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DEVELOPMENT AND IMPLEMENTION OF SMOKE DETECTION ALARM SYSTEM

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Abstract
A smoke detector alarm is a fire protection device that automatically detects smoke and also gives us warning. In the proposed system, a smoke detector upon senses smoke activates its alarm, sends a low voltage signal to all The individual smoke detectors are equipped with all the electronics required to both send and receive signals. They are battery operated and therefore they require no external connections. They can be installed by a homeowner just as they would a normal smoke detector. The proposed design is aiming to have Cost efficient system, Compact design, easily expandable, Simple to install, Replaceable components. The system was tested indoor and outdoor with different distance and with the presence of noise. Standard for Safety of Smoke Alarms, to measure the performance of a large number of existing smoke alarms.

Keywords: ***Arduino, fire detector, MQ2 smoke sensor, smoke detector alarm ,***

INTRODUCTION

According to Smoke detector has been reviewed as a fundamental component of active fire detection strategy of modern commercial and residential building. In the 1970's, industries recorded increased use of smoke detectors and these growth was accompanied by several significant research projects that reinforced the life safety protection provided by smoke detectors, thereby providing significant evidence that supported increase in use of smoke detectors. Also in order to understand the response, working principle of these detectors in the environment, several researches was embarked. Accurate prediction of smoke detector is a very significant way of assessing detector system performance because occupants and fire service notification can be dependent upon smoke detector response.

Fire Dynamic Simulator software, can be used to predict the response of smoke detector. Reference stated that "fire loss data reveals that in buildings with automatic sprinklers, 96% were controlled and extinguished by these systems". Once there a fire, the fire detection system activates the alert thereby triggering the automatic sprinkler system. It's very important for fire protection system to be installed in all commercial building. There are concerns associated with automatic smoke detection system arising from inappropriate techniques for quick notification, false noise tolerant and different sensor combinations. Researchers have been studying fire taking place in various places such as residential area and commercial buildings. A smoke alarm is a device that senses smoke, typically as an indicator of fire. It may issue a signal to a fire alarm control panel as part of fire alarm system, especially in commercial security devices or may issue a local audible or visual alarm in the household. Smoke can be detected either optically (photoelectric) or by physical process (ionization). Detectors may use

either or both methods. Smoke detectors have prior detection when compared with heat detectors, hence are preferred for fire detection. They also find application in detecting, and thus deter smoking in premises where it is banned .The A smoke detector is a device that senses smoke typically as an indicator of fire or non smoking zone .In order to ensure human safety and safeguard property against fire in both domestic and commercial settings, different solutions for smoke detection have been developed. These designs vary depending on the method of smoke detection..However, the different designs are derived.

Safety is a crucial consideration in design of residential and commercial buildings in order to safeguard against loss of life and damage to property. Fire is a key element in safety considerations. This project therefore seeks to design a microcontroller based smoke alarm that will continuously monitor the presence of significant amount of smoke and activate an alarm to prompt a safety measure to contain the situation. When it come to Fire safety, it's best to have a smoke detector in every bedroom and hall way, as well as on every floor in our home. With so many smoke detector, we can rest assured our home is protected from the unthinkable. Smoke detector is one of the easiest and low costly .Most of industries use it, because it work fatly to protect and most effective.

LITERATURE REVIEW

The A smoke detector is a device that senses smoke typically as an indicator of fire or non smoking zone .In order to ensure human safety and safeguard property against fire in both domestic and commercial settings, different solutions for smoke detection have been developed. These designs vary depending on the method of smoke detection..However, the different designs are derived. the two basic types of smoke detectors, namely:

1. The photoelectric smoke detector
2. The ionization chamber smoke detector (ICSD)

The photoelectric smoke detector uses an optical beam to search for smoke. When smoke particles cloud the beam, a photoelectric cell senses the decrease in light intensity and triggers an alarm.

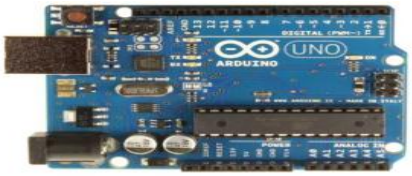
ELECTRONIC COMPONENT AND METHODS

BLOCK DIAGRAM

Figure1… Block diagram of proposed system

COMPONENTS

1. Arduino Uno



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 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.

P C B

A printed circuit board (PCB) mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet yers of a non-conductive substrate.

MQ2 SENSOR

The MQ2 sensor module was selected to serve the purpose of sensing smoke. It has the capability of sensing smoke and other combustible gases. The following are the reasons as to why it was selected:

- Wide detecting scope
- Fast response & high sensitivity
- Stable and long life
- Simple drive circuit

The MQ-2 smoke sensor is sensitive to smoke and to the following flammable gases: LPG Butane Propane Methane Alcohol Hydrogen The resistance of the sensor is different depending on the type of the gas.

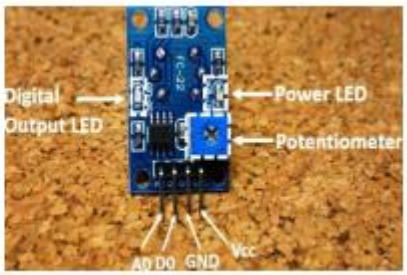


Fig : MQ2 SENSOR Fig : MQ2 SENSOR PIN OUT

2. LED LIGHT:

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

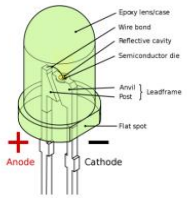


Fig LED

3. BUZZER

A buzzer is an audio signalling device which may be used in alarm devices, timers and other forms of alerts. They may be mechanical, electromechanical, or piezoelectric.

METHOD

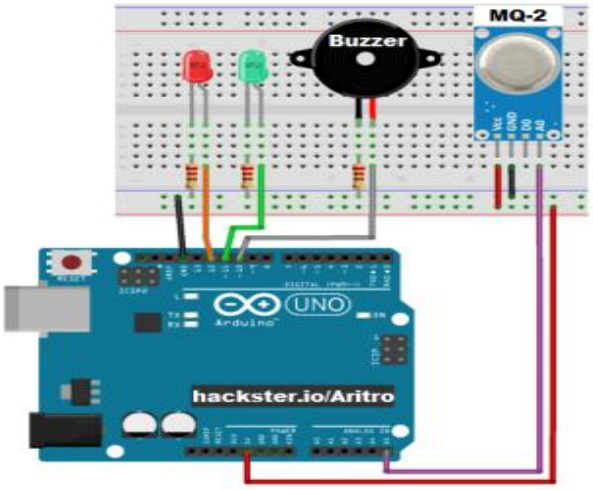


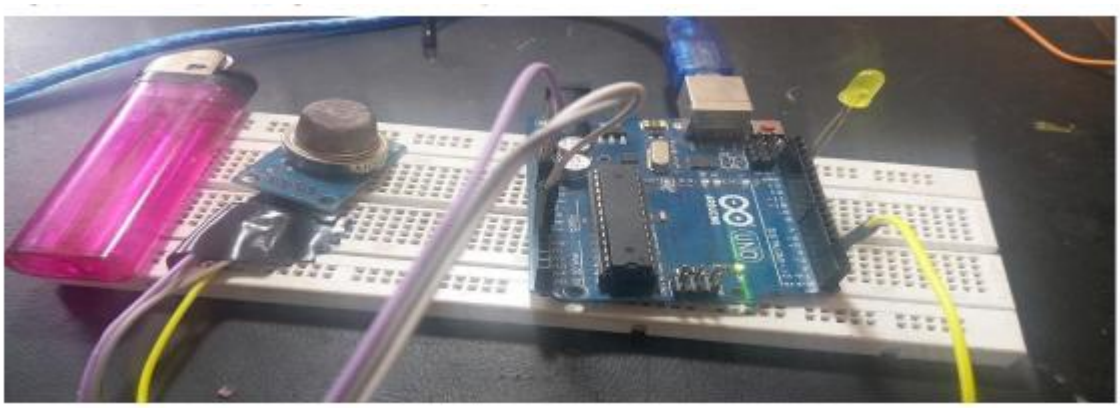
FIG. Schematic Diagram of Smoke Detector Alarm Circuit Using Arduino Circuit diagram

Smoke alarm systems include: Conventional smoke alarm system, Addressable smoke alarm system, Analogue addressable smoke alarm system, and Wireless smoke alarm system. Wireless smoke alarm systems are an effective alternative to traditional wired smoke alarm systems for all applications. It is a simple concept, which provides many unique benefits and is a full analogue addressable smoke detection system without the need for cable. These systems can provide several main functions. First they provide a means to identify a developing smoke based on smoke and gas through automatic methods and second, they alert building occupants to a smoke condition. Another common function is the transmission of an alarm notification signal to the smoke

department or other emergency response organization. They may also shut down electrical, air handling equipment or special process operations, and they may be used to initiate automatic suppression systems. A smoke sensor system based on the simultaneous detection CO, CO2, and smoke concentrations, . A smoke detector is usually implemented as a smoke sensor due to its early smoke detection capability, fast response time and relatively low cost. The installed Arduino device which was programmed with Android Studio takes received gas, smoke, the temperature, and humidity signals from the sensors. The sensor is connected to the input of the arduino with the help of connecting cables or jumper cables using Arduino Integrated Development Environment (IDE), MQ2 sensor Connect Arduino microcontroller to the computer.

RESULTS

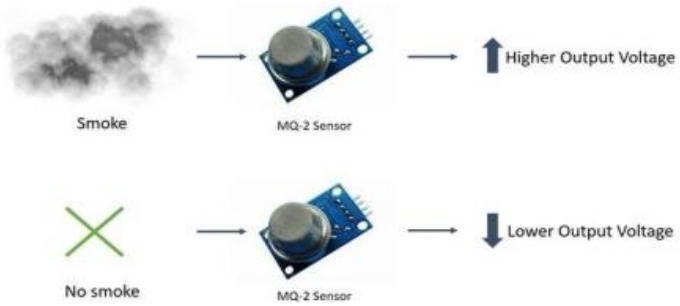
Operational Overview



WORKING OF SMOKE DECTECTOR ALARM

The voltage that the sensor outputs changes accordingly to the smoke/gas level that exists in the atmosphere. The sensor outputs a voltage that is proportional to the concentration of smoke/gas. In other words, the relationship between voltage and gas concentration is the following:

• The greater the gas concentration, the greater the output voltage



The hardware of this case consists of Gas sensor, temperature and humidity sensor, Arduino microcontroller, GSM SIM- 900A that is connected with Arduino through an relay module to control it. A smoke alarm system is number of devices working together to detect and warn people through visual and audio appliances when smoke, smoke, carbon monoxide or other emergencies are present. Smoke and smoke that spread within a building can be affected by various factors such as the geometry, dimension, layout and usage of the building. If a detector detects smoke or heat, or someone operates a break glass unit, then alarm sounders operate to warn others in the building that there may be a smoke and to abandon.

CONCLUSION

When it come to Fire safety, it's best to have a smoke detector in every bedroom and hall way, as well as on every floor in our home. With so many smoke detectors, we can rest assured our home is protected from the

unthinkable. Smoke detector is one of the easiest and low costly. Most of industries use it, because it work fatly to protect and most effective.

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