International Journal of Engineering Science Invention
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org Volume 2 Issue 10‖ October 2013 ‖ PP.23-29

Multi Security System

Dhanoj Mohan[1], Gopakumar[2]
[1](Electronics & Instrumentation Dept., Vimal Jyothi Engineering College, India)
[2](Electronics & Communication Dept., TKM College of Engineering, India)

ABSTRACT: *Security is a matter of great concern for all of us in this world at our home/workplace or anywhere. Normally, we face these types of security threat to our property-*

1. *Threat from fire*
2. *Theft*
3. *Spoilt by water (overflowing)*
4. *Gas leak.*

This project is based on a security system which deals with the above threats. Whenever, there is a threat to our property in any form, then, the circuit will have a warning system consisting of sensors and buzzers, which would help in warning about the threat. We are using Arduino Uno as well as wireless RF communication in our project. This project consists of two parts transmitter and receiver. We monitor all these parameters remotely. All the sensors are connected at the transmitter section. Whenever any sensor is actuated buzzer is sounded locally as well as indication led will also blink. We use buzzers in both the transmitter and receiver circuits. If the buzzer is fitted in the transmitter circuit, then it would be helpful to warn the local people about the danger. And through the receiver, the actual user gets information regarding the threat.Hence, the project can be practically implemented on a larger scale at our homes or our workplace or anywhere. And this would help to receive the warning as soon as any danger approaches. And then appropriate action can be taken immediately.

I. INTRODUCTION

Need of security is the basic necessity of any individual. The feeling that you are safe and everything around you is all right and is imperative for a peaceful living. But in this unsafe world, when crime, terror and threats are on their peak, how can one attain that sense of security? Here, multi security system provides us with a solution and for this reason more and more people are installing them in order to stay safe and secure.With multi security system, you do not have to worry about your home even while away from it for a long time. Burglar alarms, fire alarms, flood sensors, and gas sensors are used inorder to provide the security. In case of any intrusion or home break-ins, or the loud sound of alarm will easily scare away the thief and will also get the attention of your neighbours. In the case of threats such as fire hazards, gas leakages and water leakages, a security system can be implemented inorder to protect the environment from dangerous damages. Eventhough if we are away from home or workplace, there is no need to worry if a security system is installed. It will be provided with leds and buzzers so that if any threat occurs it will warn the people who were around the area and nearby localities. In the case of industries, security has a great role. Multi security system is one of the most commonly seen security system in industries. The main advantage of this type of security system is that it will help to reduce the intensity of damages occurring in a site. Moreover, since it is a multipurposeful system, it is more beneficial. Concerning all these factors, we decided to implement a new system in the field of security, "MULTISECURITY SYSTEM" This project consists of two parts transmitter and receiver. We monitor all these parameters remotely. All the sensors are connected at the transmitter section. Whenever any sensor is actuated buzzer is sounded locally as well as indication led will also blink. At the same time sensor code is transmitted to air through transmitter. The receiver part consists of LCD, buzzer and indication leds. Whenever any code is received by the receiver, emergency message is displayed on the LCD along with buzzer and respective led indication.

II. BLOCK DIAGRAM

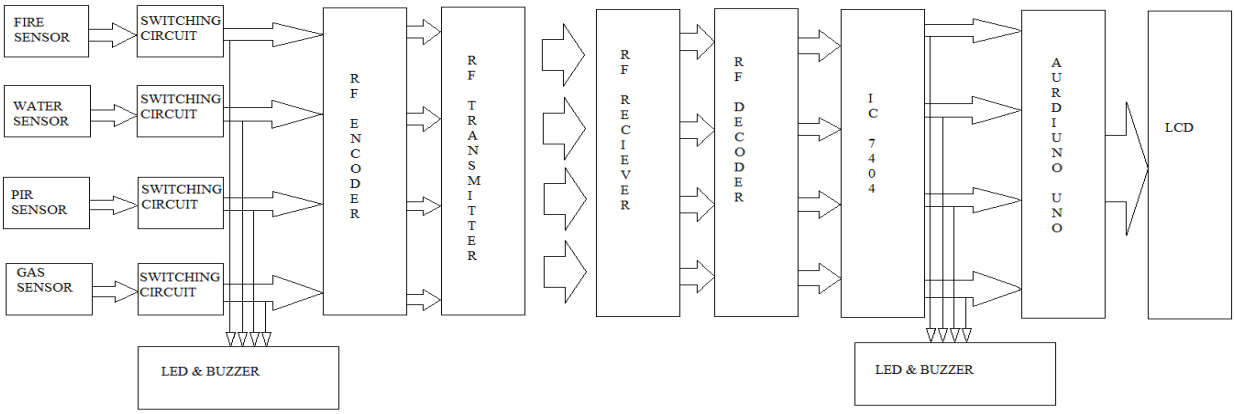

Fig.1 Block diagram of Multi security system

III. BLOCK DIAGRAM DESCRIPTION

Fig.1 shows a detailed block diagram of our project "MULTI SECURITY SYSTEM". This system mainly aims the security of home or an industry that it secures the home or industry from fire hazard, water overflow, gas leakage, and from intruder. This system mainly constitutes two sections, transmitter section and receiver section. The transmitter section includes mainly four sensors, switching circuits, RF encoder and an RF transmitter along with led and buzzer. The output of the sensor is given to the switching circuit after conditioning the signal. The switching circuit consists of relay which is responsible for the switching action. When the output of the circuit is high, RF encoder encodes the signal and this encoded signal is then transmitted using RF transmitter with the aid of antenna. At the same time it is connected to the indicator which consists of leds and buzzers for the indication of threat. The receiver section consists of mainly RF receiver, RF decoder, IC 7404, arduino Uno and LCD display. Arduino uno is mainly used for displaying purpose. The signal transmitted by the RF transmitter is then received by an RF receiver, the received signal is then decoded by an RF decoder. The output of the decoder is always high. And we are using an IC 7404 Inorder to make it low output. Then it is given to the arduino uno and given to the LCD display. The receiver section also consists of LEDs and buzzers for indicating the threat to inform the actual owner.Here we are mainly using four types of sensors. This includes mainly temperature sensor, gas sensor, water sensor, and PIR sensor. Temperature sensor get activates when the temperature of system becomes above a particular limit or when any fire occurs. In our project, we are using LM35 as the temperature sensor. When it get activates it is then given to switching circuit after conditioning the signal output from the temperature sensor. The next sensor we are used here is water sensor which is used to detect the spoilt by water or the over flow. A limit switch along with a float is used as the sensor to detect the over flow. When water level increases, the float will rise accordingly, and it changes the state of the switch. An MQ-9 gas sensor is used to detect any gas leakage in the system. The main feature of MQ-9 is that it has high sensitivity to LPG, iso-butane, and propane. It is a simple drive circuit. The fourth sensor that we are using here is PIR sensor. A passive Infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. The apparent motion is detected when an infrared source with one temperature passes infront of an infrared source with another temperature.

Each sensor output is given to a switching circuit after conditioning the signal. The main element used in switching circuit is relay. A relay is an electrically operated switch. A current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. When any sensor get actuates, the high signal which comes from the corresponding switching circuit is then given to RF encoder at the same time the sounding of the buzzer and lighting the corresponding led takes place. Here we are using HT12E as the encoder. It is mainly used in interfacing RF and infrared circuits. The encoded signal is then given to the RF transmitter for transmitting the data from transmitter section to the receiver section with the aid of antenna through RF channel.The transmitted signal is then received by the RF receiver in the receiver section. The received signal is then decoded by an RF decoder.

Here we are using a HT12D as the decoder. The decoded is always seem to be high, inorder to make it low we are introducing an IC 7404. It is simply a NOT gate. This output is then given to arduino uno which corresponds to displaying of LCD. For displaying, pins of the LCD is connected to the I/O pins of arduino uno. At the same time the output of the IC 7404 is given for sounding of the buzzer and lighting of the led.

IV. TRANSMITTER SECTION

SENSORS

Temperature sensor

The Temperature sensor we are using here is LM35. The LM35 series are precision integrated-circuit LM35 temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C sensor is rated for a -40° to +110°C range (-10° with improved accuracy). The pin diagram of LM35 is depicted in fig. 2, in which the supply is given to pin1, the output is taken from the pin 2 and the pin 3 is grounded. The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package. It is more suitable for remote applications. It has Low impedance output, about 0.1□ □ for 1□ m□ load.

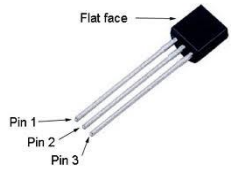

Fig.2 Pin diagram

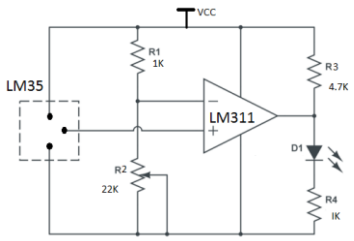

Fig.3 Circuit Diagram of LM35

Water sensor

Limit switch along with float sensor is used as a water sensor. This is a mechanical type switch. It changes its position from normally closed to normally open position or vise versa. Limit switches are ideal electrical control switches in mechanical and other industries. They have features of complete specifications and varieties of types, compact structure, nice appearance, excellent performance, flexible and reliable action, easy installation, operation, maintenance and adjustment. The switches are applicable to AC control circuits of 40 to 60Hz, with a voltage up to 500V or DC control circuits with a voltage up to 600V, and a current up to 10A to convert a mechanical signal into an electrical signal for the purpose of controlling mechanical movement or performing sequential control.The basic principle is change of switch position when there is change of level above particular limit .When level is below the limit a spring will bring the switch to older position .this spring is attached to an arm where the float is attached. When water level increases, the float will rise accordingly, and when the water level is low the float will move down hence the gravitational force of float will move the arm of the level switch down hence a change of switch is occurred.

PIR sensor

A passive infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view.PIR sensors are often used in the construction of PIR- based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a human, passes infront of an infrared source with another temperature, such as a wall. This is not to say that the sensor detects the heat from the object passing infront of it but that the object breaks the field which the sensor has determined as the "normal" state. Any object, even one exactly the same temperature as the surrounding objects will cause the PIR to activate if it moves in the field of the sensors. All objects above absolute zero emit energy in the form of radiation. Usually infrared radiation is invisible to the human eye but can be detected by electronic devices for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation."Infra" meaning below our ability to detect it visually, and "Red" because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy.

Gas sensor

Sensitive material of MQ-9 gas sensor is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). The sensor's conductivity is more higher along with the gas concentration rising. When high temperature (heated by 5.0V), it detects Methane, Propane etc combustible gas and cleans the other gases adsorbed under low temperature. MQ-9 gas sensor has high sensitivity to Carbon Monoxide, Methane and LPG. The sensor could be used to detect different gases contains CO and combustible gases, it is with low cost and suitable for different application.

FEATURES

* High sensitivity to LPG, iso-butane, propane.
* Small sensitivity to alcohol, smoke.
* Fast response.
* Stable and long.
* Simple drive circuit.

RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical. All relays operate using the same basic principle. Given below is a commonly used 4 pin relay. Relays have two circuits – a control unit (shown in green) and a load unit (shown in red). The control unit has a small control coil where load circuit has a switch. The coil controls the operation of the switch.

RF ENCODER

HT12E is an encoder integrated circuit of 2^{12} series of encoders. They are paired with 2^{12} series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits. HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

RF TRANSMITTER

An electronic transmitter is part of a radio communication system which uses electromagnetic waves (radio waves) to transport information (in this case sound) over a distance. In electronics and telecommunications a transmitter or radio transmitter is an electronic device which, with the aid of an antenna, produces radio waves. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. When excited by this alternating current, the antenna radiates radio waves. In addition to their use in broadcasting, transmitters are necessary component parts of many electronic devices that communicate by radio, such as cell phones, wireless computer networks, Bluetooth enabled devices, garage door openers, two-

way radios in aircraft, ships, and spacecraft, radar sets, and navigational beacons. The term transmitter is usually limited to equipment that generates radio waves for communication purposes; or radiolocation, such as radar and navigational transmitters. Generators of radio waves for heating or industrial purposes, such as microwave ovens or diathermy equipment, are not usually called transmitters even though they often have similar circuits. Here we are using 434MHz RF transmitter.

V. RECIEVER SECTION

RF RECIEVER

The RM-434 is a radio frequency receiving device that operates at 434 MHz. The STR-433 is ideal for short-range remote control applications where cost is a primary concern. The receiver module requires no external RF components except for the antenna. It generates virtually no emissions. The super-regenerative design exhibits exceptional sensitivity at a very low cost. The manufacturing-friendly package and low-cost make the STR-434 suitable for high volume applications.

RF DECODER

HT12D is a decoder integrated circuit that belongs to 2^{12} series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 2^{12} series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format. In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin. HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.

RF MODULE

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 433 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used along with a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder HT12E - HT12D.

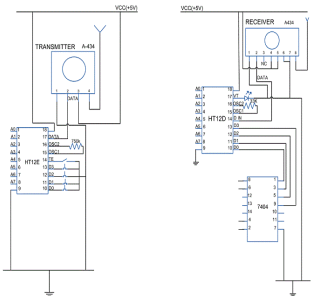

Fig. 4 Circuit Diagram of RF module

ARDUINO UNO

Arduino is a popular open-source single-board microcontroller, descendant of the open-source Wiring platform, designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design for the Arduino board with an Atmel AVR processor and

on-board input/output support. The software consists of a standard programming language compiler and the boot loader that runs on the board. Arduino hardware is programmed using a Wiring-based language (syntax and libraries), similar to C++ with some slight simplifications and modifications, and a Processing-based integrated development environment.

Hardware

An Arduino board consists of an 8-bit Atmel AVR microcontroller with complementary components to facilitate programming and incorporation into other circuits. An important aspect of the Arduino is the standard way that connectors are exposed, allowing the CPU board to be connected to a variety of interchangeable add-on modules known as shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²Cserial bus, allowing many shields to be stacked and used in parallel. Official Arduinos have used the megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5 volt linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer.At a conceptual level, when using the Arduino software stack, all boards are programmed over an RS-232 serial connection, but the way this is implemented varies by hardware version. Serial Arduino boards contain a simple inverter circuit to convert between RS-232-level and TTL-level signals. Current Arduino boards are programmed via USB, implemented using USB-to-serial adapter chips such as the FTDI FT232. Some variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. (When used with traditional microcontroller tools instead of the ArduinoIDE, standard AVR ISP programming is used.)The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs. These pins are on the top of the board, via female 0.1 inch headers. Several plug-in application shields are also commercially available.

LCD DISPLAY

The LCD Display consists of 16 pins. The details of the pin diagram are depicted in the table below. It has 8 bits of data being used. The last two pins 15 and 16 is for lighting up the led present in the display. The brightness can be adjusted by connecting a potentiometer to the appropriate pin.

Pin No	Name	I/O	Description
1	Vss	Power	GND
2	Vdd	Power	+5v
3	Vo	Analog	Contrast Control
4	RS	Input	Register Select
5	R/W	Input	Read/Write
6	E	Input	Enable *(Strobe)*
7	D0	I/O	Data *LSB*
8	D1	I/O	Data
9	D2	I/O	Data
10	D3	I/O	Data
11	D4	I/O	Data
12	D5	I/O	Data
13	D6	I/O	Data
14	D7	I/O	Data *MSB*

Table. 1 Pin Configuration of LCD display

VI. POWER SUPPLY

A well regulated power supply is essential for this circuit because even slight variations in the supply voltage could alter the biasing of the transistor used in the fire sensing section and this could seriously affect the circuit's performance.

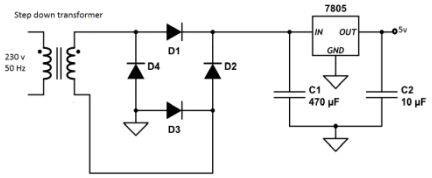

Fig. 5 Power supply circuit

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. A 230v, 50Hz Single phase AC power supply is given to a step down transformer to get 12v supply. This voltage is converted to DC voltage using a Bridge Rectifier. The converted pulsating DC voltage is filtered by a capacitor and then given to 7805 voltage regulator to obtain constant 5v supply. This 5v supply is given to all the components in the circuit. A RC time constant circuit is added to discharge all the capacitors quickly. To ensure the power supply a LED is connected for indication purpose.

VII. FUTURE SCOPE

As we are using the system for only indication of threats. This system can be modified for controlling purpose by using controlling device to detect the threat and control the emergency situation. In future, this system can be controlled by using a remote control with the help of GSM. Using GSM ,we can detect the presence of unauthorized person and may able to inform the police control room using mobile phones. It can also be used in vehicles to detect the gas leakage and hence the threat like fire can be avoided. When a GPS module is also integrated to the system the location of the threat can be easily identified and safety measures can be taken.

VIII. CONCLUSION

Security is a matter of great concern for all of us in this world at our home/workplace or anywhere. Multi security system will provide efficient security from fire hazards, gas leakage, water overflowing and from intruder. Thus it has become an important part of industry. This security system will reduce the damages caused by these threats and also provide maximum protection for human life. They are commonly used in large industries were inflammable materials are used. Apart from this, it can be used in bank or other workplace to keep protected from intruder, fire threat etc. Moreover this can be used in our home for the protection. Since we are using buzzers in transmitter section, it would be helpful to warn the local people about the danger. And the receiver, so that actual owner gets information regarding the threat. It is more economical and beneficial.

REFERENCES

[1] http://EzineArticles.com/?expert=Anand_Sharath.
[2] http://en.Wikipedia.org/wiki/levelsensor
[3] http://www.relay.in
[4] http://www.arduino.cc
[5] http://www.controlcomponents.com
[6] http://www.hwsensor.com
[7] http://en.wikipedia.org/wiki/RFmodule
[8] http://en.wikipedia.org/wiki/Arduino