GSM BASED INDUSTRIAL SECURITY SYSTEM

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Abstract: **Security and automation is a prime concern in our day-to-day life. The approach to home and industrial automation and security system design is almost standardized nowadays. In this paper, we have tried to increase these standards by combining new design techniques and developed a low cost home and industrial automated security systems. Everyone wants to be as much as secure as possible. The design of simple hardware circuit enables every user to use this wireless home security system with PIR sensor, Gas sensor, Smoke sensor and Main fuse Failure Detector at Home & Industries.**

I.INTRODUCTION

Home security is the most significant one for every homeowner either in an individual house or an apartment. To get the absolute peace of mind whether you are at home or out of home you must ensure that your home is installed with the perfect home security monitoring system. This GSM Bases industrial security system can be used to provide security system for residential, industrial, and for all domestic and commercial purposes using GSM technique. Security systems are certain electronic devices which are used to detect intrusions in home or industry. The basic components of a home automation security system are motion detectors, LPG detectors and smoke detector. It is cheaper and can be maintained easily than any other security device.

When the user is away from home or industry, all the sensors are activated by switching on the Security system. Whenever systems experiences a abnormal condition in the industry like any fire/smoke occurs in the home/industry and any intrusion into the home/industry the Security system alerts the security personnel as well as the owner of the industry by sending SMS alerts to the users of the home/industry. In the system along with security, industrial lighting is also activates based on the lighting available in the industry. The system operates with the help of sensors installed in this system.

Existing systems
1. Wired System,
2. RF Based Security System,
3. Web enabled Security System.
4.

Disadvantage of Existing Systems
1. Difficult to maintain
2. Need internet access
3. Distance.

Proposed System
    The proposed system uses GSM module which enables us to know the security status of home/industry when we are away from the home/industry.

II. ARCHTECTURE OF THE SYSTEM

It can be implemented to any levels of the security system. The architecture of the system mainly consists of three components the GSM MODEM and the interface circuit that include the different sensors used. The function of the GSM MODEM is the remote communication

between the user and the controller through the RS232 serial communication standard. The function of the controller is to continuously check the inputs coming from the different sensor and send message through the GSM network in case of emergency.

The microcontroller is connected to different devices like smoke detector, motion detector through relays. The GSM connected to the user, police station, and fire brigade through the mobile cellular network. An interface circuit has been designed which includes sensors as input devices. Then the programmed microcontroller has been connected to the interface circuit and the GSM MODEM through the serial port of the GSM MODEM

SENSING DEVICES

PROXIMITY SENSOR

A **proximity sensor** is a sensor able to detect the presence of nearby objects without any physical contact.

A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target.

It is the same principle in ALL Infra-Red proximity sensors. The basic idea is to send infra red light through IR-LEDs, which is then reflected by any object in front of the sensor.

Then all you have to do is to pick-up the reflected IR light. For detecting the reflected IR light, we are going to use a very original technique: we are going to use another IR-LED, to detect the IR light that was emitted from another LED of the exact same type. This is an electrical property of Light Emitting Diodes (LEDs) which is the fact that a LED produces a voltage difference across its leads when it is subjected to light. As if it was a photo-cell, but with much lower output current.

Fig.2. IR LED's

LIGHT DEPENDENT RESISTOR

A light dependant resistor also knows as a LDR, photo-resistor, photoconductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity. LDRs (Light Dependant Resistors) are a very useful tool in a light/dark circuits. LDRs can have a variety of resistance and functions. For example it can be used to turn on a light when the LDR is in Darkness or to turn o a light when the LDR is in light. It can also work the Other way around so when the LDR is in light it turns on the circuit and when it's in darkness the resistance increase and disrupts the circuit.
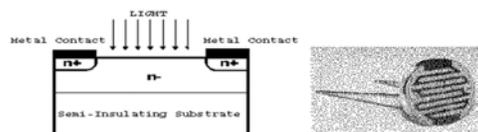

Fig.4. LDR

GAS AND SMOKE SENSOR

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

Fig.4. Gas Sensor

TYPES OF SMOKE SENSORS

The sensor is composed of micro Al2O3 ceramic tube. Tin dioxide sensitive layer, measuring electrode and heater are fixed into crush made by plastic and a stainless steel net. The heater provides necessary work condition for work

sensitive component.

Parts	Materials
Gas Sensing layer	SnO_2
Electrode	Au
Electrode line	Pt
Heater coil	Ni-Cr alloy
Tubular ceramic	Al_2O_3
Anti Explosion Network	Stainless Steel Gauze
Clamp ring	Copper plating Ni
Resin Base	Bakelite
Resin base	Copper plating Ni

Table.2. Parts of smoke sensor

SERIAL COMMUNICATION–RS232

A popular way to transfer commands and data between a personal computer and a microcontroller is the use of standard interface, like the one described by protocols RS232 (older) or USB (newer). This chapter is devoted to communication conforming to RS232 protocol, the hardware for such interface is provided onboard. An example will be presented showing the processing of commands received through RS232 interface, and sending of a string of numbers using the same interface.

The microcontroller includes up-to six hardware modules to deal with RS232 signals. Some of the modules additionally implement other communication protocols, like I2C, CAN, SPI; module named UART4 will be used in this experiment. Its detailed description can be found in RM0090, chapter 26. The voltage level translator is added on the test board, and is industry standard chip MAX3232. The Signals TX and RX are available at connector P580, pins3 and 2 respectively. The RS232 signals RX and TX are available as alternate functions replacing the regular port bits, and corresponding port pins Must be properly initialized software.
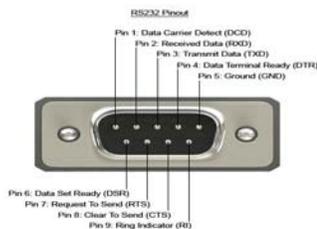
Fig: D-Connector

OP-AMP LM324

The LM324 series are low−cost, quad operational amplifiers with true differential inputs. They have several distinct advantages over standard operational amplifier types in single supply applications. The quad amplifier can operate at supply voltages as low as 3.0 V or as high as 32 V with quiescent currents about one−fifth of those associated with the MC1741 (on a per amplifier basis). The common mode input range includes the negative supply, thereby eliminating the necessity for external biasing components in many applications. The output voltage range also includes the negative power supply voltage.
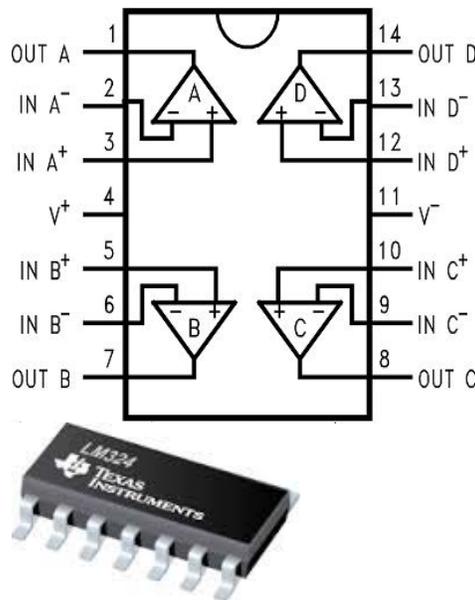
Fig: Quad OP-Amp IC Package

The LM324 series is made using four internally compensated, two−stage operational amplifiers. The first stage of each consists of differential input devices Q20 and Q18 with input buffer transistors Q21 and Q17 and the differential to single ended converter Q3 and Q4. The first stage performs not only the first stage gain function but also performs the level shifting and transconductance reduction functions. By reducing the transconductance, a smaller compensation capacitor (only 5.0 pF) can be employed, thus saving chip area. The transconductance reduction is accomplished by splitting the collectors of Q20 and Q18. Another feature of this input stage is that the input common mode range can include the negative supply or ground, in single supply operation, without saturating either the input devices or the differential to single−ended converter. The

second stage consists of a standard current source load amplifier stage.

SIM900-GSM/GPRS Module

GSM (Global system for mobile communication) is a cellular network. GSM network operate in four different frequency ranges. Most GSM network operates in 900 MHz or 1800 MHz bands. The transmission power in the handset is limited to a maximum of 2 watts GSM 850/900/300 and 1watt in 1800/1900. The longest distance the GSM specification supports in practical use is 35Km (22 mi). In this paper we use SIM900a based GSM modem to receive and send short message to user and system
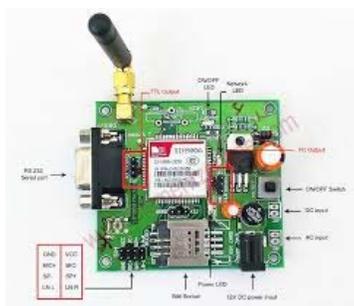

PHOTO IMAGE OF SIM 900A
LCD DISPLAY

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven-segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

RELAY DRIVER CIRCUIT

Relays are components which allow a low-power circuit to switch a relatively high current on and off, or to control signals that must be electrically isolated from the controlling circuit itself. Newcomers to electronics sometimes want to use a relay for this type of application, but are unsure about the details of doing so. Here is a quick rundown. To make a relay operate, you have to pass a suitable 'pull-in' and 'holding' current (DC) through its energizing coil. And generally relay coils are designed to operate from a particular supply voltage often 12V or 5V, in the case of many of the small relays used for electronics work.

III. WORKING
CONTROL AND INTERFACE CIRCUITS

Nowadays, microcontrollers are so cheap and easily available that it is common to use them instead of simple logic circuits like counters for the sole purpose of gaining some design flexibility and saving some space. Some machines and robots will even rely on a multitude of microcontrollers, each one dedicated to a certain task. Most recent microcontrollers are „In System Programmable", meaning that you can modify the program being executed, without removing the microcontroller from its place. In this paper a PHILIPS made P89V51RD2 Microcontroller is used. It has 8-bit data bus, 16-bit address bus, 32 general purpose registers each of 8 bits, 16 bit timers, 3 internal and 2 external interrupts, Bit as well as byte addressable RAM area of 16 bytes. Four 8-bit ports, (short models have two 8-bit ports). 16-bit program counter and data pointer, 64K Flash memory and UART for serial communication. The microcontroller is programmed by using Flash Magic Software.
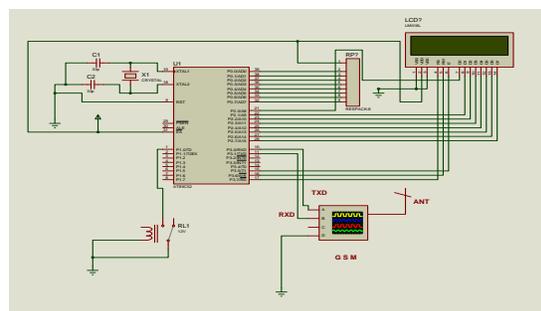
Control and interface Circuit
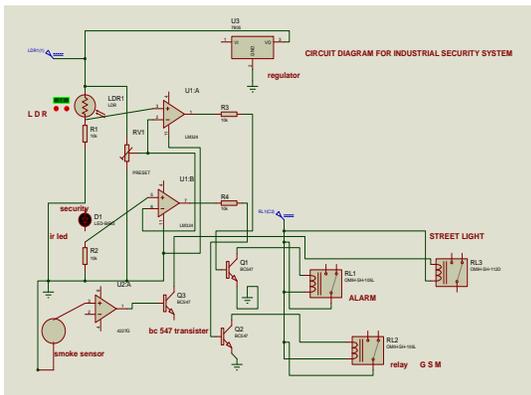
Main Circuit

WORKING OF THE SYSTEM

The system is fully controlled by the microcontroller and the microcontrollers will continuously monitors the sensors, detector and GSM modem. If the voltage level of sensor input pins goes to zero then it will send the "AT + CMGS ="USER MOBILE NUMBER" to GSM modem through serial port. The GSM modems will response with the character ">". After receiving ">"Character microcontroller again send the type of security problem SMS + CTRL Z to GSM Modem.

GSM modem will send the type of problem to user. For example any moment detected in security area at the time microcontroller pin number 39 goes to logical zero. Microcontroller sensed the change and immediately send AT + CMGS = "+888888888888" to GSM modem, GSM modem give ">"character to microcontroller. After receiving ">" Character microcontroller again sends the "MOMENT DETECTED" SMS to GSM Modem. GSM modem sends the SMS to user.

RESULTS

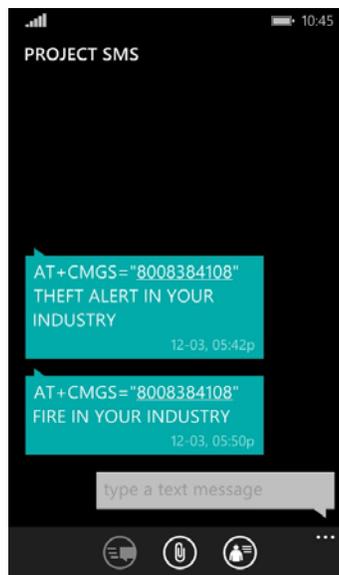Fig: Photo of working model

Fig: Photo of GSM Module

Fig: Received SMS

V. CONCLUSION AND FUTURE WORK

This paper presents user friendly and low cost home and industrial automation and security systems. After a thorough study of literatures of all the topics that include home automation design and wireless networks. A simple system to improve the standards is developed. It is a real-time monitorable system developed with simple hardware which simplifies the possibility of error free security system. This system can be easily implemented with maximum reliability and the high security with low cost is a special enhancement from the existing systems for Home security.

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