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DEVELOPMENT OF A BIOMETRIC VERIFICATION SYSTEM TO ENSURE THE SAFETY OF AIRPORT PASSENGERS

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The purpose of the work is to develop a verification system that allows to identify traveler using their real fingerprint. To model the system use case diagram, activity diagram, logical database model and wiring diagram were used. R305 Optical Fingerprint Scanner Sensor Module, Arduino IDE, Esp32-camera, Ethernet shield HR911105A, Esp32-wifi, VisualBasic.NET, XAMPP, .NET framework MySQL were employed. The developed system allows to check the validity of a passport, and also offers other opportunities - data storage, searching and disseminating reliable information about travelers.

Introduction

The world is rapidly moving towards automation, and people have less time to deal with any work with a huge amount of data and information, so automation is a simple way to deal with any device or machine that will work according to our desire.

Clearly, that designing a passport that protects against current and future attacks represents today a significant challenge for national printers and public authorities. The true identity of a person can accurately be verified using biometric system. Biometrics is an automated method of recognizing a person based on a biological or behavioral characteristic. In [1] fingerprint verification methods and technologies are described. The focus of this work is on the use of fingerprints for personal authentication. In [2] a brief review of the literature related to biometric authentication and an example of developing simple verification system are reviewed.

The goal of the research is to develop a verification system that allows to identify traveler using their real fingerprint.

It must be implemented three main stages: enrollment, storage, and comparison. During the enrollment stage fingerprint of the real user is read using the fingerprint

sensor. Then sensor generates a fingerprint's template and puts it in to device memory along with the corresponding ID. During the storage stage the additional information about the user (such as Name, Surname, etc.) is entered and stored in a centralized database. During the comparison stage the sensor compares the fingerprint of a real traveler with templates from the sensor database. If a match is found, the system provides information about the traveler. Otherwise, the system will issue an appropriate message.

1. System modeling

For the verification system, two actors must be defined to ensure its operation: administrator and user. Authorization of each user carried out by entering a login and password.

The following functionality must be implemented for the system administrator:

- login to Database Server Account;
- access to custom application;
- performing connection between database and hardware of the system through the custom application;
- getting fingerprint ID for traveler to check status by viewing passport details;
- adding, editing, modifying, deleting traveler passport data;
- adding a new system user with User Permissions.

The following functionality must be implemented for the system user:

- login to Database Server Account with custom permission;
- access to custom application;
- performing connection between database and system hardware through the custom application;
- checking traveler status by getting fingerprint ID and viewing passport details;
- adding new traveler information.

Database model, represented on the figure 1, shows the logical structure of the verification system database, including the relationships and types that determine how data can be stored and accessed.

As a *hardware* of the verification system R305 Optical Fingerprint Scanner Sensor Module [3], Arduino IDE, Esp32-camera, Ethernet shield HR911105A, Esp32-wifi module [4] were selected. Figure 2 shows the block scheme of hardware equipment.

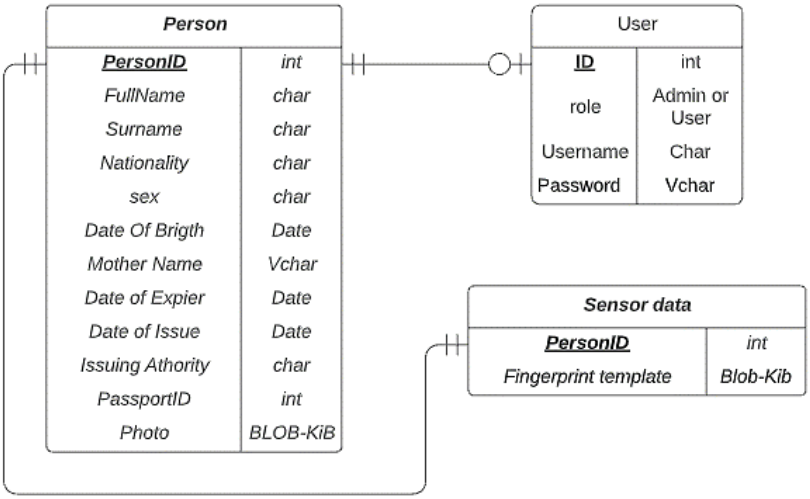

Figure 1 – Logical Database Model

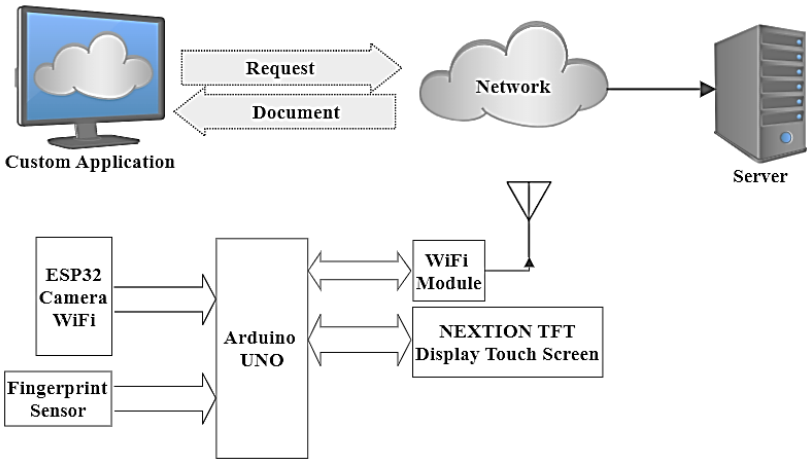

Figure 2 - Block scheme of hardware equipment

Figure 3 shows the *user interface sketch* of the custom application.

2. Implementation

For programming implementation VisualBasic.NET, XAMPP, .NET framework MySQL are used.

The following main *functionalities* have been implemented in the custom application:

- connection with Database and Hardware of the system;
- traveler identification;
- adding and modifying Database.

To initialize these functions, the corresponding buttons located in the left area of the application window are used.

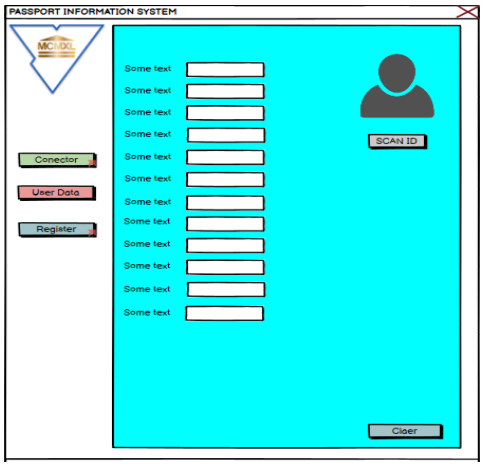

Figure 3 – UI design

Conclusion

This paper presented the development of the verification system that allows to identify traveler using their real fingerprint. To model the system use case diagram, activity diagram, logical database model and wiring diagram were used. R305 Optical Fingerprint Scanner Sensor Module, Arduino IDE, Esp32-camera, Ethernet shield HR911105A, Esp32-wifi, VisualBasic.NET, XAMPP, .NET framework MySQL were employed.

The developed system allows to check the validity of a passport, and also offers other opportunities - data storage, searching and disseminating reliable information about travelers.

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УДК 655.1

О ПРИМЕНИМОСТИ АЙТРЕКЕРОВ ПОТРЕБИТЕЛЬСКОГО СЕГМЕНТА В ИССЛЕДОВАТЕЛЬСКИХ ЗАДАЧАХ

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An analysis of the use of oculography-based effectiveness assessment of the human-machine interaction with modern oculographic devices (eye-trackers) of the consumer segment is presented. An overview of using such eye trackers to map the hit points of the user's gaze in usability research tasks is given, considering the issues of their performance and limitations.

При взаимодействии с современным аппаратным и программным обеспечением зрение часто играет роль основного, а в ряде случаев и единственного канала восприятия информации. Изображение, формируемое на сетчатке светом, проходящим через зрачок, хрусталик и стекловидное тело, обрабатывается и распознается мозгом с помощью 24 базовых стереотипов – геометрических пиктограмм или геонов, из которых строятся все остальные объекты [1]. При этом четкое и детализированное зрение, обеспечиваемое центральной частью сетчатки, известной как макула или желтое пятно, охватывает крайне небольшую площадь, но него отводится половина процессов обработки информации зрительной коры головного мозга. При этом четкое и детализированное зрение, обеспечиваемое центральной частью сетчатки, охватывает крайне небольшую площадь, но на него приходится половина процессов обработки информации зрительной коры головного мозга. Соответственно, детализированная информация получается с помощью зрительной выборки и сканирования [2].

Окулографическое исследование подразумевает анализ движения взгляда и зон визуальной фокализации, на которых концентрируется взгляд. Его примене-