Automatic Input System of Passengers Information

Gul-Won Bang, Yong-Ho Kim

Abstract Background/Objectives: ***When a passenger wants to travel on a ship, passengers record their personal information on the boarding card provided by the traveling agency before boarding the passenger ship submitting them to the boarding manager and suggesting their IDs as a part of boarding procedures and confirmation. This boarding method to the passenger ship was based on the contents of the boarding card submitted by the boarding passengers. This was how the boarding passenger information was communicated to the passenger companies and related organizations. When passengers board on a ship, their basic information is extracted and entered from their identification card comparing with the biometric fingerprint in the extracted passenger information. If the same passenger is identified, boarding is permitted while establishing the extracted boarding information. Boarding person information is regarded as an automatic input device automatically notified to the server and related institutions.***

Methods/Statistical analysis: ***A finger printer is established to acquire biometric fingerprint information of a passenger and double-sided scanner in order to acquire personal information of a passenger indicated on the upper and lower sides of an ID card. With this, it becomes feasible to insert a body in the size of a cell phone and an ID of a passenger. At the same time, it extracts the personal information obtained from a boarding person, separately stores and compares the fingerprint information among the personal information of the boarding person with the biometric fingerprint of them through the biometric finger printer, and determines whether the ID of a boarding person. At the same time, communication module is provided transmitting the personal information of a passenger to the management server of the related company or the boarding agency when the ID of a relevant passenger same is identified by performing through the fingerprint.***

Findings: ***We have carried out an experiment by entering the fingerprints of 100 men and women with the resident registration card. As a result, most of them were identified, but when the damage of the resident registration card was severe, there were cases answering how he/she was not the same applicant even though they were. Therefore, the badly damaged resident registration card had to be reissued. In addition, when the resident card was issued, the recognition rate decreased when the fingerprint image was wrong***

Improvements/Applications: ***In order to solve a problem occurring when entering passenger information on a ship, it is feasible to automatically extract and input the basic personal information of the passenger through the ID card. Afterwards, it compares the fingerprint information obtained through the ID card with the biometric fingerprint, while automatically storing and notifying to relevant authorities for the convenience of input and management of the information of a boarding person. When installed at all the ports of ships, it is feasible for a passenger to board only with their ID cards without preparing for boarding card, and the related agencies are able to receive the information of a passenger on a real-time basis.***

Keywords: ***Passenger, ID-card, Double-sided scanner, Fingerprint, Authorization, Identification.***

I. INTRODUCTION

If a passenger wants to travel on a ship, the passenger needs to record their personal information on the boarding card provided by the passenger company before boarding on a ship and submits it to the boarding manager. This conventional method of boarding on a passenger ship is based on the contents described in the boarding card submitted by passengers, and the boarding passenger information is transmitted and informed to the passenger company and related organizations. The contents of such a conventional passenger boarding information entered, stored, and notified to related authorities can only be relied on the boarding card that the boarding passenger has prepared and submitted. Therefore, if personal information was entered by a passengers by mistake causing accidents, there were many difficulties in identifying the boarding passengers in case of accidental registration. In order to solve such problems occurring when entering passenger information, the fundamental information of the passenger is automatically extracted and entered through the ID card. Afterwards, the fingerprint information obtained through the ID card is compared with the biometric fingerprint to identify the correct passenger information. This way, it serves as a system to automatically enter and manage passenger information by allowing automatic storage and notification to related organizations.

II. MATERIALS AND METHODS

2.1 Letter recognition

The character recognition device is composed of a photoelectric conversion device, a recognition processing device, a storage device, and an output device. The photoelectric conversion device converts the ground surface to a voltage waveform, and the image of the two-dimensional shape of the ground surface is converted into a one-dimensional signal.

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This is a time-series change of the voltage waveform by a scan method such as TV. The storage device save an operation control program for controlling the recognition processing device and data representing the recognized shape in a specific form[1].

The recognition processing apparatus inputs and processes an unknown part through a photoelectric conversion apparatus under the control of a program on a storage device comparing the unknown pattern with a standard pattern in the same storage device. The output device conveys the recognized information to the other information processing device for convenient delivery[2].

As for recognizing devices, there are optical character readers (OCRs) that recognize both handwriting and handwriting, tablets that can recognize handwriting, Optical Mark Reader (OMR) that can recognize special characters), barcode, and a magnetic ink character reader (MICR). Since the recognition by OCR is important for the reliability of the identified result, there is a limit on the input to secure the recognition information. There are OCR-A and OCR-B in the standard shape of OCR. OCR-A type was used at the beginning, but OCR-B type is currently used because it is not easy to read humans[3].

There are a number of problems in recognition because it is difficult to define the shape strictly with mechanical dimensions unlike handwriting. It is currently being reviewed as to whether it is possible to clearly distinguish specific lines that constitute general indices, whether it is easy to use them, and whether it is in natural shape of writing. In addition, the size and shape of the registration column are restricted at the same time to stabilize the size and shape of the handwriting. Conventional recognition methods can be largely divided into pattern matching and structure analysis. The former is used mainly for recognition of style, while the latter is used mainly for recognition of handwriting. There are feature matching methods and stroke analysis methods as intermediate recognition methods of both, and they are used in accordance with each use purpose or purpose. They are recognized as the next generation entering devices with Image Recognition System and Voice Recognition [1].

2.2 Fingerprint Recognition

Fingerprints are maintained in the same shape throughout the life after people are born. Even when they are damaged by external factors, they are reproduced in a conventional form. Therefore, the probability of having the same kind of fingerprints as other people is only one billionth. Fingerprint recognition technology refers to a technology that uses the characteristics of a fingerprint to electronically read a user's finger and compare the fingerprint with previously input data to identify the user and their identity[4].

Typically, there is a semiconductor method called optics and silicon chips. Optical is the most widely used method where strong light is projected onto a platen to reflect the fingerprint of the fingertip placed on the platen followed by the image of the reflected fingerprint passing through the high-refractive index lens and entering to the CCD (a device made to be able to do so). The semiconductors method uses biochemical features to read the specific shape of the fingerprint attached to the surface of the chip by electric signals when touching the fingertip directly to the surface of the silicon chip using the electric conduction characteristic of the skin [2].

Figure 1 represents biometric fingerprint and advantage/specialties.

Figure 1. Biometric fingerprint and advantages/ specialties

2.3 Method for extracting and processing information of a boarding person

The character recognition system recognizes characters received through input devices such as a scanner, camera, facsimile, and electronic pen through the relevant process in a recognition system followed by identifying the recognized results in a character or voice through an output device such as a printer or a speaker. In the character recognition system, the character pattern input to the sensor is extracted from the pre-processor by removing unnecessary or modified data, inputting them to the feature extractor to extract the feature, and entering them to the classifier to make a decision. As a result, 100% judgment can be made by utilizing the knowledge compared to how only 70% is available on human being. In this manner, the recognition result determined through the classifier is entered to the post-processor in the recognition system releasing the final result as an output [6].

The first step of the fingerprint recognition device is a fingerprint image acquisition device verifying the contact of a living body and acquiring a digital fingerprint image information. At this time, information related to the actual fingerprint may be lost or information related to the fingerprint may be included due to various biological characteristics such as dry finger, dry finger, eczema, and pollutants. In addition, since the sensor of the fingerprint image acquisition device introduced so far releases an output in a specific physical change in analog value according to the measurement principle, the fingerprint image used in the next step processing generally utilizes 8 bit gray level image [7].

The passenger information input device has a double-sided scanner for acquiring personal information of passengers on both upper and lower

sides of an ID card inserted into the ID port on the side of the main body making it feasible to insert identification information of the passenger in a portable size. A biometric fingerprint reader is mounted on the side of the main body to acquire biometric fingerprint information. Personal information of the boarding passenger obtained by the duplex scanner is extracted and stored in the storage section of the microcomputer[8].

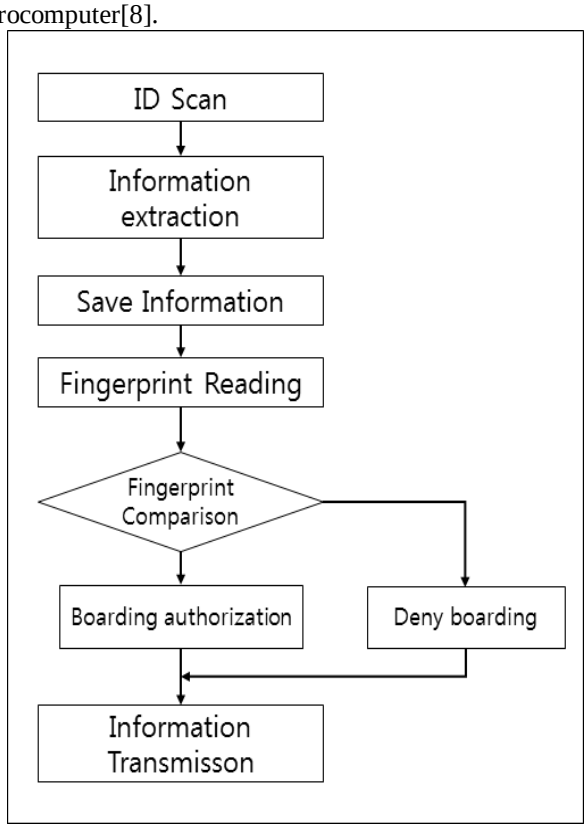

Figure2. Boarding person information deriving process procedures

The microcomputer includes an algorithm for comparing the biometric fingerprint of the passenger obtained through the biometric fingerprint reader with the fingerprint information among the personal information of the passenger to determine whether the biometric fingerprint verifies the relevant and identical person. In addition, a communication module is established for transmitting the personal information of the passenger stored in the passenger information storage unit to the management server of the shipbuilding company or a predetermined organization through the control of the microcomputer when the identity of the fingerprint is determined by the fingerprint comparison determination algorithm. Automatic entry system of information of a boarding person is comprised of the ID scanning stage on double-sided scanner. This is where personal information of a boarding person is recorded. At the same time, the system also includes personal information extracting stage for automatically extraction of information through Mycom that is internally installed with address, name, resident registration number, and finger print information relevant to personal information of a boarding person among information acquired by scanning ID card of a boarding person. Furthermore, boarding person information saving stage conducted by saving boarding person's information on the storage unit in Mycom is included. Biometric fingerprint acquiring stage is also included through the fingerprint reader equipped in the main body. Another stage for identifying is included to see whether it is the same person by comparing biometric fingerprint entered on biometric fingerprint reader among personal information saved by extracting from ID card. Boarding confirmation stage for allowing to board is also included if the ID of a boarding person is confirmed by comparing saved fingerprint information and biometric fingerprint information or not allowing to board in vice versa. Lastly, boarding person information notifying stage is included for wirelessly transmitting personal information of a boarding person permitted for boarding to the management server of the ship company or control organizations. Figure 2 indicates boarding person information extracting process ocedures. Figure 3 indicates automatic boarding person information entering structure[9][10].

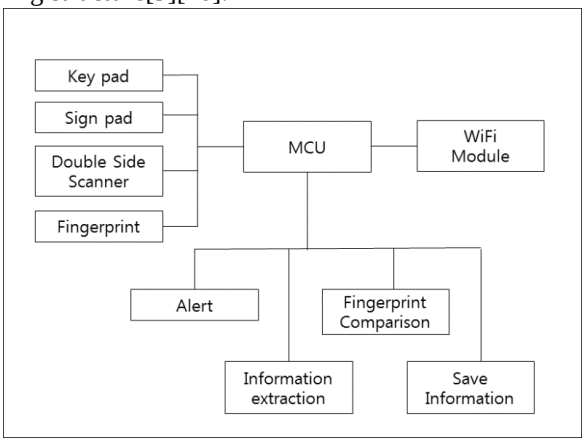

Figure 3. Automatic boarding person information entering device

III. RESULTS AND DISCUSSION

When the resident registration card is inserted, the system simultaneously scans both the front and back images of the inserted ID card and saves the image as a BMP file. After extracting and storing the characters in the stored front image, it asks user to enter the fingerprint. When the fingerprint is entered through the device, the fingerprint image is compared with the one on the back of the identification card. In this case, since the fingerprint of the resident registration card is obtained by rotating the finger when recording the fingerprint, the area is narrowly set from the center point of the fingerprint of the resident registration card and the biometric fingerprint.

Experiments were carried out using the autopilot information input device shown in Figure4. For the experiment, 100 fingerprints from men and women with ID cards were entered and tested. As a result, most of them were identified, but when the damage of the resident registration card was severe, the ID of an applicant could not be verified. Therefore, the badly damaged resident registration card had to be reissued. At the same time, the recognition rate decreased when the fingerprint image was

wrong at the moment of issuing the resident registration card. The recognition rate of characters was 99%. The performance of the passenger information input system has been verified through experiments such as identity verification experiment and character extraction.

Figure 4 Automatic boarding person information input device

IV. CONCLUSION

The automatic boarding person information input system is relatively small in size and simple in configuration. Therefore, it is easy to carry and convenient to use anywhere. Especially, it is possible to relieve the inconvenience for having passengers write boarding pass by hand and to improve the convenience of the passengers' traveling.

In addition, it is possible to accurately check the ID based on the personal information described in the ID card of the boarding passenger. After directly comparing the fingerprint displayed on the ID card with the biometrics fingerprint to accurately determine the ID of an applicant, it becomes feasible to prevent illegal boarding attempts to board with another person's ID card.

When using the automatic boarding person information system, the passenger information is notified to the related agencies as the way they are. Therefore, it is more convenient to identify the exact person in an emergency and to check the ID of the passenger in case of an accident. The automatic passenger information input device is relatively small in size and simple in configuration according to the present invention configured as described above.

Therefore, it is convenient to use anywhere. Especially, this will relieve the inconvenience for having passengers write boarding pass and improve the convenience of the passenger. In addition, according to the present invention, it is possible to accurately check the ID based on the personal information described in the ID card of the boarding passenger. After directly comparing the fingerprint displayed on the ID card with the biometric fingerprint to accurately determine the ID of an applicant, it becomes feasible to prevent illegal boarding attempted by falsifying ID of criminals or other person.

Further, when using the automatic boarding person information input device according to the present invention, the information of the boarding person is notified to the related organization as the way they are. Therefore, it is more convenient to identify the exact person in an emergency and to check the identity of the boarding person in case of an accident.

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