



## New Character Recognition System

# Pinpoint Scanner for the Digital Age

**(Ubiquitous Pinpoint Scanner)**

1) What type of product (technology) is this?

*This new technology simplifies the inputting of characters & codes printed to paper to PCs and cell phones.*

Our latest recognition system technology converts images containing characters & codes in random locations captured using the pinpoint scanner in any scanning direction to electronic data using recognition software, and directly inputting this data to user applications.

*(International Patent Acquired)*



2) What are the features of this technology? [See Figures 5) to 8)]

a) **Scan. Click. Go:** This scanner features “No Guide Roller” through “Scanning in Any Direction” and “No Blurring.” This cutting-edge technology sends characters & codes from random locations captured using a **scanner** built into a mouse to a **recognition engine** inside PCs and portable terminals, converts these images to electronic data for direct input to user applications. Character input operations are continuously handled at top efficiency thanks to operation sequence automation.

b) **Code & Character Recognition:** This **character recognition engine** operates behind user applications, and the **recognition engine** transmits recognition results for captured images to the cursor position of the predetermined application using the mouse as electronic data. Various characters & codes can be recognized by changing the recognition software. It is also possible to combine character and voice recognition with the pinpoint scanner, thus improving the recognition rate. [Image verification (Ex. “seal”, “signature”, etc.) available]

c) **Potent Recognition Capability:** Recognition operations can always be expanded to the latest & greatest technologies because of the processor on the PC and portable terminal side as

well as recognition software, without being performed in the scanner. (Scanner **miniaturization** and **cost reductions** are possible as the high value recognition engine is not located on the scanner side.)

### 3) Overview of Developed Technology

#### a) Background on Development [See Appendix 2), 3)]

**D**igitizing printed materials brings with it various benefits (storage, management, searches). Digitalization is performed with the scanner (or digital camera), and [digital image data as well as digital text information are added](#), making Google<sup>TM</sup> and other [search technology usage](#) essential. The unresolved issue remaining for existing scanners (digital cameras) is that the [technology scans only important locations](#) from thick books, newspaper articles or other materials.

#### b) Problems with Current Technology

**W**hen images are loaded to the required location, it is difficult to prevent blurring and meandering with a [handy scanner](#) using a line sensor, while scanning operations were unavailable with a [digital camera](#) using an area sensor.

Further, [recognition of characters & codes](#) in loaded image data is performed using standalone character recognition software linked to a standard PC interface (TWAIN); therefore, operations to select the desired location from the character recognition results in the user application and copy & paste is [laborious work](#) in shifting to a mouse [when performing these actions](#).

#### c) What does this new technology achieve? [See Figures 5) to 8)]

**F**ull image data without meandering of the target locations is obtained using real-time calculations based on position coordinates (including the rotation angle) of each still image where character & code images are scanned with an area sensor focused on size, and blurring during scanning is prevented using high-speed photography. (Fundamental algorithms verified by the 71<sup>st</sup> New Technology Development Foundation Grant 2003)

Everything from image loading to character recognition was automated by embedding scanner functions, where image data from target location on a paper are loaded to a mouse and, for the user application, developing system software for automatically inputting recognition results of character recognition software operating in the background to the cursor position predetermined by the mouse.

#### d) Based on these results, what products can be made with these features?

[Camera modules with scanning functions](#) can be produced that can scan without a guide rail or guide roller and can load high quality images at full character recognition without any blurring.

A [Scan, Click, Go System](#) can be made that achieves total operations whereby the module is embedded to a mouse where recognition results are input to user applications using simple operations.

4) What are the needs for this technology?

**“Portable Scanner”** [See Appendix 3)]

To go paperless, it is ideal to digitize important positions immediately when documents are in-hand. A portable scanner that can be used in one hand level to a PC solves this problem.

(Explanation)

**A**lthough we have reached a digitized society, the paper materials we have had throughout history continue to inundate us. These paper materials are bulky, and there is never enough time to organize the documents taking up the space around us. To go paperless, it is ideal to digitize **only important parts** immediately when viewing the document. For this, it is essential that the scanner is near our documents and PC, can be used continuously while being portable.

**“Automatic Address Input”** [See Appendix 2)]

A character & code device (pinpoint scanner) with “commercial” and “all-purpose” features, at low cost and with superb operability is required.

(Explanation)

**W**e are inundated with **items** other than printed materials (foods, clothes, electronic goods, etc.). Accessing information on such miscellaneous items (access to production logs, cooking instructions, operations manuals, repair parts ordering, advertisements, etc.) can be realized by using the Internet.

Information on **items** in the **industrial field** is either printed or IC tagged to these items as product or article codes (**numeric address, 2D code**). Automation of read inputting is progressing for these using “Optical Character Recognition (OCR) devices”, “Code Readers” or “IC Tag Readers.”

These automated industrial code readers are expensive and specialty devices that are not spreading in the **commercial field**. In order to promote a digitized society in the commercial field in the future, it is essential for people to have an “all-purpose” low cost, automated character & code reader with superb operability at their disposal. (See Appendix 1, 2, 4)

To get to an “all-purpose” device, a **portable pinpoint scanner (Hyper Scanner)** for inputting characters & codes to the commercial computers and **cell phones** that are spreading the most in the public arena equipped with Internet connection functions is needed.

“Global Communication” [See Appendix 1)]

People in Western Countries cannot read Asian languages; therefore, a pinpoint scanner is vital for computer inputs.

(Explanation)

Computer keyboards are primarily in English. Although Japanese people input Chinese Characters to their computers using Romanized letters, Westerners cannot read these; therefore, they cannot input them to their computers. Using the pinpoint scanner enables PC-based communications simply by scanning the location to read Japanese.

With the march of globalization, global communication is becoming increasingly important. For example, a means for Japan to gain global competitiveness is to employ foreign researchers with advanced skills received in university or other higher education, yet the reality is that, compared to advanced Western countries, the number of foreigners in Japan is only 0.7%. A survey conducted by the Japanese Ministry of Education, Culture, Sports, Science and Technology on researchers shows that the greatest response to why there are so few foreign researchers in Japan is the **language barrier**, meaning a “language or other communication issue”; therefore, **measures must be taken** in light of the severe global competition for specialists. (See Organization for Economic Cooperation and Development Statistics in ‘White Paper on Science & Technology’ 2006)

5) Who are our customers?

Electronic device (computer, cell phone, home information appliance) users

(Customers)

\* Foreigners and younger people who cannot input characters to a computer because they cannot read them,

\* Seniors and persons with physical disabilities who can read characters but cannot input them to a computer,

\* White-collar workers who do not have the time to go paperless,

\* Consumers who find 2D codes useful, but never have a reader on hand at all times (home electronics users).

(Benefits for Customers)

\* For foreigners, they can learn the meaning of foreign characters in documents they are looking at during their travels or in international business on their cell phone or laptop computer by scanning them with the pinpoint scanner (\*).

\* For younger people, characters in picture books and textbooks are read out by the pinpoint scanner.

\* For seniors, they have direct access to newspaper and magazine advertisements on their digital data devices.

\* For persons with physical disabilities and poor vision, newspapers and books are read aloud by scanning them.

\* For white-collar workers, they collect and store articles of interest from documents in meetings, newspapers they are reading and from investigative reports to their own “data log” using the pinpoint scanner and run a Google search on them on the Internet using their keywords.

\* For consumers, they pinpoint scan addresses from food packaging, home electronics instructions manuals, mail-order catalogs or **paper notices** from city hall to make direct contact to the source homepages, thereby simplifying procedures for obtaining historical information on foods and the disposal methods for packaging, direct orders of service parts for home electronics or desired goods and so forth.

6) Who will sell this product?

[Our goal is the sale of “sensor module parts” by semiconductor sensor and optical lens parts manufacturers for global computer OS manufacturers, cell phone and other peripheral device manufacturers.](#)

(Explanation)

Bill Gates, Chairman of the Microsoft Corporation, often remarks at press conferences “new input technologies such as handwriting and voice inputs will stimulate PC demand.”

For a character input system, Microsoft embedded handwriting character recognition software using the mouse (IME Pad) into its core OS in 2000, and began selling a computer (Tablet PC)

with handwriting character and voice recognition embedded using a pen in 2002.

The latest character input technology not announced by Microsoft is our company's technology, which follows the Microsoft concept. [See Appendix 4), 7), 8)] Thus, semiconductor sensor manufacturers should be able to offer the pinpoint scanner module to Microsoft and its affiliates as a new mouse function.

Optical lens parts manufacturers can also offer this camera module as a new function to cell phone manufacturers incorporating digital camera functions. Cell phones using this function can be used as a "mouse & scanner" for cell phones.

- 7) Who would purchase this product? [See Appendix 1), 4)]

**Our target is 1% of Internet users at the start of sales.**

(Explanation)

The annual computer sales volume is over 100 million worldwide. Meanwhile, the number of Internet users for cell phones and computers in Japan is expected to approach 80 million persons for 2005.

Our company's input simplification technology features miniaturization; therefore, we expect our product to spread worldwide as a ubiquitous character & code pinpoint scanner for laptop PC and cell phone users where keyboard inputs are difficult.

- 8) What is the design & manufacturing cost?

**The versatility of existing mass-produced parts greatly reduces costs.**

(Explanation)

The "recognition engine" uses mass-produced processors and commercial recognition software for computers and cell phones, while pinpoint scanner system technology ("Mouse Scan") is already developed. (See 71<sup>st</sup> New Technology Development Foundation Grant 2003)

The new development is the miniaturization and commercialization of the "**sensor module with scanner functions.**" Because mass-produced items are used for the CMOS sensor for digital cameras, etc., newly occurring costs are those for control LSI development incorporating "image process" functions and costs for their optical module parts development costs.

9) What is the sales price of the sensor module?

**From 3,000 yen (\$25.80\*) (low volume sales) to 1,000 yen (\$8.60)(high volume sales)**

*\*US Dollar figures based on December 2006 average.*

(Explanation)

At present, flatbed scanners cost 10,000 yen (\$85.99), handy scanners cost 20,000 yen (\$171.99) while mice cost several thousand yen (less than \$100). Our company's sensor module can approach a parts sales price range for installation to mice thanks to the effect of mass production.

10) Patents

(1) Mouse and Scanner Link

Name of the Invention: Image Scanner and Optical Character Recognition Devices

Using This Image Scanner

US Patent Number: 7,218,780 EP Patent Number: 1,126,404

JP Patent Number: 4,148,441

Taiwan Patent Number: 88,118,643

Name of the Inventor: Mitsuo Nakayama

(2) Digital Camera with Scanner Function

Name of the Invention: Optical Terminal Device, Image Processing Method & System

JP Patent Number: 4,019,063 US Patent Number: 7,477,783

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## Appendix

### 1) Trends in National IT Strategy (Basic IT Law Passed and Enacted January 6, 2001)

(Current) Realization of e-Government & e-Local Government (One-stop Service)

- ➔ e-Document Law enacted (April 2005)
- ➔ Mandatory reception computerization at small hospitals moved to March 2013 (April 2006)
- ➔ Japanese language barrier for foreign researchers (Taken from White Paper on Science & Technology 2006, November 9, 2006, Nikkei Evening Edition)

(Issues) Spread of “**commercial**” input devices [anyone can use, considering our Chinese Character culture](#) (Promoting e-Japan)

### 2) Internet Trends

(Current) Improved rate of visits to Internet shopping sites

- ➔ Address digit count restrictions have virtually been eliminated, and addresses can now be assigned to various electronic devices and items (2001, **IPv6**) (Home Information Electronics Age) The future task will be simplifying inputting of numerical addresses and product codes.
- ➔ Search-linked advertisements, search engine competition (Google, Yahoo, MSN, Goo, NTT).
- ➔ Google is creating e-Data for books at libraries (using the Kirtas Technologies Inc. book scanner).
- ➔ Dual use with **other media** (catalogs, newspapers, magazines, TV) has started. (2006)

(Issues) Development and spread of [Hyper IT technologies](#) supporting dual use with **other media** (printed materials)

### 3) “APT1200” Book Scanner [Kirtas Technologies, Inc. (U.S.)] (2001)

(New Technology) Automatically turns pages one at a time, and takes photos of them using a digital camera at 1,200 pages/hour at 26.5 million yen (\$227,884.45).

### 4) Simplification of Character Inputs to PCs

(Current) **Handwritten character input** and **voice input technologies** realized with Microsoft OS for PCs

- ➔ Commercialization of handwritten character inputs using mouse. (2000, Windows IME Pad)
- ➔ Sale of **Tablet PC** using handwritten character and voice input technologies by using a pen (November 2002)
- ➔ Sale of cell phones with OCR functions installed (November 2002)

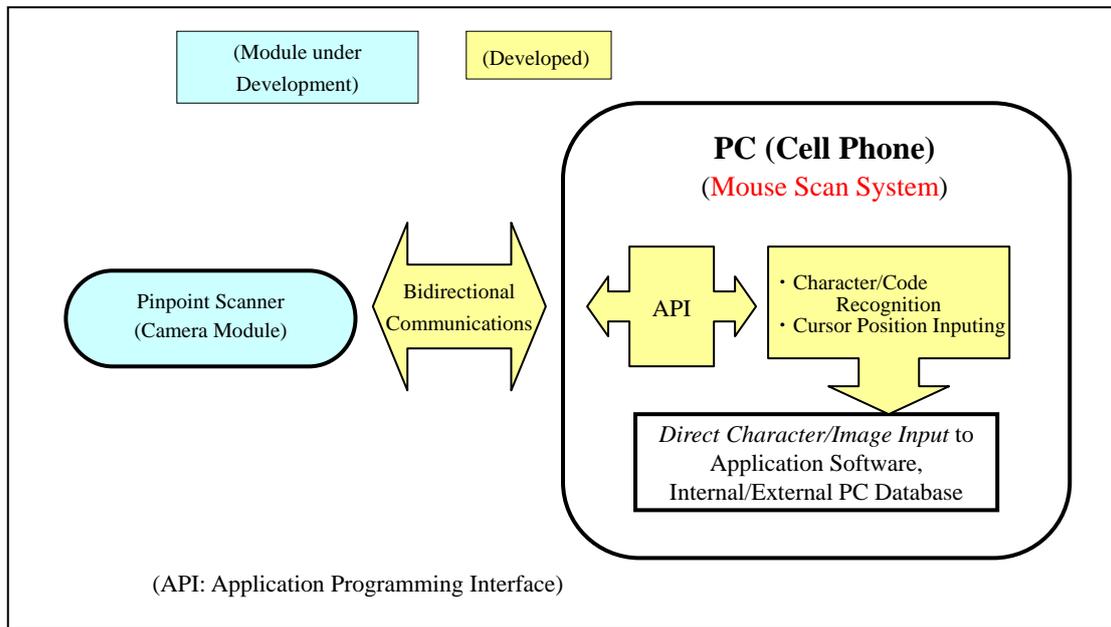
(Issues) [The remaining task is text inputs using the “Pinpoint Scanner!”](#)

(Supporting unreadable character inputs)

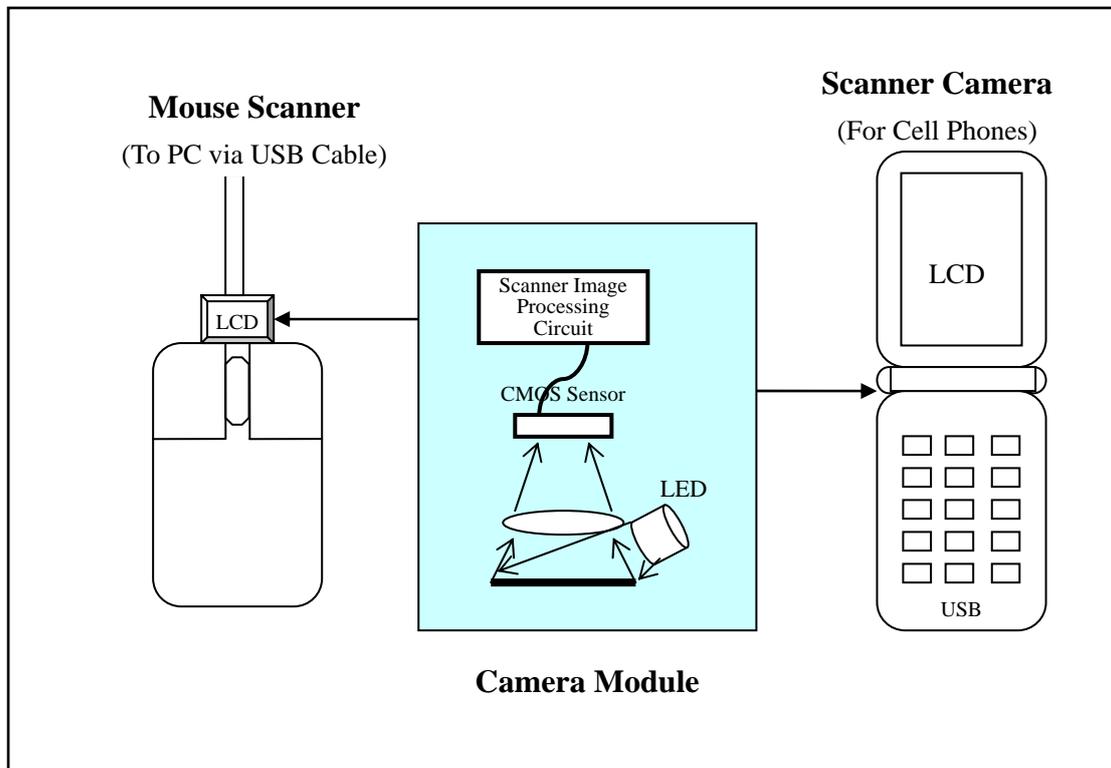
---- Input Technology Comparison ----

	Speed	Operations	Practice	Level of Completion
Keyboard	Standard	Chinese Character Conversion/Correction	Required	Completed
Handwritten Characters	Slow	Characters free of mannerisms	Required	Practical Use
Voice	High Speed	Homophone Correction	Required	Practical Use
Character Recognition	High Speed	Misrecognition Correction	Not Required	Practical Use

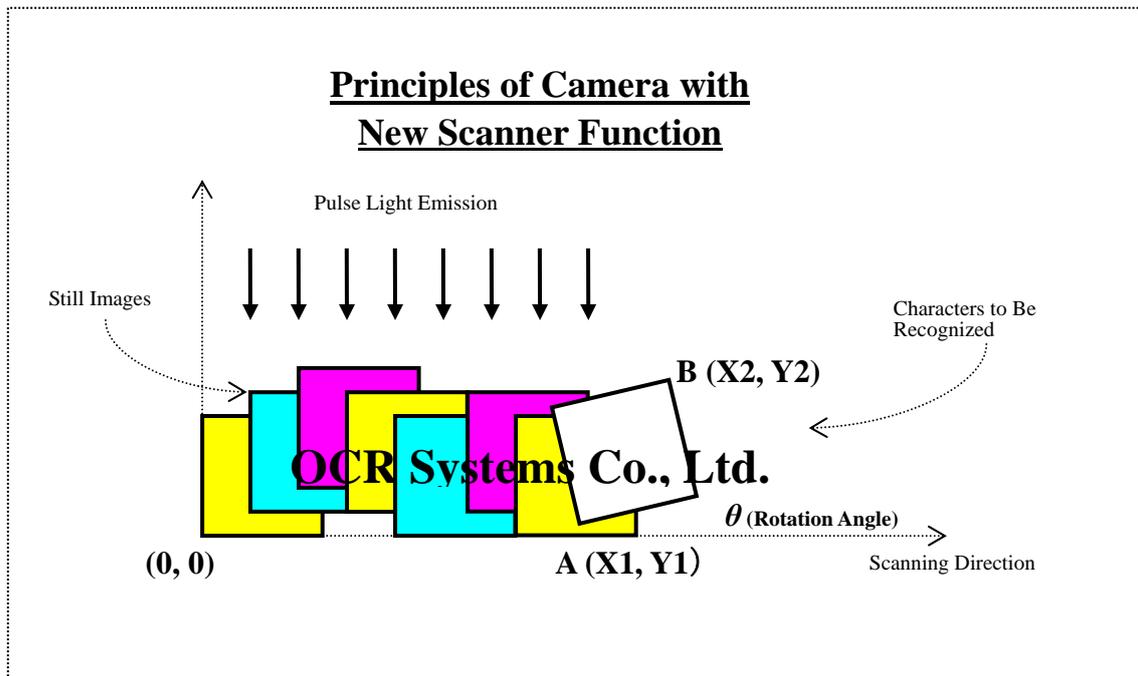
5) – Pinpoint Scanner and Character Recognition System –



6) – Camera Module (For Pinpoint Scanner) –



7) – Principles of New Pinpoint Scanner –



8) Example of Text Inputs of “Printer Graphics” Using Mouse Scanner (OCR System Product)

