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RFID and Fingerprint Based Dual Security System

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ABSTRACT

This paper focuses on research works of control engineering field and aims at impenetrable security system especially just in case of medication, jewelry, documents & others valuable items and mandatorily within the higher intelligenceagency. Here, a developed security system with automatic sensing is introduced by the utilization of both frequencyidentification (RFID) card tagging system and fingerprint sensing biometric security system to take care of the valid access of aperson to a secured place. RFID reader and fingerprint sensing device work as a locker of the protection and RFID tag and a validly ratified finger is taken into account because the key of the locker. just in case of access granted entity, door bar gets opened with a servomechanism system connected with door bar. On the contrary, no action is taken as cavalcade if the entity is taken into account invalid in the sensing system. These knock out the requirement for keeping track of keys or remembering a mixture of password orpin. A prototype of the safety system is additionally designed and therefore the performance of it's tested. The satisfactory results of its performance show the validity of the system and indicate a much better solution for the longer term security system.

Keywords--- RFID, Fingerprint Sensor , Strenuous Security, Automation, Door Control

1 INTRODUCTION

Automated assimilation and access system has turned out to be important to defeat the protection dangers looked by numerous organizations. this is often a time whereeverything is related to the system, where anybody canget hold of knowledge from anyplace round the globe. Therefore,hacking of one's information may be a major issue. Because ofthese dangers, it's imperative to own some style of personalidentification (ID) to induce to one'sown particular information.Different systems are introduced at various points to trace theindividual's movement and to confine their entrance totouchy zones within the secured area. Among standard individualID strategies, password and ID card methods are the foremostobserved methods. However, it's not very difficult to hacksecret password now and recognizable ID cards may stray, hence making these techniques very questionable [1]. Again, frequence identification (RFID) could be a remote innovation which will be utilized to evolve the doorway controlsystem. This technology provides a revolutionary automationin various processes starting from industrial sectors to homecontrol [2-3]. In RFID technology, the identification of anobject automatically consists of the thing, location of theobject or individual with a special identifier code containedwith an RFID tag, which is somehow connected to orimplanted within the target [4]. due to the shaky wirelesschannel between RFID tag and RFID reader, security dangersagainst RFID system are appearance. NumerousRFID

verificationconventions against the safety dangershave been studied in [5].The biometric security system is getting used for an extended timeas a robust security system in several spaces. Numerousstrategies are accessible in biometrics just like the fingerprint, eyeiris, retina, voice, confront so forth. These distinctivestrategies have certain focal points and inconveniences whichmust be considered in creating the biometric system, forexample, system unwavering quality, value, adaptability,need of physical contact with the checking gadget andnumerous different parameters [6]. Fingerprints are one amongthe numerous kindsof biometrics, accustomed distinguishpeopleand check their identity. the employment of fingerprint for acclimatizing has been employed in law prerequisite for a couple ofcentury [7-8]. The investigation of fingerprints for matchingpurposes requires the correlation of some highlights of theprint pattern. These incorporate patterns include totalqualities of edges, and minutia focuses. it's additionallyimportant to grasp the structure and properties of human skinkeeping in mind the top goal to effectively utilize someof the imaging advancements [9].

2. DESIGN OF THE SYSTEM

The proposed security system is intended with both RFID and fingerprint sensor as an entrance permitting key. Only RFID reader a part of RFID unit and therefore the fingerprintpressing a part of fingerprint unit is kept open before door asa locking system and both the RFID tag and validfingerprint is that the key to allow one to access the door. Theexternal photographic view of the system is shown within thefollowing Figure 1. The internal circuit design includes RFID reader unit, fingerprint sensor, servo motor, Arduino UNO, power supply, and a breadboard. of these components are connected and also the power supply is provided through jumperwires. Arduino is powered by 5V supply and sensors andservo motors are given requisite power externally.The internal circuit diagram of the system is shown infollowing Figure 1.

Fig-1

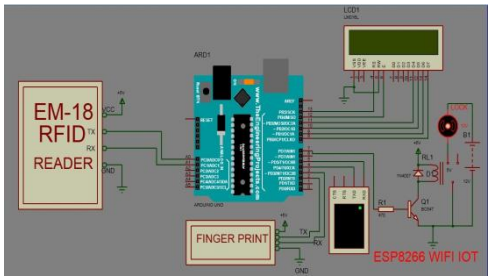

Fig-2 Circuit Diagram of Fingerprint unit

3. SYSTEM COMPONENT

The Security system can be broken down into four basic components: Arduino, EM-18 reader module, RFID unit, and fingerprint unit. Each component has its prominent use with subtle functionality.

3.1. Arduino Board

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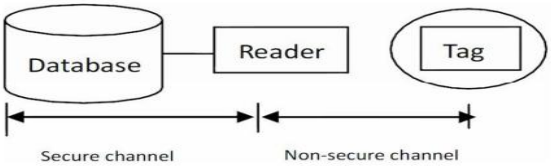
Arduino is an open-source venture for building computerized gadgets and intelligent items that may detect and control physical gadgets. The UNO version of it's utilized here as a miniaturized scale controller gadget for working the capacity of this proposed security system.

3.2. RFID Unit

The RFID gadget fills an indistinguishable need from astandardized identification or a pretty strip on the rearof a charge account credit or ATMcard;it gives a 1 of asoridentifier thereto protest. Furthermore, similarly as a scannertag orattractive strip must be checked to urge the info, theRFID gadget must be filtered to recover the recognizing data[14]. The examined data from RFID label move to RFID peruser first. At that time, it's exchanged to microcontrollerframework and altered over as databaseframework. Thisprocess of examining the info isemployed here to spot thevalidity of the one who is meant to unlock the door. Astream chart of RFID task is appeared in following Figure 3.



4. Working Principle of the System

The working principle of the system is divided into three sections. They are detailed below:

4.1. RFID Card Punching andOperating;

RFID could be a major and modest innovation that empowerswireless information transmission [20]. The RFID readermodule is powered from the external power supply andArduino ispowered from the 5V supply. For interfacing of RFID reader with an Arduino, five RFID wires are connectedwith five digital ports of Arduino. Both of the grounds pin ofArduino and RFID reader is connected. The RFID readerreads the RFID labels, a controller is used to acknowledge the information from the RFID reader and control the outputof the protection door lock andtherefore the RGB LED.The RFID reader isready outwardly of the entryway and it'sdisconnected from the controllersecretly so nobody canbreak the RFID reader for avoiding the safety. Thecontroller of this task gets serial data from the RFID readerand controls the Door bolt and therefore the LED.

5.2. Fingerprint Installing and Sensing5.2.1.Enrolling the FingerprintA pattern of interleaved ridges and valleys are the mostcomponent of a fingerprint. They easily stream in paralleland once in a very while end or bifurcate. The pattern of ridgesand valleys can show a selected shape called minutiae at alocal level [21]. There are some types of minutiae as shownin Figure 4, yet for pragmatic reasons, just two kinds of details are considered: ridge ending and ridge bifurcation [6].The terms of fingerprintstructures and their definitions aredepicted in Table 1.

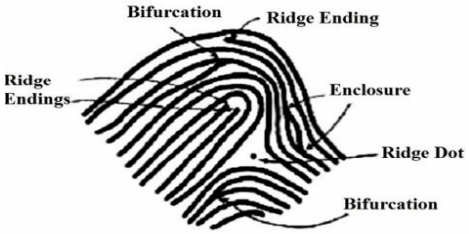


Fig-4

4.2. Enrolling New User

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he most effortless approach to try and do this is often to associate itspecifically to the USB/Serial converter within the Arduino. Todo this, a blank sketch is uploaded using Arduino Uno andthe fingerprint sensor is directly connected to theUSB/Serial.When the facility supply is provided, the red LED blink toindicate the sensor is functioning.

4.3. Wiring for Use with Arduino

After testing the sensor, it areoften accustomed verify afingerprint. Thefingerprint is attached with Arduino through the jumper wire. The Tx of Fingerprint sensor is connected tothe digital 2 (Rx) of Arduino Uno and both of their groundpins is connected. The RFID reader module is powered fromthe external power supply and Arduino is powered from the5V supply. So, the green and white wires are disconnectedand the green wire is plugged into digital 2 and also the white wire to digital 3. Interfacing of fingerprint sensor withArduino is shown in following Figure 5

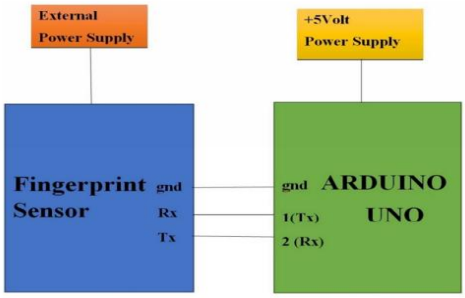

Fig-5.

4.4. Sensing System of Fingerprint

There are fundamentally two styles of filtering techniquesfor this innovation. Either an optical or capacitance scanner isutilized to scan and make a photograph of the finger. In spite of the fact that both the techniques create ananalogous form of picture,the process of scanning picture is completely extraordinary. hischecked picture is then contrasted with before existing fingerprints to urge the correct character. The examination isdone by the processor and therefore the correlation is formed betweenthe valleys and ridges.The sensing of the fingerprint is completed by the subsequentseveral steps. Firstly, the image is smitten the help ofinformation gadgets like camera, sensors, and then forth. It isdone by the inward camera of the fingerprint sensor. Secondly, the normalization process of the image. This procedureincorporates dim scale transformation of the image of thefingerprint. The third step includes filtering. The sensor fromwhich the image is taken may well be old or pore with tidy. Atold age, a man's fingerprint might not be clear by any stretch ofthe imagination, in light of the very fact that the perimeters of his/herfingerprints move toward becoming into broken parts.Therefore, for better estimation, this fingerprints should beredrawn and filtered for getting surmised full edge print. Thefourth process involves thinning.In this process, the images are thinned for expellingclamors and make the ridges thinned. The fifth step is Ridge Orientation. the image is first changed over into binaryformat. The bearing field of ridges is taken for getting theminutiae angle withinthe fingerprint.

5. Construction of the System

System supported both RFID & Fingerprint. So if one system fails other system will keep a copy the safety. Both fingerprint & RFID is required to crack the safety. RFID system consists of a RFID reader & RFID tag. When RFID reader gets valid input then it'll activate the fingerprint system. Fingerprint will command the lock when it'll get valid fingerprint. Only the fingerprint & RFID tag holder canunlock the system.The photographic view of internal arrangement of construction is shown in following Fig6.

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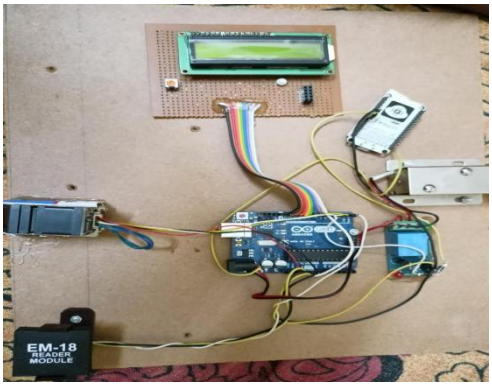

Fig-6

6. Methodology and Performance Test

In order to test the performance of the system, a performance test has been worn out several steps. The first step is to power the system. Secondly, the RFID tag is put close to RFID reader. If RFID reader finds alegitimate RFID tagthen it'll activate the fingerprint. In third step, finger is puton the fingerprint sensor. Fingerprint sensor will take animage and also the finger and verify the fingerprint of the imagewith the fingerprints that was installed previously. A flowchart of the operation of the system is shown in followingFigure 7.

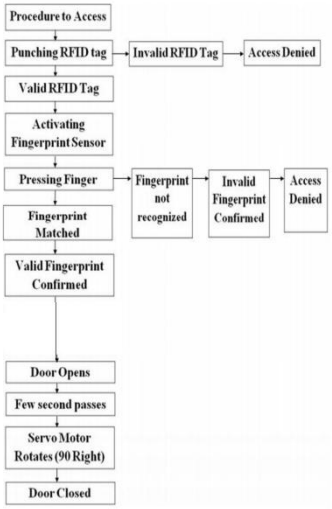

Fig-7

6.1. Performance Test

For measuring the performance test of the system, the methodology system was continued five times and also the observation output result was shown in Table 1 as performance test data and result.

Observations no.	RFID Unit	Fingerprint Unit	Door Open	Door Close
01.	Success	Success	Success	Success
02.	Success	Success	Success	Success
03.	Failure	Success	Failure	Failure
04.	Success	Failure	Failure	Failure
05.	Success	Success	Success	Success

Table-1

7. Conclusion

The world is being modernized day by days and it needs a technological backup with stronger protection and security of valuable code, hiding data, and items. This research work has the very purpose of providing robust security system with automatic sensing and operating action to access or decline. it is a developed safety security and impermeable to baffle this security system. Security is maintained with serial operation of RFID and fingerprint sensor and without the missing of 1, an abscess is denied. This security system is cheaper, flexible, less time consuming and also needs to not commit any code or password to access. Fingerprint scanning and sensing is also accustomed protect computer files and data. it's extremely reliable security system and should provide the highest security and automatic operation for any quite user.

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