

AUTOMATIC TIMER SIREN

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Abstract: Automation is employed in every sector whether it is home or industry. A process of automation is used to control the automatically control a process such as chemical, oil refineries, paper and pulp factories. Industrial automation is the use of control system such as computer and Information technologies for different handling process. Here a new and inexpensive design is being presented. This design finds a tremendous use in industry where all the workers to know the time shifting. The advantage of this design the siren will ring from starting point to closing time of industry.

As a solution real time clock is used. The real time clock with automatic siren operates without manual intervention and is used to avoid manual errors. We have also provided manual mode to operate the siren in emergency. The unit operates most accurately and consistently. The project designed allow to know the workers their shift and break time.

Keyword: ATmega328, siren, Relay, LCD display board, transformer, MCB, Contactor

I. INTRODUCTION

This unit is specifically developed for automation of factory siren to avoid manual errors, and aid the security personnel. The unit has quartz crystal controlled real time clock with battery backup operating in 24 hours fashion. Manually controlled siren can cause many problems in accuracy and sometimes the person in charge might forget to ring the siren. After analyzing this problem we have come out with a solution to use an automatic microcontroller based automatic siren which does not require any human intervention. With this the time accuracy will be maintained and the siren will ring at the exact scheduled time. One more advantage of automation is that we can store the schedule of whole day and able to change it as per our requirement. The project mainly focuses on automation of automatic siren, in which the siren will ring automatically and the data will be displayed on the LCD display. The data will be displayed on LCD only after entering unique pass key. In addition to that address matching is done and data can be received only by the dedicated receiver.

II. WORKING

The block diagram of automatic timer siren is shown in fig 1. Firstly we have developed the hardware circuit which is

used to operate our siren. To operate the LCD display and other components of our hardware we have design a power circuit to convert 230V AC to 12V and 5V DC. This voltage is used by the relay, LCD display and other components of the circuit.

The most important device is our microcontroller ATmega328. The interval of time after which the siren should ring is already programmed and loaded in the microcontroller. If the present time matches the time scheduled in the PC/Laptop, logic high is driven to the output port of microcontroller and the siren rings (20 seconds). The small voltage (12V) acts as an enable to the relay circuit, which turns on the 230V to the siren and the siren rings.

On the other side we are able to view time, alarm, on the LCD display by programming the microcontroller. We have programmed this project as to hear the siren sound every after worker shift time and break time of industry and can also display the data as per the schedule in the program. As per our requirements we can schedule the timing in the program.

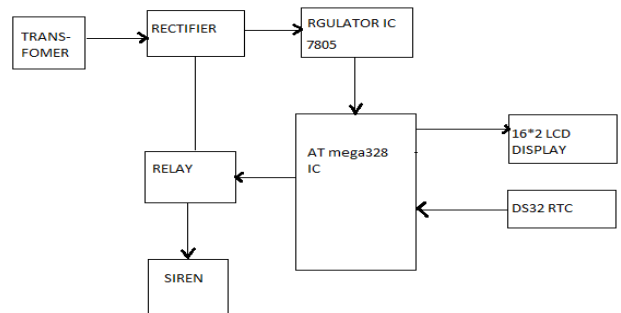


Fig.1 Block diagram of automatic timer siren.

III. HARDWARE MODULES

The automatic control system is adopted by the Microcontroller ATmega328, the principle of the hardware chart is as shown in Fig.1. The core functional modules are power module, LCD display, MCB, siren.

A. MICROCONTROLLER ATmega328

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller. ATmega328 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a

single clock cycle, the ATmega328 achieves throughputs close to 1MIPS per MHz. This empowers system designer

ATmega328 is a 28 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports. The Atmel AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. There are PORTB, PORTC and PORTD. ATmega16 has various in-built peripherals like USART, ADC, Analog Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals.

The microcontroller is the heart of the circuit. It controls all the functions of the circuit. ATmega328 is interface with LCD display. The data is load in the ATmega328. The microcontroller sends the real time, siren time and data to be displayed on the display unit. When the siren time matches with the real time then the siren will ring and the alarm will be displayed on the display unit.

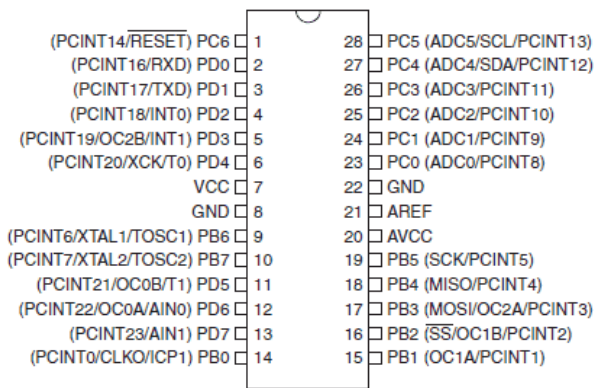


Fig.2. Pin diagram of Microcontroller ATmega328

B. LCD Display Unit

Liquid crystal display is an electronic display module and find a wide range of applications. A 16*2 LCD display is very basic module and is very commonly used in various devices and circuits. The data is ASCII value of the character to be display on the LCD.

The pin description are given below

Pin no.1 is an ground pin

Pin no.2 is VCC for supply voltage(5V, 4.7V)

Pin.no.3is VCC used for contrast, adjustment through a variable register

to optimize the device for power consumption versus processing speed.

Pin no.4 is used for register select and command register when low, and data register when high.

Pin no.5 is used for read / write Pin no.6 is an enable pin is used for send data to data pins when high to low pulses is given.

Pin no.7 to 14 are 8-bit data pins.

Pin no.15 is used for back light VCC 5V.

Pin no.16 is used for back light ground.

C. OSCILLATOR CHARACTERISTICS

In this design we used an external quartz crystal of 16 MHz According to the datasheet of ATmega328 the maximum limit of internal crystal oscillator is 8 MHz, but we can run the chip up to 16 MHz. with an external crystal.

Two main reasons of using external crystal is we want to run our design at higher clock speed than available internal oscillator because we need precise and accurate timing as our design is completely based on timing. Another thing is the internal oscillator is sensitive to temperature and voltage changes, so an external crystal will be more stable.

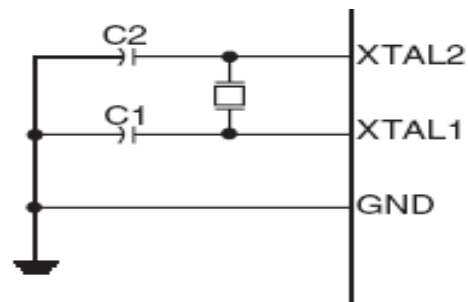


Fig. 3. Crystal Oscillator

D. RELAY

Relay is electro-mechanical device which is used to isolate one electrical circuit from another. It allows a low current control circuit to make or break an electrically isolated high current circuit path. Total isolation is provided by the relay between the triggering source applied to the terminal and the output. This total isolation is a feature that makes relay different from other integrated circuits and is also important in many digital applications. It is a feature that certain semiconductor switches (e.g. transistors, diodes and integrated circuits) cannot provide. In this circuit a 12V magnetic relay is used. In magnetic relay, insulated copper wire coil is used to magnetize and attract the plunger. The plunger is normally connected to N/C terminal. A spring is connected to attract the plunger upper side. When output

is received by relay, the plunger is attracted and the buzzer is on.

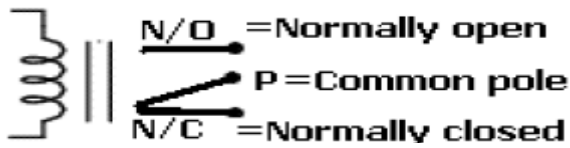


Fig. 4 Relay

E. ALARM UNIT

An automatic siren is an electrical siren that functions by means of an electrically. When [electric current](#) is applied, it produces a repetitive buzzing or clanging sound. Automatic siren have been widely used [at railroad crossings](#), [fire](#) and [burglar alarms](#), school, and alarms in industrial plants. In this project we have used an automatic siren to sound it loud and clear. When the real time and alarm time becomes equal, the alarm unit is invoked. It consists of a relay and a siren. When the time becomes equal, the relay is switched and siren sounds.

F. POWER SUPPLY UNIT

A power supply of +12V and +5V is required for circuit operation. A supply of +12V is required by the relay. +5V supply is required by the microcontroller, Max232, Dot matrix display and the components of circuit. A step-down transformer of 12V rating and Power regulator IC LM7805 is used. The AC mains power supply of 230V, 50Hz is step-down using the transformer to +12V. A bridge rectifier circuit using diodes is connected at the secondary of the transformer. This is fed to the relay and power regulator.

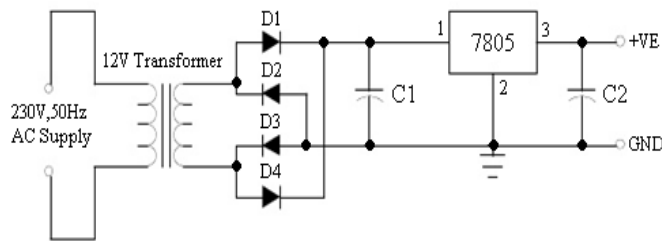


Fig.5: Power Supply Circuit

G. VOLTAGE REGULATOR

Voltage regulator ICs 7805 are available with fixed (typically 5, 12 and 15V) or variable output voltages. The maximum current they can pass also rates them. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current (over load protection) and overheating (thermal protection). Many of fixed voltage regulator ICs has 3 leads. They include a hole for attaching a heat sink if necessary.

IV. SPECIFICATIONS

As we have developed this project for industry. The industries, JSW Kalmeshwar private limited as its working hours are from 6am to 10:00 pm. There are three worker's shift in industry. Each shift consist of eight hours. The day starts with a lecture at 6:00 am. We have programmed a complete schedule of JSW kalmeshwar private limited timing. Of industry with the help of .net programming in the Microsoft visual studio. This program is being installed in the PC/Laptop and with the help of RS232 cable we are able to send the schedule in the microcontroller and according to the data the siren rings and the data will also being displayed on the display unit. Altogether the siren should ring at least 7 times in a day but with the help of program we are able to make changes in the schedule. At each instant the current time matched with the time scheduled when the siren should ring and when a match occurs, logic HIGH is obtained at the output port pin, which is given to the transistor. The 20mA current from the microcontroller pins when passed through the transistor is given to relay circuit which switches on relay circuit. Now the siren gets a direct connection to the 230V power supply and siren rings. To ring the siren, there is also a pass key used to allow only the authorized person to use the system. The time for which the siren should ring is also programmed in the Microsoft Visual Studio. We have given the time period of 20 seconds.

V. FUTURE DEVELOPMENT

A lot more advancement can be done in this design. The advantage of this design is that the timings can be edited according to an individual's requirement. Hence it can be reused infinite number of times. It can also be made by using GSM. Through GSM the RTC can be controlled and so the timings can be edited. Automatic siren system with announcement can be made. In future much advanced automatic siren system can be made.

VI. CONCLUSION

Present day ringing the siren in industry is carried out manually. The main disadvantage of this is that one person has to be alert for this. At the same time during that time he could not be engage in another task. To overcome from this, we have decided to prepare the circuit which will be operated automatically and the ringing of siren will start by its own time. The time input can be edited as per requirements. This circuit is simple to prepare and easy to install. We can say that it will be much useful for colleges or schools or other educational institutions.

VII. REFERENCE

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