Introduction to UR® Codes

Cryptographically Signed Biometric Barcodes
February 27th, 2025

Online Identity Verification (IDV) forces users to upload digital photos of ID cards or present their physical ID documents to their camera. Sensitive personally identifiable information (PII) ends up at privacy-eroding, for-profit, 3rd-party Know-Your-Customer (KYC) vendors who operate without any oversight from the actual identity issuing authorities. In most cases, KYC services use overseas human workers to check user-provided images of the IDs, literally guessing about their authenticity, and creating massive fake ID fraud vulnerability. Getting between people and their identities is lucrative for KYC services, but it has left users, identity issuers, and relying parties desperate for a better method of identity verification.

Previously, the most notable attempt to solve these trust-eroding issues has been the biometric e-passport NFC chip (released in 2005), which contains a digital copy of the holder's face photo and a tamper-proof digital signature. These chips are quite secure, but they are not widely used in ID documents, like driver's licenses, because of usability challenges, durability issues, and prohibitive costs.

To provide a similar level of security as biometric e-Passports, but without the usability challenges, durability problems, or the exorbitant costs associated with scannable NFC chips, FaceTec has developed UR® Codes, 2D barcodes that can store trusted face data and empower safe, secure, low-cost, 2-party remote identity verification at infinite scale.

URCodes contain 72 bytes of trusted face data in FaceTec's proprietary privacy-preserving, minified vector format, an 85B digital signature, and up to ~73 characters (ISO 8859-1) of PII in a 57x57 matrix, or ~123 characters in a 61x61 matrix. This 57x57 sample contains the URL of the Encoder, 9 labeled PII fields, and 72B of face data:

Sample UR Code Contents:

ur.co?c=zAAAD5fIALMkzIAABVIgAAC4SoAyqk0u4AG5AAAEj5
ogAXKYHEFAF4AAVsgA_CFABlQoArOUfixLZXZpbiBBbGFuIFRV
c3N5LDE5MTEtMTEtMTEsODc2NTQzMjEsNicgMCIsMTk1LEJ
MVSxCUk4sMjAyMy0wMS0wMSwyMDMzLTAxLTAxRYxV1dzrD
yJZTjPts4SbvHXYS8FomUqPAhJhLzQwAFwccOuPYE_gwpHz5
id9qodQfKh6_gQTa0JCkgYgaZB4Ji4X6PW4Nev_

*Face Data = a tamper-proof, minified face vector string stored in the UR® Code for matching with new liveness-proven face data.

![facetec logo]

How UR Codes Remotely Verify Identity & Age

UR Codes contain face data from a trusted 2D face photo or a Liveness-proven 3D FaceMap® and are revolutionary for remote KYC/IDV. Once an [Issuing Authority](#) adds UR Codes to their identity documents, codeholders can quickly and easily be verified remotely in a 2-party transaction. Users are no longer forced to give their data to 3rd-party KYC/IDV services. Relying parties need not pay exorbitant fees for new user ID proofing, or risk data privacy fines or breaches stemming from these 3rd-party IDV services. UR Codes make remote identity verification as intuitive, easy, and cost effective as in-person identity verification.

UR Codes include similar embedded security features as NFC e-Passports, but the face data is not stored as an image and is not human-viewable, protecting privacy and eliminating bias. UR Codes can be printed on government-issued IDs, credit reports, health insurance cards, ownership titles, diplomas; or be sent digitally, stored in a digital wallet, on a blockchain, etc.

The face data capture process is simple and universal, while security is greatly enhanced vs. using a photo of a photo ID for remote IDV. Encoded face data enables orders of magnitude more accurate face matching than can be achieved using a picture of the photo ID document.

Each UR Code is a digital-camera-scannable optical barcode that can be printed onto any document, or shown on any screen. This 2D matrix has encoded within it face data from a 3D FaceMap or a 2D Photo from a trusted source, along with their corresponding PII data.

| Liveness-unproven **3D FaceScan** w/ 3D Liveness Data | Liveness-proven **3D FaceMap®** Matching = ML15 | Liveness-proven **3D FaceVector** Matching = ML15 | Liveness-proven **UR® Code** Matching = ML9-15 |

2D:2D Match up to 1/100k FAR | 3D:2D Match up to 1/ 2m FAR | 3D:3D Match up to 1/ 125m FAR

The UR Code Matcher - The minified face data used in UR Codes enables both 3D:2D & 2D:2D [Face Matching](#) at high confidence levels. The Matcher can match the UR-encoded face data with FaceTec's [3D FaceMaps](#) *or* any [ISO 19794-5](#)-style face photo supplied by a user.

Security & Privacy by Design - UR Codes contain face feature vector data that cannot be reconstituted back into a human-viewable image. Unlike a typical photo ID that openly shows the facial image and characteristics of the holder, UR Codes protect the privacy of the person whose likeness is encoded within it. The PII stored in the UR Codes can be encoded as plain text, partially encrypted, or fully encrypted for maximum privacy and security.

Universal & Very Low-Cost Implementation - UR Codes utilize the widely used Quick Response (QR) encoding under a free license on any smart device to enable a process where the UR Code's face data can be compared to a live, 3D person for remote identity verification, or scanned by any application with UR Code matching technology included.

UR Code Validation & Anti-Tampering - UR Codes have internal security features, like hashes and checksums verified by the UR Matcher every time a UR Code is scanned, and can include asymmetrical digital signatures from the encoding organization that can be verified by any relying party. Additionally, the unique URID# and hash of every UR Code can be stored and verified independently if the encoding entity so desires.

Use Cases - UR Codes biometrically bind *any* digital account with its corresponding face data by matching the encoded face data to the live person asserting that account (the holder). The URCode also contains that person's unique account number, such as from a passport, enabling proof of biometric binding to ID documents, diplomas, credit cards, credit reports, event tickets, voting ballots, etc., or can be entirely digital such as on an mobile driver license (mDL).

SampleUR Code: 61x61 ([v11](#))

Digital Signature = 85B
Encoded Face Data = 72B
URL = Average Length ~15B
Unique URID# = 11B
URL Protocol (https://) = 8B
Encoded Date = 5B
Encoder Version = 2B

Encodes Bytes = ~**198**

Characters Available for User PII = ~**123**
(Name, Address, Driver License #, Passport #, Email, etc.)

If >73 Characters of User PII is required, the UR Code will expand to 61x61([v11](#)) and store ~123 Characters of PII.

UR Code Contents & Specs -

Scope: Cryptographically Signed Biometric 2D Barcodes
Functional Requirements: Smart Devices & Webcam Native, Opens URL, 2-party IDV
Tech Requirements: ISO/IEC 18004:2015 - QR Code barcode symbology specification
Dimensions & Print Quality: ¾" x ¾" or 2cm x 2cm @ 300 DPI
Error Correction %: Up to 7% of data loss can be corrected
Character Sets: Latin-1 - Alphanumeric + Special Characters
Face Matching Accuracy: 2D:2D = 1/100,000 FAR   3D:2D = 1/2,000,000 FAR   3D:3D = 1/125m
Face Matching Algorithms: FaceTec: 2D:2D, 3D:2D, & 3D:3D NN Models
Barcode Print Area: AAMVA DL/ID:2020 - Annex A, A.7.6 Zone 4 a/o 5
Security Features: Digital Sig. validation with Pub. Key, logged hash & internal Checksum
Vendor Lock-In: No, supports all ICAO style 2D face images & universal QR scanners

Recommended Print & Rendering Sizes -

For optimal scannability UR Codes should be digitally rendered at least: 200 by 200 pixels

Print Area:

For optimal, real-world scannability, UR Codes should be located: AAMVA DL/ID:2020 - Annex A, A.7.6 Zone 4 a/o 5

For optimal, real-world scannability, UR Codes should be printed at least:

__¾" x ¾"__ or __2cm x 2cm__ @ 300 DPI

Multi-Face Capacity for Joint Accounts, Marriage Licenses, Parental Binding

UR Codes store enough bytes that multiple people can have their faces encoded together and then digitally signed. This multi-face biometric binding can join business partners, married spouses, parents & children, and provide rules-based logic for many other joint and multi-ownership scenarios.
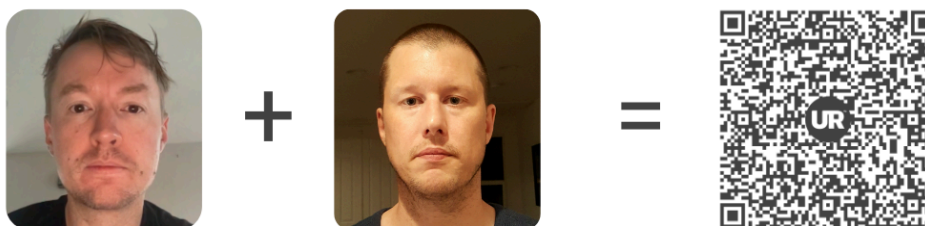
URCode - Online Encoder Demo - encode.urcodes.com

Add Info To UR®Code

414 x 532

Driver License:

Kevin Alan TUssy
1911-11-11
87654321
6' 0"
195
BLU
BRN
2023-01-01
2033-01-01

Generate UR®Code

Developer Accounts & Free Software Downloads:

dev.urcodes.com

Try the UR Code Scan + Match App

Available on the App Store

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