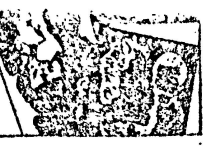
Hengsheng cai is a Visiting Research Associate in the Department of Systems and Computer Engineering at Carleton University, Ottawa. His current research interest is in Videotex, Chinese Language Computing, Super Micro-computer and Local Area Network.

He was born in Meitan, Guizhou, China. He graduated from the Department of Electrical Engineering of Beijing Polytechnic University in 1966. After then, he worked in the remote control oil field system in Daqing Oilfield. Since 1974, he has been served as a Computer Research Engineer for the Scientific Research Institute of Petroleum Exploration and Development.

He is a member of Society of Electronics and a member of the Council of Super Micro-computer Association, the People's Republic of China.

Can the world cope with so many people?..D1

Can a black man play Lear? Why visible minorities aren't all that visible on stage...C1



WEEKEND EDITION

Sunrise 5:47 Sunset 9:01
Hazy, humid
High near 30

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System for Chinese-language computing gets a boost from videotex know-how

BY JANE BECKER
Special to The Globe and Mail

TECHNOLOGY

OTTAWA

Videotex — the technology of transmitting shapes and graphics, as well as text, to a computer or television screen from a central data base — may get a warmer reception in China that it has had in Canada, where much of it originated, thanks to the work of a Chinese researcher.

This month, Heng Sheng Cai wound up a two-year research project at Carleton University's engineering department. He has developed a keyboard for Chinese language computing with the help of the videotex technology developed in the 1970s at the federal Department of Communications.

Although videotex has so far failed to catch the public imagination for large sales, the technology is now in the public domain, and several Canadian companies produce software for systems. At least one, Norpak Corp. of Kanata, Ont., produces the hardware.

Spruce Riordan, Carleton's dean of engineering, with whom Mr. Cai worked on his project, thinks the adoption of videotex in China could mean increased exports by such companies. Mr. Cai predicts an eventual two-way trade between Canada and China in videotex equipment, as the technology becomes more widely used in this country.

Translating the Roman alphabet into computer signals is relatively easy. With 26 letters, all possible combinations will fit easily into the memory capacity of the average personal computer. But the Chinese "alphabet" of about 60,000 ideographs requires a powerful computer to allow for all the possible combinations. And keyboard design is a conundrum.

So, although there are about 200,000 personal computers in China, a good deal of language work is done using the Roman alphabet for Chinese phonetic symbols. (These present difficulties too, because varied dialects in China mean different people pronounce the same word differently.)

To make transmission in Chinese practical, computer designers have reduced the usable language to 6,700 characters. But keyboard design is still a problem. Several hundred systems have been tried but there is still no single standard.

Working with the Kay Hin Research Group in Toronto, as well as at Carleton, Mr. Cai used videotex technology to design a graphics coding system for his characters, as well as to improve the representation of the characters on the computer screen.

He reduced the usable characters to those representing the 36 most-used Chinese words (including "me," "year," and "country"), one for each of the 36 keys on his keyboard. The keys also contain 36 "radicals" — strokes or combinations of strokes — that are used to form other characters.

Used as an "overlay" to a standard computer keyboard, Mr. Cai's keyboard can be used to work with numbers and the Roman alphabet, as well as to transmit in Russian, Japanese or Greek.

Videotex also helps to give the system several "user-friendly" aspects. For instance, to reduce the strokes needed to produce a character, an operator types only the first and last strokes. A selection of characters that includes these strokes appears on the screen and the operator chooses one.

The system will also supply the correct word immediately preceding or succeeding the one typed; will correct characters typed out of sequence; and will store often-used phrases.

These features should be particularly useful in education, where Mr. Cai thinks videotex technology will be primarily used — in setting up a two-way system of transmitting pictorial data to many students or researchers.

Mr. Cai originally came to Carleton to work with Mr. Riordan on mobile communications involving international transmitting by personal computers. Any such transmissions must use an international code, so that letters typed in at one end and translated into electronic impulses will be translated back into the same letter at the other end.

There is such a code for the Roman alphabet but as yet there is no one standard for symbols or graphics transmission. This means, for example, that British television signals must be decoded and re-coded before being broadcast in Canada.

To plead for an international code for graphics, Mr. Riordan and Mr. Cai are to present a joint paper to the International Conference on Communications Technology at Nanjing in November.

Their proposed new code would incorporate the "North American presentation-level protocol system." NAPLPS is a videotex standard on this continent.

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Breakthrough for Chinese Keyboard

Anyone who's a "hunt-and-peck" typist knows the agony (and hopefully the ecstacy) of working on a computer keyboard.

Imagine, though, the nightmare you'd face if your language had more than 60,000 characters in it. You'd be hunting and pecking for a long time just to get logged on.

In China, adapting computer keyboards to the language is no laughing matter. But neither has it been a simple task.

At least till now.

Heng Sheng Cai, a computer specialist from Peking, Republic of China, has been working as a research associate at Carleton for the past two years to solve the problems of using computers with his language. And he's come up with an innovative approach that goes a long way to overcoming the problems.

Using videotex technology and artificial intelligence, he's developed a keyboard and program that allows the user to build characters quickly and easily.

An average user could input about 38-40 characters per minute, while an expert typist could input up to 60, he says. That's an amazing feat considering one character could consist of as many as 12 strokes to write.

The keyboard incorporates the 36 most frequently used characters in the Chinese language, plus another 36 radicals (combinations of strokes) which can be used to build new characters. The system readily builds all of the 6,700 Chinese characters that comprise the international stardard for computers, and are the most commonly used characters in the Chinese language.

It's a tremendous advance over systems currently in use in China, he says, and he plans to develop Chinese videotex when he returns. Already he's published a paper in Chinese using the system, and will be presenting his findings at a conference in Peking next summer.

Working at Carleton has helped him to develop the system more readily than he would have been able to in China, he says.

"Professors here have been very helpful, I've been able to use computer hardware and software that we don't have in China.

"I work more efficiently here."

He said he applied to come to Carleton to work with Professor Spruce Riordon after reading some papers he had written. The Chinese government has paid all the expenses associated with his work here.

Professor Riordon, Dean of Engineering, says Mr. Cai has been very enterprising, and generated a lot of good ideas since arriving here in November 1984.

His stay was due to end this fall, but they've asked for a six-month extension for the project.

"The key thing in all of this has been Telidon technology," says Dean Riordon.

"Canada has done a lot of the pioneering work in this area, and Mr. Cai has been able to get help from one of our graduates, Doug O'Brien, as well as the Department of Communications."

Dean Riordon says the exchange has been as beneficial for Carleton as it has been for Mr. Cai.

"We've seen some interesting developments, and will have a couple of joint papers out of this," he says.

But as important, he adds, "We see this as a way of extending Carleton's reputation in the world.

"We see the connection with Mr. Cai as being an ongoing one, that can only be achieved through such long-term associations.

"We are in effect supplying them with knowledge, giving their people an environment in which to acquire knowledge.

"I think it will make a positive impact in their thinking about Carleton."

Dean of Engineering Spruce Riordon, and research associate, Heng Sheng Cai, review Chinese characters produced by new keyboard.

(Ref. 007)

Dean of Engineering Spruce Riordon, and research associate, Heng Sheng Cai, review Chinese characters produced by new keyboard.

中國大陸留加工程師蔡君
在腦理文像眞術面能突局
電處中圖傳技方可已破限

（本報訊）據上週六環球郵報一則報導謂：一名來自中國大陸的工程師蔡恒生（譯音），剛在渥太華卡爾頓大學完成了一項爲期兩年的電腦圖文傳眞技術研究，並可能已突破電腦處理中文的局限。

電腦圖文傳眞（VIDEOTEX）是一項從資料庫把圖像、繪圖及文字經由電腦或電視螢光幕的技術，七十年代得到聯邦通訊部的拓展，現在已有一家安省公司在承造有關硬件，與及數家加拿大公司建計所需的軟件。蔡恒生就是利用這種技術，爲處理中文的電腦製造了一具全新鍵盤。

一向以來，由電腦處理中文，有兩項困難：其一是中文單字變化繁多，其一是鍵盤不良於拼寫中文。一般的解決辦法亦只有兩途：其一是減省單字數目，有從六萬減至六千七百的做法；其二是利用羅馬字母音標來拼寫中文。

蔡恒生分別在卡爾頓大學和多倫多的基顏研究所（KAY HIN RESEARCH GROUP）進行電腦圖文傳眞的研究。他把日常用字縮減到三十六個，以配合鍵盤上三十六個單鍵，其中包括「我」、「年」、「國」等字樣，同時亦代表三十六個部首。操作員只需按下頭尾的筆順，數個同類單字便會在螢光幕出現以供選擇。此外，該鍵盤還可用作更正每組三個單字的先後次序，與及儲存常用片語。

蔡氏發明的鍵盤，又可以處理羅馬字母、俄文、日文、希臘文和數學。蔡氏認爲，這方面的電腦傳眞技術，對教育會有特殊幫助，例如可在研究員和學生之間建立輸送形像資料的雙管道。

與蔡氏共事的卡爾頓大學工學院院長雷奧丹預料，中國方面對電腦圖文傳眞技術會感興趣，並會因此促進上述參與有關製作的公司向中國輸出技術。蔡恒生認爲此一技術，可爲中加提供一個雙贏的基礎。

蔡雷二人共同研究的項目，是利用私人電腦作國際傳送的流動通訊設備。在國際傳送方面，已有一套爲羅馬字母而設的公認編碼，但在繪圖和其他符號方面則仍沒有。蔡恒生和雷奧丹於本年十一月到南京參加國際通訊技術會議時，會提交一份論文，支持建立公認編號之議。

星島日報（多倫多）一九八七年七月十四日

中加學者共同研究 改進成功中文電腦

黃羊

一名來自中國的訪問學者，與此間同行研究電腦，已百分之百成功地製成一套完整的中文電腦系統，操作簡單，使用便利。

這位學者蔡恒勝先生，現年四十三歲，一九六六年畢業於北京工業大學。出國訪問前，任職中國石油部計算機中心電機工程師。自從中國決定實行改革，開放門戶，加速現代化，使派出為數甚众的學者及留學生往各先進工業國家學習。蔡氏在此熱潮下，進四川及廣州之外語學院，進修英語年餘。通過重重考試，剔烈競爭，經教育部和科學院鑑定其學識與業務成就高達水準，乃公費派他出國，一九八四年抵達渥太華卡爾頓大學。

蔡氏的父親乃現代頗負盛名的科學家。于接受本報記者訪問時，蔡恒勝先生說：台灣和日本的大學都採用其先翁的著作，研究植物保護，發展農業。｜蔡恒勝之愛好研究性格及科學分析的頭腦，無疑是傳自乃父。

若論卓有成就的電腦學府，應數滑鐵盧WATERLOO他說：一九八三年，稍有進取心的學者，都爭取放洋得見世面。美國、加拿大與歐洲國家諸校均額滿見遺，僅卡爾頓大學尚有空缺，他乃在無可選擇的情況下來到渥太華。他知道，加拿大的科技甚是先進，無論那一家大學，設備與資都不應數人失望。況且該大學工學院院長RIORDON教授對他頗為器重，親自下聘書請他來加。蔡氏乃選擇加入發明的，把電視、電話線路與電腦連繫起來，運用的「公共數據庫」作研究課題。他說：只要家中有上述三樣東西，便可明悉世間的政治、經濟、新聞及一些科技情況，也可聯繫自己的銀行與公司業務，方便得很。若能把這套學識，有系統地運用于中國的教育事業，可節省人力、物力，學生可在電視螢光幕前上大學，當可加速改善落後的科學技術面貌。

加拿大使用的是英語，字幕顯現出來的是英文，中國人不能普遍接受，｜這是一大問題：如何使之中文化？

在卡爾頓大學裡，他與一組中外學者經年研究，終于有了頭緒，｜運用複雜的中國「圖聲」和「象形」文字，即把字形轉變為聲音，再把聲音變而為符號，輸進電腦，使之有思想概念，便可控制自如。

鑒于渥太華華人過少，多倫多一家叫「愷興科技研究中心」的電腦公司，正與香港、新加坡等地華人科學家共同研究電腦中文化。該設于香港的總公司正與中國政府接洽，希望達成協議，共同發展。蔡氏乃移師多倫多，跟他們合作。據說，蔡恒勝中、英文根基深，出了很多好主意，把最複雜的中國各地方言，不同之發音與中文書寫人各有異之不依規則方法、習慣，統統歸列出來，常用與經常錯誤的，一組組地編寫，只要在電腦的鍵盤上打出一個類似的字或筆劃，就可找出一個適當的漢字或一組句子。他們利用市面上出售之每副三千元左右的IBM或蘋果牌電腦，一如英文之打字方法，把漢字打出。

蔡氏展示其產品稱，鍵盤上鑄有三十六個常用的中國單字，如：我、們、應、發、而、這、得、要、所、將、他、可、家、的、是、和、在、會、國等，此乃從一百個常用的漢字中篩選出來者，已佔普通文章內容的百分之二十五至三十。再加華人慣用的繁體字。不獨如此，由于中文電腦試製成功，其他各國文字的電腦難題，亦可迎刃而解，運用漢字的同樣道理，代入俄、西班牙、希臘諸國文字。

更可喜者乃中文電腦可利用電話線路作洲際通訊，只要兩地各有電話與電腦設備，即可使用。駐外國的記者，接通電話，在電腦前打出寫好的文稿，報社可于數秒鐘內收到。同樣，商業通訊、行情查詢、簽署合同，均可輕而易舉地利用之。

愷興公司現已製成「中文文字處理軟件包」，儲藏七千個常用的漢字于一片三吋半度的磁盤內，每片僅售數百元，可永遠使用。蔡氏強調，漢字雖有六萬個之多，但經專家統計，七千個已足夠任何文章、書籍著作之運用。一般而言，一千四百個漢字已達文章所需的百分之九十；二千八百個單字為整部著作的百分之九十九；四千二百個是文章的百分之九十九點九。若極其偏僻，絕少使用的字，以部首拼湊而成，當可百分之百的解決。

中文電腦像英文電腦一樣，可以作任何大大小小、長長短短的無限量儲存、記載和應用，公司、工廠之會計制度、進貨、銷售、點存，全部自動化，只要按電鈕，資料當即顯現在眼前。

蔡夫人是一位醫生，原在北京醫院服務，去年攜其獨生女兒來加。母女倆現均在多倫多一語言學校進修英語，成績斐然；尤其年僅九歲的女兒，進步神速，已不存語言隔膜問題。蔡氏與愷興公司研製成功中文電腦，若以個人論，當可名成利就，發大財。詢以會否繼續留在加拿大。他堅決地說：「國家派我出國吸取北美的先進科技，現稍見成就，僅有點興奮。我必須利用所學，帶回中國，為中華民族服務。」他說：回國後將與同行繼續研究下去，以圖有更大的發展。