ANTI-THEFT HOME SECURITY SYSTEM

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ABSTRACT

The project of "Anti Theft Home Security System" has been designed in order to tackle the increase in robbery cases in houses and offices. This system with the help of two microcontrollers ATMEGA 8515, sensors, magnetic switch (reed switch) transmitter and receiver can form elements to protect our houses from the astute minds of thieves. The user will be carrying the receiving module, whenever he/she steps out of the house.

This module will encompass receiver, microcontroller, LCD and a buzzer. The transmitting module will be equipped with sensors, reed switch, microcontroller and transmitter. There is constant monitoring between the transmitter and receiver and as soon as some moment is detected by the sensors or reed switch, immediately the buzzer will go ON and the user will come to know about the activity through LCD.

The user needs to cut off the battery whenever he/she accesses the doors and windows as it can trigger the buzzer, which is not necessary at that moment. This system can also be successfully brought into implementation at places like offices, shopping malls (for protection of products kept on display), ATM's etc.

KEYWORDS: 8515, Reed Switch, LCD

INTRODUCTION

The increase in the number of robbery in houses, offices has given the indication to protect them with today's smart and efficient technology. This project comprises of two sections: (i) Transmitter section (ii) Receiver section. The user has to carry the receiver section along with it, to get notifications through LCD whenever there is a threat. The transmitter section can be placed near the valuable things, which is intended to be protected.

The passive infrared sensors are placed near such things. As soon as there is some movement in its vicinity, the sensor detects it and sends the signal to the user through transmitter. Also the reed switch is placed near windows and doors. The moment the door or a window is opened, the contact of reed switch with it is broken and the user comes to know about it. The buzzer goes on whenever there is a threat, which signifies that the user has to check the LCD which displays the things under danger.

REQUIRED HARDWARE

List of Hardware

- Passive infra red sensor

- Magnetic sensor switch (Reed switch) 2 in number

- AVR Atmega8515 microcontroller 2 in number

- RST 433 TX

- RST 433 RX

- LCD

- AVR STUDIO software
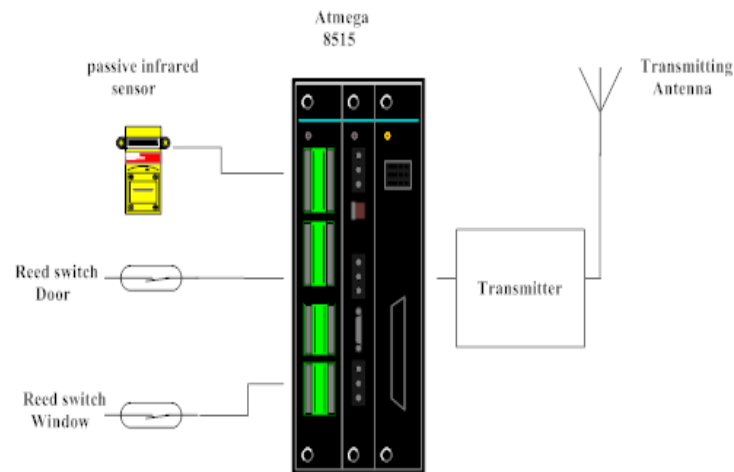
- LED

- BUZZER

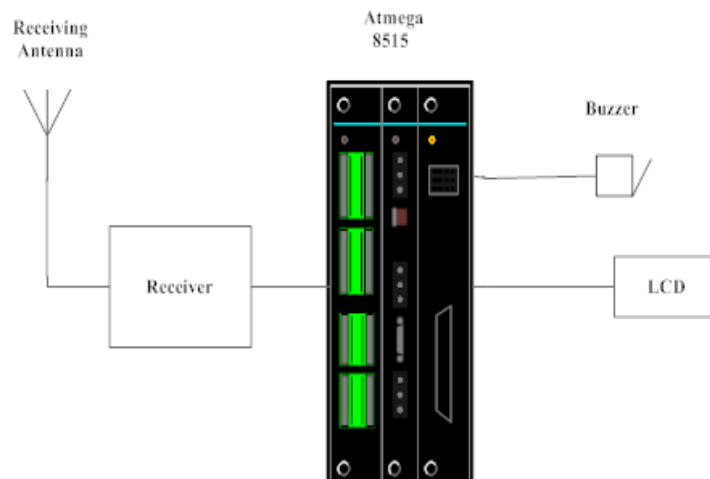## BLOCK DIAGRAM

Figure 1: Block Diagram of Transmitter Section

Figure 2: Block Diagram of Receiver Section

DESIGN AND IMPLEMENTATION DETAIL

Microcontroller 8515

ATMEGA 8515 is a high performance, low power AVR 8-bit microcontroller. Its memory consists of 512 bytes of EEPROM, 512 bytes of SRAM and supports up to 64KB of optional external memory space. Also includes 8 KB of in-system programmable flash with read-while-write capabilities. It peripheral features encompasses one 8-bit timer/counter and one 16-bit timer/counter. Along with rich instruction set, it also has 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 one 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
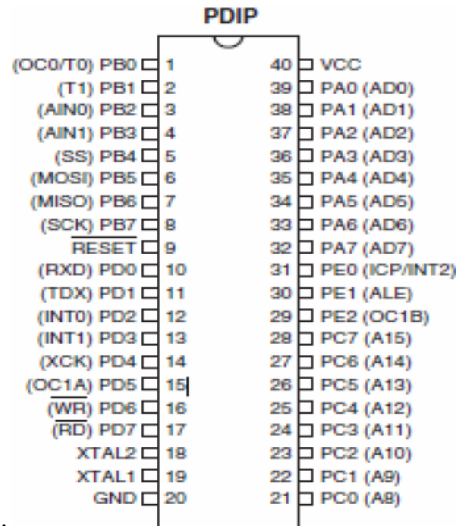
PDIP

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(OC0/T0) PB0 □ 1        40 □ VCC
       (T1) PB1 □ 2        39 □ PA0 (AD0)
     (AIN0) PB2 □ 3        38 □ PA1 (AD1)
     (AIN1) PB3 □ 4        37 □ PA2 (AD2)
       (SS) PB4 □ 5        36 □ PA3 (AD3)
     (MOSI) PB5 □ 6        35 □ PA4 (AD4)
     (MISO) PB6 □ 7        34 □ PA5 (AD5)
      (SCK) PB7 □ 8        33 □ PA6 (AD6)
          RESET □ 9        32 □ PA7 (AD7)
      (RXD) PD0 □ 10       31 □ PE0 (ICP/INT2)
      (TDX) PD1 □ 11       30 □ PE1 (ALE)
     (INT0) PD2 □ 12       29 □ PE2 (OC1B)
     (INT1) PD3 □ 13       28 □ PC7 (A15)
      (XCK) PD4 □ 14       27 □ PC6 (A14)
    (OC1A) PD5 □ 15        26 □ PC5 (A13)
      (WR) PD6 □ 16        25 □ PC4 (A12)
      (RD) PD7 □ 17        24 □ PC3 (A11)
         XTAL2 □ 18        23 □ PC2 (A10)
         XTAL1 □ 19        22 □ PC1 (A9)
           GND □ 20        21 □ PC0 (A8)
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Figure 3: Pin Diagram of 8515 Microcontroller

Passive Infra Red Sensor

PIR sensors are small, inexpensive, low power, rugged, have a wide lens range, are easy to interface with, and are easy to use. A passive infrared (PIR) sensor measures infrared light emitted from objects that generate heat, and therefore infrared radiation, in its field of view. PIR sensors have a range of approximately 6 meters, depending on conditions. The sensor adjusts to slowly changing conditions that occur normally within the environment, but shows a high-output response when a sudden change takes place.

Wireless Door/Window Contact Sensor

The Wireless Magnetic Door / Window Contact Sensor is a protective device that can send notification when the opening and closure of doors and windows occurs. It is designed to send a wireless signal to a compatible home security system when the contact between the transmitter and corresponding magnetic sensor is broken.

- Magnetic contact used to monitor normally closed entry points such as doors and windows

- Wirelessly communicates with a compatible home security system up to 300 feet away

- Adjustable radio frequency settings and built-in technology prevent missed signals and transmission errors.

RF Transmitter-RST 433TX

An RF transmitter generates radio frequency waves in its circuits, and to this 'carrier signal', it adds the information part by modulating the carrier signal. This composite signal is then fed to an antenna. The aerial induces a corresponding signal into the atmosphere, by altering the Electric and Magnetic fields at the same frequency. The impedance of 'free space' is few tens of Ohms to a few hundreds of Ohms. The power emitted by the transmitter can vary from a megawatt or so to a few watts for handheld devices.

Receiver-STT 433

An RF receiver receives the signal from the atmosphere, from its own aerial. The receiver aerial is often quite simple, and the signal level is typically of a few micro volts.The receiver circuits then strip the information part of the signal from the carrier part, and amplify this to a useful level for audio or video. The actual signal into the loudspeaker will be a few tens of volts. In spite of the inefficiency of loudspeakers, (often only a few %) the signal eventually appears at a level that may be heard. A background radio will be a few milli watts of power.

LCD Interfacing with Microcontroller (4Bit Mode)

We are going to use 16×2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters. In 4-bit mode the data is sent in nibbles, first we send the higher nibble and then the lower nibble. To enable the 4-bit mode of LCD, we need to follow special sequence of initialization that tells the LCD controller that user has selected 4-bit mode of operation. We call this special sequence as resetting the LCD.

Following is the reset sequence of LCD.

- Wait for about 20mS

- Send the first init value (0x30)

- Wait for about 10mS

- Send second init value (0x30)

- Wait for about 1mS

- Send third init value (0x30)

- Wait for 1mS

- Select bus width (0x30 - for 8-bit and 0x20 for 4-bit)

- Wait for 1mS

The busy flag will only be valid after the above reset sequence. Usually we do not use busy flag in 4-bit mode as we have to write code for reading two nibbles from the LCD. Instead we simply put a certain amount of delay usually 300 to 600uS. This delay might vary depending on the LCD you are using, as you might have a different crystal frequency on which LCD controller is running. So it actually depends on the LCD module you are using.
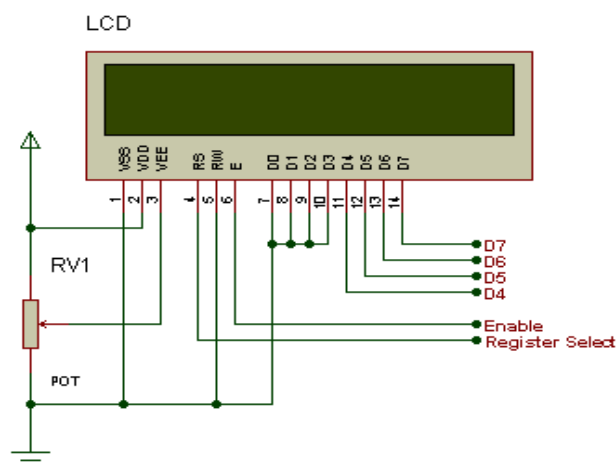

Figure 4: LCD Connection with 4-Bit Mode

Here we only need 6 pins to interface an LCD. D4-D7 are the data pins connection and Enable and Register select are for LCD control pins. We are not using Read/Write (RW) Pin of the LCD, as we are only writing on the LCD so we have made it grounded permanently. If you want to use it then you may connect it on your controller but that will only increase another pin and does not make any big difference. Potentiometer RV1 is used to control the LCD contrast. The unwanted data pins of LCD i.e.D0-D3 are connected to ground.

Buzzer

Here we use a piezoelectric buzzer. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

CONCLUSIONS

In this project we implemented Microcontroller based Home security system using Wireless alerts using RF signals as communication standards. The hardware equipment is tested and result is obtained.

This project is cost effective. Implementation of this project in present day will effectively provide a peace of mind to the residents. This project can be implemented both in apartments and General stores as well.

APPLICATIONS AND ADVANTAGES

- Can be used in house for security purpose.

- Same project can be implemented in industry or educational institutes.

FUTURE SCOPE

- We can send this data to a remote location using mobile or internet.

- We can implement other related modules like fire sensor, wind sensor.

- We can add the module of voice alarm system to indicate theft entry or gas leakage.

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