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AUTOMATIC RIFLE DRAWING AND DEPOSIT SYSTEM FOR ARMORY USING FINGERPRINT AND RFID

B.VIJAY[1], M.VEDA CHARY[2]

[1]M.Tech, Dept of ECE, CMR College of Engineering&Technology, Hyderbad, AP-India,
[2] Assoc Prof, Dept of ECE, CMR College of Engineering&Technology, Hyderbad, AP-India.

Abstract: This paper is designed to replace the existing rifle drawing and deposit system from armory, where each officer needs to enter his details like officer Id and rifle Id in register book manually. This takes much time and also not secure. To overcome the existing system, we are taking each officer finger print for his identification and also for every rifle a RFID card is attached for its identification. Each officer will be issued only one rifle, while issuing or returning the rifle to armory if any mismatch or fault occurs buzzer will be on.

Keywords: ***Fingerprint module, RFID (Radio frequency identification),ARM7(LPC2148),LCD.***

I.INTRODUCTION

In existing system, to draw and deposit the rifle in defence academy they are using older rifle drawing system where each officer needs to enter his details like officer Id, Rifle Id in register book to overcome this problem we developed this paper. In this system we are using finger print module, RF reader module and RF passive tag, LCD (16*2) and keypad (4*4).This project is built around ARM7 (LPC2148). By this implementation, we can achieve full level of security that eliminates misusing of rifles which are electronically tagged can be eliminated.

Main advantage of choosing this controller is, it consists of two Serial port interfacing capability, where RFID & Finger print modules interfaced to controller. A 4*4 matrix Keypad is used as an interface to controller. An EEPROM interfaced to the controller for storing complete information for all the rifle tags using I2C protocol. To complete this paper successfully we have studied about finger print module , RFID reader module and passive RFID tag, LCD (16*2).

II.ARCHITECTURE

We are implementing Finger print technology in the project for rifle withdrawing for high security and fast access implementation. As compared with other biometric technologies like iris and heart beat, this is very reliable and less cost in implementation. The finger print module which is having in built DSP processor and Memory unit sections that can store unique finger prints. By using this project, the time taken to take a rifle and register a particular user decreases. User can take 10 seconds maximum for his accessing. This system provides better security that he is allowed to take his rifle assigned to him. This can be done by RFID(Radio Frequency Identification) ,which identifies targets within the target area and obtains relevant data automatically through RF signals, has become welcomed by people gradually since it has been proposed.

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III.RELATED WORK

1. RFID TECHNOLOGY

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. Some tags require no battery and are powered and read at short ranges via magnetic fields known as electromagnetic induction. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies). The tag contains electronically stored information which may be read from up to several meters away. Unlike a barcode, the tag does not need to be within line of sight of the reader and may be embedded in the tracked object. A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified. The readers generally transmit their observations to a computer system running RFID software or RFID middleware. RFID systems typically come in three configurations. One is a Passive Reader Active Tag (PRAT) system that has a passive reader which only receives radio signals from active tags (battery operated, transmit only). The reception range of a PRAT system reader can be adjusted from 1-2,000 feet. There by allowing for great flexibility in applications such as asset protection and supervision. Another configuration is an Active Reader Passive Tag (ARPT) system that has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. Finally, there is the Active Reader Active Tag (ARAT) system in which active tags are awoken with an interrogator signal from the active reader. A variation of this system could also use a Battery Assisted Passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal.

RFID tags can be either passive, active or battery assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery assisted passive (BAP) has a small battery on board and is activated when in the presence of a RFID reader. A passive tag is cheaper and smaller because it has no battery. Instead, the tag uses the radio energy transmitted by the reader as its energy source. The interrogator must be close for RF field to be strong enough to transfer sufficient power to the tag. Since tags have individual serial numbers, the RFID system design can discriminate several tags that might be within the range of the RFID reader and read them simultaneously.

Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user. Field programmable tags may be writing-once, read-multiple; "blank" tags may be written with an electronic product code by the user.

The tag's information is stored electronically in a non-volatile memory. The RFID tag includes a small RF transmitter and receiver. An RFID reader transmits an encoded radio signal to interrogate the tag. The tag receives the message and responds with its identification information. This may be only a unique tag serial number, or may be product-related information such as a stock number, lot or batch

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number, production date, or other specific information. Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for when tags go in and out of the interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

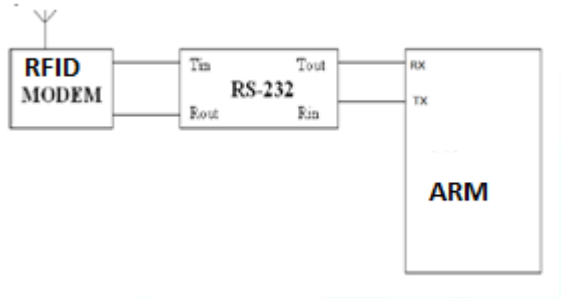

Fig 1: Interfacing RFID module with controller

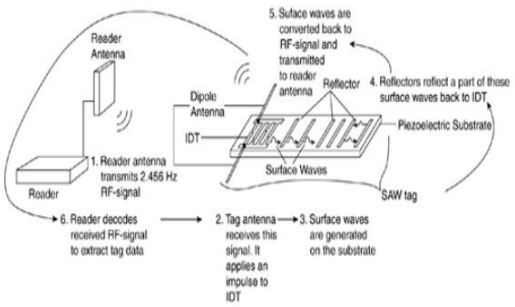

Fig 2: RFID Communication process

- Host manages Reader & issues commands.
- Reader and tag communicate via RF signal
- Carrier signal generated by the reader.
- Carrier signal sent out through the antennas
- Carrier signal hits tag(s).
- Tag receives and modifies carrier signal
- "Sends back" modulated signal (Passive Backscatter – also referred to as "field disturbance device").
- Antennas receive the modulated signal and send them to the Reader.
- Reader decodes the data.
- Results returned to the host application.

2. *FINGER PRINT MODULE:*

The field of biometrics was formed and has since expanded on to many types of physical identification. Still, the human fingerprint remains a very common identifier and the biometric method of choice among law enforcement. These concepts of human identification have lead to the development of fingerprint scanners that serve to quickly identify individuals and assign access privileges. The basic point of these devices is also to examine the fingerprint data of an individual and compare it to a database of other fingerprints.

Nearly everyone in the world is born with a fingerprint that is unique; a separate and comprehensively identifying attribute that sets us apart from the other 6.5 billon people that inhabit this world. It is because of this fact that the fingerprint has proven such a useful part of biometric security. The very reason that fingerprint scanners are useful can be found in this fact as well. However, this is far from the only reason they are used.

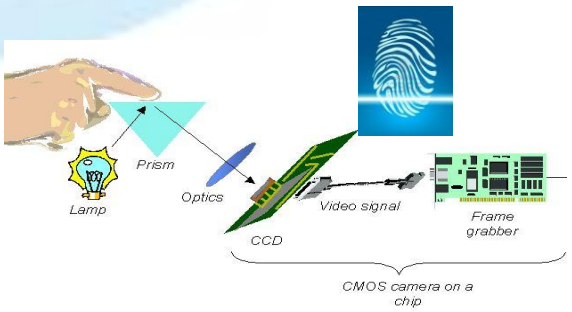

Fig 3: Finger print optical reader Reflection diagram.

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(i). Optical reader Reflection:

The oldest 'live-scan' readers use frustrated refraction over a glass prism (when the skin touches the glass, the light is not reflected but absorbed). The finger is illuminated from one side with a LED while the other side transmits the image through a lens to a camera. (FTIR: frustrated total internal reflection).

In this paper the fingerprint module we are using is for secondary development which has integrated fingerprint collecting and single chip processor together. It features small size, low power consumption, high reliability, small fingerprint template, etc. It is very convenient to be embedded to user system for realizing clients required finger print verification products.

Features:

- UART Communication port
- Optical total reflection finger print features
- 1:N verification and 1:1 identification function
- Flash memory----16MB
- Finger print image-------210 x 250(pixel)
- Resolution----------500dpi

(ii) Fingerprint processing:

After an image of a finger print is captured, a sequence of image processing algorithms will be applied to the captured images. In fingerprint authentication minutiae technology is being used. The digital image signal processing steps includes.

(a) Segmentation and filtering:

The main purpose of the segmentation is to get the good area of a captured fingerprint image, then separate this valid finger print from the image back ground. Some filtering can be applied to the image to filter out the noise in the image.

(b) Contrast enhancement:

After recognition, the image is subjected to gray stretch to increase the global contrast of the image. Since the skin of an entire finger has a similar color, the more interesting parts of the finger print & the less interesting areas have a very low level of contrast. During this step, the algorithm will stretch the gray levels of the ridges, short ridges and bifurcation of fingerprint & compress the gray levels of the less interesting parts of the fingerprint.

(c) Binarization:

The goal of binarization is to convert the gray level image to binary level “1” or “0”. In other words, this space changing operation converts the image black (or) white with no levels in between the key in this operation is to set the threshold value between black & white. Depending on the implementation, there are various ways to set the threshold value.

(d) Feature Extraction:

After the steps of signal processing, we will obtain the final fingerprint image. The minutiae based features, such as ridge ending and bifurcation, will be found and extracted from the final image.

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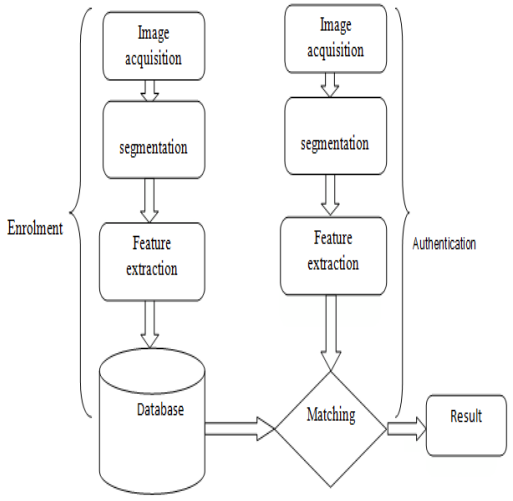

Fig 4:Architecture of fingerprint recognition system

IV.IMPLEMENTATION

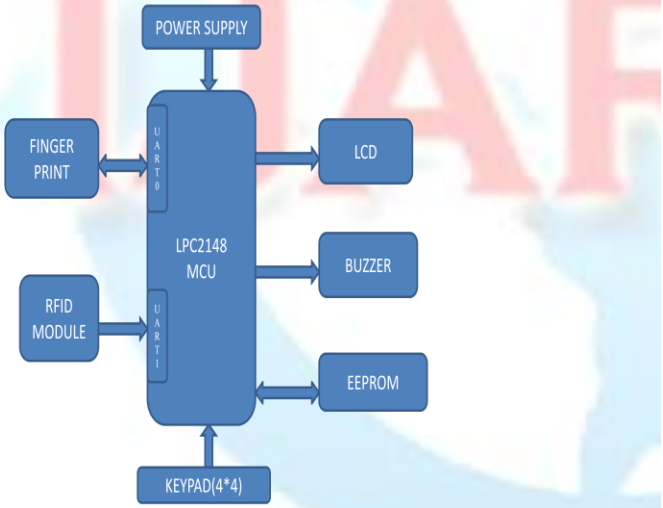

Fig 5: Block diagram of the system.

This proposed architecture operates in 4 different modes. First mode is enrollment mode (or) registration mode, in this mode we have to press '#' key in keypad it allows you to create 3 digit ID, then it will ask you to place finger on the surface of the fingerprint module after placing the finger place a RF tag (rifle) near by the RF reader and then the 3 digit will be allocated to both finger print and rifle (tag), here we are using EEPROM for information storage, this will retains the contents of all registered rifles i.e., tag information in it. Second mode is matching mode, in this mode if the thumb fingerprint matches the RF tag, we can draw and deposit the rifle. Third mode is deletion mode in this mode we can delete the particular ID by pressing 'D' from the keypad and particular ID. Fourth mode is empty mode, in this mode we can delete all the ID's at a time by pressing'*' from the keypad then it deletes all the ID's from the system.

V. SOFTWARE

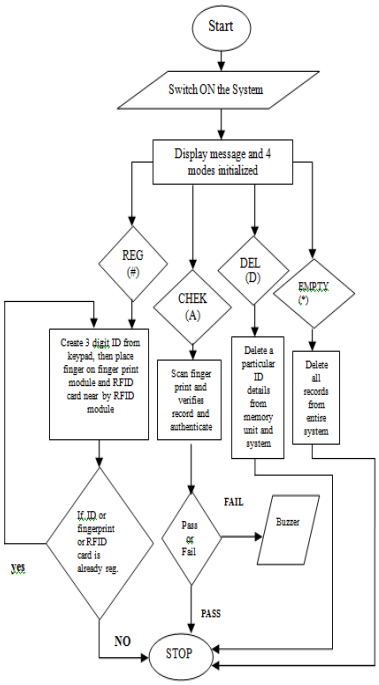

Fig 6: Flowchart of the system

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VI. RESULT ANALYSIS

In practice,our system uses middle distance RFID reader,fingerprint module , RS232 , MAX232 and ARM(LPC2148) microcontroller of RFID & fingerprint module. Fig 6 shows the compilation of the system program. From the Fig 7 we can that it's supported to draw and deposit the rifle, which reduces the time consumption and gives security for armory.

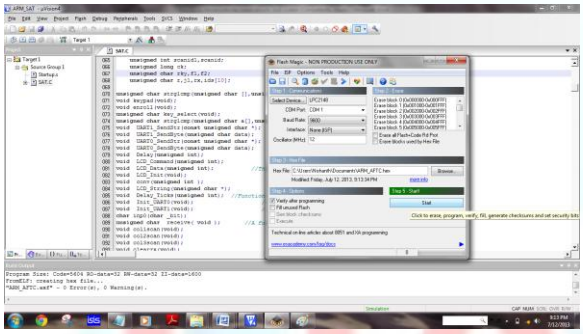

Fig 7:compilation of system program

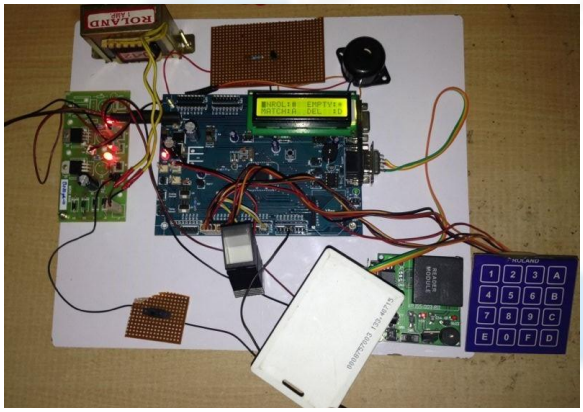

Fig 8: Rifle drawing and deposit system.

VII.CONCLUSION

This project is implemented successfully with basic requirements needed for reduction of time required to access a rifle from control room in armory, this can be further extended by maintaining data base which collects information of individual officer's rifle transaction details day to day.

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IX.BIOGRAPHIES

B.Vijay, (11H51D5502), received his B.Tech degree in Electronics & communication Engineering from JNTU, Hyderabad, currently pursuing his M. Tech, Embedded systems in CMR College of Engineering & Technology. Hyderabad

M. Veda Chary, received his M. Tech degree in Electronics & Communication Engineering from JNTU, Hyderabad, currently working as an Associate Professor, ECE in CMR College of Engineering & Technology, Hyderabad.