



# SIMBA

## Single Image Multi-Biometric Analysis

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# What are we trying to achieve?

## Requirements for Biometrics optimal for Mobile Devices

1. Accurate
  1. High recognition rate
  2. Difficult to spoof
  3. Low failure to enroll
2. Convenient
  1. Non-invasive
  2. Should operate at 1m distance
  3. Fast
  4. Easy to learn
  5. Human verifiable
3. Efficient use of computational resources
  1. Small and light device
  2. Small template sizes
4. Price competitive
  1. Purchase
  2. Maintenance



# SIMBA™ Concept

## Single-Image Multiple Biometric Analysis



2D high resolution images allow the seamless integration of **Facial Feature**, **Skin Texture** and **Iris Analysis** into a single recognition engine

SIMBA™ fulfills all requirements listed above and thus constitutes an almost optimal biometric solution!



# How do we get there?

## Steps to realize SIMBA™

1. Face and Facial Feature Finding
2. Recognition Engine with three Channels
  1. Face
  2. Skin
  3. Iris
3. Fusion Module
4. Hardware Platform
5. Database Issues



# Face Detection and Facial Feature Finding Fast and Accurate

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Live Demo



# Low Resolution Face Recognition

## Baseline Performance

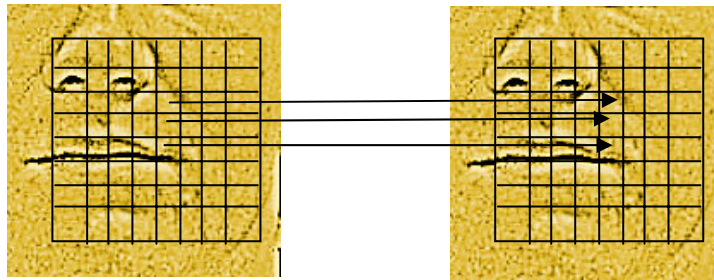
- Minimum recognizable face size is approximately 25pixels in eye separation
- Typical processing time on single image: <math><25\text{ms}</math>\*
- Template comparison is  $1.2\mu\text{s}$
- Template size below 1.0KByte
- Integrated face tracking technology allows face detection up to 10 times faster in moving video than still images <math><7\text{ms}</math>
- FRR of 0.1-0.2 at FAR of 0.001 for typical booking photos

\* All performance specs refer to Pentium 4, 3.2Ghz PC



# High Resolution Face Recognition aka Skin Texture Analysis

- Skin texture analysis popularized by Delean
- Delean/Identix approach burdens final comparison step too much.



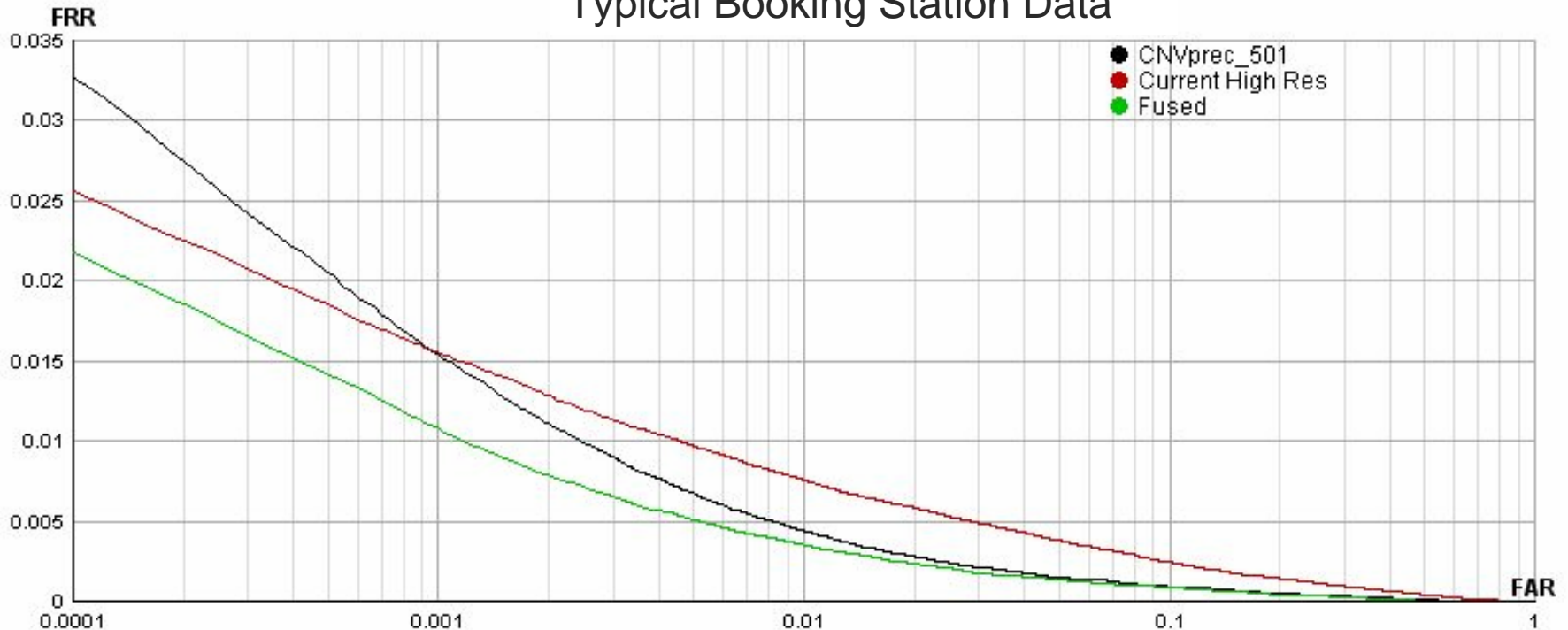
- High resolution analysis needs to be formulated such that the final comparison step stays as lean as possible.
- Neven Vision's skin texture analysis is about **1000 times faster** than the Delean/Identix algorithm.



# High Resolution Face Recognition

## Current Performance at 125 Pixel Eye Distance

Typical Booking Station Data



- still significant gains at higher resolutions
- multiple probes 4-10 reduce FRR by 2-3
- additional gains when facial photos are according to ISO standard



# Iris Recognition Channel

## Final Step

- To achieve optimal integration Neven Vision will develop proprietary iris analysis
- Key questions revolve around optimal wavelength regimes





# SIMBA™

## Single-Image Multiple Biometric Analysis



- 2D high resolution images allow the seamless integration of **Facial Feature, Skin Texture** and **Iris** Analysis into a single recognition engine
- Required resolution in pixels between the eyes:
  - Facial feature >25\*
  - Skin texture >80\*
  - Iris >600\*  
(6 Megapixel Camera)

\*Numbers assume a sharp image.



# Mobile Identifier™

## In-Field Multi-Biometric Identification



# Field Identification Issues

## ■ Problem

- Positive identification of people is time consuming and often inaccurate
- Processing people at a booking station is expensive
- Mistaken identity can lead to false arrests

## ■ Solution

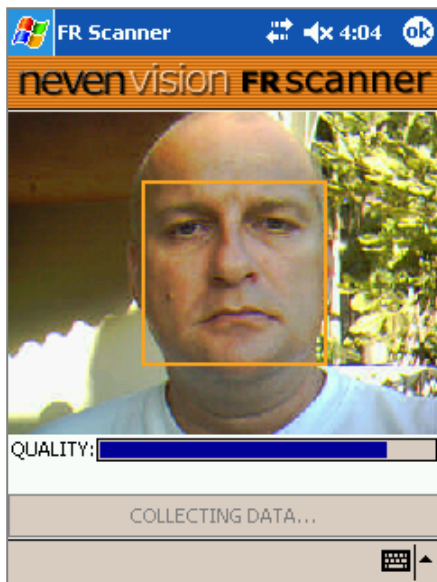
- Fast, in-field identification of persons and vehicles using a handheld device
- Multi-biometrics guarantees positive ID (face, skin, iris, fingerprint)
- Embedded database of identities or wireless connection to background servers to ensure widest match



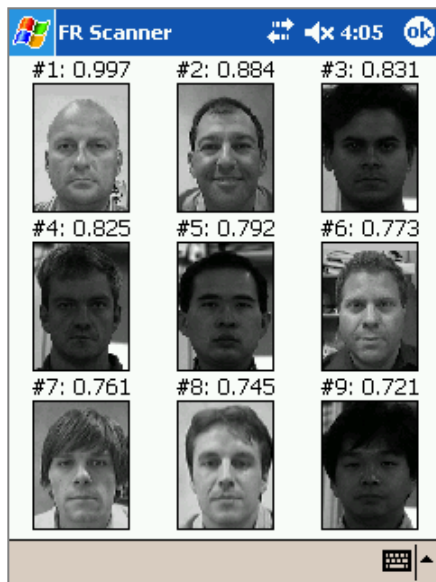
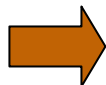


# Mobile Identifier™

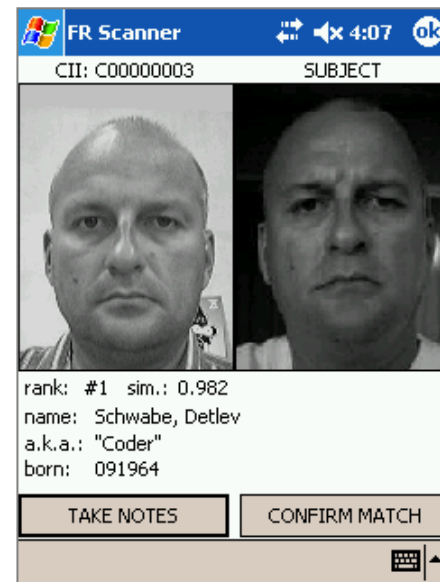
## Identification Use Case



Camera-enabled Pocket-PC device captures an image of subject's face.



Face is compared against faces in on-board, embedded database.



Identity is verified.



# Mobile Identifier™

## Swiss Army Knife Approach


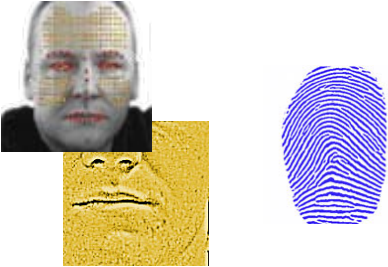

Neven Vision Software





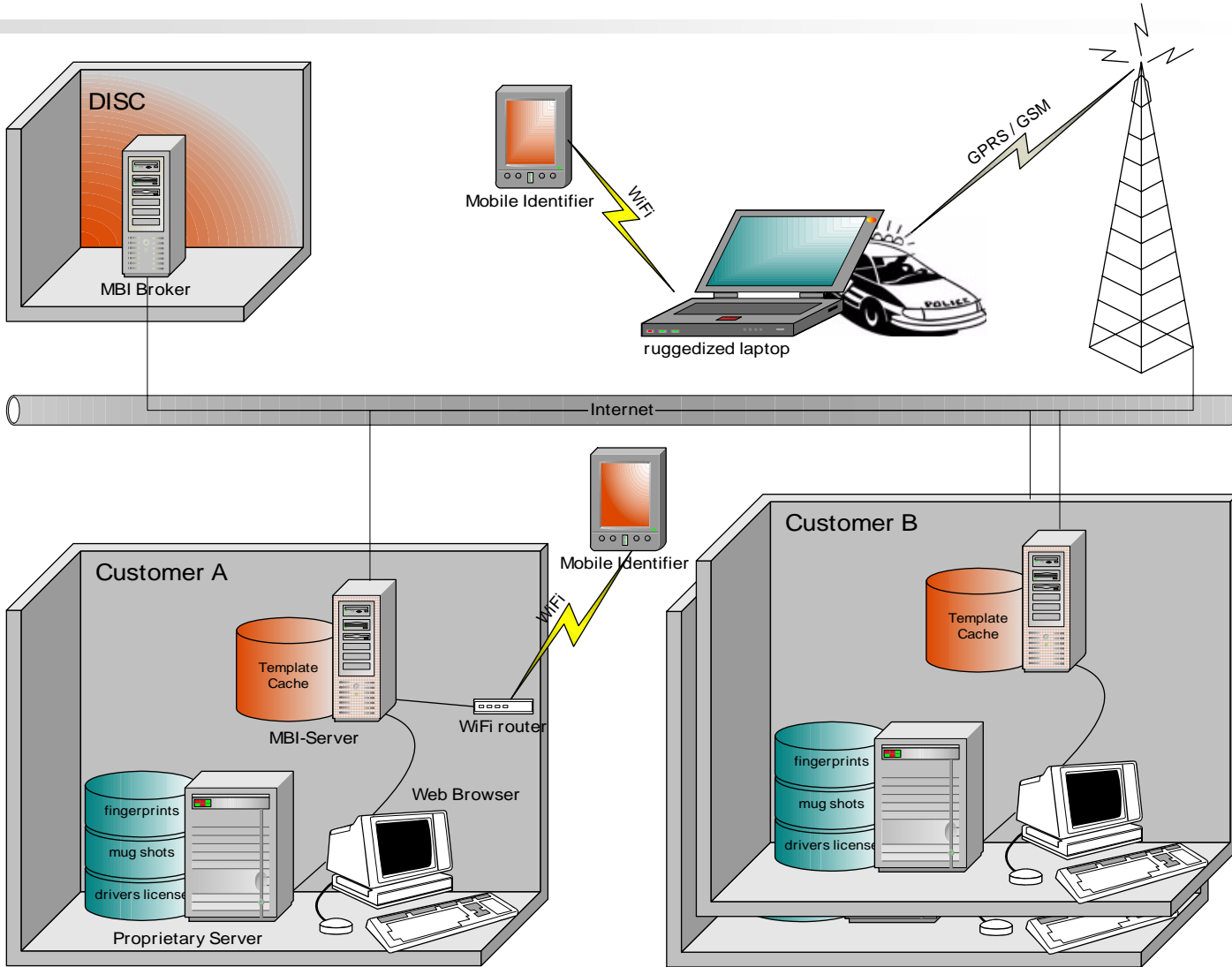
# Mobile Identifier™

## Feature Roadmap

	Early Adopter Version	Version 1.0	Version 2.0
<b>Biometric Technology</b>	<ul style="list-style-type: none"> <li>➤ Face</li> </ul>	<ul style="list-style-type: none"> <li>➤ Face + HiRes Face</li> <li>➤ Fingerprint</li> </ul>	<ul style="list-style-type: none"> <li>➤ Face + HiRes Face</li> <li>➤ Fingerprint</li> <li>➤ Iris</li> </ul>
<b>Hardware Features</b>	<ul style="list-style-type: none"> <li>➤ COTS Pocket PC</li> <li>➤ VGA Camera</li> </ul>	<ul style="list-style-type: none"> <li>➤ Ruggedized Pocket PC</li> <li>➤ 2-Megapixel Camera</li> <li>➤ Built-in Lighting</li> <li>➤ Fingerprint Reader</li> <li>➤ 2D-Barcode Scanner</li> <li>➤ 802.11g</li> </ul>	<ul style="list-style-type: none"> <li>➤ GSM Phone</li> <li>➤ GPRS</li> <li>➤ Iris Camera</li> </ul>
			



# Mobile Identifier: Distributed Search Configuration





# Deployments with Early Adopters

## LAPD

*"The Mobile Identifier platform is providing our officers with critical identity information at their fingertips... Every police officer needs to have one on his belt."*



Commander Charlie Beck  
Los Angeles Police Department

For NBC video please refer to associated file!