Multilevel Security System

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Abstract-In today's world, security is of paramount importance and undeniably cannot be overlooked. Consequently, this demands the need for something more secure along with being more user-friendly and cost effective. Premises security has been a major issue where crime is increasing and everybody wants to take proper measures to prevent intrusion. Therefore, we have strained to raise the security by involving multiple level security tactics comprising of Encrypted Data Communication and Fingerprint Scanner. System will work on different wireless communications. The aim of this paper is to investigate a cost effective solution that will provide controlling of security premises and will also enable premises security against intrusion.

Keywords:-Data Encryption, Fingerprint Scanning.

I. INTRODUCTION

In the present day and age, one can never be too careful. If you are working in an office, there are guards present 24*7, and the facility is also monitored by CCTV cameras. Even in your very own home, a security system is needed to prevent any kind of theft, robbery etc.

But the earlier methods used are erroneous and cannot be relied upon. The guards guarding the premises can easily be duped and security can be easily breached. Even the CCTV cameras used do not cover the entire area under surveillance.

Therefore, we have strained to raise the security by involving multiple level security tactics comprising of EncryptedData Communication and Fingerprint Scanner. The first level of project involves vehicle authentication at the gate to permit only the authorized vehicle along with an alarming buzzer in case of an invasion. The second level involves a fingerprint scanner to confirm personnel verification of the driver along with an alarming buzzer in case of unauthorized personnel.

A. Data Encryption

Data encryption translates data into another form, or code, so that only people with access to a secret key or password can read it. Encrypted data commonly referred to a cypher text while unencrypted referred to as plaintext. Currently, encryption is one of the most popular and effective data security methods. The purpose of data encryption is to protect digital data confidentiality as it is stored in a database. The algorithm used for data encryption provides confidentiality and drive key security initiatives including authenticity, integrity, and non-repudiation. Authentication allows for the verification of the messages' origin and integrity provides that the message's contents have not changed since it was sent. Non-repudiation ensures that the message sender cannot deny sending the message.

The data is encrypted with an encryption algorithm and encryption key. The process results in cipher text which can only be viewed in its original form if it is decrypted with the correct key.

B. Finger Print Scanning

Fingerprint scanning is a biometric process, because it involves the automated capture, analysis, and comparison of a specific characteristic of the human body. There are several different ways in which an instrument can bring out the details in the pattern of raised areas (called ridges) and branches (called bifurcations) in a human finger image. The most common methods are optical, thermal, and tactile. They work using visible light analysis, heat-emission analysis, and pressure analysis, respectively. A fingerprint scanner is a type of technology that identifies and authenticates the fingerprints of an individual in order to grant or deny access to a computer system or a physical facility.

It is a type of biometric security technology that utilizes the combination of hardware and software techniques to identify the fingerprint scans of an individual.

A fingerprint scanner typically works by first recording fingerprint scans of all authorized individuals for a particular system or facility. These scans are saved within a database. The user requiring access puts their finger on a hardware scanner, which scans and copies the input from the individual and looks for any similarity within the already-stored scans. If there is a positive match, the individual is granted access.

II. PROPOSED SYSTEM

We are using RF sensor module and finger print detector module interfaced on PIC microcontroller because it is very advanced and cost effective. in our application which is entirely dedicated to ensure security to the premises of an office, school or to the offices where security is of utmost priority. as security personnel are not that much active and attentive in providing security, we have implemented a system to assure the security. Our system is low maintenance system where things can be implemented via hardware and software without any complex programming.
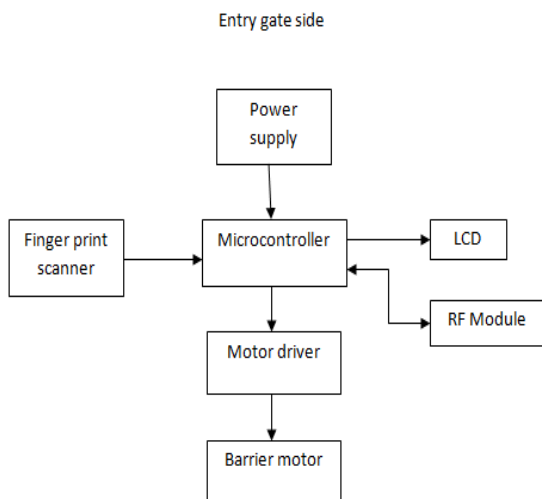
Entry gate side

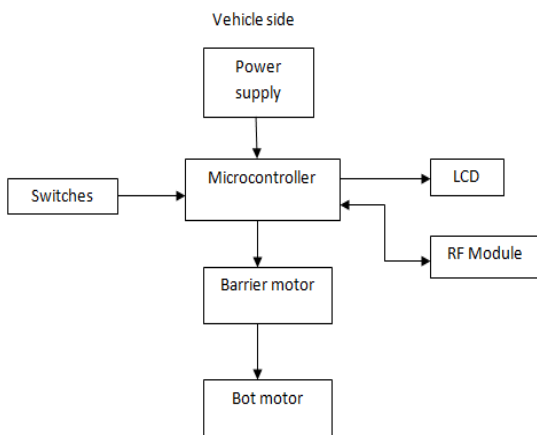Fig.1 Block Diagram of Entry Gate System

Vehicle side

Fig.2 Block Diagram of Vehicle System

Two systems will be installed at the entry gate and in the vehicle respectively. Initially, when the vehicle will reach the entry gate, it will receive a signal at the RXD pin of RF transceiver from the system at the entry gate requesting for a code. The person sitting in the car will send the respective code with help of a switch through the TXD pin of the RF transceiver. After the code is sent, it will be received by the entry gate system at the RXD pin of RF transceiver. If the code matches with the expected code, "authorized person" will be displayed on the LCD of the entry gate system. Once the code is verified, it confirms that the vehicle is authorized, signal will be sent back to the microcontroller of the entry gate system. After receiving the confirmation, the controller will send the respective signal to the input pin of the motor driving IC which in turn will rotate the motor to open the entry gate. Once the gate is opened, the vehicle can enter the premises. Now, as there is no vehicle over there, it will rotate the motor to close the entry gate. Once the person along with the car enters the premises, there is a provision of finger print detection at the entry gate of the building. the principle behind the finger print detection is that each authorized person of that premise will have his finger print data be registered in the database of operating system of finger print detection system .so ,if the person is authorized , once he scans his finger print," person ID-n" is authorized and he will be allowed to enter the building or office. This will what be carried out if the vehicle and the person are authorized.

But if the code communication between the vehicle system and the entry gate system is not verified, "Unauthorized person" will appear on the LCD of the entry gate system and simultaneously a buzzer or alert sound will be produced. Thus, the security personnel will come to know about the threat and he will take the respective action. Similarly, at the entry gate of the premises, the person will have to go through the finger print verification and if the person is unauthorized, "unauthorized person" will be displayed on the LCD and simultaneously a buzzer or alert sound will be produced .thus the security person will come to know about the threat and will take the respective action. This will what be carried out if an unauthorized person try to enter the premises.

III. IMPLEMENTATION

A. Components of the Project

a). Microcontroller

PIC is a family of microcontrollers made by Microchip Technology, the name PIC initially referred to Peripheral Interface Controller. It is 32 pin IC with High performance RISC architecture. It has 2048 Kbyte program memory and 128 byte RAM and 128 byte SRAM. Also it has 28 I/O PINS, 1 USART and three timers, two 8bit and one 16 bit. It is based

on the CMOS technology. Early models of pic had read only memory or field programmable EPROM for program storage, some with provision for the memory. The hardware functions of multifunction i/o pins of the PICareadc, dac,usart,i2c,CAN,USB etc.

The at89c2051 is also used in the vehicle system is a low voltage, high performance CMOS 8-bit microcontroller with 2kb of flash programmable and erasable read only memory.it provides following features-2k bytes of flash,128 bytes of RAM ,15i/o ports,tw0 16 bit timer/counter, a full duplex serial port, on chip oscillatoretc.

b). RF Transceiver

The CC250 is a low-cost 2.4 GHz transceiver designed for very low-power wireless applications. The circuit is intended for the 24002483.5 MHz ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band. The RF transceiver is integrated with a highly configurable baseband modem. The modem supports various modulation formats and has a configurable data rate up to 500K baud. CC2500 provides extensive hardware support for packet handling, data buffering, burst transmissions, clear channel assessment, link quality indication, andwake-on-radio.

RF Performance

- High sensitivity (–104 dBm at 2.4K Baud, 1% packet errorrate)
- Low current consumption (13.3 mA in RX, 250K Baud, input well above sensitivitylimit)
- Programmable output power up to +1dBmexcellent receiver selectivity and blocking performance
- Programmable data rate from 1.2 to 500KBaud.

In our project, this is used for sending and receiving data while the encrypted communication between the entry gate system and vehicle system.

c). Voltage Regulator

The AC power supply gets converted into constant DC by this circuit. By the help of a voltage regulator DC, unregulated output will be fixed to a constant voltage equal to 5 volt, short circuit protection, and Thermal overload protection.
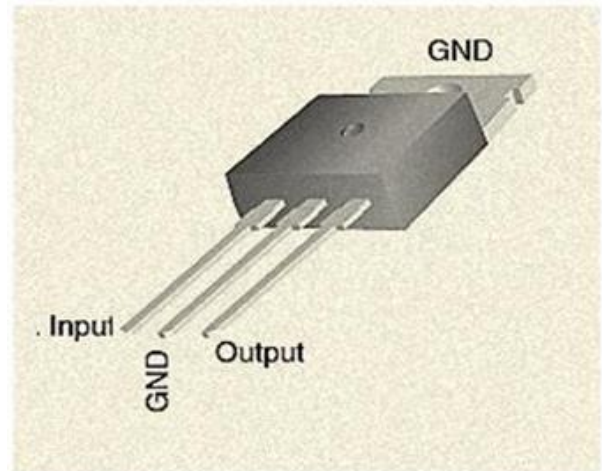

Fig.3 voltage regulator IC (LM7805)

PIN NO.	PIN	DESCRIPTION
1	INPUT	In this pin of the IC positive unregulated voltage is given in regulation.
2	GROUND	In this pin where the ground is given. This pin is neutral for equally the input and output.
3	OUTPUT	The output of the regulated 5V volt is taken out at this pin of the IC regulator.

d). Motor Driver

A motor driver IC is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot.

In our project, we are using L293D motor driver IC.These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. For this tutorial we will be referring the motor driver IC as L293D only. L293D has 16 pins, they are comprised as follows: Groundpins-4

Input pins-4 Output pins-4 Enable pins-2 Voltage pins-2

Most microprocessors operate at low voltages and require a small amount of current to operate while the motors require a relatively higher voltages and current. Thus current cannot be supplied to the motors from the microprocessor. This is the primary need for the motor driver.

Working

The L293D is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. There are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. The Theory for working of a H-bridge is given below.

H-bridge is given this name because it can be modeled as four switches on the corners of 'H'. The basic diagram of H-bridge is given below
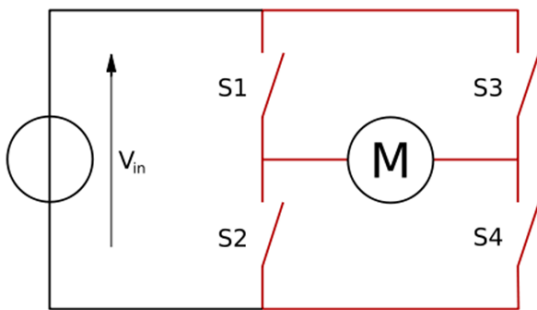
In the given diagram, the arrow on the left points to the higher potential side of the input voltage of the circuit. Now if the switches S1 & S4 are kept in a closed position while the switches S2 & S3 are kept in a open position meaning that the circuit gets shorted across the switches S1 & S4. This creates a path for the current to flow, starting from the V input to switch S1 to the motor, then to switch S4 and then the exiting from the circuit. This flow of the current would make the motor turn in one direction. The direction of motion of the motor can be clockwise or anti-clockwise; this is because the rotation of the motor depends upon the connection of the terminals of the motor with the switches. For simplicity, let's assume that in this condition the motor rotates in a clockwise direction.

Now, when S3 and S2 are closed then
And S1 and S4 are kept open then the current flows from the other direction and the motor will now definitely rotates in

counter-clockwise direction. When S1 and S3 are closed and S2 and S4 are open then the STALL condition will occur. (The motor will break).

e). LCD

16×2 LCD module is a very common type of LCD module that is used in 8051 based embedded projects. It consists of 16 rows and 2 columns of 5×7 or 5×8 LCD dot matrices. The module are talking about here is type number JHD162A which is a very popular one. It is available in a 16 pin package with back light, contrast adjustment function and each dot matrix has 5×8 dot resolution.

VEE pin is meant for adjusting the contrast of the LCD display and the contrast can be adjusted by varying the voltage at this pin. This is done by connecting one end of a POT to the Vcc (5V), other end to the Ground and connecting the center terminal (wiper) of the POT to the VEE pin. See the circuit diagram for better understanding.

The JHD162A has two built in registers namely data register and command register. Data register is for placing the data to be displayed, and the command register is to place the commands.

The 16×2 LCD module has a set of commands each meant for doing a particular job with the display.

High logic at the RS pin will select the data register and Low logic at the RS pin will select the command register. If we make the RS pin high and the put a data in the 8 bit data line (DB0 to DB7), the LCD module will recognize it as a data to be displayed. If we make RS pin low and put a data on the data line, the module will recognize it as a command.

R/W pin is meant for selecting between read and write modes. High level at this pin enables read mode and low level at this pin enables write mode.

E pin is for enabling the module. A high to low transition at this pin will enable the module.

DB0 to DB7 are the data pins. The data to be displayed and the command instructions are placed on these pins.

LED+ is the anode of the back light LED and this pin must be connected to Vic through a suitable series current limiting resistor.

LED- is the cathode of the back light LED and this pin must be connected to ground
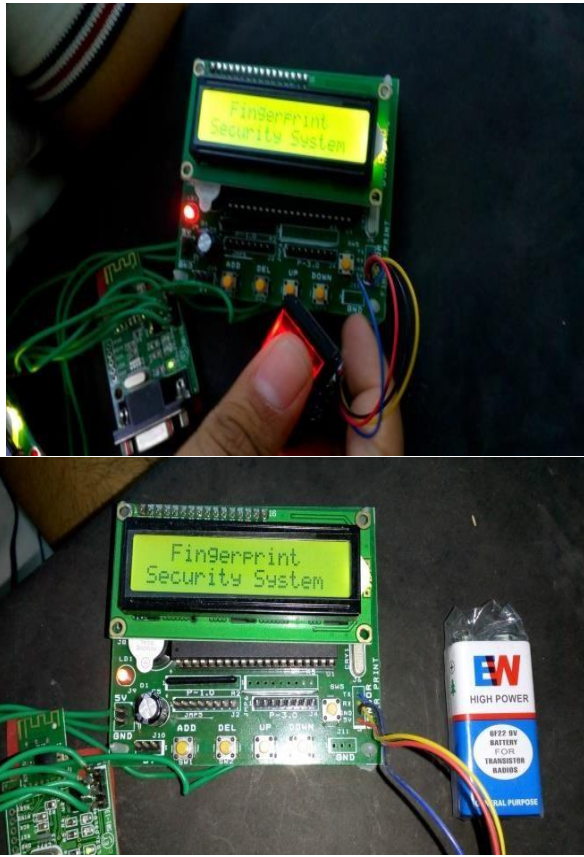
B. Shanp Shot

Fig: implemented system

C. Flowchart

IV. CONCLUSION AND ADVANCEMENTS

With the current system, an ease of security has been achieved with significant accuracy.

Though the system is in its prototype stage its cost is comparatively high, but in the later future when the system will be subjected to mass production the cost will be drastically reduced. The system can be made more faithful by acquiring various certificates from National and International Agencies concerned with human safety and security.

As it is already specified that the built system is capable of providing security, immediate action is very much possible in case of invasion. It will help in providing overall security to premises, offices or the area where high security is of utmost importance.

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