DESIGN, SUPPLY, INSTALL & TRAINING OF TRUCK OVERNIGHT MONITORING SYSTEM

VERSION 2

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ABSTRACT

Consistent, real-time License Plate Recognition (LPR) for vehicles passing through the covered entry and exit lanes will be provided to accommodate the need for reliable traffic data, including how many trucks stay longer than 1 hour. The system can integrate multiple lanes and multiple cameras per lane into a sophisticated vision-based LPR system that identifies and tracks number plates on vehicles travelling past the cameras. The LPR system will capture all vehicles entering and exiting the lanes, storing the vehicle image, license plate if present, date, time, lane and other data as required. The raw data can be imported into any statistical package for detailed analysis. The time the vehicle was on site will be established and recorded. All of the field systems which generate the traffic data employ the same SeeCar OCR engine, which will run on the local processing units. The OCR engine processes images, locates the relevant license plate ID in the image, and produces an alphanumeric result for each image processed. The OCR engine is based on neural network technology and can be trained to recognize different fonts, characters and syntax. Using outputs of several cameras, a back end program is used to calculate the number of vehicles per time period and expected income from truck overnight parking.

The financial offering for the advanced LPR solution is provided as:

- A once off capital amount of R211, 008.00 OR
- A rental (hire) option R8 967.84 OR
- An option for a cost per image solution (45c per plate).

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INTRODUCTION

Overview

The Truck Logging System (TLS) Solution will be provided to accommodate the need for consistent, real-time truck data. The truck traffic data will come from the License Plate Recognition (LPR) of all vehicles passing through the covered transport (entry / exit) lanes. The system, referred to as the TLS, will provide a take-and-discard methodology for the vehicles' video and license plate data. Vehicles using the lanes will be captured allowing proactive, real time reaction to vehicles spending more than an hour on site. The road side portion of the solution proposed uses the See Lane DLL software.

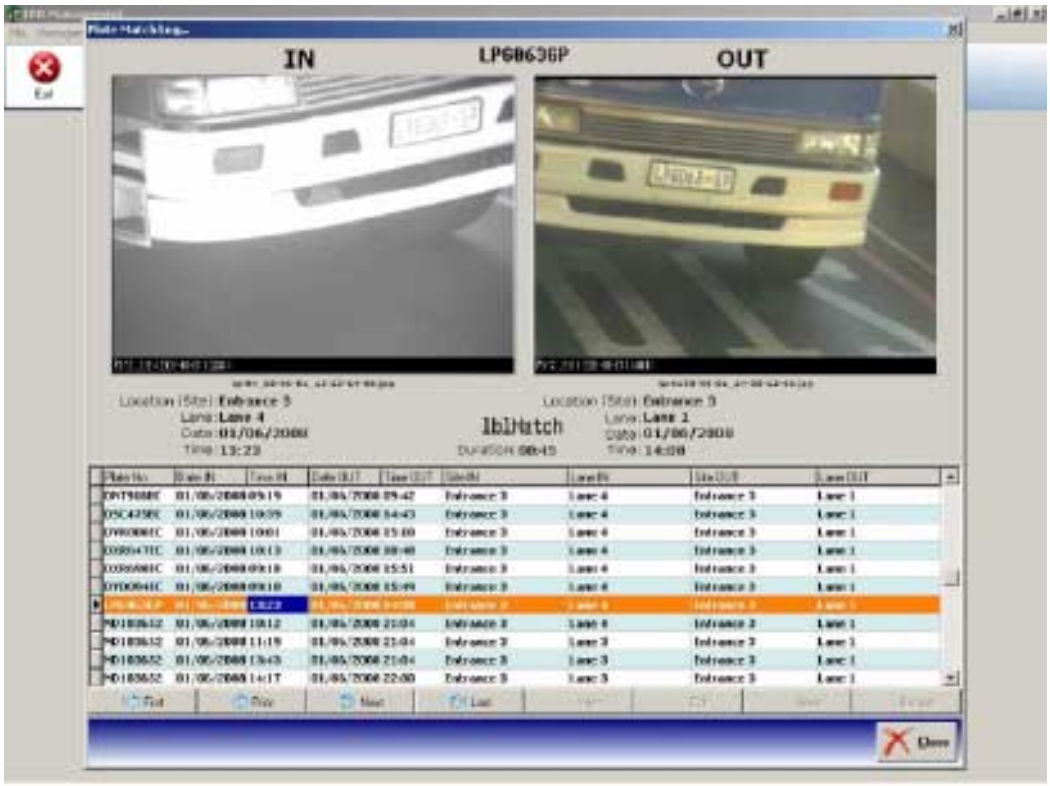
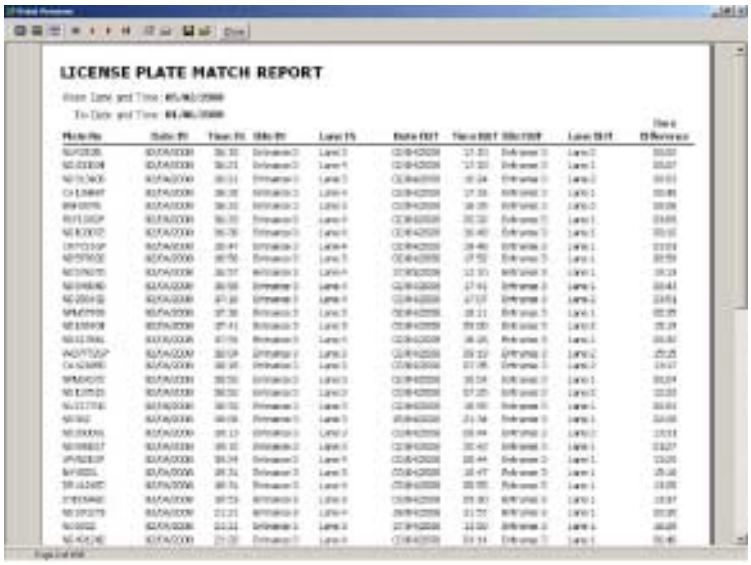


Figure 1 Time on site calculated at 45 min

The See Lane DLL is a state-of-the-art vision based recognition system for medium speed roadside installations. The system can integrate multiple lanes and multiple cameras per lane into a sophisticated vision-based License Plate Recognition (LPR) system that identifies and tracks number plates on vehicles travelling at medium speeds. The system is used world wide for various applications, including traffic data analysis, toll roads, rush hour monitoring and average speed and car flow studies. The application is supported by a full set of optical and hardware sub-systems as well as software applications and utilities.

The system will work to detect and capture the license plate information for every vehicle passing through the covered lanes. It will be the responsibility of the motion detection software to determine vehicle presence, via the advanced digital recording software. The TLS cameras will then capture a set of images, the See Lane DLL will process these and output the best image and the resulting license plate, lane, time and associated data to the network. The on site servers will capture the data for further processing as required.



- **Flow estimation** – the number of vehicles on site per time period.
- **On-line reports** – the information can be reported in order to supply live reports from the site.
- **Monitoring** – the recognition information may be used for various security applications.
- **Average Time** – using outputs of several cameras, a back end program can be used to calculate the average time on site of the vehicles.
- **Enforcement** - The license plate data can be used for a wide range of enforcement techniques, including alarm on stolen vehicles, prevention of drive away etc..

Figure 2 Example of a typical match report

Figure 3 See Truck plate capture

System description:

The proposed system consists of a number of lanes, within the truck stop area, with multiple cameras monitoring the specific areas. Each camera is connected wirelessly to an IP switch which allows any of the connected computers to view and process the data obtained from the cameras. If any of the cameras goes down, an alarm is generated immediately. If any of the computers fail, the other computers automatically take over the processing of the cameras attached to that computer.

All vehicles passing the camera will be recorded in terms of the time, lane, direction, license plate (if present), automatic detection of unauthorized vehicles, an alarm if the vehicle is wanted (black list) and other database operations.

Block Diagram

A breakdown of the proposed system is shown in the following illustration, which shows a typical configuration of the LPR system (single lane). Although a monitor is shown, it is optional, and a remote access thru the network is usually the standard configuration.

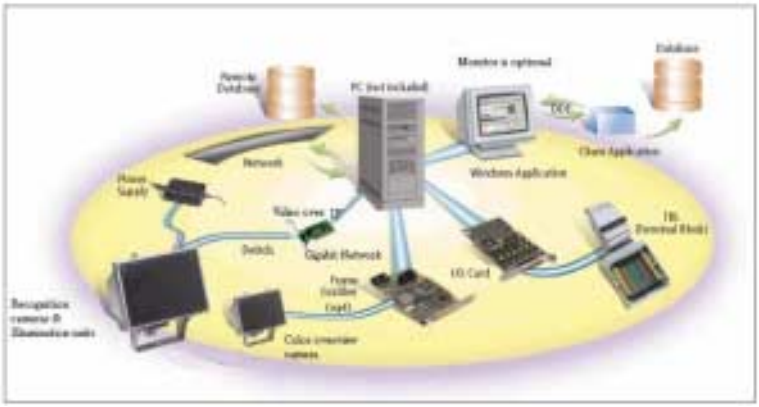


Figure 4 See Lane Connectivity

Figure 5 See Truck plate capture

SITE LOCATION

Figure 6 Overview of the Mooi River Truck EXIT / ENTRANCE

Figure 7 Mooi River Site Front Camera View

Figure 8 Site Tugela Truck Inn Front Camera View on vehicle Exit

Figure 9 Site Tugela Truck Inn Entrance and Exit lane locations

Site Layout: Installation

The design of the system allows for a motion trigger. For each trigger a series of images will be captured. The images will then be automatically reviewed by the application running on the Lane Controller, and the best result will be selected among all identifications. The application will also select the best image to be reported that will contain the plate image. Once a result is determined, the data will be sent by a message to the server.

Figure 10 With no front plate present a Rear camera could provide valuable information

The above truck would be listed as a trigger; however no plate would be recorded from the front view. In phase two the rear cameras proposed would resolve the above.

Figure 11 A rear camera would recognise the trailer plate of the above truck

TRUCK LOGGING

System Architecture: Overview

The system is based on Hi-Tech Solutions' Vehicle License Plate Recognition (LPR) stand-alone systems. Multiple LPR units are installed at several permanent sites (2) located at the entrance and exit to the truck overnight parking area. Each LPR system performs real-time recognition on passing trucks in a single traffic lane. The LPR unit is based on a Windows application that controls its integrated camera/illumination unit and an LPR recognition engine.

Figure 12 Image Capture and OCR

Each LPR unit reports the vehicle recognition events via TCP/IP network messages to a central computer in the traffic control room. The central computer application reads the recognition results from all sites, calculates the travel data (in real-time), and displays it to the operator.

Images and video clips

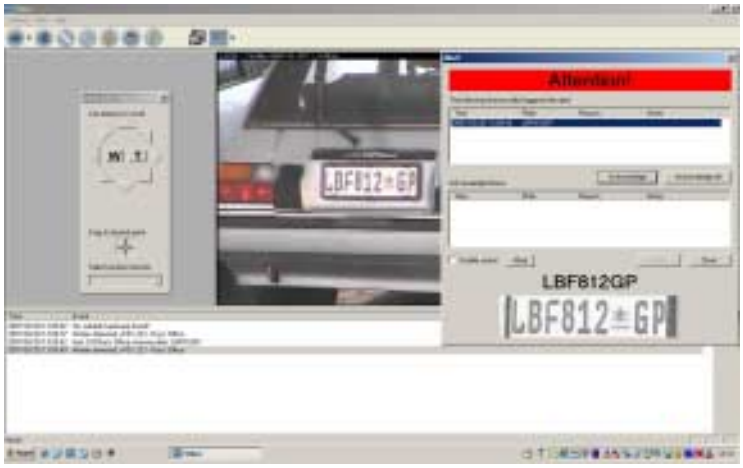


Figure 13 Rear LPR capture and recognition with alarm

LOG OF EVENTS

Figure 14 Log of the data and images from each site

Figure 15 Vehicle Logged

Truck Onsite Determination

The following is an example of software developed using the information generated from the LPR hardware and software in the field. The SeeCarFlow application uses the data generated by a number of LPR sites the field for various applications.

Overview

The central application receives recognition updates from all the sites, analyzes the data and matches the vehicle appearances, calculates the data and stores it to database, and displays it in real time.

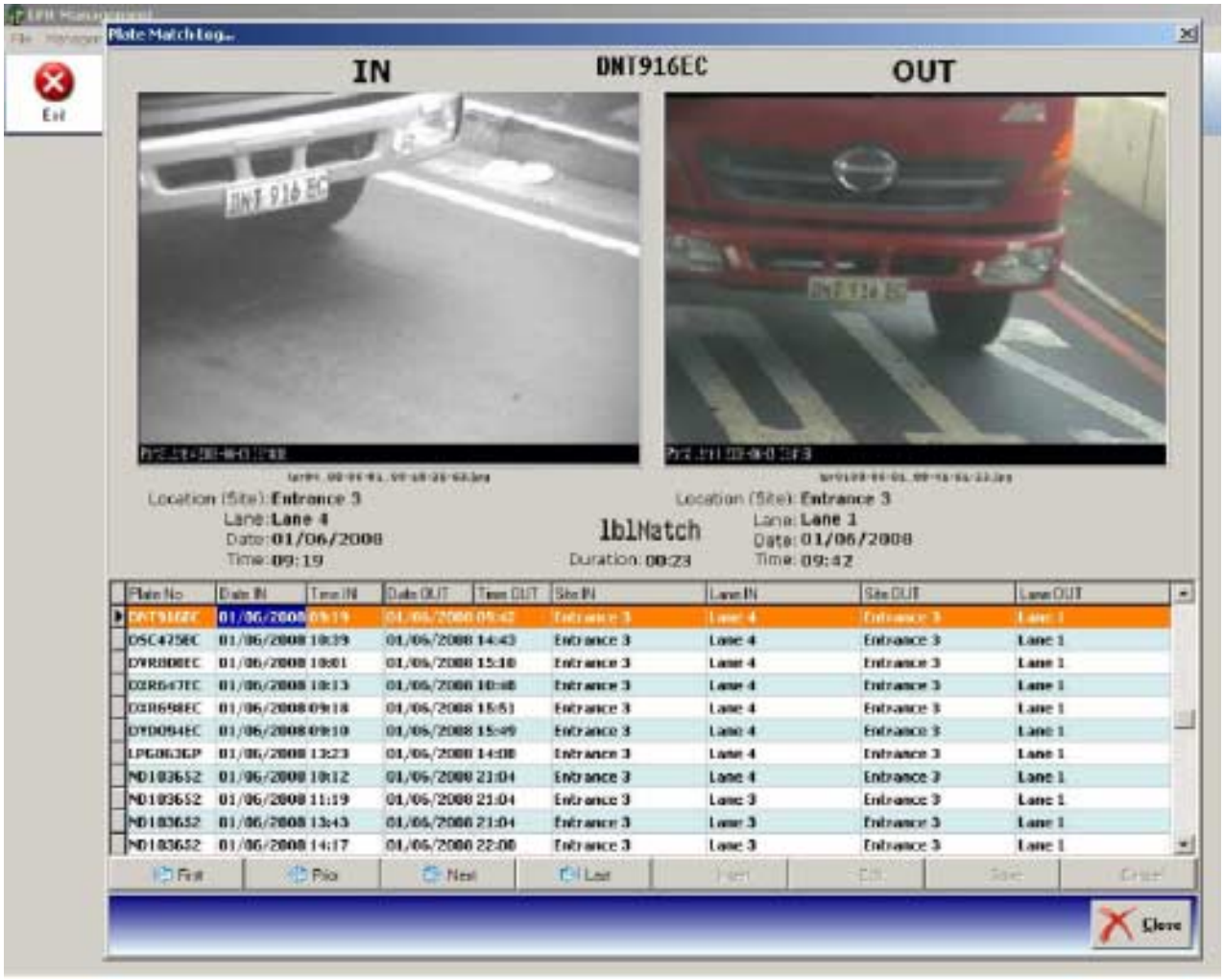


Figure 16 Time IN and Time OUT

TRUCK TIME ON SITE

The solution consists of 2 LPR cameras, with the LPR software at each site. Two overview cameras are NOT included, allowing the truck to be captured when no plate exists or additional info is required. The cameras will be wirelessly connected to the new PC in the main office, with NO link to the homes on site allowing live and remote viewing. All this data is backed up offsite. The install cost included all cables and material required, other than those detailed below, including permission, power, poles and an ADSL link.

Three payment options are offered:

- A capital amount of R211 008.00 (VAT Excluded) for both sites OR
- A monthly rental of R8 967.84 (VAT Excluded) for both sites OR
- A cost per image of 45c per vehicle (VAT Excluded).

You select the best financial option for your current cash flow and long term requirements.

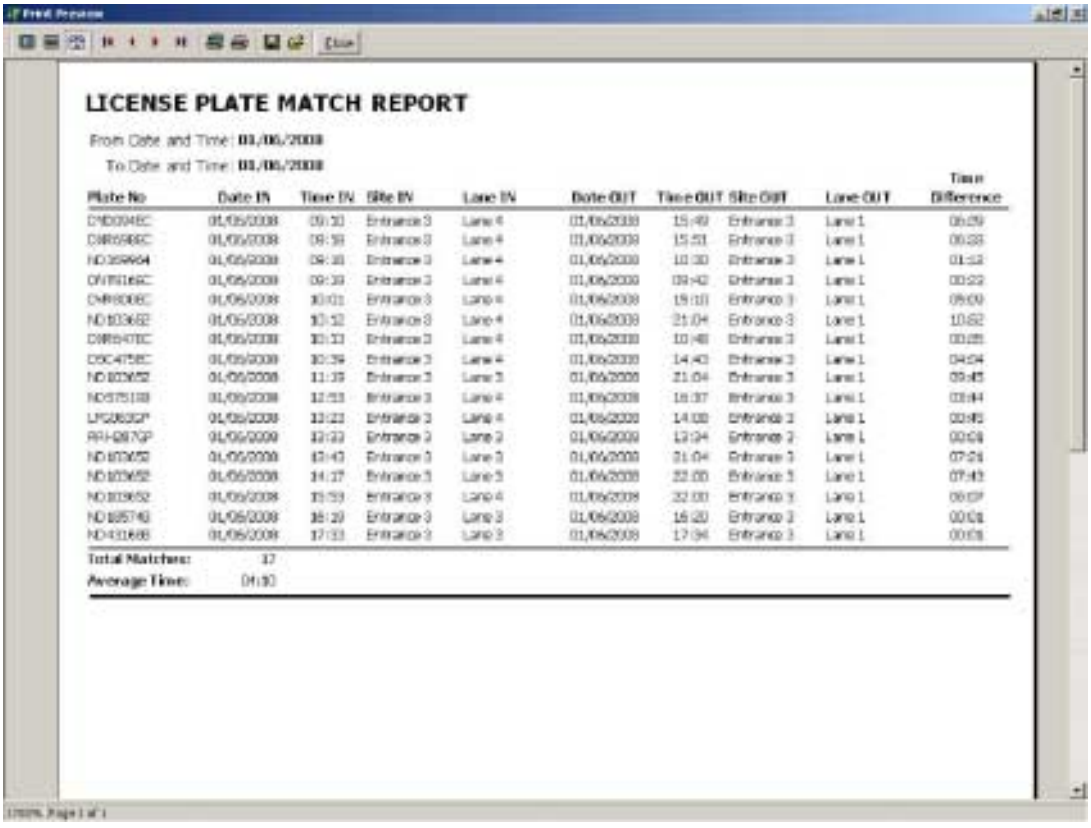


Figure 17 Time IN and Time OUT

Two locations had detailed site visits and based on this the following is proposed:

Products	Licensing	Pricing	Qty	Phase I
Sabre LPR Parking 01 Lane	Per Device	R 15,000.00	2	R 30,000.00
LPR Camera (Select from LPR Camera Spreadsheet)	Per Device	R 10,659.00	2	R 21,318.00
8 port Fast Ethernet Desktop Switch with Power over Ethernet. 4-PoE ports	Per Device	R 999.00	1	R 999.00
AXIS Video Server (4 Channel)	Per Device	R 8,750.00	1	R 8,750.00
DVR Software	Per PC	R 4,978.00	1	R 4,978.00
PC	Per Device	R 4,750.00	2	R 9,500.00
Wireless links	Per Device	R 5,750.00	1	R 5,750.00
ZK 5V UPS - 6-8Hours	Per Device	R 295.00	2	R 590.00
Cables per meter	Per meter	R 314.00	25	R 7,850.00
Upgrade from Basic to Premier Version **	Once	R 2,999.00	1	R 2,999.00
Sabre Management Software, Remote or Head Office*	Per Seat	R 999.00	1	R 999.00
Device Monitor and Management Module - Per 16 Devices	Per 16 Devices	R 999.00	1	R 999.00
Live Data Collection (Server, Auto Download of Data) **	Once	R 1,199.00	1	R 1,199.00
Off Site backup of data - Free with Software Cover	Per Month	R 180.00	1	R 180.00
Software Cover - Monthly R 180 by debit order	Per Year	R 2,399.00	1	R 2,399.00
Includes Telephone / Remote Desktop Support and Updates		Sub Total Cost for System		**R 98,510.00**
			VAT	R 13,791.40
				R 112,301.40

Installation Cost per unit	Per Device	R 1,199.00	2	R 2,398.00
Onsite Warrantee per year ***	Per Device	R 1,199.00	2	R 2,398.00
One on One Training - Up to 8 Hours	Per Site	R 1,199.00	1	R 1,199.00
Setup of Web Server with Apache	Once	R 999.00	1	R 999.00
		Sub Total		**R 105,504.00**
		VAT		R 14,770.56
		Total		**R 120,274.56**
***Call out Fee per Visit R 1250 after commissioning of hardware installation				
Standard Call out Fee R 1250 plus R 750 per hour without Onsite Warrantee Payment				R 211,008.00
Rental per month				R 4,483.92
				R 8,967.84
Cost per Transaction (per image captured)				R 0.45

Figure 18 Typical site designs and components

TO BE PROVIDED BY CLIENT

The following, non-exclusive, list of items would be required from in order for the project to proceed.

Poles to mount the cameras

A clean, consistent, source of Electricity is required at all the sites in the field.

Permission to work in the areas designated would be required from the relevant authorities

The proposed solution will operate automatically however to ensure the system operates to the best ability, trained operators and service personnel are required.

An ADSL link is required for remote support and remote viewing of the data.

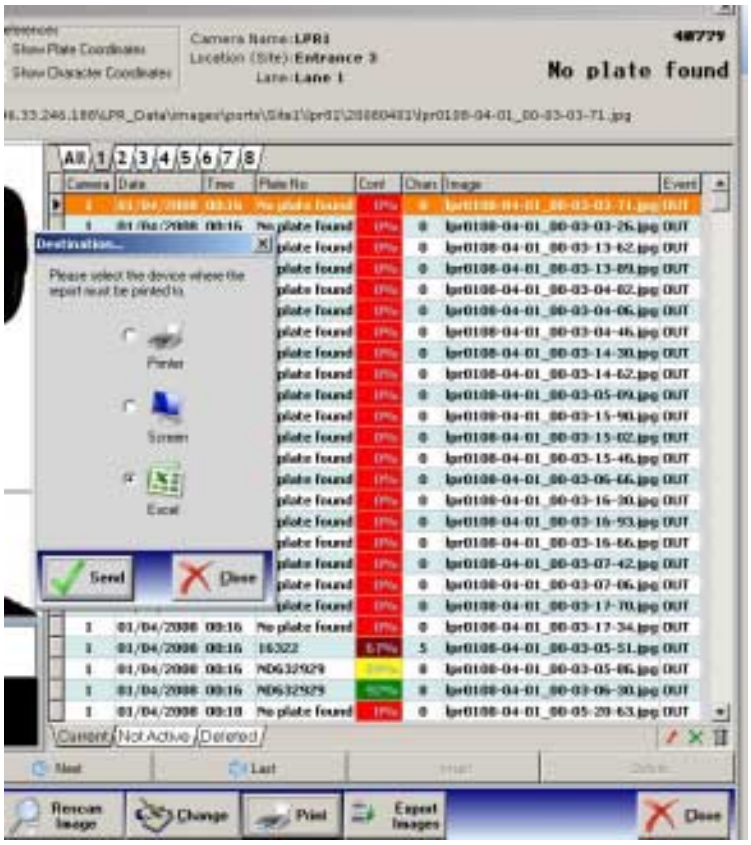


Figure 19 Time IN and Time OUT printed to excel, screen or the printer