Design & development of a carbon monoxide detector

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Abstract
This paper gives the design & development of a carbon monoxide detector. Living in cities is convenient in many ways such as high-quality public services such as healthcare and education. However, for all the advantages offered by city living, it has not come without its own costs. Pollutant levels such as Carbon Monoxide in urban environments are sometimes unacceptably high. In many heavily urbanized areas, particularly in the developing world such as China, India and Brazil, carbon monoxide detectors often register levels many times higher than accepted 'safe' levels. Unfortunately, this is by no means a problem exclusive to the developing world, with many major cities as far afield as Singapore, Seoul, London, New York and Los Angeles also regularly experiencing unsafe Carbon Monoxide levels. (CO) is a colourless, odourless gas which at high levels can cause serious illness and death. CO alarms are widely available and should be considered a back-up to BUT NOT A REPLACEMENT for proper installation, use, and maintenance of fuel-burning appliances. CO alarms are designed to warn you of any unusual build-up of CO in your home. These higher levels of CO may occur from improperly maintained, installed or used fuel-burning appliances, back drafting appliances or fireplaces, or idling cars in garages. If a CO alarm is to be installed.
Keywords – Detector, CO, Alarm, Detection

1. Introduction to the work

As with any problem, the first step to overcoming it is to understand the nature and scope of the problem. And it is with that goal in mind that we decided to develop The Red Balloon Air Pollution Detector, to help people monitor air pollution levels in their local environment. With just a handful of parts and some basic assembly work needed, one can design this simple home-made carbon monoxide detector and can run in just a matter of hours. Once it's put together we can make use of it around the neighbourhood, in backyard or anywhere else to measure carbon monoxide levels. With the right carbon monoxide detector, a homeowner should have a flashing green or red light (depending on the make and model). Flashing orange or a solid light indicates a problem. These detectors will alert the homeowner and the security company if there's something wrong. They omit a high-pitched, shrill alarm if they detect dangerous levels of carbon monoxide, so the homeowner knows to leave the area. These detectors are very sensitive, so homeowners can trust that they'll be warned if the CO_2 level in their home starts to become dangerous.

2. Problem Statement

As with any problem, the first step to overcoming it is to understand the nature and scope of the problem. And it is with that goal in mind that we decided to develop The Red Balloon Air Pollution Detector, to help people monitor air pollution levels in their local environment.

3. Proposed Methodologies Adopted

Simple carbon monoxide detector project built using the analogMQ-7 sensor from Spark fun, along with a small assortment of other common components. The MQ-7 carbon monoxide sensor detects high levels of CO-gas concentrations in the air and gives an alert by changing the LED light from green to red.
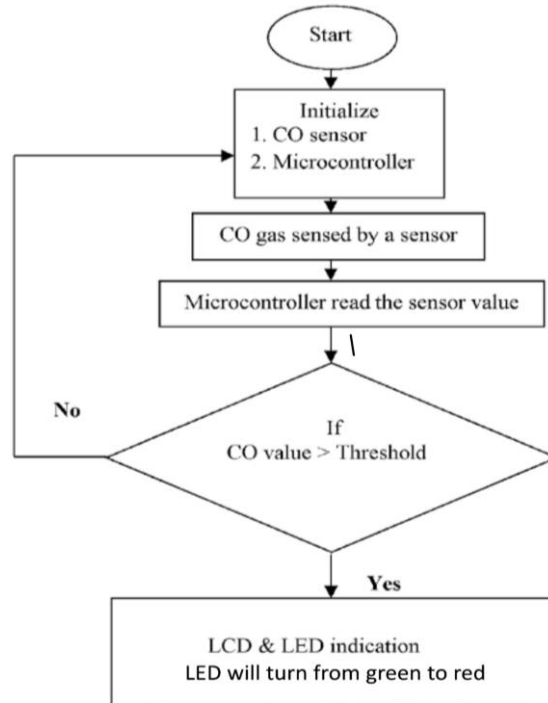

Fig. 1 : Proposed flow chart of the mini project work

The above flowchart gives us an idea about working methodology of the project.
Wherein, we use CO sensor and microcontroller as for initialising. The main input gas fed
for the project which is sensed by MQ-7 gas sensor (whether the given gas is co or not), if it is co then microcontroller reads the sensor value. The threshold value of presence of co gas is already pre-set in Arduino using code. If the CO presence is more than the threshold value, Led gets changed from its initial colour green to red.
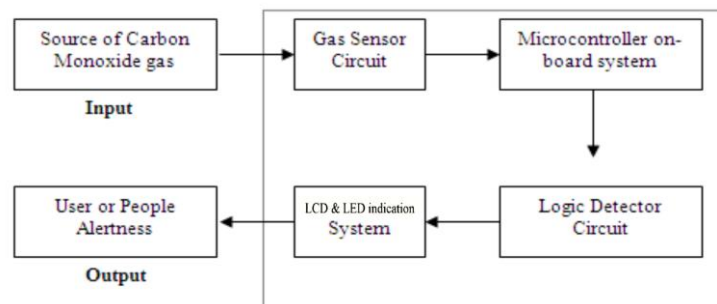Thus, the CO gets detected and alerts people from the presence of CO gas.

Fig. 2 : Overall block diagram of the mini project work

Figure 1, gives the information about the circuit related to our Mini-project.

- Arduino Uno
- RGB LED common anode
- MQ7 Sensor
- USB cable
- Battery holder
- Resistors

These are connected as respect to above figure 1 and got required output.

Arduino Uno, RGB LED, MQ7 Sensor are connected as shown in the block diagram .

Using USB cable Arduino Uno is connected to computer / PC. The Code is dumped to Arduino from Arduino IDE in PC. Then battery holder and all the other components mentioned above are connected to breadboard and Arduino. The source of CO gas is taken as input. The MQ-7 CO detector is an analog component therefore, it's connected to the Arduino ADC pin. The values read by the Arduino will be in the range between 0-1023. In order to translate the ADC values to PWM values (required by the LED) – 0-255, we use the map () function, which is then stored in mq7Val variable. Using this variable, we can determine which colour we want to control on the LED – Red, Green or Blue. The colour and intensity of the LED will change according to the co detector readings and the colour we decided to control and alerts the people about the presence of toxic gas carbon monoxide which is taken as output.

4. Results & Discussions

Fig. 2 : Hardware design of the mini-project work

This sensor can detect and measure CO concentration in the atmosphere. If the sensor detects high levels of CO, the LED changes its colour from green to red.

This mini-project is designed to measure CO levels over time and Alert people before dangerous levels of CO accumulate in an environment, giving people adequate warning to safely ventilate the area or evacuate.

5. Conclusions

The above system helps the peoples to alert from the toxic gases. The sensor signal sends to the microcontroller through input ports and it should take the action by warning through the LED glow. It helps to detect the CO concentration in the environment.

6. Advantages of Our Mini-Project Are:

The constructed system detect CO gas and help people to monitor CO levels in their local environment. CO detectors are designed to measure CO levels over time and Alert people before dangerous levels of CO accumulate in an environment, giving people adequate warning to safely ventilate the area or evacuate. Some system-connected detectors also alert a monitoring service that can dispatch emergency services if necessary. The main goal of this work is to review carbon monoxide gas sensors for using them in cyber physical systems, so that humans can quickly be alerted to avoid health related problems. The main aim is to determine a CO sensor, which can show detection ability at a very low-level CO concentration under cost effective.

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