

Practical 6 – ePassport and Iris

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Reading Data from the ePassport

1. The steps in the above pipeline are in a distinct order.

- (a) 4 points Did you notice that for the ePassport the UID value changed every time? Give a reasonable explanation why this happens.

Answer: ePassports are based on RFID technology. These protocols can leak information about the user. Some ISO standards, like ISO 14443, use a static UID value to avoid collisions at the link layer. This might mitigate the collision problem, but it opens up the possibility for tracking the ePassport, which again makes for several vulnerabilities, like identity theft and hotlisting:

- i. Identity theft: By tracking the ePassport user an adversary can connect a face to the UID. If this is combined with other personal data like social security numbers and birthday the adversary has more or less all that is needed to create fake documents.
- ii. Hotlisting: This is when an adversary builds a database that match the UIDs to specific persons, which enables them to locate the persons by where they use their UID.

The most unsettling example of where hotlisting can be used is with “RFID-enabled” bombs that only trigger when the correct person is in close proximity. As a result, using random generated changing UIDs is a good way to limit these kind of vulnerabilities.

Iris Recognition

2. 4 points Why is it relevant to capture iris biometrics in the NIR spectrum and not in the visible spectrum?

Answer: Near Infrared (NIR) because it, if not eliminates, then mitigates weaknesses of normal photographs like shadows, discolouration of the white areas of eye which for example is prominent for people from India where it has a slightly browner shade. This makes it harder to detect the features of the iris and thus harder to create templates and compare samples. However, using NIR we rely on the deoxygenated hemoglobin in the red blood cells that absorbs NIR rays, or said in layman’s terms. The veins in the eyes reflect the NIR rays back. This gives us a more consistent way of capturing iris images.

3. 4 points Which area of the iris code (iris code here refers to the rectangular matrix after normalization) do you consider as the most reliable information? Give an explanation.

Answer: The most reliable/most interesting part of the iris code is the upper part, not the noisy area at the bottom. This is because the upper part contains the iris information, only that it is converted from a circular shape to a matrix with a fixed size. This enables us to use the iris code to create templates, analyse the data, and compare it to new biometric samples. We can also do error correction like correcting the angle of an iris image by shifting the bits in the iris code to the left or right depending on what direction we want to angle the image.