Household Safety based on IOT

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Abstract - This paper presents an innovative method for the Household Safety with IOT (Internet of Things).The Internet of things is the ever-growing network of physical objects, and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the Internet. The communication occurs between these objects and other Internet-enabled devices and systems. Vehicles, buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data[3].Some people have low sense of smell, may or may not respond on low concentration of gas leakage. In such a case, gas leakage security systems become an essential and help to protect from gas leakage accidents[1].We developed the household safety system with automation system for detecting the gas leakage in the house environment and alert the householder through a phone call also it makes windows open automatically. The work presented here has profound implications for future studies and may help to solve the problems

Index terms- Automation, Embedded Technology ,Gas Leakage, Household Safety, Internet of things.

I.INTRODUCTION

Fig.1 Internet Of Things

The Internet of Things insists the overall inter-connection of computing devices that are uniquely identifiable in the existing Internet infrastructure.The Internet of Things is an innovative technology which has been creeping up on us in the background in a stealth-like manner for quite a few years and it was inevitable thus it would get some nomenclature at certain stage.It integrates the ubiquitous communications, pervasive computing, and ambient intelligence. [2]At this point (IOT) must be seen as a vision where "things", especially everyday objects, most of all home appliances like furniture, clothes, vehicles, roads and smart materials, and more, are readable, recognisable, locatable,addressable & communicatable via internet and are controllable via the Internet[2].This provides vision especially in wireless networks ,Identification Technologies, Nanotechnology and will enable a number of advanced applications. Innovative technologies like RFID, NFC, ZigBee and Bluetooth are contributing to create a value proposition for IOT stakeholders include Internet of Things Identfication Sensors[2].

II.APPLICATIONS

Internet of Things contributes its technology in variety of fields which includes Agricuture, Healthcare, Retail, Transport, Environment, Supply chain management, Infrastructure monitoring,smart transportation, manufacturing industry etc., Few of the applications are listed below:

2.1AGRICULTURE

Agricultural applications of IOT includes Soil monitoring and plant monitoring & Monitoring of animals and food supply chain,monitors crop yield,soil erosion,and foremostly plays a lead role in smart farming[2].

Fig.2.1 IOT in Agriculture

2.2 MANUFACTURING INDUSTRY

- Digital/connected factory.
- Facility management.
- Asset management.
- Safety/security and operations.
- Logistics and ecosystems.
- Customer preference and behavior.
- Services and predictive maintenance.
- Quality control.
- Packaging and shipping preparation.
- Production flow monitoring.
- Condition-based alerts.

2.3 RETAIL MANAGEMENT

Retailing has many applications areas of business interest. It includes monitoring customer behavior and preferences, Shelf stock tracking, context based advertising and product promotions, vending machines, automated checkout, and theft control[2].

Fig.2.3 IOT in retail management

2.4 HEALTH CARE

Identification of spurious drugs is a major application in healthcare area. Other application areas are personal health monitoring , telemedicine, assisted living[2].

Fig.2.4 IOT in health care

2.5 SECURITY

Detection of counterfeit goods, Access control, Restricted materials, Banknotes, Passports[2].

Fig.2.5 IOT in security

2.6 HOME

Home security, Smart - home (lighting, entertainment, energy management, assistance)[2].

Fig.2.6 IOT in home

2.7 SPORTS

Sports equipment: user performance monitoring , Safety[2].

Fig.2.7 IOT in sports

2.8 SMART TRANSPORTATION

The Internet of Things is transforming the transportation field. Next generation transportation systems will optimize the movement of people &goods, improving economics, public safety, and the environment.Smart transportation systems will automate our roadways, railways, and airways, transform passenger experiences, and reshape the way cargo and merchandise are tracked and delivered, creating substantial business opportunities for system integrators, independent software vendors (ISVs), service providers, and other solution providers[5].

- Fleet telematics and management solutions.
- Transport logistics applications.
- Guidance and control systems.
- Inventory and supply chain management solutions.
- Passenger entertainment and commerce applications.
- Smart vehicle applications.
- Reservation, toll, and ticketing systems.
- Peer-to-peer services like car sharing.
- Security and surveillance systems[5].

Fig.2.8 IOT in smart transportation

III. BENEFITS

IOT has many interesting applications of networking physical objects, they need a strong value proposition to customers for their wide adoption and acceptance[2].

Their potential benefits are:

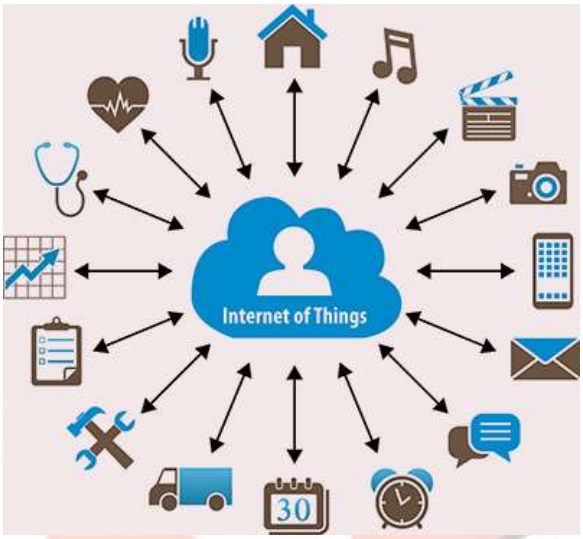

Fig.3 Benefits of IOT

Improved performance, visibility & scalability of business process automation providing better, more cost effective service through real-time highresolution visibility /capture.

Analysis of real-time product performance information.

This is useful for efficient decision making. Better transparency of physical flows and detailed status information.

This is also important for regulatory compliance and public dissemination[2].

IV.HARDWARE REQUIREMENTS

1. Arduino Uno.
2. GSM Module.
3. MQ2 Sensor.
4. Relay Switch.
5. Bread Board.
6. Jumper Wires.
7. Power Supply.
8. Motor.

At first the Arduino board is connected with the GSM Module, then the MQ2 Sensor is connected to the GSM Module through jumper wires at the bread board, Also likewise the Relay Switch is connected to the GSM Module through jumper wires at the bread board. When the LPG gas is detected on the MQ2 Sensor it gets an input (LPG gas) then the output of the MQ2 Sensor is send to the Arduino. Through GSM Module the Arduino make a phone call alert to the householder. At the same time the Relay Switch triggered by the MQ2 Sensor to run the Motor of the window to open it.

4.1 WIRELESS SENSOR NODE (WSN)

The architecture of sensor node is a combination of power supply transceiver microcontroller, external memory,and one or more sensors contained in it. The purpose of controller is to performs tasks, processes data and to control the functionality of other components connected in the sensor node[3].

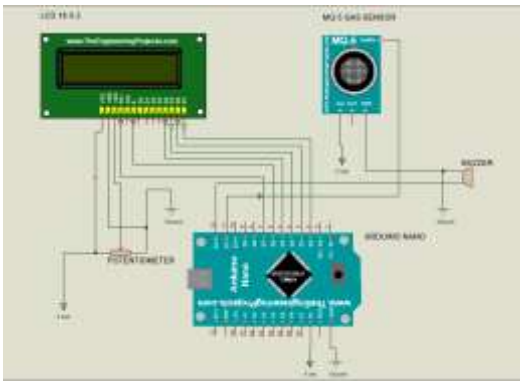

Fig.4.1 Overall Pin Diagram

4.2 AURDUINO

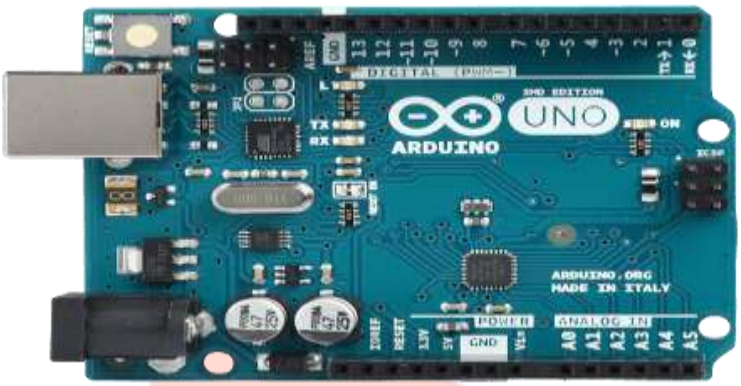

Fig.4.2.1.Arduino

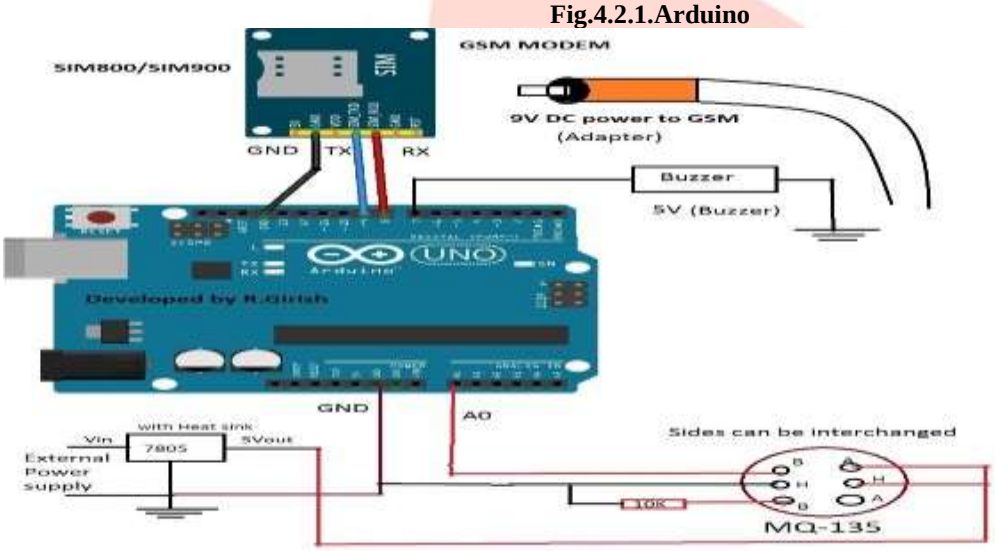

Fig.4.2.2.Arduino

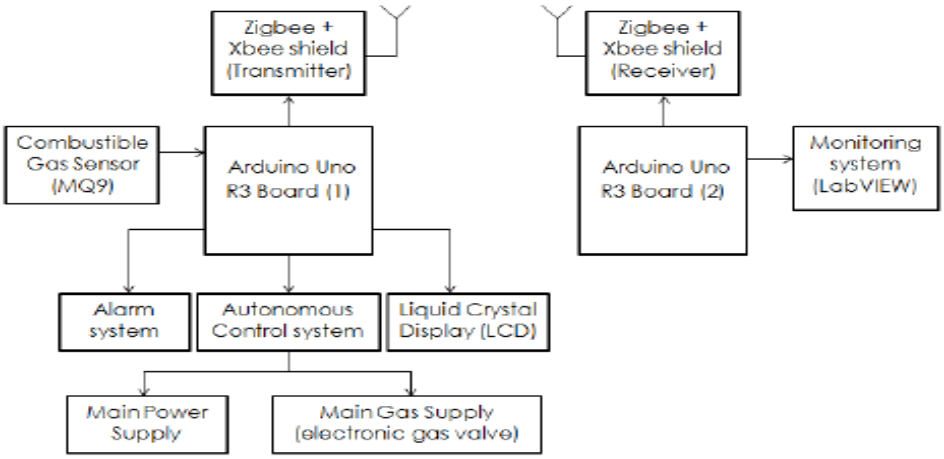

Fig.4.2.3.Circuit Diagram

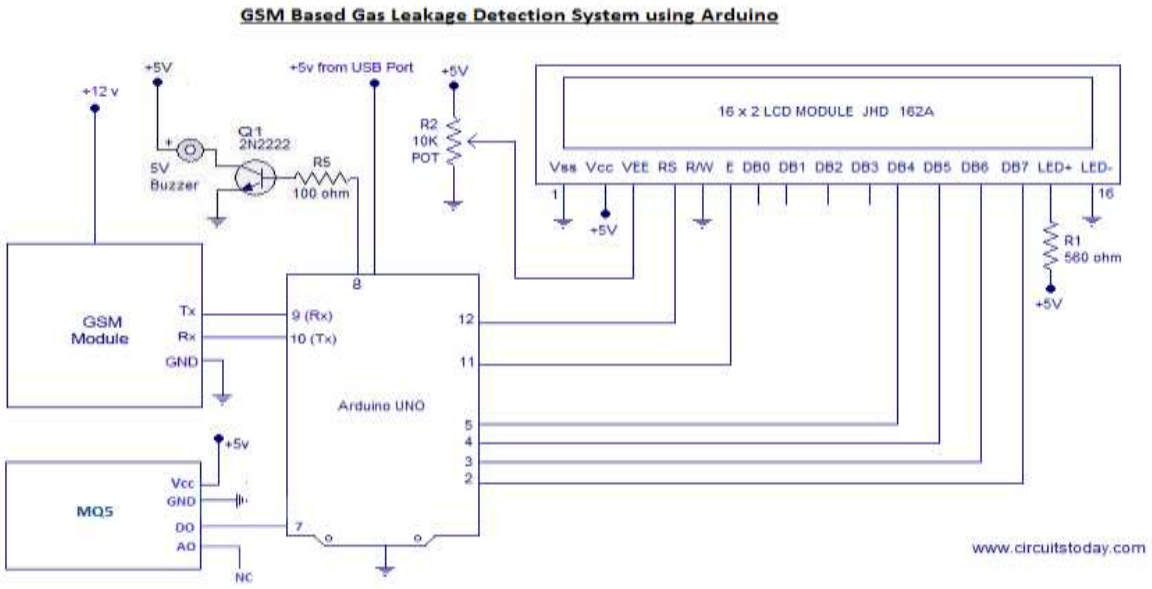

Fig.4.2.4.Arduino circuit diagram

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). Architecture contains 14 digital input & output pins in which of 6 can be used as PWM outputs,6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip [4].

4.3 MQ2 SENSOR

Fig.4.3.MQ2 sensor

Sensitive material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exists, the sensor's conductivity is higher along with the gas concentration rising. MQ-2 gas sensor shows high sensitivity to propane, LPG, hydrogen and can be used to Methane and other combustible steam, it has low cost and thus it is suitable for different application [3].

4.4 RC MOTOR

This is where the KV rating comes in (not to be confused with kV, which stands for kilovolts). It measures the RPM produced per Volt of electricity supplied, assuming zero resistance or load.

(To work out the full RPM you'll get, minus load, just multiply the KV rating by the number of Volts delivered by your battery pack.) Unlike RPM, this fact about a motor will not change so long as it is working properly. That's why it's most commonly used as a measure of a brushless RC motor.

But hold on a minute – this isn't a simple case of 'bigger is better'. While a motor with a higher KV rating is literally faster, it can only buy this speed increase with a loss of torque or 'acceleration power'. We'll spare you the details, but because of how electric motors are built, they have to strike a balance between more strength at lower speeds or less strength at higher speeds. Which one you prioritise will depend on the type of model you have/are making, and how you want to use it.

The term Motor Turns, is directly linked along with two terms relative strength which is top speed with torque of a motor. The turns are wire windings around the motor's rotor poles, if there are more turns then the motor will have more torque . Conversely, if the turns are Fewer then there will be higher the model's top speed and the torque will be lesser.

Motor efficiency is a matter of safety & power. If motor is running with efficiency of 70% then 70% of supplied electricity by battery will provide power .The other 30% is being used purely for the production of heat. At this stage things start to get risky. A

550 Watt motor that only runs at 70% efficiency, will have 165 Watts which is (30%)going to produce heat. Those kinds of

temperatures can melt cheaper parts

Fig .4.4.RC motor

4.5 ADVANTAGES OF RC MOTOR

AC motors are the highly used service, the industrial importance is for DC motor. The principal advantage of a DC motor is that its speed can be changed over a wide range by a variety of simple methods. AC motors does not provides a fine speed control. The fine speed control is major reason behind the modem industrial applications for the strong competitive position of DC motors.

V.OVERALL ARCHITECTURE

This structure contains MQ2 sensor, GSM module, relay, aurdino UNO board, RC motor are the components are interfaced together.

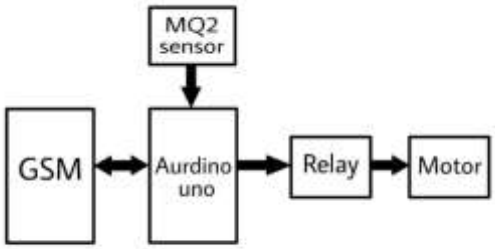

Fig.5.Overall Architecture

At first the Arduino board is connected with the GSM Module, then the MQ2 Sensor is connected to the GSM Module through jumper wires at the bread board, Also likewise the Relay Switch is connected to the GSM Module through jumper wires at the bread board. When the LPG gas is detected on the MQ2 Sensor it gets an input (LPG gas) then the output of the MQ2 Sensor is send to the Arduino. Through GSM Module the Arduino make a phone call alert to the householder. At the same time the Relay Switch triggered by the MQ2 Sensor to run the Motor of the window to open it.

VI. NEEDS & BENEFITS

- To prevent the accidents due to gas leakage.
- To get immediate alert on gas leakage through a phone call.
- To give an immediate response to the leakage of gas.
- To make ventilation by opening the windows for exit of leaked gas.

VII. IMPLEMENTATION

Our proposed system for gas leakage detection is implemented with the automation system which consists of two major activities which will take part immediately after detecting the sense of gas leakage.The first part of implementation is automatic call alert to the concerned person.The second part of implementation is the automatic opening of the window which is already installed.

CONCLUSION

This project presented a new approach for the gas leakage .Along with the gas leakage detection, this system gives a complete automation.This proposed system is cost efficient as it is involved of a very significant cost measures.

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