Access Control Using Biometrics

PROJECT REPORT

SUBMITTED BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTSFOR

THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE IN

APPLIED SCIENCE-COMPUTER TECHNOLOGY

OF THE BHARATHIAR UNIVERSITY, COIMBATORE

2001-2002

Department of Computer Science and Engineering

KUMARAGURU COLLEGE OF TECHNOLOGY

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Department of computer Science & Engineering

Certificate

This to certify that the project report entitled

Access Control Using Biometrics

Has been submitted by
S.JAYAKUMAR

In partial fulfillment of the requirements for the Award of degree of Master Of Science Applied Sciences (Computer Technology) of the Bharathiar University, Coimbatore-46 during the year 2001-2002.

(Guide) **(Head Of The Department)**

Certified that the candidate was examined by us in the project viva-voce examination held on 25-4-2002& the University Register number is. 0037Q0035

(Internal Examiner) **(External Examiner)**

Landmark Infotech
Systems and Solutions (P) Ltd.

A Landmark Group Company
Bahrain, Cyprus, India, (Hostyle), Kuwait, Lebanon,
Oman, Portugal, Qatar, Saudi Arabia, UAE, UK

CERTIFICATE

This is to certify that the Project work entitled ACCESS CONTROL **USING BIOMETRICS** was carried out by **Mr. S.Jayakumar (Reg. No. 0037Q0035)** from Kumaraguru College of Technology, Bharathiar University, Coimbatore, at **LANDMARK INFOTECH SYSTEM AND SOLUTIONS**, Chennai, in partial fulfillment of the requirements of the Degree of Master of Science in Applied science and Computer Technology, during December 2001- April 2002.

Regards,

Mr. Murali
Manager – Operations

DECLARATION

I hereby declare that this project entitled

Access Control Using Biometrics

is submitted in partial fulfillment of the requirement for the award of the degree of M.Sc Applied Science [Computer Technology] is the report of the original work done by me during the period of study (2001-2002) in

KUMARAGURU COLLEGE OF TECHNOLOGY
CHINNAVEDAMPATTI
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Under the supervision of

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Date : [illegible]

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I give my immense pleasure to express heartfelt thanks to my guide **Mr. Sivan Arun Selvan M.Sc.,MCA.,P.G.D.,P.M.I.R.,MISTE.,M.Phil Lecturer** encouragement and valuable suggestions to make this project a successful one.

I would like to thank my external guide **Mr.M. Saravanan B.E.,, Project Leader** for giving his valuable suggestions to make this project.

Last but not least I extend my heartfelt thanks to all the faculty, friends and well wishers who helped me in completing this project work.

CONTENTS

1. ABSTRACT

The project entitled 'ACCESS CONTROL USING BIOMETRICS' enables the user to act on a particular device on basis of the control level he is admissible. The access control is provided by fingerprint scanning using the BIOMETRICMOUSE. By identifying the individuality of the fingerprints. We can develop an application on any department and the security can be assured to the high percentage.

This Access control is provided on the basis of "What you KNOW" Such as passwords which are based on the concepts of "What you POSSESSES" Such as a card or badge and "what you ARE" Such as Physical characteristic or fingerprint. Individuality is maintained in a high percentage and these fingerprints can be obtained using the BIOMETRIC MOUSE.

2. INTRODUCTION

2.1 ORGANIZATION PROFILE

Landmark Infotech system and solutions (LIFTSS) is a venture promoted by Landmark Group, a 25 year old Multi National, operating more than 170 malls and large retail stores across the globe predominately in the Middle East. Landmark is in tie up with U.S based concern to provide training to IT professionals. Landmark also figured in Connect 2001 exhibition conducted by CII body. Landmark is also having branch in overseas. Landmark is in tie up Alagappa University for its study center in Chennai.

Landmark Info Tech Systems and Solutions (P) Ltd., is a part of the 25 years old Landmark Group, which operates more than 160 large retails stores and malls in various parts of the world and predominantly in the Middle East. Landmark Group has ambitious global expansion plans and is gearing up to be one of the large retail groups in the world.

Landmark Group has been operating a large IT division for the last several years to cater to the in-house IT requirements of the group. The IT division has the active involvement and contribution from several senior operational and executive Heads of the Landmark Group, developed solutions to meet the ever-changing requirements of the industry.

The Landmark's IT division has been spinning off into a separate commercial venture with the concept of application oriented Information technology products and services to care to the requirements of the IT industry at large.

2.2 PROJECT OVERVIEW

2.2.1 BIOMETRICS:

Biometrics means the measurement of a unique biological or behavioral feature of the user to verify identity through automated means. Biometric identification exploits the universally recognized fact that certain biological characteristics are unique and unchanging. For example, speech patterns, DNA, retinal patterns, the topography of the face, and the patterns of friction ridges on an individual's fingertip. A biological characteristic is forever bound to an individual. It can't be lost, forgotten, stolen, borrowed, or otherwise compromised (as with ID cards, passwords, or PINs).

2.2.2 BIOMETRIC ENROLLMENT:

The biometric can be used to verify an identity, the user must be
"Enrolled" in the system. That is, their biometric identifier or template, along
With their user ID, must be entered into the database of authorized users. A
System/security administrator normally performs this function in order to
Protect the integrity of the authentication database.

In a password protected system, the system administrator or system security administrator (SA/SSA) would either allow the user to select or would assign the user ID and password. This entails capturing the raw biometric data, converting it to a biometric identifier or template, and storing it.

For a finger imaging system, one or more fingerprints are scanned one or More times using a finger image scanner device and the resulting digital fingerprint image is used to generate a Fingerprint Model.

2.2.3 MATCHING:

Matching to determine if one biometric sample "matches" another biometric sample, they must be compared using an algorithm. Generally, the result of this comparison is a "score", indicating the degree to which a match exists. This score is then compared to a pre-set threshold to determine whether or not to declare a match. The comparison is performed using the biometric model, as opposed to the raw biometric data that is captured.

2.2.4 VERIFICATION:

Verification is a one-to-one (1:1) matching of a single biometric sample set (biometric identifier record) against another. Generally, the first sample is newly captured and the second is the enrolled identifier on file for a particular subject. The file sample is retrieved from the database based on a unique subject identifier (such as a User ID).

2.2.5 IDENTIFICATION:

Identification is a one-to-many (1:N) matching of a single biometric sample set against a database of samples, with no declared identity required. The single biometric is generally the newly captured sample and the database contains all previously enrolled samples. Scores are generated for each comparison, and an algorithm is used to determine the matching record, if any. Generally, the highest score exceeding the threshold results in a match. In an authentication environment, if a match is found against any of the authorized users, access is granted.

A third type sometimes referred to as 'one-to-few' matching is performed by executing a series of 1:1 matches against a small sample set. In a user authentication environment-using finger imaging technology, the user's finger image identifier is compared to each of the few authorized users within this group. Access is granted if any of the one-to-one matches is positive.

2.2.6 FINGERPRINT MODEL:

A fingerprint consists of a number of minutiaes - special points of the Fingerprint image, where curves end or intersect. An average finger contains About fifty such points. Every point has some individual properties. One of These properties are line direction near a minutia point. A set of minutia points With their properties is called minutia template or Fingerprint Model. Fingerprint processing is based on extracting the Fingerprint Model from the Original fingerprint image. It is necessary to point out that the fingerprint Image itself cannot be reconstructed from the Fingerprint Model.This circumstance assures the required level of safety of the original fingerprint
Image. The fingerprint privacy is not infringed. It is necessary to distinct two types of fingerprint models. Models of the first type are called LEARNED. These models are stored in some way and used as fingers' templates. Models of the second type are called SAMPLE and used for comparison with LEARNED models. Note that models of the same type are NOT comparable!

The first one is obtainment of the fingerprint image. For this step a special Device, such as a fingerprint scanner, is required. Other steps can be executed without any scanner. The second step is Fingerprint Model extraction. Often Fingerprint Model is stored in the Fingerprint Models database. The last step is fingerprint matching. The target Fingerprint Model is compared with source models from the database. If the match has occurred, a corresponding decision is taken.

3. SYSTEM SPECIFICATION

3.1 SYSTEM CONFIGURATION

3.1.1 HARDWARE SPECIFICATION

Processor	:	Intel Pentium III
Memory	:	64 MB
Mouse	:	Biometric Mouse
Terminal	:	14"SVGA color Monitor
Hard Disk	:	20 GB
Floppy Drive	:	1.44MB

3.1.2 SOFTWARE SPECIFICATION

Operating System	:	Windows 98
Front End	:	Visual C++ 6.0
Back End	:	Oracle 8*i*

3.2 ABOUT THE SOFTWARE

3.2.1 VISUAL C++

The Microsoft Visual C++ IDE (Integrated Development Environment) allows users to create, Open, View, Edit, Save, Compile and Debug C and C++ applications. As an integral part of the Microsoft Development Studio, the C,C++ environment operates as a cohesive component with the entire Microsoft family of languages, including Visual basic and Visual J++. The advantage of this language development suite is the ease of learning and use provided by such a cohesive set of development features and tools.

In windows programming using API, A detailed review of Win32 and the Visual C++ components are made. We can get a fair idea on the usage of the predefined controls and creation of customized controls with the aid of API functions .A detailed insight is provided on GDI and Multiple document interface (MDI) applications

In MFC library, we are introduced to the MFC application framework and the documentation-view architecture. The MFC library wraps SDK structures; functions and techniques inside the framework, hiding much of repetitive work windows programmers have had to deal with in the past.

Using windows programs have become much more complex and takes longer duration for application development .The Microsoft Foundation Library provides a robust set of C++ classes that hide much of the complexity of windows programming behind an impressive, high level application frame work.

Win32 programming is otherwise called as software Development Kid Programming. Where as in MFC library includes MFC structures, functions, core objects and techniques. It includes windows common controls, resources such as icons, cursors, bitmaps, menus and few more. In MFC, we have advanced concepts like non-pre-emptive multitasking with processes and threads features of OLE and automation using OLE, DLLs and linking help files for use with MFC applications. ODBC related and Application wizards are also present.

3.2.2 BENEFITS OF THE SOFTWARE

The benefit of Software Environment is that the package developed in this environment can be easily installed. We can connect to any backend like Oracle, MsAccess, and retrieve the data in Front-end using the ADO.

We can build ODBC project using the appWizard.we can use OLE containers and OLE server concepts. Implementation of the server application is done using OLE (object linking and embedding).

ORACLE 8i :-

Oracle Corporation is the world's leading supplier of software for information management, and the world' second largest software company.

Oracle is best suited to develop relational databases and client/server applications. It is especially suitable to store large databases. Oracle 8 is the first object-capable database developed by Oracle. Oracle 8i, the database for Internet computing, provides advanced tools to manage all types of data in web sites.

FEATURES OF ORACLE 8i :

- Partitioning
- IFS
- Parallel Server
- Advanced Security
- Jserver
- Oracle InterMedia
- Advanced Integration
- Multi threaded Server
- Objects and Extensibility

The Internet File System (*i*FS) combines the power of Oracle 8i with the ease of a file system. It allows users to move all of their data into the Oracle 8i database, where it can be stored and managed more efficiently.

Oracle 8i *inter*Media allow users to web-enable their multi-media data - including image, text, audio and video data. Oracle 8i includes a robust, integrated, and scalable Java Virtual Machine within the server (Jserver), thus supporting Java in all tiers of applications. This eliminates of necessity of recompiling or modifying Java code when it is to be developed on a different tier.

With the newly introduced resource management, the DBA can choose the best method to fit an application's profile and workload. The extended features of parallel server and networking improve ease of system administration. The extended functionality of advanced replication results in better performance and improves security.

Oracle 8i provides full, native integration with Microsoft Transaction Server (MTS) in the Windows NT environment. Application development is simplified by the Oracle Application Wizard (AppWizard) for Visual Studio, which provides developers with a GUI tool for creating a Visual C++, Visual Interdev, or Visual Basic applications accessing data in an Oracle database.

ODBC

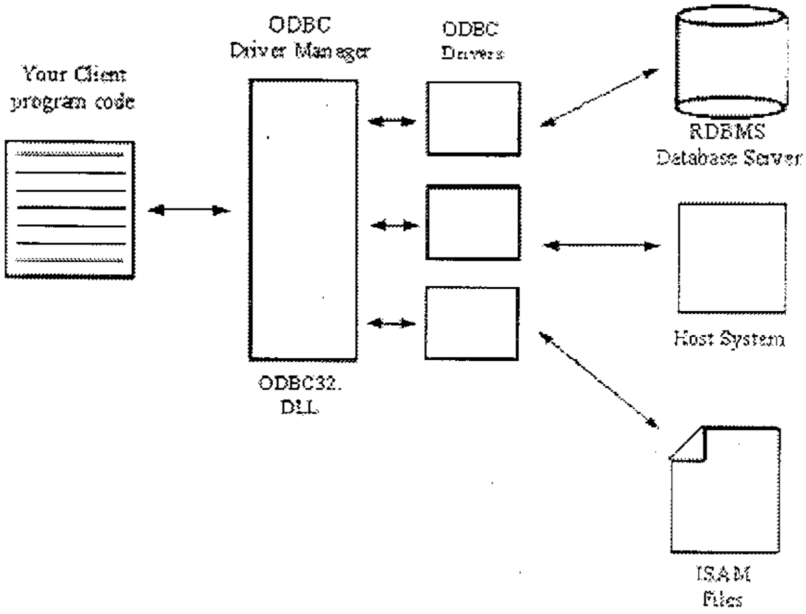
Abbreviation of Open Database Connectivity, a standard database access method developed by Microsoft Corporation. The goal of ODBC is to make it possible to access any data from any application, regardless of which database management system (DBMS) is handling the data. ODBC manages this by inserting a middle layer, called a database driver, between an application and the DBMS. The purpose of this layer is to translate the application's data queries into commands that the DBMS understands. For this to work, both the application and the DBMS must be ODBC-compliant -- that is, the application must be capable of issuing ODBC commands and the DBMS must be capable of responding to them.

ODBC

ODBC was created in the late '80s and early '90s to provide a uniform interface for writing client software for relational databases. ODBC provides a single API for client applications to work with different databases. Applications that use the ODBC API can communicate with any relational database for which there is an ODBC driver.

Compared to other database interfaces, the ODBC API could be classified as a low-level database interface. The ODBC API enables client applications to configure and control the database at a relatively low level.

Figure illustrates the architecture of ODBC.



Figure

The ODBC architecture

ODBC was designed to provide an interface to relational databases. ODBC has become quite popular and is generally accepted as a standard for interfacing with relational database systems.

ODBC is limited to relational databases. Because of the relational nature of ODBC, it's difficult to use ODBC to communicate with nonrelational data sources, such as object databases, network directory services, email stores, and so on.

ODBC provides the ODBC Driver Manager (ODBC32.DLL), an import library (ODBC32.LIB), and ODBC header files for the ODBC API. Client applications link with the import library to use the functions exposed by the ODBC Driver Manager. At runtime, the ODBC Driver Manager calls functions in the ODBC drivers (which are also DLLs) to perform operations on the databases, as shown in Figure.

ODBC does not provide an embedded SQL interface. With embedded SQL, the SQL code is embedded in the application program source code. A precompiler transforms the SQL code at build time into native function calls that call the database's runtime library.

ODBC provides a call-level interface (CLI). A CLI is a special kind of database API. A CLI, like a typical API, provides functions for client applications to call. However, in a CLI, the SQL code in the client application is not precompiled. Rather, the API provides functions that enable the application to send the SQL code to the database at runtime. The SQL code is interpreted at runtime.

ODBC is a nontrivial topic. You will explore the architecture of ODBC (and write some ODBC code) , "Legacy Database APIs."

MFC ODBC Classes

ODBC was created to provide a uniform interface to relational databases. However, the ODBC API isn't necessarily simple.

In Visual C++, MFC provides classes that simplify the ODBC API. The MFC ODBC classes make ODBC programming much less complex. "Choosing the Right Database Technology," in Listing

The MFC ODBC classes are easier to use than the ODBC API but do not give you the low-level control that the ODBC API offers. Therefore, the MFC ODBC classes could be classified as a high-level database interface. "The ODBC API and the MFC ODBC Classes."

4 SYSTEM STUDY

4.1 EXISTING SYSTEM

The existing system used is that no security is given to the access of hardware devices such as floppydrive, cdrom etc., any user is either given the priority or neglected but by this software we can give the priority based on the designation he holds. We can give cdrom access to the admin where as we can neglect the right to the employee. Such designation-based rights are given by this software. But no such practice is followed now. By now we can totally discard the wire connecting the cdrom or other devices where no user can use the devices.

4.2 PROPOSED SYSTEM

The system proposed is that we can give the access to the user based on the designation he holds. As said earlier one user may get the access of the hardware where as the other may not. This system provide the security not only to the hardware devices but also to the drivers where which the important information may be. These are the priority set up and functions of the proposed system.

5. SYSTEM DESIGN AND DEVELOPMENT

5.1 DATABASE DESIGN

The strength of a system always depends on how the tables are designed. To design efficient and more flexible tables, all tables should be normalized properly. Normalization is the process, which reduces the Data Redundancy, Data integrity and ultimately provides with a more efficient and flexible structure. Table design for the Access Control Using Biometrics is shown below:

Table Name : Administrative Table
Description : Stores the user id and Password for the End user.
Primary Key : user id

Field Name	**Type**	**Size**	**Description**
User _id	Varchar	10	A unique id that is given to a user.
Password	Varchar	7	A unique password is given to user.

Table Name: Administrative rights

Description : Stores the Administrative Password.

Field Name	**Type**	**Size**	**Description**
Password	Varchar	7	**A unique password given to a admin**

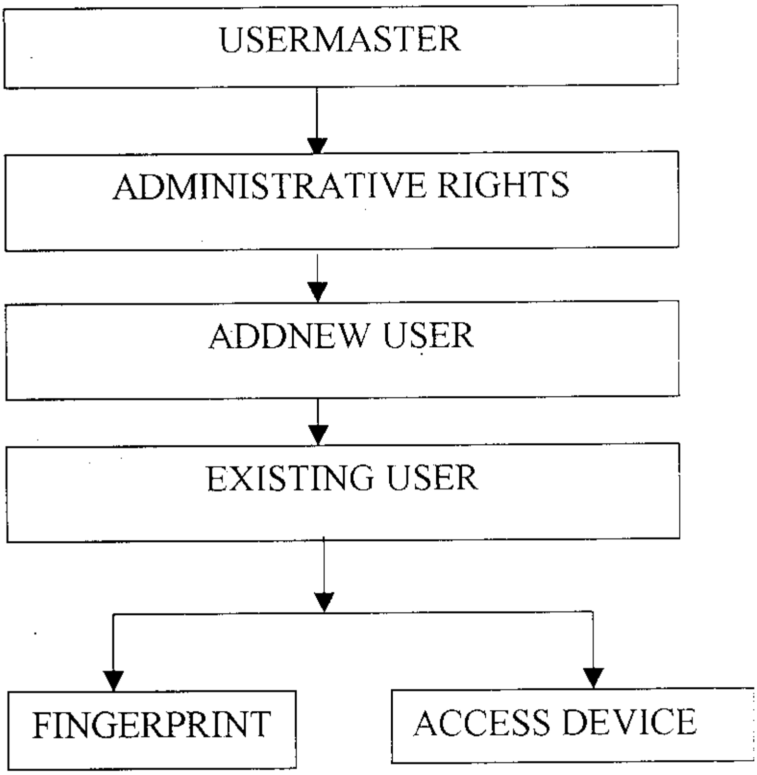
Table Name : User Master

Description : Stores the new user details.

Primary Key : user id

Field Name	Type	Size	Description
User-id	Varchar	10	A unique user-id given to a user
Password	Varchar	7	A unique password given to a user
Name	Varchar	15	Name of the user
Sex	Varchar	1	Sex of the user
Dept	Varchar	10	Department of the user
Desg	Varchar	10	Designation of the user
Project	Varchar	10	Project of the user
Rights	Varchar	10	Rights given to a user

5.2 HIERARCHICAL FLOW DIAGRAM

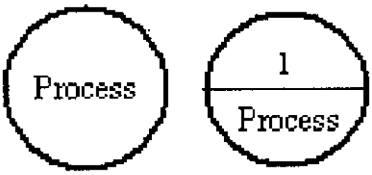


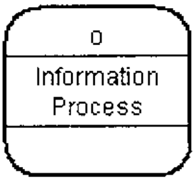
5.3 DATAFLOW DIAGRAM

Data flow diagrams illustrate how data is processed by a system in terms of inputs and outputs

PROCESS:

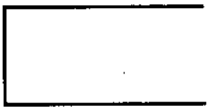
A process transforms incoming data flow into outgoing data flow.





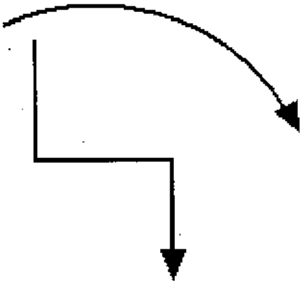
DATASTORE:

Data stores are repositories of data in the system. They are sometimes also referred to as files.



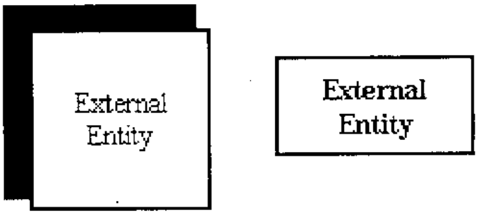
DATAFLOW:

Data flows are pipelines through which packets of information flow. Label the arrows with the name of the data that moves through it.

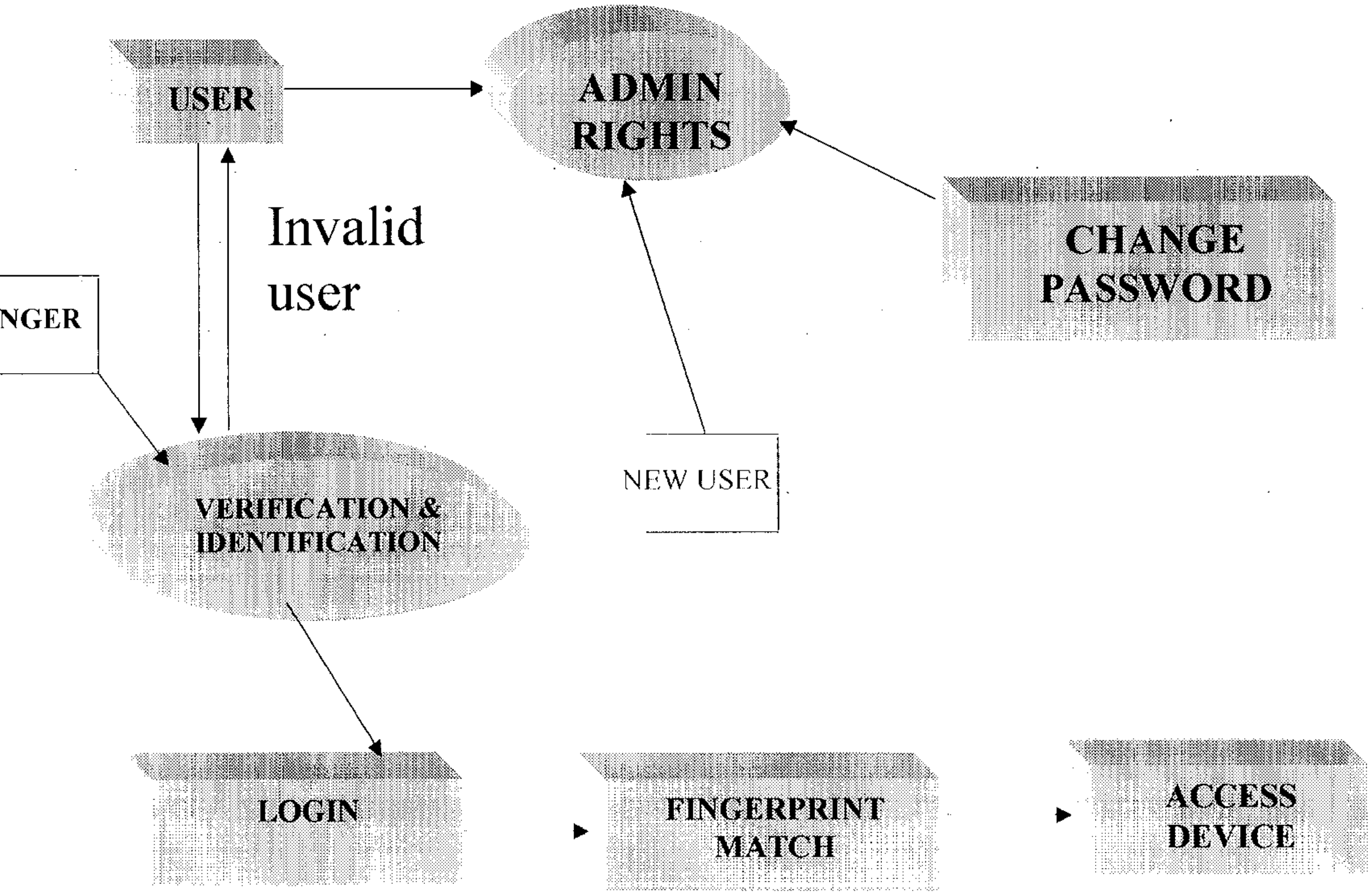


EXTERNALENTITY:

External entities are objects outside the system, with which the system communicates. External entities are sources and destinations of the system's inputs and outputs.



DATAFLOW DIAGRAM



5.4 FUNCTIONS USED

FP_OK	A function has been successfully completed. This Value can correspond to the special meaning, which is Explained in Return Value section of the function
FP_ERROR	This value indicates an error. It is usually caused by an Illegal parameter value in function call or some other Violation of call conditions.
FP_LOWMEMORY	A function call failed because available memory was Too low.
FP_SYSTEM_RESOURCES	This value specifies a fatal error, which shows that There are no system resources (e.g. system timer Handler) available.
FP_DRIVER_NOT_INSTALLED	The U-Match BioLink Mouse device driver has not Been installed.
FP_DEVICE_NOT_CONNECTED	The U-Match BioLink Mouse has not been attached to The computer.
FP_DEVICE_ERROR	This value represents a group of device errors. Either Scanner driver has incorrect version number or some Input/output (I/O) operation failed.

FP_DEVICE_BUSY	The device is busy because the previous I/O request Has not been completed yet.
FP_EMPTYFRAME	No finger was detected on the scanner touch surface.
FP_NOTMATCH	Compared Fingerprint Models do not match.
FP_USER_BREAK	Current fingerprint model obtain operation was Interrupted by user.
FP_LOW_QUALITY	This value indicates that fingerprints don't meet quality Requirements.
FP_INVALID_PARAMETER	This value indicates invalid function argument(s).

5.5 INPUT DESIGN

Input design process is to design the various inputs needed into a machine-oriented format. The main objective is to create an input layout that is to follow and to avoid operator errors.

The objectives of the input design is to:

- Produce output in neat form
- Get high level of accuracy

Input Data:

The goal of designing input data is to make data entry as easy, logical and free from errors. While entering the data, we should know aware of the Following,

- The allocated space for each field
- Field sequence, which must match that in the source document
- The format in which data fields are entered

Input Media and Devices used in this project:

Using biometric mouse, fingerprints are scanned and stored in the database and user master generates the details about the new user.

The system administrator allow the user to select or assign the user ID and password to capture biometric data.

5.6 OUTPUT DESIGN

The objective of any information system is the generation of reports. The output provides direct source of information to the user and so it is the most important in the system design phase. They also provide a permanent hardcopy of results.

The standards for printed output suggest the following,

- The message will display if the correct user login.
- The user name and fingerprint will display.
- The access specified to correct user (cdrom, floppy drive).
- Specify the procedure for providing the accuracy of output data.

6. SOFTWARE IMPLEMENTATION AND TESTING

The developer shall perform software implementation and unit testing in accordance with the following requirements.

The term "software" includes both computer programs and computer databases. The term "implementation" means converting software design into computer programs and computer databases. If a CSCI is developed in multiple builds, software implementation and unit testing of that CSCI will not be completed until the final build. Software implementation and unit testing in each build should be interpreted to include those units, or parts of units, needed to meet the CSCI requirements to be implemented in that build.

6.1 Software implementation.

The developer shall develop and record software corresponding to each software unit in the CSCI design. This activity shall include, as applicable, coding computer instructions and data definitions, building databases, populating databases and other data files with data values, and other activities needed to implement the design. For deliverable software, the developer shall obtain acquirer approval to use any programming language not specified in the contract.

Software units in the design may or may not have a one-to-one relationship with the code and data entities (routines, procedures, databases, data files, etc.) that implement them or with the computer files containing those entities.

6.2 Preparing for unit testing.

The developer shall establish test cases (in terms of inputs, expected results, and evaluation criteria), test procedures, and test data for testing the software corresponding to each software unit. The test cases shall cover all aspects of the unit's detailed design. The developer shall record this information in the appropriate software development files.

6.3 Performing unit testing.

The developer shall test the software corresponding to each software unit. The testing shall be in accordance with the unit test cases and procedures.

6.4 Revision and retesting.

The developer shall make all necessary revisions to the software, perform all necessary retesting, and update the software development files and other software products as needed, based on the results of unit testing.

6.5 Analyzing and recording unit test results.

The developer shall analyze the results of unit testing and shall record the test and analysis results in appropriate software development files.

7.CONCLUSION AND SCOPE FOR FUTURE ENHANCEMENTS

7. 1 CONCLUSION

The “Access Control Using Biometrics“ has been developed to meet almost all the requirements of the Landmark Infotech system and solutions. The entire system is event driven which is useful when worked by native users.

The system has been developed in **VISUAL C++ 6.0.**The system is more helpful and advantages over the existing manual system. Since data are proceeded much faster and reports in the required format are quit easily obtained.

Any system may also have its own drawbacks and can be modified further to incorporate the required changes.

7.1 SCOPE FOR FUTURE ENHANCEMENTS

The main objective of this project is to find user fingerprint and give rights to access devices. The fingerprint, which is already stored in the database, is compared to the fingerprint given by us. Now, the fingerprint is identified by using right thumb further, we can modify to access any finger. The existing system used is that no security is given to the access of hardware devices. The system proposed is that we can give access to the user, based on the designation he holds.

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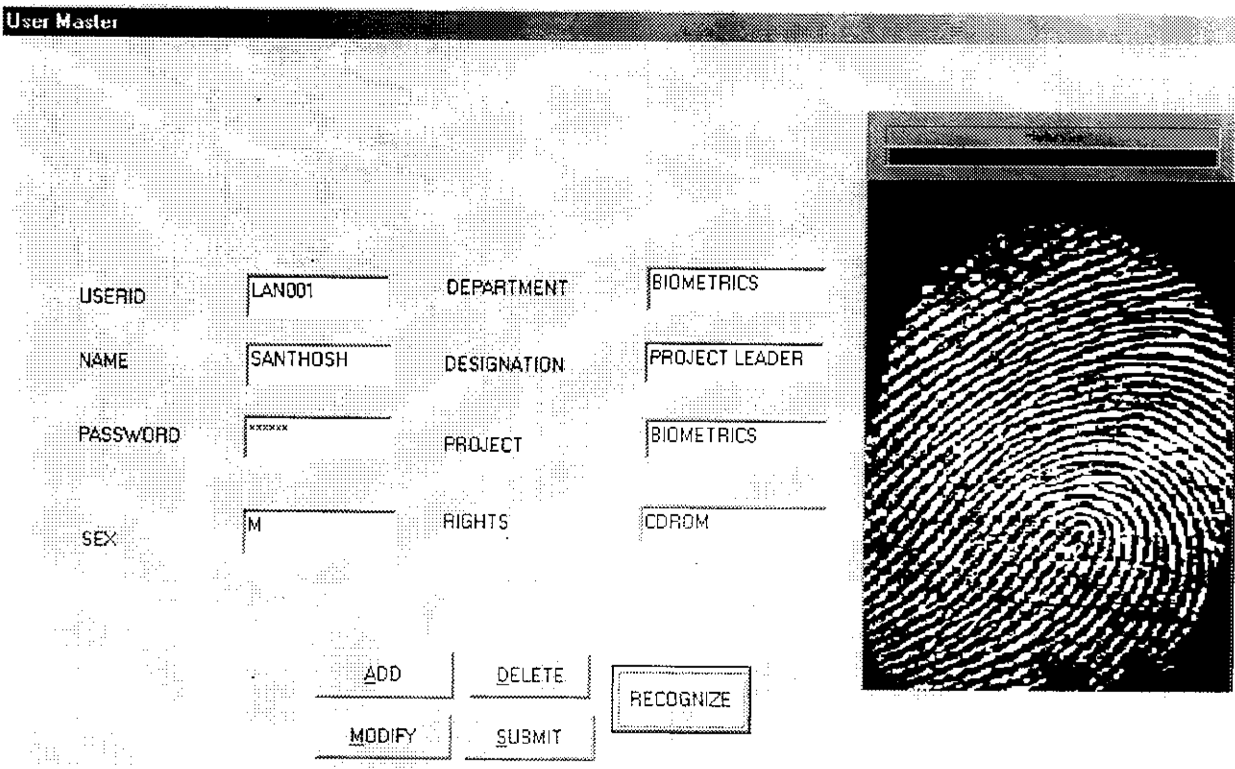
SYSTEM ANALYSIS AND DESIGN

-By Stanley Christopher

WEBSITE:

www.biolinkusa.com
www.biometrics.com

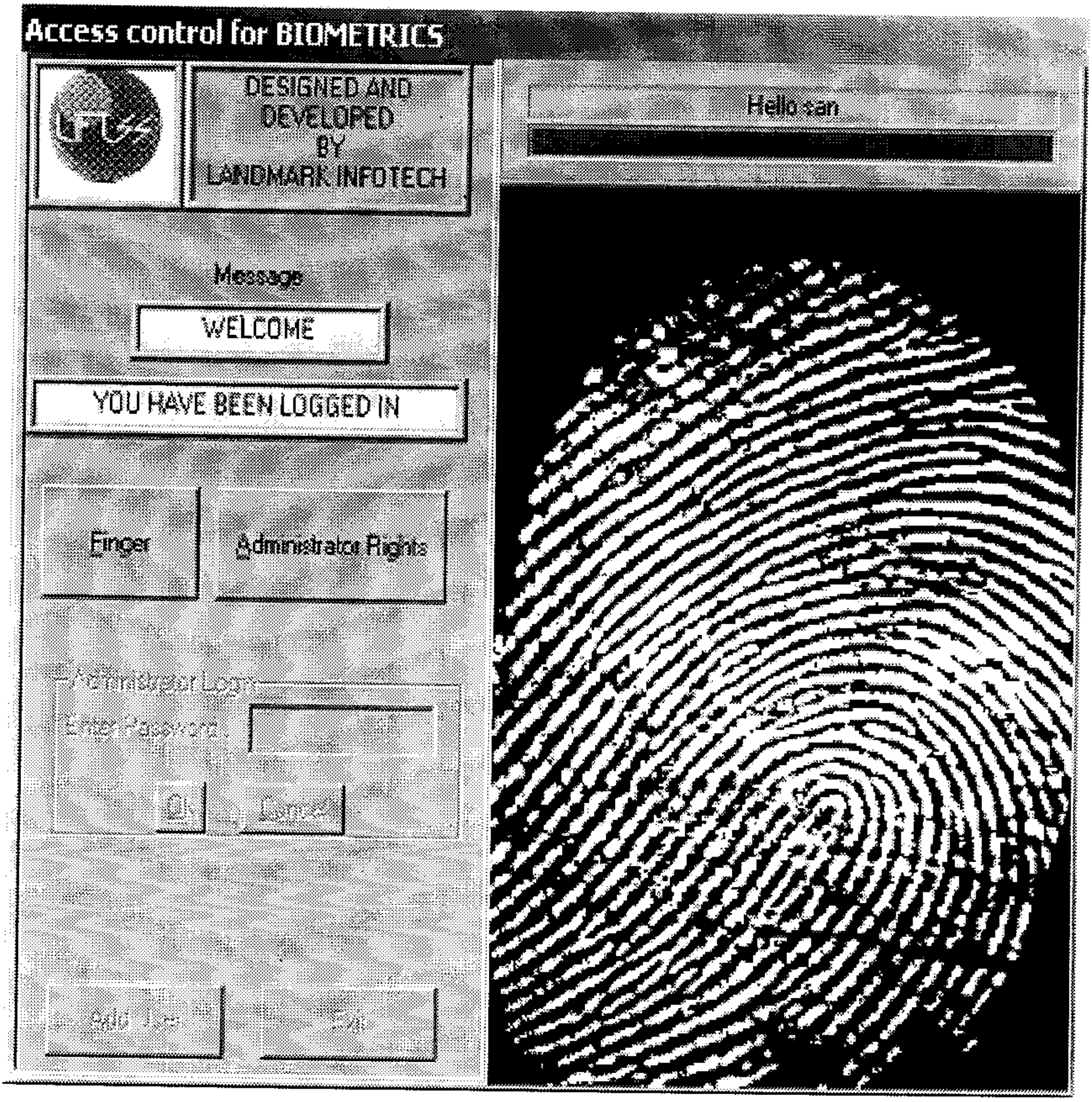
SAMPLE SCREEEN FOR USERMASTER



User Master

USERID	LAN001	DEPARTMENT	BIOMETRICS
NAME	SANTHOSH	DESIGNATION	PROJECT LEADER
PASSWORD	******	PROJECT	BIOMETRICS
SEX	M	RIGHTS	CDROM

FINGER PRINT MATCHING



Access control for BIOMETRICS

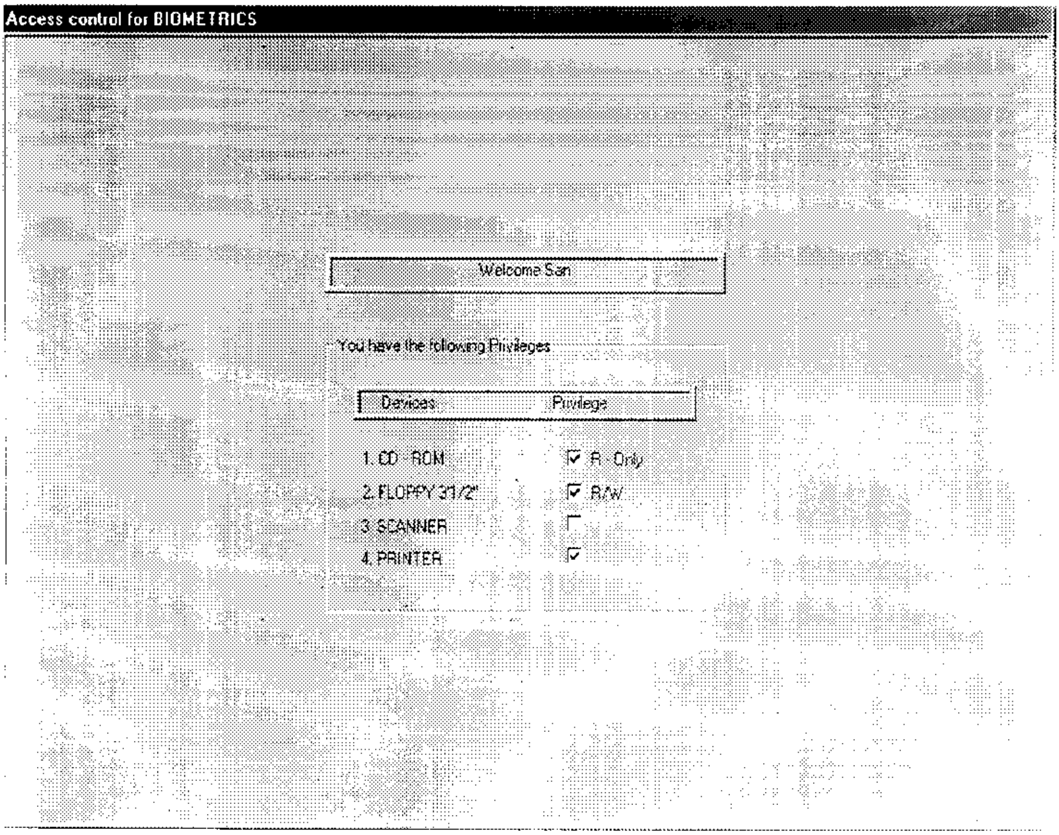
DESIGNED AND DEVELOPED BY LANDMARK INFOTECH

Message

WELCOME

YOU HAVE BEEN LOGGED IN

Hello san

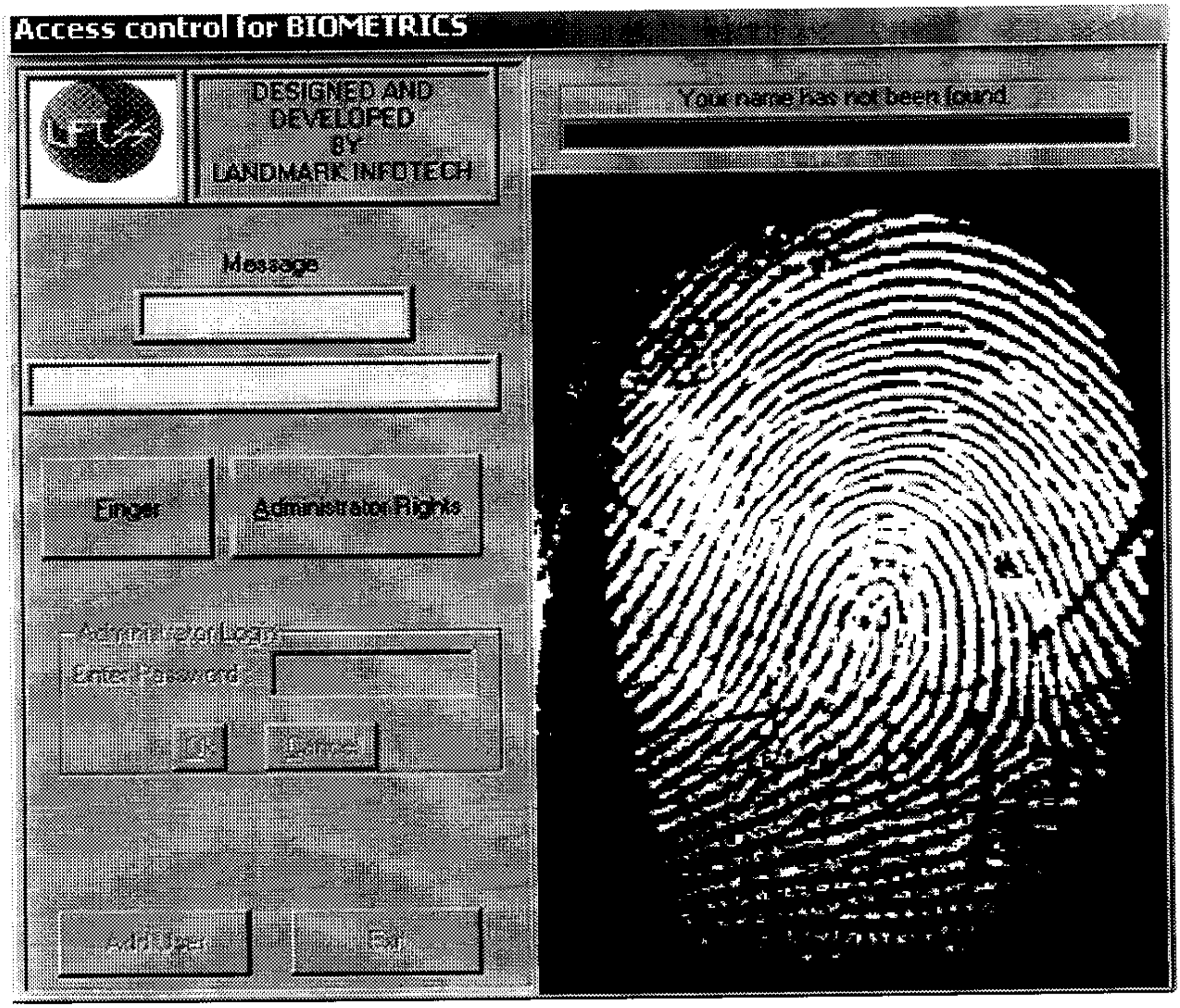


Access control for BIOMETRICS

Welcome San

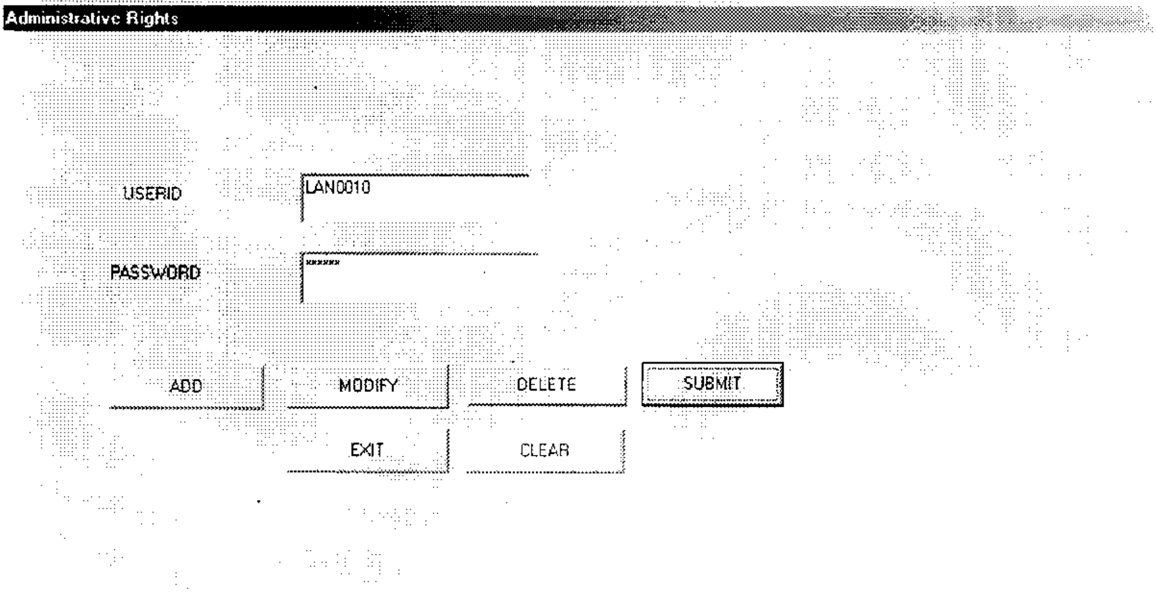
You have the following Privileges

Devices	Privilege
1. CD - ROM	☑ R - Only
2. FLOPPY 3 1/2"	☑ R/W
3. SCANNER	□
4. PRINTER	☑



Your name has not been found

ADMINISTRATIVE RIGHTS SCREEN



USERID LAN0010

PASSWORD ******