



Daffodil
International
University

Lab Project Report

Topic: Gas & PIR Sensor

Course code: CSE413

Course Title: Big Data & IoT Lab

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Introduction

The problem that we are trying to solve in this project is to design and build a system that can detect the presence of gas and motion in a given area. To achieve this, we have used a gas sensor and a PIR (Passive Infrared) sensor.

The gas sensor is used to detect the presence of gases such as methane, propane, and carbon monoxide. These gases can be harmful to humans and animals, and it is important to be able to detect their presence in order to prevent accidents or injuries.

The PIR sensor is used to detect the presence of motion within its field of view. This can be useful for security purposes, as it can alert us to the presence of intruders in a given area.

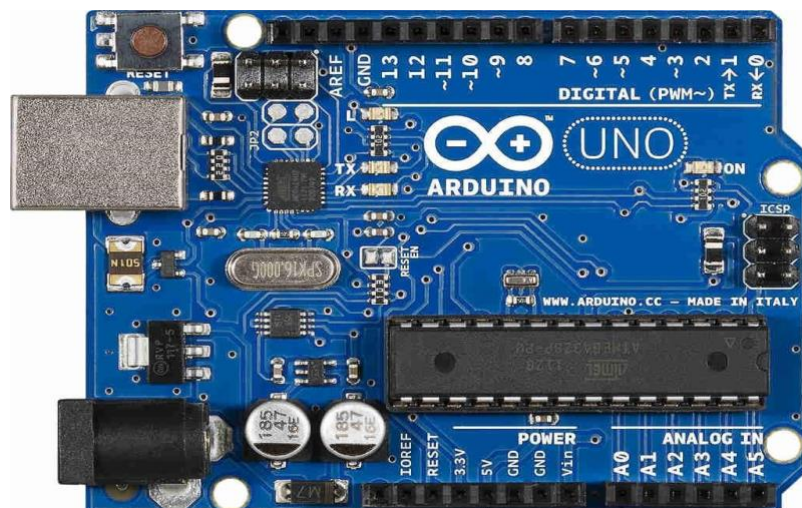
Both of these sensors are connected to an ESP8266 WiFi module, which allows them to send their data to the internet.

Traditionally, systems that are able to detect gas leaks and intrusions can be costly and challenging to install. However, by using an Arduino board and readily available sensors, we have been able to create a more cost-effective and user-friendly solution. This system can be easily set up and configured, making it accessible to a wider range of users. Overall, our project is able to provide a practical and effective way to monitor a space for potential hazards and intrusions.

Components

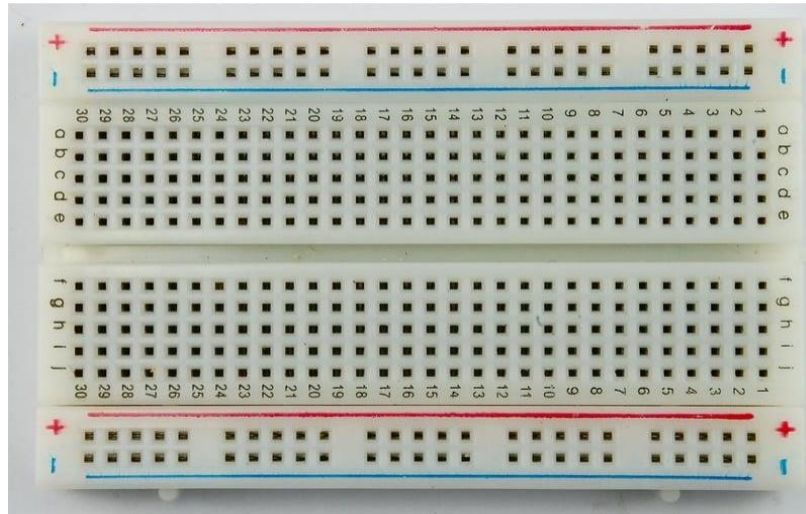
1. Arduino UNO R3

The Arduino UNO R3 is a microcontroller board based on the ATmega328 microcontroller. It has 14 digital input/output pins, 6 analog inputs, and a 16 MHz crystal oscillator. It is used to control and interface with various electronic components, such as sensors, actuators, and displays.



2. Breadboard

A breadboard is a prototyping tool used to build and test electronic circuits. It consists of a grid of holes, into which electronic components can be inserted and connected using jumper wires. Breadboards are useful for quickly building and testing circuits without the need for soldering.



3. Gas sensor

A gas sensor is a device that is used to detect the presence of gases in a given environment. It can be used to detect a wide range of gases, including methane, propane, and carbon monoxide. Gas sensors are often used in safety applications, such as detecting gas leaks in homes or workplaces.



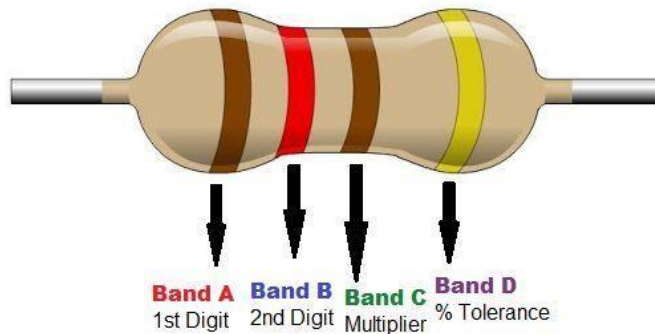
4. PIR sensor

A PIR (Passive Infrared) sensor is a device that is used to detect the presence of motion within its field of view. It works by detecting changes in the infrared radiation emitted by objects, and is commonly used in security applications to detect the presence of intruders.



5. Resistor

A resistor is an electronic component that is used to resist the flow of electric current. It is used to adjust the current flow in a circuit, and is typically characterized by its resistance value, which is measured in ohms.



6. LED

An LED (Light Emitting Diode) is a small, lightweight electronic component that produces light when a current is passed through it. LEDs are often used as indicators or signals in electronic devices, and are known for their low power consumption and long lifespan.



7. LCD (16x2)

An LCD (Liquid Crystal Display) is a type of display that is commonly used in electronic devices. The 16x2 LCD refers to a display that is 16 characters wide and 2 rows tall. It can be used to display text and numerical data, and is often used in conjunction with a microcontroller to provide a user interface for a device.



8. WiFi module (ESP8266)

The ESP8266 is a low-cost WiFi module that can be used to connect electronic devices to the Internet. It has a built-in microcontroller and can be programmed to perform various tasks, such as sending and receiving data over a WiFi connection. It is commonly used in Internet of Things (IoT) applications.



9. Jumper wires

Jumper wires are electrical wires used to connect electronic components together. They are often used in prototyping and come in different lengths and colors. They are inserted into breadboard holes and are used to build and test electronic circuits without soldering. Jumper wires are made of stranded copper wire and are coated in an insulating material for protection.



Design

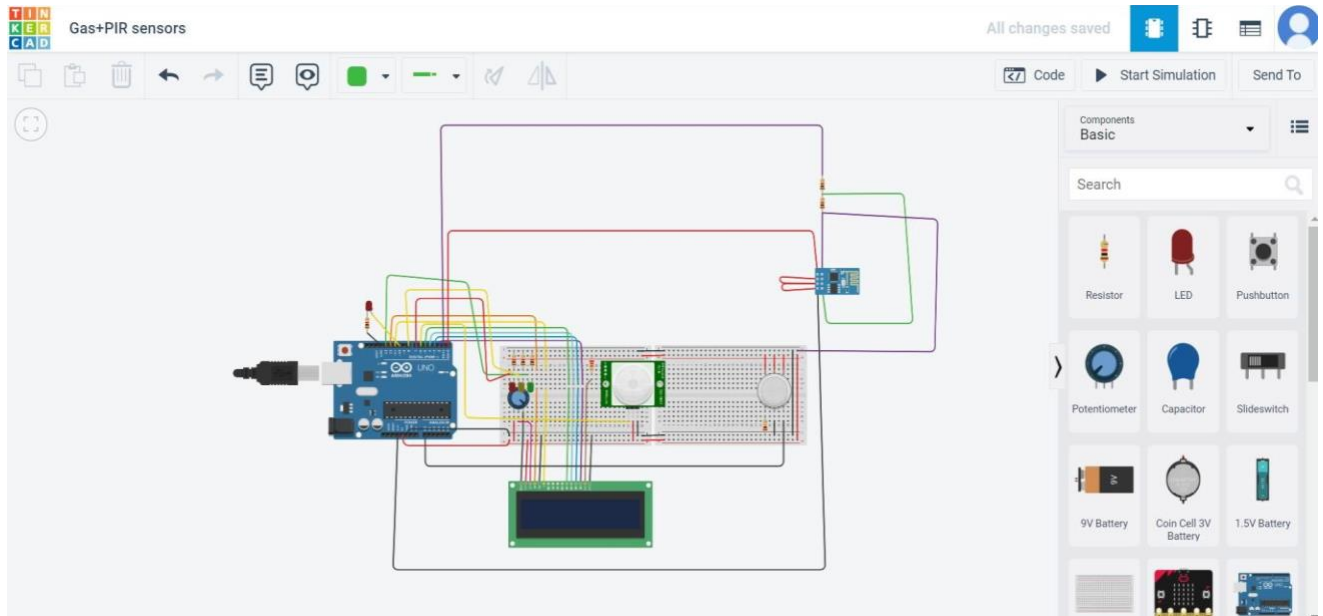


Fig: Design of the circuit

The gas sensor will detect the levels of gas in the air and the PIR sensor will detect motion within the area being monitored. Both of these sensors will be connected to an Arduino microcontroller, which will be responsible for reading the sensor data and displaying it on a 16x2 LCD screen.

The Arduino will also be connected to an ESP8266 WiFi module, which will allow it to send the sensor data to the internet. We will use the Thingspeak cloud platform to store and analyze the data in real-time.

To connect all of the components together, we will use a breadboard and jumper wires. The breadboard will allow us to easily connect and disconnect components without the need for soldering, making it easier to test and debug our setup.

Overall, our design will allow us to detect gas levels and motion, display the data on an LCD screen, and send the data to the internet for real-time analysis and storage. This can be useful for various applications such as detecting gas leaks, monitoring the presence of people in a room, or detecting intrusions.

Output

When the PIR sensor detects movement in the room, the Arduino board sends a message to the user indicating that there is movement in the room. This feature can be useful for security purposes, as it alerts the occupants of the space to any potential intrusions. The user can be notified through various means, such as an email, text message, or a notification on a smartphone app. This ensures that the user is aware of any movement in the room in a timely manner, allowing them to take appropriate action if necessary.

Similarly, when the gas sensor detects a gas leak, the Arduino board sends a message to the user indicating the presence of a gas leak. This feature can be important for safety purposes, as a gas leak can be dangerous and even deadly. The user can be notified through various means, such as an email, text message, or a notification on a smartphone app. This ensures that the user is aware of any gas leaks in a timely manner, allowing them to take appropriate action to address the issue.

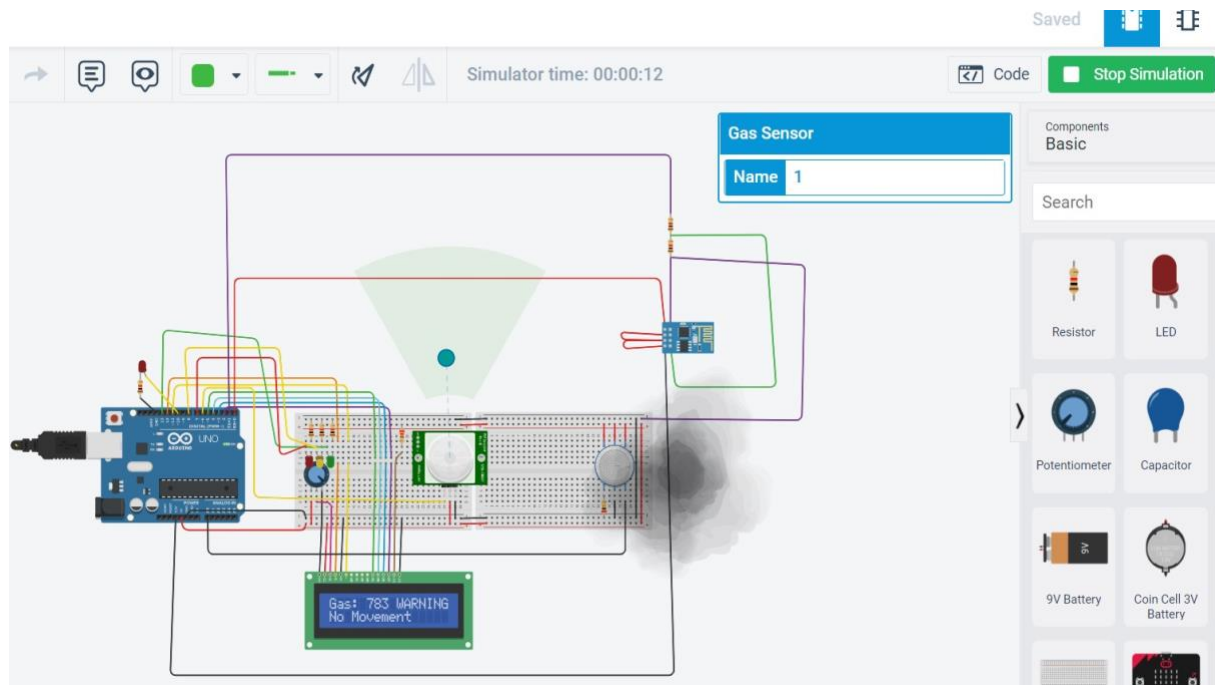


Fig: Gas Detection Output

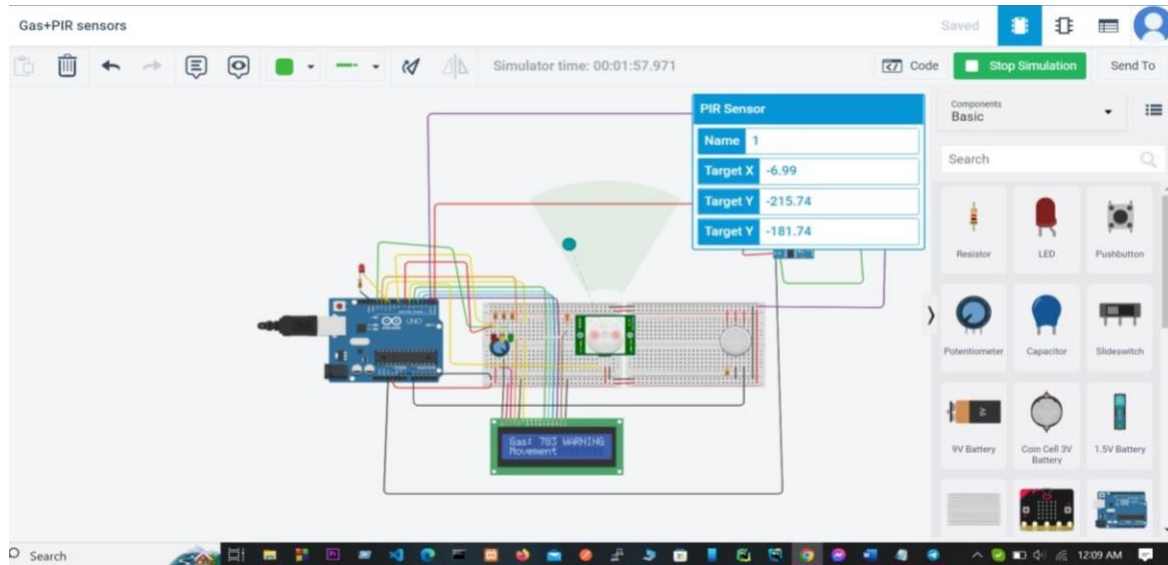


Fig: Motion Detection near the PIR sensor

Conclusion

In conclusion, we have successfully developed a system that can detect the presence of gas and motion in a room, and send this data to the internet for remote monitoring. This system can be useful for a variety of applications, such as detecting gas leaks or monitoring the presence of people in a building. The use of the ESP8266 WiFi module and Thingspeak platform allows for easy integration with other IoT devices and systems, and the data can be easily accessed and analyzed through a web browser.