

# IOT BASED SMART SECURITY SYSTEM USING ARDUINO

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**Abstract:** With the evolution of technology and people's increasing reliance on smartphones, as well as the growing desire for simple and quick solutions to everyday tasks, it's become critical to have a technology that can regulate domestic and industrial applications using IOT. Our project, titled "IOT Based Home Security System Using Arduino" discusses the internet of things (IOT) using Arduino and sensors like as the gas sensor, temperature sensor, motion sensor, Wi-Fi Module and others. The sensors will be connected to an Arduino board. Through a wireless module, the state of our household appliances will be uploaded to a cloud platform. Our system and mobile device should share the same wireless network. Our sensors will be able to enable or disable sensors that can keep the user on top of things. Relay module controls the On/Off operation of the appliances. The magnetic sensor will improve the security of door breaking.

## 1. INTRODUCTION

The "Internet of things" (IOT) is becoming an increasingly growing topic of conversation both within the workplace and out of doors of it. It is a thought that not only has the potential to impact how we live but also how we work. But what exactly is that the "Internet of things" and what impact is it getting to wear people's life? Let's start with understanding a few things. The concept of IOT basically connect any device with an on and off switch to the web (and/or to every other). This includes everything from smartphones, television, washing machines, headphones, fans, wearable devices and almost anything. Moreover, this also applies to components of machines, for instance a reaction-propulsion engine of an airplane or the drill of an oil rig. As mentioned above, if any device has an on and off switch then it's an opportunity are often a neighbourhood of the IOT. The analyst firm Gartner says that by 2020, there'll be over 26 billion connected devices, in order that may be a lot of connections (some even estimate this number to be much higher, over 100 billion). Besides, the IOT may be a big network of connected "things" which also includes people. The relationship of this network will encompass between people-people, people-things, and things-things.

The components which used in this project are as follows:

**Arduino MEGA:** The Arduino MEGA 2560 is designed for projects that require more I/O lines, more sketch memory and more RAM. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects.

**GSM Module:** A GSM (Global System for Mobile) modem is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. Here we have use SIM900A model of GSM. SIM900A GSM module is the smallest and cheapest module for GPRS/GSM communication.

**Relay Module:** The main purpose of a relay is to switch on and off a high-powered circuit from a low powered circuit.

**RFID Tag Reader:** RFID system uses Radio frequency electromagnetic fields to transfer data from a RFID tag to identify and track the object. RFID avoids the limitations of barcode scanning, which requires line-of-sight access to each barcode and can only be used to scan one item at a time. Instead, RFID tags do not require line-of-site, and multiple RFID tags can be detected and read remotely and simultaneously. RC522 RFID Reader writer Module 13.56 MHZ model of RFID tag reader is used.

**Solenoid Door Lock:** Solenoid door locks are mainly used in remote areas to automate operations without involving any human interference. A 12V DC Solenoid Lock is used.

**Temperature And Humidity Sensor:** The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It is Good for 20-80% humidity readings with 5% accuracy and Good for 0-50 °C temperature readings +2 °C accuracy.

**Gas And Smoke Sensor:** MQ2 is one of the commonly used gas sensors in MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type Gas Sensor also known as Chemiresistors as the detection is based upon change of resistance of the sensing material when the Gas comes in contact with the material. MQ2 Gas sensor works on 5V DC and draws around 800mW.

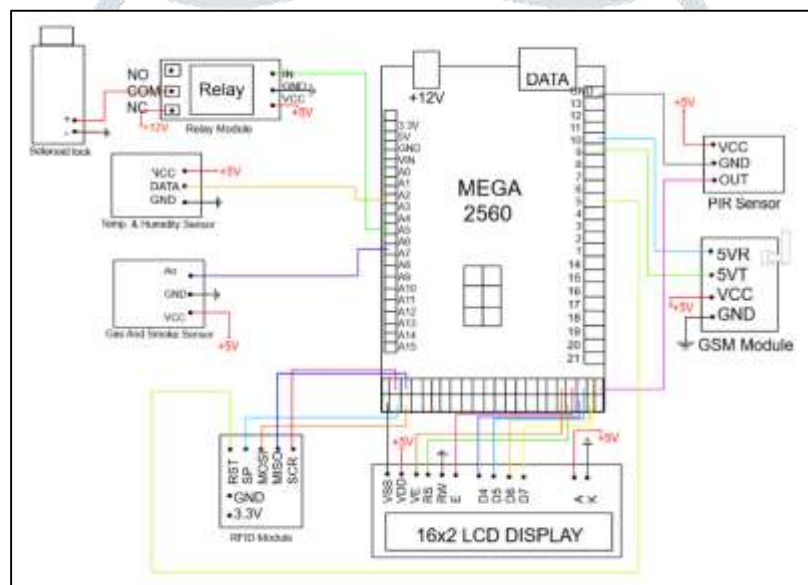
**PIR Motion Sensor:** Passive infrared (PIR) sensors use a pair of pyroelectric sensors to detect heat energy in the surrounding environment. These two sensors sit beside each other, and when the signal differential between the two sensors changes (if a person enters the room, for example), the sensor will engage.

**16x2 LCD Display:** The term LCD stands for Liquid Crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

## 2. CIRCUIT DIAGRAM

The circuit diagram for the security system contains the following components-

- Arduino Mega (Board based on the ATmega 2560)
- GSM Module (GSM900A)
- 16x2 LCD Display
- Temperature And Humidity Sensor (DHT11)
- Gas and Smoke Sensor (MQ2)
- PIR Motion Sensor
- Relay Module (Single/Double Channel)
- RFID Tag Reader (RC522)
- Solenoid Door Lock (12V)



THEN send an alert message with “Intruder Detected”

OR if none of the sensor Senses anything, then “SAFE” message is being displayed on the 16x2 LCD display.

Now for the Smart Door lock-

RFID Tag reader senses the registered RFID tag

IF the tag sensed by Reader is registered

THEN the solenoid Lock opens

ELSE the lock will not open and an alert message with “Intruder Tried to open door” will be send.

#### 4. WORKING

A low cost and efficient smart home system is presented in this design. This system has two main modules: the Hardware interface module and the Software communication module. At the heart of this system is the Arduino Mega microcontroller which is also capable of functioning as the interface for all the hardware modules. All communication and controls in this system pass through the microcontroller.

For the communication between the security system and the user, GSM module is used. It needs a normal Sim card with message service enabled. We have to set a Mobile number in the code on which we want to receive the alert messages.

This system offers feature such as environmental monitoring using the temperature, humidity, gas and smoke sensors. The Temperature, PIR motion Sensor, Gas and Smoke Sensor senses the increase/decrease in temperature, any kind of motion and any leakage in Gas and smoke in the house/home environment. If any kind of gas or smoke or any kind of motion is detected by them, then the sensors sends a signal to the microcontroller and it sends an alert signal to the registered mobile number.

The RFID Tag Reader Gives the user a unique identity to enter the house or use the lock to prevent any wardrobe. The RFID Tag reader senses the RFID Key ring tag or RFID Card tag for the registered ID number. If the ID matches with that of the registered ID, then it sends a signal to the microcontroller to open the relay with then opens the Solenoid Electromagnetic Door Lock which is connected to it. If the ID did not match then an alert message is being send to the registered mobile number.

#### 5. CONCLUSION

We can use this project to remotely turn on or off appliances, such as using a phone or tablet. By adding some sensors such as light sensors, and safety sensors, the project can be expanded to a smart home automation system that can automatically adjust different parameters such as room lighting, air conditioning (room temperature), and transmit the information to our phone. We can also link to the internet and control the home from a remote location, as well as monitor the security.

The Arduino-based device control utilizing Bluetooth on Smartphone can be introduced to manage the fan speed or lights. Internet of Things (IOT) technology can be used for home automation and device control. We can replace GSM Module with Bluetooth or Wi-Fi Module to achieve device control by sending commands through Smartphone app.

Video Surveillance can be introduced by adding the camera module to the system. And we can get the real time video feed on our smartphone whenever we want.

By connecting sample appliances to the home automation system and successfully controlling the appliances from a wireless mobile device, the system has been experimentally proved to perform properly.

#### 6. REFERENCE

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