Design and development of sensor based home automation and security system using GSM module and locking system

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Abstract— Security is a feeling of being free from Danger or threat. It would be the prime factor for any sort of situation. Security may indicate a building's ability to protect against external harm events such as home invasion. Some categories fall under the security system such as:- Home/Residential Security system, Computer Security System, Commercial Security System, Fire Alarm System , Personal Safety System etc. Fundamentally, in every home there is a locking system for security purpose but that's not enough because intruder could easily break that locks. In previous research work, there were security systems which provide burglar alarms or GSM modems for sending messages to mobile phone or password entering system using Public Switched Telephone Network. But in these research works there were no locking systems. In this thesis work, A Home Security system had been designed and developed. A microcontroller (MCU AT89S52) based system is designed to detect the intruder using Diffused in line IR sensors and Shock sensors as well as lock system is used to automatically lock the intruder if it tries to get in to the room. A GSM module is also used to send SMS knowing about the intruder in the room. An LCD is used to show that sensors detect the intruder and to show the mobile numbers of room's owner. Buzzer has been also attached which starts buzzing whenever intruder enters into the room. Thus a home automated system is designed to detect and lock the intruder for home /residential security system. This thesis work had been tested by using IR sensor's receiving and transmitting end attached to both side of wooden door and the door is locked. When intruder tries to forcefully unlock the door then shock sensors sense the shock and buzzer will start buzzing and GSM module will send SMS to the saved mobile number. When intruder unlock the door and enter into the room then IR sensor sense intruder entering into the room and GSM module will Send SMS and simultaneously automatic lock system is activated and intruder will lock into the room. This proposed work presents an implementation of model for Security System. This had features of GSM module for sending SMS and locking system to lock the intruder.

Keywords—IR sensor, Shock sensor, GSM module, Mechanical lock, ASM.51

I. INTRODUCTION

Home security is one of the important factors in today's world. Home security is the best burglar's deterrent one can have. It is essential that home privacy is always protected and no outsider can affect it by any means. In this research work, a microcontroller based home security system is

being designed. The door lock is password protected and the password is displayed using 16*2 LCD. Two types of sensors are used in this project such as Diffused Line of Site IR sensor and Shock sensor with GSM module interfaced with microcontroller. Having an ideology to protect our houses and valuables, we implement security system in which whenever intruder comes between transmitting and receiving section of IR sensors and shock is sensed by shock sensors then an automatic lock system is activated and message is being sent by GSM module and the intruder is locked. Microcontroller used is MCU (AT89S52).

II. SYSTEM ARCHITECTURE

The system contains two types of sensors named IR sensor and Shock sensor. Two mechanical locks are used. There is also a GSM module. IR sensor senses the intruder entering into the room. IR sensor senses the motion of the object. As the name suggests, Shock sensor senses the any type of shock given to the home. The attempt in this project is to counter the problem stated above by designing a model that accrues the detection of intruder using GSM module and automatic locking system. Two sensor named Diffused line of sight IR Sensor and Shock Sensor are used to detect the intruder entering into the room. A password protected door is there in the system. If any intruder enters into the room without entering the password and if shock sensor will sense the shock and intruder is detected between transmitting and receiving section of IR sensor. Then automatic mechanical lock will activate and simultaneously an SMS will send by GSM module. Whenever sensor detects the intruder, MCU will activate mechanical locks and intruder will lock into that room and an SMS is send. Room owner numbers are saved in the EPROM. The numbers can be changed if required.

III. SYSTEM COMPONENTS

1)1 AT89S52 (MICROCONTROLLER)

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8KBytes of in-system programmable Flash memory. The appliance is feigned using Atmel's high-density non-volatile memory skill and is companionable with the industry-standard 80C51 training set and pin out. The on-chip flare permits the program

memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a Six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, Down to zero frequency and supports two software selectable power saving modes: Low-power Idle and Power-down Modes.

2) IR PHOTOELECTRIC SENSOR

It is the device which is used to sense the presence, absence, distance of the object or invasion. There are two parts the IR photoelectric sensor named light transmitter and photoelectric receiver. IR sensor senses the object by using infrared rays between light transmitter and photoelectric receiver. These sensors as 'non-natural eyes' are elemental to the computerization technology. The IR photoelectric sensor used in this project is G12 -3C3PA. These sensors are mounted in side configuration in the project. The working principle of the used sensor is that when the beam emitted by the emitter is blocked or partly reflected by the object, the beam receiver whereby makes a judgments and reacts.

Specifications of IR Photoelectric sensor Used:

o   Model no: G12 -3C3PA
o   Detection distance: 3m
o   Operating voltage: DC10-30V
o   Output method: PNP transistor o/p
o   Output status :   NO (light -on)
o   Detection method :   Through beam
o   Response time :   < 2ms

3) GSM MODULE (SIM 900)

GSM is to be referred as Global System for Mobile Communication. It is of various types such as SIM (300), SIM (900), SIM (1200) etc. In this system it is used for home automation system. Basically it is used for sending messages. Whenever intruder tries to enter into the room without entering code, and IR sensor senses the object then GSM module will send messages to the room owner.

Features:	
	➢ QUAD-BAND 850/900/1800/1900 MHz
	➢ GPRS multi slot class 10/8
	➢ GPRS mobile station class B
	➢ Dimensions: 33mm*33mm*3mm
	➢ Weight: 6.2kg
	➢ SIM application toolkit
	➢ Supply voltage: 3.4V- 4.5V
	➢ Low Power Consumption

Interfaces:	
	➢ Charge interface for LI battery
	➢ PWM
	➢ ADC
	➢ Antenna pad
	➢ RTC backup
	➢ SPI interface
	➢ Serial interface
	➢ Analog audio interface
	➢ GPIO

IV.   SOFTWARE IMPLEMENTATION

For software realization in this research work, software named Keil is used. µVision4 incorporated improvement atmosphere that summarized a development supervisor, built capability, device design, editor and a grateful debugger. µVision4 is used to write down and assemble the programs via the apparatus. It could move the assembly language as well as C code into the hex file. . Keil software consists of the following:

Linker Control File – It is a text file that µVision surpasses to the linker. The control file consists of all information, names of object files and library files to comprise in the output file.

**Map File –** The map file is a listing file created by the linker.

Project Target – In an assignment, a target is an executable program that is generated. A project may create an aim that runs on an 8051 family. Plans might be produced to build with no optimization and to make with entire optimization.

Source File Group – In a scheme, a group is a number of source files that compose the project target. Although we may individually specify the toolset options for a file, a group lets us to apply the same options to a group of source files. The choice for a set might be various since the choice for the aim.

Toolsets – A toolset consist of an assembler, compiler, linker, HEX converter, debugger and the other related tools

for a picky device family like the 8051. Every tool or program in a toolset is dedicated to build mark code for a detailed family of chips.

To guesstimate the software for correct method, the case was planned hooked on the microcontroller on the significant maturity board. Encoding of the microcontroller is accomplished via the Universal Programmer. It is a handy serial programmer. These accede to hexadecimal files to be burdened into the microcontroller. Mainly the microcontroller is planned by exterminating it since the hole on the board and bringing in it into the multi-pin hole on the programmer. Microcontroller next to with it's an assortment of edges rivet software to work on. The judgment fretful in accomplishing the chosen maneuver had been vigilantly set.
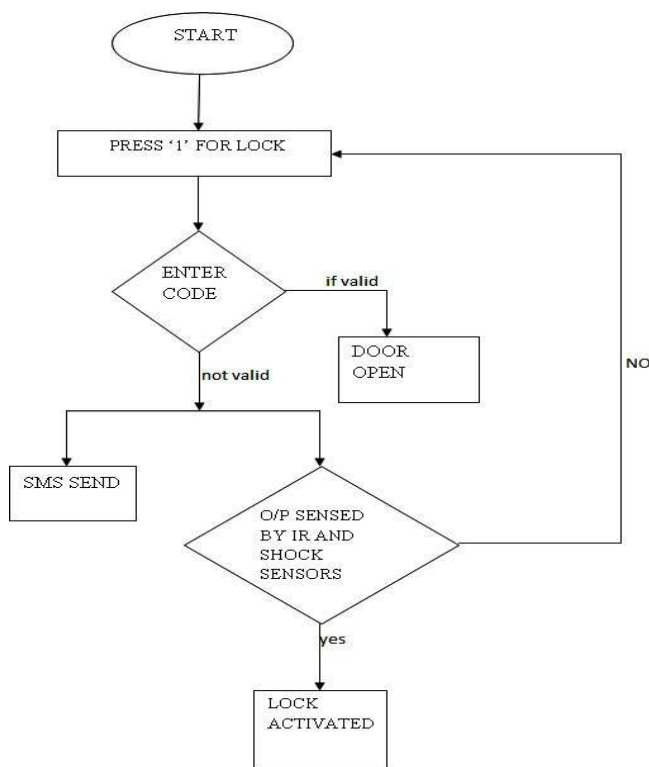
Flow Chart

V. CONCLUSION AND FUTURE SCOPE

Our country has a large number of personnel working in offices and there are residential areas. If proposed work is applied then residential areas which are not secure would be secured. GSM module and an automatic locking system are applied in this proposed work to prevent from the intruder. A password door lock system is available. If any intruder will try to enter without entering the code then IR and shock sensors will detect the intruder and an SMS will send to the room owner simultaneously intruder will get locked in the room by automatic locking system. Solar energy can also be used to supply power to the devices. Sensor like Ultrasonic sensor can also be used to detect the position of the intruder. Also the CCTV cameras are used to capture the image of the intruder.

VI. ACKNOWLEDGMENT

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