Technical Guideline TR-03122-4

Conformance Test Specification for BSI TR-03121 Biometrics for Public Sector Applications

Part 4: Additional Test Cases

Version 5.2

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1. Test Cases Hardware

This section provides test cases for Hardware (HW).

1.1. Facial Image Cameras

All listed test cases might be applied using different lighting conditions:

- changing light temperature, e.g. 2,800-6,000 K

- changing brightness, e.g. 100 - 1,000 lx

- changing frequency, e.g. 50 Hz

- changing lighting settings, such as

  - shots against the light (static light or changing light)

  - shots with light from the side

  - shots with light from above

1.1.1. General Test Cases

HW-FI-GEN-001	Performance of Image Capturing (Speed)
Aim of Test Case	Ensure that images are captured within time limit
Test Item	Average duration of captured images, extracted from captured logfiles
Description	All images that were captured during tests are examined regarding the duration of the capturing process. All durations are added and divided by the number of taken images.
Source of Requirement	PAP ACQ-FI-AUTO-1,
Scoring	automatic calculation from logfiles
Evaluation	points for average duration

Table 1.1 Test Case HW-FI-GEN-001

HW-FI-GEN-002	Quality of Image Capturing
Aim of Test Case	Ensure that captured images are of sufficient quality
Test Item	Check of quality criteria, assessed by experts
Test Group	Test subjects of maximum diversity (regarding age, gender, phenotype, etc.)
Description	All images are captured under optimal conditions: Test subject in optimal distance, optimal light conditions etc.
Source of Requirement	FM AH-FI-ICS, FM AH-FI-BCL
Scoring	by examiner on basis of checklist
Evaluation	two scores per picture (visibility of person / technical accuracy)

Table 1.2 Test Case HW-FI-GEN-002

HW-FI-GEN-003a	Image-Quality under different Brightness levels
Aim of Test Case	Ensure that captured images are of sufficient quality under different levels of brightness
Test Item	Check of quality criteria, assessed by experts
Test Group	Evaluator
Description	Image is captured with different levels of brightness, e.g. 100 lx and 3,500 lx
Source of Requirement	FM AH-FI-ICS, FM AH-FI-BCL
Scoring	by examiner on basis of checklist
Evaluation	two scores per picture (visibility of person / technical accuracy)

Table 1.3 Test Case HW-FI-GEN-003a

HW-FI-GEN-003b	Image-Quality under different Colour Temperature levels
Aim of Test Case	Ensure that captured images are of sufficient quality under different levels of colour temperature
Test Item	Check of quality criteria, assessed by experts
Test Group	Evaluator
Description	Image is captured with different levels of colour temperature, e.g. 2,800 K and 10,000 K
Source of Requirement	FM AH-FI-ICS, FM QA-FI-BCL
Scoring	by examiner on basis of checklist
Evaluation	two scores per picture (visibility of person / technical accuracy)

Table 1.4 Test Case HW-FI-GEN-003b

HW-FI-GEN-003c	Image-Quality with different Light Frequencies
Aim of Test Case	Ensure that captured images are of sufficient quality under different levels of light frequencies
Test Item	Check of quality criteria, assessed by experts
Test Group	Evaluator
Description	Image is captured with different levels of light frequencies, e.g. 1 Hz and 50 Hz
Source of Requirement	FM AH-FI-ICS, FM AH-FI-BCL
Scoring	by examiner on basis of checklist
Evaluation	two scores per picture (visibility of person / technical accuracy)

Table 1.5 Test Case HW-FI-GEN-003c

HW-FI-GEN-003d	Image-Quality with different Backgrounds
Aim of Test Case	Ensure that captured images are of sufficient quality with different backgrounds
Test Item	Check of quality criteria, assessed by experts
Test Group	Evaluator
Description	Image is captured with different backgrounds, e.g. black background not illuminated (0 lx) and white background illuminated with 3,500 lx
Source of Requirement	FM AH-FI-ICS, FM AH-FI-BCL
Scoring	by examiner on basis of checklist
Evaluation	two scores per picture (visibility of person / technical accuracy)

Table 1.6 Test Case HW-FI-GEN-003d

HW-FI-GEN-003e	Image-Quality with different Angles of Lighting
Aim of Test Case	Ensure that captured images are of sufficient quality with different angles of lighting
Test Item	Check of quality criteria, assessed by experts
Test Group	Evaluator
Description	Image is captured with different angles of lighting, e.g. lighting from the front (0°), from an angle of 45° or from behind (180°)
Source of Requirement	FM AH-FI-ICS, FM AH-FI-BCL
Scoring	by examiner on basis of checklist
Rubric	two scores per picture (visibility of person / technical accuracy)

Table 1.7 Test Case HW-FI-GEN-003e

2. Test Cases Software

This section provides test cases for Software (SW).

2.1. Fingerprint Scanners

2.1.1. Multi Finger Scanners

SW-FP-MF-001	Performance of Slap Classifier
Aim of Test Case	Ensure that scanners can distinguish between right hand and left hand slaps
Test Item	Captured images of slaps (right hand and left hand)
Description	Right hand and left hand slaps are captured (same amount). Rate of correctly classified slaps is counted and divided by the total amout of correctly captured slaps.
Source of Requirement	FM AS-FP-SLP
Scoring	Rate of correctly captured and classified slaps divided by total amout of correctly captured slaps
Evaluation	points = rate * 100

Table 2.1 Test Case SW-FP-MF-001

3. Test Classes Presentation Attack Detection

This section provides test classes for Presentation Attack Detection (PAD).

3.1. Facial Image Cameras

3.1.1. List of Attack Classes

The following classes of attacks can be used during tests of facial image cameras:

1. 3D-Masks: three-dimensional representations of a human face, masks can vary in the following parameters:
   a. Material: soft (e.g. latex, silicone, etc.) or hard material (3D-prints, etc.)
   b. Colouring: coloured or uncoloured
   c. Size: original size of the human face, resized to be worn by an examiner or significantly smaller
   d. Thickness: different thicknesses
   e. Complexity: complete face masks or parts of face masks

2. Displays: faces presented as photos or videos on different kinds of displays of tablets, smartphones, etc., different methods of displaying might be used

3. 2D-Prints: two-dimensional representation of a human face, different kinds of printing methodologies can be used, 2D-prints can vary in the following parameters:
   a. Material: printed on various materials, such as paper (in different qualities and thicknesses), foil, plastic, fabrics, etc.
   b. Colouring: different printing technologies
   c. Size: different sizes, e.g. the size of a passport photo or a t-shirt
   d. Complexity: complete faces or parts of faces

On top of the listed attack classes, additional modifications can be used during testing:

• make up (normal or professional)
• additional properties beyond the imitation of faces, such as glasses etc.

The following test classes are described below:

• MSK: mask artefacts
• DPY: faces presented with displays
• PRT: printed faces

3.1.2. Test Classes

PAD-FI-MSK	3D-Mask Artefacts
Aim of Test Class	Ensure that 3D-masks are detected as presentation attack by the system
Test Items	Pre-constructed mask(s), that can be varied in materials, colouring, size, thickness and complexity

PAD-FI-MSK	3D-Mask Artefacts
Description	The examiner presents each mask a number of pre-defined times to the system, either by wearing the mask or by using a special construction. The presentation method will be varied in different ways depending on the properties of the mask. The examiner notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.1 Test Class PAD-FI-MSK

PAD-FI-DPY	Photo and Video Artefacts presented on Displays
Aim of Test Class	Ensure that photos and videos presented on displays are detected as presentation attacks by the system
Test Items	Pre-constructed photos or videos presented on different displays
Description	The examiner presents each photo or video a number of pre-defined times to the system, either by holding the display into the camera or by using a special construction and notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.2 Test Class PAD-FI-DPY

PAD-FI-PRT	Photo Artefacts presented on 2D-Surfaces
Aim of Test Class	Ensure that photos printed on 2D-surfaces are detected as presentation attack by the system
Test Items	Pre-constructed photos presented on different types of materials, using different colouring techniques, sizes and complexities
Description	The examiner presents each photo a number of pre-defined times to the system, either by holding the photo into the camera or by using a special construction. The presentation method will be varied in different ways depending on the properties of the photo. The examiner notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.3 Test Class PAD-FI-PRT

3.2. Fingerprint Scanners

3.2.1. List of Attack Classes

Fingerprint artefacts that will be used in during tests can vary in the following parameters:

1. Materials: different materials (e.g. latex, silicone, wood glue, gelatine, etc.)

2. Colouring: coloured or uncoloured

3. Thickness: different thicknesses

4. Additives: different additives, such as graphite, metal powder, etc.

The following test classes are described below:

- FTP: fingertip artefacts

- SFI: single finger artefacts

- MFI: multi finger artefacts

- HND: hand artefacts

3.2.2. Test Classes

PAD-FP-FTP	Fingertip Artefacts
Aim of Test Class	Ensure that artefacts from fingertips are detected as presentation attacks by the system
Test Items	Pre-constructed fingertip artefacts made from paper in different materials and in various colouring techniques (including transparent), thicknesses and with possible additives
Description	The examiner presents each fingertip artefact a number of pre-defined times to the system, either by wearing the fingertips or by using a special construction and notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.4 Test Class PAD-FP-FTP

PAD-FP-SFI	Single-Finger Artefacts
Aim of Test Class	Ensure that single finger artefacts are detected as presentation attacks by the system
Test Items	Pre-constructed finger artefacts made from different materials and in various colouring techniques (including transparent), thicknesses and with possible additives
Description	The examiner presents each finger artefact a number of pre-defined times to the system and notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.5 Test Class PAD-FP-SFI

PAD-FP-MFI	Multi-Finger Artefacts
Aim of Test Class	Ensure that multi finger artefacts are detected as presentation attacks by the system
Test Items	Pre-constructed multi-finger artefacts made from different materials and in various colouring techniques (including transparent), thicknesses and with possible additives
Description	The examiner presents each multi-finger artefact a number of pre-defined times to the system and notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.6 Test Class PAD-FP-MFI

PAD-FP-HND	Complete-Hand Artefacts
Aim of Test Class	Ensure that complete hand artefacts are detected as presentation attacks by the system
Test Items	Pre-constructed hand(s) artefacts made from different materials and in various colouring techniques (including transparent), thicknesses and with possible additives
Descirption	The examiner presents each hand artefact a number of pre-defined times to the system and notes the system's PAD score together with the information "PA detected" or "PA not detected".
Scoring	by examiner on basis of the noted PAD-scores

Table 3.7 Test Class PAD-FP-HND

List of Abbreviations

Bibliography