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Home Security: - Water leakage and L.P.G gas Leakage detection

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Abstract - *Security at home has been a major issue where gas leakage and water leakage can cause dangerous consequences which will further lead to dangerous situations. The Gas leak can cause fire explosion and suffocation. The Water leak can cause the short circuit at our places and can also cause the flood or water overflow at home. If water comes in contact with a live wire then it may lead to the fire. Our system will detect water and gas leakage so we can save many homes from such situations.*

Key Words: L.P.G - Liquid petroleum gas, GSM Module- Global System for Mobile Communications, SIM, Arduino, Interfacing, ESP8266wifi module, Water Sensor and Gas Sensor.

1. INTRODUCTION

The aim of our project is to detect L.P.G gas leakage or dripping water in small scale factories or in home appliances [1]. Gas leak and the fluid leak is a major issue at many places. L.P.G is simply propane or butane, are flammable mixtures of bottled gasses used as fuel in heating gadgets, cooking mechanisms, and vehicles[4]. The L.P.G gas leak is very harmful as it can cause suffocation and people can die because of it.

Major effects of water leakage are:
1. Flood
2. Wastage of water

Major effects of Gas leakage are:
1. Fire
2. Blast
3. Suffocation

Existing water leakage and L.P.G gas leak detection systems are very costly. Water leak detection can cause 2000. Gas leak detection system separately can cause Rs 5100 or more. So, we are combining both the technology to reduce the cost and to provide safety for our home. Block diagram of this system shows all the component and flow of the system (refer Fig:-1).

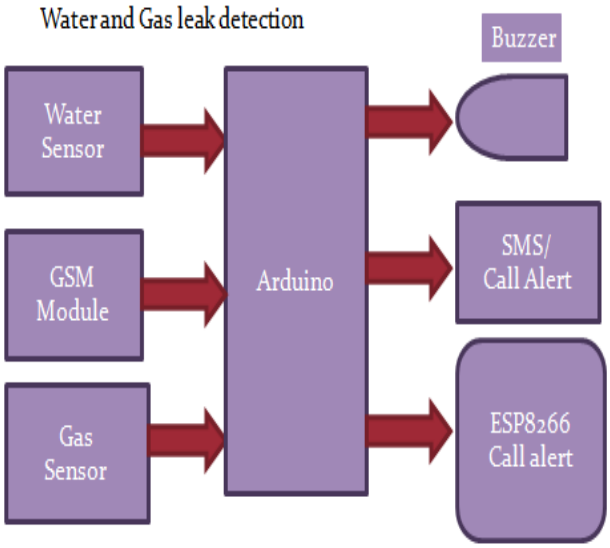

Fig -1: Block Diagram of Water and Gas Leakage System

2. HARDWARE IMPLEMENTATION

The Block Diagram of the entire system is as shown in the Fig-1.As shown in the figure there are different components explain further.

The main components of the system are-
1. Arduino Board
2. Water sensor
3. MQ-6 Gas sensor
4. GSM module
5. ESP8266 Wi-Fi module
6. M-Q6 Gas Sensor with esp8266(connection diagram)
7. Water Sensor with esp8266(connection diagram)

Connection and explanation of main components are given ahead.

2.1 Arduino Board

Arduino Board is a microcontroller board.
It consists of:
1. Power USB
2. Power (Barrel Jack)
3. Voltage Regulator
4. Crystal Oscillator
5. Arduino Reset
6. Analog pins(5)
7. VCC
8. GND
9. TX(Transistor)
10. RX(Register)
11. Digital I/O pins(14)
12. Main microcontroller etc.

We can provide power to Arduino Uno with USB cable or directly by barrel jack. When Arduino Uno is plugged in Power LED lights up. Voltage Regulator is used for managing voltage passing through different devices connected to Arduino Uno [2].

Fig -2: Arduino Uno

2.2 Water Sensor

Water Sensor module is designed for water leakage detection, which is used in sensing water leak, water level, and even rainfall. Connecting a water sensor to an Arduino Uno is a great way to detect a water leakage, rainfall, flood, spill etc [2].
Water sensor has three terminals – S (Source), V_{out} (+), and GND (-).
Connect the sensor as follows –

1. Connect the $+V_s$ to +5v on your Arduino board.
2. Connect S to digital pin number 8 on Arduino board.
3. Connect GND to GND on Arduino.
4. Connect alarm to pin 9 on Arduino board.

When the sensor detects water leak, the alarm starts ringing and we get a call.

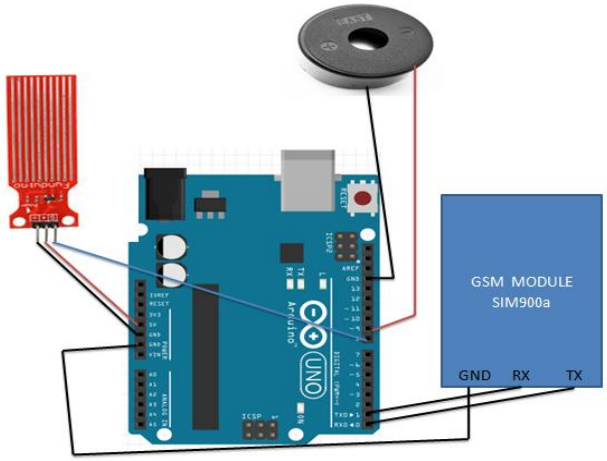

Fig -3: Circuit diagram of water sensor, GSM, and Arduino

2.3 MQ-6 Gas Sensor

MQ-6 Gas Sensor is used in L.P.G gas leakage detecting system to detect gas leakage. The MQ-6 gas sensor has 4 terminals: GND, Dout, Aout, VCC (+) [5].

Connect the Sensor as follows:
1. Connect GND of MQ-6 to GND of Arduino Uno.
2. Connect VCC (+) of MQ-6 to 5V of Arduino Uno.
3. Connect Aout of MQ-6 to A5 of Arduino Uno.
4. Connect Alarm at pin 9 to Arduino Uno.

Write code in Arduino IDE. When the sensor detects the gas leak, the alarm starts ringing and we get a call.

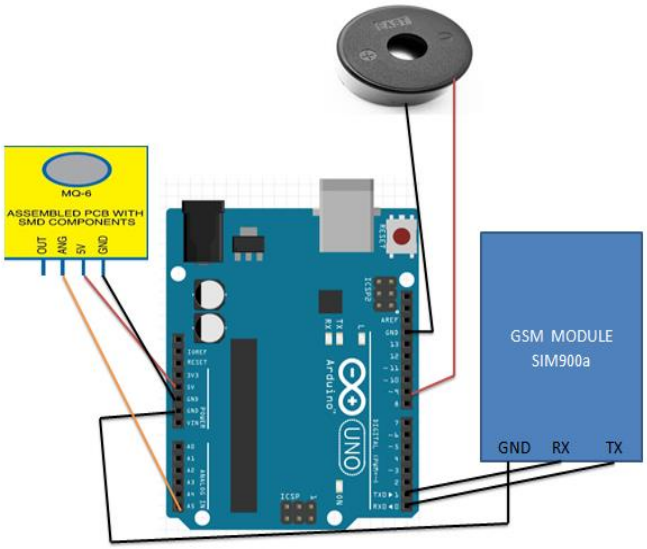

Fig -4: Connection diagram of MQ-6, Arduino, and GSM

2.4 GSM module

A GSM module is a specialized type of GSM modem. With Gsm module we can get a call to our cell phone devices whenever there is a water or gas leakage at home[2].
GSM module has 3 main terminals are TX (Transistor), RX (receiver), GND.

Connect the GSM module as follows:
1. Connect GND of GSM to GND of Arduino Uno.
2. Connect TX of GSM to RX of Arduino Uno.
3. Connect RX of GSM to TX of Arduino Uno.

Write code in Arduino IDE. When the sensor detects gas leakage or water leakage, the alarm starts ringing and we get a call with help of GSM Module.

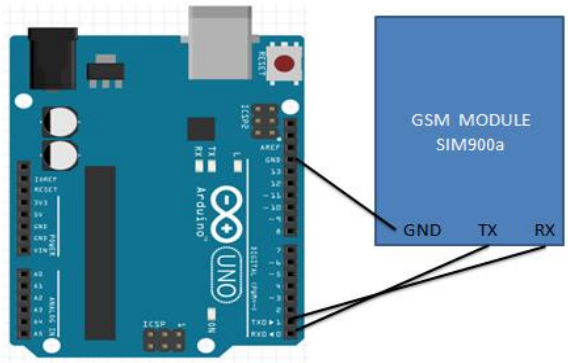

Fig 5: Connection diagram of Arduino Uno and GSM Module

2.5ESP8266 WI-FI Module

ESP8266 is a chip with which manufacturers are making wirelessly networkable microcontroller modules. More specifically, ESP8266 is a system-on-a-chip. It's a small device which is use for IOT projects. It connects us with the internet with help of WI-FI network. We are using an AMS1117 pin to control 3.3voltage regulator. As ESP8266 works on 3.3v otherwise it can burn or damage.

Connect ESP8266 WI-FI Module with Arduino Uno:
1. 3.3V of Arduino Uno to VCC and CH_PD of ESP8266.
2. GND of Arduino Uno to GND of ESP8266.
3. TX of Arduino Uno to RX of ESP8266.
4. RX of Arduino Uno to TX of ESP8266.

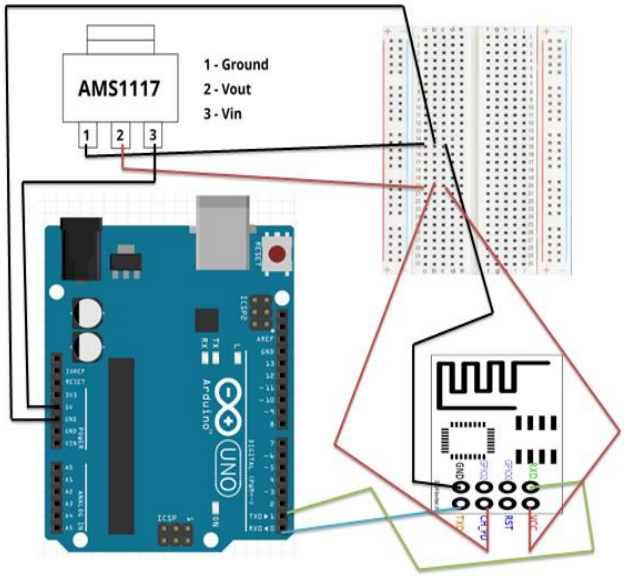

Fig-6: Connection diagram of ESP8266 and Arduino Uno.

2.6 Water Sensor with esp8266

We are connecting water sensor to esp8266 as given in figure below. We are connecting AMS117 voltage regulator to give 3.3v to ESP8266 WI-FI module. Buzzer for alert when there is a leak and ESP8266 for getting call alert on cell through internet.

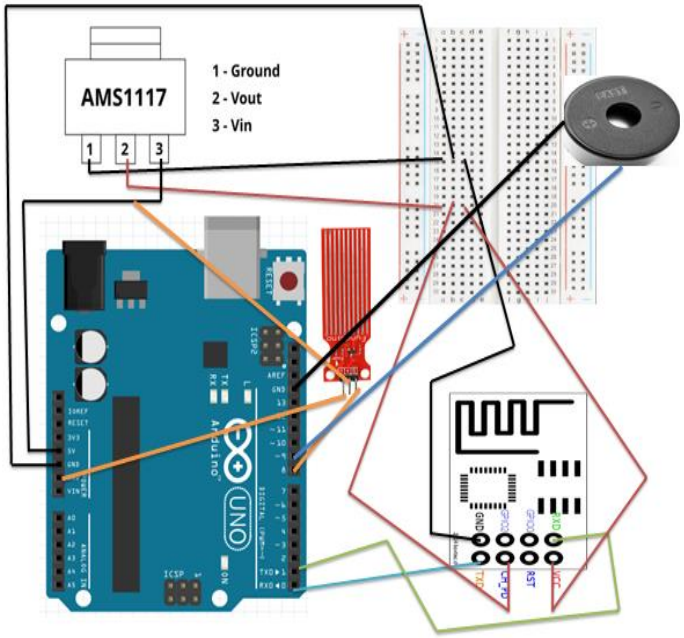

Fig 7: Connection Diagram of Water Sensor with esp8266

2.7 M-Q6 Gas Sensor with esp8266

We are connecting MQ-6 sensor to esp8266 as given in figure below. We are connecting AMS117 voltage regulator to give 3.3v to ESP8266 WI-FI module. Buzzer for alert when there is a leak and ESP8266 for getting call alert on cell through internet.

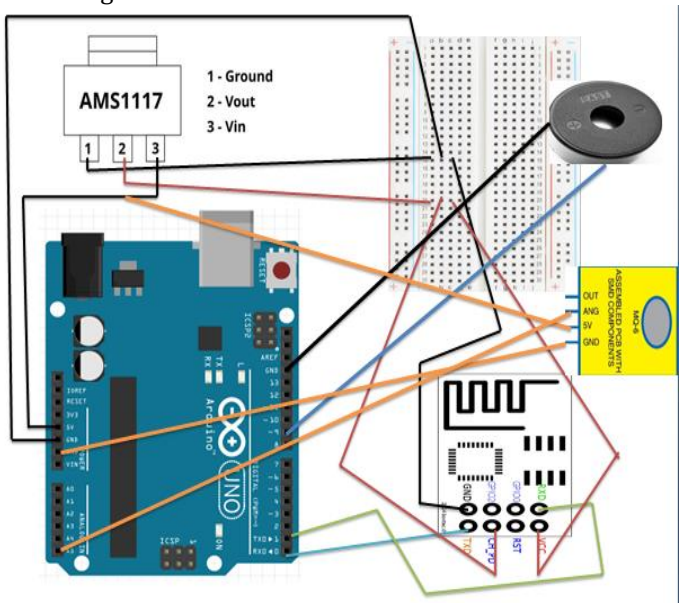

Fig 8: Connection Diagram of MQ-6 Gas Sensor with esp8266

3. RESULT

Result is generated in two different ways:
1. GSM Module
2. ESP8266 WI-FI Module

1. GSM module
Whenever there is water leakage or gas leakage we get a call alert on our cell phones with help of GSM module. We have written code in Arduino IDE and connection are done as shown in figure.

2. ESP8266 WI-FI Module
Whenever there is water leakage or gas leakage we get a call alert on our cell phones with help of ESP8266 WI-FI Module. We have written code in Arduino IDE and connection are done as shown in figure. We have created account on Twilio web application and the Thingspeak web application for getting call alert on our device.ESP8266 needs http post request to generate calls or messages so we are using Thingspeak application to get an http request.

4. CONCLUSIONS

In this system, we are trying to reduce the cost of the existing system and trying to get call alerts through Internet or with help of GSM Module whenever there is a leakage. Both Methods work differently and requirement of each method is different .GSM Module is based on SIM card and with help of transistor and receiver we generate a call. ESP8266 WI-FI Module is based on internet we get a call with help of an http request through internet.

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REFERENCES

[1] LPG Leakage Monitoring and Multilevel Alerting System by Selvapriya November 2013.
[2] Home Security: - Water leakage and L.P.G gas detection,2017.
[3] Smart Water Leakage Detection and Metering Device, Bheki Sithole, 2016.
[4] LPG Gas Leakage Detection & Control System.National Conference on Synergetic Trends in engineering and Technology (STET-2014) .
[5] Microcontroller based LPG gas detector using gsm module, Ashish Sharma (B.Tech., EL Engg.).