HIERARCHY BASED SECURITY SYSTEM

Nupur Jain[1], Shilpa Dulange[2], Priyanka Patankar[3], Mrs. K. A. Musale[4]

[1,2,3] *BE Student,* Dept. *of E&TC, PES Modern College of Engineering, Pune, Maharashtra, India*
[4] *Assistant Professor,* Dept. *of E&TC, PES Modern College of Engineering, Pune, Maharashtra, India*

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Abstract - *The paper introduces the system based on the concept of hierarchy for the internal security of any organization. The system is divided into two levels, face recognition and RFID technology. The camera and RFID reader are installed at the entrance of any cabin or department. If both image and RFID tag, match with the database based on hierarchy concept; as if consider three level hierarchy, the top level and middle level can access the cabin of middle level but the bottom level cannot access. If bottom level attempts to do so then the middle level will receive a text message of the unauthorized entrance in his cabin with the help of GSM module.*

Key Words: **Hierarchy, Face recognition, RFID technology, GSM, Motor.**

1. INTRODUCTION

The internal security issue in an organization is increasing recently. Manual identification of people as done traditionally is prone to errors and thus automatic identification for access is a must and that too with a reliable output.

The face is an important visual object in our life, which plays the role of conveying the identity of a particular individual. Face recognition commonly includes feature extraction, feature reduction, and recognition or classification. Feature extraction is used to find the most representative description of the face. Face reduction is used not only to decompose and compress the original features but also not to destroy the most important information. Recognition or classification is used to choose the available method such as Euclidean distance, etc. which is used to classify the feature of images present in the database and test image.

RFID provides greater accuracy in sustaining data. The RFID tag stores data in lasting microchip, instead of paper or barcode labels which deteriorates over time and replacement is required. RFID also provides better data security as tags cannot be cloned as easily as bar-code or paper label. Each RFID tag has a unique number which is stored in the database of RFID reader. RFID technology works on radio waves.

The controller for the whole process being used is ARM7 (LPC2148) which is 32-bit controller with 40KB on-chip SRAM, 512KB on-chip ROM, two channels of ADC with 14 pins, a DAC and two UART's.

Thus in this paper proposed idea using two levels of identification namely face recognition and RFID technology are proposed to obtain better security.

2. CONCEPT OF HIERARCHY
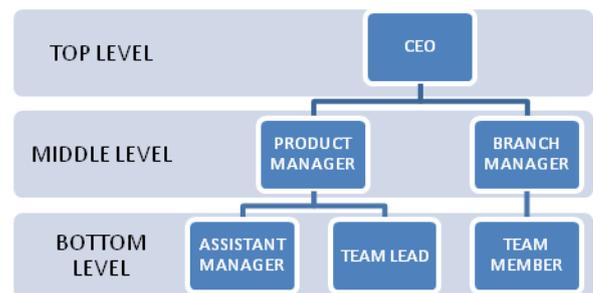
Fig -1: Hierarchy Tree

The above hierarchy tree explains the hierarchy of a particular organization. So the idea can be illustrated as, consider cabin of Product Manager at the middle level

- Access Granted
  - CEO
  - Product Manager
  - Branch Manager
- Access Denied
  - Assistant Manager
  - Team Lead
  - Team Member

3. PROPOSED SYSTEM

3.1 RFID Tag and Reader

The RFID tag which is used in the proposed system is a passive tag, as it is better in terms of power consumption and maintenance as compared to the active tag. The tag is divided into two parts chip and antenna. The reader gets the information from the tag with the help of antenna.
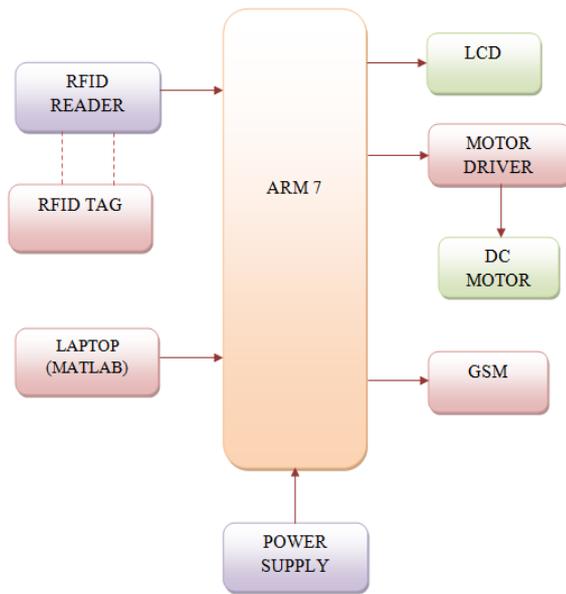
Fig.2 Block Diagram

3.2 Laptop (Camera and MATLAB)

The MATLAB software is used for implementing face recognition algorithm which includes feature extraction, feature reduction, and classification or recognition. Facial recognition analyzes the characteristics of a person's face which is taken as a test image through a camera. The pixel value of the test image is compared with the corresponding pixel value of the database image in the process of recognition.

3.3 ARM7

An ARM (Advanced RISC Machine) processor is based on the RISC (Reduced Instruction Set Computer). The ARM7 processor is Von-Neumann architecture with a single bus for both data and instructions. The pipe-line concept is used to enhance ARM7 performance. It has load/store architecture where data-processing operations only operate on register contents, not directly on memory contents. Also, it has orthogonal instruction set where all instruction types can use all addressing modes. Mostly single-cycle execution is there in which CPU executes each instruction in one cycle. Enhanced power-saving design as it uses RISC based Architecture.

3.4 LCD

LCD's are classified as passive type of display as they do not emit any light. LCD's deviate light in a controlled manner and are low power consumption displays. Liquid crystals have properties that are in between those of conventional liquid and solid crystals.

3.5 DC Motor and Drive

A DC motor is an electrical machine that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. A motor driver is a device that acts as a bridge between the microcontroller and DC motor. It is necessary because a microcontroller can usually provide roughly 0.1A of current whereas most actuators like DC motor require several amperes.

3.6 GSM

The GSM module is used to exchange the information between respective individuals. It is the second generation of cellular network. In the proposed system the text message is used as medium of communication with the help of GSM module.

3.7 Face Recognition
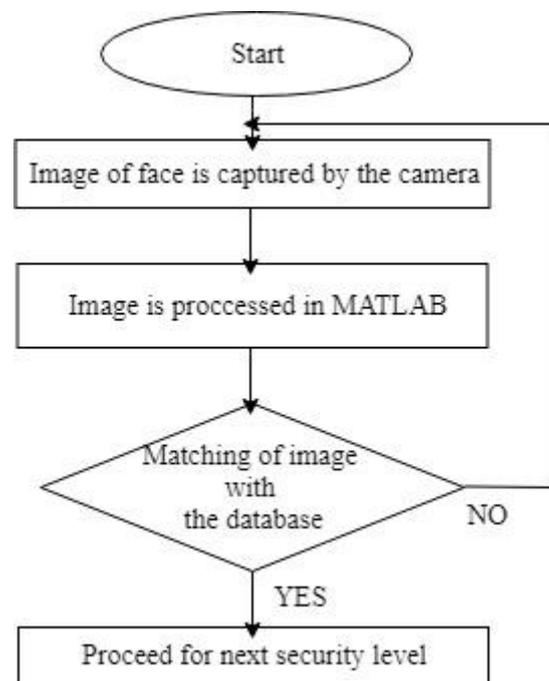
Fig -2: Flowchart of Face Recognition

1. The system will ask the user to scan his face by standing in front of the camera.

2. Then the image is captured by the camera and the image is known as a test image.

3. The test image is then matched with the database.

4. If the test image matches with the database then the control is passed to the next security level which is RFID technology.

5. If the test image does not match with the database then the system will reset to initial stage.

3.8 RFID Technology
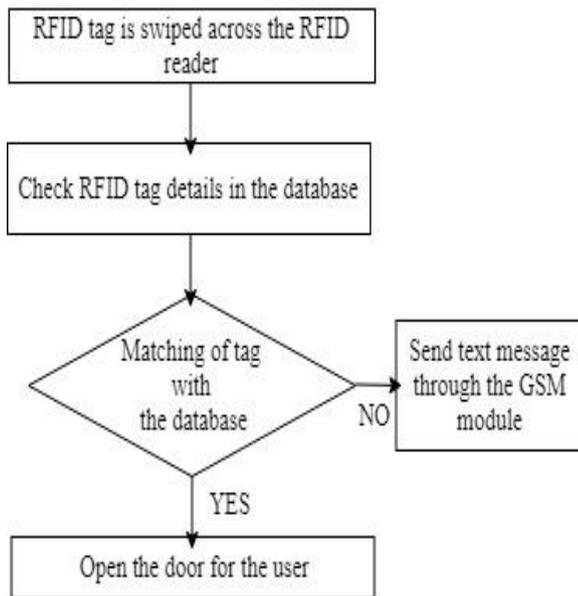
Fig -2: Flowchart of RFID Technology

1. After the face is recognized the system will ask the user to swipe his RFID tag.

2. If the tag is valid then the user is granted access to the cabin by opening the door of the cabin for some predefined time with the help of DC motor.

3. If the tag is invalid then the user is not granted any access to the cabin and the concerned person is informed via a text message about the unauthorized entrance with the help of GSM module.

5. RESULTS

Fig -3: Complete Proposed System
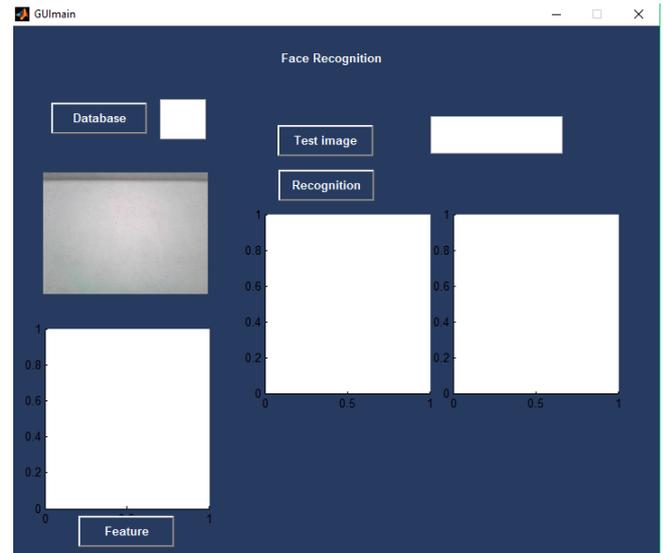
Fig -4: Graphics User Interface (GUI)

4. APPLICATIONS

- Research center

- School

- College

- Teaching institute

- Bank locker room

- In restricted area where security is main concern.

5. CONCLUSION

- As there is dual security in the proposed system, face recognition and RFID tags the system becomes highly reliable and resolves the internal security threats faced at any organization.

- The system is focused on the concept of hierarchy and the access is provided on the basis of the same.

- Thus this reduces the manual efforts and errors in the process of identification and access control.

REFERENCES

[1] Woo Jin Shin, Jeong Geun Kim, A Capture-Aware Access   Control Method for Enhanced RFID Anti-collision Perfonnance, IEEE communications leiters, VOL. 13, NO. 5, MAY 2009.

[2] Yan Qiu, Jinmei Chen, Quanyin Zhu, Campus Access Control System Based on RFID, 978-1-4673-2008-5, 2012 IEEE.

[3] Mosam Sangole, Sagar Bharote, Gaurao Singh, Kranti Deshmukh, RFID Based Campus Management System: Access Control System, International Journal for Research in Engineering Application & Management ISSN : 2454-9150 Vol-03, Issue 02, April 2017.

[4] D. L. Wu, Wing W. Y. NG, D. S. Yeung, and H. L. Ding, A brief survey on current RFID applications, in Proc. International Conference on Machine Learning and Cybernetics, Baoding, July 12-15, 2009, pp. 2330-2334.

[5] B. Yan and D. Y. Lee, Design of spot ticket management system based on RFID, in Proc. International Conference on Networks Security, Wireless Communications and Trusted Computing, 2009, pp. 496-499.

[6] N. Ahmad, S. Butler, and U. Ramachandran, Guardian Angel: An RFID based indoor guidance and monitoring system, 2010, pp. 546-551.