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REVIEW ON PREVENTION OF FIRE AND GAS ACCIDENT USING IOT LOGIC

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ABSTRACT

This is the smart system which avoids fire as well as gas accidents thereby preventing the user affected from gas leakages and protect from fire accidents. The system consists of fire and gas sensors for detection purpose. If system detects a gas leakage the system first senses the human presence in the kitchen. In the human presence if the gas leakage is detected, the system just sends an SMS to the consumer using GSM module and an alarm sound is produced with the help of buzzer. If gas leakage is detected in human presence the system first stops the gas supply with the help of stepper motor. Power is given to exhaust fan to suck out all the leaked gas in the room. Information about this event is send to all the family members through SMS and call using GSM modem. Then the buzzer which is set outside the home produces alarm sound to alert the neighbors. The authorized person can takes the necessary actions against these situations. Each activity will be send to the consumers through SMS so that the family members can update the current situation which is happening in home.

Keywords: Gas Monitoring, Fire Prevention, IOT

I.INTRODUCTION

In olden days urban people used bio gas and rural people used LPG cylinders. Nowadays many people are using LPG cylinders in their home. Liquefied Petroleum Gas (LPG) is a clean and environmentally-friendly source of energy. LPG is a mixture of hydrocarbon gases, the two most common being butane and propane. Some of them are unaware to handle the cylinders which mean they are careless while on/off the cylinders. This may cause severe damage to their family and neighbors. Many cooking women are thoughtless to helve the gas cylinders so that fire accidents will occur because LPG has an explosive range of 1.8% to 9.5% volume of gas in air. In 1984, the Bhopal disaster also referred to as the Bhopal gas tragedy, was a gas leak incident in India, and considered the world's worst industrial disaster. Over 500,000 people are affected due to leakage of methyl isocyanate. There is no precaution had taken for this damage if any alert given to the people many of them wont lost their life. The main objective of our idea is to safeguard the people life before an accident.

The Internet of Things is the network of physical objects devices and other items embedded with electronics, software, sensors, and network connectivity that enable these objects to collect and exchange data. It has ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. As of 2013, 9.1 billion IoT units Expected to grow to 28.1 billion IoT devices by 2020. Revenue growth from $1.9

trillion in 2013 to $7.1 trillion in 2020. This technology recently using in smart cities, smart transport, smart health and so on. Some of the activities currently working in smart cities such as waste management, water leakages, traffic congestion, noise urban map. IoT is using in every environment.

The areas where Internet of Things are used is

- Environmental monitoring
- Infrastructure management
- Manufacturing
- Energy management

II.INNOVATION

In our project we are going to use Intel Galileo gen 2 kit. The gas sensor (generic mq-6 gas sensor), human detector sensor (arduino compatible pir motion detector) and fire sensor (flame sensor). The LCD which is used displays the instructions that are given by the user. The buzzer is an audio signaling device which is used for alerting the people. When fire or gas leakage is detected, an SMS and call will be sent to all the consumers in the family using GSM modem. When gas leakage is detected, the stepper motor is used to shut down the power supply and switch on the exhaust fan automatically. The gas leakage here is not only detected but also prevented.

III.EXISTING SYSTEM

LPG cylinders are an integral part of home nowadays. Most of the gas accidents happen because of people negligence on not switching off the regulator. Even though some of the fire accidents occurs because of people mistake, but major accidents occurs because of faulty regulators or tubes resulting in leakage. The detection of gas leakage and its monitoring has been done. When the gas leakage is detected, SMS is send to the family member and call is also made to the consumer. An alarm is set in the home to indicate the members in the home about the gas leakage. Only the monitoring actions are done and no control action is being taken. Automatic gas booking is also done in LPG cylinders. Only the detection of gas leakage is done and no preventive action is done.

IV.DRAWBACKS OF EXISTING SYSTEM:

The gas leakage is detected and the actions are sent as an SMS to the user.

- There is a chance that the user may not see it.
- In existing system only the gas leakage is detected and no control action is being taken.
- Fire accident may occur if the person unknowingly turns on the electrical devices.

V.PROPOSED SYSTEM

The proposed method takes an automatic control action upon detection of LPG gas. The human presence is sensed first. In the presence of human if the gas leakage is detected, an SMS is sent to the consumer about the

gas leakage and alarm sound is produced to alert the family members. In the absence of human, if gas leakage is detected the system first shut down the power supply in the home thereby preventing fire accidents in the home. Leakage of gas need to be controlled. Hence, the regulator valve is switched off using stepper motor so that the gas is not supplied. The stepper motor consists of a rotor and a stationary point surrounding the sensor. The rotor is used to turn the gas valve so that the gas supply would be stopped completely. Exhaust fan is powered on and it works by sucking hot and humid air and gas out of an area, allowing fresh air to replace them. Family members are alerted about the leakage of gas through alarm sound with the help of buzzer. SMS is sent to all the family members.

VI.BLOCK DIAGRAM

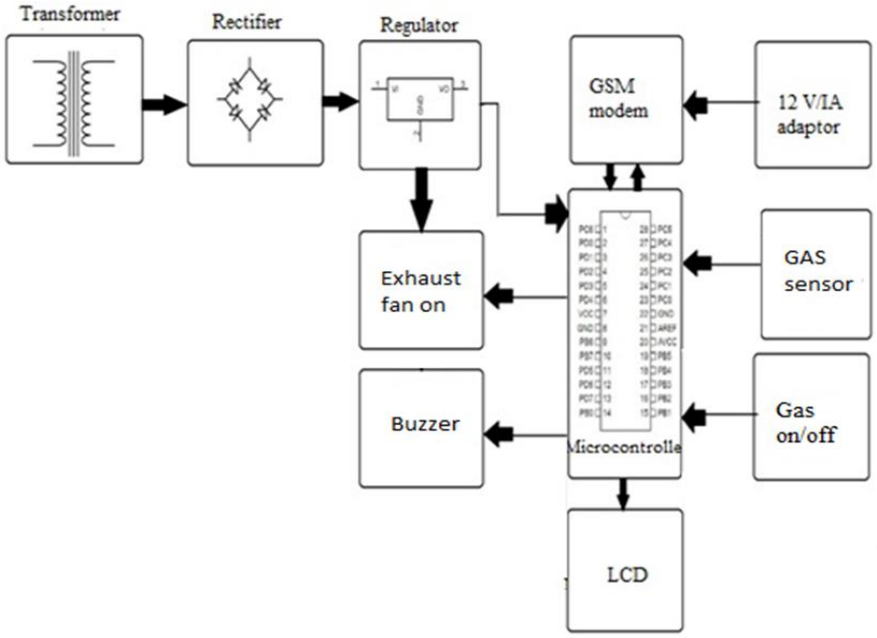

Figure 1: Proposed Model

VII.KIT DESCRIPTION

INTEL GALILEO GEN 2 SPECIFICATIONS

- SoC- Intel Quark SoC X1000 single core, single-thread application processor @ 400 MHz, with 12KB embedded SRAM
- System Memory – 256MB DDR3
- Storage – 8MB NOR fklash, 8KB EEPROM, and micro SD card slot (up to 32GB)
- Connectivity – 10/100M Ethernet
- USB – 1x USB 2.0 host port, 1x micro USB 2.0 device port used for programming Debugging / Programming.

VIII.ARDUINO HEADERS THAT SUPPORT ARDUINO SHIELDS

- 20x digital I/O (12x fully native speed)
- 6x analog inputs
- 6x PWMs with 12-bit resolution
- 1x SPI master
- 2x UARTs (1 shared with console UART)
- 1x I2C master

IX.MODULES

The modules used in our project are

- Detecting human presence using PIR motion detector
- Detecting fire using Flame sensor
- Finding Gas leakage using MQ-6 gas sensor
- Shutting down the gas supply using stepper motor
- Switch on exhaust fan
- Sending SMS and call using GSM module
- Alerting neighbors using buzzer.

X.DESCRIPTION OF PIR MOTION SENSOR

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects in its field of view. It used to sense movement of people, animals, or other objects. They are also known as passive infrared detector (PID). It will detect changes in the amount of infrared radiation, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When sensor detects an object it will rise from room temperature to body temperature and normal again. The sensor converts the change in the incoming infrared radiation into output voltage. PIR sensor detects human approximately within 10m from the sensor. PIR sensor has a 3-pin connection at the side or bottom. One pin will be ground, another will be signal and the last pin will be power supply. Power is usually up to 5V.

XI.DESCRIPTION OF FLAME DETECTOR

A flame detector is designed to detect and respond to the presence of a flame or fire. The fire sensor is too sensitive which quickly detects the fire. It is the most common method of fire detection for life safety throughout the world. The purpose of a flame sensor is to detect an occurrence, alert the proper authorities, and notify the occupants to take action. The main purpose is to minimize the risks associated with combustion. The IR detector can detect low-frequency flickering IR radiation ranging from 1 to 15 Hz.

XII.DESCRIPTION OF GAS SENSOR

The MQ-6 gas sensor is a simple to use liquefied gas (LPG) sensor, which is suitable for sensing LPG which composes mostly of propane and butane concentrations in the air. The range for mq-6 gas sensor is from 200 to 10000ppm. It has high sensitivity and fast response time. The output from the sensor is analog resistance. The sensor could be used to detect different combustible gas, especially methane, it is with low cost and suitable for different application.

XIII.DESCRIPTION OF GSM MODULE

GSM is a mobile communication modem. It stands for global system for mobile communication. The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

XIV.DESCRIPTION OF STEPPER MOTOR

A stepper motor is a brushless DC electric motor that divides a full rotation into a number of equal steps. Each pulse moves the shaft through a fixed angle. It has multiple "toothed" electromagnets arranged around a central gear-shaped piece of iron. Stepper motor has two phases unipolar and bipolar.

• Unipolar motor: A unipolar stepper motor has one winding with center tap per phase. Each section of windings is switched on for each direction of magnetic field. The center tap of each winding is made common: giving three leads per phase and six leads for a typical two phase motor. These two phases are internally joined. So that motor has only four leads. If the terminals of coil are connected the shaft becomes hard to turn.

XV.SAMPLE CODE

```
int ledPin=10;
int led=13;
void setup(){
   pinMode(ledPin,OUTPUT);
 //  pinMode(led,OUTPUT);
  Serial.begin(9600);
}
```

```
void loop(){
  int fire,human;
  Serial.println("PIR Sensor Value:");
  human=analogRead(0);
  Serial.print(human);
  if(human>500)
  {
  Serial.println("Human present");
  }
 fire=analogRead(1);
Serial.println(fire);
if(fire>200)
{
  Serial.println("Fire detected");
}
else
{
  Serial.println("no Fire");
}
if((human>500)&&(fire>200))
{
  digitalWrite(ledPin,HIGH);
  digitalWrite(led,HIGH);
}
else
{
  digitalWrite(ledPin,LOW);
  digitalWrite(led,LOW);
}
delay(1000);
 Serial.println(" ");
}
```

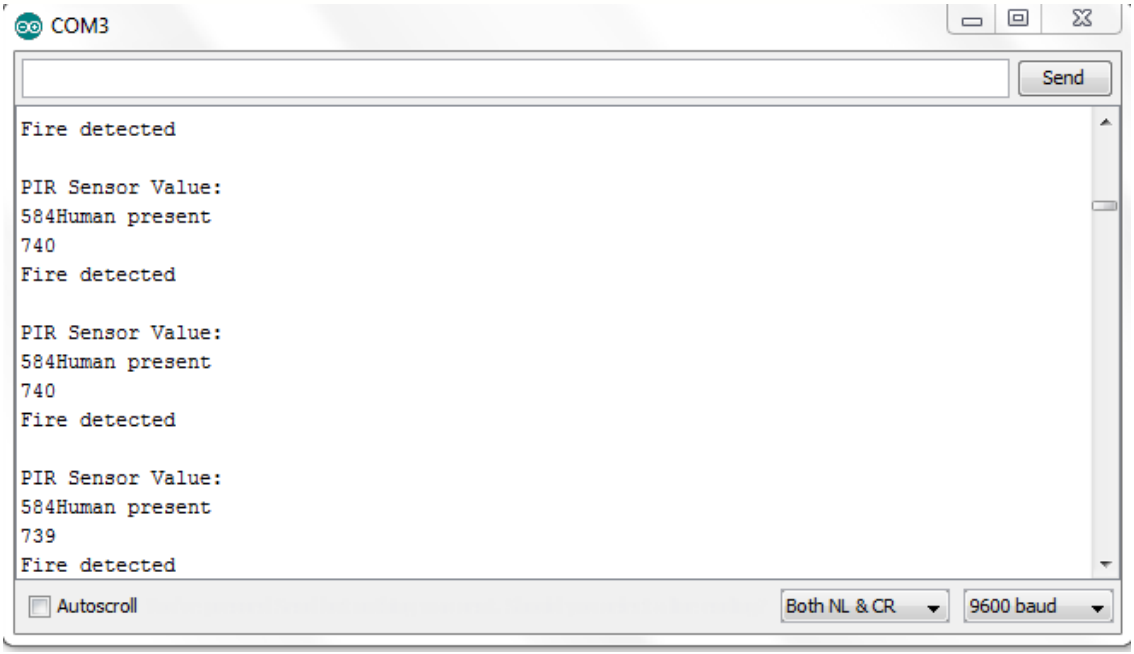

Figure 2: Fire Detection Result

XVI.CONCLUSION

By using our project in real time, the fire accident which happens due to gas leakage is prevented. Here, not only the monitoring action is done but also the preventive measures are done. In which a relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The current flowing in one circuit causes the opening or closing of another circuit. It is used in variety of applications throughout industries like telephone exchanges, digital computers and automation system.

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