Smart Fingerprint Based Doorbell for Visually Impaired Using Arduino

Mrs. Pavithra[1], R. Solomon Suganesan[2], S. Praseeth Kumar[3], S. Surenthar[4]

[1]*Assistant Professor, Electronics and communication Engineering, Loyola Institute of Technology*

[2,3,4]*Electronics and communication Engineering, Loyola Institute of Technology*

Abstract - **In this paper, we provide an assistive aid for visually impaired people. Fingerprint is the unique identity of any individual. From olden days till today it has been the symbol of uniqueness. This Fingerprint based doorbell security system is implemented using Arduino technology. In this system the database the close circle of the visually impaired person is stored using the Fingerprint sensor as input. This provides them with highest level of security. When the current fingerprint matches with the database, they are marked as authorised and the name is being conveyed to the visually impaired. And if it doesn't, they are conveyed as unauthorised. In the software the fingerprint data, date & time of the entries are listed for future investigation. Thus, this system publishes the name of the one at the doorstep to the visually impaired person inside the house.**

Index Terms - **Visually Impaired, Fingerprint**

I. INTRODUCTION

According to WHO, the estimated number of people visually impairment in the world is 285 million out of which 39 million are blind and 246 million having low vision; 65% of people visually impaired and 82% of all blind are 50 years and older. Visually impairments require assistance in their day to day life.

Security is essential for very human, especially any creature on earth must feel secure in its own habitat. Secure Housing is an essential part of livelihood. Millions of people live under the threat of insufficient security. Especially those who are visually impaired are highly affected.

These people remain in additional security need from rest of the community. Recently the unique concerns study shows that the visually impaired people are at higher risk of various security vulnerabilities and attack. The visually impaired people are quite unaware of dangers and obstacles in front of them, even in familiar environment.

This paper addresses solution to this problem using embedded system.

The security system is basically an embedded system. Embedded system is the combination of software and hardware. The system software is used to control the hardware microcontroller.

II. EXISTING WORK

Initially, unique Identity was implemented by issuing of RFID. Even today RFID identity is used in a mass number. But an RFID tag also carries a large number of risks. It is vulnerable to be stolen, identity theft and damaged. Automatic Door locking system is the base ideology of this project. And, that paves way to identification by Image processing. Image Processing is faster and more cost effective. One needs less time for processing, as well as less film and other photographing equipment. It does not require chemical fixing. But the main aim of embedded technology is to reduce the memory consumption.

III. PROPOSED WORK

Image processing Identity requires a lot of samples of the respective individual. Thus, it requires a program more complex and more memory space. And, thus bought us to this innovation using Fingerprint sample. Fingerprint is the ultimate identity of a person. This requires fewer samples than Image processing samples. Thus, the memory consumption is minimised. And this system uses Arduino as hardware controller, for high efficiency at low cost.

IV. SOFTWARE REQUIRED

- Arduino IDE

- Arduino Uno (ATmega328P) microcontroller
- Fingerprint Module Sensor(R307)
- Amplifier Circuit (IC LM386) with Speaker

V. HARDWARE

5.1. BLOCK DIAGRAM OF PROPOSED WORK

The below diagram is used for fingerprint detection using sensor along with Arduino. The fingerprint is compared with the library files using algorithm. The voice output is given through the speaker through Audio amplifier (LM386).
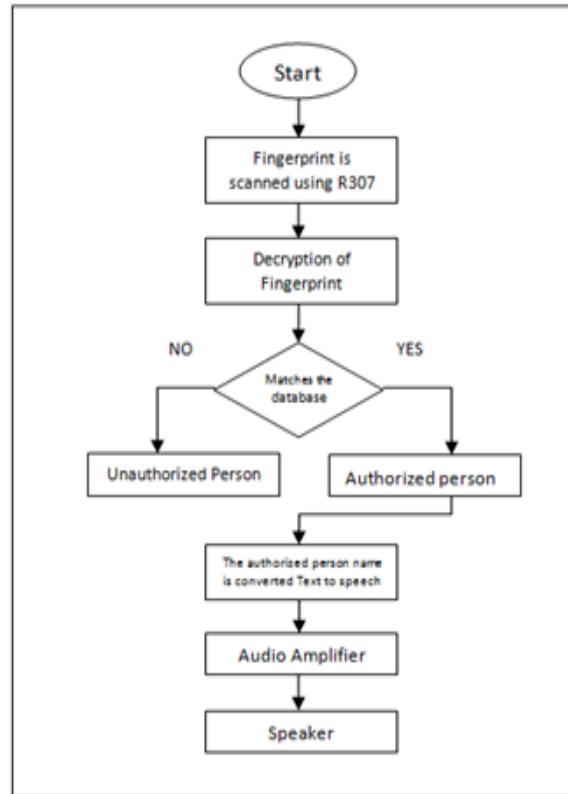

Figure 1. Block diagram of the proposed system

5.2. METHODOLOGY OF PROPOSED WORK

Figure 2. Methodology of the proposed system

The system starts with scanning of the Fingerprint of entrants using R307, designed as smart switch. The Fingerprints are stored in the database with their names. The Fingerprints are stored in form of unique code. To provide a tight security, only the close circle of the visual impaired are stored. Initially, when the Entrant presses the biometric sensor, it is decrypted as code. In the next step, the decrypted code is checked with the fingerprint codes stored in the library. If the Decrypted code matches with the database stored, then the person is marked as authorized and their name is broadcasted through speaker. If the Decrypted code doesn't match with the database, then the respective entrant is marked as unauthorized person. On the back end, a list of all the entrants is stored with date and time, which can be used for future investigation. This list enables to include the names of unauthorised person in the database if the user desires.
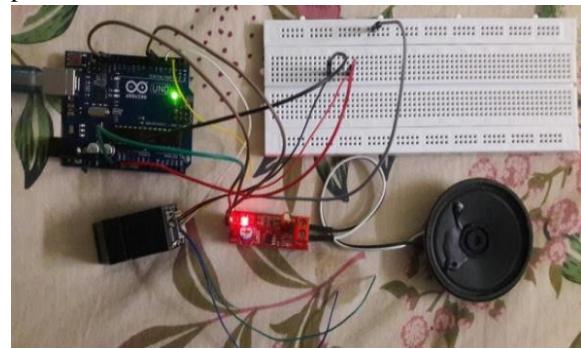

Figure 3. Hardware Implementation

VI. EXPERIMENTAL PROCESS

6.1 FINGERPRINT ANALYSING:
6.1.1 FINGERPRINT ENROLMENT:

Figure 4.1. Step 1 of enrolment process

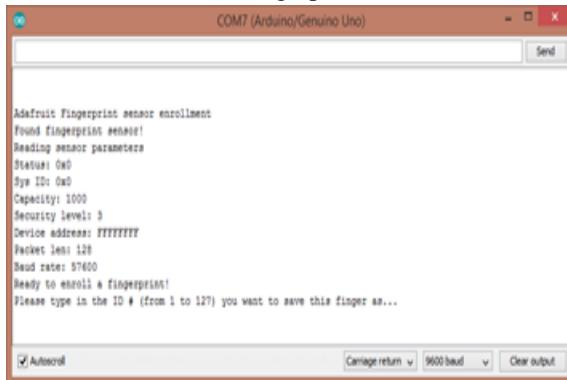The above-mentioned program enroll is used for thee enrolment of the new Fingerprint of the visitors

Figure 4.2 Step 2 of enrolment process

In the Serial Monitor the Enrolment process starts, initially checking whether the Fingerprint module is found by the Arduino. And, once the Fingerprint Module is recognized by the Arduino, The Arduino asks to enter a number which also acts as the unique code for that Fingerprint.
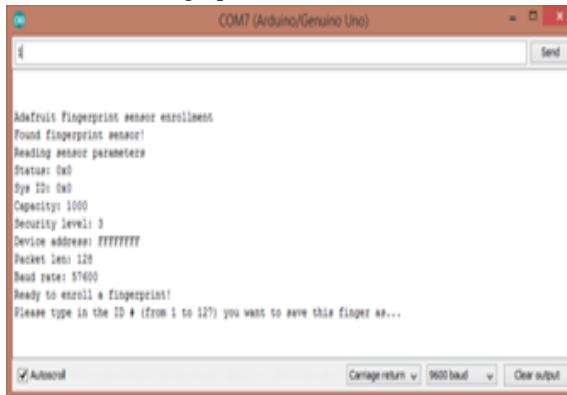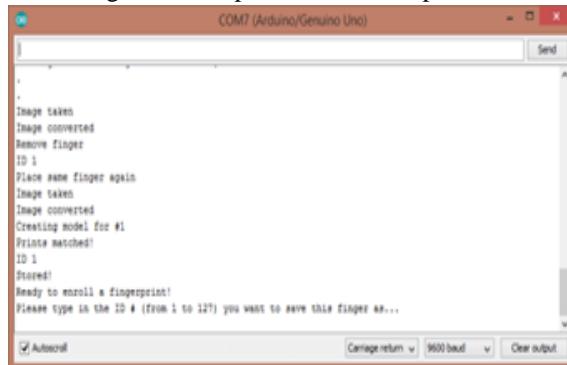

Figure 4.3 Step 3 of Enrolment process

Figure 4.4. Final step of Enrolment process

The Fingerprints of an individual are taken twice and stored in the Database. The message "Stored!" appears on the screen on success of every Fingerprint enrolment. Arduino provides a large memory for saving the Fingerprints of minimum 127 people with their unique number (1-127).

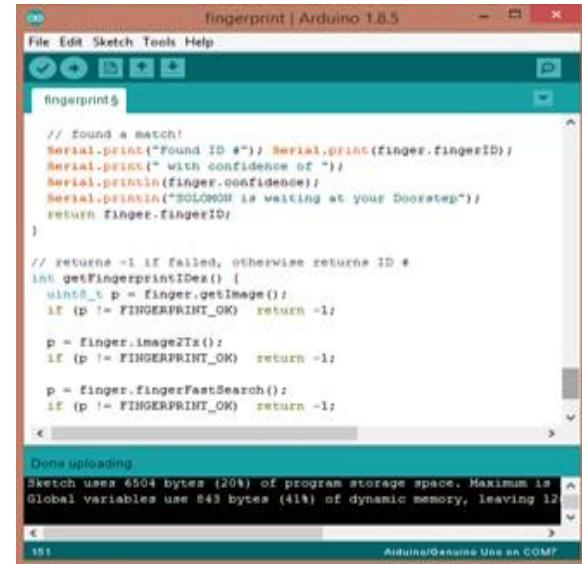6.1.2 FINGERPRINT VERIFICATION:

Figure 5.1. Step 1 of verification process

Once the Fingerprint is saved in the Database, it is verified using the Fingerprint program. Where, the fingerprint is verified, and the Message appears on the Serial Monitor if the Fingerprint matches with the Database.
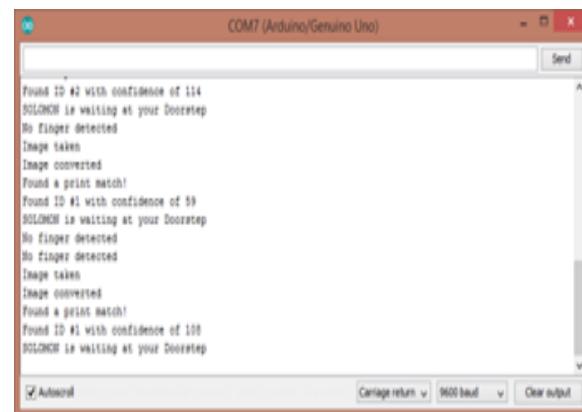

Figure 5.2. Step 2 of verification process

The Fingerprint image is taken, and it's converted into code and starts searching with the database. And the match is found with the Fingerprint number along with the confidence level. Similarly, the next person fingerprint is also taken.

6.1.3 ANNOUNCING THE NAME:

The announcing of the arrival of the person waiting at the Doorstep is managed using Talkie or Talkie-master library. This announcing can be done by convert the

words into codes using LPC (Linear Predictive Coding). There are few words which already available in the additional libraries of the Talkie library.

Figure 6. Code for announcing the name of the person

VII.FUTURE WORKS

In this project Fingerprint Sensor module R307 is used to read the data, however this grabs our unique identity only with 2 samples. We opt to use a much efficient Fingerprint sensor with low cost. And the Fingerprint sensors to be fabricates as a Doorbell switch. In this project we have used only 10 fingerprints, in future we would like to increase the number of fingerprint database. The future work also includes a connection with solar panel board to the Arduino, so the process is carries on even if there is any power cut.

REFERENCES

[1] Dhrubajyoti Adak1, Manoj Kumar Pain2, Uttam Kumar Dey3, "Rfid based security system using Arduino module", International Journal of Scientific & Engineering Research, vol. 8, Issue 3, March 2017, pp 143-145.

[2] Shubham Swaraj1, Ass. Prof. Richa R Khandelwal2, "Rfid Based Automatic Vehicle Identification for Access Control", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 2, February 2016.

[3] Khin San Myint1, Chan Mya Mya Nyein2, "Fingerprint Based Attendance System Using Arduino", International Journal of Scientific and Research Publications, Volume 8, Issue 7, July 2018, pp 422-425.

[4] Raj Kumar Mistri1, Kamlesh Kishore2, Priyanka Nidhi3, Pushpakumari4, Vikrant kumar5, "Rfid Based Attendance System", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 6 Issue V, May 2018.