



# License Plate Recognition (LPR) & Facial Verification linked to Access Cards

***MARSHALL INTERNATIONAL***

***Harold & David Marshall***

[www.marshall.co.za](http://www.marshall.co.za)



## **Requirement: Secure access control**

**The requirement is to provide Licence Plate Recognition (LPR) technology, linked to car colour, driver card and for Facial Capture / ID / Verification to facilitate secure ACCESS CONTROL.**

**The driver is linked by the facial biometric to the access card and the vehicle (colour and license plate) on entering and exiting.**

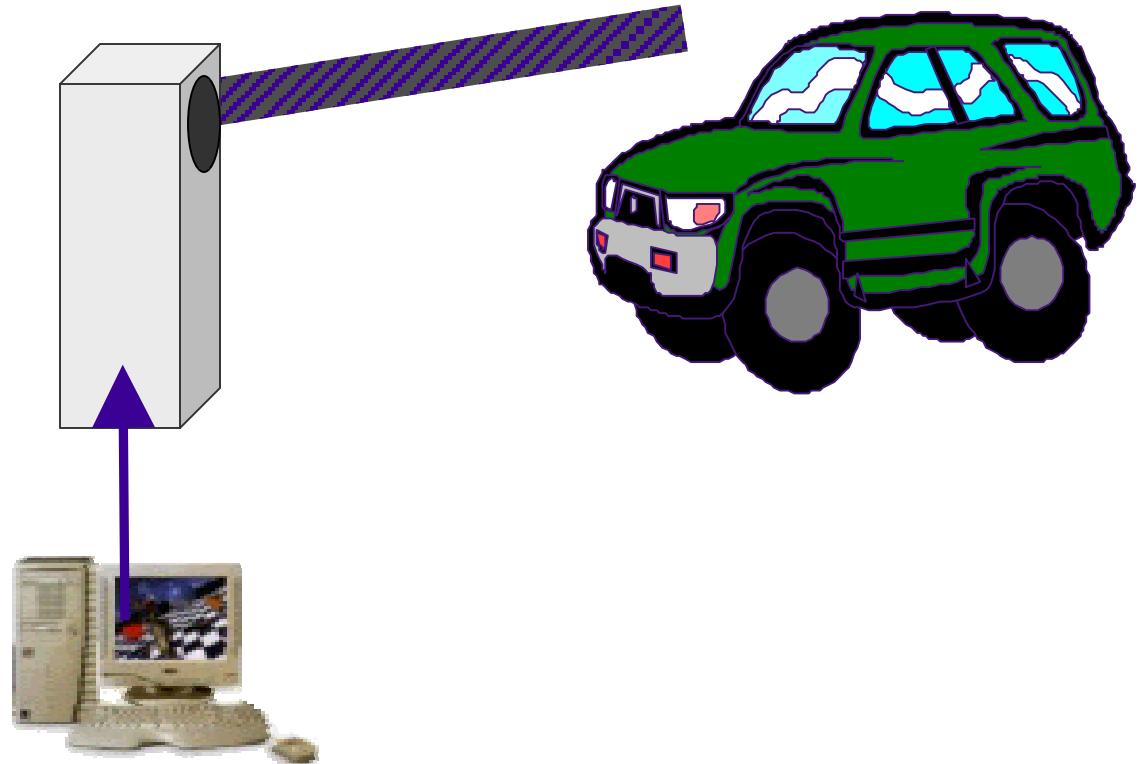
# PROCEDURE:

- LPR occurs as vehicle approaches boom,
- Then driver swipes access card,
- Facial Capture / Verification then occurs,
- Image capture of vehicle colour occurs,
- If all captured information matches the database, boom opens.
- If ANY information does not agree, guard called.
- LPR of vehicle plate front and back;



# LPR Installation for entry / exit monitoring

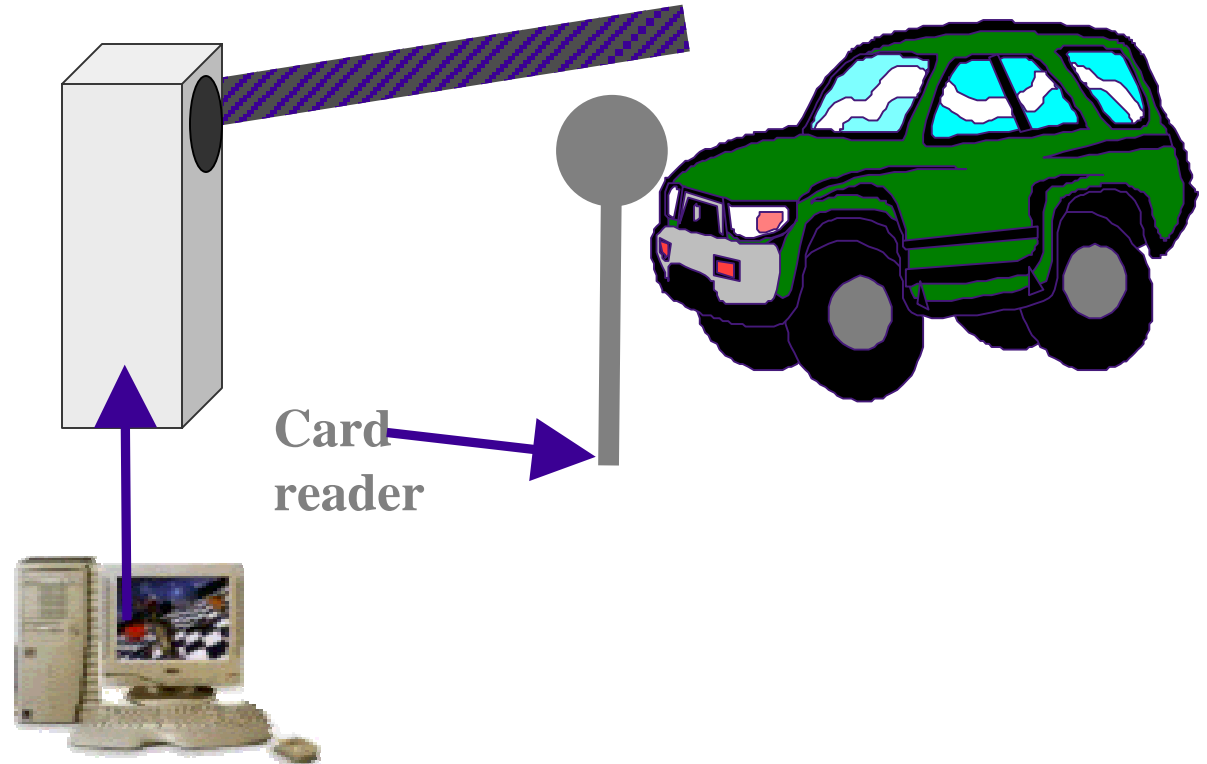
## Vehicle approaches entry





# LPR Installation for entry

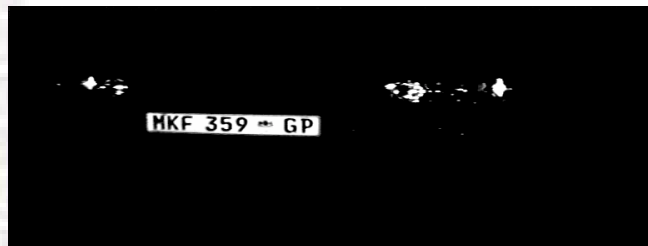
## Vehicle approaches entry



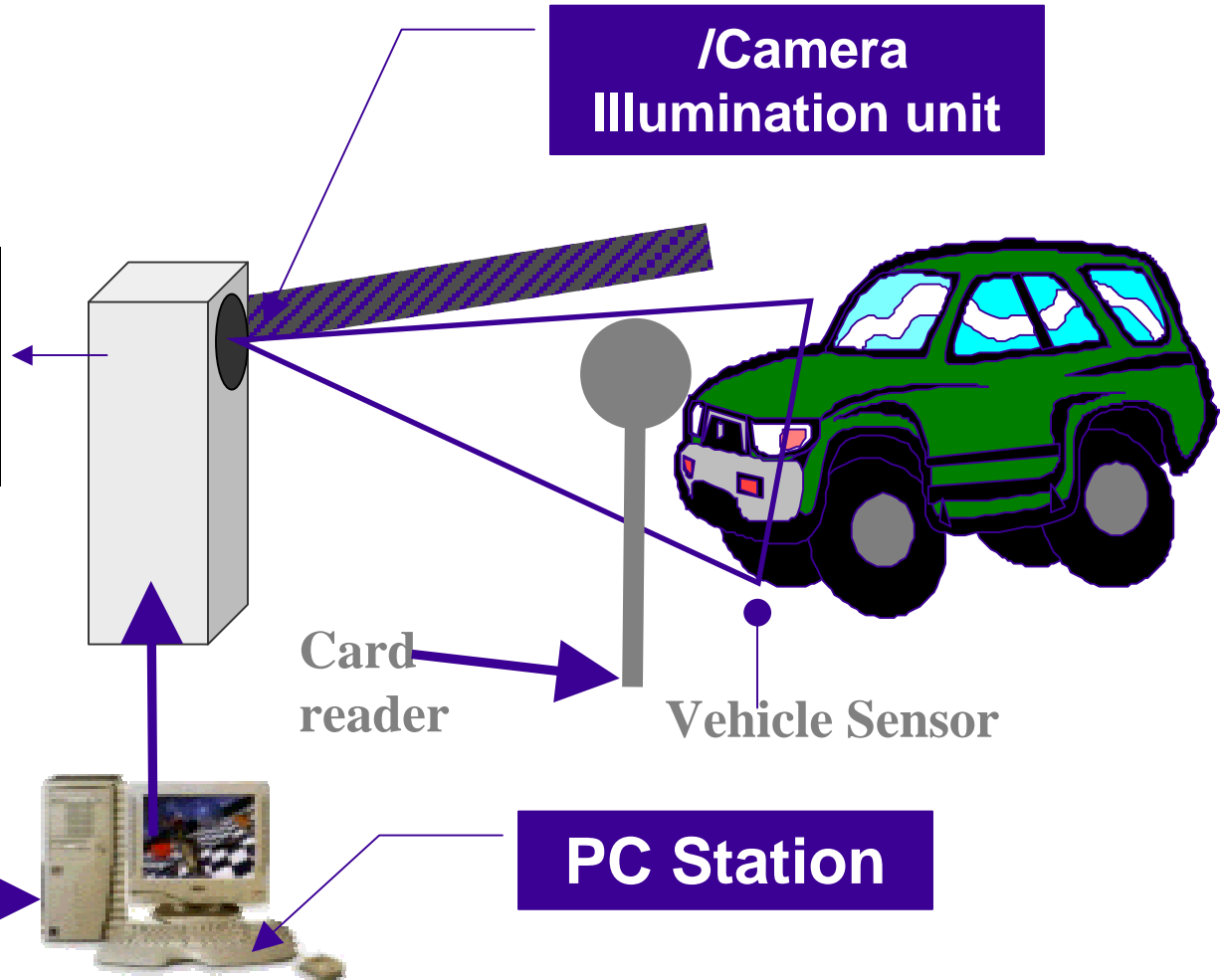


# LPR Installation for entry

Recognize plate number and compare to data base

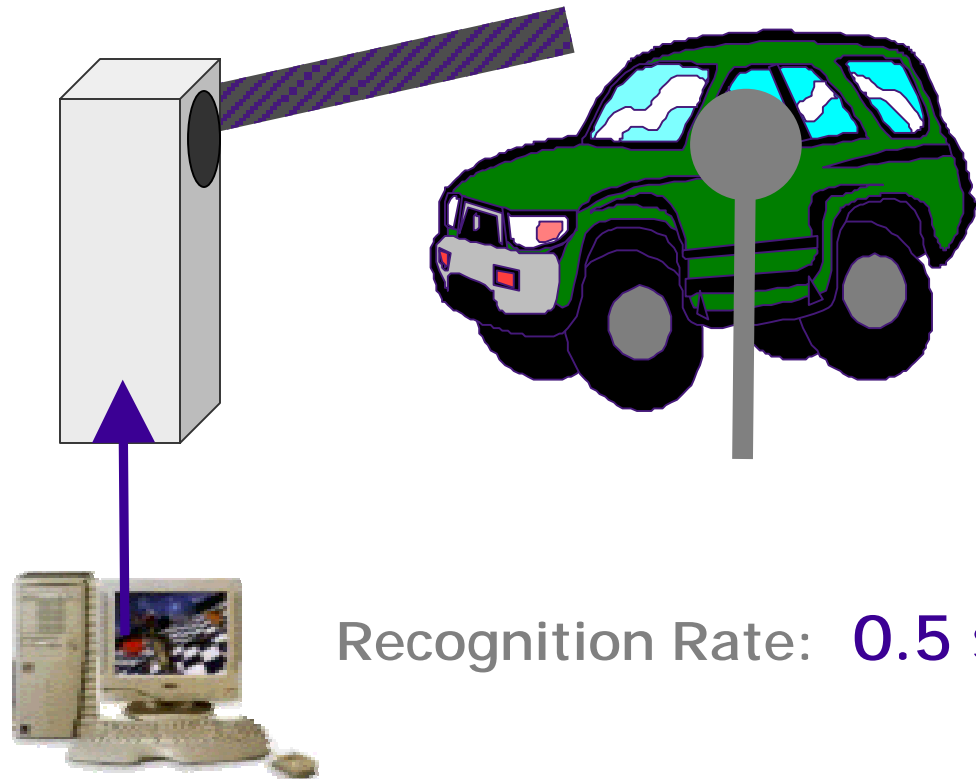


**MKF 359 GP**





# Vehicle approaches card reader stand



Recognition Rate: 0.5 sec

# Person presents card to card reader

Picture of driver is captured, possibly compared to database of allowed drivers



**FACIAL**

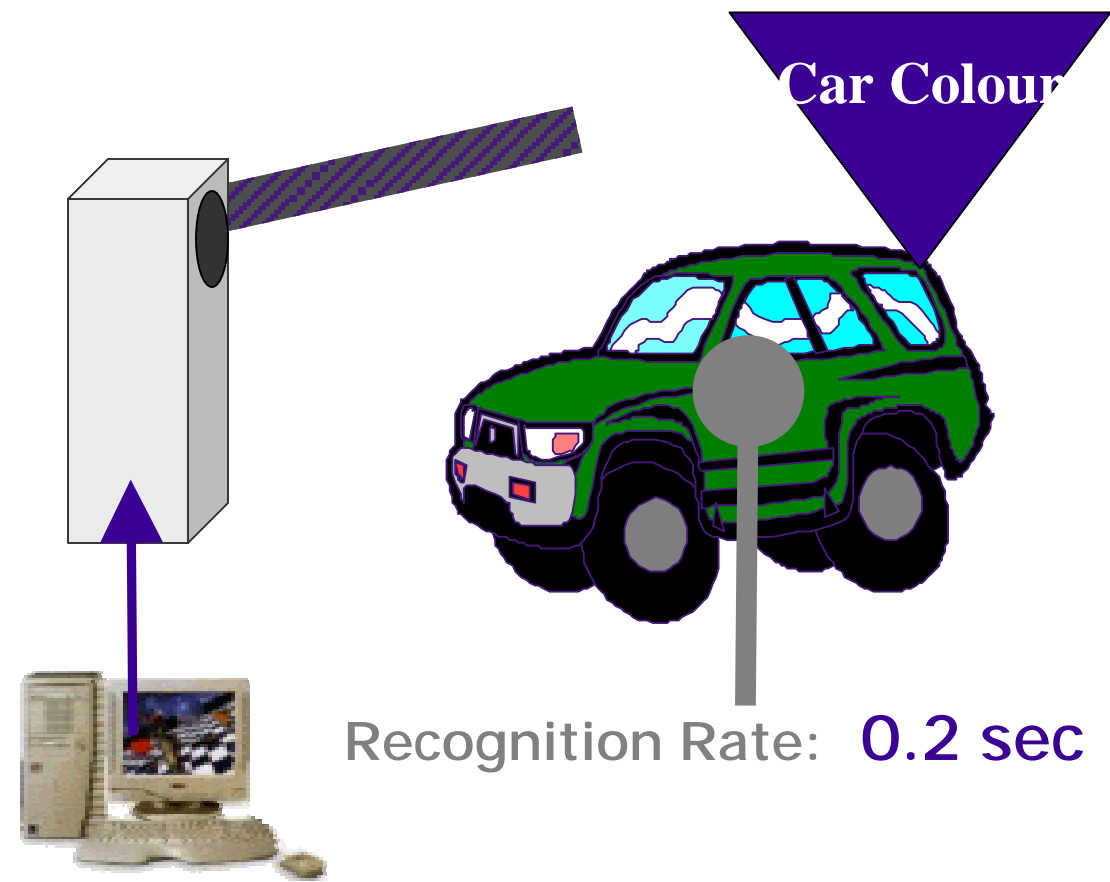
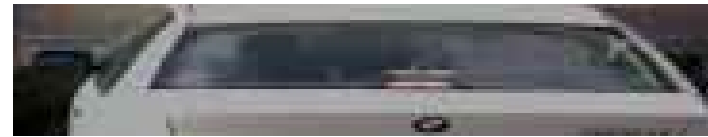
**Compared** →



Recognition Rate: **0.1 sec**

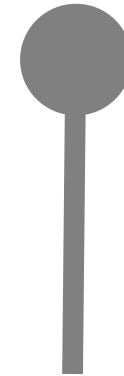
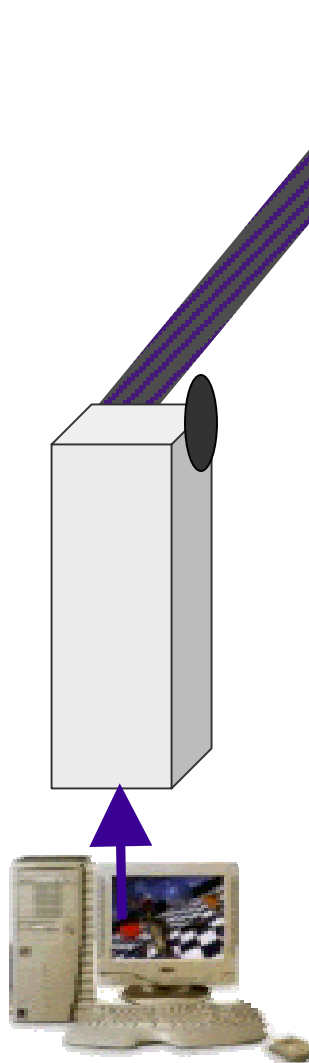
# Person presents card to card reader

Vehicle colour captured, possibly compared to database





**If Card, License Plate, Facial  
and Car Colour match entry in database, boom  
opens,  
IF NOT,  
guard called  
to investigate**



Total time required for an authorized driver, with the correct car (colour & license plate) and access card: **7 seconds**

# LPR Front End




LiveCam

File Edit View Help

Settings Live Data One UI

Lane 1 | Lane 2

NP-132785



**HI-TECH**  
*solutions*

Time	Event
4:40:30	Lane 1 - Sensor rising
4:40:31	Lane 1 - Sensor falling
4:40:33	Lane 1 - Sensor rising
4:40:34	Lane 1 - Gate opened
4:40:35	Lane 1 - Sensor falling
4:40:50	Lane 1 - Sensor rising
4:40:52	Lane 1 - Gate opened
4:40:52	Lane 1 - Sensor falling
4:41:37	Lane 1 - Sensor rising
4:41:38	Lane 1 - Gate opened
4:41:39	Lane 1 - Sensor falling
4:44:09	Lane 1 - Sensor rising
4:44:10	Lane 1 - Gate opened
4:44:11	Lane 1 - Sensor falling
4:50:35	Lane 1 - Sensor rising
4:50:36	Lane 1 - Sensor falling
4:55:20	Lane 1 - Sensor rising
4:55:21	Lane 1 - Sensor falling
4:58:39	Lane 1 - Sensor rising
4:58:40	Lane 1 - Gate opened
4:58:41	Lane 1 - Sensor falling

#	Vehicle code	L	Auth:	Name	Time
10	NLJ44067		Yes	barry t dudley	Sat Mar 12 16:4...
11	NLJ44067		Yes	barry t dudley	Sat Mar 12 16:4...
12	NP-132785		No		Sat Mar 12 16:5...
13	NP-132785		No		Sat Mar 12 16:5...
14	NP-132785		Yes	barry dudley	Sat Mar 12 16:5...

Ready

License 8031/None

# FRS Front End

The screenshot displays the 'FRS Front End' software interface. At the top, the 'Acsys' logo is visible. The main window features a large video feed of a man wearing glasses and a pink shirt, seated in the driver's seat of a white car. To the left of the video feed is a vertical toolbar with icons for 'Track', 'Clarity', 'Verify', 'Watch List', 'Track', and 'XT'. To the right is a vertical toolbar with buttons for 'Track', 'Clarity', 'ECover', 'Verify', 'Enter', 'Join/Leave Call', 'End Call', 'Hangup', 'Request more', 'About/Help menu', 'Video on/off', 'Track/View History', 'Text', 'Enter/Track without', 'Track/Post on', 'Event Log', 'Text', 'Connect/Disconnect', and 'Hangup'. At the bottom, there is a row of buttons for 'Download software', 'Download software', 'Download software', 'Hangup/Leave', 'Hangup/Leave', 'Hangup/Leave', 'Get/View', 'Get/View', 'Hangup/Ignore', 'DCE Test (Call)', and '10-44887'. A 'Hangup' button is also located at the bottom right.

# FRS LOG



Activity Log Viewer (Administrator) - Log1 - From 101

File Window Help

ACIS

ID	Date/Time	User Name	Computer Name	Activity Event
1	2005/03/12 15:20:18	BARRY DL	DEMOPUTURKX	Clearly Success Face
1	2005/03/12 15:20:58	BARRY DL	DEMOPUTURKX	Verily Success Face
2	2005/03/12 15:21:29	BARRY DL	DEMOPUTURKX	Verily Success Face
3	2005/03/12 15:22:38	BARRY DL	DEMOPUTURKX	Verily Success Face
4	2005/03/12 15:24:29	BARRY DL	DEMOPUTURKX	Verily Failure Face
5	2005/03/12 15:25:07	BARRY DL	DEMOPUTURKX	Verily Failure Face
6	2005/03/12 15:26:03	BARRY DL	DEMOPUTURKX	Verily Success Face
7	2005/03/12 15:26:44	BARRY DL	DEMOPUTURKX	Verily Failure Face
8	2005/03/12 15:34:04	BARRY DL	DEMOPUTURKX	Verily Success Face
9	2005/03/12 15:35:02	BARRY DL	DEMOPUTURKX	Verily Success Face
10	2005/03/12 15:39:57	BARRY DL	DEMOPUTURKX	Verily Success Face
11	2005/03/12 15:30:18	BARRY DL	DEMOPUTURKX	Verily Failure Face
12	2005/03/12 16:25:38	BARRY DL	DEMOPUTURKX	Clearly Failure Face
13	2005/03/12 16:26:41	BARRY DL	DEMOPUTURKX	Clearly Failure Face
14	2005/03/12 16:33:08	BARRY DL	DEMOPUTURKX	Test result Success Else
15	2005/03/12 16:33:57	BARRY DL	DEMOPUTURKX	Verily Success Face
16	2005/03/12 16:40:29	BARRY DL	DEMOPUTURKX	Verily Success Face
17	2005/03/12 16:40:58	BARRY DL	DEMOPUTURKX	Verily Success Face
18	2005/03/12 16:41:41	BARRY DL	DEMOPUTURKX	Verily Success Face
19	2005/03/12 16:44:14	BARRY DL	DEMOPUTURKX	Verily Success Face
20	2005/03/12 16:55:28	BARRY DL	DEMOPUTURKX	Verily Success Face
21	2005/03/12 16:56:43	BARRY DL	DEMOPUTURKX	Verily Success Face
22	2005/03/12 17:03:43	BARRY DL	DEMOPUTURKX	Verily Success Face
23	2005/03/12 18:19:06	BARRY DL	DEMOPUTURKX	Verily Success Face
24	2005/03/12 18:19:19	BARRY DL	DEMOPUTURKX	Verily Success Face
25	2005/03/12 18:19:05	BARRY DL	DEMOPUTURKX	Verily Success Face
26	2005/03/12 18:20:06	BARRY DL	DEMOPUTURKX	Verily Success Face
27	2005/03/12 18:22:26	BARRY DL	DEMOPUTURKX	Verily Success Face
28	2005/03/12 18:25:38	BARRY DL	DEMOPUTURKX	Verily Success Face
29	2005/03/12 18:25:51	BARRY DL	DEMOPUTURKX	Verily Success Face
30	2005/03/12 18:26:28	BARRY DL	DEMOPUTURKX	Verily Success Face
31	2005/03/12 20:06:38	BARRY DL	DEMOPUTURKX	Verily Success Face
32	2005/03/12 20:16:53	BARRY DL	DEMOPUTURKX	Verily Success Face
33	2005/03/12 20:18:19	BARRY DL	DEMOPUTURKX	Verily Success Face
34	2005/03/12 20:18:28	BARRY DL	DEMOPUTURKX	Verily Success Face

24 2005/03/12 16:19:04

25 2005/03/12 16:19:07

26 2005/03/12 16:19:08

27 2005/03/12 16:19:09

28 2005/03/12 16:19:10

29 2005/03/12 16:19:11

30 2005/03/12 16:19:12

31 2005/03/12 16:19:13

32 2005/03/12 16:19:14

33 2005/03/12 16:19:15

34 2005/03/12 16:19:16

# LPR LOG



## LICENSE PLATE, LANE, USER, DATE

HFP848GP,.....,1,Yes,Rachel Tim,Sat Aug 14 09:05:16 2004,  
KBW141GP,.....,2,No,,Sat Aug 14 09:05:18 2004,  
MKF359GP,.....,1,Yes,David Smith,Sat Aug 14 09:05:20 2004,  
LJD977GP,.....,3,No,,Sat Aug 14 09:05:22 2004,  
ND474276,.....,2,Yes,Daniel Bush,Sat Aug 14 09:05:24 2004,  
DYK370GP,.....,3,No,,Sat Aug 14 09:05:30 2004,  
LGW487GP,.....,1,Yes,Goldy Luck,Sat Aug 14 09:05:36 2004,  
KPR835GP,.....,3,No,,Sat Aug 14 09:05:38 2004,

All images are kept

## LOG FOR A SINGLE EVENT

Added,1,NP192785,100,100,100,100,100,100,100,100,100  
Added,2,NP132785,100,100,100,100,100,100,100,100,100  
Added,3,NP12785,91,100,100,75,100,100,100,100  
Added,4,NP12785,91,100,100,75,100,100,100,100  
Best,2  
Result,NP132785

Added,1,NP132785,95,100,100,100,100,100,100,100,100  
Added,2,NP132785,100,100,100,100,100,100,100,100,100  
Added,3,NP132785,100,100,100,100,100,100,100,100,100  
Added,4,NP12785,96,100,100,75,100,100,100,100  
Best,3  
Deleted,4  
Result,NP132785

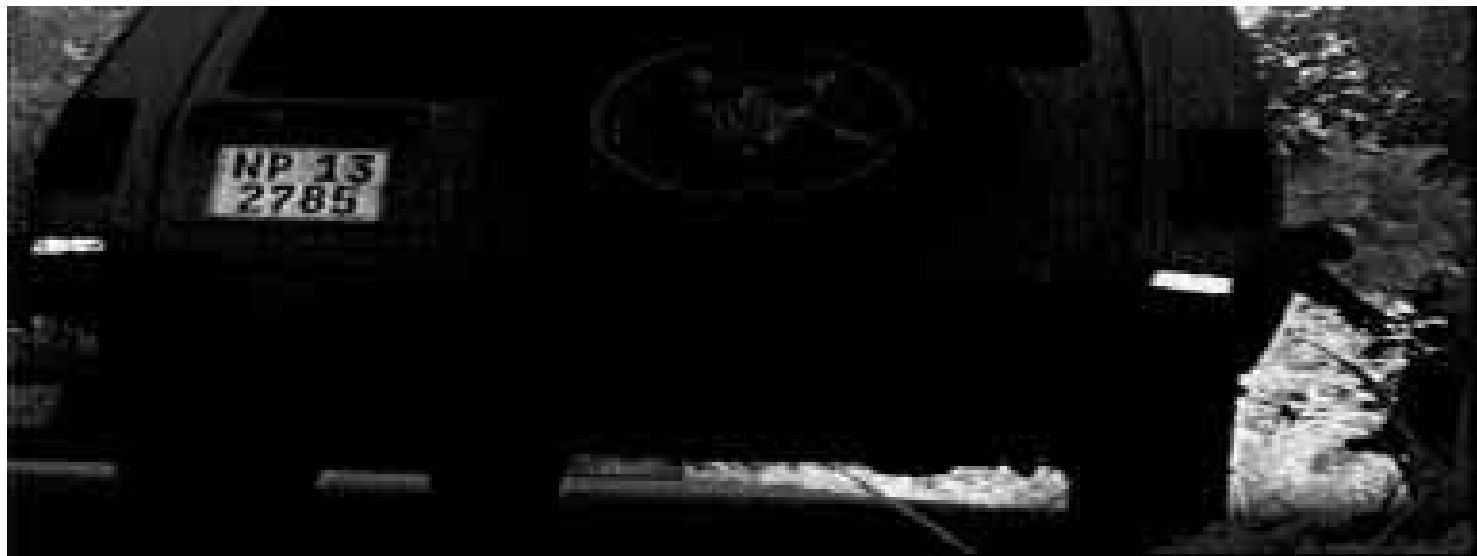
Added,1,NU44667,99,100,100,100,100,100,100,100,100  
Added,2,NU44667,99,100,100,100,100,100,100,100,100  
Added,3,NU44667,99,100,100,100,100,100,100,100,100  
Added,4,NU44667,99,100,100,100,100,100,100,100,100  
Added,5,NU44667,99,100,100,100,100,100,100,100,100  
Added,6,NU446M7,75,100,100,100,100,30,40,100  
Best,3  
Deleted,6

Result,NU44667

# Land Rover 4X4 LOG - Facial

The screenshot displays the Acsys facial recognition software interface. The central window shows a video feed of a man with glasses and a pink shirt sitting in the driver's seat of a vehicle. The interface includes a top menu bar with the Acsys logo and a green progress indicator. On the left side, there is a vertical toolbar with icons for Track, Classify, Verify, and Track Live. On the right side, there is a vertical toolbar with buttons for Track, Classify, Score, Verify, Extract, Database, Evaluate, Register, Authenticate, and Track Time. At the bottom, there is a status bar with various system information and a 'Connect' button.

# Land Rover 4X4 LOG - LPR



# VW Jetta LOG - FRS



# VW Jetta LOG - LPR





## **Solution Proposed** This solution allows: -

- Multiple image capture by high resolution LPR camera's;
- License plate finding within the image;
- License plate number reading at a high accuracy (with multiple cameras used in stereo);
- Multiple image capture by high resolution cameras of the driver and vehicle colour;
- Linking of license plate number and Facial ID or verification of driver with an Access Card, so that both card, face, car colour and license plate have to match in order for boom to open.
- Log of number, date, time, lane & image of all vehicles enter/exit the facility;
- Audio Alarm if a wanted / prohibited vehicle detected
- Recording vehicle load and overall view as an option.



LPR

# License Plate Recognition

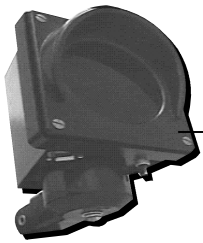
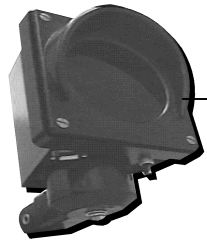


# System description

- *Licence Plate Recognition is a non-intrusive, computerised method of matching a Vehicle Licence Plate to a database of registration numbers.*
- **System includes camera/illumination units, hardware and software (application + recognition library)**
- **Automatically reads License Plate number**
- **Displays, records and transmits vehicle image and recognition results**
- **Can compare plate number to data base - and optionally open gate or activate alarm**



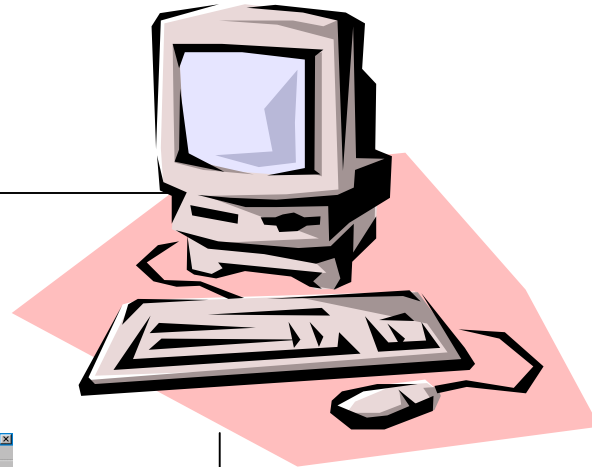
# LPR system



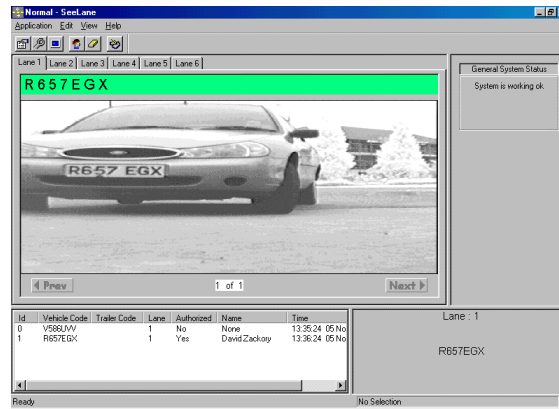
**Camera/Illumination  
Units**  
(Up to 4 per system)



**Frame Grabber**



**PC Station**



**LPR Software**

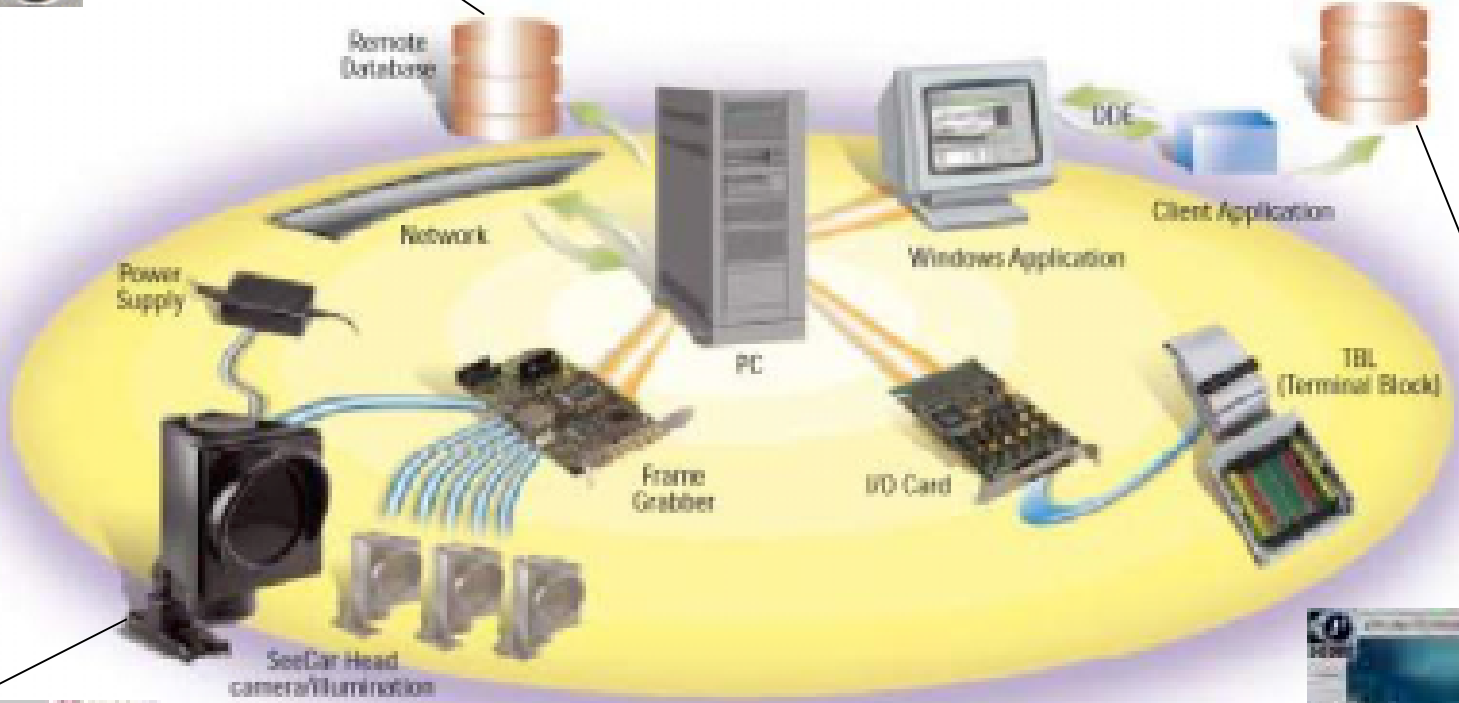
**Included Hardware**  
**I/O Card + Terminal Block**

**Power Supply for SCH**

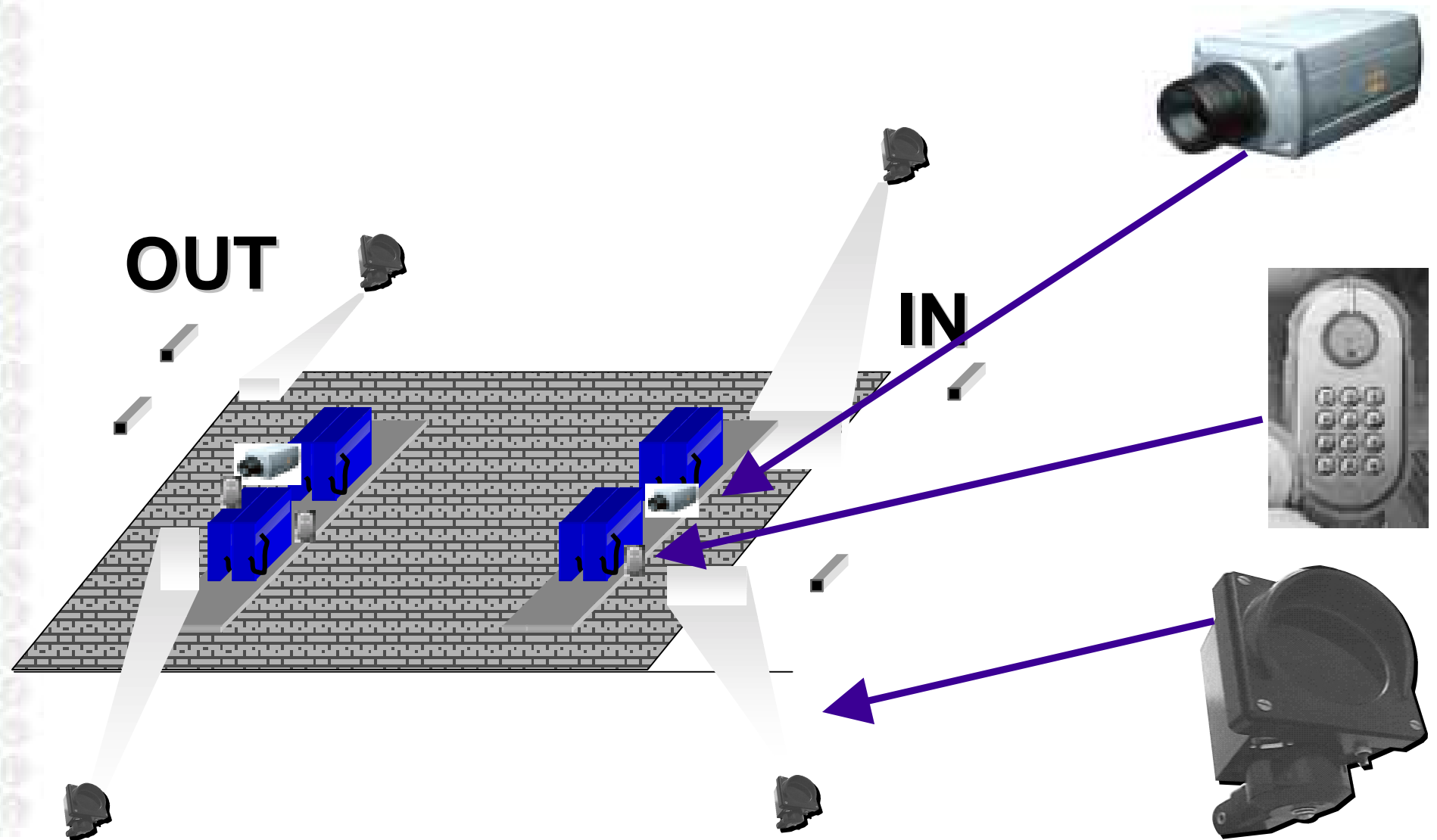
# Configuration



Typical SeeLane Configuration



# GATE : 1 lane IN; 1 lane OUT



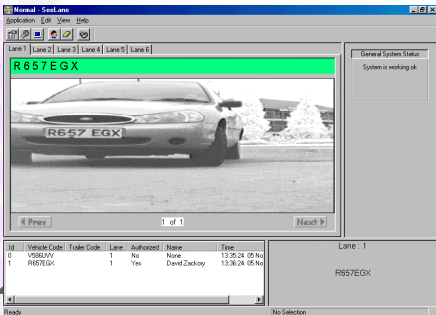
# LPR system



PC Station



Frame Grabber



LPR Software

IR & CCTV cameras linked to DVR system



DVR HW Software

View and Edit members list

You can add a new member, delete, edit or find an existing one.

Member ID	Code	First	Last		Add...
4580	NU24352	5183582	67012050448...		
4581	NI110499	5183510	38092851471...		
4582	ND389630	9372139	73102851440...		Edit...
4583	NPN27873	9373466	65060657470...		Find...
4584	NDC6143	9376063	54082950140...		Delete
4585	KZ24277	9376079	73091400390...		
4586	ND15073	9376097	6512285300...		
4587	ND368679	9376104	47022051500...		
4588	NPN41721	9376161	58101151400...		
4589	NPN60331	9376272	60123007890...		
4590	ND441094	9376279	69070150560...		
4591	ND513343	9376387	67041156090...		Close

Allowed Database LIST  
WANTED LIST



**FRS**

# Facial Recognition System



## Facial Recognition

### 2D vs 3D

- ❗ **2D systems typically used for identification comparing an image captured with static images. Security personnel tries to find a match**
- ❗ **3D systems typically used for verification of people or for identifying with minimal or no personnel involvement**



# Facial Recognition

## 3D System

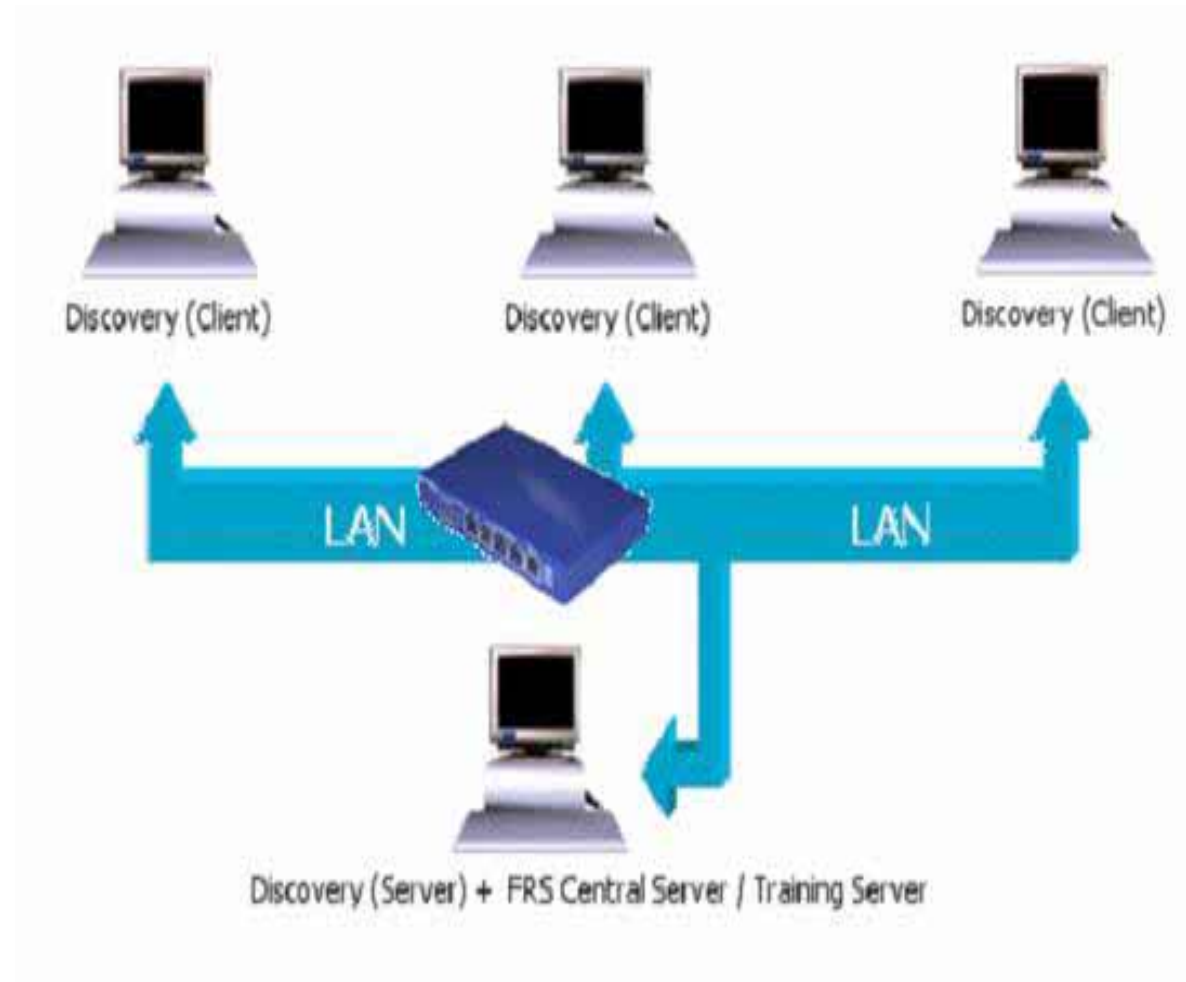
Deploying HNET 3D technology to verify people enrolled in the system



## Facial Recognition

3D System – How does this get connected?

FRS Network (multiple clients, one server): -





## Facial Recognition

3D System – What are the benefits?

Speed, accuracy and intelligence are among the key qualities



# Facts, features and benefits *of facial recognition*

New real-time security alternatives are a reality today, says Lodge, with its lightning fast face recognition system. A leading developer of mission critical retail solutions, Lodge says it is committed to leadership, responsiveness and unparalleled results. "We are driven to empower our clients and partners to go beyond tradition to create new benchmarks for security. Accuracy is everything."

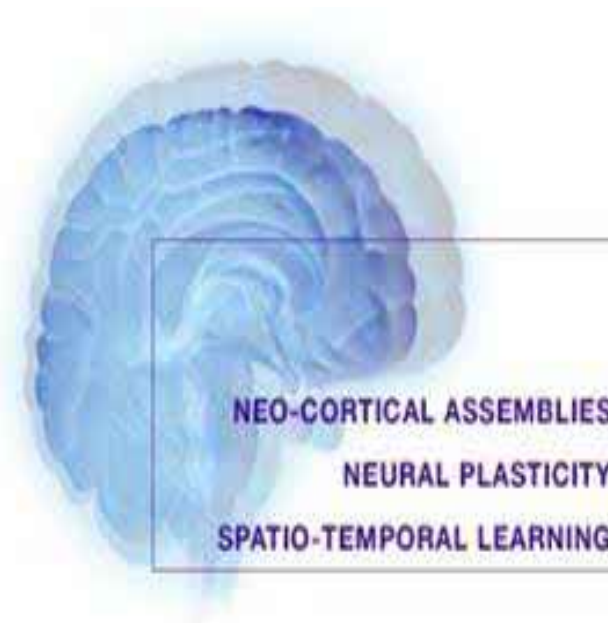
48 Security Focus April 2004



## Facial Recognition

### 3D System – Speed

Using a revolutionary core technology HNet, based on neural networks, I-CUBE facial recognition delivers cutting-edge security and split-second processing times.



# Facial Recognition

## 3D System – Accuracy

The proposed FRS was the most accurate technology tested in the International Biometric Group’s Comparative Testing for IT Security and E-Commerce

Activity Log Viewer - [Log] [Print]

Acis

ID	Date/Time	User Name	Computer Name	Activity Detail
0	2004/11/18 12:21:00	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
1	2004/11/18 13:30:22	DAVID MARSHALL	DEMOPUTER01	Verify Failed Face
2	2004/11/17 14:23:57	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
3	2004/11/17 12:57:11	DAVID MARSHALL	DEMOPUTER01	Verify Failed Face
4	2004/11/17 12:23:04	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
5	2004/11/17 09:38:29	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
6	2004/11/17 09:38:24	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
7	2004/11/17 09:38:20	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
8	2004/11/17 09:38:17	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
9	2004/11/17 09:38:13	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
10	2004/11/17 09:38:09	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
11	2004/11/17 09:38:05	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
12	2004/11/17 09:38:01	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
13	2004/11/17 09:37:58	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
14	2004/11/17 09:37:54	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
15	2004/11/17 09:37:50	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
16	2004/11/17 09:37:46	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
17	2004/11/17 09:37:42	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
18	2004/11/17 09:37:38	DAVID MARSHALL	DEMOPUTER01	Verify Failed Face
19	2004/11/17 09:37:34	DAVID MARSHALL	DEMOPUTER01	Verify Success Face
20	2004/11/17 09:37:30	DAVID MARSHALL	DEMOPUTER01	Verify Success Face



## Facial Recognition

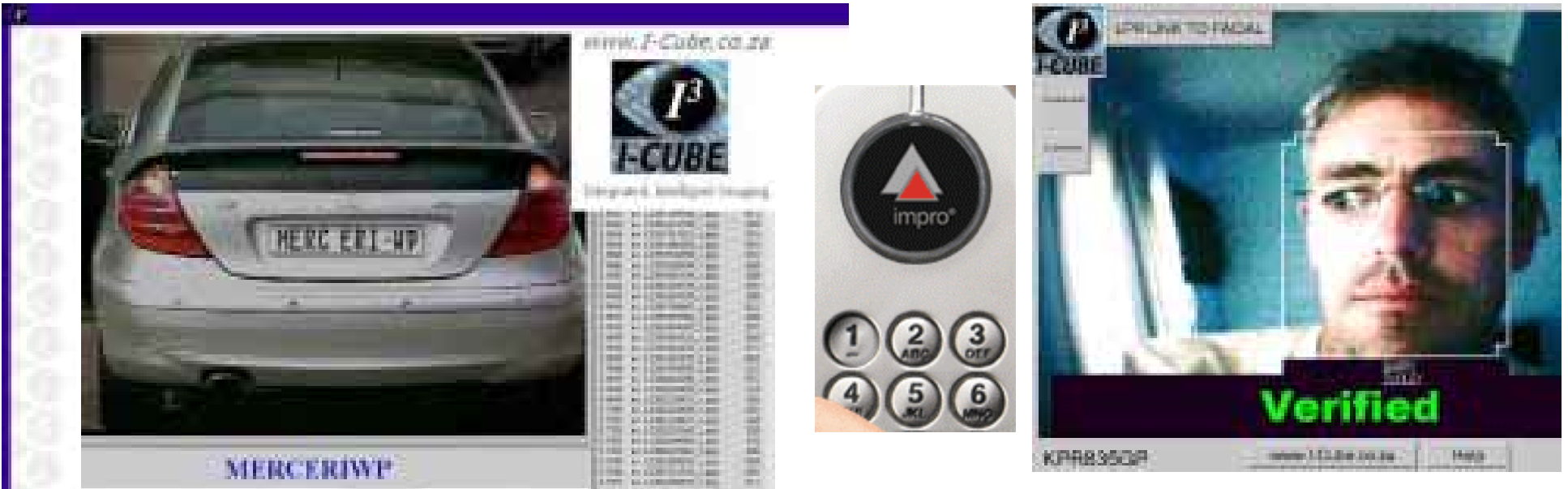
### 3D System – Intelligence

The proposed FRS learns, remembers and recognises, becoming more familiar with your face each time it sees you, adjusting for difference due to aging and cosmetics.

**Fred Bloggs**

250 image(s) - 0 image(s) selected

Image ID	Timestamp
1	11/11/04 10:34:30
2	11/11/04 10:34:44
3	11/11/04 10:34:49
4	11/11/04 10:34:51
5	11/11/04 10:34:58



# License Plate Recognition (LPR) & Facial Verification linked to Access Cards

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