

Auto-Fact Security System

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Abstract

"Science is the study of the world as it is. Engineering is the creation of the world tomorrow". Science is basically "passive" observation of the universe, as it exists to generate knowledge. Engineering is making use of that knowledge to meet human needs by creating machine, systems, process and technologies that have not previously existed. In present systems number of applications & devices are operated manually. In school & college also after every class, one employee is engaged into alarming bell. To avoid this, atomization is very much necessary. This paper "Auto-fact security system" includes auto door system that is automatic opening closing of door using IR rays having frequency 430THz. Along with this we are also providing authentication through RF module. This RF module consists of a transmitter receiver pair which runs on 434MHz frequency. Operation of two doors is performed with the help of microcontroller 89c51 IC. This IC controls all the operations running in the interfaces, the input output devices like motor driver IC L293D, buzzer, etc. The first door is opened through the motor driver IC when there is an obstruction between IR transmitter and receiver. The second door is opened only for the authorized person of the factory having RF transmitter with them. If any unauthorized person tries to enter through the second door the buzzer will turn ON and the system will be locked and the person will get trapped.

Keywords: Microcontroller, IR rays, RF module, Motor driver, Buzzer

I. INTRODUCTION

This paper is all about to provide easily affordable IR industrial automation as well as security system for Industry, Factory and Colleges or for any important room where you want to have security by connecting RF Transmitter and receiver at the entrance of the room. Automatic opening and closing of doors is designed using IR rays. For that purpose an IR transmitter-receiver pair is used and for the mechanical working a motor is driven with the help of motor driver IC L293D. The IR transmitter receiver pair is connected to the micro controller 89c51 which is connected with a buzzer. This helps to provide security to the system. Buzzers and indicators are used for alerting purpose. LED's are used as indicators. They help to provide security to the system. This RF module comprises of RF transmitter and an RF receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434MHz. It is used for authentication purpose.

The 89c51 microcontroller IC is interfaced with IR transmitter-receiver pair, RF module, L293D motor driver IC, relays, buzzers, power supply together and controls all the operations. The power supply (12-10-12) provides voltage of 12V to motor driver IC L293D and 5V to the remaining components of the circuit. Whenever the microcontroller gets an interrupt from door 1 it gives signal to L293D and the door is opened and closed after the time slot as set in controller. For door 2 there is authentication provided with the help of RF module. If the interrupt is given through RF transmitter and the IR rays gets an obstacle then with such interrupt the controller IC activates the buzzer and a signal is passed to lock both the doors, so the unauthenticated person is tapped in between the doors.

II. METHODOLOGY

A motion sensor is the linchpin of the security system. Infrared radiation exists in the electromagnetic spectrum at a wavelength that is longer than visible light. It cannot be seen but it can be detected. Objects that generate heat also generate infrared radiation and those objects include animals and the human body whose radiation is strongest at a wavelength of 9.4um are detected as seen in Fig(1)

Infrared (IR) radiation is electromagnetic radiation with a wavelength between 0.7 and 300 micrometre, which equates to a frequency range approximately between 1 and 430THz. Its wavelength is longer (and the frequency lower) than that of visible light, but the wavelength is shorter (and the frequency higher) than that of terahertz radiation microwaves.

The 89C51 microcontroller IC is interfaced with IR sensors. When a human being is sensed by the sensor, then it sends a signal to the micro controller. Then the microcontroller sends a signal to the motor driver IC, which in turn opens the door. Algorithm specified in Fig(2), Fig(3) and Fig(4) shows the flow of all the operations performed.

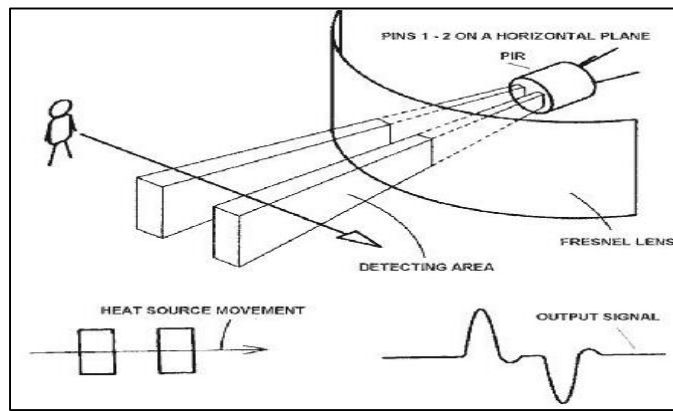


Fig. 1: PIR sensor

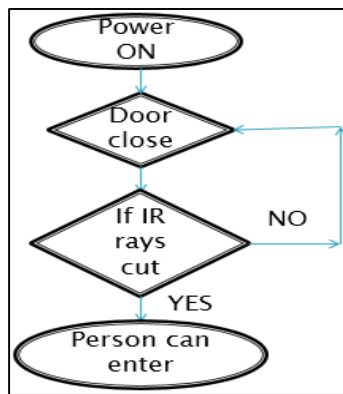


Fig. 2: First door working

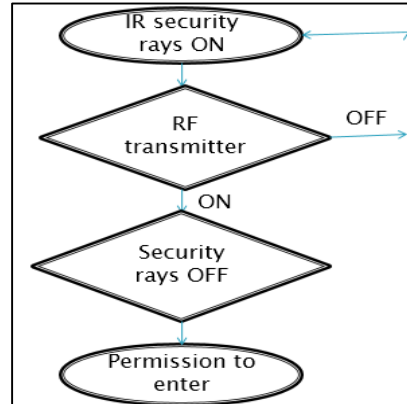


Fig. 3: Working of authentication door

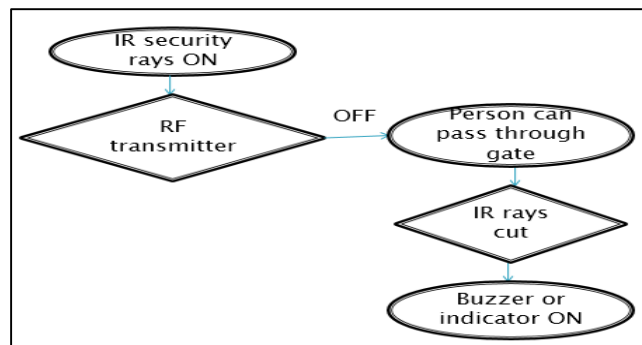


Fig. 4: Working of authenticated door for non authorized person

III. OVERVIEW OF ELECTRONIC CIRCUITS

The 89C51 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high density non-volatile memory technology and is compatible with the industry standard 80c51 and 80c52 instruction set and pin out. The on chip flash allows the program memory to be reprogrammed in system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control application. Circuit diagram for controlling through microcontroller is shown in Fig(5).

In mains-supplied electronic systems the AC input voltage must be converted into a DC voltage with the right value and degree of stabilization. In the basic configuration the peak voltage across the load is equal to the peak value of the AC voltage supplied by the transformer's secondary winding. For most applications the output ripple produced by these circuits is too high. However, for some applications – driving small motors or lamps, for example –they are satisfactory. If a filter capacitor is added after the rectifier diodes the output voltage waveform is improved considerably.

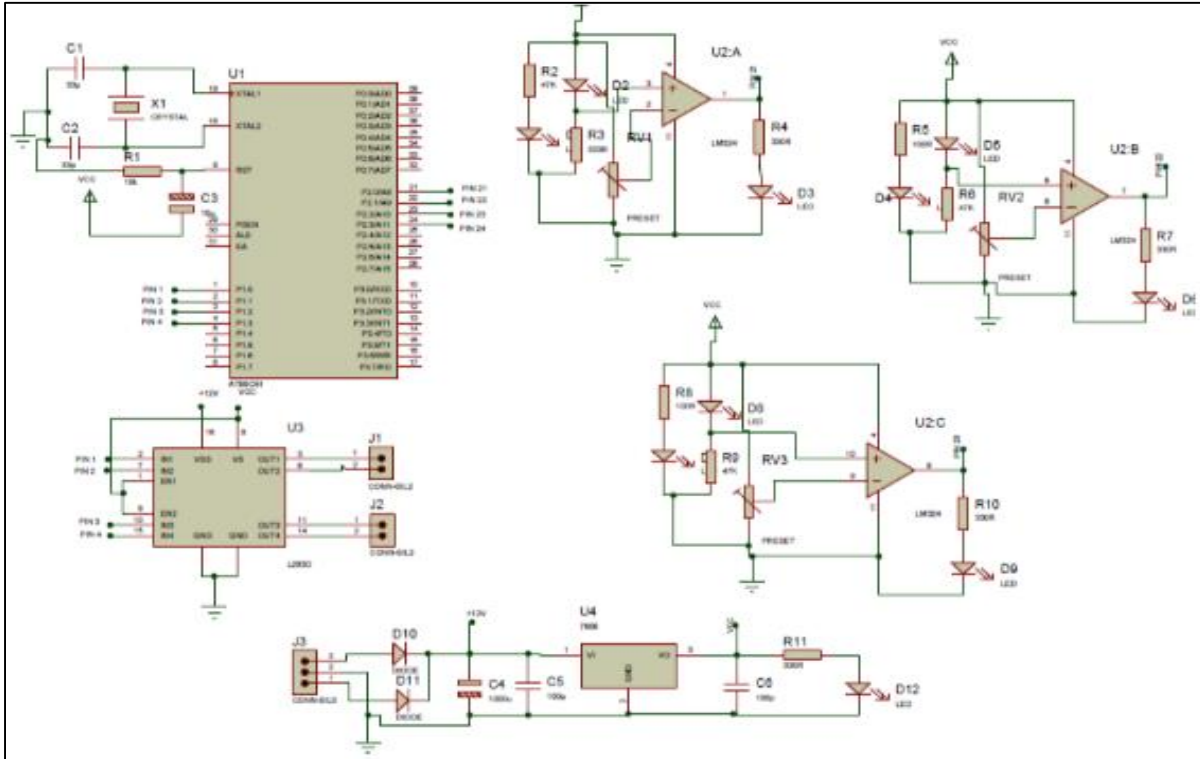


Fig. 5: Circuit diagram for controlling through microcontroller

IV. OPERATING PRINCIPLES AND WORKING

Here power supply of 5V, 500mA is used. The input to this supply is 230V, 50Hz AC supply and output of it is given to transformer. Transformer is used to convert high voltage AC into low voltage AC. Then diode is used to rectify AC into DC. Output of diode is not smooth DC i.e. it contain ripples. To remove that ripple, output of diode is given to electrolytic capacitor. Here electrolyte capacitor is used as bypass filter which will smooth the output of rectifier.

The circuit consists of L293D which requires 12V dc and LM324, 89C51 IC requires power supply of 5V DC. To provide 5V voltage regulator IC 78095 is used and 12V is directly given from output of the filter.

On interrupt the output from IR module is directly given to the controller pin, which is generating interrupt at pin no. 21, 22 and 23 from pin no. 1, 7 and 8 of comparator LM324. The RF signal used for security purpose is directly connected with HT12D which is a RF decoder IC interfaced with microcontroller to deactivate the buzzer connected to pin 11. When 2nd switch is pressed it gives signal to the decoder IC which interrupt to pin no 39 and 38 of microcontroller which in turn gives signal from pin 1 to 4 L293D to open the door.

Fig(1) shows the diagram for PIR sensor that is passive infrared sensor. Whenever the continuous flowing IR rays transmitted through the IR transmitter are cut by an obstacle. The continuous flowing voltage of 5V is stopped and goes to 0V value, due to which the square waves are converted to sinusoidal output signal as shown in Fig(1). This causes an interrupt to the microcontroller input pins 21, 22, 23. This in turn gives a signal to L293D motor driver IC through microcontroller output pins 1,2,3,4 to open the door. Its digital working can be seen in Fig(8)

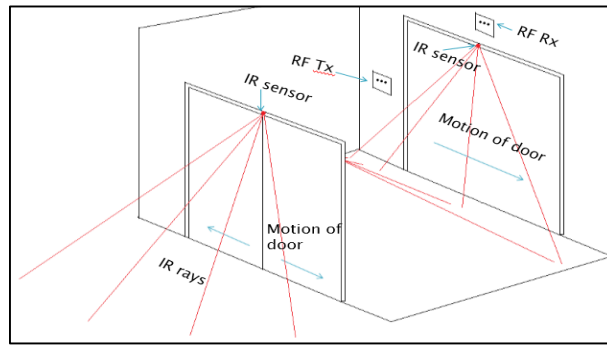


Fig. 6: Working of the doors

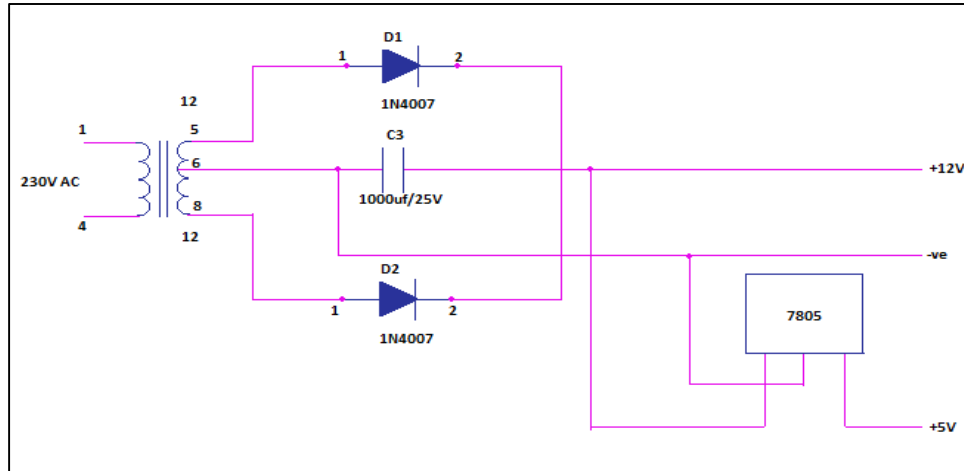


Fig.7: Circuit diagram of Power Supply

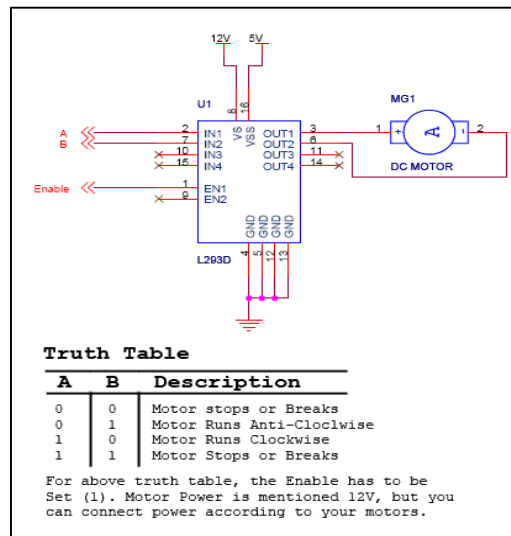


Fig. 8: Working of L293D

V. PERFORMANCE ANALYSIS

Printed circuit board is a piece of art. The performance of an electronic circuit depends upon the layout and design of PCB. Hardware designing of PCB is done with the help of Proteus VSM and PCB Express as shown in Fig(9). Software programming is done in MPLAB IDE with compiler, simulator and linker. For preparing the PCB layout, we used the PCB layout manufacturing by the Vega Company with the help of computerized equipment. Steps involved in PCB designing are layout planning, layout scale, layout sketch, artwork, soldering, printing of PCB, etching of PCB, drilling, mounting and soldering.

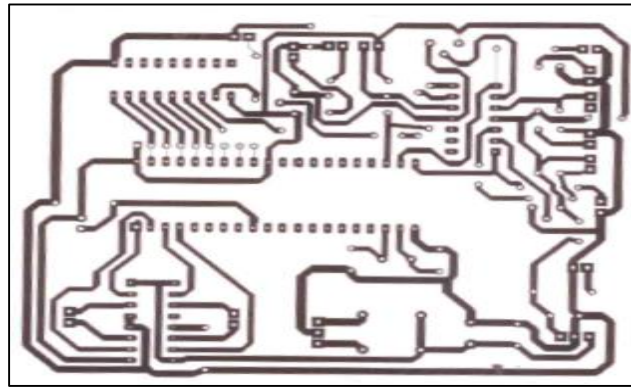


Fig. 9: PCB Design

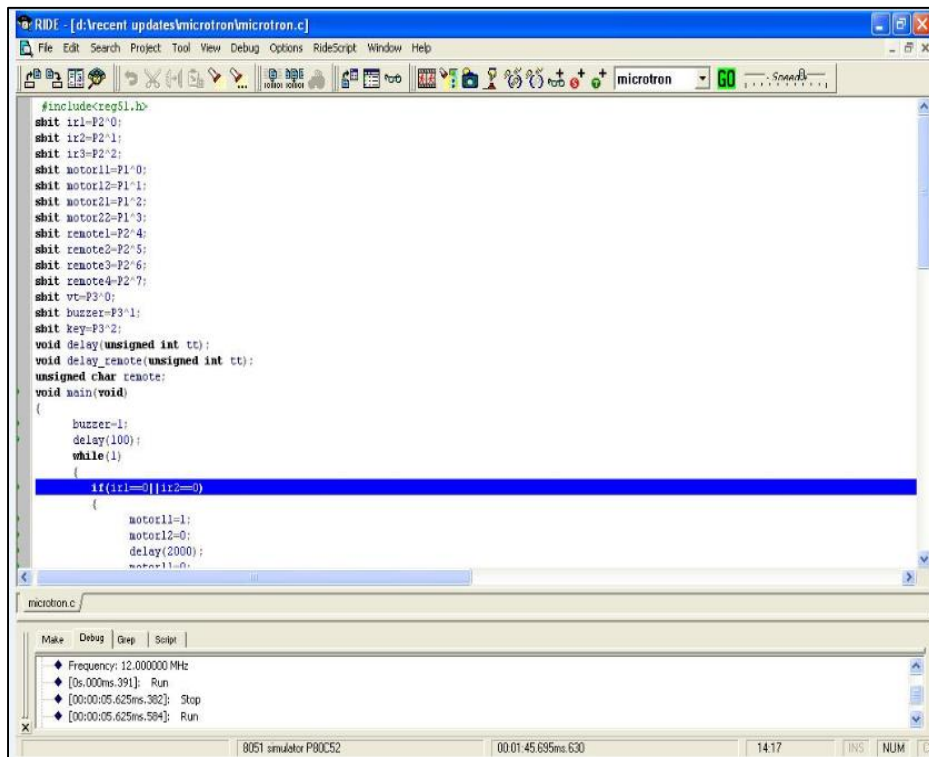


Fig. 10: Result of the Program

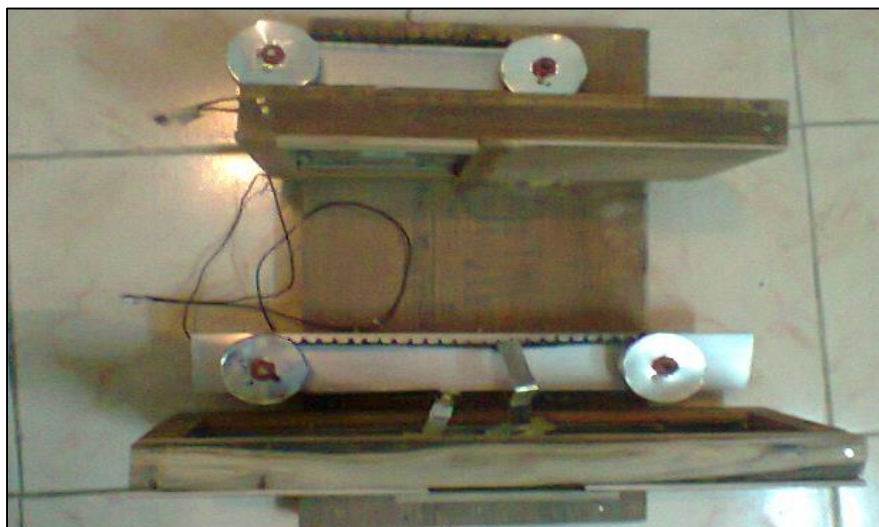


Fig. 11: Top View of Working Model



Fig. 12: Front View of Working Model

All the IR and RF are shown by using the LED indicators mounted on the controller board by using all the IR and RF technology along with microcontroller the system provide security as per the designed logic. As the first and second IR rays are cut, motor 1 starts moving clockwise and after some delay again moves anticlockwise, that is the door open and close as the person cut the IR rays. The third IR ray is for security that is when without any RF interrupt if person cuts the 3rd IR rays the buzzer start and the first door automatically puts itself in the locked condition, until the 1st switch is pressed. Here from two keys of RF transmitter, the second key is used to deactivate the 3rd IR interrupt and first key is to open the second door. That is when we push the first clock wise for a while and again move reverse after a while showing the opening and closing of doors.

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