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CA 94086 (US). **SHEN, Lixin**; Blk 31, Dover Road #03-111, Singapore 130031 (SG). **LEE, Seng, Luan**; 58 Upper Thomson Road, Singapore 576230 (SG).

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(74) Agent: **SACHITHANANTHAN, Suresan**; c/o Tan Rajah & Cheah, 9 Battery Road, #15-00, Straits Trading Building, Singapore 049910 (SG).

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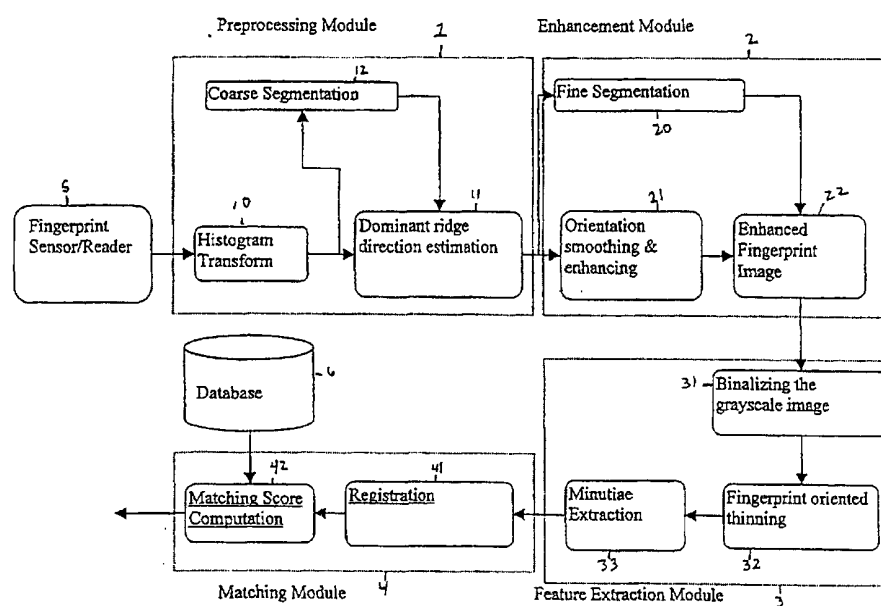
(71) Applicant: **NATIONAL UNIVERSITY OF SINGAPORE** [SG/SG]; 10 Kent Ridge Crescent, Singapore 119260 (SG).

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(72) Inventors: **XIA, Tao**; Blk 1C, Gillman Heights #18-19, Singapore 102001 (SG). **LIU, Bao**; Blk 894B Woodlands Drive 50, #11-39, Singapore 731894 (SG). **THAM, Jo, Yew**; Apartment #1110, 1035 Aster Avenue, Sunnysvale,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM



Flowchart of declared system

(57) Abstract: A method and system for performing automated biological identification. The system including a preprocessing module with a histogram transform for locally and globally enhancing biological data such as fingerprints. An enhancement module with a fast smoothing and enhancement function. A feature extraction module with a fingerprint oriented thinning function. A matching module with a resolution-enhanced Hough transform function for fingerprint registration and matching score function.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/SG 00/00199

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06K9/54 G06K9/62

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 493 621 A (MATSUMURA YOSHIHIDE) 20 February 1996 (1996-02-20) abstract column 13, line 28 - line 59 column 14, line 63 - column 15, line 5 ---	1,4,8,16
A	DE 40 04 948 A (AGFA GEVAERT AG) 22 August 1991 (1991-08-22) column 3, line 65 - column 4, line 63 ---	3
A	US 5 659 626 A (ORT JAMES R ET AL) 19 August 1997 (1997-08-19) abstract ---	1-10
X		16,17
A	GB 1 577 797 A (CALSPAN CORP) 29 October 1980 (1980-10-29) the whole document ---	11-16
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

2 October 2001

Date of mailing of the international search report

31 10 2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Sonius, M

INTERNATIONAL SEARCH REPORT

International Application No

PCT/SG 00/00199

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 119 435 A (BERKIN GEORGE M) 2 June 1992 (1992-06-02) abstract; figures 4,5 ---	11-15
A	ATIQUZZAMAN M: "PIPELINED IMPLEMENTATION OF THE MULTIREOLUTION HOUGH TRANSFORM IN A PYRAMID MULTIPROCESSOR" PATTERN RECOGNITION LETTERS, NORTH-HOLLAND PUBL. AMSTERDAM, NL, vol. 15, no. 9, 1 September 1994 (1994-09-01), pages 841-851, XP000465982 ISSN: 0167-8655 abstract ---	11-15
A	MASASHI MORIMOTO ET AL: "VARIABLE HOUGH TRANSFORM FOR HIGH-RESOLUTION LINE DETECTION" SYSTEMS & COMPUTERS IN JAPAN, SCRIPTA TECHNICA JOURNALS. NEW YORK, US, vol. 24, no. 12, 1 November 1993 (1993-11-01), pages 88-98, XP000447466 ISSN: 0882-1666 abstract -----	11-15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG 00/00199

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

As a result of the prior review under R. 40.2(e) PCT,
no additional fees are to be refunded.

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☒ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10,16-20

Fingerprint processing methods, in which non-trivial features concern different forms of image preprocessing

2. Claims: 11-15

Fingerprint matching systems, with specified matching-processing, in particular the use of the generalised Hough Transform

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/SG 00/00199

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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