

# Introduction to UR<sup>®</sup> Codes

## Cryptographically Signed Biometric Barcodes

July 8th, 2024

For over a decade, online Identity Verification (IDV) has forced people to upload digital photos of ID cards or present their physical ID documents to their camera. Sensitive PII ends up at privacy-eroding, for-profit 3rd-party Know-Your-Customer (KYC) Vendors who operate without ANY oversight from the actual identity issuers. In most cases, KYC Services force overseas human workers to check grainy user-provided images of IDs, literally guessing about their authenticity, and creating massive fake ID fraud vulnerability. Getting between people and their identities has become a lucrative way to make a buck for opportunistic KYC Services, but it has left users, identity issuers, and relying parties desperate for a better method for remote IDV.

The most notable attempt to solve these trust issues has been the biometric e-Passport 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, without the usability challenges and durability problems, or the exorbitant costs associated with scannable NFC chips, FaceTec has developed [UR Codes](#) - 2D barcodes that can be matched to trusted face data and empower safe, secure, low-cost, two-party remote identity verification at scale.

UR<sup>®</sup>Codes contain 72 Bytes of trusted face data in FaceTec's proprietary privacy-preserving minified vector format, an 84B Digital Signature, and up to ~73 Characters (ISO 8859-1) of PII (Personal Identifiable Information) 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 70B of face data:



### Sample UR<sup>®</sup> Code Contents:

```
UR.co&n=Kevin&n2=Alan&n3=Tussy&st=Nv&nat=USA&emp=FaceTec&role=CEO&yrs=10&patents=>30&fd=W49oIRmmAOyPfc8G6K62SLCW1WsskF6J6O2q6JGcXnq9VfoBZpFStkUdhjzhj8bQW49oIRmmAOyPfc8G6K62SLCW1WsskF6J6O2q6JGcXnq9VfoBZpFStkUdhjzhj8bQ
```

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

## How UR<sup>®</sup>Codes Verify Identity Remotely

UR<sup>®</sup>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<sup>®</sup>Codes to their Identity Documents, holder's 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<sup>®</sup>Codes make remote identity verification as intuitive, easy, and cost effective as in-person identity verification.

UR<sup>®</sup>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<sup>®</sup>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<sup>®</sup>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 from a trusted source 2D photo (ID or Passport), along with appropriate PII data.



Liveness-unproven  
**3D FaceScan**  
w/ 3D Liveness Data



Liveness-proven  
**3D FaceMap<sup>®</sup>**  
Matching = ML15



Liveness-proven  
**3D FaceVector**  
Matching = ML15



Liveness-proven  
**UR<sup>®</sup> 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<sup>®</sup>Code Matcher** - The minified face data used in UR<sup>®</sup>Codes enables both 3D:2D & 2D:2D [Face Matching](#) at high confidence levels. The Matcher can match the UR<sup>®</sup> 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<sup>®</sup>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<sup>™</sup>Codes protect the privacy of the person whose likeness is encoded within it. The PII stored in the UR<sup>™</sup>Codes can be encoded as plain text, partially encrypted, or fully encrypted for maximum privacy and security.

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

**UR<sup>®</sup>Code Validation & Anti-Tampering** - UR<sup>®</sup>Codes have internal security features like Hashes and Checksums and are verified by the UR<sup>®</sup>Matcher every time a UR<sup>™</sup>Code is scanned, and asymmetrical Digital Signatures, which can be included by the Encoding Organization and verified by any Relying Party. Additionally, the unique URID# and Hash of every UR<sup>™</sup> Code can be stored and verified independently if the Encoding Entity so desires.

**Use Cases** - UR<sup>®</sup>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 UR<sup>®</sup>Code also contains that person's account's unique number, such as a Passport # and enables proof of biometric binding to ID Documents, diplomas, credit cards, credit reports, event tickets, voting ballots, etc., or be entirely digital such as on a [mDL](#) (Mobile Driver License).

### Typical UR<sup>®</sup> 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

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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<sup>®</sup>Code will expand to 61x61([v11](#)) and store ~123 Characters of PII.



## UR<sup>®</sup> 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:**  $\frac{3}{4}$ " x  $\frac{3}{4}$ " 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 2D face images & universal QR scanners

## Recommended Print & Rendering Sizes -

For optimal real-world scannability UR<sup>®</sup>Codes should be digitally rendered at least:

200 Pixels by 200 Pixels

### Barcode Print Area:

For optimal real-world scannability UR<sup>®</sup>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:

$\frac{3}{4}$ " x  $\frac{3}{4}$ " or 2cm x 2cm @ 300 DPI



## UR<sup>®</sup> Code - Online Encoder Demo - <https://encode.urcodes.com>

### Add Info To UR<sup>®</sup>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<sup>®</sup>Code

 facetec  
UR<sup>®</sup>Code Generator



Download UR Code

