

# Arduino Based Intrusion Alert System for Security Purpose

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**Abstract:** Security is becoming a major issue everywhere. Security is becoming necessary nowadays as the possibilities of intrusion is increasing day by day. Safety from theft, leaking of raw gas and fire are the necessary requirements for home security system. However, IoT(Internet of Things) based security systems provides enhanced security as whenever a signal from sensor occurs, a text message is sent to the desired number to take necessary actions. Here we are using an antitheft reporting system which will report the owner by ringing alarm and send a text message. Also, for the safety system in case of fire or gas leakage, it will notify the owner by sending an SMS and also by ringing an alarm.

**Keywords:** NODE MCU, ESP8266, PIR sensor, Smoke Sensor, LPG Gas Sensor, 16x2 LCD , I2C, Mobile phone.

## I. INTRODUCTION

Safety and security of any living or working place is one of the most primary concern. Today's security system include CCTV surveillance which are very costly and many of these systems do not trigger any alarm if intrusion or fire is detected. Thus a cost-effective and fast- reactive security system is needed. For this purpose we have made a prototype of such system using three sensors-PIR sensor, Smoke sensor and LPG Gas; Arduino unit- NODE MCU and ESP 8266. If there is intrusion through any of these access points, then the sensor will detect it , generates pulses to be read by Arduino unit.

The approach to security system design is almost standardized nowadays. In this project, it is intended to improvise these standards by employing new design technique and developing a low cost security and safety system. The designs of simple hardware circuit enables every user to use this wireless security system with PIR sensor, smoke sensor and LPG gas sensor. The system is controlled by Node MCU ESP8266.This Node MCU ESP 8266 constantly monitor all the sensors and if it senses any security issue then it will send the SMS or give call to the user mobile the Wi-Fi module.

## II. PROPOSED METHODOLOGY

THE PROPOSED ARDUINO BASED INTRUSION ALERT SYSTEM HAS FOLLOWING FEATURES:

1. Checking status of pir, whether any motion is detected or not.
2. Checking status of smoke sensor , whether any smoke is detected or not.
3. Checking status of lpg gas sensor , whether any gas is detected or not. if gas detected then firstly give logic 1 to node mcu to make solenoid valve off.
4. ESP 8266 read the status of 3 sensors and transmit this data to iot cloud.
5. IOT cloud send this information to predefined mobile number through call or via sending message to the user.

## III. WORKING PRINCIPLE & BLOCK DIAGRAM

In this project, we have used NODE MCU & ESP 8266 for controlling the whole process of the project. There are 3 inputs :-

- 1) PIR Sensor
- 2) Smoke Sensor
- 3) LPG Gas Sensor

PIR sensor sense any movement in targeted area, if it detects any movement then it gives high logic to NODE MCU and then ESP 8266 which is in build wifi module connect it with IOT cloud and IOT cloud make call or send the SMS to predefined mobile number.

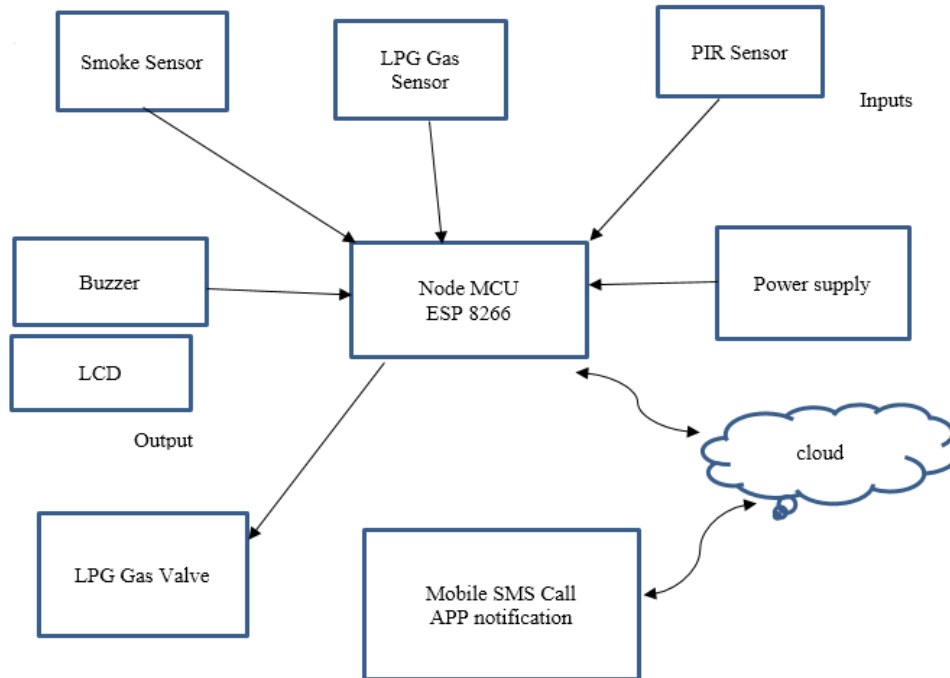
We are doing this programming using arduino.

Smoke detector detects the smoke then buzzer beeps and red LED blinks simultaneously. LPG Gas sensor detects the gas, it gives the logic 1 to D3 pin of the NODE MCU then solenoid valve get off by giving logic 0 to D0 pin of arduino.

There are 3 outputs :- 1) Buzzer  
2) LED  
3) LCD

If smoke sensor detects the smoke buzzer beeps and LED blinks simultaneously.

LCD displays the status of three sensors if any of it detects the gas or smoke or movement in that area.



## IV. COMPONENTS USED

### 1. NODE MCU ESP 8266:

Node MCU is an open-source Lua based firmware and **development board** specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The Node MCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip having Tensilica, Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. Node MCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. Node MCU can be powered using Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

### 2. PIR SENSOR:

PIR Sensor is the heart of this simple burglar alarm circuit using Arduino. A PIR sensor is basically a motion sensor or a motion detector which identifies any object that moves inside its range of view. PIR sensor identifies infrared radiations emitted by any object under its radar range. The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance basically the sensitivity of the sensor. When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a *positive differential* change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change.

These change pulses are what is detected. In the detection area, the lens of the detector receives the infrared radiation energy of the human body through the clothing and focused on the pyroelectric sensor. When the human body moves in this surveillance mode, it enters a certain field of view in sequence and then walks out of the field of view. The pyroelectric

sensor sees the moving human body for a while and then does not see it, so the infrared radiation of human body constantly changes the temperature of the pyroelectric material.

### 3.SMOKE SENSOR:

A smoke detector is an electronic fire-protection device that automatically senses the presence of smoke, as a key indication of fire, and sounds a warning to building occupants. Commercial and industrial smoke detectors issue a signal to a fire alarm control panel as part of a building's central fire alarm system. A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial smoke detectors issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue an audible or visual alarm from the detector itself or several detectors if there are multiple smoke detectors interlinked.

### 4.LPG GAS SENSOR:

An LPG gas sensor is a one kind of device which is used to sense the presence of a hazardous LPG gas leak in service station, cars, storage tanks and homes. This sensor is attached to an alarm circuit to give an alert to the operators through a buzzer sound in the area where the gas leak is occurring. The LPG gas sensor is also used to detect cigarette smoke, toxic gases, combustible, propane, iso-butane and LNG. An LPG gas is a versatile fuel used in homes, but the leakage of LPG gas could lead a disaster. To aware of LPG gas leakage and avoid any mis happening there are different products to notice the leakage. Here we have designed an Arduino microcontroller based LPG detector circuit. Whenever LPG gas leakage occurs, then this system notices and gives an alert through the buzzer which is attached to the circuit. The entire system is easy to design who have some basic knowledge of electronics and programming.

### 5.BUZZER:

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric . Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

### 6.LCD :

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. A liquid-crystal display (LCD) is a [flat-panel display](#) or other [electronically modulated optical device](#) that uses the light-modulating properties of [liquid crystals](#) combined with [polarizers](#). Liquid crystals do not emit light directly,<sup>[1]</sup> instead using a [backlight](#) or [reflector](#) to produce images in color or [monochrome](#).<sup>[2]</sup> LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden.

### 7.SOLENOIDVALVE:

Solenoid valves consist of a coil, plunger and sleeve assembly. In normally closed valves, a plunger return spring holds the plunger against the orifice and prevents flow. Once the solenoid coil is energised, the resultant magnetic field raises the plunger, enabling flow.

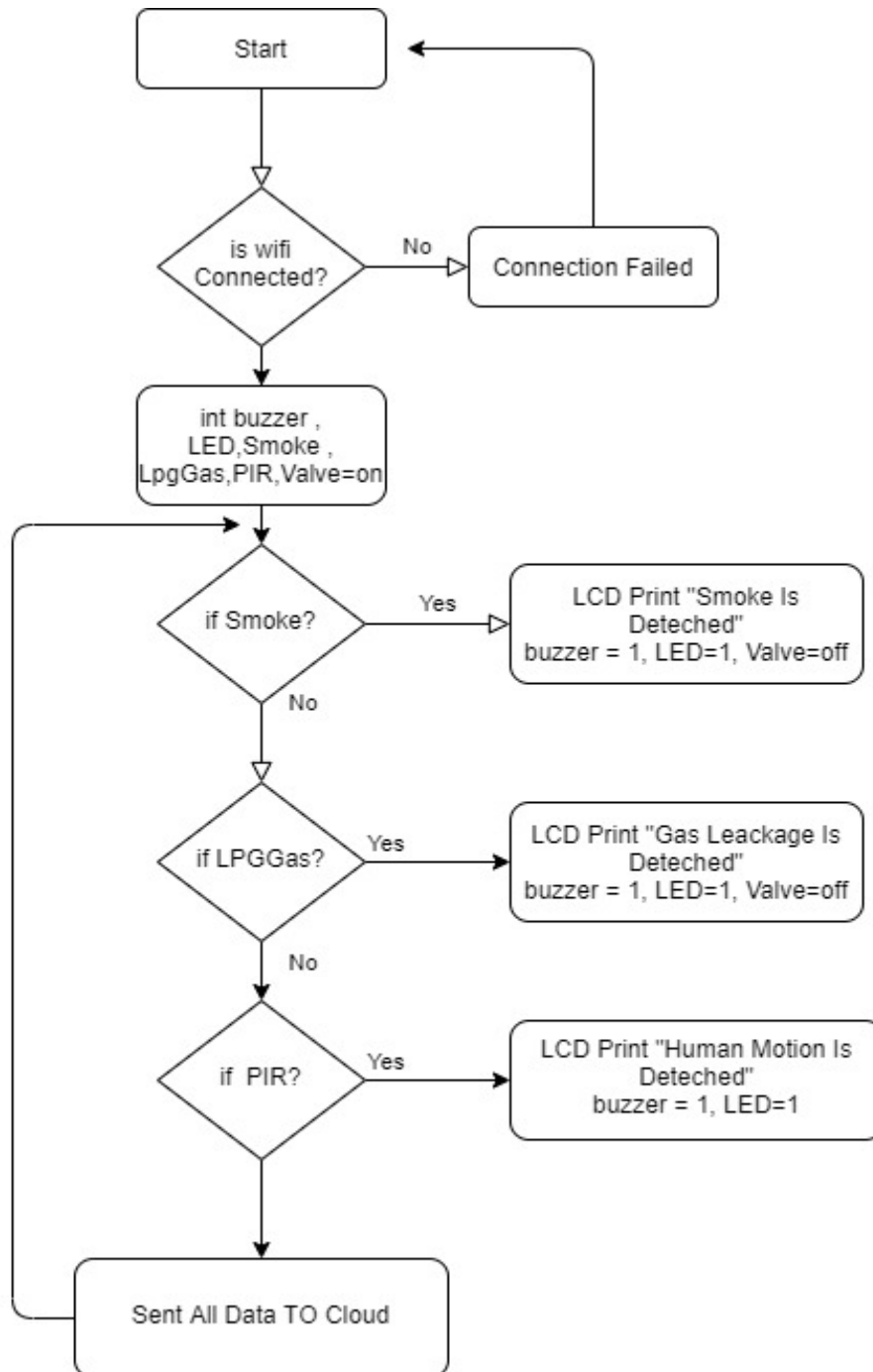
### 8.ARDUINO:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. IOT applications are on the rise, and connecting objects are getting more and more important. There are several ways to connect objects such as Wi-Fi protocol.

### 9. IOT CLOUD:

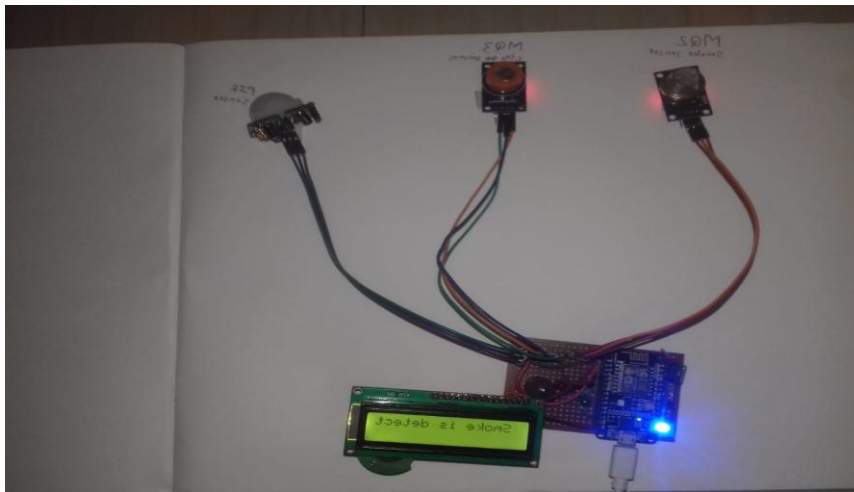
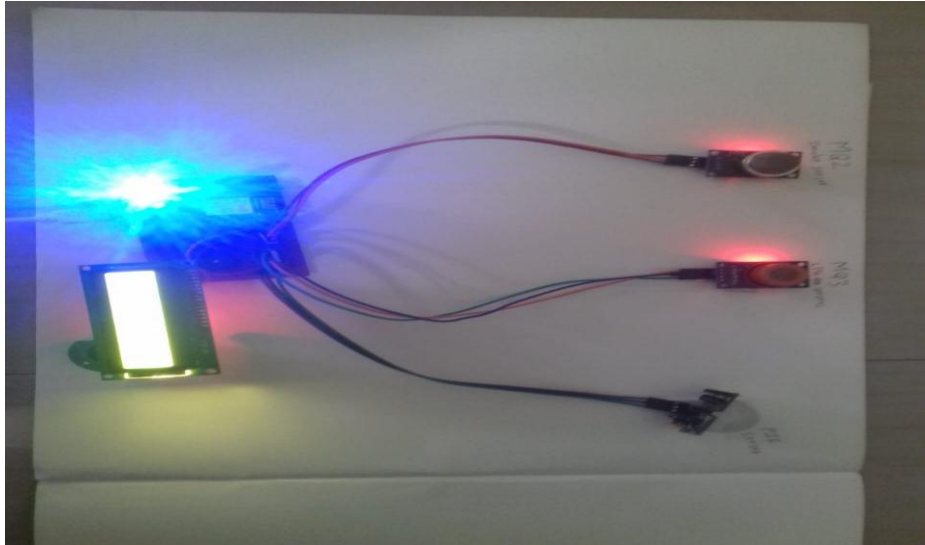
An IoT cloud is a massive network that supports IoT devices and applications this includes the underlying infrastructure service and storage needed for real-time operations and processing and IoT cloud also includes the services and standard necessary for connecting managing and securing different IoT devices and application IoT clouds offer an efficient, flexible, and scalable model for delivering the infrastructure and services needed to power IoT devices and applications for businesses with limited resources. IoT clouds offer on-demand, cost-efficient hyperscale so organizations can leverage the significant potential of IoT without having to build the underlying infrastructure and services from scratch.

## V.FLOWCHART



Text

## VI. RESULTS



## VII. ADVANTAGES

- 1) CONSTANT PROTECTION – If you install this system in your home, you and your family have round-the-clock the protection against break-ins. Some systems also have fire alarms built in, which provides additional reassurance.
- 2) Deterrent to Criminals – If you install this system in your home or industry, it will help you to provide the constant protection from criminals.
- 3) The status of various devices can be monitored.
- 4) The operation of the system is very simple.
- 5) This systems also have fire alarms build in, which provides additional reassurance.

## VIII. APPLICATION

1. Home automation and security
2. Office automation and Industrial automation
3. The security system can be employed in household or in any organization
4. The system is used in private institutes.
5. The system is used in schools.
6. The system is used in banks also.



## IX. CONCLUSION

This paper is acknowledge user friendly, low cost, augmented security system. After researched study of many topics that consist of security design and wireless network, simple system to improve the standards is developed. It is real time monitorable and controlled 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 lesser cost.

We presented an approach that can be employed to improve the performance of various devices that are not in the close vicinity of the user. The user was informed about the action through a reply SMS sent by the IOT cloud.

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