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INVISIBLE SECURITY SYSTEM FOR HIGHLY SECURED LOCKER

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ABSTRACT

The concept presented here is aimed to provide full pledged electronic security system for the special purpose locker where only authorized person can operate the locker. When an intruder enters the guarded area at the entrance of locker room, the electronic observing system detects the intruder and delivers the beep sound for little time, after that the intruder must confirm his/her identity through a RF identity card allotted to him or her. The RF card decoding system interfaced with main processor detects the authorized person and details will be displayed through an LCD. If the person is authorized, the sliding door mechanism will be activated and it will be opened automatically and information in the form of user details will be transmitted to the concern authority through GSM module. Once the sliding door is opened, it will be closed automatically and after that the user must prove his identity again to open the locker. Here invisible type of sensors arranged other side of the non conducting material, and by activating these sensors one after another in a sequence through a small permanent magnet, the system energizes the flashing green LED which indicates that the locker is open.

The invisible fence is constructed with IR sensors and these sensors arranged over tiny poles parallel to each other must be arranged at the entrance of the door. As the person passing between the sensors, the IR signal will be interrupted and raises the beep sound for few seconds. After that the authorized person must prove his identity in two steps by which the system energizes the flashing LED and sliding door mechanism which simulates that the locker is opened by an authorized person. Once the sliding door is opened, it remains in open condition for few seconds and after that the door will be closed automatically. The main processor is constructed with Arduino Uno board and the magnetic switches arranged at either side of the board are interfaced with 89c2051 microcontroller chip. Here entire system is designed as two parts, in second part, Hall Effect sensors are used and they can be activated through a small magnet. Here these sensors must be activated one after another in a sequence of specific pattern and if the sequence matches with pre-defined program, green LED starts flashing that indicates that the locker is opened.

I. INTRODUCTION

The main purpose of the project work is to describe the highly secured electronic security system that also included motorized sliding door mechanism which is intended to perform better demonstration. This mechanism constructed with DC motor will be opened and closed automatically for authorized persons. The authorized person must prove his/her identity through an RFID card. If the system detects correct RFID card, the door will be opened automatically.To prove the basic concept of sliding door practically, here this system is developed and for demo purpose a mini door mechanism will be constructed which will be opened automatically by sensing the Authorized ID card. The subject of 'Mechatronics' and a part of it are adopted to fabricate this mechanism by using electro-mechanical components.12V DC motor built-in-with reduction gear mechanism is used to drive the door in both directions and with the help of two limit switches interfaced with main processor designed with Arduino Mega board, door movements are restricted to a specific dent positions.

As described in the abstract infrared sensors are used to detect the approaching person and these sensors are arranged at the entrance of sliding door. These sensors arranged over tiny poles at little height must be placed parallel to each other with a distance of 15cm's approximately. Whenever any person passes between the sensors, the IR signal delivered by the IR signal transmitter LED will be interrupted by which the trigger circuit constructed with IC567 generates a logic high signal for the processor and based on this signal the alarm will be energized for momentarily to alert the concern person near the door. Whenever the door is opened for authorized person, the information in the form of user name, designation, etc, will be passed to the concern authority through GSM module.. Concern authorized mobile phone number must be stored in to the main

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processor by which the information will be transmitted to that specific number in the form SMS. The RFID reader interfaced with main processor can read the data of RFID card by which the main processor displays the card details through an LCD and this same information will be transmitted to the concern mobile phone.

Once the door is opened, it will be closed automatically after specific time, means the user must pass through the door without any delay. The same door can be opened by activating open key installed inside the door. This facility is essential to the authorized person to come out from the room after finishing the job. The assigned job is to open a secret locker for specific reason and here locker is simulated by energizing the green flashing light. Here Hall Effect sensors are used to create secret code such that these sensors must be activated one after another in a sequence. If the sequence is correct, than green LED starts flashing which indicates that the locker is open. Hear a specific pattern can be used to energize the sensors in sequence which is known as symbolic representation. With the help of a piece of permanent magnet, Hall Effect sensors can be activated.

II. METHODOLOGY

Since the system is intended to provide security to the special locker, the security system is designed in two steps there by the unauthorized entry is strictly restricted. In first step, locker room door must be opened for authorized entry for which the authorized person must prove his identity through RFID card. Here to detect the approaching person at the entrance of locker room, IR sensors are used to detect the person near the door. This is a invisible type of intruder detecting concept is introduced to detect the approaching person. Here unique proximity sensing concept is presented that contains Infra Red beam that is not visible. Here one set of IR sensors are used and are arranged over tiny poles at certain height. Means, one pole contains an IR signal generating LED & the other pole must be equipped with IR sensor LED and both these poles must be arranged parallel to each other by which the IR signal delivered from the IR signal radiating LED must fall on the IR signal detecting LED.

The arrangement must be made in such a fashion so that the IR energy delivered from one pole must be reached to the IR sensor arranged over another pole. Likewise sensors must be aligned properly. Means, IR energy delivering LED and IR signal sensor must be parallel to each other by which the IR beam will be focused over the IR sensor. As IR energy transmits in uni-direction like laser beam, the IR sensor must be placed parallel to the IR beam, otherwise the sensor cannot detect the IR signal. Likewise sensors must be mounted over poles. Since it is a prototype module, short range sensors are considered for demo purpose and the range is defined as 15 to 20 inches approximately. This range is also high for prototype module, because the demo module cannot be more than 12 square inches. Here one square feet area is considered and all required components are assembled over a wooden plank.

Photoelectric beam system is presented here to detect the presence of an intruder by transmitting infrared light beams at the entrance of locker room, where the IR beam may be obstructed due to the entering person. The range depends up on the power transmitting capacity of the IR LED. When a high power IR LED is used, correspondingly suitable current amplifiers must be used to enhance the range. Presently, here in this project work, simple IR LED is used and in our trail runs we found that the range is around one meter. Since it is long range, this range is restricted to less than 10inches. In general, Infrared light beams can be disturbed by using focusing type of torchlight's, in addition when these beams are exposed to Sunlight, primary purpose will be disturbed. To prevent this kind of disturbance, infrared light beams must be made as modulated light source.

As per the main circuit diagram provided in the following chapter, the process or function begins with IR sensors. Here one set of IR sensors are used and it contains IR energy radiating LED and IR signal detector. These two components are wired with IC 567. The idea of using this device is to generate IR signal at specific frequency and transmit along with the IR energy. In this method, the signal data traveling along with IR energy will not be disturbed with other light sources. When this kind information bearing IR signal falls on IR sensor wired with other section of the IC, its output status (high or low) will be changed automatically depending up on the signal presence or no signal. Here the IR LED and IR signal sensor arranged parallel to each other at certain distance over the poles and as long as IR signal falls on the IR sensor, IC output remains in zero state. Whenever the IR beam is broken due to the passing intruder, IC output will become high. Based on this signal, the Arduino processor can activate the buzzer automatically.

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Contact less proximity detection scheme is designed with infrared sensors which are aimed to detect the entering persons. This technique is called IR remote detection method. Generally this concept is used to detect the broken link of IR beam. Proximity sensors are used for many applications. Depending up on the type of application, sensors must be selected. Here in this project work, as the task is simple, normal commercial type of sensors are selected for the purpose of sensing the approaching person. As these are common type of sensors, the range is less when compared with specialized sensors used for specific applications.

III. MODELING AND ANALYSIS

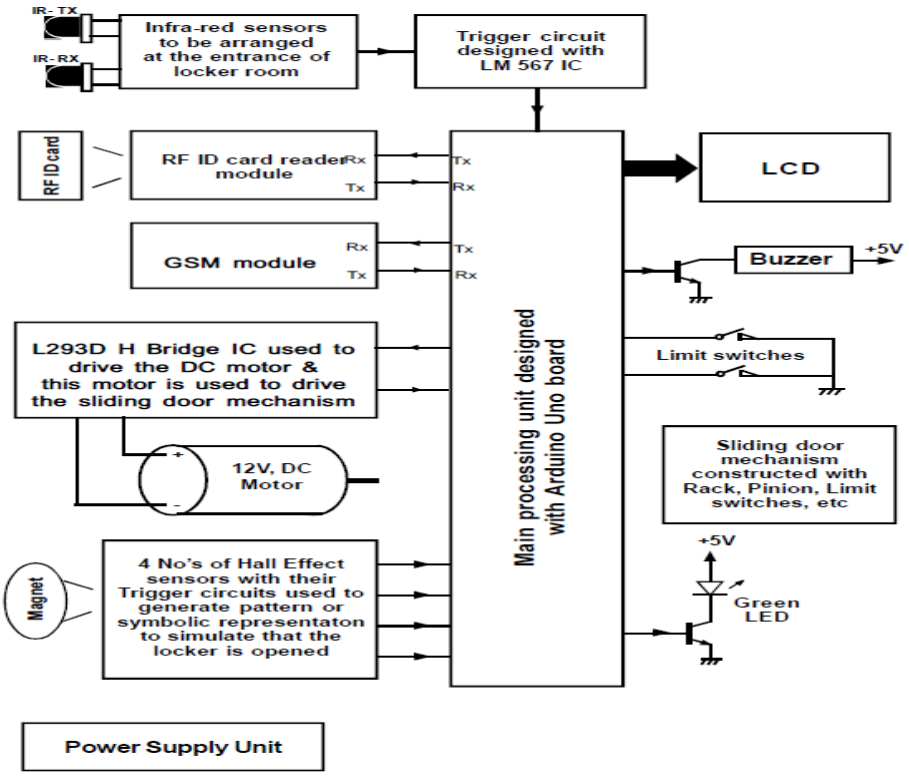

Figure 1: Block Diagram

IV. RESULTS AND DISCUSSION

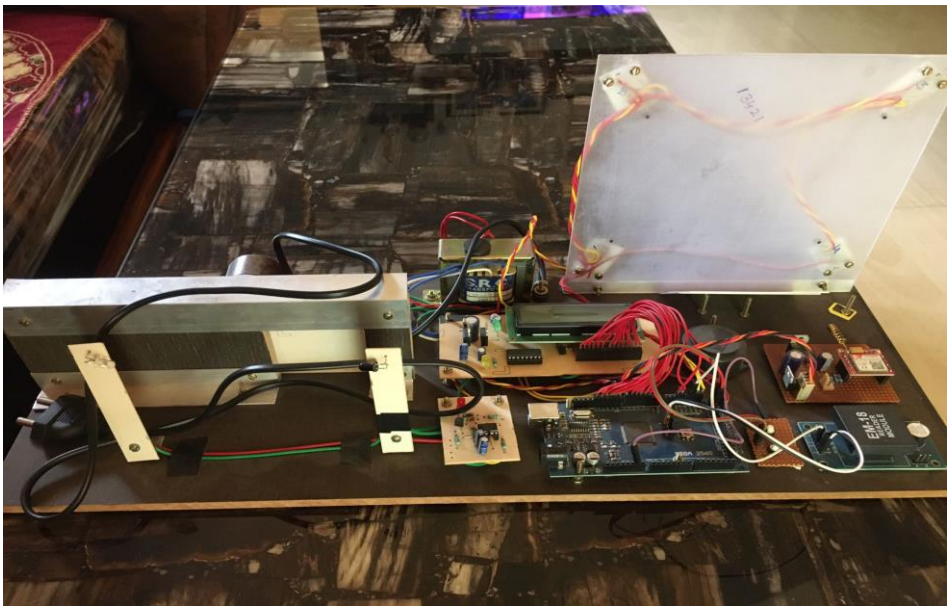

Figure2: Invisible Security System For Highly Secured Locker

V. CONCLUSION

The main purpose of this project work is to design and implement a highly secured locker system based on RFID, GSM, symbolic representation technique, automatic sliding door, etc. the system designed here is very useful for banks, ammunition go-downs for military applications, etc. presently this security system is designed as 3 stages, means the user must prove his/her identity in two steps. In addition to enhance the safety level, finger print and Image processing technology are also can be included in the system to enhance the security level further. In this concept, only authentic person can able to operate locker.

It is a low cost, low in power conception, compact in size and standalone system. The main processor designed with Arduino board is programmed to perform the function of full fledged security system that is mentioned in abstract. If required the level of security can be enhanced by adaptoing advanced security devices mentioned above.

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