris is a coloured and most visible part of human eye which surrounds the pupil. The iris controls the amount of light that enters into the eye. It is the ring-shaped region of the eye, bounded by the pupil and sclera on either side.

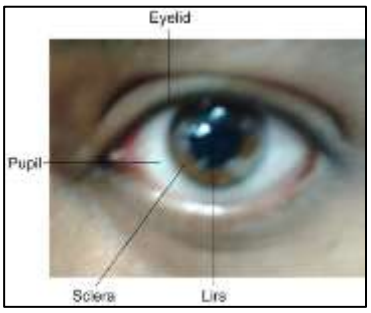


Figure 12: The Iris

The iris has a distinct structure that forms a pattern which can be photographed. The patterns form randomly and are highly complex. The salient features of iris recognition and pattern matching are as follows:

- The patterns do not change with time except may be due to injuries.
- No two individuals' iris patterns are similar; not even those of an individual's left and right eye.
- Spectacles and contact lenses rarely affect the quality of image capture.
- This method covers a large number of people as compared with other biometric technologies.
- The comparison of patterns with existing patterns is the fastest.

Figure 18: Iris Patterns

The iris is an inner part of our eye. Therefore the iris faces very little chance of damage. So it can be used as an 'always available' proof for verification for most individuals over their lifetime.

The capture of the iris image is the same as taking a regular photograph, except that it operates using the infrared light, nearly invisible to our eye. The iris capturing device captures the image of the iris and it generates an image which can be stored in a computer.

The iris is widely believed to be the most accurate biometric. Also the iris pattern of each eye is not correlated; so it gives two independent biometric feature sets.

The iris sample acquisition is done without physical contact and without much inconvenience to the person whose iris image is being acquired. Also, the capture time is very small.

Iris Capturing Device

Iris Capturing Device is a biometric device. Two types of Iris Capturing Device are available, viz.,Single Iris Capturing Device and Double Iris Capturing Device. Single Iris Capturing Device can capture any one eye at a time while Double Iris Capturing Device can capture both the eyes at a time. Based on make and model, these devices can be hand-held or tripod-held.

At the enrolment station the iris capturing device is connected with laptop/desktop computer through USB (Universal Serial Bus) port. No separate power supply is required to run this device. The iris capturing device gets power from the laptop/desktop computer through USB port.

Figure 19: Double Iris Capture Devices

Figure 20: Single Eye Iris Scanner

Based on the functionality, there are different types of Iris Scanner. They are as follows:

- Double Iris Scanner scans the images of two eyes at a time. The scanner is held by the Operator and he gradually moves the scanner towards the Enrollee's eyes. The iris is auto scanned when the scanner is sufficiently close to the eyes.
- There is another type of double iris scanner which is held close to the eyes. The scanner scans the iris one after another. But there is no need to move the scanner.
- Single Iris Scanner looks like a digital camera. This type of scanner scans one eye at a time. The scanner should be held by the Enrolment Operator and captures the image of one eye of the Enrollee at a time.

Iris Capturing Device scans the intricate patterns (as discussed in previous section) in the iris and produces a digital image. Most of the modern Iris Capturing Devices use infrared light, which is not visible to the human eye, to illuminate the iris without causing any harm to the eyes.

Based on make and model, these devices can be,

- Hand-held
- Tripod-mounted

Iris Capturing Device is a lightweight device. When the device is placed properly, it is able to automatically focus the iris. It can also adjust to various lighting conditions automatically.

It has a USB connector cable which connects the device to a computer. The device gets power supply from the computer through the same USB connector.

Iris Capturing Device is fast and accurate. It can capture picture automatically without any user intervention. But, its accuracy can be affected by the objects obscuring the eye. Also it may not be appropriate for persons having cataract.

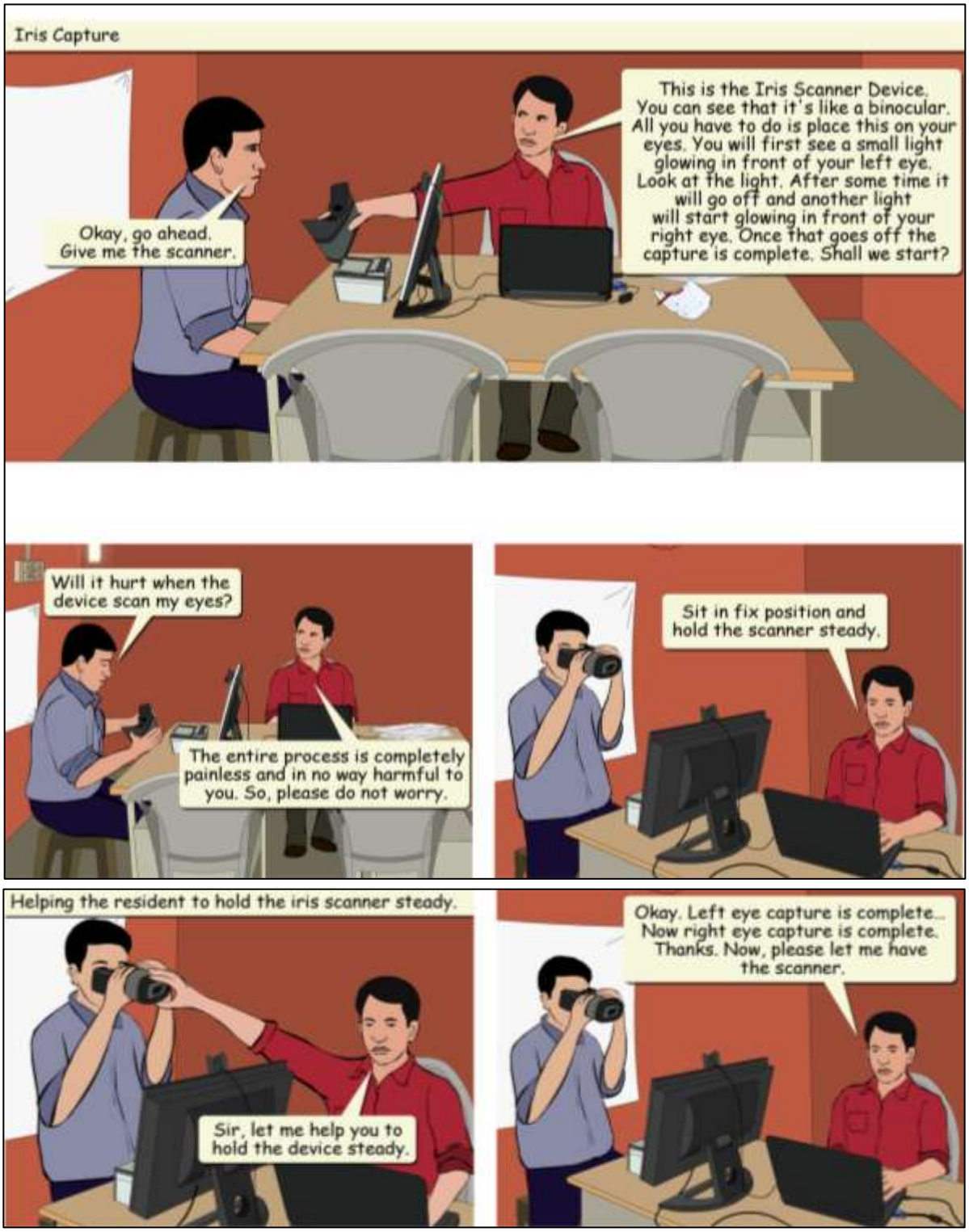
Figure 21: Iris image capture and resulting image

Steps to Capture Image of Iris

To capture iris biometric using Iris Capturing Device perform the following steps:

1. **Checking the existence of Enrollee's eyes:**If capturing the iris image is not possible due to non-existence of one or both the eyes or bandage across one or both the eyes/any other deformity or disease, the same has to be recorded in the Aadhaar Enrolment Client application software.
2. **Checking the Enrollee'sposition:**Request the Enrollee to sit in a fixed position. The posture should be like taking a portrait photograph.
3. **Aiming the Iris Capturing Device:** Aim the Iris Capturing Device towards the eye of the Enrollee. The device should be held steady. In case, if the device is required to be held by the resident, the Enrolment Operator may help the Enrollee to hold the device steady.
4. **Checking the light in the room:**The iris capture process is sensitive to lighting condition present in the room. Make sure that no direct or artificial light directly reflects off theEnrollee's eyes.Light source used for facial image capture should be switched off during the iris capture.
5. **Checking the image quality:**After capturing the iris image, the Aadhaar Enrolment Client application software is able to measure the iris image quality. An initial image quality assessment would be done to provide feedback to the Operator during the capture process. The device alerts the Operator if the captured iris image is of poor quality.If the captured iris image is of poor quality then try again to capture a good quality image.

Scenario 6: Capturing Iris Image



Guidelines for Iris Scanning

1. If Enrolleeis squint eyed and the capture of both eyes at a time is not possible, Operator may attempt recapture.
2. If Enrollee is unable to open the eyes properly for iris scan, then gently guide him/herusing mimicry / play act to open the eyes wide. If that does not work, then do the best you can to capture a good quality image by using recapture.
3. Iris Capture Device uses auto focus and auto-capture functions.So it does not require any focusing or capturing adjustment by the Operator.

Note

In few cases it is possible to capture iris patterns for a blind person. The iris recognition technology used by the Iris Capturing Device captures details based on iris pattern. As long as the iris pattern is visible in a blind eye, its details can be captured.

Exercise 10: Check your understanding.

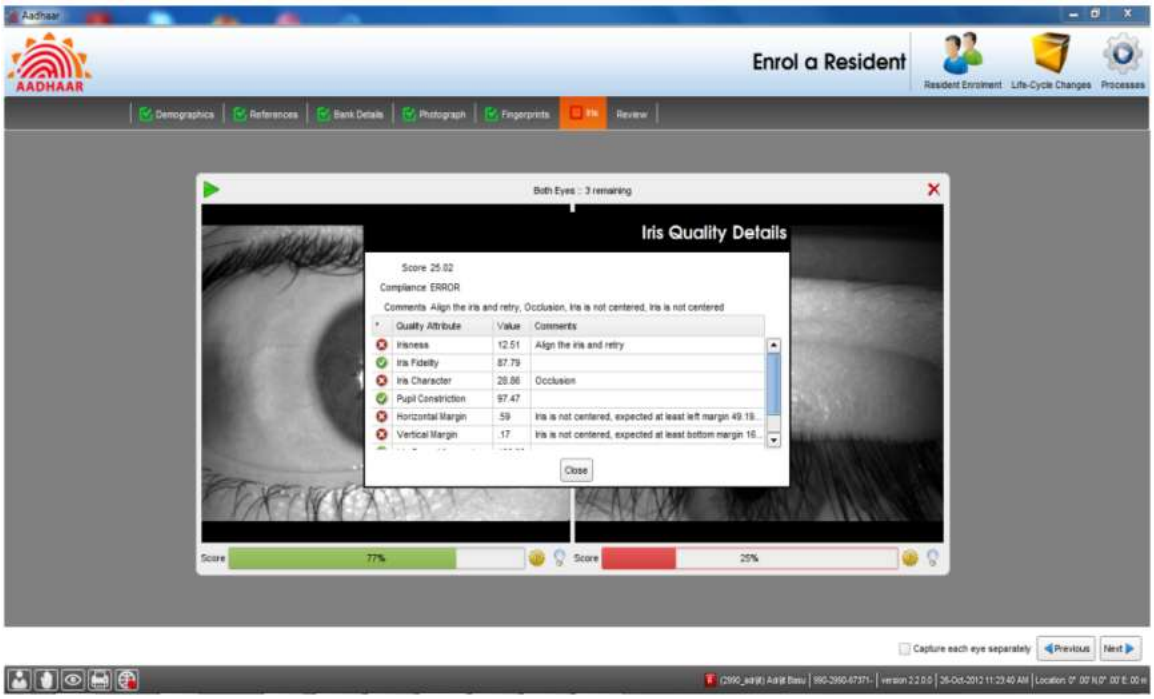
After reading through the preceding content,

- What are the different types of devices used for capturing the Iris image?
- Think of reasons that would hamper proper capture of Iris image.
- What are the best practices that you could follow to ensure excellent Iris images?
- How would you handle the following:
  - Physical deformities in the resident's eye(s)
  - Inability of the resident to handle the Iris scanner
- How would you know whether the image captured is of a good quality

Data Quality

If the quality of data captured meets the quality threshold specified in the system, it will accept and save the data.
If the Iris capture is okay, the **Score** bar will be **green**. R**ed** colour indicates that the capture has fail.

On clicking the **Actionable feedback** icon, **Quality Details** pop up window is displayed on which the Score, Quality Attribute, Compliance and Comments to each of the attributes are displayed.



Iris Quality Details

Some actionable feedbacks provided by software are:

- Occlusion (significant part of iris is not visible)
- Iris not in focus
- Gaze incorrect (resident looking away)
- Pupil dilation

Specifying Exceptions

To specify any biometric exceptions, click the **Biometric Exceptions** button on the **Demographics** screen.

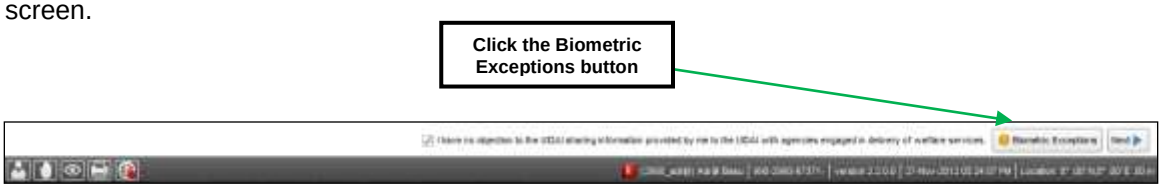
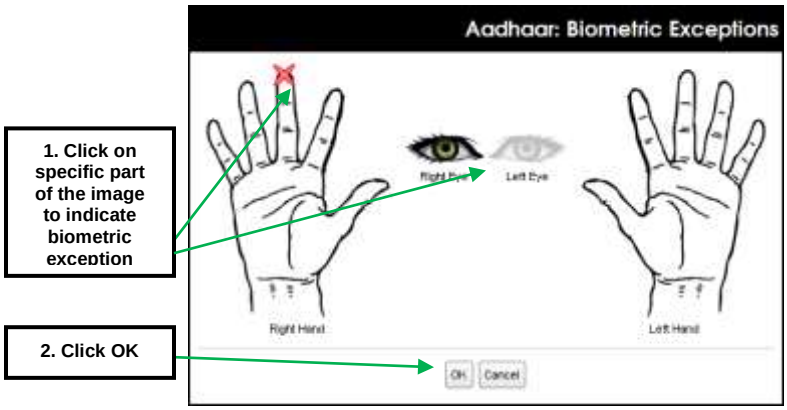


Figure 22: Biometric exception information capture

The following pop-up window will open.



Biometric Exception Capture – After Identifying the Exception

- Specify the resident's biometric exceptions by clicking on the specific part of the image and then click OK.

Handling Exceptions

Exceptions have to be handled with utmost care. Special care has to be taken to make them comfortable throughout the entire process. Given below are the ways to handle exceptions.

Facts About Exceptions
Rural India has many people who have worn out fingerprints because of physical labour

The key is to ensure that ***capture quality is monitored carefully by the Operator***

Exceptions occur because of:

- Injury
- Amputation of fingers
- Amputation of hands
- Problems with the eyes

Capturing the Biometric Exceptions in the Enrolment Client

1. First, check the resident's fingers and eyes for fitness
2. Specify biometric exceptions by clicking on the Biometric Exception Capture button
2. Click on the specific part of the image
3. Click on any part of the image once, to indicate non-availability of data for that part
4. Capture exceptions as photographs, on the Photograph screen
5. Obtain Supervisor verification for biometric exceptions

- All exceptions are captured at one go, by clicking the Biometric Exceptions Capture button
- If the resident has an extra finger/s, the Operator needs to ignore the extra finger
- The extra finger will not be captured as a Biometric exception.
- In such a case, the operator shall assist the resident in the fingerprint capture to avoid capture of the extra finger/s.

While capturing the photograph of the exception:

- Palms should face the camera
- Face and both the hands should be in the frame

Case

Manmeet Singh is a 65 year old Sikh resident who has come to the enrolment station. He is wearing a turban. You are facing difficulty capturing his facial image because of the turban. He seems to be very irritated as he has been waiting in a queue for a long time.

How will you deal with him?

What kind of problems can occur in facial image capture?

- Poor light
- Inability to crop the image because of turban or head scarf
- Resident unable to keep the face or body still and vertical

Poor Light Conditions

- Do not use flash.
- Contact the local authorities to improve the light in the surroundings.
- Use the generator backup to improve lighting, in case of insufficient lighting due to low voltage.
- Consider moving to a location in the room with better light.
- Backdrop should be placed against an opaque wall or partition.

Inability to Crop Image Because Of Turban / Head Scarf

- If accessories are worn due to religious reasons, choose the manual capture option.
- The operator may politely request the resident to remove the headgear.
- In the case of women enrollees, a lady Operator or volunteer must handle this process

Inability to Keep Head / Torso Still and Vertical

- Assist the enrollee if needed
- In case of lady enrollees, assistance should be provided by the lady operators or volunteers.

Case
Geeta Devi is a 42 year old resident of a village in U.P. She is daily wage labourer. She has come to the enrolment station. While collecting her biometric data the Operator notices that the quality of her fingerprints are not good enough. He makes repeated attempts to capture her fingerprints but is faced with the same result! He then tries to flatten Gita Devi's fingers on the platen. She gets very angry and starts screaming at the Operator. 1.What do you think went wrong? 2.Could the situation have been handled better?

What kind of problems can occur in fingerprints capture?

- Missing / amputated fingers
- Fingerprint captured is not of the right quality
- Inability to flatten the fingers
- Worn out ridges

- Hands blackened through mehendi or some other substance

Missing/Amputated Fingers

- Capture the biometric exception in the enrolment client

- If the resident has an extra finger/s
  - The Operator needs to ignore the extra finger
  - The extra finger is not captured as a biometric exception
  - The Operator needs to assist the resident in the fingerprint capture to avoid capture of the extra finger/s.

Fingerprint Captured Is Not of the Desired Quality

- If standard images are not obtained despite repeated attempts, politely ask the enrollee to wash his hands.
- Provide a wet sponge or towel available in the centre.
- Request the enrollee to apply pressure on the platen
- First rely on the enrollee's efforts for applying pressure.
- If not successful, take permission and assist her/him in applying the pressure to capture the image.
- Ensure that women residents are assisted by women operators / volunteers.
- Make a reasonable number of attempts to capture the biometrics of the resident.
- The number of attempts that can be made is built into the software.

Inability to Flatten the Fingers

- Take the enrollee's permission. Then assist him in order to capture fingerprints.
- If this is not successful, the Operator can try to obtain fingerprints to the extent that the enrollee is able to flatten and place her / his fingers on the platen.
- The enrollee can then move to the next set of fingerprints of the other hand or the two thumbs.

Worn Out Ridges or Hands Blackened Through Mehendi Or Any Other Substance

- Attempt a manual capture
- Proceed to capture fingerprints of fingers which are not blackened or without worn out ridges.
- If an enrollee has mehendi on her hands, request her to wash her hands before the fingerprint capture.

Be Sensitive to Women Residents

- If the lady is unable to provide sufficient pressure for the fingerprints to be captured you can:
  - Take the help of the lady volunteer
  - Place the piece of foam (available at the enrolment centre) on the lady's hand and then apply pressure

Squint / Disoriented Eye

- If the capture of both eyes at a time is not possible, the single eye iris scan device may be used

- In case the single eye iris device is not available, the operator can make use of the dual eye device to capture one of the irises correctly

Inability to Open the Eyes Properly

- Guide the enrollee to open the eyes wide.
- Help the enrollee to open the eyes with the help of your own hands.
- Take the help of a lady volunteer in case of women enrollees.

Generic Exceptions

- The enrollee may not be able to keep herself / himself in the correct posture photograph due to old age or sickness.
- In such cases the operator should arrange to capture biometric data by moving the equipment close to the enrollee.

Handling Exceptions is About

GAINING THE RESIDENTS TRUST!

Gaining the Resident's Trust

- Be polite to residents
- Be sensitive to physical disabilities
- Provide assistance wherever needed
- Assure the resident that exceptions will not cause any problem in data capture
- Explain any related information that the resident would like to know

Non-Biometric Devices

Non-biometric devices are Computer, Printer, Scanner, Photocopier, Barcode Reader and Storage Device like CD, DVD, Hard disk and Pen Drive. The Aadhaar Enrolment Client software is installed on the computer for collecting the demographic and biometrics data. Biometric Devices such as finger print scanner, iris capturing device and digital camera are connected to the computer through the USB port. The data captured using biometric devices is stored on computer. This data can then be transferred from the Enrolment Centre to Central Identities Data Repository (CIDR).

Computer

There are two types of computers that can be used in an Enrolment Centre. They are,

- Desktop
- Laptop

It is used for entering demographic data of the resident which is to be further used for linking the resident's biometric information. It is used to store the data temporarily until successfully transferred to CIDR.

Desktop

The desktop computer is suitable for a permanent setup, where the machine need not be moved around frequently.

It consists of separate units including,

- Cabinet consist of Power Supply Unit, Motherboard and Storage Devices
- Video Display Unit or Monitor
- Keyboard
- Mouse

Figure 2223: Desktop Computer

Laptop

A laptop functions like a desktop computer, but it is compact, light-weight and suitable for mobile use. Laptop gets power from a rechargeable battery placed inside the laptop. Hence the laptop can be used even in the absence of an external power source.

Figure23: Laptop Computer

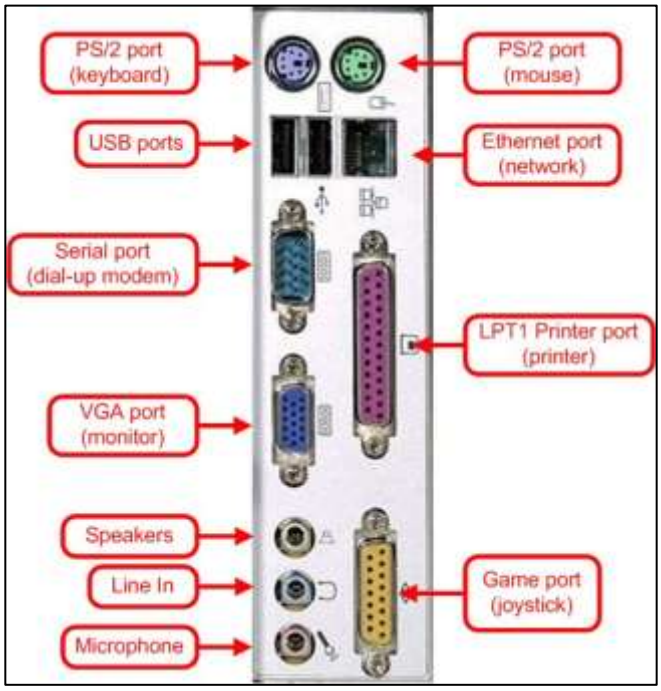


Figure24: Typical Connectors

Figure 24: Laptop Charger

Software

A computer consists of hardware and software. Typically the following software are installed on a computer.

Operating System (OS)– It manages the hardware and hides the complexity of the machine from the user. The user interacts with the computer directly or by using Application software (like the Aadhaar Enrolment Client) which in turn use the services provided by the OS.

Examples of OS – Windows XP, Windows Vista, Windows 7, UNIX, MAC OS

Antivirus – Viruses disturbs the normal operations and functions of a computer. They can slow down the operations of a computer, corrupt data, destroy information stored on the computer and cause the entire system to 'crash' (become unusable). To prevent such 'virus' from infecting the system, Anti-virus software is used.

Examples of Antivirus – McAfee, Symantec, Quick Heal

Anti-spam – Spam is unwanted messages that are received when the computer is connected to the Internet. Spam can slow down the enrolment operations in an Enrolment Centre.

Example – McAfee Anti-spam, Comodo

Application Software – Computer does not understand our language it has got its own language. Application software works as the bridge between computer and user. It is designed to perform the specific task.

Example – MS Word, MS PowePoint, Aadhar Enrolment Client Software

Printer

A Printer is a peripheral device connected to a computer and is used to generate a paper copy or hard copy (permanent readable text and graphics). Generally, printer is connected to a computer by USB cable. Printer is powered from an external power outlet.

The following Figure 26 shows the different components of a printer.

Figure 256: Printer

The printer is used to print an Acknowledgement Slip (Enrollee's copy) and Consent for Enrolment Slip (Office copy) after successful completion of the entire enrolment process.

Dos and Don'ts for Operators

DOs – One time Activity

- ✓ Must be **enrolled** for Aadhaar and obtained Aadhaar/Enrolment number
- ✓ Register with UIDAI appointed certification agency for taking test and get **Certified**
- ✓ Get **activated** by the Enrolment Agency with a unique Operator ID
- ✓ Get **on-boarded** (enrolled) by providing your biometrics in the Aadhaar client software

DOs - Beginning of Day

- ✓ Login with your own Operator ID and fingerprint
- ✓ After login, make sure that the **date and time** setting on the computer is current
- ✓ After login, check the footer area i.e. left hand bottom corner icons to ensure proper connections of Biometric devices, printers etc.
- ✓ Check the pop up message that appears every time the logs in intimating "last Sync" and "time left for export". Inform EA Supervisor accordingly
- ✓ Capture GPS coordinates at least once in 24 Hours.
- ✓ Log off the application when going away from the seat

DOs - During Enrolment

- ✓ Keep documents during enrolment in tray and do not fold them
- ✓ Check that the resident's enrolment form has been verified (carries Verifier's signature/thumbprint and stamp/initials).
- ✓ The enrolment form has the resident's signature/thumbprint
- ✓ In case of Introducer/HoF based enrolment, check the Introducer/HoF's signature/thumbprint in the form along with their details is available
- ✓ Put the resident at ease
- ✓ Make sure that the resident's screen is **on** all the time during the enrolment and ask the resident to cross check the data being entered
- ✓ Follow the **sequence** of data capture as per the screens provided on the software client
- ✓ Must immediately report to Registrar in any corrections are required in the enrolment form or the resident insists to make any changes in the data entered in the enrolment form.

DOs - During Demographic Data Capture

- ✓ Enter **all** the demographic data from the verified enrolment form
- ✓ Cross check the spelling, spaces, punctuation marks, capital & small letters etc.
- ✓ **Check and correct transliterated errors, like spelling mistake etc., if any**
- ✓ In case of Pre-enrolment data, make sure that the data pulled using pre-enrolment ID belongs to the resident getting enrolled, by confirming against enrolment form details
- ✓ Check and correct the pre-enrolment data as per verified enrolment form details.
- ✓ In case of temporary damage to fingers or eyes, record it as an exception. Ask the resident to get his/her biometric updated later
- ✓ Be sympathetic and gentle but firm while checking for biometric exceptions

DOs – During References and Bank Details Data Capture

- ✓ In case of document based verification always select the respective document names
- ✓ Always enter total number of documents submitted by the resident

DOs – During Biometric Data Capture

- ✓ Help and encourage the resident while capturing biometric information

DOs – During Photograph Capture

- ✓ Ensure availability of a **white** background
- ✓ Make sure that the camera use **auto focus** and **auto-capture** functions
- ✓ Capture enrollee's face with **neutral** (non-smiling) **expression**, teeth closed, and both eyes open and looking into the camera
- ✓ If the capture fails, check the **actionable feedback** using "Quality Details" icon
- ✓ Switch off the table light after the facial image capture is complete
- ✓ The review screen facing resident can be switched off is the resident is a child and is getting distracted by seeing her/his own face in the screen

DOs – During Fingerprint Capture

- ✓ Remember that fingerprint capture is **mandatory** for all residents aged 5 years and above
- ✓ Clean the platen of the fingerprint scanner after every capture

- ✓ Use a lint free cloth periodically to **clean the platen** of the finger print device
- ✓ If the capture fails, check the **actionable feedback** using “Quality Details” icon
- ✓ Ask the resident to stand as fingerprints are best captured in standing position
- ✓ In case of additional fingers, ignore the additional finger and capture the main five fingers
- ✓ In case of hands blackened through mehendi or any other substance, capture as normal
- ✓ In case of worn out ridges, capture as normal. The resident may be asked to rub his/her hands
- ✓ Keep a wet and a dry piece of cloth to clean the hands of a resident in necessary

DOs – During Iris Capture

- ✓ Remember that iris capture is **mandatory** for all residents aged 5 years and above
- ✓ Handle the iris capture device by yourself, generally not by the resident
- ✓ Tell children and other fearful residents that the iris scan procedure is as simple and safe as taking a normal photograph
- ✓ Ensure that **No direct or artificial light** is reflected off the enrollee’s eyes
- ✓ Hold the device **steadily**. Incase device requires to be held by resident, help the resident to hold the device steadily
- ✓ If resident is experiencing difficulty during iris scan and recapture is required, then navigate to next screen to capture other details and then return to iris capture. This will relax the resident from constant pressure to keep eyes wide open during iris capture
- ✓ Be patient during capture and wait for the device response instead of scrolling, navigating back and forth on screen
- ✓ If the capture fails, check the **actionable feedback** using “Quality Details” icon

DOs – During Review, Confirmation and Print

- ✓ Check the **colours** (red/green/orange) next to the screen-names at the top bar of the screen to verify the completeness of the data capturing process
- ✓ Ask the resident to **observe and verify** the recorded data from the monitor facing the resident
- ✓ **Read out the text** on the screen if resident is blind or unable to read or if required
- ✓ In case of any errors, correct recorded data and review again with the resident
- ✓ Get the Supervisor’s Sign Off in case enrollee has biometric exceptions
- ✓ In case of Introducer/HOF based verification, get the Introducer’s/HOF’s sign off
- ✓ Get the resident’s **signature** or **thumb impression** on the Consent-for-Enrolment Slip

- ✓ In case resident is a child below 5 years, father/mother/guardian of the child whose enrolment ID was recorded in software will sign/ provide thumbprint the consent form.
- ✓ In case of Introducer based verification, the Introducer should sign/provide thumbprint on the Consent for Enrolment endorsing the resident.
- ✓ **Sign** and seal the Acknowledgement Slip. Give the Acknowledgement Slip (Resident's copy) to the resident
- ✓ While handing over the acknowledgement to the resident, must **inform** below to the resident -
  - The Enrolment Number printed on acknowledgement is **not** the Aadhaar number and that the resident's Aadhaar number will be communicated through a letter subsequently. This message is also printed in Acknowledgement Slip
  - The resident must preserve his/her and the children's Enrolment Acknowledgement Slip for future reference.
  - There is a **96 hour** period during which the resident's data correction, so in case of any mistake they should avail this facility
  - To know the Aadhaar Generation **Status** they can call the Call Centre or log on to e-Aadhaar portal/Aadhaar Portal/website
  - Aadhaar number will be delivered by the local post office/or other designated agency in the address provided at the time of enrolment

DOs – During Document Management

- ✓ Upon completion of enrolment, immediately collate the set of documents and **staple** it at left hand corner. Ensure documents for a resident are **tagged together** along with enrolment form on top. Ensure all documents in **one set belong to one resident**
- ✓ Store documents in proper box and **avoid folding** and excessive stacking
- ✓ Protect documents from direct sun light, inflammable material, dust and water. It is recommended to **use plastic covers** to store set of documents to protect against environmental hazard
- ✓ **Avoid writing on documents**; this may create confusion in later phases
- ✓ Avoid tying up documents using rope or packing tapes directly. This will permanently damage documents. If tying up is unavoidable use PET Straps with edge protectors
- ✓ File documents in **order of enrolment**
- ✓ Handle enrolment documents with care and protect from damage and theft
- ✓ Make sure to hand over the documents to your Supervisor/ other assigned authority at the end of the day

DOs – During Document Management (when scanning process is introduced)

- ✓ Scan **Originals** of each of the documents

- ✓ Make sure that the desired portions (the data entered during Aadhaar enrolment) of the document are **visible clearly** in the scan and the document pages do not overlap
- ✓ Once all document pages are scanned, see and **check** the total no. of pages scanned and confirm that all pages are scanned
- ✓ Return all the original documents and Enrolment Form to the resident.

DON'Ts

- × Do not ask for any payment from the resident for enrolment
- × Do not allow any person to substitute for a resident
- × Do not include salutations or titles like Mr, Miss, Mrs, Major, Retd etc. while entering name in the demographic section
- × Do not use unnecessary spaces, punctuation marks and capital letters during data capture
- × Do not enter N/A, NA etc. in fields where resident has not provided any data. Leave those non-mandatory fields blank
- × Do not mark Biometric Exceptions where Biometrics can be captured. It will be treated as 'fraud' and invite strictest penalty
- × Do not allow any head rotation or tilt of the head while capturing Facial Image of the resident
- × Do not allow the resident for chewing and talking while taking Facial photograph
- × Do not accept or record any Facial Image which suffers from motion blur, over or under exposure, unnatural coloured lighting, or distortion
- × Do not accept or record any Facial Image which is captured with non-neutral (smiling) expression, teeth visible, any or both eyes closed or the resident is not looking into the camera
- × Do not use any light exactly above the enrollee since it can cause shadows
- × Do not allow dark glasses/tinted glasses on eyes while taking Facial photograph
- × Do not allow hats or head/face covering unless worn for religious reason. Ensure that the full face is clearly visible
- × Do not allow any accessories that cover any region of the face while capturing Facial Image
- × Do not allow anyone else to sign for an enrolment that has been done by you
- × Do not sign for enrolment that is done by other operator
- × Do not write on the resident's documents

- Do not tie up documents using rope or packing tapes directly, as this may permanently damage the documents
- Do not de-staple, re-staple or fold the documents that are collected from residents
- Do not keep the documents in direct sun light, near inflammable material, dust or water
- Do not allow corrections of resident's data for more than one time
- Do not instantly react and mutter something in anger
- Do not use technical terms that are not easily understood by most people
- Do not speak too fast or too slow
- Do not make any changes in the enrolment form by yourself. Even if the resident insists to make some minor changes in the form, operator must refer this to verifier. In such cases the operator must politely ask the resident to go back to verifier and make changes and take signatures of verifier henceforth in the enrolment form.