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## VECON: Recognizing Vehicle License Plates and Container Numbers

By Dr. John Chung-Mong Lee & Mr. Wing-Kin Wong  
Asia Vision Technology Limited

VECON and VELIN are character recognition systems for container ID numbers and vehicle numbers, respectively. The most intractable problems in designing such systems are to overcome segmentation issues and to deal with the location of individual characters in real-world settings. Identification numbers always appear in a wide range of sizes, fonts and spacing. The characters of the container ID number, for example, can be aligned in one, two, or three horizontal line(s), or one vertical line. The number may even appear slanted due to the orientation of the vision system. The recognition system must, therefore, be able to process various sizes, fonts, and spacing of the characters.

Moreover, the sources of light in real-world settings vary according to the time of day and the changing weather. Sunshine, rain, fog, and artificial light will affect the contrast between the ID number and its container, as will the colour of both the number and the container. Thus, the system must be able to perform in both natural lights during the day as well as under artificial lights through the night.

The system must also deal with information "noise". The ID numbers may be obscured by rust, mud, peeling paint, and fading colors. Then, too, there may be many unwanted visual objects such as signs, company logos and weights printed on the containers. Such "noisy" characters create problems for the recognition system and easily slow it down. The system must be designed to deal quickly with them. The VECON system is designed to overcome these difficulties.

The first commercial VECON system was installed at a container depot — United Asia Container Services Co. Ltd., in Shanghai in 1995. Once the container goes in or out of the gatehouse, the company can immediately notify customers on the status of their container from the computer system.

The system is built on novel principles of both character extraction and character recognition. During character extraction, the system recognises the relative size, shape, thickness, and ratio of the characters as well as the relative distance between

characters for location and segmentation. During character recognition, it uses different expansion and reduction strategies for different extracted characters in order to reduce mistakes. These strategies are embedded in two separately trained neural network architectures that complement each other.

Several public & private car parks in Hong Kong are using VELIN to recognise both incoming and outgoing vehicles. VECON managed to achieve a better than 95% accuracy rate. The Hong Kong police has purchased two systems to monitor the lorries crossing the border with China. The border guards use VELIN to keep track of the number of exits, entrances and license plates automatically.



The system can be modified to work in other character recognition settings as well, including inventory control in warehouses, toll collection at tunnels, bridges and highways, and cataloguing library books and videos.

**摘要：**VECON及VELIN分別是一套能分辨貨櫃編號及汽車車牌的字體辨別系統。該系統在不同環境及光線下依然能正常運作。

VECON首項商業應用位於上海的貨櫃碼頭，每當貨櫃進出開口時，公司的電腦系統便可立即通知客戶貨櫃目前的大約位置。香港亦有數家停車場採用VELIN，以確認出入車場的汽車；警隊亦添置該系統，安裝在邊境關口以監察出入境的貨車。兩套字體辨別系統亦適用於貨倉管理、隧道收費、橋和高速公路、甚至圖書館的書本及影帶記錄。



PEOPLE

# Academic gains from commercial exposure

ELLA LEE

Creating a commercial product was one way John Lee Chung-mong, assistant professor of computer science at the Hong Kong University of Science and Technology, helped further his academic research.

"It makes me realise the limitations [of my invention] in real applications," he said.

The Vecon software system, developed by Mr Lee, recognises alphanumeric characters on cargo containers and vehicle licence plates. It can be used at car parks to increase security, and container terminals to speed up stock checking.

Mr Lee said that to have restricted his research to the university would have been similar to the Chinese idiom "make a cart behind closed doors", which meant isolating oneself from reality and acting blindly.

During the process of commercialisation, he made several improvements to the technology by considering external factors such as lighting and the location of the connected camera which might affect the system's performance. He also upgraded the system to make it function for up to 24 hours non-stop.

Mr Lee set up his company, Asia Vision, last year with a former student who specialises in computer vision technology. While he enjoyed teaching and would never give up his position in the university, Mr Lee planned to consult for the company while allowing his partner and employees to take charge of the business operation.

Mr Lee started his research in Singapore University in 1989. He introduced the technology to the city's container terminal before moving to Hong Kong three years later.



Asia Vision chairman John Lee

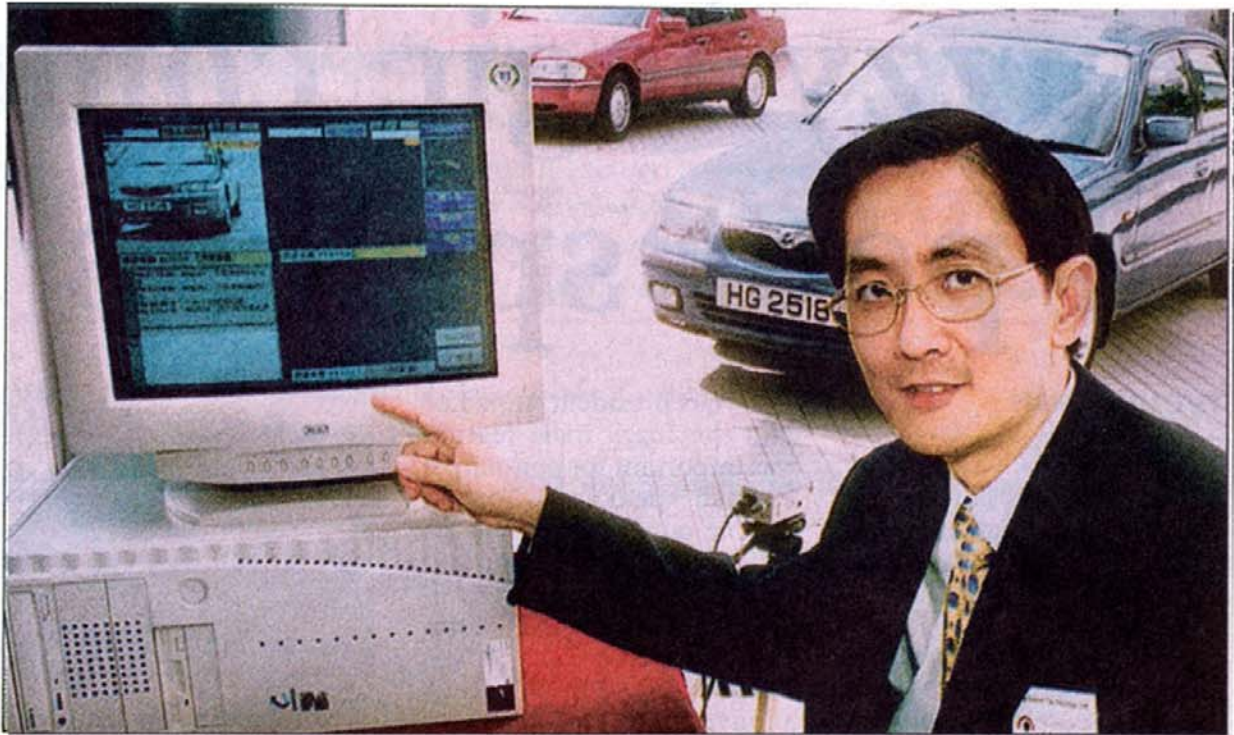
He said the culture in Hong Kong was better for developing technology and running a business "although inadequate government support has hindered the development of hi-tech industry".

Shortages of capital and people with technical expertise and business experience were the biggest problems he had encountered when starting his company.

"I have no other solution except to spend my own money," Mr Lee said.

He urged the Government to create a second stock exchange to help local start-up companies garner investment.





## Visionary

Edward Wong

Computer scientist John Lee Chung-mong demonstrates the video recognition system he developed.

# System 'reads' vehicle plates

ELLA LEE

A computer scientist from the Hong Kong University of Science and Technology has developed a video system that can read English words and licence plates.

The Vecon system can recognise words and numbers on

moving and stationary vehicles or cargo containers.

The accuracy rate is claimed to be 95 per cent and recognition speed less than one second. The system can work indoors and outdoors, and under adverse conditions such as rain or dim light.

Users of the system, the

brainchild of computer science professor John Lee Chung-mong, include the Hong Kong police.

The software costs \$100,000, with a complete system including camera and computer adding another \$150,000.

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R & D 科研

# Videobook

## 影像圖書

Retrieve Your Ideal Clippings in No Time  
即時找出心中所需的片段

By John C.M. Lee & W. Xiong  
Department of Computer Science,  
Hong Kong University of Science and Technology

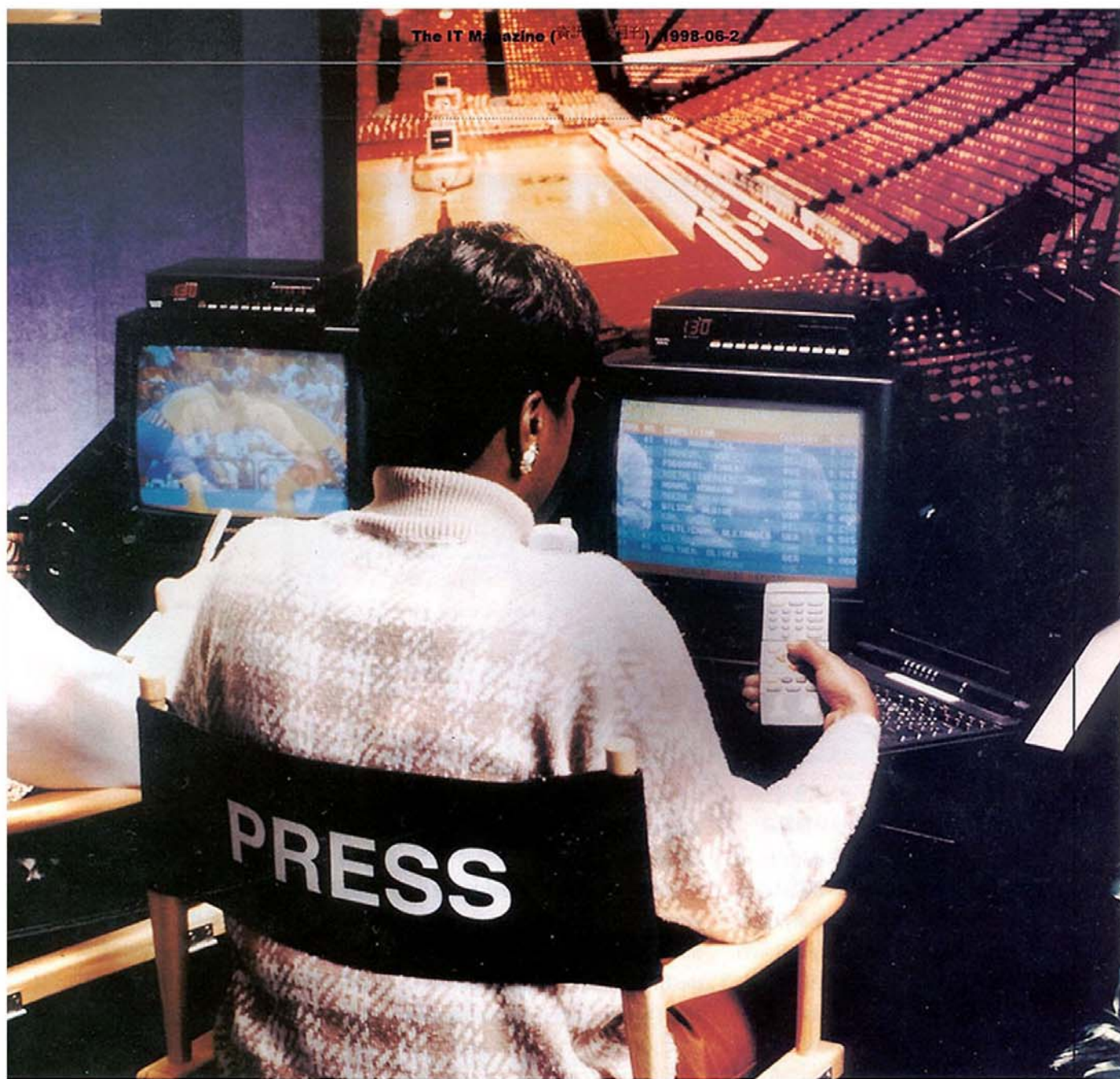
A television news producer has thirty minutes until the evening news. A story breaks about the local economy: there is no time to send a cameraman to the banks and stock market. The producer must find relevant videoclips. She

walks into the library and finds at least ten cassettes that are entitled "Stock market." How can she find just the right video images to help make the story interesting? She must look through all the tapes, using the fast forward button to



尚 有三十分鐘便到晚間新聞時間，監製突然接獲一宗突發經濟新聞，將會嚴重影響本地經濟，但可惜卻沒有時間派攝影師到銀行及股票市場取景，監製惟有跑進「影帶資料庫」，嘗試尋找有關片段，她可能找出十套貼有「股票市場」標識的錄影帶，但她怎樣才能以第一時間從這十套錄影帶中，找出她心目中的片段？她必須要以快速搜畫方式，把每一套錄影帶由頭到尾看一次，在節目播出前數分鐘，她終於找到





speed up the process. Minutes before the news begins, she slaps down the very same clip that was used the night before for another story. Her problem: too much video and no time.

With the rapid progress in video technology, more and more information is available as video data. Video cassette tapes, VCDs, laser discs, and DVDs are used for many purposes such as entertainment, scientific and engineering re-

search, medical research, surveillance and so on. In most places, however, huge piles of videotapes are stored for future use, though data on them remains disorganized. Traditional data management methods are inadequate for video data management since they rely entirely on simple textual annotations and do not allow content-based queries (i.e., retrieval of video segments based on features of colour, shape, motion and other

適合的片段，但可惜前晚的新聞節目中曾採用。她的主要煩惱是：影片太多而時間太少。

隨著影像技術急速發展，越來越多各類形資訊（例如家庭娛樂、大機構活動、科學及工程研究、醫療研究、監視系統等）均樂意存放在影像媒體，包括影像數據、錄影帶、VCD、雷射光碟、DVD等。有不少公司要不斷儲存日積月累的錄影帶，他們的影像資訊開始變得混亂，傳統數據管理方式不足夠應付及



## R & D 科研



In the future, most video data will be stored in digital form.  
在未來，大部分影像數據將會以數碼方式儲存。

context specifications).

In the future, it is likely that a lot of video data will be stored in digital form (say as part of a multimedia digital library) so that it can be accessed over networks and viewed directly from a computer or TV with support of VOD (Video-On-Demand) service. Being able to access huge amounts of digital video data through a content-based method will be very useful to users. As the amount, complexity and inter-relationship of video data increase, the need for intelligent video manipulating tools to analyze and index video data also becomes evident. Though indexing of conventional editing operations (e.g., insertion and cut-and-paste) and special effects (e.g., fading in/out, superimposing images, and window splitting) is easily implemented, no tools supporting

content-based analysis of video information are currently available.

Leading American researchers have considered the creation of a video information management system as one of the Grand Challenge applications under the famous High Performance Computing and Communication (HPCC) program. Even so, there has been relatively little research activity in this area. The MediaBENCH and QuickTime systems are not concerned with the semantic content of video images. The experimental ART MUSEUM and QBIC systems focus on image database systems. For the last five years, we have been focusing on video data handling problems and have built a video information management system (VIMS) called "Videobook."

Videobook is composed of three

管理新興的影像數據，因為這些方式只依賴「文字註解」，無法對實際內容進行搜尋(即按照影像的實際特徵、顏色、形狀、動態及其內容等進行搜尋)。在未來，將會有越來越多影像數據會以數碼方式儲存(好像多媒體數碼圖書館)，可





parts. The database (DB) provides a framework for storage of conventional annotations in a structured way as well as various sorts of visual information. The indexing module can assist the operator in capturing the usual annotations whenever a new tape enters the system.

More importantly, it automatically extracts pertinent features up to semantic level from raw video data. This will enable the Videobook to respond to a variety of user queries. The query processing module supports queries based on colour and texture patterns, layout or structure description, example images, iconic and graphical information, in addition to queries only based on text. The prototype system has been constructed on Macintosh and Pentium-based PC systems.

We have taken pioneer steps on robust and fast camera break detection algorithms, image features (such as color, motion, and texture) extraction and classification methods, scene (such as specific sports video) classification methods, as well as a software structure

allowing flexible editing functions. Our algorithm for camera break detection called Net Comparison, which can divide the video stream into small semantic-related units called shot, automatically, has proven to be a very robust method for partitioning of video data.

We have further analyzed the video shots for the selection of most representative key frames for concise representation of visual content in a video shot and have developed a wavelet-based method for key frame selection. We have also developed a novel, robust algorithm for the generation of motion-content-based annotation for the video shots, with which we can automatically classify the motion content in a video shot. Our unsupervised colour image segmentation algorithm can segment an image into regions as well as classify the regions into classes with similar colour distribution.

We have been working on structuring of video data as well as clustering of video segments based on concepts. Important research results have been obtained on dynamic object clustering

任由用戶透過電腦網絡或支援VOD服務的電視進行存取，亦可直接讀取影像的實際內容，這對用戶的幫助更大，但由於影像數據所佔的空間越來越大，而且數據間的關係變得越來越複雜，我們必須要發展一套具智能的影像操控工具，把影像數據分析及進行索引，儘管傳統的編輯操作索引（例如加插及剪接）及特別效果索引（例如褪色、重疊、分割等）十分容易採用，但卻沒有工具替他們儲存的影像進行內容分析和分類。

美國著名高性能電腦及通訊計劃 (HPCC)曾研究開發一套影像資訊管理系統，但在這方面的研究始終較為缺乏，MediaBENCH及QuickTime系統並不能自動為影像提供內容分析；在實驗階段的ART MUSEUM及QBIC系統則針對影像數據庫系統；在過去五年，我們一直針對處理圖像數據的問題，並開發了一套名為「影像圖書」的影像資訊管理系統。

影像圖書包括三個主要部分：數據庫部分可儲存影像資訊，而且為儲存資料提供傳統的註解方式；索引部分可協助操作員攝取一般的註解，無論新的錄影帶在什麼時候輸入電腦，最重要的是它可從原來的影像數據中，抽取有關特徵（直至有一定程度的內容特徵），這讓影像圖書可應付不同的用戶查詢；查詢處理部分可根據顏色結構、版面、結構描述、影像例子、肖像、圖像資訊、文字等進行查詢，此原型系統可分別在Macintosh及Pentium PC上運行。

我們首先開發了一系列新的影像編輯功能，包括快速畫面中斷偵測，影像特徵提取（例如顏色、動態、結構、分類方法、影像內容分類方法（例如特別的運動項目影像），我們的快速影像中斷偵測方法名為Net Comparison，它可自動將「影像流」分割成多組細小相關的單位（名為Shot），這是一套十分有效的影像內容分組方式。





## R & D 科研

using an OODB model. Now we are developing the Semantic Scene Net (SSN) to represent the high level semantics in video sequences. SSN fills the gap between the low level image features and high level user knowledge. A SSN is automatically derived based on the key frames to represent the relationship and transitions among the key frames. Such concise representation of visual content in the form of key frames and the associated features can help tremendously in achieving our objective of enabling content-based access to video data, which involves (i) fast browsing capability and (ii) capability for quick search and retrieval of relevant video segments.

Videobook will easily improve the entertainment and media video production by enhancing the efficiency in video management and editing processes. Our system is highly relevant to the following applications:

- TV programme production, including interactive production.
- Movie production.
- Advertisement production.
- Personal home video album

production.

- Multimedia products development.
- Information archiving (e.g., electronic/digital library materials, trademarks).
- Making information on existing video tapes (e.g., tapes for educational purposes) more organized and readily accessible.

As our system covers a variety of application techniques relating to content-based access to video, the particular needs for specific applications such as interactive TV production and content-based VOD services can be developed based on the Videobook system techniques.

Another application is in Internet surfing. The traditional searching engines such as Yahoo, Excite, Lycos, and Infoseek are all based on text. With the rapid increase of the amount of video and image data on the Internet, a content-based searching function may be used to enrich the function of next-generation search engines to facilitate video surfing on the World-Wide-Web (WWW). IT

我們同時分析如何把最有代表性的影像畫面，用作代表各分段內容，並發展了一套「微波方式」選擇適合的畫面。我們亦發展了一套嶄新的系統，主要用來為影像片段製作動態內容註解，讓我們能把影像的動態內容自動分類；自動顏色影像分類系統可將影像分割成不同顏色區域，並把顏色分佈相近的區域分類成不同類別。

我們同時按照不同概念，研究構造影像數據及把影像分段成簇(cluster)。主要的研究結果包括利用OODB模型獲取動態物件簇，現在我們正發展「Semantic Scene Net-SSN」，用作在影像串中代表高層內容，SSN縮短低層次影像特徵與高層次用戶知識的距離，按照畫面代表的關係及主要畫面的轉變，SSN是自動運作的，它不但可提供更高速的瀏覽功能，而且可為有關影像片段提供更快的搜尋及攝取功能。

影像圖書可改善娛樂及其他媒體的影像製作過程，因為它能加強影像的管理及編輯過程，這系統可應用在：

- 電視節目製作，包括動畫製作
- 電影製作
- 廣告製作
- 家庭影像製作
- 多媒體產品開發
- 資訊資料（例如電子／數碼圖書館、註冊商標）
- 在目前的錄影帶上附加資料（例如作教育用途的影帶）方便儲存及存取

影像圖書系統的技巧亦可引用到互動電視製作及以內容為主的VOD服務。

另一個可考慮的應用是互聯網，傳統的搜尋工具例如Yahoo、Excite、Lycos及Infoseek均是文字搜尋器，隨著互聯網上的影像數據越來越多，新一代的搜尋器將可協助用戶在萬維網上尋找影像數據。 IT







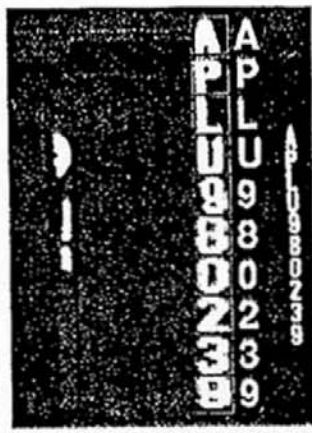
## 「慧光」電腦視覺技術

### 識別車牌號碼

貨櫃碼頭塞車事件對香港人來說經已是見慣不怪了，相信這可能是由於貨櫃碼頭出入口一向是以人手來記錄貨車車牌號碼的原因，不過隨著系統的電腦化，塞車情況已舒緩了不少。

香港亞洲視覺有限公司亦推出了一套「慧光」電腦視覺技術系統，該系統是一套可以在室內外環境、不同光暗背景或彩色影像下找尋和確認英文字母和數字的識別系統。在記錄車牌號碼時，該系統並不需要在車輛上安裝感應器，因它採用了數學識別技術來簡單抽取及辨認貨櫃上的編號和私家車牌號碼。就算是面對惡劣環境如下雨或陰暗燈光，該系統仍可閱讀靜止及正在行駛中的車輛車牌號碼或貨櫃上的字母號碼。故此，該系統無疑能提高以往只用人手記錄進出貨車車牌號碼的效率，並減低塞車情況，實為香港忙碌的出入口岸帶來不少便利。

「慧光」系統可於多種硬件平台運作，包括 Sun Sparc、SGI、DEC Alpha 工作站及備有 Pentium 處理器的個人電腦。其識別及閱讀車牌號碼

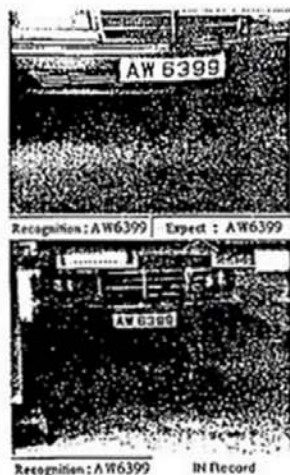


### 監控車輛流量

的準確度高達95%，而該系統在使用Pentium II 電腦摘取和處理影像時所需時間可少於1秒，還可於4G硬盤內儲存多過十萬幅JPEG質素的影像。

「慧光」電腦視覺技術已率先被停車場及貨櫃碼頭所採用，透過整合在「慧光」系統內的數據庫管理系統，用戶可編印各種如停車場使用率、出入閘記錄等分析報告和處理發票，可快速辨識和查實印在貨櫃上的編號，避免人手抄寫貨櫃號碼的不便，能直接改善貨櫃收集站操作效率及監察停車場車輛流量並加強保安管理。

亞洲視覺科技是在1997年十一月成立的，但其慧光系統已在1993年開始在香港科技大學的科研項目中研發成功，並於現時全面推廣以作商業應用。

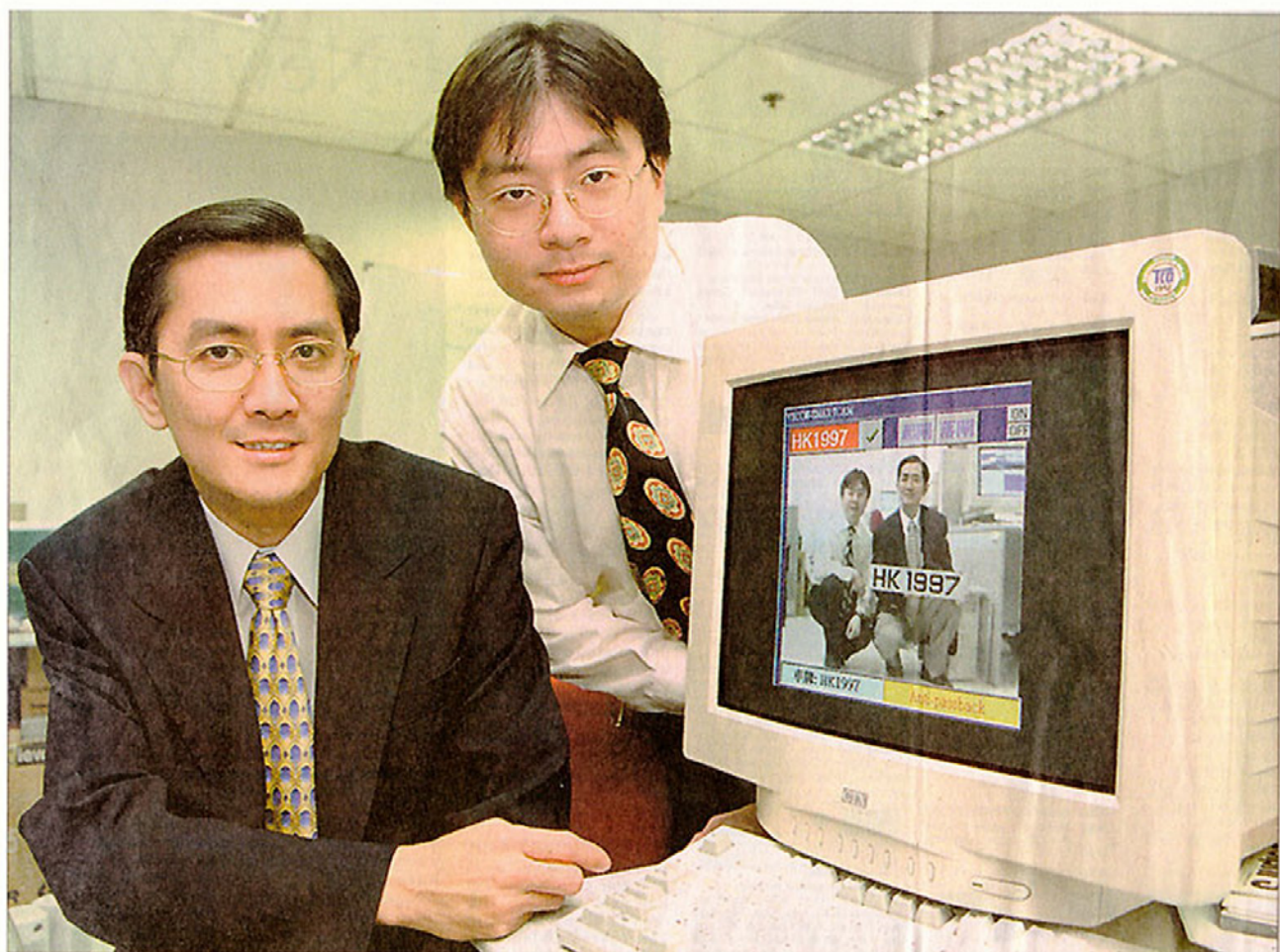


▲「慧光」車牌及貨櫃號碼識別系統。

MET



## System recognises registration of vehicles and containers



Like a scanner: John Lee and Wong Wing-kin with the system called Vecon that can read numbers faster than humans and with a high degree of accuracy.

PICTURE BY DANIE PERALTA



By Steven Ribet

**E**VERY time a new development in technology comes along, there are always those who refuse to believe that it constitutes real progress.

"Are we really better off than our ancestors?" they argue.

However, all but the most die-hard sceptics will concede that a machine that can do the job of a visual display unit operator, that most crushingly mundane of jobs, must improve the lot of humanity.

Creating software that can recognise the registration numbers of vehicles and freight containers as they pass by a camera is what John Lee, assistant professor of Computer Science at the University of Science and Technology, and his former student Wong Wing-kin have achieved.

"Our system can read numbers faster than humans, and with nearly as high a degree of accuracy," says Dr Lee. "At the moment it is being used to identify cars and shipping containers at checkpoints on roads

and in depots. But we are in the process of adapting it to numbers on aircraft, planes and even computer screens."

Dr Lee started work on a system when working as a research assistant for the National University of Singapore in 1989. His team was given the task of developing a set-up to read numbers on freight containers by the Port of Singapore Authority. The result was an accuracy rate of about 80 per cent, in an average time of about four seconds.

In 1992 he took up his present position and started looking at the problem again, this time with Mr Wong who was assigned the job as his final-year undergraduate project. Between them they have come up with a new approach that does not infringe the patented Singapore program.

They have set up their own company, Asia Vision Technology Limited, and are selling their creation under the name of Vecon.

It works in much the same way as an office scanner, using neural networks to identify characters. However, the specifics of the operation make its job much more difficult.

It has to find the registration number itself, which may be written vertically as well as horizontally on containers, in different fonts or even by hand. Colours of the number and its background will vary and characters may overlap, be dirty or be on corrugated surfaces.

Recognition has to occur around the clock under different lighting conditions. The vehicle or container may be stationary or moving and distance from the camera will vary.

Perhaps the most difficult constraint is the resolution the software has to work with. An office scanner typically breaks down a single character into 40 pixels. In the screen area that Vecon has to find its target number in, however, a character only takes up 16. Recognising images as blurred as these needs nifty programming.

They have combined their smart new software with the greater processing power that is now available to achieve much better speed and accuracy than the Singapore system; less than a second and greater than 95 per cent respectively.

Considering that humans only get it right 98 per cent of the time when reading and entering numbers into a VDU and taking account of the difficult conditions under which Vecon has to work, this is most impressive.

The system has already been put to work at a commercial car park in Sun Po Kong, reading the number plates of vehicles entering and exiting. It raises the barrier for monthly ticket holders, and for those paying hourly it makes sure the ticket being used to pay on exit matches up with the car that bought it on entry. Once the times for each car have been recorded on a database, usage patterns can be identified and optimal pricing structures adopted.

Vecon has also been installed at three stations on the new Tung Chung line to restrict entry into vehicle access areas. At the Man Kam To border crossing in the New Territories it is helping the police by keeping a record of trucks and containers going each way.

# New software has got your number



## 專利——形象 推廣的利器

亞洲視覺科技有限公司所發明的慧光車牌及貨櫃號碼識別系統已申請專利。慧光系統是一項可以在不同光暗背景及移動的影像上，找尋及確認英文及數字的識別系統。該系統可應用於識別及檢查車牌號碼、貨櫃箱上所印的貨櫃箱號碼及貨品的標籤上。

### 提高形象助推廣

該公司技術總監黃永建表示，申請專利可以證明慧光系統是原創的，也可令客戶及分銷商對慧光更有信心。這無疑對公司的形象，和市場推廣都有好處。另外，當申請專利獲批後，該專利就會是公司的資產，可以方便向銀行貸款。他說，由於該公司是一間中小型企業，資產不多，若不將慧光系統申請專利，根本不容易向銀行借貸。現時該公司要借貸，都是用其他途徑，例如向香港科技技術中心申請資助。

黃永建謂，該公司為慧光系統申請美國的專利，是因為美國是知識產權發展最成熟的地方，申請了美國的專利後，要申請其他地區的專利都會較為容易。而該公司的市場又以香港及中國內地為主，所以日後將會把專利權的有效地區伸延至香港及內地。

慧光系統原本是香港科技大學的一項研究項目，由科大的技術轉移中心把該技術轉化為商業用途，在去年十月，亞洲視覺科技成立後，成為科技中心「科技創業培育計劃」的培育公司。由於慧光系統在九五年八月已開始登記專利，所以現時任何有關專利申請的費用，都是由科大負責的。

### 申請費高要考慮

黃永建坦言，申請專利的費用頗高，對中小型企業來說，成本是相當高的。由於慧光是一個頗複雜的系統，申



黃永建指取得專利可令客戶更有信心。

請專利的時間也會較長，而律師的顧問費用亦會較高。該公司在申請專利的文件中，須盡量仔細描述慧光的技術，否則，律師會要求重寫，顧問費用便會增加。

在申請專利後，任何公司以後想發展此技術，都要和他們商討，以及繳付專利費用。黃永建謂，他們會在市場上留意看有沒有人侵犯自己公司的專利，憑藉發達的科技資訊，他們很容易就可以察覺到有沒有人侵犯他們的專利，從而保障自己的知識產權。



慧光系統是一項可以確認車牌號碼的識別系統。

## 政府資助首次申請專利

工業署在今年四月二十八日推出「專利申請資助計劃」。由於申請專利的費用由數萬元至十萬元不等，對不少中小型企業或個人發明者來說，是一筆頗高的費用。而該計劃就可以協助本地公司和個人為其發明作專利註冊申請。只要以往從未擁有任何專利註冊的本地註冊公司或香港永久居民，便有資格申請。

申請一經批核，最高資助額可達十萬元或申請費用總額的九成（以金額較低者為準）。不過，這並不包括檢索費用，檢索費用由三千元至六千元不等。申請公司或個人在成功申請專利之前，要付一筆檢索費用，以確保減低侵犯現行有效的專利權之可能性。



# Hong Kong's visionary breakthrough technology

*An alpha-numeric  
character  
recognition system  
that accurately  
reads and identifies  
printed characters  
on cargo containers  
and vehicle licence  
plates, even under  
adverse conditions.*



The Hong Kong company Asia Vision Technology Ltd has created VECON — a system that can read printed characters on both moving and stationary cargo containers and vehicles under adverse conditions. The system, with its patent-pending technology, is fast and accurate in recognising characters. Its novel and advanced features originate in the system's techniques for both character extraction and recognition.

## What is it?

The VECON system can be used in applications where recognition of printed alphanumeric characters in a complex image is required. For instance:

- Recognition of ID numbers on cargo containers at entrance/exit gates of container terminals and depots\*
- Recording and verifying vehicle licence plate numbers at car parks, warehouses, car rental depots, bus

- stations and residential complexes
- Automation of toll collection at tunnels, bridges and highways
- Security monitoring of moving vehicles
- Inventory control of merchandise in situations where the use of bar codes is not feasible

### \*At entrance

- Capture monthly pass/hourly ticket number and car image
- Recognise licence plate number
- Store information as entrance record
- Issue warning when monthly pass does not match licence plate number
- Raise barrier after validation

### \*At exit

- Capture monthly pass/hourly ticket number and car image
- Recognise licence plate number
- Perform security check with entrance record
- Issue warning when monthly pass/hourly ticket does not match licence plate number
- Raise barrier after validation



亞洲視覺科技有限公司於一九九七年十一月成立，其首個產品名為「慧光系統」(VECON)。該系統於一九九三年至一九九七年期間由公司創辦人李春茂博士及黃永建於香港科技大學之科研項目中研發成功，並於一九九七年十月與香港科技大學達成協議，將「慧光系統」全面推廣作商業應用。與此同時，該公司更以該系統參與角逐一九九八年香港資訊科技成就大獎，經評審委員會甄選後，獲頒發本年度之香港資訊科技成就大獎(工貿界)優異獎，足證該新產品具有卓越科技成就。

### 香港資訊科技成就大獎(工貿界)優異獎 亞洲視覺科技有限公司

## 「慧光系統」保安功能卓越

亞洲視覺科技有限公司董事長李春茂博士表示，正在申請美國專利的「慧光系統」是一套可於室內外不同光暗背景或彩色影像下找尋和確認英文字母和數字的識別系統。就算面對惡劣環境如下雨、陰暗燈光，「慧光系統」仍可閱讀壓印在靜止或正在行駛車輛之車牌和貨櫃上的字母號碼，直接改善貨櫃收發站操作效率，監察停車場車輛流量並加強保安管理。現時的客戶有 Adams Parking，地鐵公司新設之停車場及香港警務處。

目前，香港的貨櫃碼頭由守關員人手輸入號碼，核實進出的車輛與貨櫃是否相符。「一貫的做法是以人手輸入和核對資料，不但費時，而且容易出錯。」李博士說：「為了加強保安和提高效率，VECON 的設計重點是要能準確找出車牌和貨櫃號碼，予以識別。」

李博士更希望該系統能在市場上佔一席位，以及該公司能在電腦視覺領域成為世界領導級公司。在知道新產品獲獎後，李博士更表示：「實在多謝科技大學科技轉移中心和香港工業科技中心給予支持和鼓勵。」



「慧光系統」研製人李春茂博士(右)及黃永建(左)。



「慧光系統」能識別移動中貨櫃箱號碼及車牌號碼等。



## 亞洲視覺科技

# 展示得獎電腦視覺應用技術

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意為電腦視覺領域領導者的亞洲視覺科技有限公司在參展98亞太科技展期間，推介新推出便已獲得「香港資訊科技成就大獎」之「慧光」電腦視覺系統。「慧光」系統是一套可於複雜影像內、雨天或陰暗燈光等惡劣環境下找尋及確認英文字母和數字的識別系統。亞洲視覺創辦人兼董事長亦是香港科技大學助理教授的李春茂博士表示，自一九九三年亞洲視覺科技已在香港科技大學研發「慧光」技術。年終無間的研究工作，不斷重覆的真實測試和檢討只為確保系統的高度準確性和可靠性。現時「慧光」系統可於一秒時間內確認影像而準確度達95%。

### 「慧光」車輛及貨櫃號碼識別系統

「慧光」廣受停車場和貨櫃碼頭管理公司採用。能迅速辨認和核實行駛中或靜止車輛之車牌號碼，再加上電腦化存取月票/時票號碼配對功能，尤其適合停車場出入通路控制閘、流量和保安監察，提高日常運作效率和管理服務水平。貨櫃碼頭管理公司採用了「慧光」系統後，電腦視覺技術代替了傳統人手抄寫貨櫃號碼，直接舒緩貨櫃碼頭和收發站出入口碼頭通道的高度流量，以及簡化繁複的船務安排。

展覽攤位：C01j



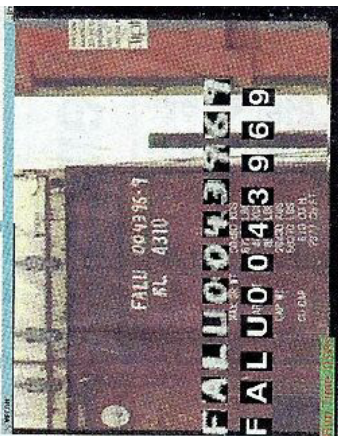
14 電腦廣場



文：殺意龍  
攝：Manny

呢套「慧光」主要用作作掃車牌及貨櫃編號，成個系統包括車牌識別裝置、個人電腦、capture卡、保安攝影機、照明設備、套索、車牌偵察器、即時識讀、全套多謝十八萬蚊。雖然係香港人所研發，但係軟件方面一啲唔啱唔研。無論晴天雨天甚至至夜宵暗都有問題，掃指貨櫃號碼咁長都唔使一秒時間，普通車牌號碼更只需0.3秒就搞掂，裝載率則高達95%以上。

據說夠無驚嚇，做起上環又有冇力呢？據有「估份計」系統總李博士稱，目前全港計划興建機場大概有四十多個間車庫已經落實，兼地庫系統，由於「慧光」喉管制介面太細窄，兼且鋪排完喉管全部即時錄低喉，包起出入時間、日期、車牌號碼、諸君日後需問等，之後更會幫您儲存資料值作系統統計及管理，的確唔錯。如果唔係唔正又點會連政府職文錦發出關卡關卡所用呢？相信方便來往中港嚟可發過邊過呢喉喉喉喉喉喉喉喉喉喉喉喉喉



呢個系統只  
一萬零咁地方  
就係長長嘅手  
寫編號都掃得  
得到，例如時  
貨櫃車編號  
咁，數埋最  
十個字有多，  
冇咁難，

成三行寫都有，人手抄都辛苦啲，絕對令貨櫃碼頭就照例唔使一秒抄錯晒資料，絕對令貨櫃碼頭亦流量大大提高。其中上海同比利時嘅貨櫃碼頭已經用緊，不過最像嘅就香港貨櫃站就重本傾咗。呢度接洽咗哪幾間重有專提供快車嘅交通同私人嘅保安公司等。還請聯絡你班友仔重寫咩唔落咗依家週規則此荷事。

亞洲視覺科技有限公司：2319 2648  
相關網址：<http://www.asiavision.com.hk>



# Asia Vision views future with automated eyes

**By Megan Scott**

One-year-old local software firm Asia Vision Technology will be showcasing its Vecon vehicle identification computer vision technology at next week's Software Exhibition '98.

The Vecon system is designed to "accurately" retrieve and recognize container ID numbers and vehicle license plate numbers with the aim to improve efficiency at container terminals, maintain parking lot security and monitor traffic, according to officials at Asia Vision.

Asia Vision has a patent pending for the alpha-numeric character recognition system that is designed to locate and identify printed characters in complex gray-level or color scene images, indoors and outdoors, with an accuracy rate as high as 95 percent, officials

said. Image acquisition and processing time using a Pentium III machine is less than .5 seconds, they added.

The Vecon system was originally developed at the Hong Kong University of Science and Technology (HKUST) in 1993, according to Wong Wing Kin, director of Asia Vision Technology. "At that time, I was studying undergraduate courses and took up Vecon as my final-year project," Wong said.

Character recognition in scene images is a "very tough problem" for computers to handle, Wong explained. "The most difficult part is how to emulate the function of human eyes and the brain to recognize the characters that we see," Wong said.

Currently, the system is being deployed by Adams parking, the new MTR Station

parking garage, the China Merchandising building and the Hong Kong Police to provide security and driver authentication features without adding extra manpower, Wong said. The Hong Kong Police are using the system "to monitor all the vehicles passing through Hong Kong and Shenzhen," Wong said.

In addition, Vecon features an integrated database management system, which manages

statistical reporting for parking usage analysis, entrance/exit logs and invoice billing," according to Wong. For the Hong Kong Police, this feature allows the force to nab thieves in stolen vehicles since "there are many stolen cars passing between Hong Kong and Shenzhen," Wong said.

Wong's original motivation to develop this product was "to create a system that is widely applicable in everyday life and

also in the industrial world," Wong said.

Looking to the future, Wong said the Vecon system can be deployed in applications that require visual recognition of alpha-numeric characters such as train and flight numbers, inventory numbers and also information displayed on screens.

For instance, the Vecon system has recently been adapted for monitoring financial infor-

mation, Wong said. A local international financial institution replaced one of its employees with the Vecon, he said. The system can be connected to the computer's VGA output and programmed to recognize specific data, Wong explained.

The system runs on various platforms including Sun Sparc workstations, Silicon Graphic workstations, Compaq/Digital Alpha workstations and Pentium-based PCs.



**The Vecon alpha-numeric character recognition system can locate and identify printed characters with an accuracy rate as high as 95 percent.**





亞洲視覺科技有限公司董事長李春茂(右)、董事黃永建

九八粵港高新技術合作項目推介會參展項目之一「慧光」(VECON)電腦視察系統，是一套可於複雜影像內、雨天或陰暗燈光等惡劣環境下尋找及確認英文字

# 慧光車輛辨認系統 識別字符快速精確

據「慧光系統」開發者、亞洲視覺科技有限公司董事長李春茂博士表示，該系統結合了計算機視覺科技與神經網絡技術，自動找出號碼予以識別和核對，準確度達到百分之九十六。

整套「慧光系統」包括慧光車輛識別軟件、個人電腦、影像攝取卡、保安攝錄機、照明設備、欄杆、車輛偵察機和交通訊號燈。香港鐵路沿線各站、巴士上落客區今年七月安裝了該套系統，從車輛駛至開口經自動辨認其車牌號碼至核准自動開關讓車輛駛過，平均不需一秒鐘；所有車輛出入記錄均儲存在資料庫中，供以後查閱。

文錦渡海關在今年九月安裝了兩組慧光系統，分別監控進出本港的兩條行車線，即使車輛以高達四十公里時速駛過關卡，其車牌、駛越時間及影像均會被系統攝取和記錄下來。

慧光系統的卓越保安功能亦引起香港警務處的興趣，正考慮在警車上安裝該套系統加強對警車監察車輛的能力和提昇維持治安的效率。

上海貨櫃存儲站採用了慧光車牌及貨櫃號碼識別系統後，雖然貨櫃箱號碼的識別面積闊達八呎乘八呎範圍，書寫表面凹凸不平；號碼有直寫的，也有橫寫的；既有單行，又有雙行，還有各種不同顏色，該系統識別一架貨櫃車的時間平均只需一秒至三秒，大大縮短了貨櫃車的通過及輪候時間，而且節約了人力資源。

慧光系統已在新加坡申請了全球專利，目前正在申請美國專利。李春茂表示明年二月會將此先進電腦視察技術送往北京展出，冀進一步打開內地市場。

董恩明



## Vehicle and Container Number Recognition System 慧光車牌及貨櫃號碼識別系統



### \* 自動識別流動及靜止車輛的車牌號碼

- 以便記錄及監控車輛進出貨倉，車輛維修中心或車輛出租站
- 以便執行停車場、橋樑及高速公路的自動收費或監控

### \* 自動識別流動及靜止貨櫃箱的號碼

- 以便記錄及監控貨櫃箱進出碼頭及堆場
- 以便監控碼頭及貨櫃船起卸中的貨箱



### \* 亦可自動識別飛機、火車、貨物及螢幕上的字母數字



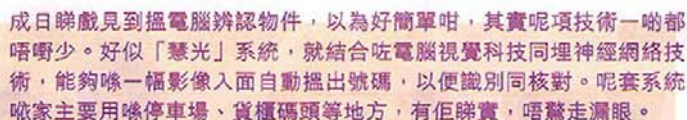
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認字夠**準確**

據發展區項技術藝亞洲視覺有限公司負責人李春茂博士解釋，「慧光」視覺電腦技術採用攝影原理，其實同OCR軟件有少相似，但就功能好得多。「慧光」視覺點點攝影機只採用400p分辨率度攝取影像(攝器一般用300dpi)，用電腦系統捕捉影像，過程都有問題，而且由於攝影機快門速度達千分之一秒，即使物件移動，也可以準確捕捉，辨識過程所需時間，由最快少於一秒，至最長幾秒不等，視乎拍攝攝影影像係唔係清晰，文字有冇破損等。



李春茂指出，拍返嗰啲影像好多時都唔清楚，有黑點，冇分text，又整又畧等，影響件認嘅嘢度，高係做到嘅速度對資料。

亦可以應用於電子道路收費方面。此外，裝係邊境出入口關卡、停車場出入口通道，也可達到控制同警察逼出車輛職目的。

以停車場保安為例，用呢個系統就可以準確追蹤同核實每架車嘅車牌號碼，並可以24小時全電腦化運作，好適停停車場出入實施自動收費同車輛流量監察。另外，配合附設數碼車牌管理系统，用戶亦可以編印好似停車場使用率，列出邊架車邊幾段時間流出，令日常運作變為自動化。而且咁做亦能夠避免人手抄寫車牌號碼不便，改善質檢及車站操作效率，並有效加強保安管理。



● 這座24小時管理停車場，記得找出  
那部「黑車」，就可領回這件寶物。

幫你睇實滙市

電腦視覺技術就應用造車止係認真嘅。由於股票外匯市場波動好大，賺少陣都好容易唔見好多錢。所以好多股票外匯公司都搵專人全日24小時睇實外匯市場變化。有見及此，佢哋其中一個新產品VECON 視電腦系統就係針對呢個方便就應用。VECON System軟件系統同樣用番「慧光」視電腦技術為基礎，能夠將電腦螢幕上嘅文字，直接轉入另一部電腦入面作分析，過程完全唔經人手。

聽講話，呢個新系統已獲美國其中一家大型金融投資機構採用，以取代用人手24小時收集股票外匯市場數據，等啲員工唔使再捱夜，亦可以減少人手輸入出錯嘅危險。

電腦管理員

聯華博士講，專家組研究緊將「慧光」視覺電腦技術配合智能卡，將使用照相片儲存臉部卡，然後讓系統辨識使用者樣貌係與同相片一樣，達到保安管理效果，預計明年三月就可以正式推出。

亞洲視覺有限公司可算係本地少數科技公司，能夠成功將大學研究成果轉化為商業應用賺錢。但地氹「慧光」系統啱家真泛應用嚟賣櫃碼頭、新機場停車場、邊境關卡等地方，解決本地工商業、政府部門等要面對數難題。唔使搵外國公司幫手，搵除「外匯月亮係圓」，振觀念，生蛋最有營養。

## 控制交通最管用

既然研究到認數目字認得咁準，跟住諗吓應用嘅邊度就唔難。聽李春茂講，「慧光」應用廣泛，只要涉及數字就認得，好似可以幫警方搞失車、賊車、捉司機衝紅燈、超速駕駛，

慧光系統

可以不分晝夜，核對並確認貨車、貨櫃嘅資料。



## 編輯手記

讀者Jacky e-mail昇編輯部，問可否可以講多啲Mac機嘅軟、硬件。事實自從iMac出街後，確係多啲屋企玩Mac機，我哋以後都會盡可能報道埋Mac資訊。另外Jacky問Sony嘅HIFD可否support Mac，答案係PC、Mac 及iMac都得。

第二期我哋介紹過Gymbreak呢個軟件，結果個設計者問番我哋對Gymbreak嘅評價，但係佢係澳洲人！唔知佢點神通廣大可以睇到info.mag嘅介紹呢？

有問題、有意見、有投訴，隨時電郵samuella@adihk.com或傳真至2742 4953info.mq編輯部。

## 學術研究走出象牙塔

亞洲視覺有限公司成立於1997年11月。佢地第一個產品「慧光」系統就係由創辦人李春茂博士同埋佢嘅學生黃建文，喺科技大學花咗四年時間至研發成功，及後同科技大學達成協議，將「慧光」系統全面推廣作商業應用。

該公司唯家共有7個全職員工，有兩個博士、兩個碩士同埋兩個學士，大部分都係香港科技大學畢業生。