AUTOMATED HOME SECURITY SYSTEM

ABSTACT:

Although there are rapid advancements in science and technology around the world, it is a common phenomenon to notice that not all the highly advanced technologies are useful for the common people who account for more than 90% of Earth's population. One of such technology is Home Automation. After a deep study on this situation it seems that not all homes have these fully automatic systems because of their high cost and the ignorance to the worst possible scenario that can never be stopped. But with this cheap and effective system our team would like to deliver a power package of low power automation system that monitors,

1. Gas leakage and Fire accidents.
2. Burglary and security.

With this system we were able to achieve the above mentioned objectives in a cost efficient and power efficient way.

INTRODUCTION:

This Home Automation system will consist of

1. IR Sensors
2. Gas Detection Sensor
3. Flame detection sensor
4. GSM module and a
5. Buzzer

All these peripherals can be attached with any microcontrollers for receiving and processing the raw information given by these sensors and co-ordinate their respective works. The microcontroller we will be using in this project is Arduino Uno. Once the code is dumped into Arduino Uno this system can be deployed in real life environment by powering the Arduino with an external power source. In order to increase the lifetime of the system Arduino and GSM modules are powered by

separate 12V batteries. In order to prevent any major fault by this automation system due to low power or faulty sim card placement, this system is provided with a fail-safe mechanism where the system informs the user before any peripherals go offline. There are Green and Red LEDs provided with the system which indicates the current battery status.

COMPONENTS:

- IR Sensors – 2
- Gas Sensor(MQ-2) - 1
- Flame Sensor – 1
- Arduino UNO - 1
- GSM Module – 1
- RTC Module - 1
- Buzzer -1
- Exhaust Fan – 1
- 9V DC Battery – 1

GSM Module

A GSM module consists of GSM modem, serial communication and power supply. A GSM modem is a specialised type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. AT commands are used to control the modem. The advantage of GSM modem is compact, low power consumption and high-quality SMS function. The interfacing of GSM module with 8051 microcontroller can be used to send the sensed information from the sensors that alert the user through an SMS sent by GSM modem.

GSM Module

MQ-2 Gas Sensor

The sensitive material of the MQ-2 gas sensor is SnO2, which has the lower conductivity of clean air. When the target combustible gas exists, The MQ-6 sensor's conductivity is higher along with the gas concentration rising. The MQ-6 gas sensor has high sensitivity to Propane, Butane, methane and LPG.

MQ-2 Gas Sensor

Specifications

- Input voltage: 5V DC
- Output voltage: 0-5V
- Dual signal output (analogue output and TTL level output)
- Power: 150 mA
- Size: 32x22x27mm
- Designed in 4-pin male header
- Detection range: 200 – 10,000ppm

Advantages

- Highly sensitive and quick response
- Reliable stability and long life

Flame Sensor

Flame sensors are used to detect the existence of fire in the surroundings. This sensor is sensitive to the flame and radiation. It can detect ordinary light source in the range of a wavelength 760nm-1100 nm. This module has two outputs

1. AO: analogue output, a real-time output voltage signal on the thermal resistance.

2. DO: when the temperature reaches a certain threshold, the output high and low signal threshold adjustable via a potentiometer.

Flame Sensor

Specifications

- This sensor is suitable for the flame wavelength of 760nm to 1100nm.
- It has a high-speed and highly sensitive NPN silicon phototransistor.
- There is a rollover threshold level output. Detection angle of 60 degrees Power supply indicator lamp Comparator output indicator lamp.
- Power supply: 3.3V-5.5V DC
- Used wide range voltage comparator IC LM393
- Size: 2.9cm x 1.2cm

IR Sensor

Infrared Obstacle Avoidance Proximity Sensors Module has built-in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.

The sensor module can be interfaced with Arduino, Raspberry Pi or any microcontroller having IO voltage level of 3.3V to 5V.

- Obstacle avoidance in robots
- Production counting on assembly lines
- Presence detection
- Security systems

Technical Specifications

- Model Number: FC-51
- Detection angle: 35 °
- Operating Voltage: 3.0V – 6.0V
- Detection range: 2cm – 30cm (Adjustable using potentiometer)
- Overall Dimension: 4.5cm (L) x 1.4 cm (W), 0.7cm (H)
- Active output level: Outputs Low logic level when obstacle is detected
- In-active output level: Outputs High logic level when obstacle is not detected
- Current Consumption:
  - at 3.3V : ~23 mA
  - at 5.0V: ~43 mA

METHODS:

1. Gas Leakage and Fire Accidents:

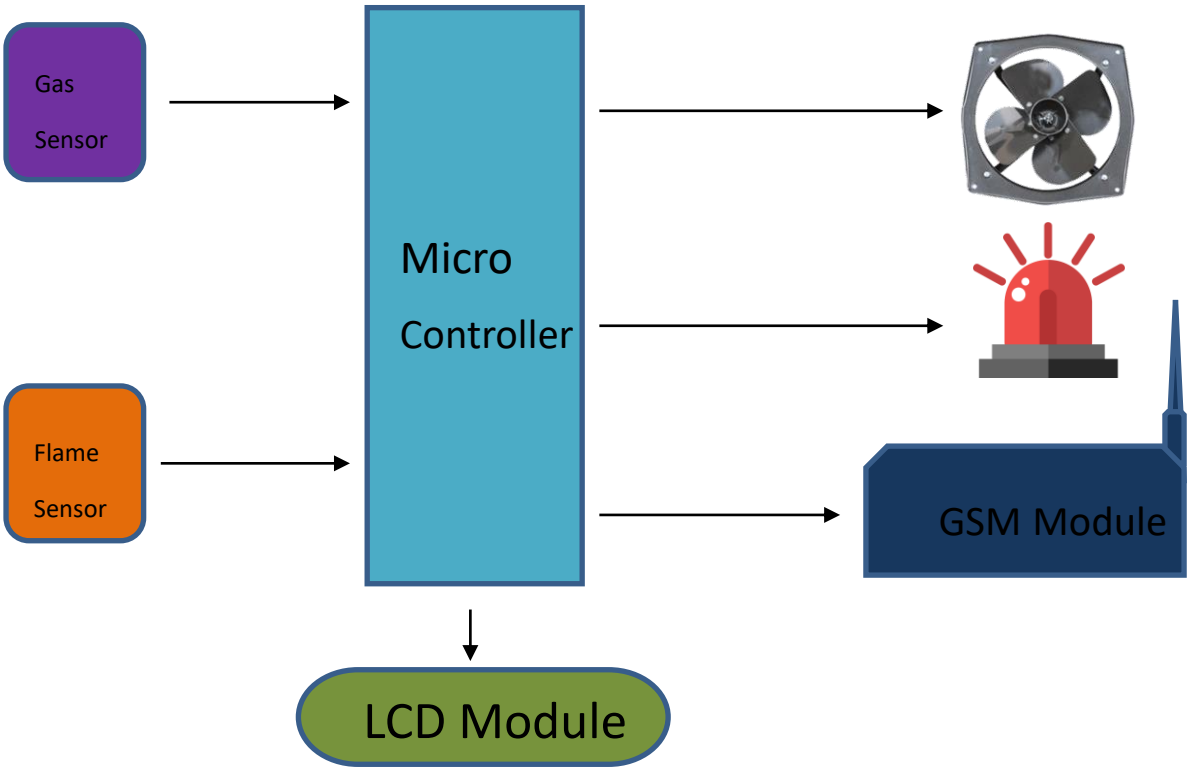
The first task of the system we will be discussing about is gas and fire detection and its prevention. The sensors we will be using for this task are a Gas Sensor and a Flame Sensor. The Gas sensor is capable of detecting all sorts of gases but what we expect in particular is that it detects LPG leaks. This is where the microcontroller comes to the rescue where it reads the continuous data sent by the sensor and compares it with a threshold value which is equivalent to the LPG gas readings. If the sensor's value reaches or exceeds this threshold value, the microcontroller takes charge and automatically triggers a switch that is connected with an exhaust fan. Not only does it turns on the exhaust fan automatically but also informs the user via SMS via GSM module. Similarly Flame sensor detects any flame or a spark in a specific range particularly used in kitchen. Whenever the microcontroller detects any flame along with LPG gas leakage it informs the user via SMS and automatically turns on showers to prevent further damage.

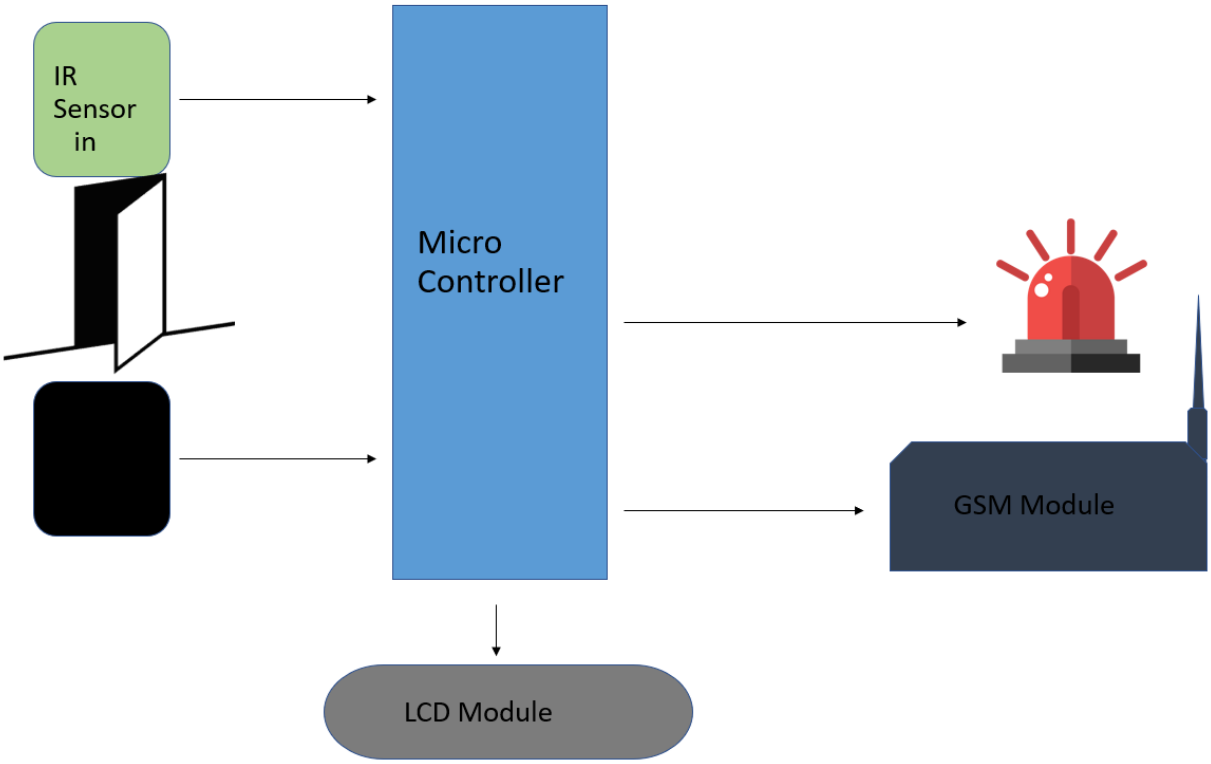
Not only does this system informs the user but also informs all other civic departments such as Fire department and Ambulance in case of fires via GSM.

2. Burglary and Security:

This task is achieved by incorporating an IR sensor behind the doors and windows. The IR sensor detects major suspicious motions only during night times or if the system is manually switched on. If the system detects any suspicious activity it sets up an alarm in the house along with informing the concerned departments (POLICE Department) via GSM.

BLOCK DIAGRAM:





ADVANTAGES:

- Low cost.
- Low power
- Easy maintenance
- Can act as both Fully-automatic and Semi-automatic

CONCLUSION:

Thus a low cost home automation system is achieved which is really easy to build with very little knowledge on microcontroller coding. Its low cost and low maintenance are the major strength of this system. Finally it ensures impending disaster protection as desired and fulfils its purpose.

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