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Advanced E-Voting System Using Finger Vein Sensor

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ABSTRACT

Voting is one of our Fundamental rights by which the government is established. Electronic voting is better than ballot voting system, but there is also some security breach, so to avoid that biometric authentication is used in this system. Finger vein authentication is used for voting in this system using SVM classifier which is better than finger print. 2 IR sensors and a stepper motor are used to allow a single person inside the voting room. This system will provide a better security and authentication in voting.

Keywords: Biometric, Finger Vein and SVM.

1. INTRODUCTION

Current Voting System is vulnerable because of its insecurity, but this project will increase the security level in the voting center and to avoid false voting, by which our Democracy can be maintained.

2. CHALLENGES IN EXISTING SYSTEM

There are two types of system is currently being used, they are
1. Ballot System
2. Electronic voting

In Ballot System, the candidates' names are printed in a sheet and voters will mark the candidates using seal over the candidate photo, and they will be drooped into the polling box. After one month it would be opened and counted and the won candidate will be announced. Within that one month it is vulnerable by some politicians. There is also a huge a delay, due manual counting of votes.

In Electronic Voting System, the voters are making their votes by button system, it also have some drawback that anyone make other votes. To avoid all these problems biometric authentication voting System is being introduced.

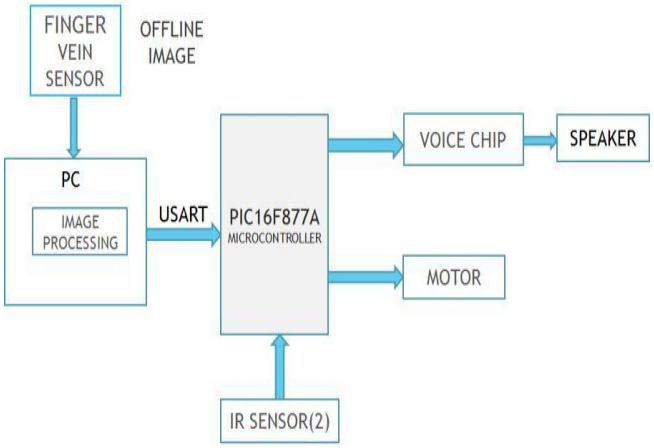

Fig.1. Block diagram of Proposed System

3. PROPOSED SYSTEM

The Proposed System would be having a biometric authentication sensor i.e. Finger vein Scanner which would capture the vein pattern of the voters and it would be compared with the valid voters list already stored in the database. Using MATLAB the two templates (voters vein pattern and already stores database image) are checked whether they are matched. SVM classifier is being used in MATLAB for matching. If that two templates are matched means, the vote made by them is accepted, otherwise their vote will not be considered.

Two IR sensors and a Stepper Motor will be used in the voting room to make only one person entry into the voting room.

4. COMPONENT DESCRIPTION

1) Finger Vein Scanner: This is the device used for capturing the vein pattern from the voter. Fingerprint biometric data is get using an optical sensor by total reflection using visible light. Finger vein biometric data is scanned by infra-red illumination and reflection by direct view using near infra-red light. Finger vein data is lying below the skin and is a highly effective anti-spoofing technology.

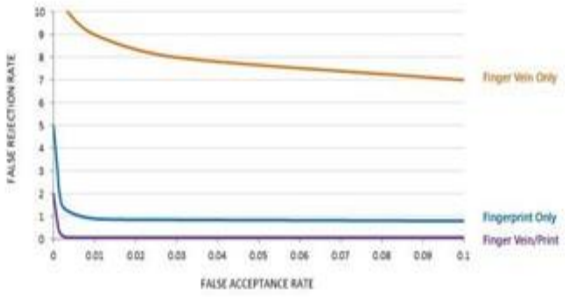

Fig.2. FAR VS FRR

Finger vein authentication has too many advantages as compared to finger print authentication. Finger print scanned

image may not match, if the finger is moisture and if finger has any wound or scars, so by this even the valid user may also cannot enroll their vote. To overcome these disadvantages, the finger vein scanner is used.

2) PIC16F877A: This is the Microcontroller used for interfacing and controlling all the accessories like IR sensor, Stepper Motor, Personal Computer, and Voice Board.

3) IR Sensor: In IR Sensor there will be one led and one photo diode. The led will be transmitting the light, when it is being crossed by an object means the light would be get reflected back. For receiving that light there would be a photo diode which will produce a voltage difference on incident of light over it, but the voltage difference produced by it, is very small, to overcome that an operational amplifier would be there to make the voltage to a large quantity.

4) Voice Board: The voice board is used for reporting if the voter is registered his/her vote. If the unauthenticated person is found after template matching, the voice board will start alarm and report that unauthenticated person is entered the voting room. The APR9600 exploratory board is a gathered PCB board comprising of an APR9600 IC, an electret receiver, bolster parts and important changes to permit clients to investigate all elements of the APR9600 chip. The wavering resistor is picked so that the aggregate recording time frame is 60 seconds with an inspecting rate of 4.2 kHz.

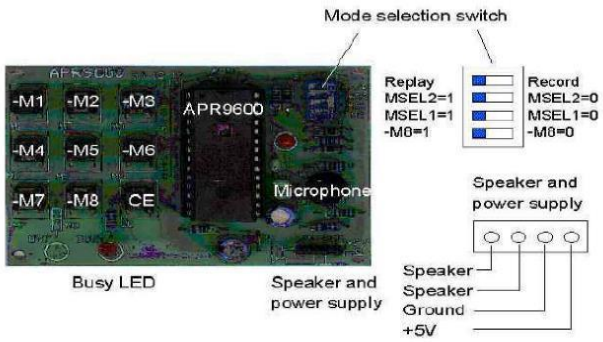

Fig.3. Experimental Board of APR9600

5) Stepper Motor: A Stepper motor will be used at the entry door using a relay to make sure that only one person is entering the voting hall.

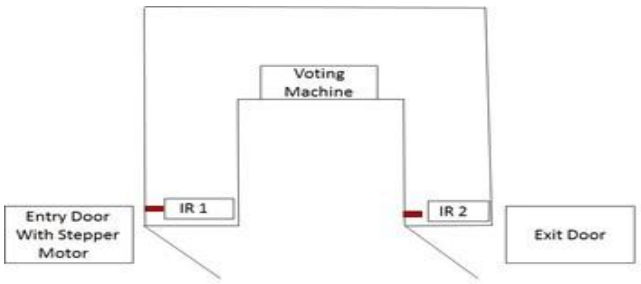

Fig.4. Outline of Voting Hall

5. OPERATION OF VOTING SYSTEM

The voting hall would be having two doors, one for the entry and another one for exit. Two IR Sensors will be placed at the doors, one for each. The Entry door will be having a stepper motor for opening and closing. Door will be closed and then the person is moving towards the voting machine.

The voter finger vein image will be captured by the finger vein sensor and it would be compared with the database already stored to check whether the voter is a valid or invalid voter. If the both the templates are matched means then the person will be allowed to vote, and after voted the speaker connected to the voice board will report that the vote is accepted.

If both the templates are not matched means then the voice board will report that the voter is invalid and followed by an alarm.

After completing the voting, the voter will come out through exit door, where another IR sensor is placed. When IR2 is detected, the entry door will be opened and next person is allowed into the voting hall.

6. TEMPLATE MATCHING USING MATLAB

1) Finger Vein Image Acquisition

To catch the finger vein pictures, an extraordinary imaging gadget is built. The built gadget comprises of an adjusted camera (Logitech V-UAV35) and a variety of infra-red LED (OSRAM SFH485, wavelength = 880 nm). The camera is not infra-red (IR) touchy gadget where it comprises of an IR blocking channel. Thus, the IR blocking channel is supplanted by a negative film to respond as an IR pass channel. To decrease the finger arrangement issue, particularly finger pivot, an open window with a settled size (2.5 cm × 2.5 cm) is set for the client to put their finger amid the catching procedure.

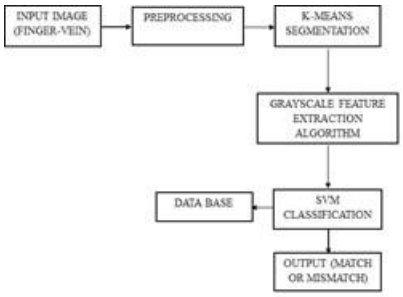

Fig.5. Block Diagram of Template Matching

2) Pre-processing

There are four noteworthy strides in the preprocessing stage, which are ROI extraction, picture resizing, picture upgrade and interpretation arrangement. The first picture is gained with the dark undesirable foundation. A straightforward calculation is created to remove the finger vein picture from the foundation. Three noteworthy strides required in this calculation. In the first place, the caught picture is changed over to twofold utilizing an edge esteem that has been dictated by Otsu's technique. At that point, the focal point of the question, which is the finger, is acquired. At long last, the picture is edited to 480×160 pixels in light of the got focus of the finger.

3) Median Filtering

Middle sifting is a nonlinear strategy used to expel commotion from pictures. It is generally utilized as it is exceptionally successful at expelling clamor while protecting edges. It is especially viable at expelling 'salt and pepper' sort clamor. The middle channel works by traveling through the picture pixel by pixel, supplanting each an incentive with the middle benefit of neighboring pixels. The example of neighbors is known as the "window", which slides, pixel by pixel over the whole picture 2 pixels, over the whole picture. The middle is computed by first sorting all the pixel values from the window into numerical request, and after that supplanting the pixel being considered with the center (middle) pixel esteem.

4) Gray Scale Feature Extraction Algorithm

The histogram of oriented gradients (HOG) is a feature descriptor used in computer vision\ and image processing for the purpose of object detection. The technique counts occurrences of gradient orientation in localized portions of an image. This method is similar to that of edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy.

5) SVM Classifier

The histogram of arranged slopes (HOG) is an element descriptor utilized as a part of PC vision\ and picture handling for the reason of protest discovery. The method include events of angle introduction limited parts of a picture. This strategy is like that of edge introduction histograms, scale-invariant element change descriptors, and shape settings, however varies in that it is figured on a thick matrix of consistently dispersed cells and utilizations covering nearby difference standardization for enhanced precision.

7. CONCLUSION

By this voting system, the security level is much more increased by which only authenticated persons can enroll their vote, and thus our democracy can be saved.

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