TrustID
Intelligent Student Identity Management
for Higher Eduation Institutions

FACING-2 project overview

vis team
isr-uc

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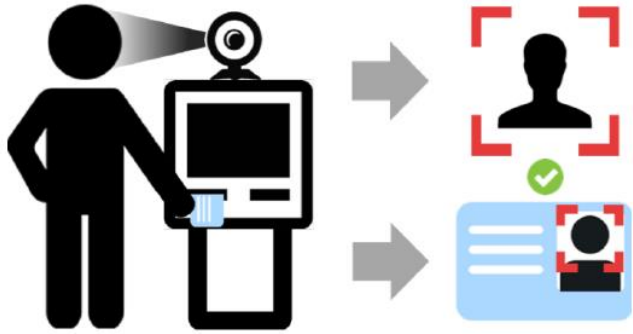
Summary

1. **FACING** challenges
    1. ICAO (International Civil Aviation Organization) compliance
    2. Face recognition
    3. Morphing attack detection
    4. Liveness detection
    5. Biometric template protection



Security processes for biometric (facial) recognition

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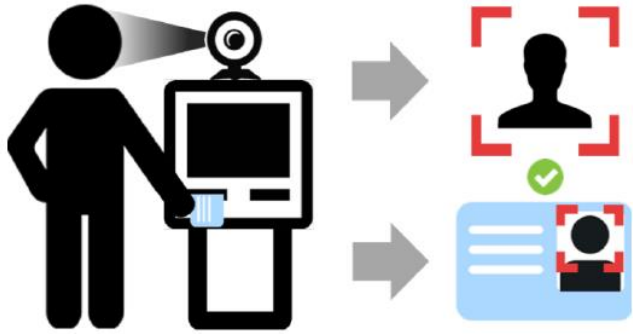


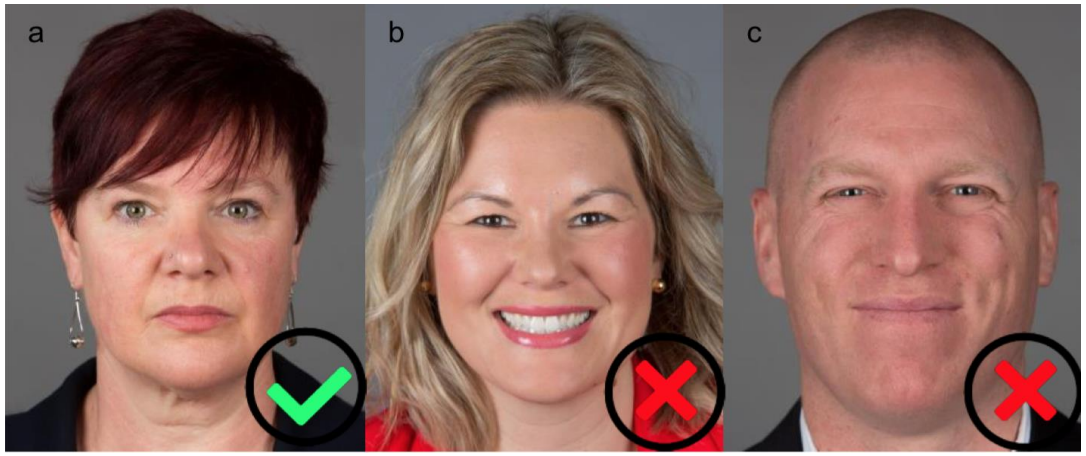
Security processes for biometric (facial) recognition

ICAO (International Civil Aviation Organization) compliance

- Photographs used in **travel documents** must comply with certain requirements that guarantee standardization and that the individual in the photo is properly identified through that image.

- One of the main institutions to define this type of requirements is the **International Civil Aviation Organization (ICAO)**. It has defined the standards for travel documents [1] [2].

- Examples: neutral facial expression, the contrast with the homogeneous background, the restriction on the use of sunglasses or glasses whose lenses or frames partially or completely hide the eyes, among many others



[1] - Doc 9303 Machine Readable Travel Documents, 2021
[2] - Portrait Quality (Reference Facial Images for MRTD). Technical Report, 2018

ICAO (International Civil Aviation Organization) compliance

Category	Subcategory	Requirement
SCENE	Scene - Background	**24 Uniform / Basic**
		25 Shadows
		26 Must allow individual segmentation
	Scene - Ilumination	27 No directions of light
		28 Evenly distributed
		29 Hot spots / Reflections / Light Artefacts
	Individual - Pose	30 Head Rotation
		31 Centered Face
	Individual - Facial Expression	32 Eyes / Smile / Mouth
	Individual - Shoulder	**33 Towards the camera, frontal**
	Individual - Eyes	**34 Completely visibile**
		35 Visible Pupils / Iris (eyes looking at the camera)
		36 Red eyes
		37 Eye patches

Subcategory	Requirement
Artefact - Glasses	38 Dark tinted lenses
	39 Transparent
	40 Frame Thickness
Head Covering	41 Generally not allowed, it might be in case of religious coverings (face must be visible)
Assistance	**42 Other people not allowed**
	43 Object/Toys not allowed

ICAO (International Civil Aviation Organization) compliance

Category	Subcategory	Requirement
DIGITAL	Geometry	1 Pixel aspect ratio
		2 Origin coordinates
	Color Profile	3 Color space
		4 "Video interlacing" not allowed
		5 Infrared cameras not allowed
	Post Processing	6 Rotation
		7 Cropping
		8 Down Sampling

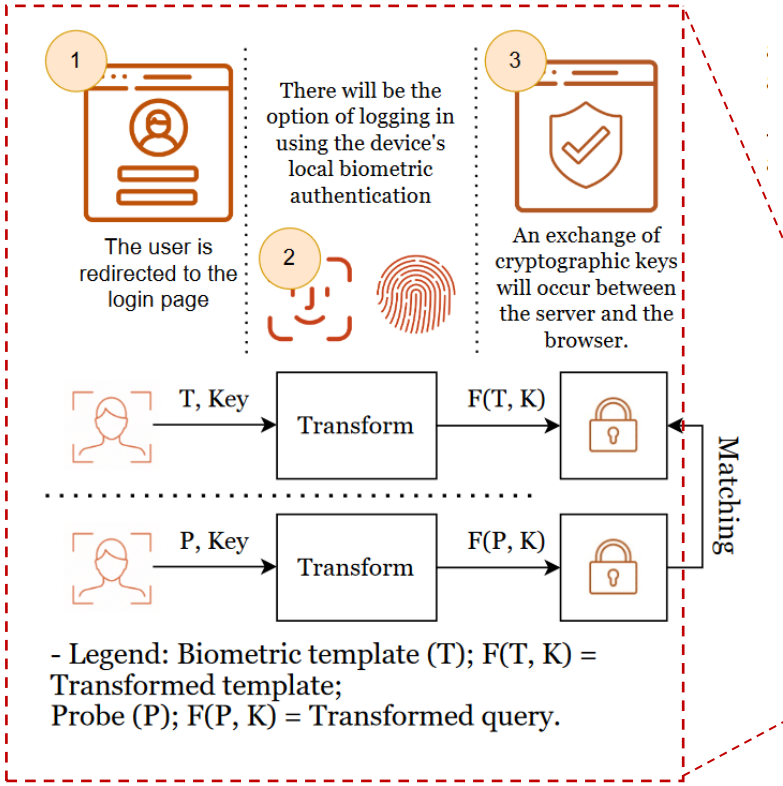
Category	Requirement
PHOTOGRAPH	9 Contrast
	10 Focus and "depth of field"
	11 Unnatural color
	12 Grey scale image correction
	13 Camera Lenses's Radial Distortion below 2.5%
	14 Color Saturation

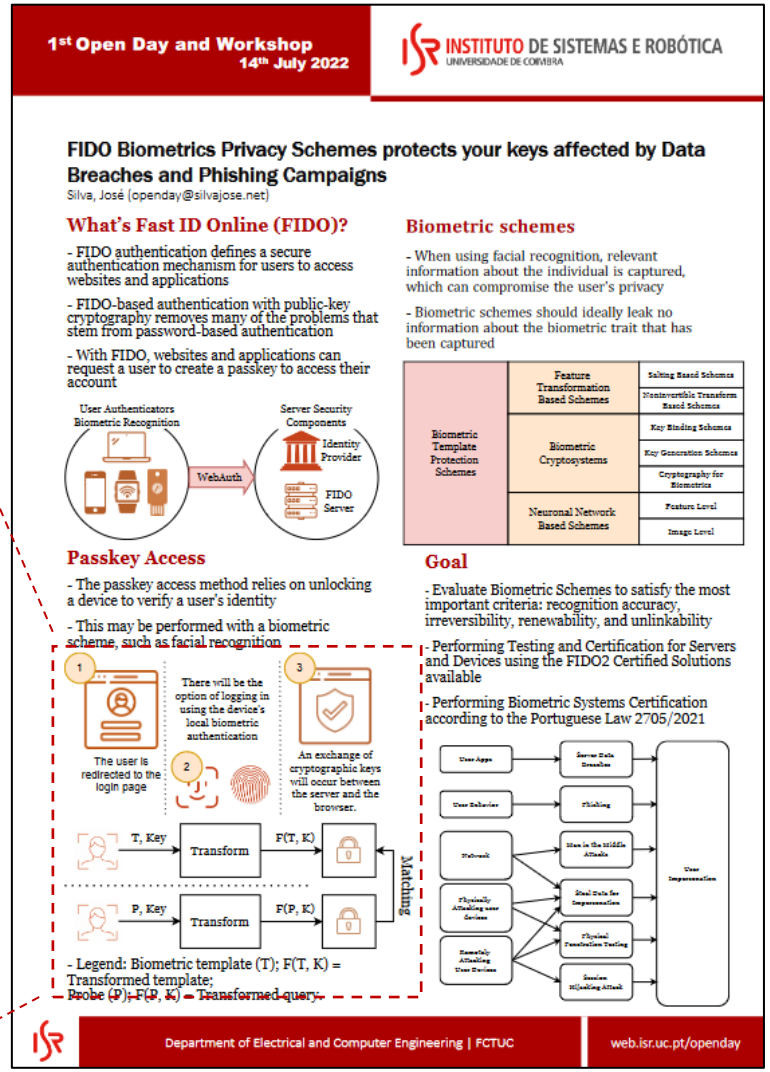
Category	Subcategory	Requirement
IMAGE	Dimensions - Physical	15 Width,, Height (cm)
	Dimensions - Pixels	16 Width, Height
	Face - Position	17 Horizontal, vertical
	Face - Dimensions	18 Width, Height
		19 Width/Height Ratio
	Eyes - Coordinates	20 Distance between the eyes (inclusive)
		21 Eyes's Coordinate Y
		22 Right eye X coordinate
		23 Left eye X coordinate

Biometric template protection

Obfuscation techniques

"FIDO Biometrics Privacy Schemes protects your keys affected by Data Breaches and Phishing Campaigns"

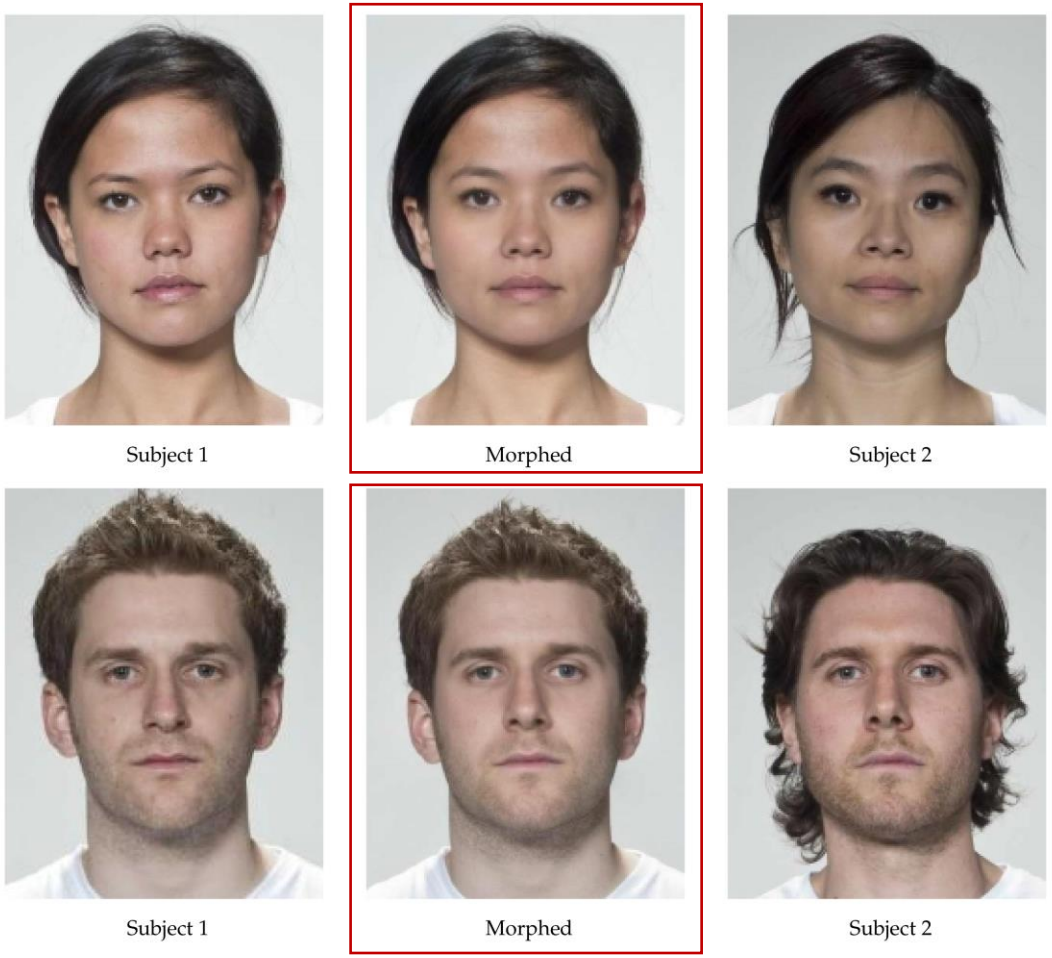




FACING - Morphing

Face Morphing

Image morphing techniques are used to combine information from two (or more) images into one image.



Morphing attacks:

- Face Morphing oppose significant risks for document security.
- Two scenarios of morphing detection are usually considered:

Differential (border control scenario)

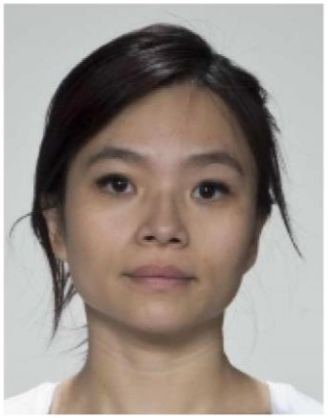
Photo presented as being from Alice

Morphed

Does this photo correspond to Alice?

Face verification (1:1)

Database Photo of Alice



Subject 2

No-reference (enrollment scenario)

Is this face a morphed face?

FACING – Liveness detection

Liveness detection:

- What is **liveness detection**? Liveness Detection or Face Anti Spoofing is the task of verifying if a face presented to a system is real or an attack (*bonafide* or *spoof*)

- What is meant by "**attack**"? An attack is any attempt to change the identity of the individual who presents himself to the system, either by obfuscating his own identity or by impersonation (em português: representação ou personificação) of another subject.

Types of attacks

Print attack: display a printed image (photo)to an authentication system

Replay attack: display a video recording

Mask attack: covering one's face with a material which may present or not human facial features (impersonating or obfuscating)

Thank you!

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