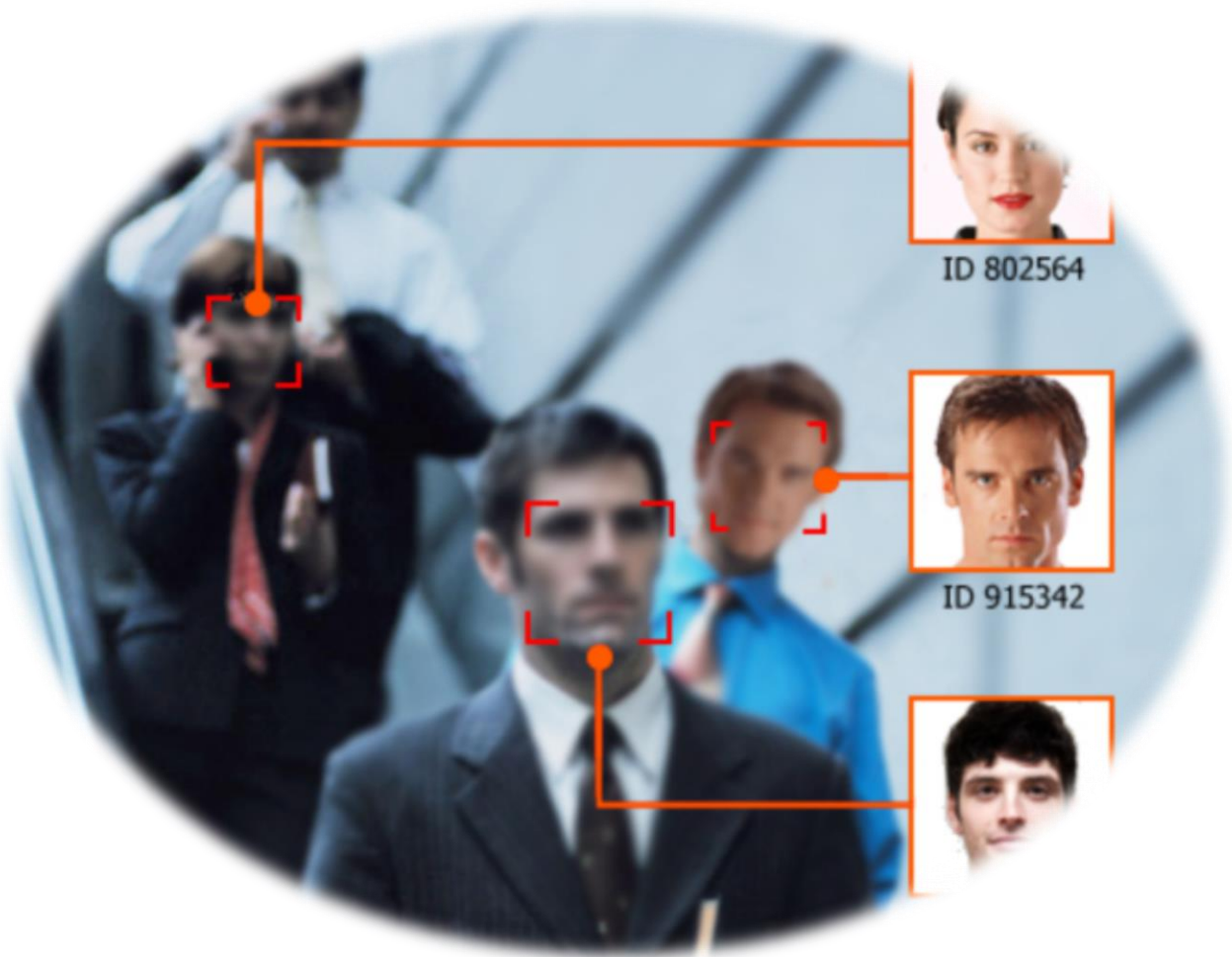




ExpertEye[®]

Facial Recognition by IBIOS

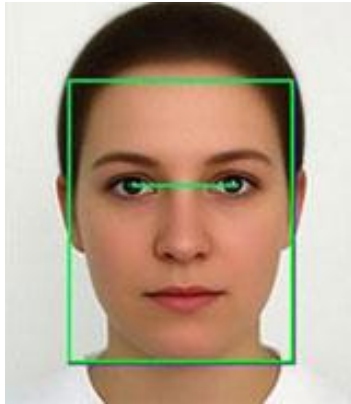


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IBIOS ExpertEye: The Facial Matching System



Face recognition technology is the least intrusive and fastest biometric technology. It works with the most obvious individual identifier – the human face. Instead of requiring people to place their hand on a reader or precisely position their eyes in front of a scanner, Face Recognition systems silently take pictures of people's faces as they enter a defined area. There is no intrusion or delay, and in most cases the subjects are entirely unaware of the process. They do not feel "under surveillance" or that their privacy has been

invaded.

Purpose of IBIOS ExpertEye

- **Identify individuals with prior arrest records, suspected shoplifters and persons of interest on your internal watch/ban lists when they enter your store.**
- **Scan crowds entering your facility to identify individuals on a terrorist or police watch list — or on your company's internally generated list.**
- **Ensure that VIPs are greeted by name.**
- Fast Expert Eye's automated system sends detailed graphical alerts to phones, email, SMS, MMS and can even activate dry contacts. Seconds after our high-speed face-tracking video camera
- identifies a potential suspect, watch list photos and data are in your hands.
- Full DVR integration means users can playback actual digital video footage of alerts as well.

FRS Technology

Facial Recognition analyzes the characteristics of a person's face images input through a digital video camera/ Web camera/. It measures the overall facial structure, including distances between eyes, nose & mouth and jaw edges. These measurements are retained in a database and used for comparisons when a user stands before the camera. This biometric has been widely and perhaps wildly, touted as a fantastic system for recognizing potential threats. (Whether terrorist, scam artist or known criminal)but so far has been unproven in high-level usage. It is currently used only in verification systems with a good deal of success.

Every face has numerous, distinguishable landmarks and the different peaks and valleys- that make up one's facial characteristics unique. Each human face has approximately 80 nodal points. Some of these features measured by the Facial Recognition Technology include distance between the eyes, width of the nose, depth of the eye sockets, shape of the cheekbones and length of the jaw line etc.

How it Works

The following four-stage process illustrates the way biometric systems operate:

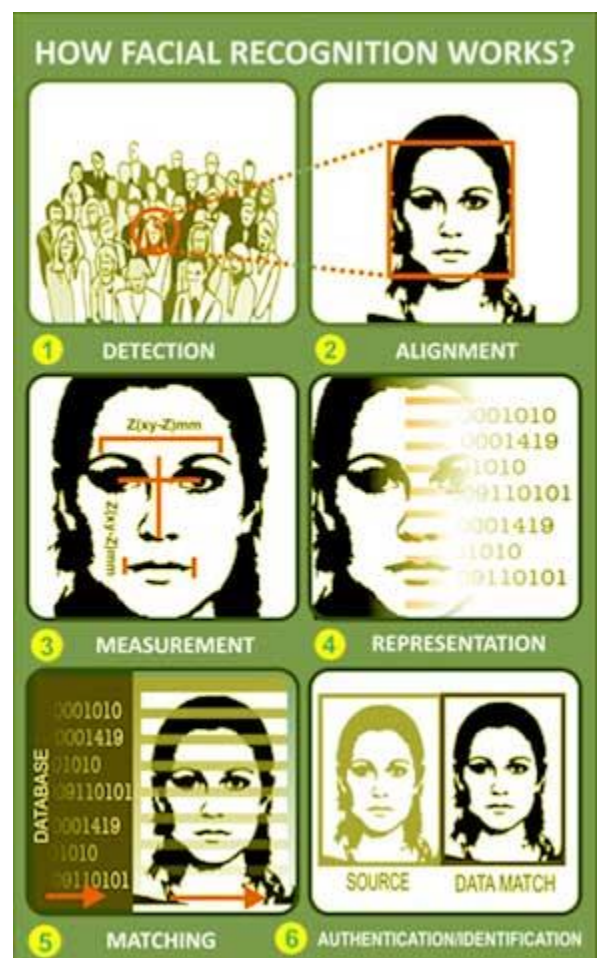
Capture - : Physical or behavioral sample is captured by the system during enrollment

Extraction - Unique data is extracted from the sample and a template is created

Comparison - The template is then compared with a new sample

Matching - The system then decides if the features extracted from the new sample are matching or not

User faces the camera, standing about two feet from it. The system will locate the user's face and perform matches against the claimed identity or the facial database. It is



possible that the user may need to move and re-attempt the verification based on his facial position. The system usually comes to a decision in less than 5 seconds.

Use

Currently gaining support as a potential tool for averting terrorist crimes, facial recognition system is already in use in many law enforcement areas. Software has already been developed for computer networks and automated bank tellers that use facial recognition for user verification purposes.

Evaluation

One of the strongest positive aspects of facial Recognition is that it is non-invasive. Verification or identification can be accomplished from a distance of two feet or more without requiring the user to wait for a longer period of time or do anything more than look at the camera.

Face Recognition is also very difficult to dupe. It works by comparing facial landmarks - specific proportions and angles of defined facial features - which cannot easily be concealed by beards, eyeglasses or makeup.

The ideal solution

All of these makes face recognition ideal for high traffic areas open to the general public, such as:-

- Airports & Railway Stations
- Corporates
- Cash-Points
- Stadiums
- Public Transportation
- Financial Institutions
- Government Offices
- Businesses of All Kinds

Salient Features

- **Accurate**
Expert Eye has the lowest error rates and highest auto matching accuracy. When an automated identification is not possible, trained human operators make a final determination.

- **Powerful**
your security staff can e-mail cell phone snapshots of suspected lawbreakers to Expert Eye and receive an instant photo-match with all known data.
- **Customized**
You select the watch lists for your security needs, including your company's own filed-and-forgotten photos of persons of interest as well as police and NCRB wanted lists. Network Ready.
- **Affordable**
Typically low cost as it is indigenously developed.
- **User-Friendly**
Designed to use by non-technical persons , Most of the features are auto activated . Can be connected to any existing CCTV based City Surveillance system without much hassel.

Easy To Customize, Easy To Run

- Using the FaceFirst web portal on your intranet, you'll be able to subscribe to specific watch lists, add and delete individual records, run reports and configure your alerting preferences. There's no technical jargon to learn, no need for time-consuming training. FaceFirst lets you launch a profitable new era of ultra-personalized customer service.

Salient Functionalities:

- Real-Time multiple face detection and recognition from incoming camera streams
- Real-Time alarm and notification on recognizing person to administrators
- Easy database addition and search from diverse filters
- Support multiple interfaces for enrollment by incoming camera streams, face history log and images
- Support single and batch enrollment
- Logging of all face images with date and time index
- Simple and fast logging history search from various filters
- Identify an individual's identify from customer databases and collect similar faces in order of high score
- Quick finding an individual's identify IBIOS database search technology
- Simple and easy the booking and finding process by enrollment from only one single image

- Editable database if an individual's information is updated such as release and investigation process
- Support both color and Gray-scale images

Face Template Extraction and Matching

Template generalization is used to generate a better quality template from several face images. Better quality templates result in higher identification quality.

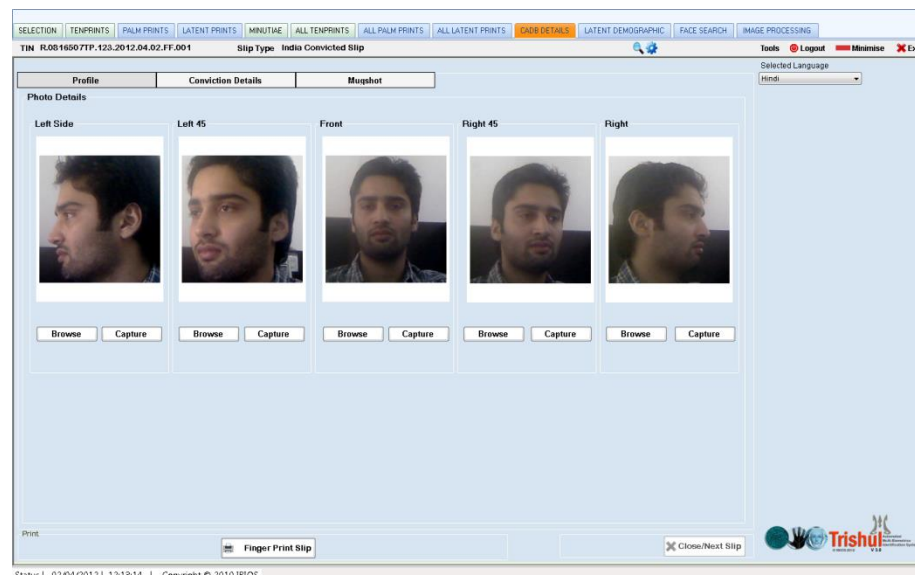
Tolerance to face posture assures face enrolment convenience it allows 360 degrees head roll. Head pitch can be up to 15 degrees in each direction from the frontal position. Head yaw can be up to 45 degrees in each direction from the frontal position.

Reliable face detection assures convenient face enrolment from cameras, webcams and especially various scanned documents: faces will be found on scanned pages from passports, files etc. Multiple faces can be also detected on an image and simultaneously processed.

Live face detection. A conventional face identification system can be easily cheated by placing a photo of another person in front of a camera. It is able to prevent this kind of security breach by determining whether a face in a video stream belongs to a real human or is a photo.

Head counting feature is used to count approximate no of persons in large gathering like market , stadiums etc.

The biometric template record can contain several face samples belonging to the same person. These samples can be enrolled from different sources and in different time, thus allowing improvement in matching quality. For example a person could be enrolled with and without eyeglasses or with different eyeglasses, with and without beard or moustache, etc



Mug Shot preparation for Face enrolment

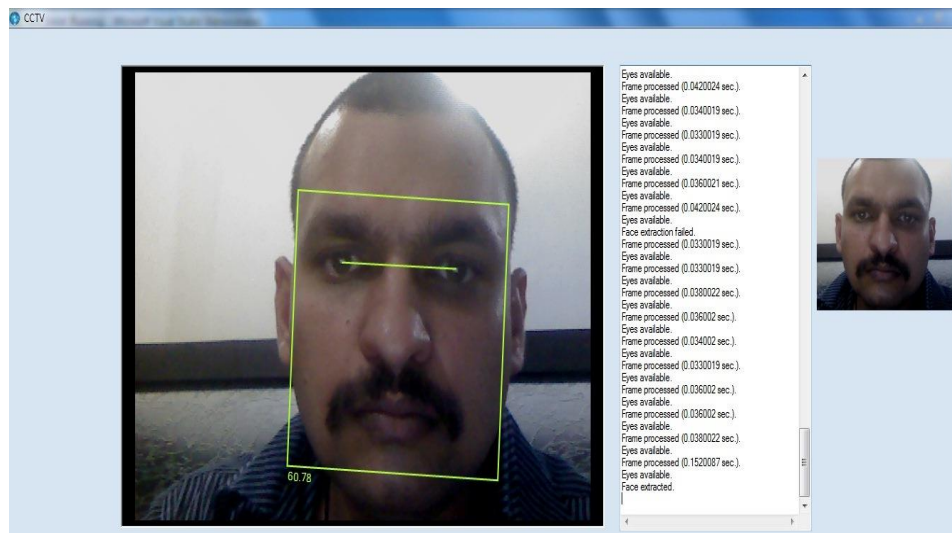


Figure 1 : Face Detection & Extraction

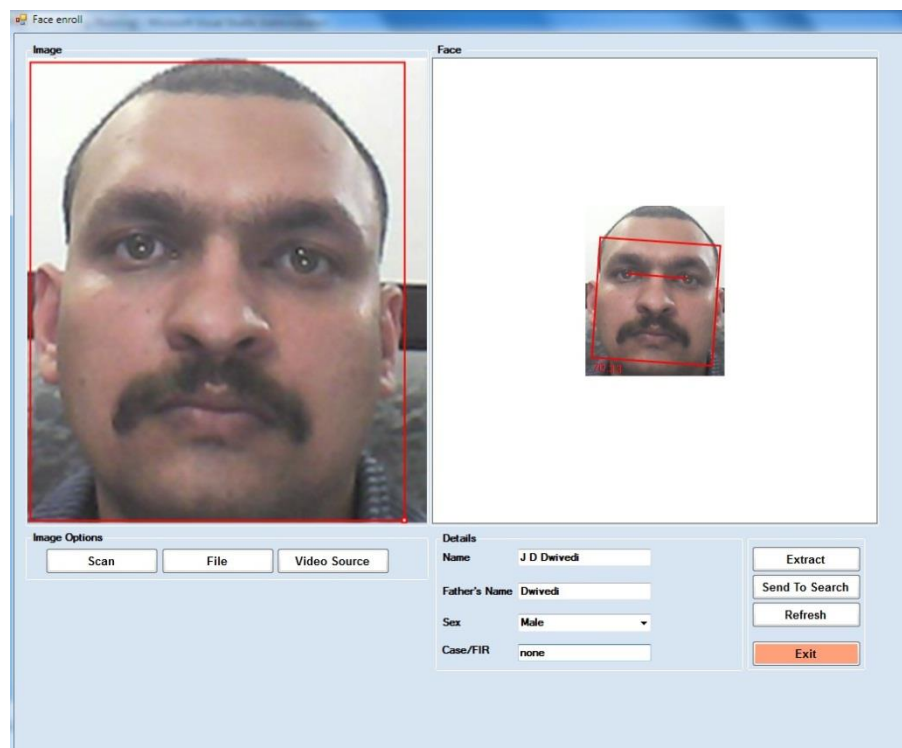


Figure 2 : Face encoding and demographic data input

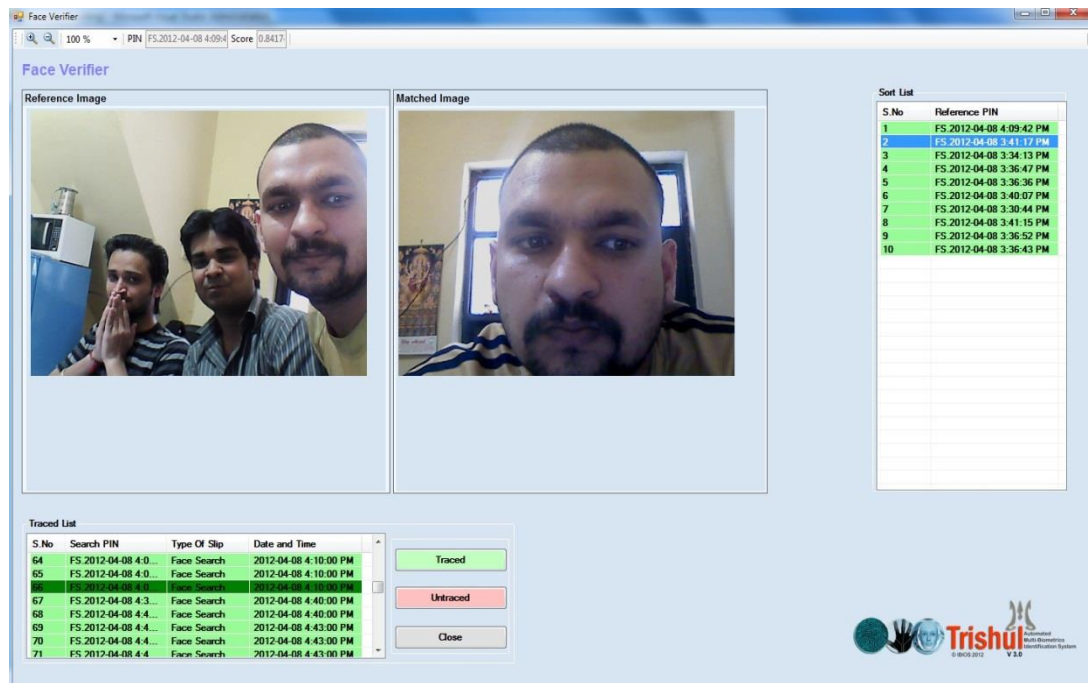


Figure 3 : Face Verifier Window

SELECTION | TENPRINTS | PALM PRINTS | LATENT PRINTS | MINUTIAE | ALL TENPRINTS | ALL PALM PRINTS | ALL LATENT PRINTS | CASE DETAILS | LATENT DEMOGRAPHIC | FACE SEARCH | IMAGE PROCESSING

TIN: R0816507TP.123.2012.04.02.FF.001 Slip Type: India Convicted Slip

Tools | Logout | Minimise | Exit

Selected Language: Hindi

Profile	Conviction Details	Mugshot
<p>Conviction Details</p> <p>Serial Number: 1</p> <p>Case/ FIR No.: FIR No. 123</p> <p>Date: 01/04/2012</p> <p>Under Section: 34 IPC</p> <p>Police Station Name: CHANAKA(VAPURI)</p> <p>Identifying Officer: S.I. ABHINAV</p> <p>Name Under Which Convicted: DEEPAK KUMAR</p> <p>Date of Conviction: 02/04/2012</p> <p>Sentence Details: RS 1000 FINE AND 2 YEARS PRISON</p> <p>Judge Name: MAHAWEER SINGH</p> <p>Judge Designation: MM</p> <p>Court Name: Rohini Court</p> <p>District Name: OLIVER</p> <p>P.F. No.: 115080</p> <p>Save Conviction Details (Alt+D)</p>	<p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>26</p> <p>27</p> <p>28</p> <p>29</p> <p>30</p> <p>31</p> <p>32</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p> <p>41</p> <p>42</p> <p>43</p> <p>44</p> <p>45</p> <p>46</p> <p>47</p> <p>48</p> <p>49</p> <p>50</p> <p>51</p> <p>52</p> <p>53</p> <p>54</p> <p>55</p> <p>56</p> <p>57</p> <p>58</p> <p>59</p> <p>60</p> <p>61</p> <p>62</p> <p>63</p> <p>64</p> <p>65</p> <p>66</p> <p>67</p> <p>68</p> <p>69</p> <p>70</p> <p>71</p> <p>72</p> <p>73</p> <p>74</p> <p>75</p> <p>76</p> <p>77</p> <p>78</p> <p>79</p> <p>80</p> <p>81</p> <p>82</p> <p>83</p> <p>84</p> <p>85</p> <p>86</p> <p>87</p> <p>88</p> <p>89</p> <p>90</p> <p>91</p> <p>92</p> <p>93</p> <p>94</p> <p>95</p> <p>96</p> <p>97</p> <p>98</p> <p>99</p> <p>100</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>26</p> <p>27</p> <p>28</p> <p>29</p> <p>30</p> <p>31</p> <p>32</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p> <p>41</p> <p>42</p> <p>43</p> <p>44</p> <p>45</p> <p>46</p> <p>47</p> <p>48</p> <p>49</p> <p>50</p> <p>51</p> <p>52</p> <p>53</p> <p>54</p> <p>55</p> <p>56</p> <p>57</p> <p>58</p> <p>59</p> <p>60</p> <p>61</p> <p>62</p> <p>63</p> <p>64</p> <p>65</p> <p>66</p> <p>67</p> <p>68</p> <p>69</p> <p>70</p> <p>71</p> <p>72</p> <p>73</p> <p>74</p> <p>75</p> <p>76</p> <p>77</p> <p>78</p> <p>79</p> <p>80</p> <p>81</p> <p>82</p> <p>83</p> <p>84</p> <p>85</p> <p>86</p> <p>87</p> <p>88</p> <p>89</p> <p>90</p> <p>91</p> <p>92</p> <p>93</p> <p>94</p> <p>95</p> <p>96</p> <p>97</p> <p>98</p> <p>99</p> <p>100</p>

Print

Finger Print Slip

Close/Next Slip

Trishul V1.0

Status | 02/04/2012 | 12:14:14 | Copyright © 2010 BIOS

Criminal Attribute Database form

Some Basic Screenshots of Application:

IBIOS ExpertEye Engine Capability Demo

Live Search | Enrollment/Verification | Verified Results | Refresh Database | Settings | Reports | Exit

Search ID: 2 Match PIN: 1 Face Index: 3 Score: 100 Name: Deepak Father Name: demo Gender: Male Address: demo Remarks: demo

Searched Faces: 23-07-2015 00:00:00:15:08... 23-07-2015 00:00:00:15:08...

All Saved Faces With Match Face: 1 1

Settings

Multi-Pose/Posture Enabled: No
No. Of CCTV Camera View: 1
Send Sma Alert: Yes
Siren Sound: Yes
View Log From Date before: 2 Days
Alert Average Time: 0 Hrs.
Alert Last Time: 0 Hrs.
Automatic Send Mail Full Report: Yes
Automatic alert send in every: 4 Days
Send blacklist and restricted person alert mail: Yes

Alert Mail Send From MailID: deepak@bios.co.in
Password:
Alert Mail Send To MailID: deepak.bios@gmail.com
Alert Mail Send To Cc: shikant@bios.co.in
Alert Mail Send To Bcc: kks@bios.co.in
Alert Mail Subject:
Mail Message:
Sms Alert Number: 9311989711

Submit

IBIOS ExpertEye Engine Capability Demo

Live Search | Enrollment/Verification | Verified Results | Refresh Database | Settings | Reports | Exit

Search ID: 2 Match PIN: 1 Face Index: 3 Score: 100 Name: Deepak Father Name: demo Gender: Male Address: demo Remarks: demo

Searched Faces: 23-07-2015 00:00:00:15:08... 23-07-2015 00:00:00:15:08...

All Saved Faces With Match Face: 1 1

Settings

Extraction: Faces

Face confidence threshold: 50
Minimal IOD*: 40
Maximal IOD*: 4000
Face quality threshold: 128
Max roll angle deviation: 15
Max yaw angle deviation: 15
Template size (for enroll): Large
Template size (for identification): Large
Favor largest face: ☒
Use liveness check: ☐
Liveness threshold: 50
Live enrollment max frame count: 10

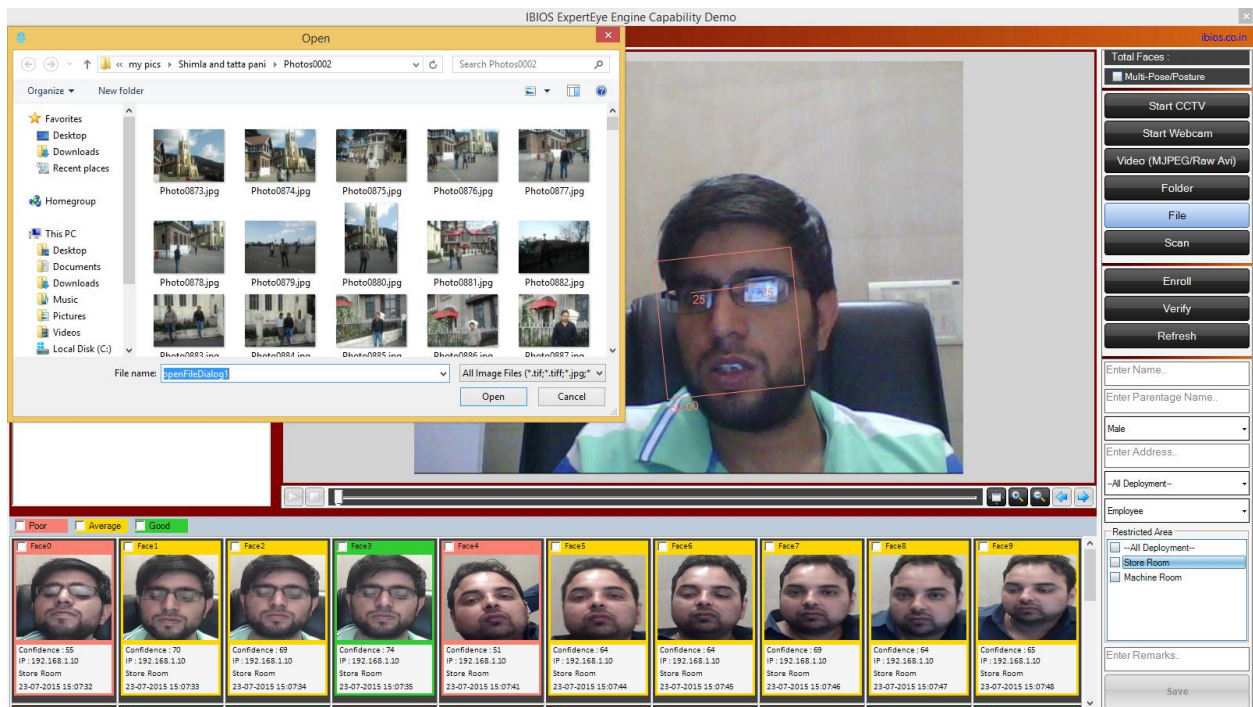
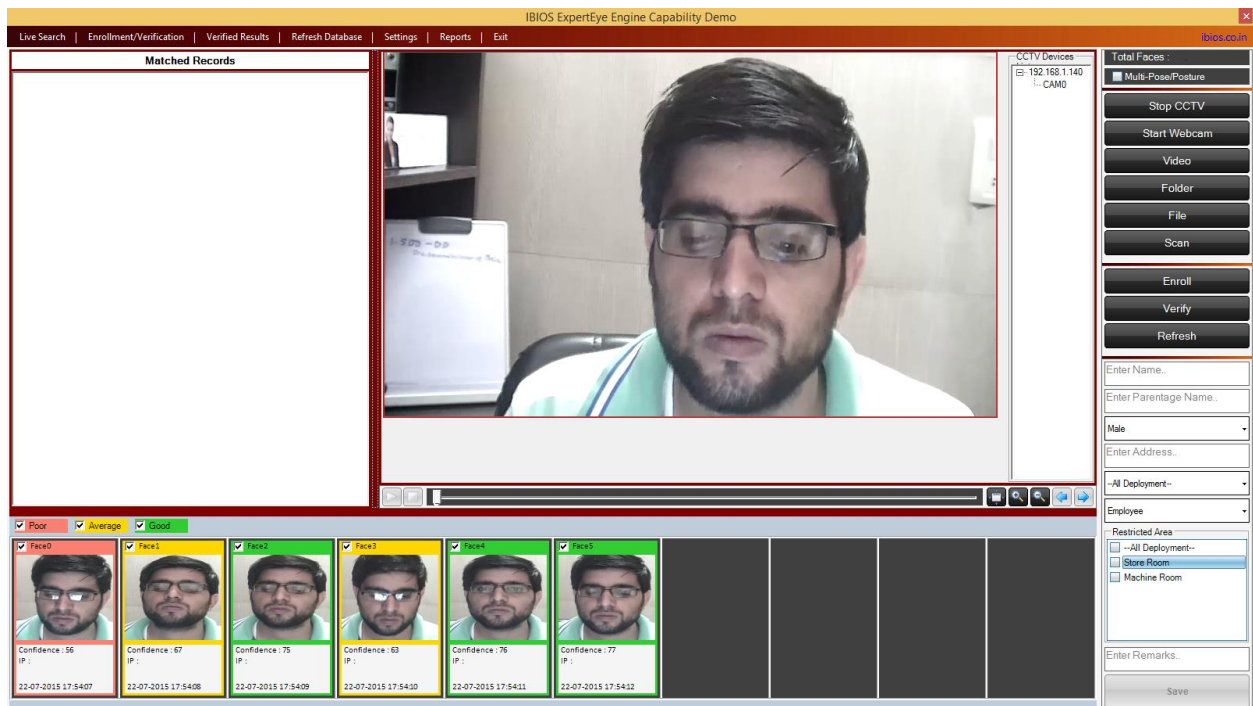
Feature detection

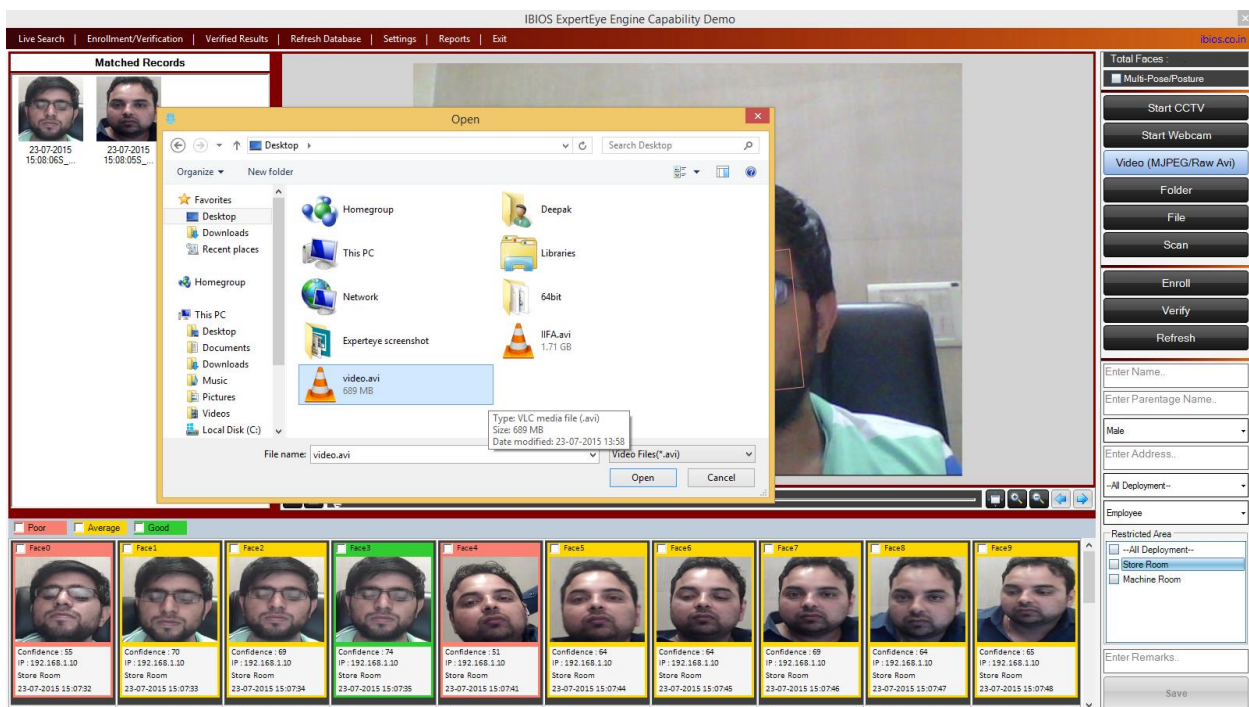
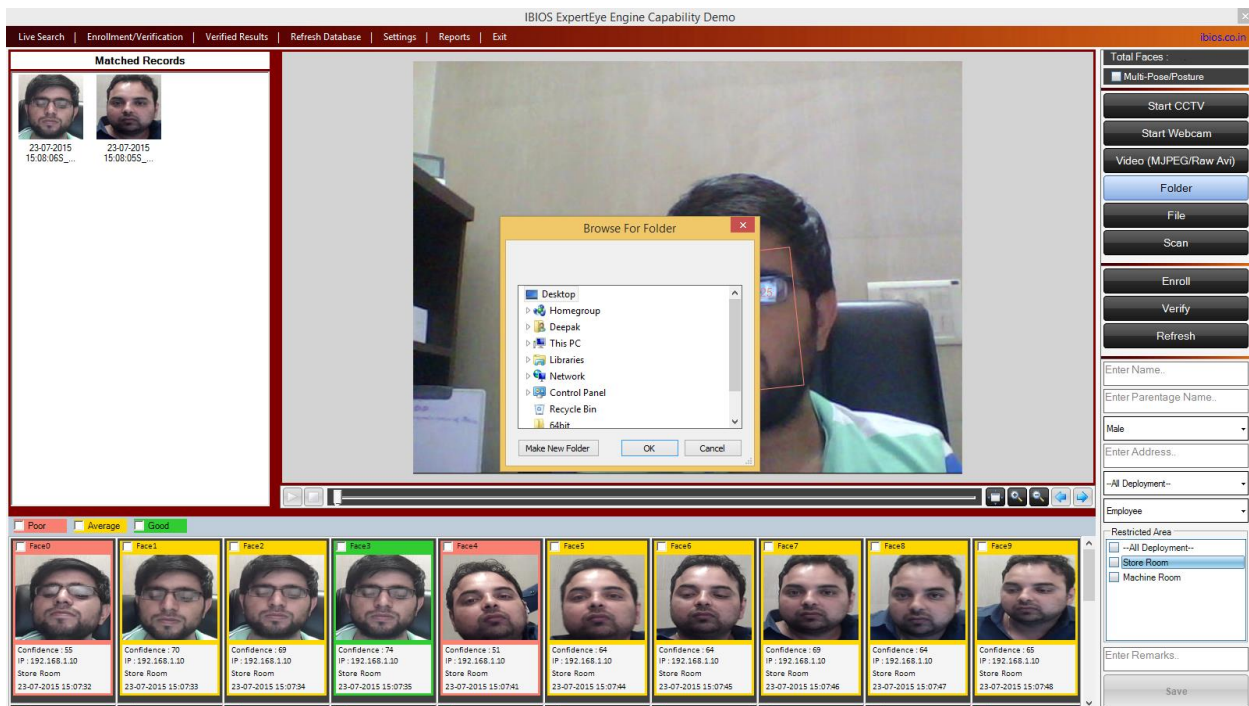
☐ Detect Gender Threshold: 5
☒ Detect Expression Threshold: 5
☒ Detect Blink Threshold: 5
☒ Detect Mouth Open Threshold: 5
☒ Detect Glasses Threshold: 5
☒ Detect Dark Glasses Threshold: 5

☐ Detect base feature points when extracting from file

Matching FAR: 0.1%

Set default values OK Cancel Apply





IBIOS ExpertEye Engine Capability Demo

Live Search | Enrollment/Verification | Verified Results | Refresh Database | Settings | Reports | Exit

Matched Records

23-07-2015 15:08:06S... 23-07-2015 15:08:05S...

Start CCTV
Stop Webcam
Video (MJPEG/Raw Avl)
Folder
File
Scan
Enroll
Verify
Refresh

Enter Name...
Enter Parentage Name...
Male
Enter Address...
-All Deployment-
Employee
Restricted Area
-All Deployment-
Store Room
Machine Room
Enter Remarks...
Save

Face0 Face1 Face2 Face3 Face4 Face5 Face6 Face7 Face8 Face9

Confidence: 55 IP: 192.168.1.10 Store Room 23-07-2015 15:0732
Confidence: 70 IP: 192.168.1.10 Store Room 23-07-2015 15:0733
Confidence: 69 IP: 192.168.1.10 Store Room 23-07-2015 15:0734
Confidence: 74 IP: 192.168.1.10 Store Room 23-07-2015 15:0735
Confidence: 51 IP: 192.168.1.10 Store Room 23-07-2015 15:0740
Confidence: 64 IP: 192.168.1.10 Store Room 23-07-2015 15:0744
Confidence: 64 IP: 192.168.1.10 Store Room 23-07-2015 15:0746
Confidence: 69 IP: 192.168.1.10 Store Room 23-07-2015 15:0746
Confidence: 64 IP: 192.168.1.10 Store Room 23-07-2015 15:0747
Confidence: 65 IP: 192.168.1.10 Store Room 23-07-2015 15:0748

IBIOS ExpertEye Engine Capability Demo

Live Search | Enrollment/Verification | Verified Results | Refresh Database | Settings | Reports | Exit

Stop CCTV Start Webcam Full Screen Refresh

Match Record: 2 Enroll Faces: 2

CCTV Devices
192.168.1.140
CAM0

Search Face Matched Face

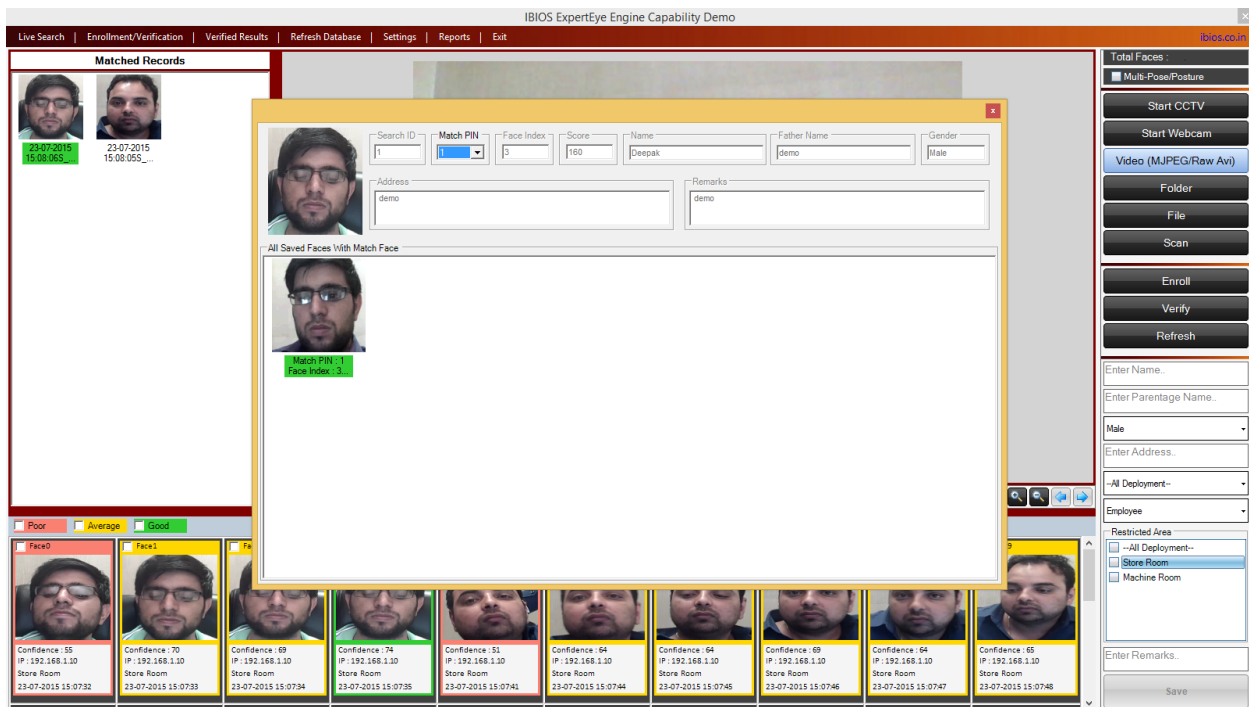
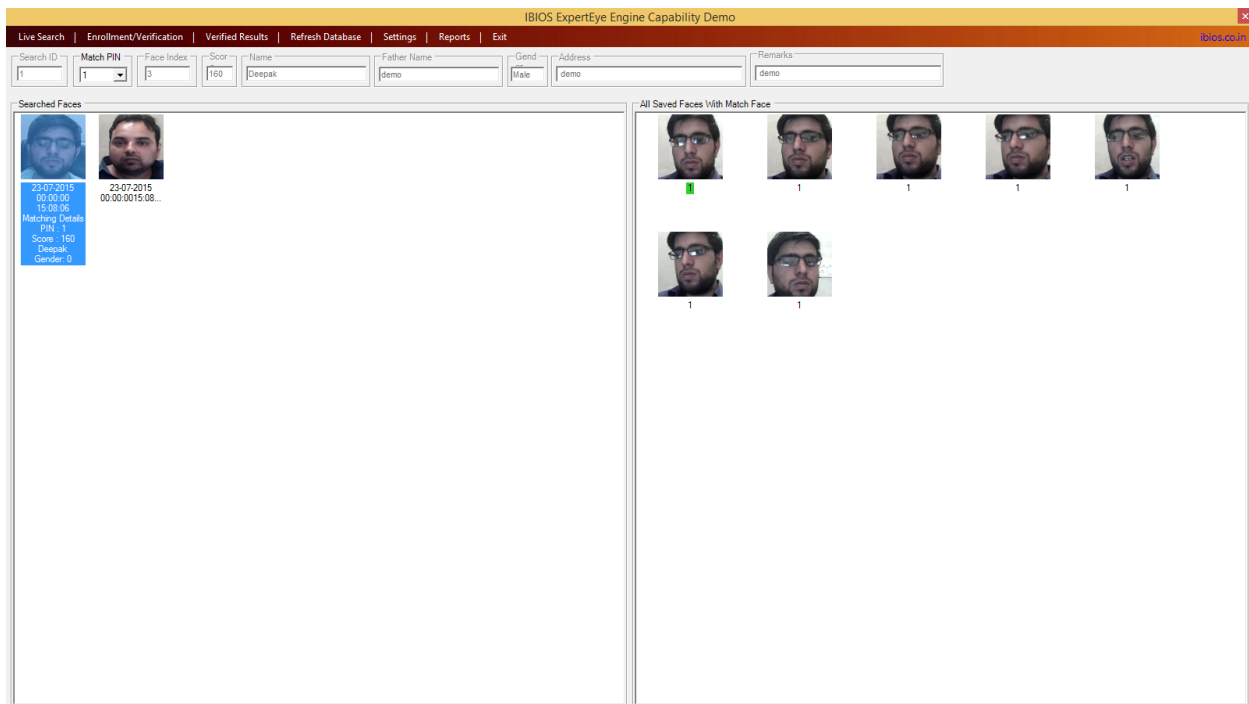
Capture Time: 23-07-2015 15:28:09
Camera IP: 192.168.1.10
Location: Store Room
Matching Score: 251
Face Confidence: 70

PIN: 2
Name: Shrikant
Parentage: demo
Gender: Male
Deployment: Machine Room
Address: demo

Send Alert! Log Full Profile Get Dossier

Face0 Face1

Confidence: 77 IP: 192.168.1.10 Store Room 23-07-2015 15:2755
Confidence: 71 IP: 192.168.1.10 Store Room 23-07-2015 15:2801



Basic Work Flow :

STEP BY STEP

Currently used by governments and private firms across the world, facial recognition is considered the least intrusive of biometric technologies

