Radio Transmitter Devices Security System Using GSM Technology

Samahir Tag Elsir Ali, Dr.Altahir Mohamed Hussein

Collage of Engineering, Al-Neelain University Khartoum, Sudan
Corresponding author E-mail: samahirali80@gmail.com

ABSTRACT

Control of electrical and electronic equipment is very important because of the sensitivity of the devices against the environmental factors, and the most dangerous such as temperature, humidity, fire from the overload or the result of high temperature. Also, from steal or damage by mankind so the purpose of the project is to monitor and control the room remotely for all these reasons. The main idea of this paper is to monitor and protect the control room of radio transmitter devices by using GSM mobile depends on the microcontroller which processes the input data and gives the output signal.The Temperature, smoke sensors were connected to the microcontroller to detect the heating of fire or electricity in the control room. The door-latch opening system using password entered through the keypad. If 3 wrong password entered consequently and the parameters (Temp and smoke) exceed the threshold value, the buzzer turned on.

Keywords— microcontroller, keypad, password, buzzer, LCD, driver motor.

I. INTRODUCTION

Security is the most important thing in our daily life and the primary goal in this paper is to protect and monitor the radio transmitter devices either AM (Amplitude Modulation) or FM (Frequency Modulation) devices by using GSM technology. This project applied to 2 FM transmitter devices but can use more devices. This system enables to turn on these devices, air conditions and lighting help of mobile controller according to user needs. Also, it helps to turn devices off in case of (damage, fan stop working, reflected power or less forward power) and sends SMS message to the user (engineer). This project provides security and energy efficiency[1]. GSM is used to digitalize and transmit signal or data to the receiver. GSM module can be used to send the signal over a mobile in a fixed frequency to other mobile phone connected to the receiver. As the mobile network is available in most regions and low cost of the message through a mobile network, the SMS (short message service) is used to communicate with devices. This project takes a chance to create a simple and smart system with less cost and high performance.

II. SECURITY SYSTEM COMPONENT

Microcontroller   The CPU (central processing unit) of our project Microcontroller of the type pick 16f877 comes with an on-chip EEPROM (electrically erasable and programmable read-only memory) with ready to use instruction to access this memory .it collects the data or information from various sensors and compares it with appropriate prescribed limits .it is programmed by embedded C. By receiving the sensor signals, it takes the corresponding course of action by sending commands to the output devices[2].

GSM Modem; mode stands for "modulator-demodulator" and it encodes and decodes signals sent to and from the network servers. It consists of SIM card and operates over a subscription through a mobile network and it supports GPRS for spontaneous data transfer [2]. It is a highly flexible plug-and-play device capable of connecting to a PC or any microcontroller's serial port through MAX232IC. This IC is used to convert the TTL logic levels of the microcontroller to an RS232 logic level for enabling serial communication. AT commands are used to automatically receive the call on the system from the preconfigured number and system also sends the voice message to preconfigured number about the status of appliances and intrusion through AT commands [3].

Table 1: The following section describes the AT command

Command	Description
AT	Check if serial interface and GSM modem is working
AT$AREG=0	AT command to turn off the automated GSM registration feature.
AT+CFUN=1	Turn the radio on.
AT+COPS=0	Select network operator for registration.
AT+CGATT=1	AT command to start the ATTACH sequence.

C. Sensory System: It consists of various sensors like IR sensors for detecting human presence to open or close the door, a Smoke detector to detect the presence of fire and temperature sensor to detect high temperature. These sensing values are sent to the microcontroller with intermediate circuitry like Analog to Digital Converter[4].

D. Key Pad: It used to enter a password, if 3 wrong passwords entered consequently, buzzer turn on and the system sends SMS message to the engineer.

E. TX1 and TX2

Transmitter1 and tranmitter2 devices which are used to transmit frequency modulation radio signal. Which were connected either to the output of microcontroller or to the modem of GSM?

F. Control Devices

These devices include buzzers and motors with driver ICs and LCDs display. Final control devices generate alarms of different kinds by using buzzers; doors and fire exhauster operations are controlled by using motors. All these devices act upon the commands directed from a microcontroller.
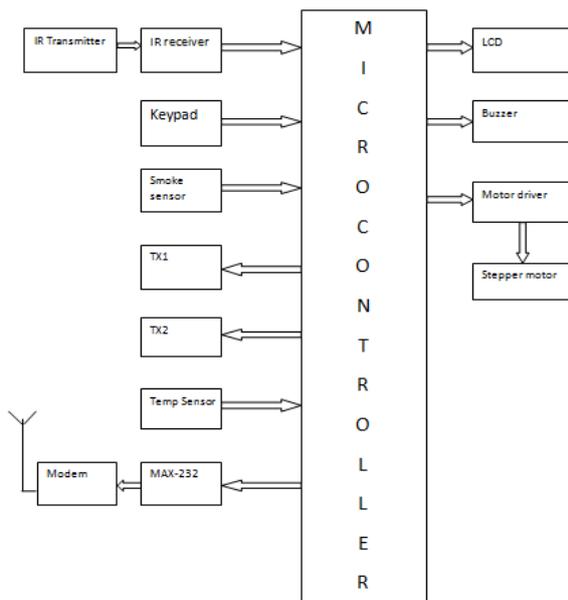
Figure 1: Block diagram explains the components of the project

The radio transmitter devices (AM and FM) work with high power and radiation because of electromagnetic waves especially AM transmitters and need high air condition, so this smart security system enabled high protection and monitoring devices from far distances and getting a complete report about devices situation[5].

The main objective of this paper to design smart, low cost, simple and high-performance security system using microcontroller programmed with C language for protection devices and get full report about devices from far distances using GSM. Also, this project reduces the consumed power, big staff of engineers and contact with the devices because of radiation in electromagnetic waves[6].

IIV. METHODOLOGY

In this paper, the microcontroller will be used to control the signal input from IR transmitter, IR receiver, smoke sensor, temperature sensor and keypad gives an output signal to LCD, Buzzer, TX1, TX2, motor driver to run the stepper motor according to the program in the microcontroller and SMS to mobile. The flowchart is shown in figure (2) gives the details of the process.
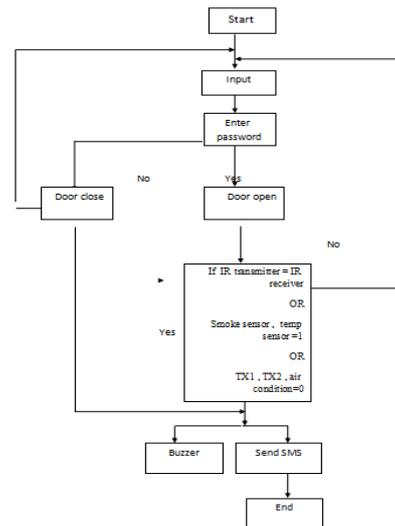
Figure 2: Gives the details of the process.

1) Flow Chart Description

After the model started, the LCD start message after 2000 MS. User enters the password from the keypad, where was saved in the memory. If the password is" YES" that means to send the signal from the microcontroller to drive motor to rotate stepper motor clockwise to opening the door and display" DOOR OPEN" in LCD.After 2000 MS sends the signal to drive motor to rotate the stepper motor anti-clockwise to close the door and print "DOOR CLOSE" on LCD. If "NO" that means

print "WRONG PASSWORD" and send the signal from microcontroller to buzzer. If the IR transmitter equals the IR receiver or smoke and temperature Sensor equal one that means "YES" and the microcontroller will send the signal to the buzzer. If the transmitter devices (TX1and TX2), air condition, lights =o (turn off) that means send signal to buzzer and the modem send message to the user mobile.

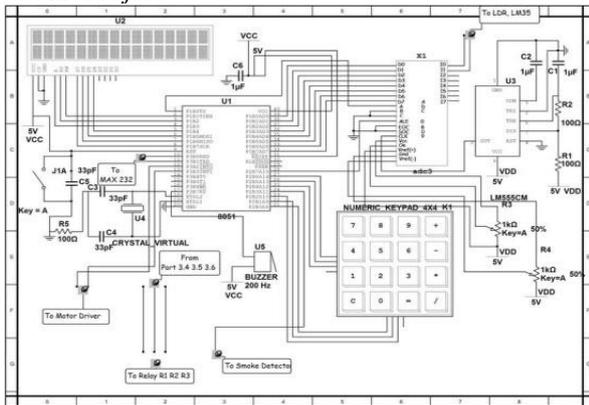### 2) Circuit Diagram and Operation of RTDSS using GSM Project

Figure 3: Circuit Diagram and Operation of RTDSS using GSM

Figure3 observe the connections of various devices like sensors, ADC, relays, keypad, etc., to a microcontroller. In this system, an LCD is connected to the port1 of the microcontroller; ADC to the port0 and a matrix keypad to the port2.

Smoke detector is connected to the port 2.3; a temperature and a Light Dependent Resistor (LDR) are connected to the channel 1 and 2 of the ADC, respectively.

This system continuously monitors the conditions of the devices at a given time by getting the sensor values. Analogue sensor values of temperature and light illumination are sent to the ADC where these are then converted to the microcontroller understandable language as digital values. These digital values are compared with the pre-stored values of the microcontroller.

Circuit Diagram Of Devices Security System

If these values exceed the predefined limit, then the microcontroller turns lighting and air conditioning systems on with the help of relays.

Similarly, in the presence of fire, smoke detector gives signals to the microcontroller so that the fire exhausting system is turned on.

Matrix keypad allows a user to enter the password to lock or unlock doors. Thus, if a user enters a correct password, the microcontroller sends appropriate signals to the motor driver IC to open or close the door. If a user enters 3 incorrect passwords, then this system turns the alarm system

even if it is a case of fire. All these events' information is remotely transferred to a user mobile using GSM modem. The GSM modem is responsible for sending the status of the temperature, illumination, smoke, etc., to a remote mobile from the commands of master microcontroller. And also it receives the far away user SMS to control the devices TX1, TX2, lights and air conditions in the control room.

RTDSS is high efficiency, compact, less expensive, easy to design and reduces the consumed power also obtained full report about the situation of devices

This paper based on two parts: software which was implemented via micro C program and the program writing by C language. And hardware RTDSS is high efficiency, compact, less expensive, easy to design and reduces the consumed power also obtained full report about the situation of devices .the figure below explain the hardware.

CONCLUSION

The GSM based security system has been designed and tested with the mobile network. The user (engineer) can get alerts anywhere through the GSM technology thus making the system location independent. A flexible way to control and explore the services of the mobile, AT commands, is used in the system. The control of devices through the SMS is low cost and high performance also It can be used in factories, hospitals, offices and homes for security purpose.

REFERENCES

[1]   J. Bangali and A. Shaligram, "Design and Implementation of Security Systems for Smart Home based on GSM technology," *International Journal of Smart Home,* vol. 7, pp. 201-208, 2013.

[2]   G. Demiris and B. K. Hensel, "Technologies for an aging society: a systematic review of "smart home" applications," *Yearb Med Inform,* vol. 3, pp. 33-40, 2008.

[3]   M. Butt, M. Khanam, A. Khan, and M. S. H. Khiyal, "Controlling home appliances remotely through voice command," *IJACSA) Interna tiona l Journal of Advanced Computer Science a nd Applications, Special Issue on Wireless & Mobile Networks,* pp. 35-39, 2010.

[4]   G. Livitsanos, N. Shetty, D. Hündgen, E. Verstrynge, M. Wevers, D. Van Hemelrijck*, et al.*, "Acoustic emission characteristics of fracture modes in masonry materials," *Construction and Building Materials,* 2018.

[5]   D. L. Abbey, "Method and apparatus for composite signal separation and PSK/AM/FM demodulation," ed: Google Patents, 1995.

[6]   H. Elkamchouchi and A. ElShafee, "Design and prototype implementation of SMS based home automation system," in *Electronics Design, Systems and Applications (ICEDSA), 2012 IEEE International Conference on*, 2012, pp. 162-167.