THE STRUCTURE OF AUTHENTICATION SYSTEM BASED ON FINGERPRINT

Otaboyeva Munisa Ollabergan qizi
Master's degree student of Urgench branch of Tashkent University of Information Technologies named after Muhammad al-Khwarazmi
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Abstract. *This study aims to design and develop an automated student attendance system based on fingerprint recognition that will be hassle-free management of records in student attendance for conducting the classes.*
Keywords: *hassle-free management, attendance system, time-consuming, biometric.*

Introduction.

The modern world is the revolutionary time of Information and Computer Technology. Most of the works in daily life depends on computer applications. The traditional student attendance includes all the hassles of roll calling and the very time-consuming of the students and teachers for conducting the classes in an institute. This time-consumed process is very boring for the students and teachers. Thus, a new and innovative approach is required to handle this issue. It motivates us to design a reliable system for student attendance. The biometric authentication systems are widely utilized for the unique identification of people, like students, especially for the verification and identification of individuals. Also, the use of biometric features in the student attendance management system is a secure approach. A biometric system could be either an identification system or a verification (authentication) system. Several biometric features are used in user authentication systems. These include DNA sequence (chemical biometric), ear (visual biometric), eyes (iris or retina recognition) , face recognition (visual biometric), fingerprint recognition (visual biometric), gait (behavioral biometric), signature recognition (visual/behavioral biometric), speech and speaker recognition (auditory biometric). Designing a trustworthy student attendance system based on face detection and recognition is considered the faster and optimal way to manage the records for students' attendance in institutes. Furthermore, any business organization or educational institution has to maintain the attendance of students or employees for effective functioning of business records.

Main Part.

The structure of authentication system consists of these parts.

User Interface:

Student registration form, filled by student itself under control of tutor guardian.

Faculty registration filled by Head of the respective department.

Through college level management all employees of college, i.e. management staff and heads of the departments get registered.

There is a single admin who can control all the activities related to attendance.

Some lesser manipulation authority will be given to management.

Functionality:

- Administrator-

Admin needs to login using specific id and password to perform activities.

Can view the attendance of all management staff.

Can view the attendance of all the HODs and Faculties of distinct departments.

Can view the overall attendance of students of each department with distinction based on semester.

Also analyze individual attendance of any person.

- Employee-

To mark his/her daily attendance will select College then Department then Name and will submit it.

If Employee is management staff then he or she can select their details in college level filtering system.

After submission of details system will ask to put impression of thumb.

Just after successful match of thumb, a photo of respective faculty will be captured and stored.

System will be designed in a way that apart from a permanent photo, database will maintain the collection last 7 recent photos of each faculty so that in case of false attendance security enhancement can be achieved.

If 3 consecutive false attendance is marked then, system will block that faculty and management can only unblock that faculty.

- Students-

Student simply will select their details by selecting college then department then semester then enrollment number and submit the details.

System will ask to put thumb impression on the device.

Student will mark their attendance by putting thumb impression and its successful match.

2. INPUTS

Inputs are divided in two categories-

1. Pre-Inputs
2. Post -Inputs

Pre-Inputs are all the details that are used at the time of registration of the person and person can be an employee or any student. Post Inputs are used at the time of thumb impression recognition for match and attendance marking.

Basic Pre-Inputs are:

1. Name
2. Address
3. Designation
4. College
5. Branch
6. Semester
7. Id
8. Permanent thumb impression binary image file
9. Permanent photograph
10. Temporary Image

Basic Post Inputs are:

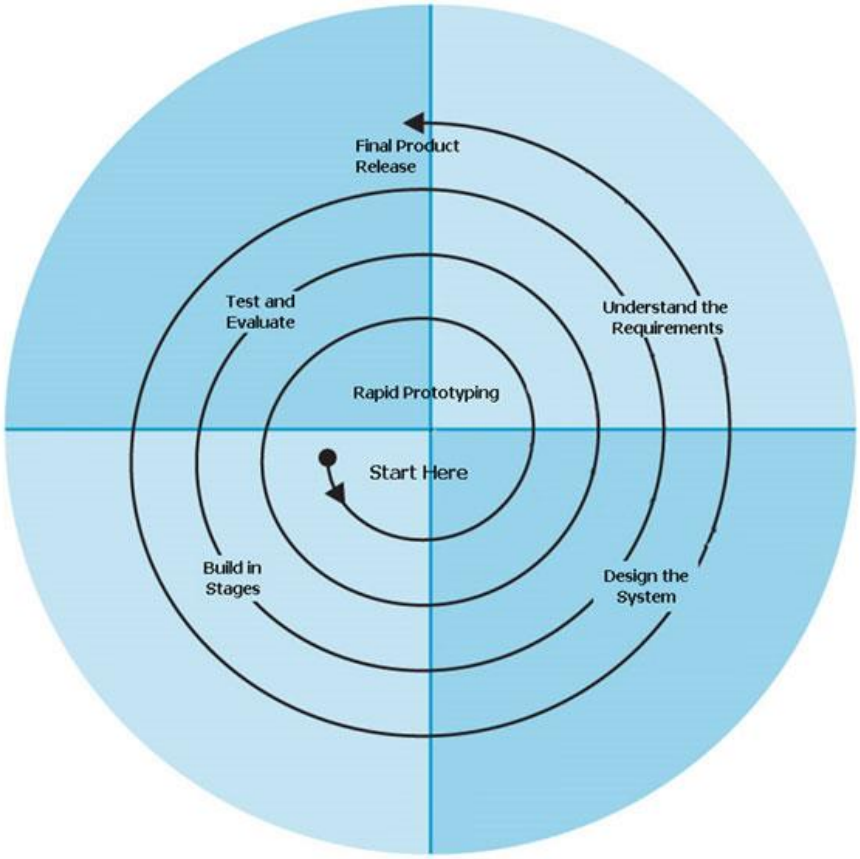
1. Thumb Impression
2. Captured temporary photograph
3. OUTPUTS

According to pre-Inputs we have set data of all the persons which will further used for match and attendance.

According to post inputs we have following 3 outputs-

1. Marked Attendance.
2. Unmarked Attendance.
3. Blocked status of the person if multiple false attempt are made.
4. SYSTEM DESIGN

PROPOSED MODEL



The Spiral Model

The Spiral Life Cycle Model is a type of iterative software development model which is generally implemented in high-risk projects. It was first proposed by Boehm. In this system development method, we combine the features of both, waterfall model and prototype model. In Spiral model we can arrange all the activities in the form of a spiral.

Each loop in a spiral represents a development phase (and we can have any number of loops according to the project). Each loop has four sections or quadrants:

1. To determine the objectives, alternatives and constraints. We try to understand the product objectives, alternatives in design and constraints imposed because of cost, technology, schedule, etc.

2. Risk analysis and evaluation of alternatives. Here we try to find which other approaches can be implemented in order to fulfill the identified constraints. Operational and technical issues are addressed here. Risk mitigation is in focus in this phase. And evaluation of all these factors determines future action.

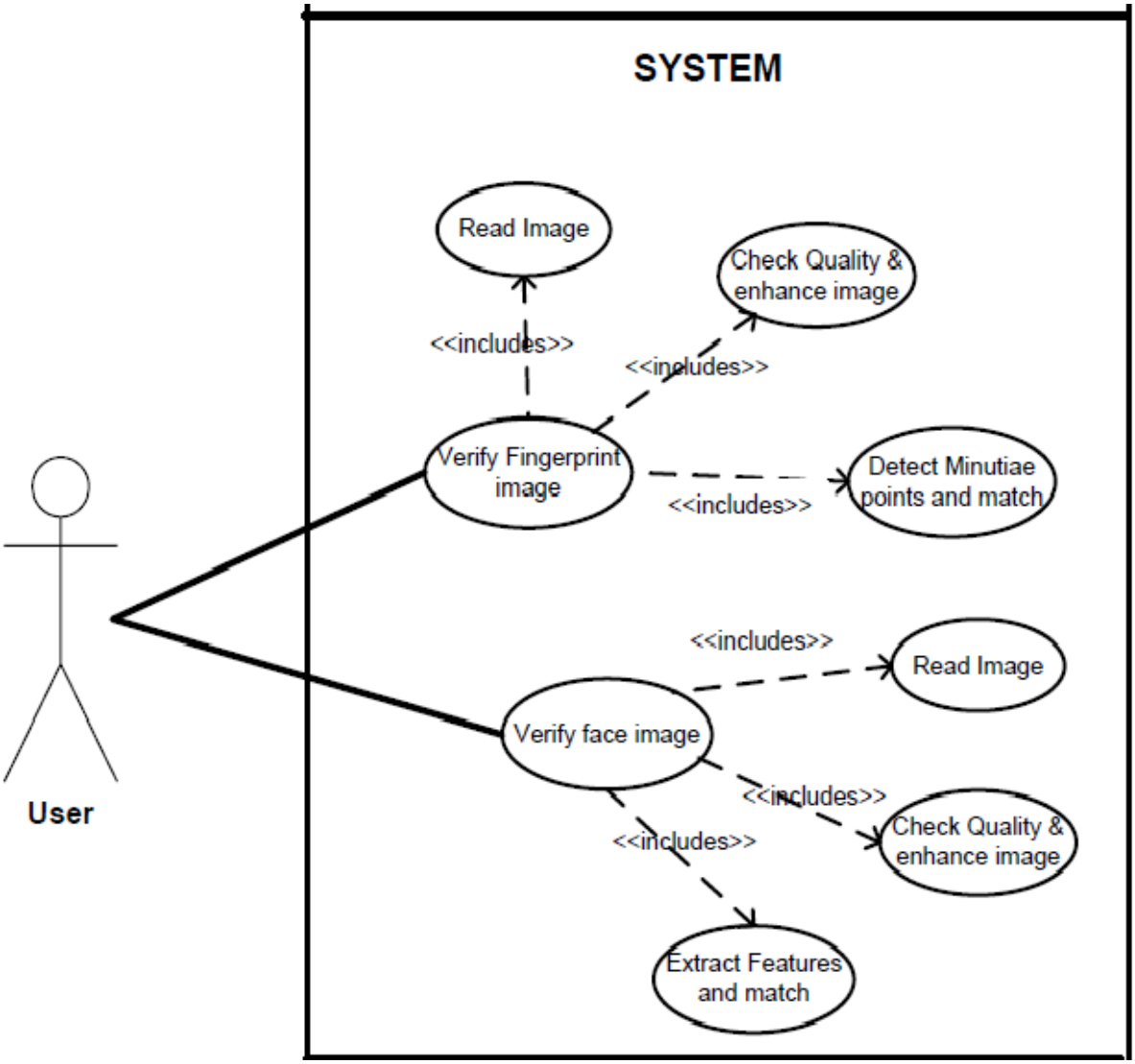
3. Execution of that phase of development. In this phase we develop the planned product. Testing is also done. In order to do development, waterfall or incremental approach can be implemented.

4. Planning the next phase. Here we review the progress and judge it considering all parameters. Issues which need to be resolved are identified in this phase and necessary steps are taken.

Subsequent loops of spiral model involve similar phases. Analysis and engineering efforts are applied in this model. Large, expensive or complicated projects use this type of life cycle. If at any point of time one feels the risk involved in the project is a lot more than anticipated, one can abort it. Reviews at different phases can be done by an in-house person or by an external client.

In our project the review works have been done by calculating the positive and negative aspects of existing systems and evaluating our software on the basis of the same.

USE-CASE DIAGRAM



Conclusion.

The reliability of any automatic fingerprint system strongly relies on the precision obtained in the minutia extraction process. A number of factors are detrimental to the correct location of minutia. Among them, poor image quality is the most serious one. In this project, we have combined many methods to build a minutia extractor and a minutia matcher. The following

concepts have been used- segmentation using Morphological operations, minutia marking by specially considering the triple branch counting, minutia unification by decomposing a branch into three terminations and matching in the unified x-y coordinate system after a 2-step transformation in order to increase the precision of the minutia localization process and elimination of spurious minutia with higher accuracy. The proposed alignment-based elastic matching algorithm is capable of finding the correspondences between minutiae without resorting to exhaustive research.

There is a scope of further improvement in terms of efficiency and accuracy which can be achieved by improving the hardware to capture the image or by improving the image enhancement techniques. So that the input image to the thinning stage could be made better which could improve the future stages and the final outcome.

Also, by using the proposed software we would be able to avoid prevent multiple people from using the same identity, a more convenient and accurate method to ensure one's identity. At the same time, we would be able to maintain, access or fetch the records more easily.

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