QUOTATION FOR: COR TEST STATION

DESIGN, SUPPLY & INSTALL OF LPR EQUIPMENT FOR A COR TEST STATION

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Submitted by:

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ABSTRACT

The Traffic Logging System (TLS) Solution will be provided to the Department of Transport for use at COR stations; to accommodate the need for Traffic Data acquisition linked to actual COR tests. Consistent, real-time License Plate Recognition (LPR) for vehicles passing through the covered Transport Lane will be provided as the source of the traffic data. 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 TLS will capture all vehicles entering and exiting the lane, storing the vehicle image, license plate if present, date, time, lane and other data as required. This would then be linked to the COR tests. The raw data can be imported into any statistical package for detailed analysis. The software will allow vehicles to be enrolled into a notification list, linking this information to the license plate, for the booking of a COR test. If a vehicle is detected which is in the notification list, this will be 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. Each LPR unit reports the vehicle recognition events via TCP/IP network messages to a central computer at the COR control room. The central computer application reads the recognition results from all lanes (if multiple exit), calculates the data (in real-time), and displays it to the operator and sends the data out to the department of Transport. Using outputs of several sites, a back end program can be used to calculate the number of vehicles per time period, the type of vehicles (cars, trucks, public transport vehicles, etc.) and other information as required.

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

- A once off capital amount **R171 369.47 for a single camera** OR **R259 021.95 for 4 cameras** OR

- A rental option @ R5, 621.71 for 4 cameras per month OR **R3, 719.33 for 1 camera per month** OR

- An option for a **cost per COR @ R8.92**
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  Barry Fryer Dudley CEO OF ASD
  CURRICULUM VITAE: Dr. M. F. MITCHELL, CHAIRMAN OF ASD

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Definitions, acronyms and abbreviations

AGC - Automatic Gain Control - A circuit for automatically controlling amplifier gain in order to maintain a constant output voltage with a varying input voltage within a predetermined range of input-to-output variation.

Aperture - In television optics, it is the effective diameter of the lens that controls the amount of light reaching the photoconductive or photoemitting image pickup sensor.

Aspect Ratio - The ratio of width to height for the frame of the televised picture 4:3 for standard systems, 5:4 for 1K x 1K, and 16:9 for HDTV.

Automatic Brightness Control - In display devices, the self-acting mechanism which controls brightness of the device as a function of ambient light.

Automatic Gain Control - A process by which gain is automatically adjusted as a function of input or other specified parameter.

Automatic Iris Lens - A lens that automatically adjusts the amount of light reaching the imager.

Automatic Light Control - The process by which the illumination incident upon the face of a pickup device is automatically adjusted as a function of scene brightness.

Bandwidth - The number of cycles per second (Hertz) expressing the difference between the lower and upper limiting frequencies of a frequency band; also, the width of a band of frequencies.

Blooming - The defocusing of regions of the picture where the brightness is at an excessive level, due to enlargement of spot size and halation of the fluorescent screen of the cathode-ray picture tube. In a camera, sensor element saturation and excess which causes widening of the spatial representation of a spot light source.

Brightness - The attribute of visual perception in accordance with which an area appear to emit more of less light. (Luminance is the recommended name for the photo-electric quantity which has also been called brightness.)

CCD - See Charge Coupled Device

C Mount - A television camera lens mount of the 16 mm format, 1 inch in diameter with 32 threads per inch.

CCTV - Common abbreviation for Closed-Circuit Television

Charge-Coupled Device CCD - For imaging devices, a self-scanning semiconductor array that utilizes MOS technology, surface storage, and information transfer by shift register techniques.

Contrast - The range of light to dark values in a picture or the ratio between the maximum and minimum brightness values.

Contrast Range - The ratio between the whitest and blackest portions of television image.

DDE – Dynamic Data Exchange

Depth of Field - The in-focus range of a lens or optical system. It is measured from the distance behind an object to the distance in front of the object when the viewing lens shows the object to be in focus.

Depth of Focus - The range of sensor-to-lens distance for which the image formed by the lens is clearly focused.

DLL – Dynamic Linked Library

EPS - Edge pre-select

Fiber Optics - Also called optical fibers or optical fiber bundles. An assemblage of transparent glass fibers all bundled together parallel to one another. The length of each fiber is much greater than its diameter. This bundle of fibers has the ability to transmit a picture from one of its surfaces to the other around curves and into otherwise inaccessible places with an extremely low loss of definition and light, by a process of total reflection.

Field - One of the two equal but vertically separated parts into which a television frame is divided in an interlaced system of scanning. A period of 1/60 second separates each field start time.
Field of View - The maximum angle of view that can be seen through a lens or optical instrument.

Focal Length - Of a lens, the distance from the focal point to the principal point of the lens

Focal Plane - A plane (through the focal point) at right angles to the principal point of the lens

Focal Point - The point at which a lens or mirror will focus parallel incident radiation.

Gbps – Giga Bits per second

HTS – Hi-Tech Solutions

Iris - An adjustable aperture built into a camera lens to permit control of the amount of light passing through the lens.

IO – Input output

IP – Internet Protocol

IR – Infra Red

JPG – Joint Photographic Group Image Format

LED – Light Emitting Diode

Monitor - A unit of equipment that displays on the face of a picture tube the images detected and transmitted by a television camera.

MSMQ – Microsoft Message Queue

ND Filter - A filter that attenuates light evenly over the visible light spectrum. It reduces the light entering a lens, thus forcing the iris to open to its maximum.

Patch Panel - A panel where circuits are terminated and facilities provided for interconnecting between circuits by means of jacks and plugs.

PC – Windows based Personal Computer

Pixel - Short for Picture Element A pixel is the smallest area of a television picture capable of being delineated by an electrical signal passed through the system of part thereof. The number of picture elements (pixels) in a complete picture, and their geometric characteristics of vertical height and horizontal width, provide information on the total amount of detail which the raster can display and on the sharpness of the detail, respectively.

PWC – pulse width control

RFID – Radio Frequency Identification

Shutter - Ability to control the integration (of light) time to the sensor to less than 1/60 second; e.g: stop motion of moving traffic.

Signal-to-Noise Ratio - The ratio between useful television signal and disturbing noise or snow

Snow - Heavy random noise.

Spike - A transient of short duration, comprising part of a pulse, during which the amplitude considerably exceeds the average amplitude of the pulse.

TCP – Transmission Control Protocol

TBL – Terminal Block

Test Pattern - A chart especially prepared for checking overall performance of a television system. It contains various combinations of lines and geometric shapes. The camera is focused on the chart, and the pattern is viewed at the monitor for fidelity.

VB – Visual Basic

VDC – Voltage Direct Current

Vertical Resolution - The number of horizontal lines that can be seen in the reproduced image of a television pattern

VES – Vehicle Enforcement System

Zoom - To enlarge or reduce, on a continuously variable basis, the size of a televisual image primarily by varying lens focal length.

Zoom Lens - An optical system of continuously variable focal length, the focal plane remaining in a fixed position.
INTRODUCTION

Overview

The Traffic Logging System (TLS) Solution will be provided to the Department of Transport to accommodate the need for consistent, real-time traffic data at COR testing stations. The traffic data will come from the License Plate Recognition (LPR) of all vehicles passing through the covered test lane or 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 COR tests and long term studies of test data. The road side portion of the solution proposed uses the See Lane DLL software.

The TLS will allow the Department of Transport to
- improve safety on roads and eliminate “tests without the vehicle”;
- limit access to the road of vehicles which have not been tested
- manage the number of COR tests to minimise delays;
- provide effective control;
- increase COR test station capacity;
- provide better COR user services such as real time information and systems.

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 DEPARTMENT OF TRANSPORT servers will capture the data for further processing as required.

- **Flow estimation** – the number of vehicles and types of vehicles can be used for COR Test Station conjunction analysis that can assist future planning.
- **On-line traffic report** – the roadside information can be reported on web sites in order to supply live reports to those wishing to use the COR test station facilities.
- **Monitoring** – the recognition information may be used for various security applications, such as ensuring stolen vehicles do not get issued with COR or that the vehicle tested in the vehicle issued with the COR.
- **Enforcement** - The license plate data can be used for a wide range of enforcement techniques, including outstanding traffic fines, warrants, etc. COR station could be used to issue violation or collect payment or tickets.

**System description:**

The proposed system consists of a single lane (but could cover a number of lanes), within the COR test area, with multiple cameras monitoring the specific areas of entrance and exit. Each camera is connected either via cable if suitable or 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.

<table>
<thead>
<tr>
<th>Department of Transport: COR Site Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>COR test Station</td>
</tr>
<tr>
<td>CONTROLL ROOM</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

Figure 1 Possible site items required for 1 lane, 1 Site COR Test Station LPR Solution

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.

**System Architecture**

SeeLane is a turn-key system comprises of the following elements:

- **PC running Windows XP Pro**
- **SeeCar DLL** - which is used to analyze the images and extract license plate string
- **1-4 Recognition Camera** unit(s) to capture the images. These cameras are high resolution state of the art cameras that are connected to the PC via a gigabit network.
- **Gigabit Network** – 8-port switch and network card (or motherboard network). This is an internal network used for communicating with the cameras.
Figure 2 Elements making up See Lane

- **Illumination units** to illuminate the plates. The illumination units may be external lights, or solid state strobe units that are supplied.

- **I/O card** – Not required for this system but could be provided. The input/output board with multiple I/O discrete lines supports the sensors and illumination control. It is connected via a cable to a terminal interface board with easy connections and indicator lights.

- **BW dedicated rear plate camera** – used as an option to supply images used for specific capture of the rear plate only. This is used for additional recognition where no front plate is present.

- **Sensors** to indicate the presence of the car (a sensor for each lane). These are not required and are not included.

- **See Lane**

The See Lane Windows application interfaces the hardware elements (camera/illumination unit(s), IO card and sensor). It controls the illumination (if present), reads the video inputs and passes the images to the DLL in order to obtain the recognition results. The application displays the image and recognition results. It then exports the results using messages and image files. Its man-machine interface supports on-line setting control, which can easily adapt the application to various types of configurations. The image below illustrates how the items link together on site and in the control room. All the items indicated in the image below reside on site, except for the remote database which will be on the central server in the control room.
Block Diagram

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

The See Lane application runs as a background Windows application in the PC (in the centre), which has a gigabit network connection (from a network card or the motherboard), via a Gigabit switch to the IP recognition camera(s) (with integrated illumination). The number of these high resolution cameras depends on the width and number of lanes, but is limited to 4 or less cameras based on traffic volume. The PC has an I/O card which is connected via a terminal block to the sensors and the illumination control signals. An option of a colour / BW overview picture and video is available with a colour / BW overview camera.
SITE LOCATION

A single location, the COR test site, has been proposed but not identified as yet. A typical site design has been proposed and detailed site visits can follow.

<table>
<thead>
<tr>
<th>Location</th>
<th>Image / Video</th>
<th>Power</th>
<th>No of Lanes</th>
<th>Traffic Direction</th>
<th>Lane Width</th>
<th>Lanes per Camera</th>
<th>Colour Cameras</th>
<th>Black and White Cameras</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1: 1 lane, IN</td>
<td>4</td>
<td>Grid / Solar</td>
<td>1</td>
<td>1</td>
<td>3.2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4 Typical site designs and components

Site 1: SA

21-05-2007 12:10:17 pm

Figure 5 proposed image with a Front Camera View

Site 1: 1D

Figure 6 Typical image possible with Front Camera View showing full taxi

Please note: This image is provided as an illustration only.
Site 2: SA

Figure 7 Front Camera View of entire vehicle

Figure 8 Front Camera View with plate removed

Figure 9 Typical front camera view with shape of car
Figure 10 Front Camera View with a Durban Plate

Figure 11 Front Camera View with GP plate
Figure 12 Front Camera View of a truck with plate

Figure 13 Front Camera View of a colour camera showing colour of truck
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.

Below is a diagram depicting the physical layout of the equipment involved in the single-lane See Lane TLS system:

Figure 14 Rear camera and Site PC layout

Figure 15 Rear camera wiring and layout
The effective field of view of each unit is about 12 meters in order to achieve the proper plate size. The SCH (See Car Head camera / illumination unit) is mounted at the side of the lane as close as possible to the edge (parameter C) and at height of about 5.1 meters. The range (parameter B in the figure) is 15.5 meters from the “loss of detection” point (where the rear of the vehicle leaves the detector) using a 60 mm lens.

The SCH unit should be installed at about 5.5M from the trigger detection line for standard lens. See the illustration above, parameter B. This translates to about 5 meters or more from the front of the car (for standard lens) since a typical vehicle is about 4 meters.

The side distance (parameter C) in this installation is identical – 0.0 to 0.5 meters. Side of the Traffic lane: Install the SCH as close as possible to the traffic lane, within 0.0 to 0.5 meters. See the illustration above, parameter C.
TRAFFIC LOGGING

The following illustration shows one of the sites (“Site A” out of N sites) monitored by a License Plate Recognition (LPR) unit. Each unit is connected via a network to a control room. Each LPR unit transmits its recognition results to the control room computer where the data is collected and analyzed. The central computer application then updates and displays the COR vehicle status that includes all the online and real time database information, if required. This information is presented in real-time and saved to a traffic database for off-line processing.

![Figure 17 SeeCarFlow illustration (Site A of N sites, with control room)](image)

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 in selected urban road routes (N3 and Smith Street) in the city. Each LPR system performs real-time recognition on passing cars 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 18 Image Capture and OCR](image)

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.

This section describes each of the major elements.

**LPR units**

Each LPR unit is a turnkey system, which is comprised of the following elements:

- a **PC** Pentium running Windows XP
- LPR unit Windows application software package (described below)
- **Recognition DLL** – the recognition engine which is used to analyze the images and extract license plate string
- **Camera/ Illumination** unit to capture the images (detailed below)
- a **I/O card** - multiple I/O discrete lines - which supports the sensors, illumination control and optional gate-open signal (not required in this design).
- **sensor** to indicate a presence of the car (motion in this design)
- a **list** of known vehicles (such as buses or taxis) which will be analyzed separately in the traffic analysis

These components are shown in the following illustration.

![Figure 19 LPR unit Architecture](image)

When a vehicle triggers the sensor, the LPR application activates the illumination (if present - which is controlled by the IO card) and captures a series of images (one or more image fields) which are captured by the frame grabber or IP stream. It then proceeds with the identification of the car.

The LPR system is designed to work **simultaneously** with one to four traffic lanes. However in the SeeCarFlow system the traffic load will limit the number of lanes.
According to the traffic load for each location it will be determined if a single or double lane will be assigned for each PC.

The application also reports on special vehicles that are listed in the ‘white-list’ (listed in a file, cars.txt). This is used in SeeCarFlow application to differ between standard vehicles and special vehicles when displaying the results.

**LPR unit Windows Main Display**

The LPR unit application main window is designed to display as much information as possible in a friendly user interface. The window is divided into several display panes, where each pane is responsible for a single system task (video images, system status, identified code, ...).

The different panes include:
- Image Display - shows video from the camera (from one of the lanes)
- History Log - display a list of all identified vehicles
- Identification Window - a graphical representation of the identified vehicle
- Status Window - system messages and sensor status display

An example of such display is shown in the following figure. The vehicle (that is shown) was captured with a front camera/illumination unit and displayed on the image display; its license plate number is shown in the bottom list and graphical display.

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![Figure 20 Example of LPR application main view](image-url)
The application can operate automatically without operation control and can be minimized to a background application.

**LPR Client**

The LPR unit application is designed to share the vehicle identification results with other processes. This can be done either by external communication (RS232 or TCP/IP) or by application-to-application messages. The latter method is implemented by DDE messages that are sent after each identification cycle. Each vehicle generates one message containing the recognition result.

When a vehicle triggers the motion sensor, the LPR unit application captures a series of images (one or more), then proceeds with the identification of the car. After completing the identification cycle, a DDE message containing the ID is sent to the PC Windows system (along with more information: date and time, lane number, ‘white-list’ vehicle and image pointer).

This message is intercepted by another application - the LPR client process. This process receives the messages, groups a series of recognition results together (for reducing the network bandwidth requirements) and sends the recognition block across the network via TCP/IP. This data is received at the control room by the SeeCarFlow central application and used for traffic processing.
The sites will be connected together by a network. The recognition results (grouped in a block consisting of several recognition results) are transmitted over the network. The TCP/IP protocol is used for this transmission. Each of the Client applications will be a server in this network, and connect to the client (the central application).

Each of the Client/Server applications has a configurable list of TCP/IP addresses that specify the network connections. Adding a new site is simple so the traffic control system is easy to expand.
The information sent across the network includes also the system status in each site for on-line diagnostic status display.

Additional activities are possible through this network by maintenance technicians:

- change of configuration parameters settings
- software update
- update of list of known (allowed) vehicles
- Other applications as required.

**System operation:**

Vehicles identified as being important to log on a frequent basis would be enrolled into a database. This database would be stored on the central servers and mirrored on the local computers. When a vehicle that is enrolled into the database passes the camera, notification of that vehicle would be generated, along with any other required information, such as driver name or taxi association or type of vehicle etc.

The database could be generated from:

- Existing Databases of busses and taxis, such as eNATIS, Durban Metro Database, etc.
- Driver enrolment via SM, E-Mail, phone, web site etc.
- Uses of the system, that is when a vehicle is detected using the lane it could be then the enrolled into the allowed database.
- Any other existing or future data source as required.

The cameras will capture all vehicles entering and exiting the lanes, storing the vehicle image, license plate if present, date, time, lane and image. The software will allow vehicles to be enrolled into an allowed list, linking this information to the license plate. If a vehicle is detected which is not allowed to use the lane, this will be recorded. If the vehicle is in the black list, an alarm will be generated. The average speed of the vehicle will be automatically determined and an alarm generated if it is over the set speed.

**Data Output**

Data will initially be acquired and kept for every vehicle, and DEPARTMENT OF TRANSPORT will determine which images to keep and which to discard. The data for each vehicle will include:

1) **Image** - A stand alone, human readable monochrome JPEG image with a resolution of approximately 1600 pixels by 1024 pixels (for See Lane). This image will display the detected plate on the best recognized image within the set of images that are captured for that event.
2) Optical Character Recognition Data:
- Lane (Site) unique ID integer number
- License Plate string
- Date and Time of Image Capture
- File Name (a link to the name of the resulting .jpg file stored in the DEPARTMENT OF TRANSPORT server)
- Confidence of the recognition result

The data will be transmitted to the TCS in two forms:
a) Windows DDE (Dynamic Data Exchange) Message - sent to the DEPARTMENT OF TRANSPORT server over the TCPIP network. The DDE will contain the VES Optical Character Recognition Data as described above.
b) Image file - which will be stored on the DEPARTMENT OF TRANSPORT server, then transmitted to the DEPARTMENT OF TRANSPORT over the NCS via a dedicated transfer service running on the Trip Processing Server.

**OCR Engine**

All of the systems (2 See Lane sites of 4 front cameras) employ the same See Car 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. The systems supplied for the DEPARTMENT OF TRANSPORT Project are specially trained to recognize license plates in Southern Africa, and focus on the local South African plates.
SEE DATA

SeeData is a software service application that connects a cluster of recognition systems (such as SeeLane or See Lane) together by a network. The networked units can thus report the recognition results to a Central server.

Client-Server Architecture

SeeData is a set of applications, which comprise of the following elements (see also the following illustration):

- **Remote** units (one or more) - also referred as client nodes, or front end units. Each unit has a LPR (License Plate Recognition) recognition system which generates recognition messages which report the results.

- **Central** server (single) The SeeData application is connected to one or more remote units, and collects their reports to a central recognition system. It is also possible to send commands from the Server to the remote (front-end) recognition units, although this is not described in the diagram.

![See Data Architecture Diagram]

Events data

The See Data application, which runs on the Central server, communicates with front-end OCR hosts by a protocol designed especially for HTS application. On this protocol the HTS recognition systems report the results to the central server. The See Data protocol is based on TCP/IP. It allows to See Data to operate in cross OS environment. For example, See Data could receive recognition results from Windows (See Lane for example) and embedded Linux (C4, Compact Car Controller).
Images and video clips

If “Transfer Images” option is configured in See Data settings the application will handle the transfer of locally saved images and video clips from the front end hosts to the SeeData Central Server station.

![Image showing LPR capture and recognition with alarm](image)

Figure 26 Rear LPR capture and recognition with alarm

Recognition data

Vehicle topic is used for transmitting of recognition data (See Data output). Items of the topic are:

- **CarCode** – string contains recognized license plate
- **Name** – string contains driver first and last name as was found in database
- **Time** – event time in format: “Mon Jul 03 14:29:06 2006”
- **LaneId** – string contains lane index (zero based)
- **Authorized** – string “1” (vehicle is authorized) or “0” (not authorized)
- **File** – string contains saved vehicle image path
- **Confidence** – string contains recognition confidence ("0"-"100")
- **PlateType** – string contains one based index of plate format
- **Trigger** – string contains exact trigger time stamp in format:"032809233", which means 3 h 28 m 09s 233 ms
LOG OF EVENTS

The images below illustrate the data obtained from two lanes, from 12:57 to 13:17

Figure 27 Log of the data and images from each site

Figure 28 Vehicle Logged
ALARM GENERATION

A list of vehicles which, when captured, will result in an alarm, can be added to the system. Which vehicles are added to the list, who adds them and how they should be removed needs to be determined.

The alarm list is stored on the central computer and replicated on each of the field computers.

Figure 29 Alarm on vehicle detected
Possible Database connectivity

Figure 30 Possible database connections required

Figure 31 Typical Site Layout showing database links
COR Test Station Central application

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 in the field for various applications. For DEPARTMENT OF TRANSPORT a similar application would be created and implemented after joint specification.

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.

Status: LPR unit status

When selecting this option the program displays the live status of all LPR units. This includes:

- the number of recognition messages received from each point in a given period,
- the percent recognition success (and an alert if a low threshold is reached),
- the last time the unit has been initiated or started a recovery process,
- On-line Diagnostics results (each unit reports on its status in a periodic cycle)
  Note that in case of a change in the status of an LPR unit (failure of the on-line diagnostics, or missing messages from that unit), the SeeCarFlow application will display a message and an alarm will be heard.

Settings

The number, name and position of the sites are defined in the application settings and could be easily updated if more sites are added.

Other parameters can also be changed in the settings. All settings are password protected in order to avoid unauthorized changes.

Storage and export of Results

All COR Test Station statistics will be recorded in a database. This data can be extracted later for off-line processing. The calculated data will also be transmitted over the network for other applications using TCP/IP.
System stability

The See Lane systems are based on proven applications that are running in many installations worldwide - in hundreds of lanes and many diversified applications. The newly developed systems share most of the common modules in these systems (such as the recognition DLL), and are tested in various types of tools and methods that are used by HTS development for years. Thus, their stability is guaranteed by the experience in such systems, the development and test methodologies, and in the proven components that build these systems.

Nevertheless, additional mechanisms are used to ensure the stability of the systems. These are part of HTS utilities, which ensure that if the systems will fail, they will be reactivated and also report their failure to external monitor systems. These utilities include:

- **SeeService** – a watchdog utility that periodically checks the aliveness of the application. In case the application does not respond, the application will attempt to rerun the application. If this fails, the utility resets the PC. In any such case the event is written to the Windows event log.

- **SeeMonitor** – this tool resides on a central server, and monitors the state of each system – by checking the Windows event log. It will alert external systems in case of a fatal error. It can also show soft errors (warnings) status, and display a set of graphs of past recognition results, which is a very important diagnostic tool.

- **SeeCleaner** – This utility cleans the old images directories after a specified time has elapsed, and also cleans local diagnostics files. Thus, the system will not grow endlessly in size, a common source of problem in other Windows based systems (which will not happen here).

Redundancy

In See Lane systems there is a need to guarantee an absolute up time, i.e the systems always work, even in case of malfunction or required service.

The system is designed to work in an automatic redundancy mode, where the 2ⁿ server automatically takes over the functions of the other down server.

The dual servers can be set to monitor each other through network messaging and revert to degraded mode if there is a fault in one of the servers. To support this mode, both servers should be connected to the same cameras. In the parameters each lane will be designated as “primary” normal connection, or “secondary” redundancy mode.

During the redundancy mode the system is working in a degraded mode, and the performance may be lower than the normal mode in case of certain traffic patterns.

Note that the See Lane system is limited to 4 concurrent cameras in the redundancy state. So a recommended configuration is to have one server normally connected to 2 lanes, the other server connected to a single lane, while in the backup mode one server will service the 4 lanes.
REFERENCE SITES: Record of Similar Projects Completed

The development of LPR started in 1995 and first systems were installed internationally in 1996/7. The first systems were deployed in RSA in 1999 by HTSOL.

The years experience in ANPR within SA by ASD is over 15 years.

M4 Durban DEMO to Durban Metro

- Total number of vehicles detected: 1593
- Distance between Point A and B: 165M (theoretical distance with D Link directional antenna is 9 KM)
- Full system (Point A & B) hours in operation: 2
- Number of lanes (1 per site), slow lane

Figure 33 Trucks speeding on the M4 towards the airport
Figure 34 Visitors to Durban who obey the rules of the road

Figure 35 M4 Durban Demo of ASD
PMB to Durban – N3 from Ashburton to Camperdown by I-Cube / ASD

Full Name: John Schnell  
Company: KwaZulu-Natal Department of Transport  
Business: (033) 3558600  
Business Fax: (033) 3558092  
E-mail: john.schnell@kzntransport.gov.za  
Web Page: http://www.kzntransport.gov.za

The 3 month demo went from the Ashburton off ramp (Bridge) on the N3 (above), past Camperdown off ramp (below) to Camperdown N3 (Old Road) bridge.

Figure 36 Ashburton on the N3

Figure 37 Camperdown on the N3

The distance between the two points was 13.750 KM
Ashburton

Figure 38 Ashburton Image Capture Example

Camperdown

Figure 39 Camperdown Image Capture Example

Figure 40 Average Speed Determination created from 2 sites on the N3
Figure 41 ASD example from the N3

Figure 42 Example of data obtained from LPR

Figure 43 Traffic Data Analysis
Above is some data generated from the 1 day test on the N3 over 8 KM.

![Data chart]

Figure 44 Data generated from the 1 day test on the N3 over 8 KM

An example for a toll road installation with multiple lanes in Europe is shown in the following photo.

![Photo of ASD operation]

Figure 45 Example of a ASD operation in Europe
## REFERENCE SITES:

Record of Projects Completed in SA by I-Cube

<table>
<thead>
<tr>
<th>Client</th>
<th>Nature of works</th>
<th>value of work for which the SUB-CONTRACTOR was directly responsible (excluding vat)</th>
<th>year completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACSA</td>
<td>3 Lane LPR system for Baggage access control and logging at Oliver Tambo</td>
<td>R180 000.00</td>
<td>2007</td>
</tr>
<tr>
<td>SPS</td>
<td>Vehicle Monitoring</td>
<td>R375 000.00</td>
<td>2006</td>
</tr>
<tr>
<td>Fourier Systems:</td>
<td>LPR Software</td>
<td>R67 000.00, R67 000.00, R67 000.00</td>
<td>2007, 2006, 2005</td>
</tr>
<tr>
<td>N4 Toll Rd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N3 Toll Rd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Rupert</td>
<td>Access Control</td>
<td>R175 000.00</td>
<td>2002</td>
</tr>
<tr>
<td>SPOORNET HEAD OFFICE</td>
<td>2 Lane LPR system for access control and logging at SPOORNET head office</td>
<td>R220 000.00</td>
<td>2004</td>
</tr>
<tr>
<td>AVIS</td>
<td>6 site (multiple lanes per site) LPR for logging vehicles at JHB, DBN</td>
<td>R1,2 million</td>
<td>2002</td>
</tr>
</tbody>
</table>
This system is installed in the gates of a South African University. It is used for gate control and theft prevention. The license plate of the cars entering is recorded along with the driver face. This data is compared to the information at the exit and the guard can see that the person at the entrance to the University was different than the person driving the car out. The system also provides statistics and data logging, as well as an on-line surveillance of the gates.

After the installation of this system the number of thefts decreased sharply. A sample actual record of an attempted theft is shown in the following animation.

The SeeCarTrap system is based on SeeLane recognition system and has special modifications for a roadside mobile system. This system is used for catching cars in cases of warrant of arrest, unpaid fines or taxes and stolen cars. It deals with a database of up to 0.5 million entries. The stand-alone real-time system automatically recognizes the car plate number then searches a database. It sounds an alarm when a car has been detected in the 'black' list, and displays the vehicle and arrest information contained in the record. This revolutionary system simplifies the roadblock operation and thus helps to increase selective enforcement.

The system is also connected to a large outdoor display that shows the car number, the car type, the reason for arrest and the name of the driver. This display can be seen by the police officer down the road. All the officer needs to do is wait for the siren, then stop the car and verify the arrest details, as seen in the film clip below.

The system is portable and installed in minutes by the police officer. It is installed in a battery powered lunch-box PC. It operates day and night on a free-flowing traffic at average speeds of 10-80 KMH. The system contains all the elements of a recognition system: hardware (frame grabber, optional IO card, and a special camera/illumination unit optimized for this application) and software (SeeRoad application and a client application). The application includes a special software trigger option which reduces the need to place a detector on the road, making the system portable and easy to install.
This system is installed in a traffic police violations processing center in Pretoria, South Africa (in conjunction with Labat Traffic Solutions using the Startrap Intelligence violation data processing system). It is used to automate the process of handling the fine processing (a fast turnaround from film to fine). The application reads both the license plate off the frame - together with violation information.

A sample violation is shown in the following photo. The frame, read from the film, includes the view of the car, the vehicle plate, and the violation information - which includes the date, location and speed, and is attached in the upper-right corner.

The system performs both access-control, parking and traffic-flow management functions. It provides solutions for a congested University entrance and enforces an overall traffic policy in its gates and parking lots.

The entrance display provides traffic guidance by displaying one of the 3 options (left 'Guests' for guest parking, middle 'GO' for entrance, and right for 'Inquiries'). The display is controlled by the management software which has multiple authorization lists. Faculty members can use an automated telephone Interactive Voice Response system which accepts requests for temporary passes. The security guards and officers can also change the permit lists on-line. The system keeps records of the traffic events. It also controls the access-control to internal parking lots.
The system consists of a cluster of LPR systems, a management software, and an outdoor traffic light display unit. Each of the camera/illumination units (SeeCarHead) is installed in an anti-vandalism metal cover. The LPR units are based on (SeeLane server application) which interfaces the hardware and performs the recognition process. It sends recognition messages to the client applications. Each of the client applications perform traffic management decisions and connect via network to a management software on a remote server.

This system is installed in the entrance to a new UK office compound and provides automatic access to authorized cars. The records of the entry and exit are recorded. The system automatically opens the gate for vehicles that match the authorized list. A large outdoor display greets the vehicles (as seen behind the gate).

This system part of a toll road system in South Africa. The license plate is read and used as a key to fetch the vehicle information from the toll database. The information is compared to a swipe card which is used by the driver. This integrated system reduces fraud and increases the toll income.

The toll system is based on a multi-lane (SeeLane) system which reads and verifies the plate data and sends a message to the toll control application. This
The application uses the recognition information to obtain the vehicle data, which is matched to the swipe card information. The results are displayed to the operator and also sent to the control room for further processing of the frauds, and long-term data logging.

Vehicle Control & theft prevention (S.Africa)
Roadblock trapping system (S.Africa)
Violations Film Processing (S.Africa)
University Traffic management (Israel)
Office Access system (UK)
Toll station (S.Africa)
Border Control System (Hungary)
Parking System (Singapore)
Airport Parking (USA)
Bus station control (Colombia)
Average Speed Violation (Portugal)
C3 Access Control (Israel)

Double Security access Control (Israel)
University Security Control (Mexico)
Handheld license plate data entry (USA)
Parking Management (Korea)

Gated Community (Israel)
University Access (Korea)
Office Security (Israel)
Site Security (Spain)

Gated Community (USA)
Toll station (Colombia)
Shopping Center (Australia)
Casino Valet Parking (USA)

Port Gates (16 lanes) (Ghana)
Gated Community (Israel)
Shopping Center, 36 lanes (Chile)
Airport security, 8 lanes (Israel)

Shopping Center, 16 lanes (Hungary)
Toll Road, 54 lanes (USA)
Theory of operation

The operation of the system is as follows: When the motion vehicle detector signals the vehicle, it will trigger the application telling it to take a series of pictures. The See Lane application will capture the images from cameras that are installed on that lane – either front or rear.

The application also controls the IR illumination level (if present) via the IO card – switching from off (the normal idle state) through low, medium and high illumination states. This set is predefined in the application’s parameter settings, and could be defined for different time of day (such as night and day capture sets). This is for the front camera only, due to the headlights.

See Lane will also capture an additional image using an additional colour camera that will be positioned to cover the entire width of the lane. This camera will supply a view of the lane which can be used for a manual review – it can be used to verify the colour of the vehicle’s body.

Single Lane LPR system

The application analyses each of the captured images and extracts the plate string from each image. After collecting and comparing the results from all captures, the application determines the final result and selects the best image. It then outputs its 2 constituents: the JPEG image and OCR

Hardware

Components description

See Lane components are shown in the following diagram. The system is composed of a number of cameras; all connected to the frame grabber (video input) and to the I/O card (illumination control). The I/O card also receives dry-contact inputs from the loop detectors, and could also open a gate. The Windows application (See Lane) runs in the PC and controls the system. It sends the recognition results by a DDE message, and to the network to a remote application or database.
Pulsed Illumination unit (if selected)

The highlights of the unit is:
- B&W camera with mounted lens
- Pulsed LED array (Near Infra-Red spectrum)
- Case (IP 65, weatherproof, Enforced Poly-Carbonate, UV protected)
- Control circuit (sync and pulse control, illumination level control)
- Power supply (3A 15VDC) and cables
- Mechanical interface (with 2 degrees freedom)
- Inputs: 2 lines TTL (3 levels of intensity + off)
- Output: Composite Video 1Vp-p / 75Ω
- ISO 9002 Manufactured (by Hi-Tech Solution’s sister Company)

The unit is integrated in the LPR unit Windows application, which switches the unit on (only when the vehicle is present), controls its illumination level in various sequences (based on the recognition results and the setting parameters), and captures its images for recognition and optional archiving.

This compact and highly integrated unit is installed Worldwide in hundreds of lanes in various applications and configurations.

Figure 46 Image illustrates the use of the IR.
Figure 47 Image illustrates the pulsed operation of the LPR system

Light Safety Notations

Note on Compliance with International Standards:

The illumination unit complies with International Standard IEC 60825-1, for Class 1 LED (light emitting diodes) product containing Class 1 LED’s. Class 1 LED product poses no hazard to the user or to any other person present near the illumination unit. The use with the illumination unit is totally safe and needs no specific precautions.

Figure 48 Pulsed IR illumination

Figure 49 Wiring for the Illumination Units
ASD KEY COMPANY PERSONAL PROFILE

With over 78 sites in South Africa, the I-Cube LPR system is the leading software solution. I-Cube was the first company in Africa to implement real time (sub second), high speed (over 175 KM /H), multi-lane LPR solution in a free flow environment, incorporating average speed determination (on an average 35 000 vehicles a day).

Barry Fryer Dudley, the CEO of ASD is a committee member of the KZN Computer Society of South Africa.

Presentations: Neural networks to enhance safety in local authorities: automatic identification, tracking and alarm at TECHNOLOGY IN LOCAL GOVERNMENT RAISING LEVELS OF SERVICES DELIVERY THROUGH TECHNOLOGY 20-21 JUNE 2006 – MIDRAND

Education:  MBA at the University of Natal, speciality: IT Information Management & E-Commerce. The MBA dissertation, Casino Exclusion Technique Exploration - Framework Development, examines the possible solutions to excluding problem gamblers from SA casinos.

University of Natal, Pietermaritzburg, Republic of South Africa – M.S. thesis (Cum Laude) in Microbiology (April 1999). Thesis Title: “Application of Image Analysis in Microecophysiology Research: Methodology Development.”

Publications: The Industry Journal for Security and Business Professionals Volume 11 No. 2 Pg 34/35 DIVERSITY OF LICENSE PLATE RECOGNITION APRIL SECURITY FOCUS (Vol 22, No. 4) Facts, features and benefits of facial recognition

A. Refereed Journals
Invited and Published

Submitted and Published
“Laboratory-scale UASB digesters (with/without conditioning tank and recycle): efficacy to treat increased hydraulic loads”, *Water SA*. 19, 313 - 318. (1993)

**B. Papers Presented at Professional Meetings**
**Invited and Published**

**Submitted and Published**
CURRICULUM VITAE : Dr. M. F. MITCHELL,
CHAIRMAN OF ASD

1. Personal Details

Name: Dr Malcolm F, MITCHELL
Nationality: South African
Profession: Civil Engineering: Registered Professional Engineer.
Specialisation: Transportation Engineering and Administration.
Date of Birth: 26.11.1935
Company: Consultant in single person Private Practice, following retirement from Department of Transport.

2. Key Professional Experience

Dr Malcolm Mitchell had a distinguished career in civil engineering and public administration spanning over 40 years before he retired as Deputy Director-General at the South African National Department of Transport in 1998. His Doctoral dissertation in Transportation Engineering related to a strategy for developing a road network in Southern Africa and extensively dealt with institutional and financing aspects of road administration, including road charging/pricing and fund allocation procedures. His thesis for the Master’s Degree in Public Administration related to the development and management of a toll road system for South Africa. He has had over 70 papers published, received the SAICE Transport Division Award for outstanding services to the Transportation Engineering Profession (1994) and served on both the S A Roads Board and the Board of Control of the S A Rail Commuter Corporation. He was the first Chairman of the South African Committee of Land Transport Authorities, and the “Roads Function” Committee, a Treasury body responsible for managing the allocation of all roads funds in South Africa, as well as many other government and professional committees. He was also an external examiner at several universities, the President of the Chartered Institute of Transport in Southern Africa and a Senior Fellow and Council Member of the South African Institution of Civil Engineers.

Key areas of experience include:
- Road Management and Toll Roads
- Quality Control of Road Construction
- Transport Policy Formulation and Implementation
- Civil Engineering Contract Documentation and Dispute Adjudication
• Road Design and Supervision of Road Construction and Contracts
• Geotechnical and Pavement Engineering
• Road Financing, Project Programming and Strategic Planning for Transport
• Urban Transport Planning and Management

3. **Education and Qualifications**

• B.Sc.Eng. (Civil): University of Natal, 1956; Won Certificates of Merit for various individual courses; Awarded status of “Scholar of University of Natal” Won final year civil engineering design thesis prize

• B.Admin (Hons): University of South Africa, 1986.


• D.Eng (Transportation): University of Pretoria, 1991; Dissertation : Contributions to Establishing an Appropriate Road System for Southern Africa

4. **Some Professional Affiliations, during career.**

1.1_ Previously: -
• President, Chartered Institute of Transport in South Africa
• Member (and often acting Chairman) South African Roads Board
• South African representative on World Road Association (PIARC) Permanent International Commission
• Member of the Executive Committee of World Road Association
• Chairman South African Civil Engineering Advisory Council
• Member of Council, and Executive Committee Member, South African Institution of Civil Engineers
• Member of Civil Engineering Joint Consultative Committee (JCC) comprising SAICE, SAFCEC and SAACE representatives
• South African Representative on SATCC Committees
• Chairman South African National Committee on Tunnelling
• Member of Board of Directors of South African Rail Commuter Corporation
• Chairman : Committee of Land Transport Officials and Committee of State Road Authorities
• Deputy Chairman, National Road Safety Council
• Chairman : Annual Transportation Convention Organising Committee
• Chairman : Transportation Division, South African Institution of Civil Engineers
• Member : CSIR Transportation Division, Research Steering
Committees

- Member: Various Metropolitan Transport Advisory Boards
- Currently Member: Engineering Council for South Africa, Professional Advisory Committee for Civil Engineering

5. Experience Record

1998 to date
Following retirement from Department of Transport, established a one person professional consulting practice, specialising in Transportation matters. Was Specialist Consultant to Transportek Division of the Council for Scientific and Industrial Research until the end of 2005, Chairman of the Dispute Adjudication Board for the Maguga Dam project in Swaziland, and has carried out work for the Development Bank of Southern Africa and some consulting engineering firms. He is currently Executive Director of the South African Road Federation and a member of the Civil Engineering committee of the Engineering Council of South Africa. He is currently registered with the Johannesburg University as a D.Phil. student, with a dissertation examining the development and impact of transport policy in South Africa during the 20th century.

1989 to 1998
Department of Transport - Deputy Director-General
Overall responsibility for central government activities in respect of all aspects of Land Transport in South Africa, including roads, urban transport, road traffic management and safety, transport policy formulation and strategic planning, research and development and freight and public passenger transport.

1984 - 1989
Department of Transport (Chief Director of National Roads)
Responsible for overall management of all National Roads in South Africa

1980 – 1984
Department of Transport (Chief Engineer/Director)
Overall responsibility at central government level for National Road financial management and project programming and strategic planning, as well as urban transport planning activities for all national roads and metropolitan transport areas in South Africa.

1972 – 1980
Department of Transport (Assistant Chief Engineer)
Head of Materials and Pavement Design Section and, responsible at central government level for supervision of road design, construction, quality control, geotechnical design, and pavement maintenance activities on all National Roads (including research).

1970-1972
Department of Transport (Assistant Chief Engineer)
National road design and supervision of construction and maintenance contracts at regional level.
Route location for new national road (N3) over the Drakensberg mountain range (100-km)

1966 – 1970
Consulting Engineer (Senior Engineer to Associate Partner)
National and provincial road design (Geometric and pavement),
- Supervision of road contracts
- Geotechnical engineering design and management of geotechnical and materials laboratory testing

1962 – 1966
Natal Roads Department (Engineer Grade I to Principal Engineer)
Quality control of road construction, geometric, pavement and geotechnical design of provincial and national roads, bridges and interchanges (200 km road and 5 interchanges) and management of materials testing laboratory.

1956 – 1962 **South African Railways and Harbours**

On site responsibility for construction of railway tunnels (five twin tunnels, including the current second longest railway tunnel in South Africa), approximately 50 km of new railway lines involving heavy earthworks various new stations and bridges and major mechanical workshops, as well as maintenance of 250 km of open line.

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### 6. Selected Career Achievements

- Initiated, promoted and directed introduction of toll roads in South Africa as a road pricing financing mechanism.
- Initiated and administered the first two comprehensive National Transport Policy Studies between 1984 and 1996.
- Initiated, promoted and participated in research and development of procedures for road financing, fund allocation, project prioritisation, road needs studies and cost/benefit analysis for roads, in South Africa.
- Initiated, promoted and directed the extensive use of concrete pavements for heavy-duty roads in South Africa as well as drawing up of a design manual for concrete roads.
- Promoted the use of, and procedures for, statistical quality control for road construction.
- Introduced and promoted the first rational; planning approach to the provision of passenger transport services in Regional Service Council and Metropolitan areas in South Africa.
- Promoted the early development (circa 1973 – 1980) of road pavement management systems in South Africa.
- Initiated, promoted and directed developments in respect of revised approaches for road management in South Africa, i.e. the Road Agency concept.
- Involved in initial formulation and development of a project to draw up a Strategic Plan for Transport in South Africa.
- Promoted and directed initiation of Centres of Development in Transportation at selected South African Universities as well as Technology Transfer Centres for Transportation.
- Initiated and promoted first “Build, Operate and Transfer (BOT) National Road Project in South Africa (N1) in 1993.
- Recipient of CSIR award for “Contributions to Transportation Research”.
- Recipient of SAICE award for “Outstanding Contribution to the Transportation Engineering Profession.”

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### 7. Publications

Has had over 70 refereed papers published, locally and overseas, primarily in the fields of Transport Policy and Institutional Arrangements, Road Management, Road Design and Road Financing, including Toll Roads and Road Concessions. Has won “Best Paper” awards at Conferences and in the SAICE Journal, as well as presenting papers, by invitation, at the World Bank.
SOFTWARE

This section details the software elements of the See Lane system.

**Figure 50 HTSOL Software dongle and CD**

**The Image processing DLL**

The See Lane system calls SeeCar image processing DLL that analyses the captured images of the vehicle. The DLL is described in a separate document (see APPENDIX). It is usually configured to the specific country using a configuration file (format.ini).

**Main Display**

The main window is designed to display as much information as possible in a friendly user interface (the user does not need to switch between any child windows during normal operation). The window is divided into several display panes, where each pane is responsible for a single system task. The different panes are described below:
- Image Display - shows video from the camera (from one of the lanes)
- History Log - displays list of identified vehicles (index, code, lane, time, image path)
- Status Window - system messages

An example of such display is shown in the following figure:

**Figure 51 Front end**
The vehicle that is shown was captured with a front camera and is displayed on the image display. Its license plate number and the date/time are shown in the left/bottom scrollable history list. Its license number is shown in the top-left corner. The system status (triggers and messages) is shown in the right list.

SETTINGS

**Parameters settings**

The application is configured using a set of parameters that can be controlled using the See Lane options.

There are different settings windows:
- Lane definition *(see example below)*
- Camera definition
- View definition
- General parameters
- Save images parameters *(see example in the next page)*
- Communication parameters
- Diagnostics

A sample window is shown below and in the next page. For all windows and an explanation of each option – refer to the installation manual, or use the HELP button.

![Figure 52 Setting in the See Lane Software](image)

**Images files**

One of the main purposes and advantages of image based recognition systems is the creation of the image files. Due to the high resolution, the images are kept in a jpg format, with a quality level that is defined in the settings. The user may select one of the 5 levels (lowest quality to highest quality), or save in bitmaps.
The other parameters include the local images directories path, and the option to save the images in a daily sub-folder (as in the example below), weekly or single directory.

The naming of the images files is composed of an optional camera prefix and a random number that is assigned to the image. Thus, all images are identified in a unique identification for each lane. This unique number may be used for creating a transaction number.

Figure 53 Setting Page

Figure 54 Data communication from the field LPR units
OPTION: CAMERA SIGNALLING DEVICE

I-Cube uses the BANDIT Activ device to ensure the remote camera housings are not tampered with. This will alarm if:

- The camera housing is opened without authorisation;
- The remote housing tilts or moved in any way;
- If the system is stolen, it can be recovered;
- The power goes off;
- Other signals as required.

BANDIT Activ

Our most-affordable 'entry level' system, Active Tracking hallmark is the key to our enviable Recovery Rate and renowned level of Client Satisfaction. **Peace-of-Mind Positioning delivered within seconds of Client Request.**

BANDIT Probable-Theft-In-Progress Alerts

- Power or Battery Disconnect - often indicates a crime in progress
- Automatic Backup Battery Activation
- Alerts accompanied by Vehicle Positioning
- Activation of Beacon Transmitter for final pinpointing of 'distress signals'

BANDIT Tracking Unit Self-Test

- Automatic Testing - no added responsibility for DEPARTMENT OF TRANSPORT
- Results regularly transmitted to BANDIT 24-Hour Control

BANDIT Bonus Benefits

- Private Recovery Teams with Helicopter Support in all major centres
- Stolen items returned as found - guaranteed
- MTN network: of 5 000 towers covering one million square kilometres - ' Everywhere You Go'

BANDIT is networked into the GSM grid of cellular giant MTN - 5 000 towers covering one million square kilometres of South African terrain. Access to the dedicated SMS Server means the added advantage of Priority Messaging. Not only does GSM constitute the undisputed medium of the future, but in terms of Tracking it furthermore meets all demands of the country's stringent Insurance Underwriters.

COST: 24 month contract @ R129/M (Cash price of R1 690) or 3 year contract at R179.00

082 562 8225 / 031 764 3077
OPTION: SUPPORT

HTSOL and the local partner, I-Cube provides a 7 year support program.

Free e-mail, telephone, remote login and live chat support is provided.

Figure 55 ISO 9001 Certification

On site support is charged at R7 500.00 per day.

Figure 56 Products certified to FCC15, CE, UL, GS and IEC60825-1

CERTIFICATION

082 562 8225 / 031 764 3077
SOFTWARE MAINTENANCE

All software upgrades will be provided free for the 1st year. After the 1st year software maintenance will cost 15% of the purchase price of the software. If the software maintenance option is not selected this can be purchased when required at market prices.

SPARES

Requires spares are:

1.00 Communication links

1.00 IP Colour Camera with mounting, lens, housing and power supply

1.00 P4, 3.4 GHz, 2048 MB RAM, Windows XP

1.00 SW dongle for LPR

DELIVERY PERIOD - The period within which deliveries will be made:

Initial order: One week for existing software (LPR & ASD), three weeks for hardware which is in stock, longer for items which are not in stock, 4 weeks for the solution proposed and longer periods for custom developed software.

Subsequent orders: One week for existing software (LPR & ASD), three weeks for hardware which is in stock, longer periods for items which are not in stock or require custom developed software.

GUARANTEE - 3 year guarantee on software. Hardware carries a one year guarantee.
# Training of Staff

For

# Department of Transport

## Document Control

### Document Information

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<td>TBA</td>
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<tr>
<td>Procurement Manager</td>
<td>TBA</td>
</tr>
<tr>
<td>Communications Manager</td>
<td>TBA</td>
</tr>
<tr>
<td>Project Office Manager</td>
<td>Barry T. Fryer Dudley</td>
</tr>
</tbody>
</table>
1. Executive Summary: Traffic logging using LPR is a new technique and training for the multiple uses is required.

2. Business Problem
In conjunction with Private enterprise, the DEPARTMENT OF TRANSPORT requires these Public Transport Lanes to be monitored on an ongoing basis. This will require the training of 4 staff, to be trained in the systems and maintenance thereof.

2.1 Root Cause Analysis
Training is to be provided to staff of DEPARTMENT OF TRANSPORT.

2.2 Problem Analysis
Business Problem
This is a new venture for the DEPARTMENT OF TRANSPORT as no similar system exists and initial set-up and training will be required.

Business Opportunity
Multiple areas of opportunity exit.

3. Solution
3.1 Option 1
3.1.1 Description
The staff will be trained on the necessary systems in the basic set-up and operation of the said operating systems.

3.1.2 Benefits
The staff gets to undertake and view the installation of the basic systems set-up.

3.1.3 Costs
The cost of training the 4 staff members individually is detailed in Schedule B.

3.1.4 Risks
The possibility of there being insufficient time is a real possibility and can not be understated.

3.1.5 Assumptions
It is assumed that the 4 staff members would have an advanced level of training; i.e. at least M+4, with an advanced level of computer knowledge. If this is not the case, additional levels of training will be required.

3. Recommended Solution
Training Solution
Training in the said solution is done by I-Cube on site and in the DEPARTMENT OF TRANSPORT control room.

Proposed Training course outline
As the current skill and knowledge level of the delegates is unknown, it is proposed that the training is designed in modules that can be added to, changed or removed from the training programme.

Module 1: PC orientation and Microsoft Windows skill builder
Contents: The first half of this module would focus on familiarising the delegates to computers and the terminology. The second half of this module would focus on introducing the delegates to Microsoft Windows and particular terminology in the graphic environment. Specific features would include managing windows, working with multiple windows, copying or moving data between different windows and managing files at a very basic level.
Length: one day

Module 2: SeeLane software
Contents: This module would focus on the theory and practical aspects of the SeeLane software which is used for monitoring average car speed. The delegates would learn how to use the optical and hardware systems necessary for this software. Depending on the nature of this system, this learning may take place in the training venue, in the field and in the Control Room.
Length: one day
Module 3: SeeCarSpeed software

Contents: The focus of this module would be on the theory and practical aspects of the SeeCarSpeed software which forms the front-end of this system. Depending on the nature of this system, this learning may take place in the training venue, in the field and in the Control Room.

Length: one or two days depending on the technical requirements

Assessment: A post-training assessment will be conducted to determine whether there has been a transfer of knowledge and skills. This assessment can be done immediately at the end of the training programme or, alternately, after a few days which would allow the delegate to experiment and practice with the system. The decision on when to assess would ultimately be driven by the urgency of getting the delegates to use the system confidently. The assessment would be of a practical nature with the delegates needing to demonstrate that learning had taken place and that they would be able to competently utilise the system to create an outcome.

On-site Requirements:
- A training venue with a minimum of 1 each per delegates and 1 for the trainer.
- A data projector connected to the trainer’s computer.
- Windows XP to be installed on all the computers.
- The LPR software would need to be installed on all computers, alternately training on this software would need to be done in the Control Room.

Times:
Note: Training times are 08h30 until 16h00 with a 45 minute break at 13h00

Negotiability: As there are currently many unknown factors regarding the training of these delegates, it is important to note that the above schedule of training is a proposal only and that any of the modules and time frames are open to negotiation to suit the needs of the client.

5. Implementation Approach
5.1 Project Initiation
The project is to be initiated at the announcement of the tender and once all data to be trained has been identified.

5.2 Project Planning
The Project planning team will embark on the training schedule once the tender announcement has been awarded.

5.3 Project Approach
The project will be approached from a basis that staff members have limited or no knowledge at all.

5.4 Project Execution
An attempt will be made to have the required training completed before completion of the said tender.

5.5 Project Management
The project will be managed very closely by the Principal Contractor

6. Appendix: Any and all supporting documentation listed in the APPENDIX will be provided.
OPTIONS: LIGHTING

The ability to capture more than the license plate detail, including the car shape, colour, type etc. is useful in a wide range of applications. In order to do this BEKA, used extensively by Durban Metro, is suggested as the lighting solution provider. BEKA have suggested the BEKASUN, details below.

BEKASUN

High Wattage Streetlight Luminaire Range

The BEKASUN high wattage streetlight luminaire range has been designed for lighting of Group A roads where efficiency, optical control and ease of maintenance is required.

Figure 57 Beka lighting

FEATURES

- Lamp compartment - IP65
- High pressure die cast aluminium gear compartment
- Removable control gear
- Suitable for use with elliptical or tubular lamps

APPLICATIONS

- Group A streetlighting
- Area lighting
- Security lighting
BEKA POLE

Glassfibre-reinforced Polyester (GRP) Pole

SUCCESS STORY

In the late Seventies, BEKA was approached by the authorities in Namibia to find a solution to the corrosion which was damaging the then conventional materials used for lighting poles, like steel, wood and concrete.

Namibia is not only one of the world's most atmospherically corrosive environments, but it also has large tracts of land with highly corrosive soils.

The resulting research into non-corrosive materials has culminated in the choice of the glassfibre reinforced polyester (GRP) pole. This material exceeded the expectations of the authorities, as it not only offered the answer to the excessive corrosion, but also offered convincing strength properties combined with an appealing finish and design.

BEKA subsequently bought the expertise and machinery for the manufacture of filament wound GRP poles from a leading German manufacturer and since commencement of production in July 1978, has manufactured several hundreds of thousands of GRP poles for the African subcontinent and beyond.

BEKA has perfected the process by adopting the latest technology. In 1989 BEKA became the first manufacturer to be awarded the ISO 9002 accreditation for its quality management of its pole and luminaire manufacturing plant. BEKA’s production is constantly subjected to the stringent quality demands which this accreditation implies.

Through its commitment to consistent quality, BEKA has became one of the world's leading manufacturers of GRP poles. BEKA's GRP poles are used for highways, main roads, residential streets, sportsfields, decorative lighting, area lighting, post-top lighting, perimeter security, parks and gardens, as well as for flag poles.

The BEKAPOLE, as it became known, is used not only for its resistance to corrosion, but is preferred by architects, developers and local authorities for its aesthetic appearance, strength, ease of installation and inherent safety for road users.

FEATURES

- Non-corrosive
- Maintenance free
- Light weight
- Longevity
- Non-conductive
- Low inertia
- High bending strength
- Versatility
- Vandal resistant
Financial Offering

The offering is provided as a capital amount, a rental option with a performance based calculation plus an option for a cost per transaction solution.

Please see the equipment schedule on the enclosed CD for a full list.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>QUALITY</th>
<th>PRODUCT DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td>AXIS Camera with license, Sun &amp; SW, 2 YEARS</td>
</tr>
<tr>
<td>1</td>
<td>1.00</td>
<td>Vehicle Colour Capture camera EGIS Network Camera</td>
</tr>
<tr>
<td>1</td>
<td>1.00</td>
<td>Fixed IP, 5.1 Progressive Scan Frame Rate</td>
</tr>
<tr>
<td>1</td>
<td>1.00</td>
<td>5.1 Monitor 1024 x 768</td>
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Vehicle Camera Housing
Medium Outdoor Aluminum Side Opening Housing, Concealed Mount, Sun Shield, IP65, (L375 x H117 x 138W). Use with GL-208 Bracket

Daynight Switch for IR Illuminator
GH - 24  Housing IP 68  with heater and wall bracket

24VAC PSU 2A

VideoWise Housing Bracket
Indoor / Outdoor Beige, Wall Mount, Cable Managed, 10kg (Use with GL618, GL-619 Housing)

Daynight Switch for IR Illuminator
GH - 24  Housing IP 68  with heater and wall bracket

24VAC PSU 2A

VideoWise Housing Bracket
Indoor / Outdoor Beige, Wall Mount, Cable Managed, 10kg (Use with GL618, GL-619 Housing)

Daynight Switch for IR Illuminator
GH - 24  Housing IP 68  with heater and wall bracket

24VAC PSU 2A

Sundries

P4, 3.4GHz, 2048MB RAM, Windows XP

INTEL PENTIUM Core 2 DUO E 6850 - 3.0GHZ
INTEL 775 1066FSB MOTHERBOARD
GIGABYTE 4-IN-1 BLACK+SILVER SYSTEMS
TRANSCEND JETRAM 4GB DDR2-800 MEMORY MODULE
BARRACUDA™ Series - 7200.10 SATAII Plus - 200GB x 5

Camera mounting poles and acc  4 Poles Galvanised
With supporting gussets 10mm thick

Base plate to be 12mm thick

20mm adaptaflex connectors

Electrical sub db installed Dirty power

Electrical sub db UPS with 16way box and CB's

20mm adaptaflex connectors
to be provide

dirt power

Electrical sub db UPS with 16way box and CB's

20mm adaptaflex connectors
to be provide

Sundries

LPR

SW development @ 750 per hour

Wireless Links

= MONTHLY FEES

MONTHLY FEES

Sundries

PHR D3180 1080

Lighting

Metal Offices Lamp 400W, on Delta Dimmable providing min 30 LUX at the plate level

For 64KVA emergency power plus

Options

Sundries

Options

Other

Training, per day

LPR @ I-Cube.co.za

082 562 8225 / 031 764 3077
Option 1: Capital amount

This option allows the Department of Transport to purchase the vehicle monitoring equipment and software with no additional fees required going forward, other than the indicated monthly operating costs. Software configuration and training is included, allowing Department of Transport to set up and operate the traffic data system without any additional requirements.

The total amount if all options are selected, excluding VAT:

FOR 1 CAMERA is R 171, 369.47

FOR 4 CAMERAS is R 259, 021.95

Please see the equipment schedule on the enclosed CD for a full list.

50% would be payable on placement of order
25% would be payable on notification of the equipment available
25% would be payable on commissioning of the site

The items to be provided by Department of Transport are detailed in the technical documents provided and include power at the sites in the field, people to train in the use of the software, secure Internet link for software upgrades, etc.

MONTHLY OPTIONS are:

Setting up an APN if one does not exist @ R7 410.00 and Monthly maintenance of the APN if metro does not currently have one @ R7 410.00

OTHER OPTIONS are:

Software development at R750.00 per hour
Option 2: Rental option

The rental option allows Department of Transport to rent the traffic logging equipment and software at a fixed rate going forward. The biggest advantage of the rental option is that the accuracy of the system is linked to the rental amount, if the accuracy falls below 50%, no payment is due. If a higher level of accuracy is obtained, the solution provider is suitably rewarded. The accuracy would be determined by the number of license plates captured compared to those vehicles were no plate was captured. Software configuration and training is included, allowing Department of Transport to setup and operate the system going forward.

The initial rental amount, excluding VAT, would be based on the achieved accuracy during the 3 month N3 demo, leading to a monthly rental:
- for a single camera of **R 3,719.33 plus VAT**
- for a four cameras of **R 5,621.71 plus VAT**

This accuracy would be recalculated on a monthly basis, using the previous month’s results. The rental has been based on a 5 year contract but other terms can be negotiated.

| COST for 1 system made up of 8 sites with 16 cameras | R 708,391.44 |
| RENTAL per month | R 15,374.64 |
| COST for 1 system made up of 4 sites with 4 cameras | R 259,021.95 |
| RENTAL per month | R 5,621.71 |
| COST for 1 system made up of 1 sites with 1 camera | R 171,369.47 |
| RENTAL per month | R 3,719.33 |

Performance based rental calculation

<table>
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<th>Any performance below this level would not be rewarded</th>
<th>50.00%</th>
<th>R 5,000.00</th>
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<tr>
<td>Base amount determined from N3 test</td>
<td>60.01%</td>
<td>R 5,621.71</td>
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<tr>
<td>Rate at 56% accuracy (Base rate plus X %)</td>
<td>65.01%</td>
<td>R 5,902.79</td>
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<tr>
<td>Rate at 70% accuracy (Base rate plus X %)</td>
<td>70.01%</td>
<td>R 6,197.93</td>
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<tr>
<td>Rate at 75% accuracy (Base rate plus X %)</td>
<td>75.01%</td>
<td>R 6,507.83</td>
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<tr>
<td>Rate at 80% accuracy (Base rate plus X %)</td>
<td>80.01%</td>
<td>R 6,833.22</td>
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<tr>
<td>Rate at 85% accuracy (Base rate plus X %)</td>
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<td>R 7,174.88</td>
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<td>Rate at 90% accuracy (Base rate plus X %)</td>
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<td>R 7,533.63</td>
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<tr>
<td>Rate at 95% accuracy (Base rate plus X %)</td>
<td>95.01%</td>
<td>R 7,910.31</td>
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Determined as ability to capture license plate from vehicle

Figure 58 Rental option per month

The items to be provided by Department of Transport are detailed in the technical documents provided.

Please see the equipment schedule on the enclosed CD for a full list.
Option 3: Cost per Transaction

The concept of transaction management is one that this proposal is based on and consists of a basic underpinning approach that defines each assessment of a vehicle as a transaction. The transaction identifies the date, time, location, camera/lane, license plate number, associated image identifier, (and any other information that is assessed). Each of these transactions is sent through to the DEPARTMENT OF TRANSPORT service centre and is then matched against any of the registered lists in the database. The violation or the matching of the vehicle to a list will result in the relevant entity being informed of the event through email with a secure link to the image for copying and processing of the necessary action, viz. fine or alerting, etc.

Components

The entity responsible for the processing of the transactions in as close to real-time as the networks will allow. The transaction, with the data that uniquely identifies the vehicle and location will be passed through the broad based network in http format to the service that will record the transaction. The vehicle information will then be checked against the exception lists received from entities such as SAPS, eNATIS, etc. If a match is identified, the listed entity provider will be notified of the identification through and email with a link to the image on the PC on site. This gives the exception entity an opportunity to validate data captured and confirm that this is a valid transaction and will then trigger the necessary action relevant to the event.
Number of Test Stations 546
Possible Number of Tests per Day per station 30
Possible Number of Tests per month per station 630
RENTAL per month R 5,621.71
Cost per TEST R 8.92

Figure 60 Cost per transaction option EXAMPLE based on certain no of vehicles

An option for a cost per transaction solution is provided, based on 30 tests per station per day.
= R8.92 per test

WWW
The Internet as we commonly call it. It is a public network infrastructure that can be communicated over in order to transfer data. Data between DEPARTMENT OF TRANSPORT and ASD could also be handled via a dedicated link, but this is not necessary as the ability to securely transfer data is available and allows for greater flexibility.

MTN Network
The use of the MTN Data network is suggested as an alternate redundant route and is highly suitable as the transaction management systems are hosted at MTN in a secure manner. This enables cost effective data transfer for the back-up service.

DEPARTMENT OF TRANSPORT Network
Is the current network in use and under the control of the DEPARTMENT OF TRANSPORT. This could include fibre, wireless networks supplied by the city for the purposes of this communication.
Reporting

Real time reporting is possible via a web interface that will provide a dashboard of information that must be agreed and specified in consultation with the DEPARTMENT OF TRANSPORT. Standard reports can also be extracted from the Database with a reasonable amount of flexibility.

The COST PER TRANSACTION option allows the Department of Transport to benefit from the use of the TRAFFIC LOGGING AND LPR equipment, paid for by the uses of the system. The biggest advantage is that the Department of Transport pays only for the data captured. The achieved accuracy would not be the Department of Transport concern as the higher the accuracy the more the solution provider will benefit. The period has been based on a 7 year contract in order to keep the costs as low as possible.

The items to be provided by the Department of Transport are detailed in the technical documents provided and include power at each of the sites, etc.
APPENDIX: ADDITIONAL ASD INFO:

Further details on the proposed LPR solution is provided in the following appendices and on the supplied CD.

APPENDIX 1 ASD for Department of Transport (PPT) – A PowerPoint introducing license plate recognition, system design, showing the proposed site layout, how the system works and some example images of the results from the N3 demos.
Root directory of the enclosed CD.

APPENDIX 2 See Lane Manual (PDF) – This document provides a technical overview on See Lane, a state-of-the-art vision based recognition system for roadside installations. The application is supported by a full set of optical and hardware subsystems as well as software applications and utilities.
Directory of the enclosed CD: \Manuals

APPENDIX 3: “Overview (PDF)” – Contains a brochure of the LPR solutions available from ASD.
Root directory of the enclosed CD.

APPENDIX 4: “See Lane (PDF)” – Contains a brochure of the See Lane software on which See Way is based.
Root directory of the enclosed CD.

APPENDIX 5: “EQUIPMENT SCHEDULE (XLS)” – Full equipment and software list, capital, rental or cost per transaction amounts
Root directory of the enclosed CD.

MANUALS

APPENDIX 6: “See Car DLL (PDF)” – Contains a brochure of the See Car DLL software on which See Way is based.
Directory of the enclosed CD: \Manuals

APPENDIX 7: “See Data (PDF)” – Contains technical information on the See Data a software service application that connects a cluster of recognition systems (such as See Lane or See Way) together by a network.
Directory of the enclosed CD: \Manuals

APPENDIX 8: See Lane Install (PDF)” – technical information on the LPR software install, operation and design.
Directory of the enclosed CD: \Manuals
**APPENDIX 9: See Utilities (PDF)** – Contains technical details of the See Utilities software describes the set of utilities that support Hi-Tech Solutions’ Seex products (such as See Lane, SeeTruck, SeeCrane or SeeLane). These utilities enrich our products, ease the technical support and cut the time to market.
Directory of the enclosed CD: \Manuals

**APPENDIX 10: See Lane Manual (PDF)** – Contains technical details of the See Lane software on which See Way is based
Directory of the enclosed CD: \Manuals

![Figure 62 LPR Recognition](image)

**SA REFERENCE SITES**

**APPENDIX 11: “ASD N3 RESULTS Sat Jan 06th (PDF)”** – Contains the typical daily results from the N3 for a single day
Directory of the enclosed CD: \ SA Reference Sites

**APPENDIX 12: “ASD N3 RESULTS SUN JAN 7th (PDF)”** – Contains the typical daily results from the N3 for a single day
Directory of the enclosed CD: \ SA Reference Sites

**APPENDIX 13 IT WEB ASD Article 31 Oct 2006.(PDF)”** – Contains details of the N3 ASD 3 month demo as covered by IT web

The directory on the CD: **SA Reference Sites** contains images from the N3 ASD demo.

The directory on the CD: **SA ASD DEMOS** contains working demos from:

- N3 ASHBURTON images (run PLAYER.EXE to see the demo).
- See Car Speed Demo (run RunMe.bat to see the demo of the ASD software)

- I-CUBE LPR Demo of RSA Customised Plates (run PLAYER.EXE to see the demo of colour images being recognised).

- N3 Camperdown Player EX (run PLAYER.EXE to see the demo of 380 cars recognised at high speed).

- Hand Held Plate Demo (run PLAYER.EXE to see the demo of a hand held unit being used to recognise license plates).

- Colour LPR_Demo.wmv – Demo of the colour camera capturing and recognising license plates.

- DBN Metro CCTV Control Room – A 1 hour test of the use of LPR in combination with the existing CCTV cameras. Images of all vehicles captured.

![Figure 63 ASD on the N3](image)

**SOFTWARE**

**Drivers: Hasp** – Contains the software for the Hasp (dongle) drivers

**PRODUCT SPECIFICATIONS**

**APPENDIX 13:** BEKA POLE_SPEC.doc / Bekapole.pdf

**APPENDIX 14:** AXIS 223M Network Camera:
high performance camera, designed for demanding security installations. It delivers crisp and clear images disclosing every detail, thanks to its top quality 2.0 Megapixel progressive scan CCD sensor, Megapixel varifocal lens and advanced image processing.

**APPENDIX 15:** Duxbury_HSDPA_WirelessRouter.pdf Always on high speed internet connectivity
APPENDIX 16: Edge_Router-230M.pdf - Auto-sensing Ethernet Switch
Equipped with a 4-port auto-sensing Ethernet switch. WAN type supported The router supports some WAN types, Static, Dynamic, PPPoE, PPTP, L2TP, Dynamic IP with Road Runner.

APPENDIX 17: quickbridge2_a4.pdf - complete, user-installable wireless point-to-point bridging solution designed for reliable long distance and low latency voice and data connectivity. This high performance hop-in-a-box is available with 54 Mbps aggregate throughput.

APPENDIX 18: Swith.pdf - The ProSafe FS108P provides power and data from a single point, using Power over Ethernet (PoE) over a single Cat-5 cable. The eight Fast Ethernet ports can be used for any 10/100/1000 Mbps link and four of these ports can supply industry-standard IEEE 802.3af power.

APPENDIX 19: ADI Company Profile.pdf - ADI International is a leading international distribution business of security solutions and services with over 205 branch locations across Europe, the Middle East, Africa and America. ADI International has over 50 years of experience in the specialist security sector. We have built our business by developing personal partnerships with our customers, providing them with best of breed security solutions and bespoke support services to meet the ever changing demands of the market.


Figure 64 Multiple vehicles being captured using a single camera
AVAILABLE ON THE ENCLOSED CD OR FROM THE I-CUBE WEB SITE (www.I-Cube.co.za) ARE:

“SEE WAY DEMO” – Use the see way demo to see how the LPR software works over multiple lanes and watch as alarms are generated when the vehicle exceeds the set average speed above which alarms will be generated.

“PLAYER” – Use the PLAYER.EXE to watch the cars from the N3 & M4 being recognised using the LPR DLL

“SEE LANE” – Use the SEE LANE DEMO to see how the software works, enrol allowed cars, alarm on WANTED cars, see the log of all the vehicles and see a history of the vehicles.

Figure 65 Bus logging at multiple sites
APPENDIX 21–SITE SURVEY/PROJECT PLAN

A request for a SITE SURVEY is certainly acceptable, and something we do on a regular basis. What I-Cube requests is a refundable deposit of R7 500.00 which confirms the client’s interest. This money will be refunded in full IF the provided system does not work OR an order is received. We do this as undertaking a SITE SURVEY is an opportunity cost for I-Cube, and we ensure that only client’s who are actually interested take this further. This in no way means the client has to buy the LPR software or buy from I-Cube. If no order comes out of the SITE SURVEY, that is fine.

Once I-Cube has received the deposit, we will allocate a suitable team; obtain full site information and negotiate an appropriate day for the SITE SURVEY.

The substantial experience I-Cube has developed from installing systems locally in KZN and South Africa will prove extremely beneficial during the install of the solution. Key to the successful installation and faultless operation is the initial design, based on a complete TCP/IP backbone, consisting of wireless links and real time connectivity. The connectivity allows real time operation. The ability to obtain feedback from the equipment in the field in real time, allowing proactive response to any issue ensures all challenges are resolved before they escalate.

Once the order is received, a meeting with DEPARTMENT OF TRANSPORT will be arranged to discuss any modification to the system design, layout, position or if any of the options presented will be selected. A weekly meeting time is requested for feedback on progress plus the ability to immediately identify any issues which might arise. If there is nothing to discuss, this should take only a few min. However, if any issue does present, all role players can be kept informed of the progress and decide on a suitable way forward. This is the ideal time for the operational staff to get involved, so they understand the solution from an operational level. At each meeting additional reading material will be provided to the operational staff for study and prepare. A total of 10 days have been allocated for alternative design options, when the onsite work will begin, assuming the electricity is in place.

The systems will be pre-built before being installed, with substantial tests to limit any on site issues. This is the ideal time for the operational staff to get hands on involvement, so they understand the solution from a board level. The first items to be installed consist of the rack (1 per site) and cameras. Once these are in, the PC’s, cameras (1, 4 or 16), UPS, HUB, modem, mouse, keyboard, monitor, switch and other items can be installed and connected. With a single team each site will be installed and operational within 2 days.

Once the systems are installed, extensive tests begin. As these are all done from the control room this is the ideal opportunity to continue the on the job training of the personal who will operate the system. Each stage of the process will be extensively tested: from trigger detection, multiple image capture, OCR, transfer of the data (plate, lane, date, time, etc.), loading users and those plates where an alarm should be generated. Tests will be performed using dedicated vehicles travelling at specific speeds to ensure the entire system is fully operational, including the measured distance between sites (if selected).
TO BE PROVIDED BY CLIENT

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

A clean, consistent, source of Electricity is required at all the sites in the field. Delay of the provision of the electricity beyond that detailed in the project plan will delay the launch of the project.

Permission to work in the areas designated would be required from the relevant authorities. Any delay in obtaining the required permission would result in an unknown delay in the project.

The proposed solution will operate automatically however if Department of Transport are going to ensure the system operates to the best ability, trained operators and service personnel are required. The training period as detailed should be followed hence these personnel are required to start training early.

A communication link is required to send the data and images captured to the central server at the Department of Transport. This might be GPRS or wireless or ADSL but connectivity is required and is for the account of the Department of Transport.

Software development to link into the required databases is required and needs to be specified. Software development is charged at R750.00 per hour.
FURTHER INFORMATION:

I-CUBE IMAGING SOLUTIONS ALLOWING PROACTIVE CRIME PREVENTION

Barry T. Fryer Dudley
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Imaging Consultant (LPR, IA & Facial)

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Add me to your address book... | Want to always have my latest info?

I-Cube provides imaging solutions to distributors and installers who want to provide Integrated, Intelligent, Imaging (I3) solutions to their customers. These imaging solutions proactively reduce crime, prevent theft, link an image to a transaction or invoice, allowing immediate response via SMS, E-Mail or audio / visual alarms.

License plate recognition can be linked to weight, speed, colour, shape, time, access control or invoice. The ability to ALARM when a wanted or suspected stolen vehicle is detected is certainly possible, both with CCTV & IP cameras, with fixed and mobile cameras.

Generation of revenue from the LPR system is certainly possible, with various marketing opportunities being created with the system.

Facial ID and verification solutions can be linked to an access card or pin or to a database of known criminals or important people, allowing PROACTIVE steps to be taken.

Image analysis allows colour, size, shape, intensity or texture to be used to identify any object, allowing the object to be accepted or rejected from a process. An example here is a wide range of sugar bags which can be classified and counted, linked to weight and invoice.

I-Cube can supply software only, a KIT made up of some hardware with suitable software or a total solution which just needs to be installed, either as a monthly rental, cost per transaction or a capital amount.