An Efficient Monitoring and Controlling Of Bank Security by Using IR Sensors

Ahmed Salih Mahdi. Al-Zuhairi

Abstract

In today's real time modern industrialized world security systems place a vital role. This bank Security system is a prime concern in our day-today life. Now a day's everyone wants to be as much secure as possible. IR based security is a low cost, so that the concept is implemented by using AT89C51 series micro controller. The system is fully controlled by the microcontroller which has a 4Kbytes of ROM for the program memory. The system has an IR transmitter and IR receiver. When somebody enters in to bank then the buzzer will be on. Microcontroller continuously monitor the infrared receivers, when any object pass through the IR receiver's then the IR rays falling on the receiver's are obstructed this obstruction is sensed by the microcontroller. The implementation is made simpler by using IR sensor to detect the person or track the person. The system includes the IR sensor, microcontroller, LCD display, buzzer and 5V power is supplied to operate the system. The system uses a compact circuitry built around 8051 microcontroller program are developed in Embedded C. Flash magic is used for loading program into microcontroller. In this system, microcontroller continuously monitors the sensors of the biometric system (iris scanner and vein detector), the keypad for the authenticated code i.e. unique password and registered identification number, and the output of wireless motion detector. The wireless motion detector will be active during nights and if any variation occurs in its output, it will be sensed by the microcontroller and alert sounds will be given by it.

Index Terms- Security System, Biometrics, Authentication, Iris Scanner, Unique Password, Wireless Motion Detector.

---IJMTARC---

1. Introduction

We are going to make a project which every one required. Now a day it is very important to prevent bank from thief. We are saving our money in bank so it is equally important to save bank form thief. Now day by day the number of larceny is increasing so it is very important to prevent bank from burglar. Infrared radiation is part of the electromagnetic spectrum, which includes radio waves, microwaves, visible light, and ultraviolent light, as well as gamma rays and X-rays. The IR range falls between the visible portion of the spectrum and radio waves. IR wavelengths are usually expressed in microns, with the IR spectrum extending from 0.7 to 1000 microns. Only the 0.7-14 micron band is used for IR temperature measurement. Using advanced optic system and detectors, noncontact IR thermometers can focus on nearly any portion or portion of the 0.7-14micron band. Because of every object emits an optimum amount of IR energy at a specific point along the IR band, each process may require unique sensor models with specific optics and detector types.

The present system of security is not very efficient as it can be easily faked by the smart larceners as they can get hold of the keys or the password. Also it's a painstaking job for the administration of the banks to keep an account of the locker activities as there is no dedicated employee appointed for this. To get rid of these issues, bank security system like this one is needed which does not require any manual presence of the officer. This also reduces the waiting time of the customers. When any new customer wants to open a bank locker, they are supposed to get there iris scan and vein recognition scan done. They are also given a unique password and another password is any registered proof like the driving license number, passport number, voter id number or any other government authorized proof is also made of. They are also supposed to give alternatives to all the above samples so that it can be used to access the lockers in case of any misshape. The motion detector which functions in night helps in safeguarding the locker area for any theft furthermore. Biometrics refers to the identification of humans by their characteristics or traits.

2. Related Work

In this section some related works connected to the monitoring system using IR based microcontroller services.

The basic idea is to send infra red light through IR-LEDs, which is then reflected by any object in front of the sensor. Then all you have to do pick-up the reflected IR light. For detecting the reflected IR light that was emitted from another led off the exact

same type. It has developed a period water meter system for prepaid billing of water consumption through remote monitoring without any human involvement. This system may be fast and accurate billing of water as well as preventing any mishandling of it. In this system is used to control home application tenuously and offer security when the owner is away from the place. The similar work presented in which designed and developed a smart home application system. The system allows the property owner to be able to monitor and control the residence appliances via a mobile phone set by sending commands in the form of SMS message and receiving the home appliance status.

3. Proposed Method

In this proposed work, the basic idea is to send infra red light through IR-LEDs, which is then reflected by any object in front of the sensor. Then all you have to do is to pick-up the reflected IR light. For detecting the reflected IR light that was emitted from another led of the exact same type. This is an electrical property of Light Emitting Diode (LEDs) which is the fact that a led produces a voltage difference across its leads when it is subjected to the light. As if it was a photo cell, but with much lower output current. In other words, the voltage generated by the leds can't be in any used to generate electrical power from light. It can barely be detected that's why Opams are mostly used for accurately detection of low voltages.
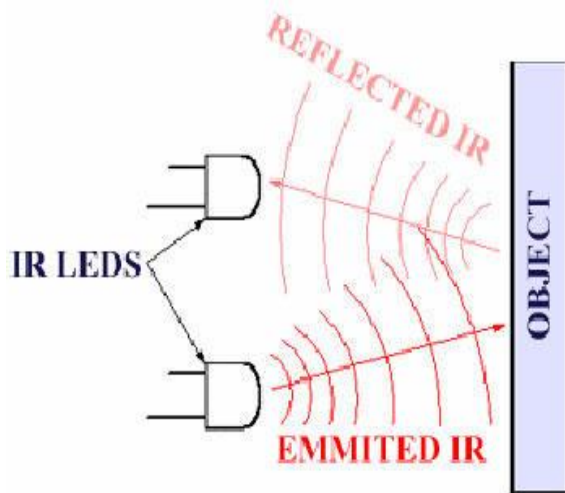

Fig 3.1 IR detection of

How the receiver of the sensor measures the distance of the intruding object

As you know this is an electrical property of Photo Voltaic Cells (Light Emitting Diodes (LEDs)) which is the fact that a led produce a voltage difference across it is subjected to light. So by using this property you can measure the distance of an object. The

output of these is in Analog voltage format. It varies from distance from object. So you can interface it with an ADC and then read this analog voltage by using micro controller and calibrate it into any scale.

3.1 Iris Scanner

A vein Iris scanning may seem to be something which is very innovative but it's a simple CCD (Charge Coupling Device) digital camera which uses visible and near-infrared light to capture a clear, high contrast picture of a person's iris. The use of near infrared light is to differentiate the pupil and iris of a person as person's pupil is very black, making it easy for the computer. When we look into an iris scanner, the camera, which is 3 to 10 from your eyes, take a picture, the computer locates i) The center of the pupil ii) The edge of the pupil iii) The edge of the iris iv) The eyelids and eyelashes, then analyzes the patterns in the iris and translates them into a template. Iris scanners are becoming a source of authentication of any individual as everyone has unique eyes.
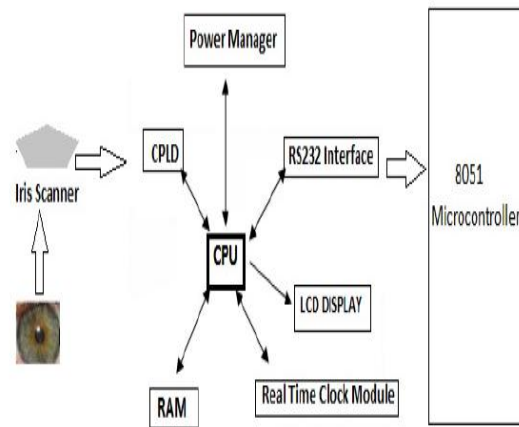

Fig 3.1.1 Architecture of the Iris scanning mechanism

There are more than 200 reference points stored in every template for comparison. Through the iris is visible it's protected, and does not change with time. In most cases, people's eyes even remain unchanged post an eye surgery. Even the blind people can use this facility. Also, the presence of eyeglasses or contact lenses doesn't cause interference. The hard ware part of wireless iris recognition system is made up of iris recognition verifying module, microcontroller, power module, real time clock module, and LED display module. Figure 3.2 shows the architecture of hard ware design. 8051 microcontroller is interfaced using RS232 interface in the form of transmitting and receiving data packet with the output of CPU. The power module supplies the necessary power and makes sure that the system is functional even when the available power is less. The real time clock module satisfies the accuracy of the time needed for the database purpose. The LED display tells if

the authentication is confirmed or not. The microcontroller leads to the next level even if the validation fails.

3.2 Vein Detection

As mentioned in case of irises, every individual's veins are completely distinctive. Even the twins don't have identical veins. The right and left side of any individual's veins are also different. Most of the veins are not visible through the skin, and hence can't be simply forged or fiddled with. Similar to the case of iris their shape doesn't change with age. In this IR LED system, you can use your finger print, wrist, palm or the back of your hand to scan. The near infrared light is used by the camera to capture the image. The light is absorbed by the hemoglobin and the veins appear to be black in picture. This picture is used to create a template which is stored and then compared whenever required.
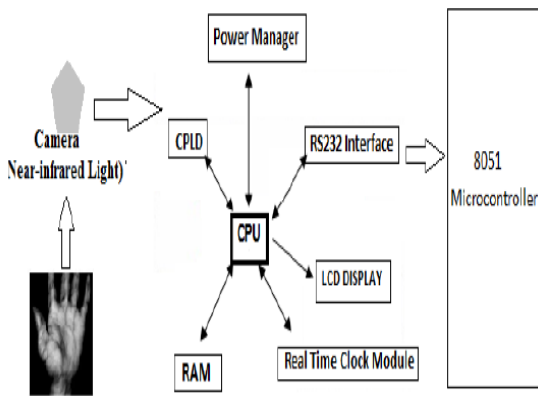

Fig 3.32.1 Vein Detector

Fig 3.2.2 Architecture of Vein Recognition system

The hardware architecture consists of a Near-infrared Camera which is a device interested for capturing of the veins patterns. They are processed for verification by the CPU by the Complex Programming Logic Design (CPLD). The device consists of an illumination unit with infrared diodes a digital signal processor is attached for video preprocessing and image enhancement processing. Then there is a microcontroller to control the peripherals. The memory is present to store the enciphered templates. When a limb is placed in its nearby region of the led source, it radiates the infrared rays on the hand and then the IR camera captures the image veins and then stored them. Figure 3.4 shows the architectural arrangement.

3.3 Digital Code Lock

This is a lock which unlike the above two is not common to the locker cluster. It's individually installed at the door of every locker. This is a microprocessor based digital lock system which gets open if the right password is entered. The password is numeric without any characters and the password of 4 numbers is mandatory. The lock interfaced with the microcontroller and has a memory with it for the storage of password. There are three trails given, if the validation is not done then the system gives in danger signal and then authentication fails.
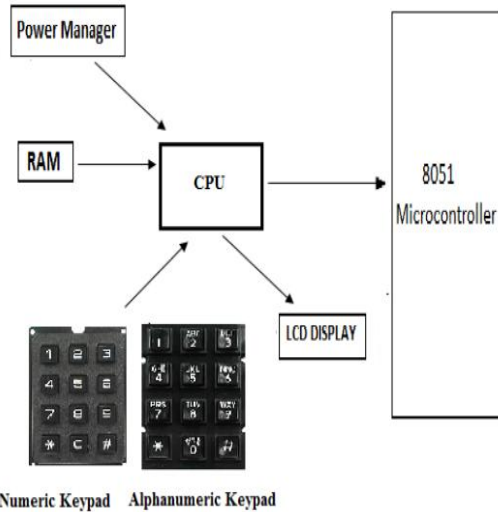

Fig 3.3.1 Architecture of Digital lock

The lock consists of a LCD screen, keyboard and a microprocessor 8051. The keyboard consists of 12 keys i.e. [4x3] from 1,2,3,4,5,6,7,8,9,*,0,# and is used to input the password. Where * is used for to delete one single digit. When 6 digit passwords is entered, then # is pressed to submit that password. LCD screen is used for display. Here the LCD is used to show the typed digits and to act as interference between the microprocessor and the user. The architecture has shown in figure 3.3.1.

3.4 Wireless Motion Detector

Motion detecting sensors are revolutionary security equipment which give excellent security to banks. The crystals which show piezoelectric effect i.e. if the encounter any slightest change in the infrared radiations in the form of heat they generates current on their surface, are the material which are used as thermal sensors. Every human body emits infrared radiation which is approximately 9.4 micrometer in wavelength. Hence motion of any human results In changes in local infrared radiation pattern In the vicinity of the sensor. By using of Fresnel lens, the radiation can be focused on the sensor. As this is made to function only in night there is no possibility that any sunlight related temperature changes it triggers the response of a motion sensor unnecessary. Wireless motion detector consists of 8051 microcontroller and PIR sensor module. PIR sensor is a three pin connector those are VCC, output and ground. Whenever a motion sensed the voltage reaches its peak. Microcontroller manages the voltage of collector of the transistor. In the normal conditions transistor is cut off and collector voltage at its high. When the IR sensor sensed the motion at that time the high output from the sensor module saturates the transistor and the voltage at the collector drops down to logic low and the Buzzer is switched on.

3.5 Infrared Technology

Infrared imaging is used extensively for both military and civilian purposes. Non military uses include thermal efficiency analysis, remote temperature sensing, short ranged wireless communication, spectroscopy, and weather forecasting. Infrared astronomy uses sensor-equipped telescopes to penetrate dusty regions of space such as molecular clouds detect cool objects such as planets and to view highly red shifted objects from the early days of the universe.
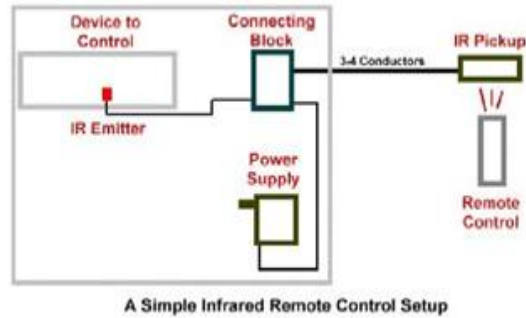

Fig 3.65.1 A simple infrared remote control setup.

Good alignment of the emitter and detector is important for good operation especially if the gap is large. This can be done with a piece of string stretched between and in line with LED and phototransistor.

Infrared receiver: This device picks up the infrared signal from remote control just like a TV or VCR. It encodes the infrared signal into a signal suitable for transmission. Receivers must be located in the room you wish to use the remote control.

Infrared Emitters: IR Emitters generally stick onto the front of the device you want to control anything. Blink emitter blink visibly as well as infrared so they are easier to troubleshoot. All emitters come with long cords and extra double stick tape.

4. Flow of Control

The bank locker has a series of equipments. Once the person enters the locker area either he/she has to undergo four authentication tests. First one is the iris scan. In this test the iris of the persons is scanned using a special machine which compares the iris with the scanned records stored at the same time of opening of the account otherwise recognize we recognize the face of the person is scanned. After this the next step is vein detection, every person have unique vein position and this detector would compare present vein template with the stored templates. If none of these two tests are cleared then the next step is the digital code lock in which a person has to enter a unique registered identification card. Submitted during the opening of an account opening of an account and the matching code has to be entered identification proof.

The final outputs of these equipments are interface with a Microcontroller which checks for authentication. Out of the four levels if any three outputs are validated the locker opens. This concept is very help full in many ways. In case a person fails to bring his registered identification number or has lost his possession, he can still manage to open the locker if the other three authentications are positive. Similarly if someone is unable to validate the first two banks closing hour till the time the bank opens. It can even work on specific days when the bank is off. The
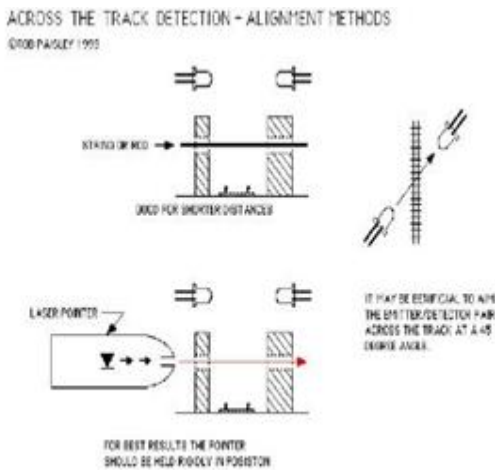
buzzer system is designed in such a way that it gives alarm not only to the security officials in the bank but to the local police station as well.
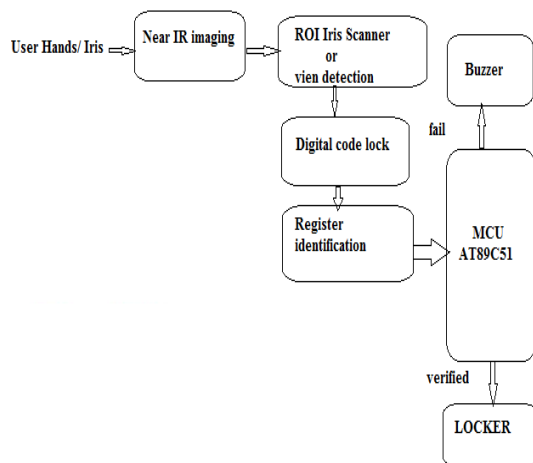

Fig 4.1 Block diagram of the flow of control.

5. Conclusion

This is a real time application based which tells that there is a need to bring in a revolution in the bank locker security by making the procedure a little easy and more systematic for the bank officials. It is a low cost, low in power conception, compact in size and standalone system. The microcontroller compares the authentication details and passwords entered by the keyboard. If the authentication details and these passwords are correct the microcontroller provides necessary control signal to open the bank locker. This is just a proposed model which when implemented would surely gives a very good protection of the lockers curbing theft and making the lockers more reliable. The assurance it will gives to the bank customers will force them to use it and hence protect their valuables from theft or any kind of robbery. As this is protected by the the vicinity sensor hence can detect any unwanted or forced entry inside the bank locker area and can protect the lockers in the most efficient way.

References

[1] http://en.wikipedia.org/wiki/Biometrics

[2]http://science.howstuffworks.com/biometrics4.htm

[3]http://science.howstuffworks.com/biometrics5.htm

[4] Ani1 K. Jain, Arun Ross, and Sharath Pankanti, "A Prototype Hand Geometly-based Verification System," Proc. of 2nd Int. Conf. on Audio- and Video-based Biometric Person Authentication, Washington D.C., pp.166-171, March 22-24, 2012.

[5] Daugman, John (2003). "The importance of being random: statistical principles of iris recognition" (PDF). Pattern Recognition 36 (2): –291. doi:10.1016/S0031 -3203(02)00030-4

[6] Daugman, John (2003). "The importance of being random: statistical principles of iris recognition" (PDF). Pattern Recognition 36 (2): 279–291. doi:10.1016/S0031-3203(02)00030-4

[7] Allen, Jonathan (28 July 2011). "New York hospital using palm-scanners". Stuff.co.nz. Retrieved 30 July 2011.

 Ahmed Salih is working as Assistant Lecturer in AL Mustansiriya University/college of Engineering / Computers &Software Eng. Dept. Ahmed salih was completed B.SC in control &system engineering /university of technology/ Baghdad 1978, and M.SC   in electronic computer engineering university of technology Baghdad 1983 .