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JANUARY 2001

CSX gets a clearer view in Hong Kong

Among recent installations at the CSX World Terminals' terminal (ex-SLOT) in Hong Kong is an intelligent computer vision system at the exit gate called VECON-CON, developed by Asia Vision Technology Ltd, a Hong Kong-based company originally set up by academics led by Dr John C M Lee from Hong Kong University of Science and Technology.

The SLOT terminal is the first customer for the VECON-CON automatic container number recognition system, although other VECON applications such as VECON-VIS are used for various road traffic and fleet management applications as well as by the Hong Kong MTR and commercial car park operators.

VECON-CON is claimed to be more than 98 per cent accurate in reading alpha-numeric container numbers, while image capture and processing time takes only a few seconds - typically between 0.6 and just under 1 second, according to the presence of distortive variables such as corrugation, faded colour, peeling paint, light reflections, etc. It is also capable of being used to read Chinese vehicle license plates.

The data are integrated with the terminal management system so verification is carried out automatically instead of relying on manual checking of the container ID number against the paperwork, thus reducing the gate dwell times for truckers.

VECON-VIS is also ready to read Chinese characters and Asia Vision is now developing the China market. Sample in Nanjan is the first to install VECON-CON for its cargo logistics management. In addition, there are nine VECON-CON systems installed at Custom checkpoints in China including Shenzhen, TinJin and Dalian provinces.

Other new VECON applications developed by the company include chassis identification and crane-mounted versions (quay cranes, RTGs and RMGs).

車牌辨識系統 目標盈利3000萬

科研商品化

不少人都說，讀書人不宜投身商界，因為課本理論與現實環境往往南轅北轍，其中最難掌握的就是市場變數。不過，亞洲視覺科技有限公司兩位創辦人雖分別持博士及碩士銜頭，卻早在97年成功把大學的科研技術商品化，更大膽預期，其產品純利可以由今年的600萬元，飆升至來年的3000萬，真教人刮目相看！

亞洲視覺科技（Asia Vision）創辦人之一的主席兼總裁李春茂指出：「科學研究最重要是有實在的環境進行系統應用測試，否則很難提高其準確性，這正是學府最欠缺的東西；但大學勝在資料及數據充足，而且有不少可以申請的資助。」亞洲視覺科技最近便成功向創新科技署申請撥款，開發專門針對大陸市場的產品。

對小型企業而言，基於資源所限，要令營運走上軌道，秘訣不離一個「專」字。目前亞洲視覺科技便以一套專門針對車牌及貨櫃等號碼，名為慧光（VECON）的識別系統為主要產品，並以車牌識別作重點推廣。

最低消費13萬

系統首先會拍攝汽車的圖像，再把車牌數碼化，並自動記錄下來。另一位創辦人黃永建說：「不同地區系統售價會有不同，本地用戶最低消費約為13萬元，包括軟、硬件及攝錄系統。」

此外，用戶每年尚需繳付相等於售價15%的保養費，作為更新系統及補助進一步研發的技術開支。

省本兼防盜竊

李春茂說：「系統不僅有助減省人手及運作成本，更可以打擊汽車盜竊及協助追尋。」因此目標客戶除一般公共及私人停車場外，尚包括紀律部隊、各條隧道及政府屋苑等。

現時識別系統已在本港、國內、台灣、新加坡及英國使用，並計劃在年中推廣至南韓、泰國、美國及歐洲等地。李春茂指出：「各地車牌都有本身一套編制方式，所以每進入一個新市場，均需搜集數十萬個數據樣版，以供系統自行學習。」

在眾多地區的車牌之中，最難識別的肯定非國內的車牌莫屬。李春茂坦言：「國內的車牌包含中文字，加上車輛穿州過省，牌面滿布泥濘，直接影響識別的準確性。」現時該系統的辨認誤差約為2%，若遇到無法識別的個案，系統會出現警告訊息，由監察人員親自檢查。

撰文：丹琍

■李春茂（左）及黃永建本為師生關係，現更進一步攜手共同創業。 凌樹輝攝

亞洲視覺科技檔案

亞洲視覺科技有限公司創辦人李春茂及黃永建本為師生關係，早於93年開始，便在科技大學共同研發慧光辨識技術；及至97年，二人向科大以成本價購回技術專利，並成立公司開發電腦視覺技術，應用到日常生活，繼而推廣至各地市場。

該公司現僱有12名員工，並已先後獲3個投資基金注入2500萬元。

集中火力宣傳

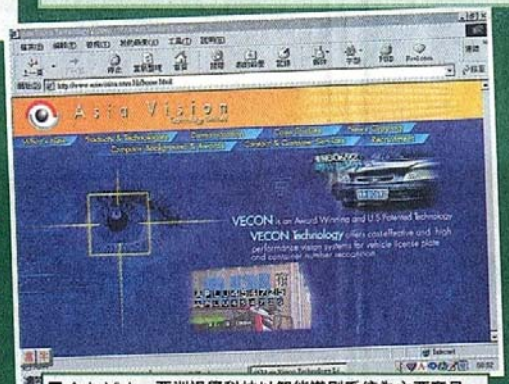
李春茂走出「象牙塔」從商，可以追溯到12年前。其時李春茂仍任教於新加坡大學，已應當地Port of Singapore Authority的要求，發展一套專門識別貨櫃的系統，這亦是現時慧光系統的雛形。

至於黃永建，則由93年入讀科技大學始便已協助李博士從事相關的研究計劃，及後更從師生關係提升為生意夥伴。

雖然黃氏沒有透露這項原本屬於大學的科研專利的真正售價，卻承認只是以低廉的「成本價」購回。

李春茂說：「過去三年，我們以改進產品為主要工作，現在產品已趨完善，便會集中力量在市場推銷方面。」除直接與物業管理企業接觸外，該公司亦會在國內電視台賣廣告，藉此吸引公眾注視。

此外，針對本地隧道電子化及日漸增加的欺詐事件，亞洲視覺會把隧道的風險損失率呈報有關公司，吸引他們選用其產品，藉此提升營業額。而在目標市場如美國、國內、東南亞及澳洲等地舉辦展覽，亦是該公司推廣產品的主力途徑。



■Asia Vision亞洲視覺科技以智能識別系統為主要產品。

VECON出沒點

- 機場快線巴士站
- 香港新機場巴士站
- 文錦渡關閘（2002年）
- 落馬洲關閘（2002年）
- 沙頭角關閘（2002年）
- 德福花園停車場
- 銅鑼灣世貿廣場
- 杏花邨
- 京士柏山

2001 年3月刊

智能化管理

给交通系统配上金睛火眼

——简介亚洲视觉科技有限公司的智能科技产品

随着 ITS(智能交通系统)在中国的快速发展,国内外智能交通系统的最新信息和系统知识普遍受到业界的关注。目前国内的智能科技发展已接近国际水平,而亚洲视觉科技有限公司便是其中的佼佼者。

亚洲视觉科技有限公司于 1997 年在香港成立,公司致力于将最新电脑视觉技术应用到日常生活中。自成立以来,公司已在停车场管理、集装箱码头和交通监控等领域里建立起令人钦羡的地位。公司承接的项目和用户包括香港特区政府、香港地铁公司、香港新机场和遍布在中国内地、香港、台湾,新加坡,欧洲等各处的停车场和集装箱码头。亚洲视觉一直以丰富的实际安装经验和不懈的研究发展努力来保持我们在业界内之领导地位。他们的目标是透过向系统整合商、商业合作者和软件开发公司进行技术特许,将"慧光"(VECON)技术推广至全世界。

慧光技术的原理,是通过电脑视觉技术,把 CCD 摄影机拍摄下来的影像输出转换成数据,用亚洲视觉所开发的软件去分析影像中的内容,如数字、文字和各类物体等。以下我们就逐一介绍亚洲视觉科技有限公司的产品:

产品名称

VECON – CON:集装箱号码自动识别系统

VECON – VIS:车牌号码自动识别系统

产品用途

1. 能识别印刷字母、数字、汉字、颜色、图案、物体大小和物体移动的通用电脑识别系统。

2. 高准确度和可靠度。

3. 在恶劣的环境和天气下仍可运作。

4. 能够阅读静止或高速移动车辆上的车牌号码及集装箱国际 ID 和 ISO 号码。

5. 可识别中国车牌和世界大部分国家的车牌。

6. 可 24 小时不停运作。

7. 可用标准和非专用的硬件设备,安装方便。

8. 很容易和用户的应用软件与操作系统合成,并随时可与网络接口。

产品简介

VECON – CON:集装箱号码自动识别系统

集装箱系统特性

1. 自动实时识别集装箱 ID 和 ISO 号码及记录集装箱的图像。

2. 无论正在移动中或是静止的集装箱 ID 和ISO 号码均可识别。

3. 可核对集装箱车车牌与其运送之集装箱号码资料是否相符。

4. 自动验证 ISO 号码的"复核数位"。

5.24 小时不停运作。

6. 高度准确及可靠。

7. 自动管理进出码头闸口、补给站或仓库的集装箱。

8. 可结合卸货单及码头管理数据库使用。

9. 大量已安装应用的装置可作为技术和经验的明证。

集装箱系统优点

1. 实时提供集装箱的全球位置信息。

2. 将日常的码头管理工序自动化,包括闸口及货物管理,集装箱存货管理,场地规划,收费管理及其他有关的物流管理工序。

3. 电脑自动识别起落中的集装箱号。

4. 节省集装箱检验收回的时间。

5. 降低人手记录集装箱号码的出错率。

6. 加强码头出入口的保安。

7. 节省运送集装箱的时间。

8. 增加处理集装箱的数量。

9. 可结合码头业务流程资讯系统。

集装箱系统设备

CCD 摄录系统(每条车道需独立安装)

1.3 台或以上之彩色保安摄像机(水平 480 行扫描线;S/N50DB)连接箱及支架。

2. 电子快门:1/1000。

3.300 – 500 瓦泛光灯。

4.PENTIUM Ⅲ 600 MHz 或以上。

5.6.4GB 或以上的硬盘(储存 120,000 幅图像)。

6. 图形捕捉卡。

7. 作业系统:WINDOWS 2000 / WINDOWS NT。

8. 彩色显示屏。

VECON – CON 集装箱号码识别系统软件

1. 快速准确识别集装箱 ID 和 ISO 号码。

2. 适用于 WINDOWS 2000 / WINDOWS NT。

3. 系统管理模块可结合摄像机、探测器与泛光灯使用。

4. 标准用户界面。

5. 触发装置;红外线感应器。

VECON – VIS:车牌号码自动识别系统

VECON – VIS 慧光车牌号码自动识别系统能非常准确可靠地确认、识别及验证移动或静止的车牌号码,针对对象为智能交通监控、道路检查站、停车场及车队管理企业等。

车牌识别系统优点

1. 可识别不同国家地区的车牌号码,包括香港、中国大陆、台湾、新加坡及其他地区。

2. 自动控制及准确记录车辆之出入与流量。

3. 防止车辆被盗或内部员工欺诈。

4. 已安装本系统之企业包括香港机场快线、香港新机场、香港特区警察及多个公共/私人停车场。

车牌识别系统特性

1. 自动实时对所有进出之车辆进行车牌识别。

2. 能识别包括英文字母,数字及汉字车牌。

3. 准确率高、速度快。

4. 自动生成车牌号码与车辆影像的数据库。

5. 无论单行或是双行的车牌均可识别。

6.24 小时不停运作。

7. 可连接用户的资讯系统或业务流程。

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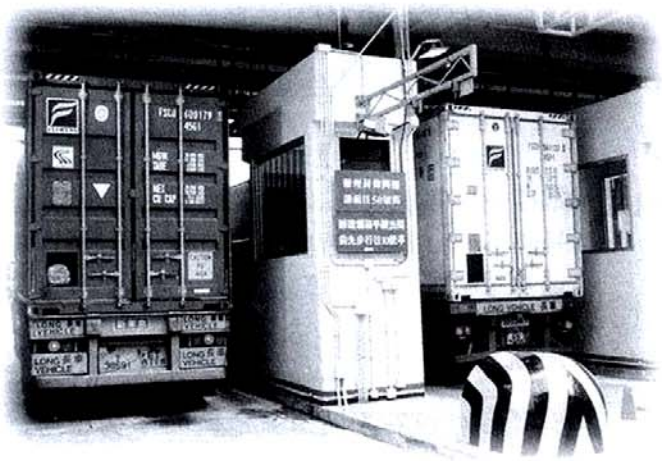
智能化管理



应用范围

1. 时租停车场。
2. 月租停车场。
3. 住宅及智能小区停车场。
4. 商业楼宇停车场。
5. 集装箱堆场。
6. 公共汽车总站。
7. 仓库停车场。
8. 警局及医院停车场。
9. 需严密保安的楼宇。
10. 道路检查站。
11. 高速公路收费站。
12. 城市道路出入。
13. 隧道收费站管理。
14. 海关和码头进出口通道。

车牌识别系统设备

CCD 摄录系统

1.2 台或以上之保安摄像机(水平480行线;S/N > 50DB)连接箱及支架。

2. 彩色、黑白或红外线感应。

3. 电子快门速度:1/500 – 1/1000。

4.100 – 500W 泛光灯,120 – 500W 红外线照明灯。

触发装置

1. 每台摄像机至少连接一台安装于地底的金属感应器。

2. 如果未能安装金属感应器,也可用红外线感应器代替。

3. 用户也可以选择连续拍摄的非标准模式。

车牌识别系统要求 (每条车道需独立安装)

1.Pentium Ⅲ 600MHz 或以上。

2. 视频捕捉卡。

3.6.4GB 硬盘(储存 120,000 个图像)或以上。

4. 作业系统:WINDOWS 2000 / WINDOWS NT。

5. 彩色?影示器。

6. 用 RS – 232 总线连接金属感应器。

VECON – VIS 慧光车牌号码自动识别系统

1. 自动实时对所有进出的车辆进行车牌识别。

2. 系统管理模块可结合摄影机、探测器及泛光灯使用。

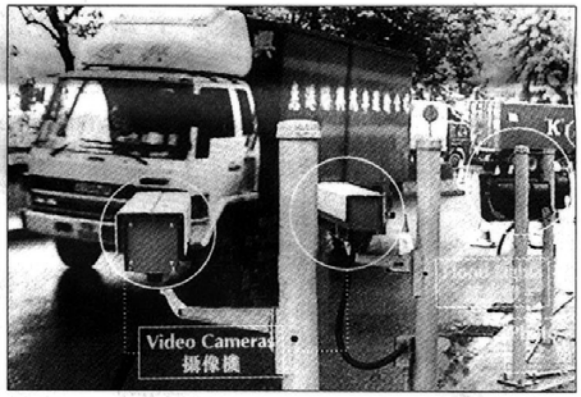
3. 标准用户界面。

4. 数据库管理模块分类并检索车辆资料,产生报表。

5. 可选择连接其他票机或轻触式感卡等装置。

海關申撥千萬 三邊境管制站安裝

車牌辨認系統加快過關



海關將於陸路邊境口岸裝置車牌辨認系統，於通道加設錄影鏡頭，既可節省過關手續時間，亦有助偵緝失車。

特稿

本港海關計劃申請撥款一千萬元，在落馬洲、文錦渡及沙頭角三個陸路邊境管制站，加裝車牌辨認系統，以減省現時人手輸入資料的程序，預計新系統可以令每輛出入境車輛的檢查時間節省五秒，而海關人員可以有更充裕時間作車輛檢查工作。

海關發言人表示，已經於管制站試驗新系統，效果理想，預計載貨及無載貨車輛的檢查時間，可由現時的四十秒及二十秒，分別縮減至三十五及十五秒，計劃可於二〇〇三年中逐步實施。

海關將於三個口岸合共四十二個車輛出入境通道，加裝閉路電視鏡頭拍攝過境車輛的圖像，並將車牌數碼化，自動紀錄低車牌號碼、過關時間，甚至是可翻查車身顏色。

檢查時間省五秒

鑑於經常往來中港兩地車輛掛上兩地車牌，辨認車牌系統設計亦可同時處理兩個車牌，甚至可辨認內地車牌上的中文字，如代表廣州的「粵」字等。

另外，透過辨認車牌系統，海關電腦即時察覺一些只具多次出境但無入境紀錄的可疑車輛，有助偵查失車。

辨認系統的發明者，亞洲視覺科技有限公司主席李春茂博士指出，系統認字準確度達百分之九十八，偏差率爲百分之二。在邊境管制站設置辨認系統，需克服大型貨櫃車車身長、車牌位置不一的情況，故新系統將於每一通道設四個鏡頭，及調節燈光，以確保錄得正確的車牌號碼。

不過，有熟悉管制站運作的海關人員擔心，電腦拍攝可能隨角度不同容易出錯，但認同現時陸路口岸電腦系統已使用逾十年，呈現老化，有需要作更換。

貨櫃運輸業職工會主席趙資強支持引入新系統，預計可減低偷車及偷貨櫃的情況，他希望系統甚至可錄低車架號碼，可避免貨櫃車架被偷情況。其實，內地口岸早於今年一月開始，引入相類的自動化紀錄系統。

明報記者 曾錦雯

陸路口岸貨車流量

邊境管制站	貨車流量(99年)	貨車流量(2000年)	增減(%)
落馬洲	565萬架次	629萬架次	+114%
文錦渡	260萬架次	249萬架次	-4.5%
沙頭角	621,157架次	621,928架次	+0.1%
總數	888萬次	940萬次	+5.9%

SecurityWorld Total Security Magazine

Security Forum

VECON: Accurate and Secure Character Recognition

By C.M. Lee,
Chairman and CEO of Asia Vision Technology Ltd.

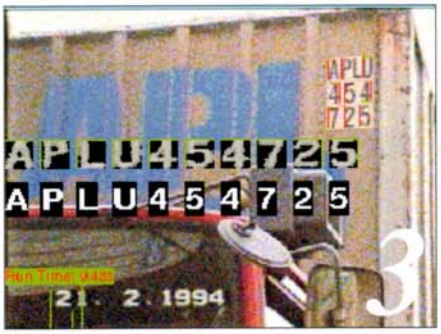
The VECON-VIS system is an automatic reader of vehicle license plate numbers. Installed at entrance and exit gates of car parks or depots, it can reliably and accurately read, recognize and verify the license plate number of any incoming and outgoing vehicle. It is an ideal solution for car park managers who put high value on security, operational efficiency and information management of their car parks and depots.

We've all seen the signs that read "Authorized Vehicles Only". But how can the operator of a car park or a manager of a vehicle fleet control access easily, efficiently, accurately and cost-effectively?

In the complex world of transportation logistics, how is it possible to identify and track particular cargo containers at container terminals? And how can the police force identify stolen cars without tying up hours and hours of scarce manpower?

All these problems can be solved through the latest computer vision technology. Asia Vision Technology Ltd., the specialist in developing innovative computer vision solutions, employs its patented VECON technology to solve these and many other problems when number and character recognition are required. AVT is now aggressively looking for new markets outside Hong Kong.

The VECON-VIS system is an automatic reader of vehicle license plate numbers. Installed at entrance and exit gates of car parks or depots, it can reliably and accurately read, recognize and verify the license plate number of any incoming and outgoing vehicle.(Fig1) It is an ideal solution for car park managers who put high value on security, operational efficiency and information management of their car parks and depots. There are no national boundaries on the system; it can read the license plate number of China, Hong Kong, Singapore, Korea, Japan, Greece, UK, etc.(Fig2) The VECON-VIS has been successfully applied in its major target areas worldwide, including Hong Kong International Airport, Hong Kong-China Border, the Beijing World



Trade Center and the Shanghai City Government Building.

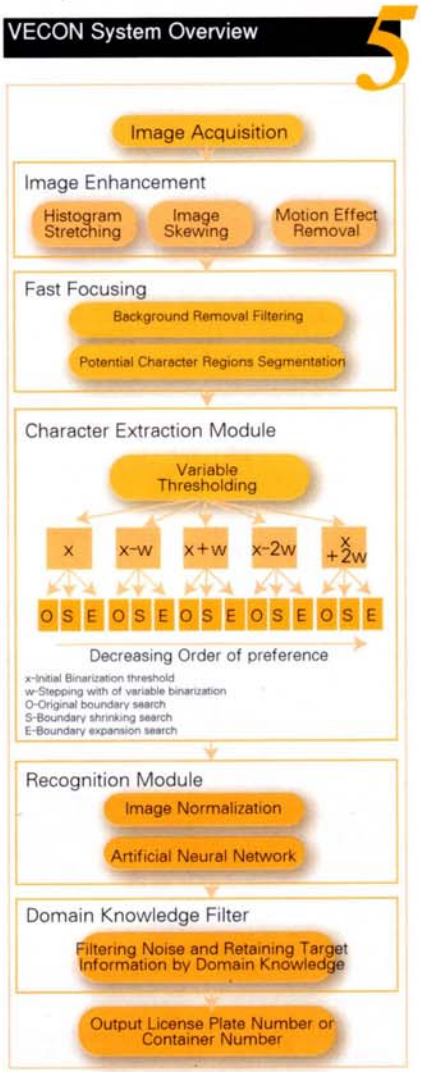
VECON-VIS' s sister technology is VECON-CON, a container number recognition system.(Fig3) VECON-CON allows terminal controllers to keep track of containers as they move from land to sea or from sea to land and then out of the terminal again.(Fig4) Sea-land Orient Terminals Ltd.(SLOT) is a terminal operator in Hong Kong handling more than 1 Million TEU throughput per year. SLOT implemented VECON-CON in their Gate process in early 1999. With the VECON-CON application, the Gate-Out process is made 100% automatic with greatly improving in their container dispatching reliability. After operating the system for 2 years, Sea-land was highly impressed by our consistent and high accuracy rate of 98%, quick response time in capturing container numbers and our excellent technical support.

What makes the VECON systems unique?

First of all, they are highly accurate. VECON-VIS has an accuracy rate of over 99%. This is a proven statistic collected at the VECON-VIS installed site in Hong Kong-China Border. Within one week(24 x 7), a total of 16,137 vehicles passed the border and a total of 15,987 images are successfully captured. The accuracy rate was 99.7 percent. The rest, 0.93 percent of them were unrecognized mainly because the vehicle number plate was too dirty or damaged. In addition, the systems are quick. The time for an image acquisition as well as recognition is less than half a second when the system is installed on a Pentium III 650MHz computer.

But what's more important is that the VECON systems can overcome typical problems encountered in real-life character recognition situations and deliver excellent results. While many methods have been proposed for character recognition, they are often subjected to substantial constraints due to unexpected difficulties in real-life images.

A real-life image may be complex for a variety of reasons. Rust, mud, peeling paint, or fading color may distort the images of the characters; uneven lighting may make them difficult to discern. The VECON system takes into account a wide range of real-life considerations and aims to offer applicable solutions.



How the VECON System Works

The first step is to start the system and to capture the character images. The system is triggered by vehicle detectors, which then capture the container and vehicle license plate images. Image processing techniques including histogram stretching is used to enhance the contrast and image skewing is used to correct the slant angle of the characters in case the image is not captured exactly head-on(as would be likely in situations where vehicles are moving past the detectors).

A fast focusing technique based on the character widths and heights is used for an initial rough segmentation and to remove any unwanted background information. With this fast focusing technique, the view angle of the video camera can cover a wide area while the processing time can still be fast. Then, the individual characters are extracted through a multi-pass extraction module that can deal with the problems of noise and contrast. Finally, the normalized individual characters are fed to a feed-forward neural network that tackles the problems of size, contrast and the shape distortion of the characters.

Properties of Characters

After years of studying horizontal and vertical line segmentation, the computer scientists from Asia Vision Technology can now describe the important properties of characters in real scene images with a resolution of 768x576 captured from a video camera. Though the details seem simple, they are vastly important. They are:

a. The character sizes of vehicle and container ID numbers in captured images are in the pixel range from 16 to 64, and the width of the character strokes is greater than or equal to 3 pixels. These are the input parameters of the whole system.

b. The contrast between the gray-levels of the characters and the background is greater than that of other non-characters and the background. The characters are either black on a white background

or white on a black background.

c. The characters in the images are composed of both short vertical and horizontal line segments.

d. The non-character regions are composed of either long horizontal and vertical line segments, long horizontal line segments but short vertical line segments, or long vertical line segments but short horizontal line segments.

Fast Focusing

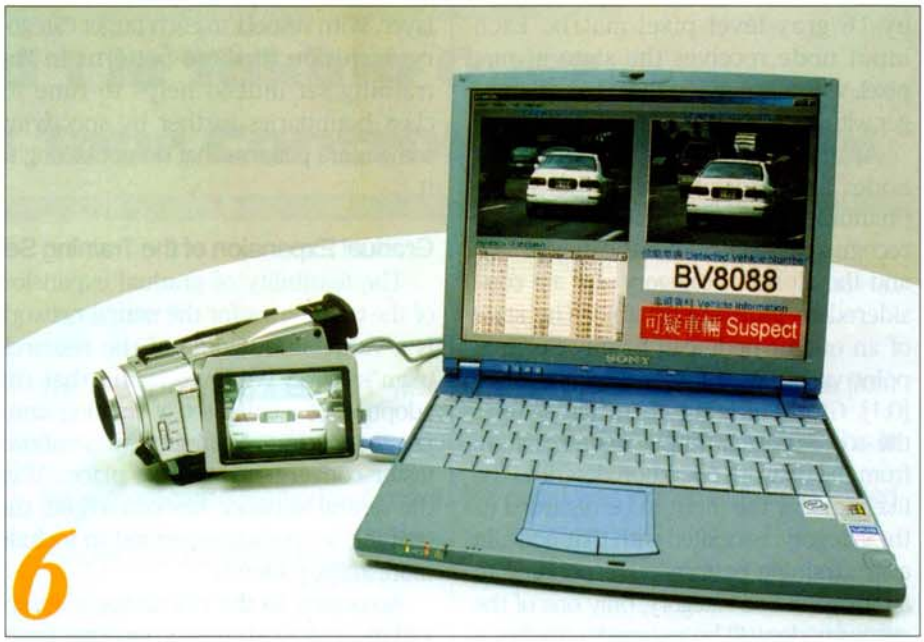
From their analysis of the character properties, the Asia Vision research and development team has determined that the characters in a real-life image will be located in the regions with both short horizontal and vertical line segments and with relatively high gray-level contrast. Since the characters are assumed to have high contrast with their background, the adjacent line segments will have relatively high gray-level contrast. Asia Vision considers the properties of a group of characters in the scene image in two dimensions(horizontal and vertical directions). The characters can be distinguished from the background more easily and thus more accurate character segmentation can be achieved.

An experiment of removing all the very long horizontal and vertical line segments was conducted to test this hypothesis. These discoveries led the research team to create a system that could focus quickly on the actual characters to be recognized.

Expansion & Shrinkage of Extraction Boundary

After the segmented regions have been translated into binary input, the isolated characters can be extracted through a connected component search. During the search, if the region is too small, the boundary box of the region will be expanded so that the background components can be extracted. Without the expansion, the background may appear to the system to be characters.

If the region being searched is too large, the boundary box of the region will be shrunk so that the characters that have merged with the background will still be extracted. Without this approach, all merged characters may appear to the system to be one character. As it is not clear which method will produce better results, both methods are used for searching and the results are selected in the next module.



ROBO-EYE enables character recognition from a moving vehicle. The system is fully portable, comprising a notebook computer and digital camera suitable for Road Patrol and covert operations that require remote and non-stationary activities. The police force can use this technology to search for stolen vehicles.

Multi-Extraction Evaluation and Selection

More than one set of results is generated by the boundary expansion and shrinking modules at different thresholds. This module will select the best set based on the total number of extracted components and the size variance in each set.

Because several results may be generated, they are first ordered according to the hierarchy and confidence of the operations.

In the binarization step, the initially selected threshold is most likely to produce good results. Hence, the results are ordered as {x, x-w, x+w, x-2w, x+2w} where w is chosen as 10% of the largest gray value(255) in our implementation (that is 25). In the character extraction, the original boundary search is more likely to produce good extraction results for clear images.

Both the boundary shrinking and boundary expansion search are good for noisy images, but they are less likely to occur in normal cases. Hence, the results are ordered as the original boundary search, the boundary-shrinking search and the boundary expansion search. If there are any other connected component extraction methods created to tackle the failed cases of the present methods, the final results can be ordered by considering the occurrences of these cases.

Neural Network Character Recognizer

The neural network in the VECON system acts as the character recognition module. Basically, it is a general feed-forward multi-layer perception with one hidden layer, trained by the back-propagation algorithm. The number of nodes composing the input layer, the hidden layer and the output layer are 256, 100 and 35 respectively.

The input to the neural network is the character pattern extracted by the schemes described above. The normalized character is represented in a 16-

by-16 gray-level pixel-matrix. Each input node receives the state of one pixel, whose value is either 0 or an integer within the range 128 to 255.

At the output layer, the 35 output nodes are associated with the 35 alphanumeric character categories to be recognized. The numeral category '0' and the alphabet category 'O' are considered as indistinguishable. The state of an output node can be any floating-point value(i.e., the score) in the range [0,1]. Given an input character pattern, the score of each output node resulting from the network operation describes the likeliness for the input to be regarded as the category associated with that node. In every training pattern corresponding to an image of one category, only one of the output nodes will be assigned a teacher's output of 1.0 while all the others will be forced to be 0.0.

Among these output nodes, only those with their firing scores above a preset threshold value are examined. In Asia Vision's current usage of the network, at most, two candidates are selected for further consideration in the license plate recognition phase. One of them is the node with the highest score among those corresponding to the subset for alphabetical letters, while another one is the node with the highest score among the node subset for numerals.

Training of Unclassified Patterns

In Asia Vision's application of the neural network, it is very likely for the neural network to be given an input that does not belong to any of the 35 target categories. This will happen since the VECON system works on real-life images captured under loosely controlled conditions. The images can be full of ambiguous patterns that may be extracted for neural network recognition as well. Hence, it is necessary for the neural network to respond robustly to these "noisy" patterns.

To handle the "noise", the false patterns extracted by the system, which are regarded as potential character patterns, are fed to train the neural network as well. The teacher's output for this kind of pattern(called "unclassified patterns"), however, is a zero vector. In other words, the neural network is trained to respond with all "zeros" in its output layer. With respect to each target category, inclusion of these patterns in the training set indeed helps to tune its class boundaries further by specifying some more patterns that do not belong to it.

Gradual Expansion of the Training Set

The feasibility of gradual expansion of the training set for the neural network is a valuable outcome of the research team's work. We have found that the adoption of a small set of training samples in the initial training phase allows faster convergence to take place. After the neural network has converged, the training set is then expanded to include more image patterns.

According to the researcher's observations, such a strategy converges faster than one that attempts to learn all patterns available from the very beginning. Besides this benefit of quick convergence, such a strategy also enables the VECON system to be developed at a faster pace. Real samples captured from a site can be collected to build an initial system rapidly, while the system performance can be further improved by continually collecting more samples into the training set from the operating site.

Neural Network Training Results

By the strategy described above, the neural network is trained with 10,000 samples at the beginning. After the network has converged, the trained weight configuration is recorded. Then, new samples are introduced and training takes place again with the most up-to-date configuration. Such a cycle is repeated until the training set consists of 50,000 samples in total. Finally, the network is able to report an accuracy rate up to 99.5% when a test set of 10,000 character samples is used.

Domain Knowledge Filter

After extraction and recognition of the potential characters in the image, the vehicle license plate number or container numbers are still not determined, as there is much noise such as the company logo or container weight and dimension information around the target. The following parameters are used to identify the location of the real target.

As for the formats of the vehicle license plate number and container numbers, for instance, vehicle license plate numbers normally consist of one to two letters and three to four numbers, while container numbers consist of four letters and six numbers plus one check digit.

In relation to line separation and orientation, container numbers can be divided into two or three lines and they can be oriented horizontally or vertically. Also, there is an issue about character color, size, and spacing. For instance, in gray-level images, there exist white characters on black backgrounds and black characters on white backgrounds. The size and spacing of the characters are of fixed dimensions.

Based on the above domain parameters, the recognized characters will be grouped together in various ways and the combination that satisfies most of the specifications will be selected as the result.

The Future

Recently, we have extended the application of VECON to Traffic Enhancement Field.(Fig6)ROBO-EYE enables character recognition from a moving vehicle. The system is fully portable, comprising a notebook computer and digital camera suitable for Road Patrol and covert operations that require remote and non-stationary activities. The police force can use this technology to search for stolen vehicles.

To achieve full automation in the Container Terminal, we have innovated a cutting-edge technology on quay cranes. The system's technology is used to scan container numbers as they leave and enter the port, in order to cross check the data with number plate and manifest data to ensure the right containers leave on the right trucks. The benefit is in vastly improved terminal security system and greater delivery accuracy. Furthermore, it can carry out the container scratch and punches hole inspection. ■ ■ ■

About Author

Dr. C.M. Lee is the chairman and CEO of Asia Vision Technology Ltd. He received his Ph.D. in Computer Science from the University of Minnesota in 1989. He successfully developed and commercialized the "VECON" - Computer Vision technology, which is US patented.

CONTAINER ASIA 2001

THE CRANE REPORT

Visibility visionaries

What price visibility? For shippers and carriers, the answer could be at hand, with a new, crane-based technology that could offer full visibility on individual containers within a port. **Jacqueline Nunan** reports.

QUAY CRANES DOMINATE the container terminal landscape, so it is not surprising that they commanded the attention of Dr John Lee when he looked to expand the applicability of his machine vision system.

Dr Lee's technology is already reaping benefits in several terminals: an early generation of the Asia Vision system is in place on gates at the Port of Singapore, while a current version is in constant development as part of a project at the CSX World Terminals (formerly Sealand Orient Terminals) in the Port of Hong Kong.

In both cases, Asia Vision image recognition technology is used to scan container numbers as they leave and enter the port, in order to cross check the data with number plate and manifest data to ensure the right containers leave on the right trucks. The gain, as Lee explains, is in vastly improved terminal security and accuracy of delivery: the potential for this technology, however, is much wider.

Dr Lee, a professor at the Hong Kong University of Technology, became interested in machine vision technology and its potential applications for container ports during his time in Singapore.

In research funded by the Port of Singapore Authority, he developed a first-of-kind container number recognition system that proved to be 87% accurate on its installation at PSA in 1992.

The technology, Lee points out, was very much in its infancy (current accuracy is in excess of 98%), but was sufficiently promising to be protected by a patent taken out by the PSA; Lee's second patent, filed in 1995 and passed last year, is in the name of his own company, Asia Vision Technology, and heralds both a new level of functionality, and a broader application of the system.

Applications

The most successful product so far is VECON-VIS, designed to read license plate numbers and widely installed across south east Asia and China by police forces and customs officials. This technology is echoed in, and expanded upon in the container port product, VECON-CON, but Dr Lee and his team are currently working on new technologies that will extend container number recognition beyond the gate. Advanced trials of a system that hopes to improve yard management are underway, with container numbers being scanned by cameras mounted throughout the yard or on container handling equipment such as RTGs and RMGs or straddle carriers.

The next step, Dr Lee believes, is to enlist the powerful position of the container crane – the means by which every container either leaves or enters the terminal. This, in combination with a yard-based and gate-mounted system, would offer a terminal complete visibility of every container within its domain.

"The terminal would know exactly when the container was unloaded from the ship, where it was placed in the stack, and reassignments of position, how long it has been

Dr John Lee: crane visionary.

CONTAINER ASIA 2001

in the stack, and when it left the terminal," Dr Lee enthused.

Another level of development would come with the incorporation of the available data into a system that would enable interested parties – shippers, freight forwarders, carriers or logistics companies – to access the data on demand.

"It would mean complete visibility, at least at port level. The carrier would know how long it took the boxes to be unloaded or loaded, based on the difference in time between when they berthed and individual boxes were taken off or put on; the shipper would know when a cargo has reached the destination port," Dr Lee said. The new level of transparency would ensure a higher level of service, with no opportunity for the carrier, terminal, or intermodal operator to avoid responsibility for delays in their particular leg of the supply chain.

Dr Lee's vision, he allows, is still some time away. Trials of the container yard system are underway with CSX World Terminals in Hong Kong, while Asia Vision is seeking suitable partners to trial the crane-mounted technology. This requires a specific set of circumstances, Dr Lee explains, with appropriate lighting conditions to ensure optimum visibility, and no canopy over the cranes that might obstruct camera lines of sight.

Simple set-up

The "vision" side of the equation, he explains, is relatively simple, with a configuration of cameras mounted to offer a range of views of container numbers, and that information then pooled and analysed by computer software.

Accuracy has been improved through an ever-widening "library" of images; the software "learns" to rebuild partial numbers, and obscured images to offer a "best guess" solution. At 98% accuracy, it is obviously an excellent guess, but 100% accuracy will never be achieved, Lee warns. This is not because of any failure in his technology, but due to factors such as poor lighting, and dirty, rusty or otherwise damaged containers.

Needless to say, this is not an inexpensive tool: terminals can expect to pay between $20,000 and $40,000 per lane for gate mounted systems, and possibly some $40,000 to $60,000 per quay crane.

The takeup of this technology will be a clear indicator of the value placed on visibility, and the potential productivity and customer service gains it offers. Shippers, carriers and logistics companies are likely to be very interested in the answer.

Dr Lee's technology is already reaping benefits in several terminals: an early generation of the Asia Vision system is in place on gates at the Port of Singapore

An early version of Lee's technology was installed on gates at the Port of Singapore.

CONTAINER ASIA 2001

THE CRANE REPORT

Talking spreaders

Spreader downtime is a major issue for crane operators. Help is at hand, **Jacqueline Nunan** discovers.

WHILE ASIA VISION is working to provide information on the containers that pass through a port, spreader specialists Bromma are focusing on eliciting more, and more useful, information from crane spreaders.

Launched in February, the SCS² spreader communication system is designed to improve access to spreader status and key diagnostic information – something Bromma believes will prove a breakthrough in both information management and the all-important task of reducing downtime.

Kok Choong Hwa, managing director of Bromma Far East, presenting the new product to the TOC Asia conference in February, pointed out that some 35% of container handling downtime was believed to be spreader related.

Of that, some 90% was thought to be related to failures in the electrical system: and better communication can ensure that this downtime is minimised by rapid location of the fault.

Improved information management is also expected to offer significant gains for operators: 15 years ago, Kok Choong Hwa said, there were usually less than 40 I/Os to be monitored on a spreader. Today, the average unit has 150. In the same period, the number of cores required has doubled.

"So we need ways to handle more information, more efficiently, without increased cable size," he stressed.

To meet the goals of reduced spreader downtime and improved information management, Bromma evaluated possible solutions in the area of standard bus systems, but found shortcomings in temperature range, shock resistance, electro-magnetic compatibility protection, and mechanical roughness (among others). The company's development team found it was necessary to design a new system that would meet the demands placed on electronic systems used in container handling environments.

"Our team's goal became to develop a modular programmable controller with a field bus interface that would surpass international standards for control equipment in this area," Kok Choong Hwa explained.

"The result was SCS² – a single control product that can be used for I/O, as a PLC, and for distributed control, for up to 48 I/O points per node. We believe in SCS² so fully that we are making it a standard feature – at no additional cost – on all Bromma ship-to-shore spreaders."

SCS², he promises, will enable terminals to react faster to fault events, by giving technicians specific, precise information on source of the fault. All faults are diagnosed within the spreader node, with

Some 35% of container handling downtime is believed to be spreader related.

the most recent fault captured on the onboard LED display, and stored in the onboard error/event log. Diagnostic information then communicates the type of error and offers a diagnostic code.

The technology also conveys total system status, with complete monitoring and logging of control system status, application rates, crane commands and signals, and sensor and actuator signal changes. And if technicians miss the cues for potential faults, the system goes one better, with a self-diagnosis programme that detects bad power supply, analyses control system problems or short circuits, and software errors.

Not only does SCS² promise to help overcome faults more quickly, it hopes to stop them from occuring by simplifying the spreader system. By eliminating or minimising the requirement for junction boxes, terminal strips, terminal ends, relays and DIN rails (areas where wire breakages are common), the likelihood of mechanical failure is reduced. Conventional wiring is minimised, and molded, prefabricated connections protect this vulnerable area.

SCS² takes advantage of cellphone and modem technology to allow off-site monitoring of the system, with diagnostics available via the spreader display, the crane itself, the maintenance office, or on a laptop or hand-held computer.

While officially launched in February, the system was already operating for a number of customers, Kok Choong Hwa said. It had been tested over a range of different applications: RTG cranes at HIT in Hong Kong, separating twin-lifts at Aarhus in Denmark, and on a conventional ship-to-shore crane in Gothenburg, Sweden. In the latter case, the performance of the spreaders had been monitored from Bromma's design headquarters in Stockholm – a distance of several hundred kilometres.

Oriental Daily News (東方日報)　Jun 1, 2001

●李春茂博士利用資助資金，將他發明的視象自動識別系統開拓內地市場。

在經濟低迷、科網泡沫爆破之際，開創高科技事業更見艱難。不過本港卻有科研學者放棄穩定的大學教職工作，毅然走出「象牙塔」，憑藉資助基金將其科研成果發展成全球通用的視象自動識別系統，建立高科技事業。

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■圖：吳啟偉　■文：黃慧心

港創視象新科技 進軍全球

在去年以前，李春茂仍是一名不折不扣的科研學者，他原本在新加坡大學任教，當時已開始鑽研視象自動識別系統，運用於貨櫃碼頭以識別貨櫃編號，以監察及記錄進出碼頭的貨櫃。九二年，李春茂受聘成為香港科技大學任教計算機科學系的助理教授，並繼續研發有關技術，至年終在港研發成功。

可透過資料分析助查失車

視象自動識別系統是模擬人類的眼睛及智慧，有別於一般掃描系統，能夠透過攝錄機，在室內外不同光暗背景或彩色影象下，辨認靜止及移動中的英文字母、數字，甚至中文字，例如車牌及貨櫃號碼，準確度高達百分之九十八，該系統除了可以核實車輛身分，亦可透過資料分析，有助偵查街上的失車，違反交通規例的車輛及控制交通流量等。

至九七年，李春茂與科大達成協議，購回其視象自動識別系統的知識產權，成立公司令科研項目進一步推出市場。不過，李春茂的公司出現資金短缺，雖然他於九九年向香港工業科技中心以私人名義借貸一百萬，仍未能解決問題，此時李春茂仍然在科大任教，漸漸感到難以兼顧。

「公司有人做決定，金錢周轉又有問題，如果再繼續兩面兼顧落去，公司隨時會執笠，但係教書份糧又可以補貼貸款，捱扎咗好耐，先至嚟舊年九月辭職，專心搞好公司。」李春茂走出「象牙塔」後，努力為公司解決資金問題。

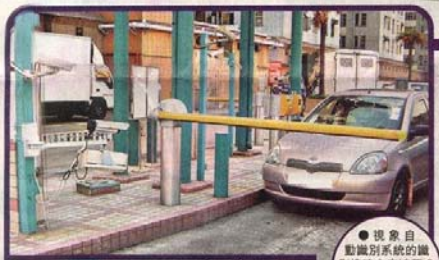
三個邊境管制站亦將安裝

去年該公司透過發展視象自動識別系統，申請創新科技署轄下的創新科技基金內的小型企業研究資助計畫，想不到洋洋灑灑二百字的介紹，竟然為其公司帶來一百七十萬元的資助金，以資助開發專門針對內地市場的視象自動識別系統，解決資金問題。雖然資助金分期支付，但在產品成功後才需要分期還款，難怪李春茂笑言綜觀多個資助貸款計畫，「都係呢個最抵」。

現為亞洲視覺科技有限公司主席兼總裁的李春茂博士表示，視象自動識別系統目前在本港機場快線巴士站，葵涌貨櫃碼頭已有使用，而落馬洲、文錦渡及沙頭角三個邊境管制站亦將會安裝，而大陸、韓國及歐美等地亦有使用，而今年更會參加十九個展覽會，將視象自動識別系統推廣至外地，進一步開拓市場。

●警方亦有使用視象自動識別系統，協助偵查失竊車輛。

●文錦渡管制站已安裝視象自動識別系統（圖內）作試驗，以加強保安及控制交通流量。



●視象自動識別系統的識別準確率高達百分之九十八，較其他識別掃描系統高。

●視象自動識別系統只需要利用攝錄機及手提電腦，即可以在室內外進行識別，方便簡單。

●內地大連的貨櫃碼頭亦有安裝視象自動識別系統，以識別貨櫃號碼。

資助基金申請最多二百萬

小型企業研究資助計畫是五十億創新科技基金的其中一個項目，申請只需填寫一份簡單的申請書，並填寫二百字的介紹信，即可以申請最多二百萬元的「一對一」的等額資助，可謂一字萬金。有關企業在項目獲得收益或引入新投資者後才償還資助，毋須繳付利息。

企業提交申請後，署方會上門考察，然後再將申請交由專業評審小組審核有關產品的可行性、競爭力及專利問題，然後在兩個月內完成批核過程。

資助計畫分兩期進行，第一期會分期獲得四十萬元的擴展資助，企業需於六個月內完成產品雛形及發展市場，若表現良好，會進入第二階段，再獲資助的企業多於十八個月內完成項目。由九九年十二月計畫開始至今，共有二百六十宗申請，現時有六十一間企業在第一階段，有二十多間在第二階段，兩間企業更已完成資助計畫。

●鄭君威博士指出，申請者亦須擁市場觸覺及推銷技巧。

申請者最緊要「識得轉彎」

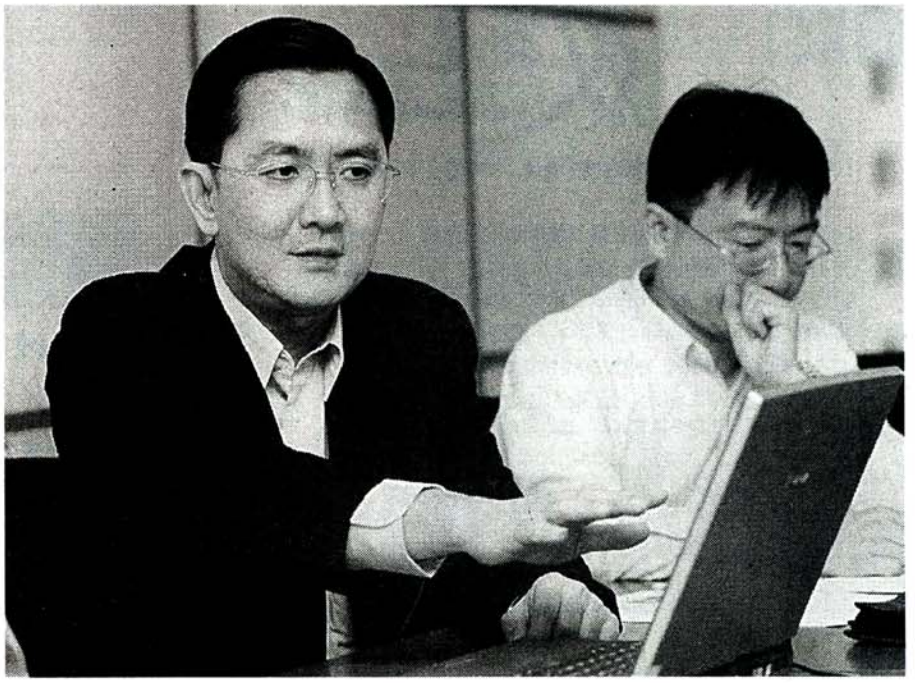
創新科技署小型企業研究資助計畫高級經理鄭君威博士表示，雖然科網陷入低潮，但是申請資助項目中，百分之五十二是資訊科技項目，百分之十是電子產品，百分之八是電子電機工程。而在資訊科技項目中，科網佔百分之四十三，軟件開發佔百分之二十九。

鄭君威透露，署方在接獲申請後會主動會見申請者，而大部分申請者都認為自己的概念不凡，但他卻表示新科技不需要有很多學術背景，反而最重要是申請者「識得轉彎」，如在發展過程中出現困難，懂得應變及推銷，不能「孤芳自賞」，故步自封，不理會市場需求。

鄭君威指出曾用了五小時會見申請者，目的是為了游說他們不要立刻放棄原本的職業，但最後申請者堅持為了創業而辭職，鄭認為此舉顯示了申請者「唔識轉彎」，最後並未獲得資助。

Hong Kong Economic Journal (信報) Jun 5, 2001

亞洲視覺科技計劃上創業板



李春茂（左）表示，該公司自行研發的自動識別系統，可識別任何複雜圖象中的字體及符號，準確度高達百分之九十八。

從事自動識別系統製造的亞洲視覺科技計劃明年首季於創業板上市。管理層表示公司明年3月底盈利目標爲三千萬元。

亞洲視覺科技董事長**李春茂【圖左】**表示，該公司自行研發的自動識別系統，可識別任何複雜圖象中的字體及符號，準確度高達百分之九十八，應用範圍廣泛，包括用於停車場及貨櫃碼頭，以監控出入車輛及貨櫃箱，達致減少人手操作及加强保安措施的目的，該系統也可用於隧道及高速公路等地點作爲自動收費系統。目前該公司客戶包括香港國際機場、香港飛行服務隊、香港國際貨櫃碼頭、深圳鹽田港、上海市政府大樓及其他私人屋苑停車場等。

李春茂表示，該公司目前約八成收入來自車牌號碼識別系統的銷售，產品於推出初期，售價每套只需數萬元，但毛利率仍高達八成，預期在市場需求不斷上升下，明年三月底全年盈利可由目前接近收支平衡上升至約三千萬元。

至於產品的市場銷售方面，李春茂表示，現在該公司識別系統已在本港、國內、台灣及新加坡等地銷售，今年則計劃推廣至南韓、日本、歐洲及中東等地。目前亞洲視覺科技於國內透過多於一百個電腦系統集成商銷售其產品，公司於深圳及北京分別設有銷售辦事處，日後也會透過在各地舉辦展覽會以推廣其產品。

李春茂在九二年六月至去年八月任教科技大學，期內與現在公司董事**黃永建**共同研究開發自動識別系統，二人於九七年向科大購回技術專利，並正式成立亞洲視覺科技，把該項技術轉化爲商業應用，去年更先後獲渣打直接投資及首富國際投資注入資金。

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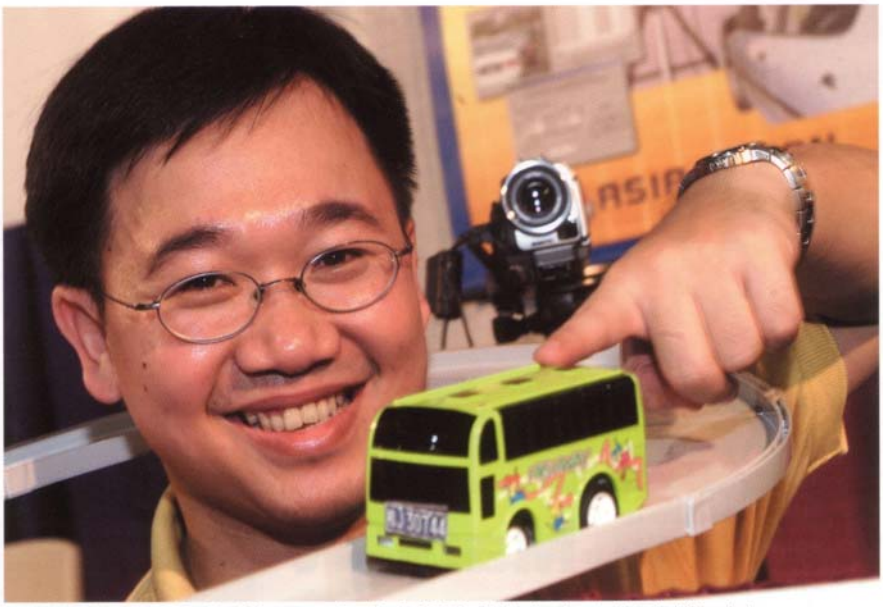
Vision of a bright future at the show



Patrick Ng (pictured) and Pauline Chiu are spearheading Asia Vision Technology's entry into the US market.

Hong Kong-based Asia Vision Technology (AVT) is taking its first steps into the US market here in Miami with its range of vision systems. Although OCR number plate and container recognition are well recognised in tolling, enforcement, car parking access, surveillance and freight operations, AVT's system is portable. It uses a standard digital camcorder and laptop computer. Hong Kong Police use the system to take pictures of licence plates continuously and check numbers against the police database. If a vehicle shows up as being wanted, the officers in the car are notified immediately.

AVT was founded by John Lee Chung-mong, assistant professor of computer science at the Hong Kong University of Science and Technology with a former student, Wong Wing-kin in 1997. Initial orders were received from the Hong Kong Police, the new airport, Government Flying services and a number of commercial building and shopping mall car parks as well as other Government agencies.

Having concentrated on and established itself in the Asian market, particularly Hong Kong and China, AVT is now looking further afield and its appearance at ITS 2001 is the first time the system has been seen in the USA. The company's website is at www.asiavision.com.hk

HI-TECH WEEKLY
2001 年 6 月 19 日 第 140 期 逢星期二出版

香港發明 教曉電腦認字

李春茂博士是新加坡人。一個新加坡人來港搞科技，有點像美國人從矽谷來港開發軟件。究竟他有否去錯地方？

在新加坡唸大學的李春茂博士，做研究生時到過一藥廠參觀，這次經驗對他有着頗大的影響。「那間工廠很大、很自動化，但去到最後成功的品質檢定時，他們竟把藥丸放在盤上，在燈光下用肉眼檢查。我當時覺得，一間這麼現代化的工廠，為何要在最後階段用人手？當時，我了解到發展電腦視覺系統的重要性。」一粒藥，令李春茂醒覺，之後，他便在新加坡的大學專注於這方面的研究。可是，要教識電腦認字並不容易。

德國參展增信心

1992年，他到香港科技大學任教，繼續向電腦視覺方面鑽研。到了1997年，他向科大購回研究的專利，跟他的一個畢業學生合作成立亞洲視覺。「那時，德國有一個國際性的科技展，不過大家都知，香港沒有什麼高科技，於是工業署便攞了我出來！到步後，竟發現反應良好，不斷收到各國的查問電郵，而大部分都是來自貨櫃碼頭及停車場等私人公司。因此，開始對自己的研究抱有信心。」

到1998年，他的慧光系統終於接到首單生意，這個客户更大有來頭，就是香港警務處。警方把他的成果安裝在文錦渡邊境，用以辨識車牌，找尋失車，結果成功截獲一些失車。之後，機鐵站停車場也成為他的客户之一。

辨識率達98%

「接到兩單大生意，李博士當然高興到不得了。但回想起來，慧光的發展毫不簡單。「要電腦辨識文字其實很有難度，例如貨櫃上的文字，有時一行，有時兩行，而文字的背景顏色也不同，有時字體更會被弄污或破爛了。直至今日，我們的對手連80%的認字率也未到達。早幾天，便有一名印度警方代表找我，他說：『認得80%已經夠了！』，但現時慧光的辨識率，其實已達到98%。」

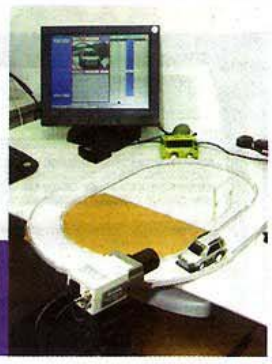
辭退教職屬明智

去年8月，他作了一次重大的賭注，就是離開科大。「科技產品很有時限，想得出的話，便一定要即時製造出來。我當時一面教書，一面要在公司管人、作決定，一星期只能抽一天向客户做顧問工作；在商業社會，這還早會死。」他續說：「現在回頭看，當時的決定很正確。公司第二年便拿到風險基金，我覺得很幸運。」

他在決定離開科大的同時，其實心中亦盤算着另一件事，就是應否留在港繼續研究。「美國投資基金多，他們懂得評價一間公司，而且研究風氣好。香港很少識貨之人，市場小、人才少，而且企業反應慢，不大肯接受新科技。我在印度展覽時，反而收到百多間公司的查詢，反應熱烈得多。」那麼，為何他最終會留在香港？他半認真半開玩笑地說：「我在1997年參加了工業科技中心的培育計劃，借了100萬，走了後怎辦？」

做愛迪生還是李嘉誠？

一間科技研究公司膨脹到某一階段，他的創始人便需作出另一抉擇，就是當上管理人，還是研究員。「如果要我選擇，我會做一個研究專才，因為我始終是做研究出身的。當我舉行展覽會時，觀眾見到我能解決到其他人解決不了的難題，便會很有滿足感。因此，我近日聘請了一位General Manager，以幫我處理行政事務。不過，暫時仍避不開，還是要當一位管理人！」



慧光（VECON）電腦視覺辨認系統

要教小朋友認字，需要數年時間，但慧光系統卻要花十多年才得到98%的成功辨識率。這套認字系統的硬件很簡單，包括一台攝影機及普通電腦，重點其實在軟件。慧光的功能是，可辨認物件上的文字，而所需時間僅0.3至0.5秒，因此應用範圍包括找尋失車、貨櫃及停車場管理等。

CCTV Focus Magazine

Contributed article

Asia Vision Technology Limited

VECON & CCTV System:
The Secure Solution for Traffic Enforcement

We have all seen the CCTV cameras monitoring a car park, a container terminal and highway traffic, but how effective are these cameras at pinpointing problem vehicles and containers?

CCTV systems record the area on which they are focused but may not zoom in to record a specific license plate number (LPN) of the vehicle or number of the container against which the crime is being committed. Camera security systems also rely on operators to constantly watch the monitors and react when necessary. However, there are many disadvantages associated with operators, for example, the repetitious nature of the job encourages inattentiveness, and the conditions may invite bribery or corruption. We expect total, unquestioning dedication from our employees, but reality makes this expectation unreasonable.

Asia Vision Technology Limited (AVT), is the world's leader in developing innovative computer vision solutions, using its patented VECON technology to resolve these problems and other related issues where number and character recognition are concerned.

The VECON-VIS system automatically reads vehicle license plate numbers (LPNs). Installed at entrance and exit gates of vehicle parks, ports or depots, the system reliably and accurately reads, recognizes and verifies the LPN of all incoming and outgoing vehicles (Fig. 1). Able to read both non-alphanumeric and alphanumeric characters, VECON-VIS has been successfully employed at the Hong Kong-China Border and Hong Kong International Airport in fleet management:

Imagine at least 16,100 vehicles passing through one lane at the border in one week, some of them perhaps stolen, suspected traffic violators and more. Manually checking each vehicle's license plate number against a connected database, presents uncountable

Fig.1

opportunities for mistakes, for example, misread characters. This problem is intensified by the huge number of lanes at the border. Moreover, the border system identified and verified only the driver and not the driver's vehicle.

But with the integration of VECON-VIS in conjunction with CCTV systems, the problem of wanted vehicles or law-violating drivers escaping notice has dropped sharply. The system can recognize a vehicle's LPN in less than 0.5 seconds, matching it against those of a connected wanted-list database. If the vehicle currently passing through the checkpoint is wanted, VECON-VIS beeps to alert the operator (Fig. 2). The driver and vehicle are detained and a more detailed investigation can be conducted.

In 1999, the Hong Kong International Airport installed VECON-VIS at three Airport Express stations to monitor the airport shuttle bus traffic. The LPNs of any shuttle buses entering the stations are read

Fig.2

and matched against a database of LPNs. For all pre-registered shuttle buses, the barrier will automatically rise. This automated operation has reduced the manpower required and enhanced the security and efficiency of shuttle bus traffic.

At the container terminals and ports as well as other depots, the cause of the majority of problems was the incorrect container loaded onto the correct, outbound truck and vice versa. In addition, the correct truck and correct container were driven away by the incorrect driver, despite security cameras. The loss of one container means significant loss of business for the terminal and the container's company. While these incidences are not uncommon at a terminal, they are frequent enough to cause a great deal of concern. One terminal began looking at Optical Character Recognition (OCR) solutions and after much evaluation decided to use VECON-CON.

VECON-CON is a container number recognition system which allows terminal controllers to monitor and track containers as they enter and exit the compound (Fig. 3)

CSX Terminals, the largest terminal operator in Hong Kong, handles over one million TEU throughput per year. CSX implemented VECON-CON in their gate process, rendering it fully automated, greatly improving their container dispatching reliability. CSX has been operating the system for two years and as a result have been highly impressed by VECON-CON's accuracy rate (98%), quick response time in capturing container numbers and excellent technical support.

Not only is VECON-CON applied to container terminals, but it is also employed at customs and excise points throughout China, verifying and registering vehicles and containers as they pass through the sites. Prior to VECON-CON, the customs and excise system was manual, thus opportunities for costly, and sometimes embarrassing, mistakes were numerous. With VECON-CON automating the system, these errors have been eliminated.

However, not all illegal traffic will be slow or stationary long enough, or at all, for CCTV systems alone to capture a clear image

Fig.3

Fig.4

of the vehicle. Traffic today, when it is not stopped by intersections or traffic lights, is always in flow. This makes capturing clear images difficult and cross-referencing of license plate numbers even more complex. Hence the practicality of tracing stolen or traffic-violating vehicles becomes more complicated, especially if the target vehicle is moving too fast for stationary security cameras.

ROBO-EYE (Fig. 4), the newest development in the VECON suite, negates the issue of mobile/stationary image capture for mobile situations, for example, highway traffic. This solution, based on the technology of VECON-VIS, makes it possible to recognize characters from a moving vehicle. The system is fully portable, comprising only a notebook computer and digital camera, therefore making it very suitable for road patrols and covert operations that require remote and non-stationary activities. Robo-Eye has impressed the police authorities of China, Hong Kong, Malaysia and India which have scheduled installation plans.

Though CCTV systems perform well and image quality is gradually becoming less of an issue, greater security and performance can be achieved by combining camera systems and OCR technology. This would enable greater verification of vehicle and driver match, vehicle and container pairings, and solve the issue of mobile/stationary license plate recognition as well as container number recognition. This combination is the total solution for today's Intelligent Security System. □□□

Computerised container damage inspection system cuts back on need for manual observations

Asia Vision Technology (AVT) is introducing its latest product - Container Damage Inspection (CDI) system. With previous manual systems every container had to be checked individually, requiring an inspector to move above and around the container.

The process could be time consuming and error prone, with no actual image of the container inspected readily available.

The 24-hour non-stop CDI solution from AVT helps eliminate human errors and ensures actual images of containers inspected are stored in a database for future reference.

AVT founder and CEO, Dr John C. M. Lee (right) is joined by the company's Business Development Manager, Patrick Ng and Marketing Manager, Iris Kong to update customers on the advantages of the CDI system.

Realising that many wharves and container terminals do not have adequate and effective control over damage inspection, AVT has developed the CDI solution and incorporated it into its VECON technology. This allows terminal staff to monitor the automatic gate procedures centrally and remotely.

AVT uses high-resolution digital cameras together with the latest VECON technology for damage inspection. As containers enter and exit the terminal, CDI captures images of the entire truck at different angles and zooming levels. Images of each container panel are then archived in a database for reference and verification should a dispute arise. The operator can now view these images and look for even the tiniest punch hole or scratch in a quick scan on the computer screen.

While the driver is providing the relevant data for arrival at, or departure from the terminal gate, the operator can inspect the images and enter any noted damage into the system. CDI works on moving containers as the cameras automatically trigger and capture the right images during the operation. The simple and easy procedure enables image acquisition, storage and indexing of container images being processed simultaneously.

AVT says the CDI system significantly expedites gate transaction procedures, increases gate throughout and revenue, enhances reliability and accuracy of inspection data, reduces paperwork and reduces outdoor manual works and industrial accidents.

AVT, established in 1997, developed its VECON technology as a generic recognition system that can visually locate and identify printed alphanumeric characters and colours, patterns, object size and motion in either complex gray-level or colour source images. The computer vision application may encounter a source image that may be complex for a variety of reasons. Rust, mud, peeling paint or fading colours may distort the character's image, and uneven lighting may make them difficult to discern. However VECON has been developed and trained to handle these different conditions.

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Fairplay

Vecon-Con Quay Crane Application Unveiled

Asia Vision Technology unveiled its Vecon-Con quay crane application announcing that this innovative product should speed the movement of containers and therefore helps streamline the supply chain.
The Hong Kong based company specialises in artificial intelligence-based computer vision systems and has utilised its container number recognition technology to develop the crane application.

Images are obtained from a range of angles by cameras and sensors that are attached to the sides of the crane and these then detect the position of the container. The container number is therefore identified before the crane finishes loading or unloading. Character extraction and recognition are the key features that lie in the systems technique and it is promoted as 95 per cent and above accuracy of complete recognition of the container number. The systems is able to store over 100,000 high quality JPEG images and image processing and acquisition is believed to be less than one second.

A spokesman commented that 'The container number captured will then be checked against data in the client's database to ensure the correct containers have been loaded and unloaded' and should provide real-time data access for shippers, freight forwarders, carriers and logistics companies.
The tracing and global tracking of containers should also become effortless in the future with the Vecon-Con system.

http://www.porttechnology.org/industry.news/2001/03.10.01.shtml

喂，Mandy，又係我，淨係顧住屋內，我泊喺停車場部鹿車都好名貴，容乜易被偷或被偷龍轉鳳，用低班鹿頂包，點算，有冇辦法先？

喺停車內出入口安裝部電腦視像技術辨認車牌及車型，就唔怕被人偷龍轉鳳，用低班鹿車偷偷換咗你架一等鹿車。當失車被駛離邊界，都出唔到境啦！就讓我首先介紹乜係電腦視像。

電腦視像 認車唔認人

亞洲視覺科技開發了名為慧光系統（Vecon-match），能自動識別行駛或停泊中的車輛車牌號碼，在停車場出入口安裝一部CCD攝影機，與電腦軟件連接，車主要預先為汽車辦理登記手續，當車輛駛入停車場，入口的攝錄機系統會把車牌號碼、車型及入閘時間儲存在電腦資料庫。

當車輛駛出停車場，系統會進行影像分析及核對，自動識別車牌及車型，若汽車出入資料相符，閘口便自動打開，過程不過一秒；若然歹徒想利用換車牌而偷天換日，出口閘門便會響警號。

亞洲視覺科技主席李春茂強調，這套監視系統最大特點是只會記錄動態影像，現場若是靜止狀態，則不會進行錄影，相反，當有車輛或人在攝影機鏡頭前走過，系統便自動開啟進行錄影。而且作為停車場保安，慧光系統的準確率可達98%，餘下2%的車牌無法正確識別是由各種客觀條件引致，包括因惡劣天氣令能見度太低，車牌本身有嚴重損毀等都影響系統辨識的準確性。其實，普通停車場靠人眼識別車輛，每天出入車輛數以百計，無可能完全辨別，而且人眼出錯率高，效率低，反而不及電腦視像。不過，李春茂亦承認，若歹徒偷車後故意撞欄，已超越慧光的能力範圍。「故意撞欄實際已是搶車，是刑事罪行，慧光系統在駕駛者衝閘前，早已拍下該車車牌的相片，無論車輛是否停下，保安員都可通過照片提供的記錄報警，加上慧光系統可增設攝像機拍下駕駛者的樣貌，罪犯將無所遁形。」

車主Vera表示汽車安裝車牌號碼自動識別系統後，確實較以前方便，「車主不用給予任何個人資料，將車泊在停車場就不怕被偷，就算偷都有記錄，有迹可尋，車主會好放心。」

「911後，最重視是保安，安全，甚麼私隱亦要拋開。」李春茂說。

現時機場鐵路沿途各站的巴士上落客區已安裝了慧光系統，汽車駛至閘口後，系統會辨認車牌，核准後自動開啟閘門，過程不過是一秒。