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Design and Modelling of Prototype on Advanced Home Security System

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Abstract:
The paper introduced a method there are many cases of burglary sited for every hour in the country either home or any private spaces. Due to these burglaries, there is always loss of valuable property. Many measures and technology have been used to capture such unauthorized movements using CCTV cameras and motion detecting cameras, but they were failing in stopping the theft from being happening. Overcoming these drawbacks, this project involves arresting the burglar from escaping away and communicates the situation of burglary immediately to the owner or nearby local police using mobile communication and siren.Apart from communicating the situation, this home security system also locks all doors and windows that arrest the burglar inside the house. More additional accessories have been used such as releasing chloroform to make the thief unconscious. This helps in protecting both property and not harming the burglar to acute health disorders.

Keywords:
Lasers, sensors, Actuation system (for closing of doors and windows), Pressurized cylinders/ gas releasing systems for pumping chloroform into the rooms. AVR microcontroller and communicate using GSM modules

1. Introduction:
This paper provides an overview of the implications of Smart Home can be also known as Automated Home or intelligent home which indicates the automation of daily tasks with electrical appliances used in homes. This could be the control security of the house interiors for surveillance purposes or giving the alarm alteration and release of gas. Home security has changed a lot from the last century and will be changing in coming years.

Security is an important aspect or feature in the smart home applications. The new and emerging concept of smart homes offers a comfortable, convenient, and safe environment for occupants. Conventional security systems keep homeowners, and their property, safe from intruders by giving the indication in terms of messages. However, a smart home security system offers many more benefits. This paper mainly focuses on the security of a home when the user is away from the place. Two systems are proposed, one is based on GSM technology. The security system is SMS based and uses GSM technology to send the SMS to the owner. The proposed system is aimed at the security of Home against Intruders. In any of the above cases happens while the owners are out of their home then the device sends SMS to the emergency number which is provided to the system. The system is made up of three components: sensors, GSM Module), Atmega16A microcontroller, relays to control the device and buzzers to give security alert signal in terms of message and arrest the thief and release gas.

2. LITERATURE SURVEY:
Technologies and resources:
According to the market research, the common parameters or characteristics of home security system are 24 hours monitoring of the intruder, ease of use, reliability, efficient, fast and precise notification system. Today numbers of home security systems are available in market. A design which contains a home network including a GPRS/GSM gateway and three kinds of wireless security sensor nodes is presented. This system has a user interface and it can respond quickly to alarm incidents. A new method of moving object detection by combination of pixel illumination with its chroma in YUV color space is implemented.

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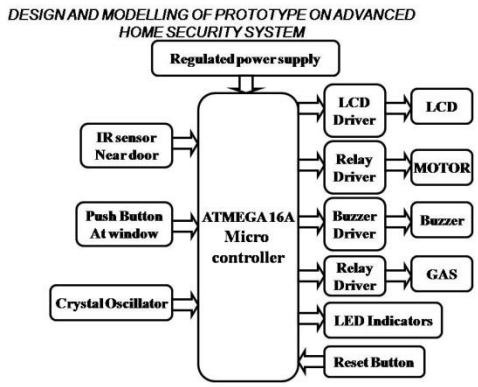
The algorithm of maintenance with 3 key values is discussed in this paper. In case of swaying objects, it is very robust and effective way of false alarms. Discuses the detection and description based on an object oriented, statistical multi feature analysis of video sequences. The system described monitors everything by moving cameras. The system can increase the efficiency of monitoring and can eliminate the blind spots of fixed cameras. In this system, a mobile manipulator is developed which is equipped with cameras at the arm end for purpose of monitoring. The system is based on SMS technology using any GSM modem/mobile is presented. The proposed remote control system works from anywhere in the world. A low cost Short Message System (SMS) based home security system equipped with motion sensor, smoke detector, temperature sensor, humidity sensor and light sensors has been studied. The sensors are controlled by a microprocessor PIC 18F4520 through the SMS having password.

3. IMPLEMENTATION:



From the above figure, we can see that the device which is able to perform the task is a ATMEGA 16A Micro controller. There is IR sensor the sensor data is sent to micro controller then the buzzer indicates alerts and send message through GSM to the owner, ATMEGA 16A Micro Controller is programmed using embedded 'AVR'.

4. RELATED WORK:

This system consists of ATMEGA 16A micro controller which is the main controlling part of the system. The sensor will sense the readings from the thief it can alert sound by using buzzer and send message through GSM module. And closed the doors release some harmful gas in the room. The brief introduction of different modules used in this project is discussed below:

ATMEGA 16A MICRO CONTROLLER:

The ATmega16A is a low-power CMOS 8-bit microcontroller based on the Atmel AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16A achieves throughputs approaching 1MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. 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 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. The ATmega16A provides the following features: 16Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities; 512bytes EEPROM; 1Kbyte SRAM; 32 general purpose I/O lines, 32 general purpose working registers; a JTAG interface for Boundary-scan; On-chip Debugging support and programming; three flexible Timer/Counters with compare modes; Internal and External Interrupts; a

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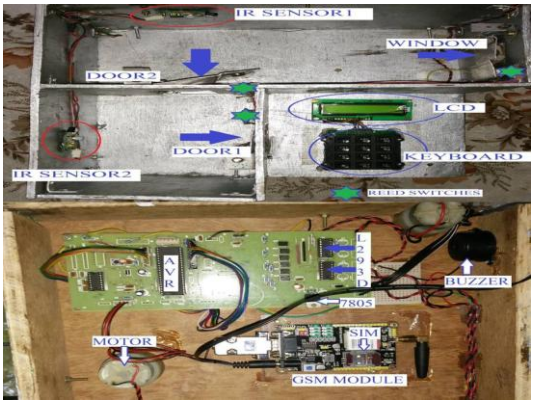
serial programmable USART; a byte oriented Two-wire Serial Interface, an 8-channel; 10-bit ADC with optional differential input stage with programmable gain (TQFP package only); a programmable Watchdog Timer with Internal Oscillator; an SPI serial port; and six software selectable power saving modes. The Idle mode stops the CPU while allowing the USART; Two-wire interface; A/D Converter; SRAM; Timer/Counters; SPI port; and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next External Interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except Asynchronous Timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run



IR sensor:

The IR Sensor-Single is a general purpose proximity sensor. Usually its is used for collision detection or obstacle detection. The module consist of a IR emitter and IR receiver pair. The high precision IR receiver always detects a IR signal. The module consists of 358 comparator IC.

The output of sensor is high whenever the IR receiver receives a signal of IR frequency and low otherwise. The on-board LED indicator helps user to check status of the sensor without using any additional hardware. The power consumption of this module is low. It gives a digital output.

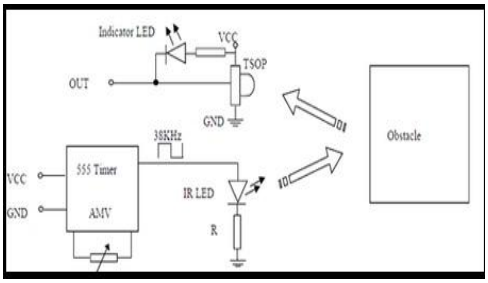


Fig.1.5.1 Block diagram of IR sensor communication

Features:

- General Purpose Proximity Sensor.
- IR emitter and IR receiver pair.
- LED indicator for sensor output.
- Very compact.
- Low power consumption.
- LM358 for Digital Output.

Pin Configuration

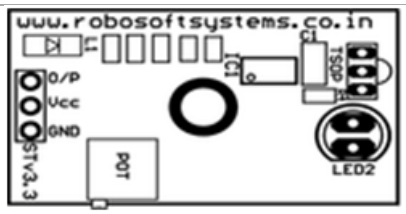


Fig.1.5.2 Pin configuration of IR sensor

The figure to the right is a top view of the IR Sensor module. The following table gives its pin description.

Pin No.	Connection	Description
1	OUTPUT	Digital Output(High or Low)
2	VCC	Connected to circuit supply
3	GND	Connected to circuit ground

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Table3: Pin description of IR sensor

Application Ideas

- Obstacle detection.
- Shaft encoder.
- Fixed frequency detection.

KEYPAD :

Keypad is organized as a matrix of switches in rows and column as shown in the fig 1.4. This project uses a 4X3 matrix keypad and a 16x2 LCD for displaying the output of keypad. The circuit diagram shows the connection of keypad with the controller. Port P2 of the microcontroller is used to send the data for displaying on the LCD. P1^1, P1^2, P1^3 pins of microcontroller is connected to RS, RW, EN pins of LCD respectively. Port P0 is used to scan input from the keypad (refer circuit diagram for connection). The concept of interfacing keypad with the MCU is simple. Every number is assigned two unique parameters, i.e., row and column number (n(R, C) for example 6 (2, 3)). Hence every time a key is pressed the number is identified by detecting the row and column number of the key pressed.Initially all the rows are set to zero by the controller and the columns are scanned to check if any key is pressed. In case no key is pressed the output of all the columns will be high.

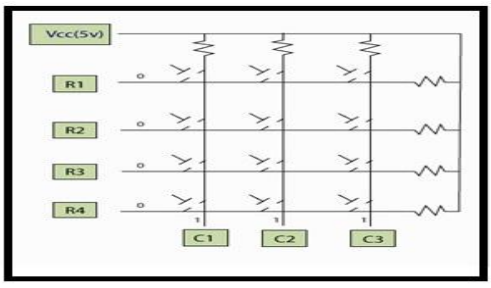

Fig. Keypad layout

Whenever a key is pressed (see Fig1.5) the row and column corresponding to the key will get short, resulting in the output of the corresponding column goes to go low (since we have made all the rows zero). This gives the column number of the pressed key. Once the column number is detected, the controller set's all the rows to high.

Now one by one each row is set to zero by controller and the earlier detected column is checked if it becomes zero. The row corresponding to which the column gets zero is the row number of the digit.

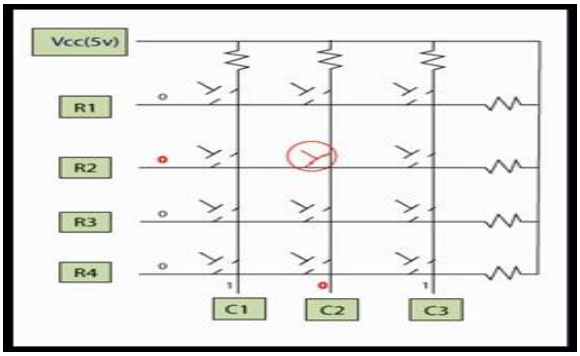

Fig Keypad layout when a key is pressed

The above process is very fast and even if the switch is pressed for a very small duration of time the controller can detect the key which is pressed. The controller displays the number corresponding to the row and column on the LCD.

DC Motor:

A dc motor uses electrical energy to create mechanical energy, very generally through the interaction of magnetic fields and current-containing conductors. The reverse process, producing electrical energy from mechanical energy, is carried out by an alternator, source or dynamo. Many types of electric motors can be run as sources, and vice verse. The input of a DC motor is current/voltage and its output is torque (speed).

DC Motor:

The DC motor has two basic parts: the rotating part that is called the armature and the stable part that includes coils of wire called the field coils. The stationary part is also called up the stator.

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Figure shows a depict of a distinctive DC motor, Figure shows a picture of a DC armature, and Figure shows a picture of a distinctive stator. From the picture you can see the armature is build of coils of wire wrapped around the core, and the core has an covered shaft that rotates on charges. You should also observe that the ends of each coil of wire on the armature are finished at one end of the armature. The outcome points are called the commutator, and this is where's brushes produce electrical contact to bring electrical current from the stationary part to the rotating part of the machine.

LCD:

One of the most usual devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the multiple microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

L293D:

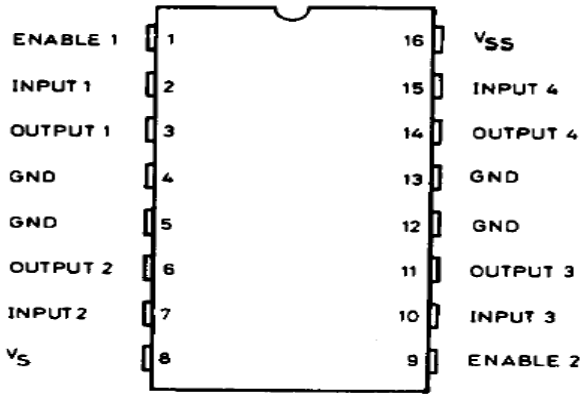

Fig. 1.9.1. Layout of L293D

L293d General Description

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

L293d Features:

- Wide Supply-Voltage Range: 4.5 V to 36 V
- Separate Input-Logic Supply
- Internal ESD Protection
- Thermal Shutdown
- High-Noise-Immunity Inputs
- Functionally Similar to SGS L293 and SGS L293D
- Output Current 1 A Per Channel (600mA for L293D)
- Peak Output Current 2 A Per Channel (1.2 A for L293D)
- Output Clamp Diodes for Inductive Transient Suppression (L293D)

BUZZER:

Basically, the sound source of a piezoelectric sound component is a piezoelectric diaphragm. A piezoelectric diaphragm consists of a piezoelectric ceramic plate which has electrodes on both sides and a metal plate (brass or stainless steel, etc.). A piezoelectric ceramic plate is attached to a metal plate with adhesives. Applying D.C. voltage between electrodes of a piezoelectric diaphragm causes mechanical distortion due to the piezoelectric effect. For a misshaped piezoelectric element, the distortion of the piezoelectric element expands in a radial direction. And the piezoelectric diaphragm bends toward the direction.

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The metal plate bonded to the piezoelectric element does not expand. Conversely, when the piezoelectric element shrinks, the piezoelectric diaphragm bends in the direction Thus, when AC voltage is applied across electrodes, the bending is repeated, producing sound waves in the air.

To switch on buzzer -high 1
To switch off buzzer -low 1

Notice (Handling) In Using Self Drive Method
1) When the piezoelectric buzzer is set to produce intermittent sounds, sound may be heard continuously even when the self drive circuit is turned ON / OFF at the "X" point shown in Fig. 9. This is because of the failure of turning off the feedback voltage.
2) Build a circuit of the piezoelectric sounder exactly as per the recommended circuit shown in the catalog. Hfe of the transistor and circuit constants are designed to ensure stable oscillation of the piezoelectric sounder.
3) Design switching which ensures direct power switching.
4) The self drive circuit is already contained in the piezoelectric buzzer. So there is no need to prepare another circuit to drive the piezoelectric buzzer.
5) Rated voltage (3.0 to 20Vdc) must be maintained. Products which can operate with voltage higher than 20Vdc are also available.

Fig: Picture of buzzer

LCD (LIQUID CRYSTAL DISPLAY):

Liquid crystal displays (LCD) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. The LCD s won't generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly.

LCD OPERATION:

In recent years the LCD is finding widespread use replacing LED s (seven-segment LED or other multi segment LED s). This is due to the following reasons:

- The declining prices of LCD s.
- The ability to display numbers, characters and graphics. This is in contract to LED s, which are limited to numbers and a few characters.
- Incorporation of a refreshing controller into the LCD, there by relieving the CPU of the task of refreshing the LCD. In the contrast, the LED must be refreshed by the CPU to keep displaying the data.
- Ease of programming for characters and graphics.

USES:

The LCDs used exclusively in watches, calculators and measuring instruments are the simple seven-segment displays, having a limited amount of numeric data. The recent advances in technology have resulted in better legibility, more information displaying capability and a wider temperature range. These have resulted in the LCDs being extensively used in telecommunications and entertainment electronics. The LCDs have even started replacing the cathode ray tubes (CRTs) used for the display of text and graphics, and also in small TV applications.

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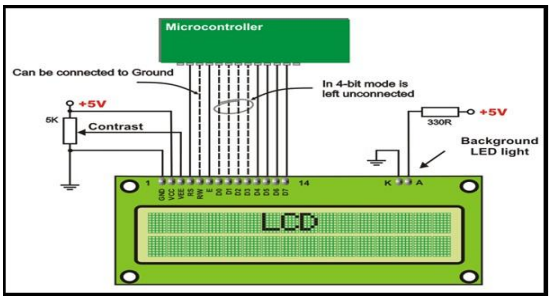

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